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# The dental-alveolar contrast in Mapudungun: loss, preservation, and extension

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**Abstract:** Dialects of the South American language Mapudungun are claimed to display a dental-alveolar contrast across four manners of consonant articulation: stops, nasals, laterals, and fricatives. Such a full, symmetrical system of distinctions among coronals is typologically unique and, as such, is predicted to be unstable. This paper's survey of contemporary data, however, shows that, despite lexical contrast being marginal and dentals being morphologically restricted, the distinction is highly salient to native speakers of the more vital dialects. A careful examination of the pattern's historical roots and diachronic stability, furthermore, allows us to reconstruct it throughout the 400-year textual record. Indeed, the early descriptions and transcriptions shown that, instead of contracting, the contrast expanded, by borrowing the alveolar fricative /s/ from Quechuan and Spanish. The historical and articulatory data shows that while /t̪ n̪ l̪ θ/ are laminal, /t n l/ are apical. Incoming /s/, however, does not follow the pattern, being laminal and prompting a reorganization of featural contrasts among fricatives. As a result of erosion of native fluency under Spanish contact, loss of the dental-alveolar contrast has become commonplace, although there is much variation across speaker, dialect, and manner of articulation. Crucially, dialects which had only voiced fricatives until the borrowing of /s/ seem to have added voicing as a new contrastive feature, helping to preserve the coronal contrast among fricatives, even where vitality is reduced.

**Keywords:** contrast; coronals; dental consonants; language contact; Mapudungun

## 1 Introduction

Mapudungun (ISO [arn], unclassified/isolate) is the endangered, ancestral tongue of the Mapuche people of the Southern Cone of the Americas.<sup>1</sup> Before European invasion (ca. 1530), speaker numbers are estimated at around one million (Bengoa 2000: 21). Today, optimistic counts stand at about 250,000 (Eberhard et al. 2020; Zúñiga and Olate 2017). Despite these rough, large figures, proficiency varies widely and transmission has seen a sustained decline (Gundermann et al. 2009), with Spanish-dominant bilingualism the norm, while native education programmes remain incipient and insufficient (Loncon 2017).

Our empirical focus is the typologically unique four-manner (stop, nasal, lateral, fricative) dental-alveolar contrast described in the literature on Mapudungun. In Section 2, I examine the standard account, its typological status, and the lexical and morphological distribution of phonemes. I then survey the 400-year written record (Section 3), in order to assess the stability of the pattern. Particular focus is placed on fricatives, since the contrast between /θ/ and /s/ appears to be an innovation. Section 4 surveys the contemporary dialectal data, showing the different patterns of maintenance and decay. A discussion and formalization of the changes in the contrastive system vis-à-vis contact follows in Section 5, with a particular focus on the features of fricatives. Section 6 concludes the paper.

<sup>1</sup> Other names/spellings for the language include Mapuche, Mapuzugun, Mapuchedungun, and Araucanian (the last now dispreferred).

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## 2 Dental-alveolar contrast in Mapudungun

### 2.1 The standard account

Much of contemporary scholarship on Mapudungun focuses on central varieties, spoken in the western Andean slopes, central valley, and coastal areas of Chile's Araucanía and Los Ríos regions (see Figure 4). It is on the basis of these dialects that the language is traditionally claimed to display a phonemically contrastive, symmetrical series of (inter)dental and alveolar segments (Echeverría 1964; Echeverría and Contreras 1965; Lagos 1981, 1984; Salas 1976, 1992a; Zúñiga 2006), such as can be observed in Table 1.

While minimal pairs contrasting the two places of articulation do occur for stops, nasals, and laterals (see Table 2), these are somewhat rare, as are dental segments more generally (see Section 2.3). For fricatives, only near-minimal pairs may be found, since the alveolar sibilant (/s/) is mostly restricted to borrowings.

In their study of the Lafkenche (coastal/central) variety of Isla Huapi (Figure 4), Painequeo et al. (2018) show that most speakers – especially older ones – consistently contrast dental and alveolar stops, nasals and laterals in both production and perception. Particularly, they find speakers tend to reject dental-consonant target words produced with an alveolar segment (e.g. \*[tapəl] for [t̪apəl] ‘leaf’), claiming they sound “foreign”. Indeed, despite the marginality of lexical contrasts, speakers have strong intuitions about the distinction. This is reflected in community-led orthographic conventions, where native speakers insist on representing the dentals graphemically (see Salas 1992b: 502–503; Zúñiga 2001).

Acoustic evidence for the robustness of the contrast in Lafkenche is given by Fasola et al. (2015) and Figueroa et al. (2019), who observe that, at the onset of adjacent vowels, dentals cause a greater depression in F2 than alveolars.<sup>2</sup> In the same dialect, Sadowsky et al. (2013) use static palatography to capture a more nuanced articulatory picture. The dental series shows apical protrusion throughout, while /t̪, n̪, l̪/ also display broad laminal contact on the upper incisors, consistent with laminal interdental articulations.<sup>3</sup> The alveolars

**Table 1:** Central Mapudungun consonant inventory, based on Sadowsky et al. (2013).

	Labial	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar
Stop/affricate	p	t̪	t	tʃ	tʂ		k
Fricative	f	θ	s	ʃ	ʂ		
Nasal	m	n̪	n			ɲ	ŋ
Lateral		l̪	l			ʎ	
Approximant	w					j	ɰ

**Table 2:** (Near-)minimal dental-alveolar pairs by manner of articulation (from de Augusta 1916; Painequeo et al. 2018).

Stops	Nasals	Laterals	Fricatives
[t̪ən] ‘head louse’	[m̪ə.n̪a] ‘cousin’	[ki̪.l̪a] ‘bamboo’	[θ̪a.kel] ‘pact/agreement’
[tən] ‘high sound’	[mə.na] ‘much’	[ki.la] ‘three’	[sa.ku] ‘sack’(<Spa. ‘saco’)

<sup>2</sup> These two studies focus only on non-fricatives. In Figueroa et al. (2019), the findings are statistically significant only for stops and laterals, a fact that is attributed to the smaller number of tokens available for the dental nasal.

<sup>3</sup> Unless making a specifically phonetic point, I simply use the term *dental*, since this captures the phonological contrast (but see Mena and Salamanca 2018). Typological surveys, furthermore, do not tend to make distinctions among dentals, since interdental-postdental contrasts are unattested (Ladefoged and Maddieson 1996: 20). The term also avoids the fraught matter of IPA representations of interdentals.

/t, n, l/, show narrow – likely apical – contact on the alveolar ridge. Finally, while /s/ displays some overlap with other fricative categories,<sup>4</sup> it is usually realized as [s̺] with a lamino-alveolar articulation. The resulting pattern, in Table 3, is less symmetrical than what we get from viewing the passive articulator alone.

The general upshot, however, is that – at least for the more vital Lafkenche dialect – Mapudungun does present a discernible phonetic and phonological contrast between the two coronals.

## 2.2 Typological rarity

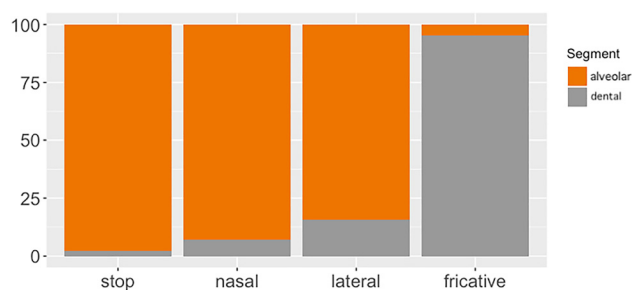
Most languages of the world tend to have only one main coronal place of articulation – most frequently alveolar<sup>5</sup> –, the contrast between dentals and alveolars being fairly rare and usually supported by a laminal-apical contrast (see Butcher 2006). Indeed, at the time of consultation, among the 2,100 languages in the PHOIBLE database (Moran and McCloy 2019), only 8.9% of languages contrasted dentals and alveolars among stops, 7.8% among nasals, 4.1% among laterals, and 2.9% among fricatives. The implication is that dental-alveolar contrast is somehow dispreferred, or, in diachronic terms, difficult to develop and/or maintain. With this in mind, Mapudungun – the only language in PHOIBLE with four major manner distinctions for the contrast – is an excellent case study for probing the possibilities of its synchronic and diachronic robustness.

## 2.3 Lexical and morphological distribution

Despite phonological contrasts, there is a definite imbalance between the two coronal series in Mapudungun, such that lexical incidence for the dental stops, nasals, and laterals is far smaller than for the alveolars. In the case of fricatives, however, the opposite pattern obtains, as seen in Figure 1. Just as striking is the fact that, comparing the overall consonant frequencies in Mapudungun to the occurrence of the same consonants across the languages in PHOIBLE, we find that the dental and alveolar fricatives are outliers (see Figure 2). In other words, they violate the strong typological tendency for correspondence between language-internal phoneme frequency and phoneme attestations across the languages of the world (see Gordon 2016: 71–82 for an overview). A further distributional fact about our target segments is that dentals occur only in the root morphemes of the language, while the alveolars – excepting /s/ – are found across the board, in inflectional and derivational elements as well. This

**Table 3:** Active and passive articulators for Mapudungun anterior coronals.

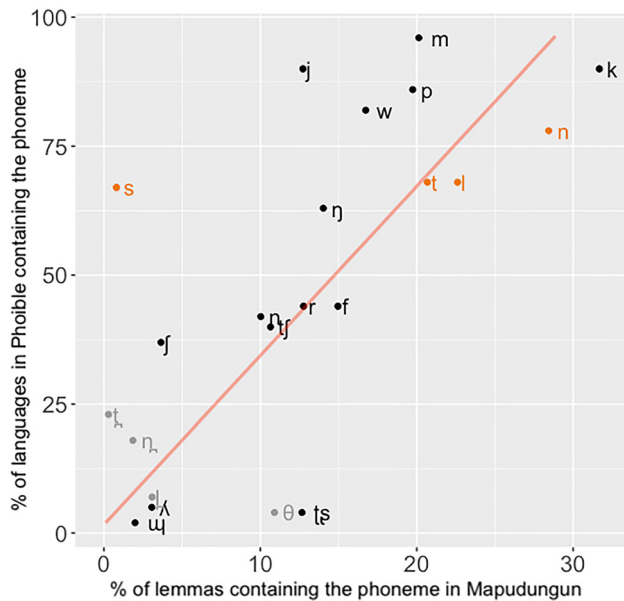
	Apical	Laminal
Alveolar	/t, n, l/	/s/
Interdental		/t̪, n̪, l̪, θ/



**Figure 1:** Proportion of lexical items with alveolar versus dental segments, based on the 5,125 dictionary entries in de Augusta (1916).

<sup>4</sup> A full analysis of Mapudungun fricatives and affricates, unfortunately, exceeds the scope of this paper.

<sup>5</sup> Overall, /t, n, l, s/ are found in 68, 78, 68, and 67% of inventories in PHOIBLE, respectively. The phonemes /t̪, n̪, l̪, θ/ appear in 23, 18, 7, and 4%.



**Figure 2:** Lexical incidence of Mapudungun phonemes (in de Augusta 1916) versus their attestation in languages of the world (the 2,100 languages in PHOIBLE).

pattern suggests that dentals (and /s/) belong to open-class categories only and may have either been recently innovated in roots or lost in suffixes due to their greater markedness (see Bybee 2005).

### 3 Historical evidence for dental-alveolar contrast

As one of the “general languages” used by colonists for evangelization and diplomacy across the Americas, Mapudungun has a relatively substantial early textual history. Using data from the Corpus of Historical Mapudungun (Molineaux and Karaïskos 2021), I will show that European missionaries, explorers, and linguists were able to observe the dental-alveolar contrasts throughout the 400-year record and were often at pains to provide suitable descriptions. That being said, early sources vary in their quality, interpretability, and regional coverage. This is further complicated by early writing rarely being conducted by native speakers, so there are different phonologies, as well as spelling systems, at play in each source.

#### 3.1 The sixteenth-century evidence: Luys de Valdivia (1606, 1621)

Father Luys de Valdivia was part of the first group of Spanish Jesuits to work with the Mapuche in the Mission of Chile. His *Art and grammar* of Mapudungun, published in 1606, is the earliest printed, surviving grammar and vocabulary of the language. In describing the language’s pronunciation, we find the following claim (Figure 3):<sup>6</sup>

these three letters *l, n, t*, aside from the pronunciation they have in our Spanish syllables [la, na, ta] have another pronunciation in this language which should be known in order to avoid mistakes, since the meaning of many words depends on this pronunciation, which is thus: that nearing the tip of the tongue to the teeth, they pronounce [la, le, li, etc.] and [na, ne, ni, etc.], which is different from our first pronunciation.

Given that Spanish coronal nasals and laterals were alveolar at the time (Penny 2002: Section 2), there is good reason to believe that the given contrast is between “our Spanish” alveolars (<l, n>)<sup>7</sup> and the “different” dentals (<l', n'). For stops, however, the situation is less straightforward. Indeed, “our” coronal stops in

<sup>6</sup> Here and elsewhere in the paper, translations are my own.

<sup>7</sup> Throughout, I use angled brackets to represent graphemes (not IPA equivalents).

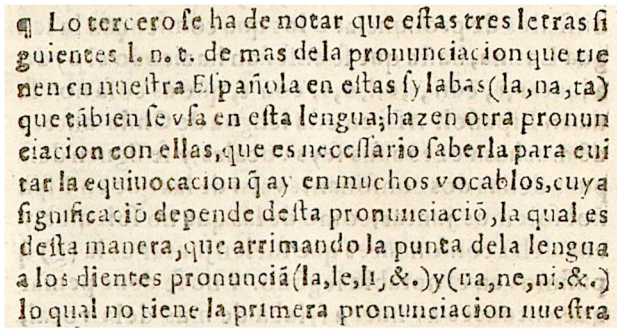


Figure 3: Valdivia's description of dentals in seventeenth-century Mapudungun.

seventeenth-century Spanish were probably dental (Penny 2002: Section 2), while Valdivia tells us that Mapuche speakers have a “different” <ṭ> for which “they shift the tip of the tongue towards the high palate” (8r).<sup>8</sup> Since the words spelled with <ṭ> in Valdivia's vocabulary match the present-day retroflex affricate (/t͡ʂ/) set, we suggest that the contrast was between alveolar and retroflex stops (affrication probably developed not long afterwards). The lexical set which today corresponds to the dental stops, however, shows no graphemic contrast with alveolars, both being spelled <t> (Table 4).

Coronal fricatives are not explicitly treated in de Valdivia (1606), however, the lexical set which today contains a dental fricative is consistently spelled with <d>, as in *dihuen* ‘companion’ (Table 5). This is roughly in line with the intervocalic, fricative allophone of seventeenth-century Spanish voiced dental stops (with e.g. <d> being produced as [ð] in *ca[ð]a* ‘each’ and [d] in *[d]ios* ‘god’; Harris-Northall 1990). The implication, is that the dental fricative was voiced, as were all fricatives in Valdivia's dialect, given the spellings in Table 5. As we shall see in Section 5.2, this is an important isogloss in Mapudungun today, where fricatives tend to be voiced in the northern varieties and voiceless in the central and southern ones (see Figures 4 and 5). Stops, on the other hand, are always voiceless, so voiced stops borrowed from Spanish are voiceless in Mapudungun (e.g. *toninco* < *domingo* ‘Sunday’; Herckmans 1907[1643]). This supports the idea that Valdivia's <d> is not a stop, but a voiced dental fricative.

The picture for the alveolar fricatives is less clear. Spellings in the lexical sets for /s/ include <ç>, <z>, and <s>, but these are rare and appear almost exclusively in words of Spanish or Quechuan (ISO [qwe]) origin.<sup>9</sup> The Spanish words – mostly related to Christian doctrine (Table 6) – suggest no phonological incorporation, preserving their original spellings. Quechuan words are likely older, originating in the languages of the Incan Empire, which expanded into central Chile in the 1470s. These borrowings display phonological and morphological integration, however they seem to preserve the alveolar fricative, otherwise absent from the Mapudungun inventory. A full list of the <ç/z/s> Quechuan borrowings is given in Table 6, where the reference forms from Cusco Quechua (ISO [quz]) are taken from Middendorf (1890); for further details, see Moulian et al. (2015) and Sánchez (2020).<sup>10</sup>

Although from Granada, Valdivia was educated in Salamanca in the late sixteenth century, so would likely have been exposed to Castilian dialects where <ç/z> represented denti-alveolar [ʃ] and <s> represented apico-alveolar /s/ (Sanz-Sánchez 2019). These are likely the target values for the Spanish non-incorporated words. In the Quechuan borrowings, the tendency is for <ç/z> spellings, which indicates that Valdivia probably perceived them to be distinct from Spanish apico-alveolar [ʃ]. In all likelihood, <ç/z> spellings represented a laminal articulation of the sibilant ([ʃ]). This, however, was probably still not fully integrated into Mapudungun phonology, and ultimately did not merge with the native dental.<sup>11</sup> Eventually, integrated Spanish

<sup>8</sup> “arriman la punta de la lengua al paladar alto”.

<sup>9</sup> The only exception is *Yzùm*, given as ‘birds’, which looks very much like a variation on *üñüm*, the native word for ‘bird’.

<sup>10</sup> Of these forms, the least clear is *ñampas clelu*, given as “hueca cosa”. It ends in Mapudungun /kile-lu/ ‘PROGRESSIVE+NON-FINITE’ and, combined with the provided Quechuan source, possibly reflects the meaning ‘that which is being on another road/elsewhere’ (i.e. empty or hollow).

<sup>11</sup> The only apparent exception to this pattern is the word <pozco> ‘yeast’ in Table 6, which alternates with <puḍcu> in Valdivia's *Vocabulary*.

borrowings with a sibilant would have joined this category too, since the dominant New World Spanish (*seseo*) varieties would have also had a lamino-alveolar [s̺].

### 3.2 The eighteenth-century evidence

From the next century, two Jesuit grammars survive: one by Febrés (1765), a Catalan, and one by Havestadt (1777), a German. In both cases, descriptions of the sound system are cursory. Febrés mentions, however, that “in some words, they pronounce *l* and *n* nearing the tip of the tongue to the teeth” (5),<sup>12</sup> but he decides not to transcribe this, as he considers the difference almost imperceptible and lexically rare. Havestadt fails to mention dentals altogether, providing no special marking. This is surprising, given that both missionaries were stationed in areas where northern dialects were spoken (Angol and Nacimiento, respectively), which we would otherwise expect to be similar to those described by Valdivia. Given Febrés’s comments, it is likely that, due to its low functional load, the place distinction of non-fricative dentals and alveolars was ignored in favour of the more Spanish-like phones [l, n, t̺]. The only exception to this pattern is the occasional use of <ld> in words with /l/ reflexes (e.g. *pelde* for [pe̺e] ‘mud’) which probably represents the lateral with the dental articulation of Spanish coronal stops.

Both Febrés and Havestadt use <d> to represent the voiced dental fricative (/ð/), as did their predecessor. This is in line with other fricatives, such as <v>, which Febrés claims to sound as in Spanish or Catalan ([β/b/v]) for northern Mapuche. Further to the south, however, he tells us it is pronounced “a bit stronger, much like *F*, in the way that Germans pronounce it in the Latin words *parvulus* or *vita*” (5),<sup>13</sup> which is to say, voiceless.

The grammars include lexical lists that use the grapheme <s>. The familiar Quechuan words, such as *misqui* ‘sweet’ crop up,<sup>14</sup> but now there is a wider set of integrated Spanish borrowings, such as <awas> ‘faba/broad bean’ from *habas* ‘faba/broad beans’ or <mansun> ‘ox’ from *manso* ‘tame’, probably taken from *seseo* varieties of Spanish (with one anterior sibilant) and representing [s̺]. Despite this integration,<sup>15</sup> it seems that /s/ does not join the voicing pattern of the other fricatives, which are voiced.

An independent source for the dialectal details of the dental-alveolar contrast can be found in Thomas Falkner’s *A description of Patagonia* (1774). The Mancunian surgeon-turned-Jesuit gives a brief overview of central Mapudungun. Words that elsewhere have a <d> are spelled with either an <s> or a <z>. He appears to use Spanish, rather than English grapho-phonemic correspondences,<sup>16</sup> so <z> is likely a voiceless sound representing either Castilian /θ/ or New World /s/. All fricatives, crucially, appear to be voiceless in this area, as evidenced in Table 7.

### 3.3 The nineteenth century and beyond

In the late nineteenth century, the German-born linguist Rudolf Lenz compiled the first scientifically oriented collection of Mapuche stories and dialectal samples (Lenz 1897). Prompted by his main consultant, Calvún (Segundo Jara), he was also first to recognize the full set of dental-alveolar contrasts (including [t̺]-[t̺̺]). He recalls how Calvún would patiently turn to him when pronouncing the key sounds: “to show me the tip of his tongue as it protruded between his teeth” (1897: 130),<sup>17</sup> which he eventually understood to be systematic. Lenz also identifies the dental fricative (68), using <d> for realizations with voicing, and <z> for voiceless ones (i.e.

12 “en algunas palabras pronuncian la *n* y la *l*, arrimando la punta de la lengua a los dientes”.

13 “un poco más fuerte, que se parece a la *F*, al modo que la pronuncian los Alemanes en estas voces latinas, *parvulus*, *vita*”.

14 Some variation is registered by Febrés for these borrowings, alternating between <z, s, j>. These likely represent variation between [s̺], [s̺̺], and [ʃ].

15 Note the phonological changes [β]>[w] and [o]>[u], the de-morphologization of plural <s>, and the metonymic shift from the quality of an animal to the animal itself.

16 For example, the use of <hu> for /w/ (e.g. on p. 144, <huenuy>=/wenuj/ ‘friend’).

17 “para mostrarme la punta de la lengua que se asomaba entre sus dientes”.

“the Castilian <z> of some northern dialects of Spain”; p. 7). As for <s>, he uses the symbol only in words of Spanish or Quechuan descent, representing /s/ (69).

The last of the major missionary grammars was published in 1903 by another German, the Franciscan Félix de Augusta. As in de Valdivia (1606), three dental-alveolar contrasts are proposed: nasals, laterals, and fricatives. Only when he composed his *Dictionary* (1916) did Augusta decide to use the grapheme <t> to represent dental stops. Again, the decision was prompted by an explicit recommendation by one of his main consultants, Domingo Segundo Huenuñamco of Panguipulli (1916: xiv). The grapheme <d>, Augusta claims, sounds like Spanish *d* or English *th* (1910: x), which by now would have contrasted with alveolar <s>, pronounced “as in Spanish” (i.e. /s/).

Ultimately, then, we find that both Lenz and Augusta, albeit later in their studies of the language, observe the distribution of dentals and alveolars as in the standard system of Table 1. This is true for both the northern and central dialects they describe, although the dental fricative is voiced in the north.

### 4 Dentals versus alveolars in contemporary dialects

In what follows, I give a brief overview of the available data for dialects of Mapudungun today, summarized in Figure 4.

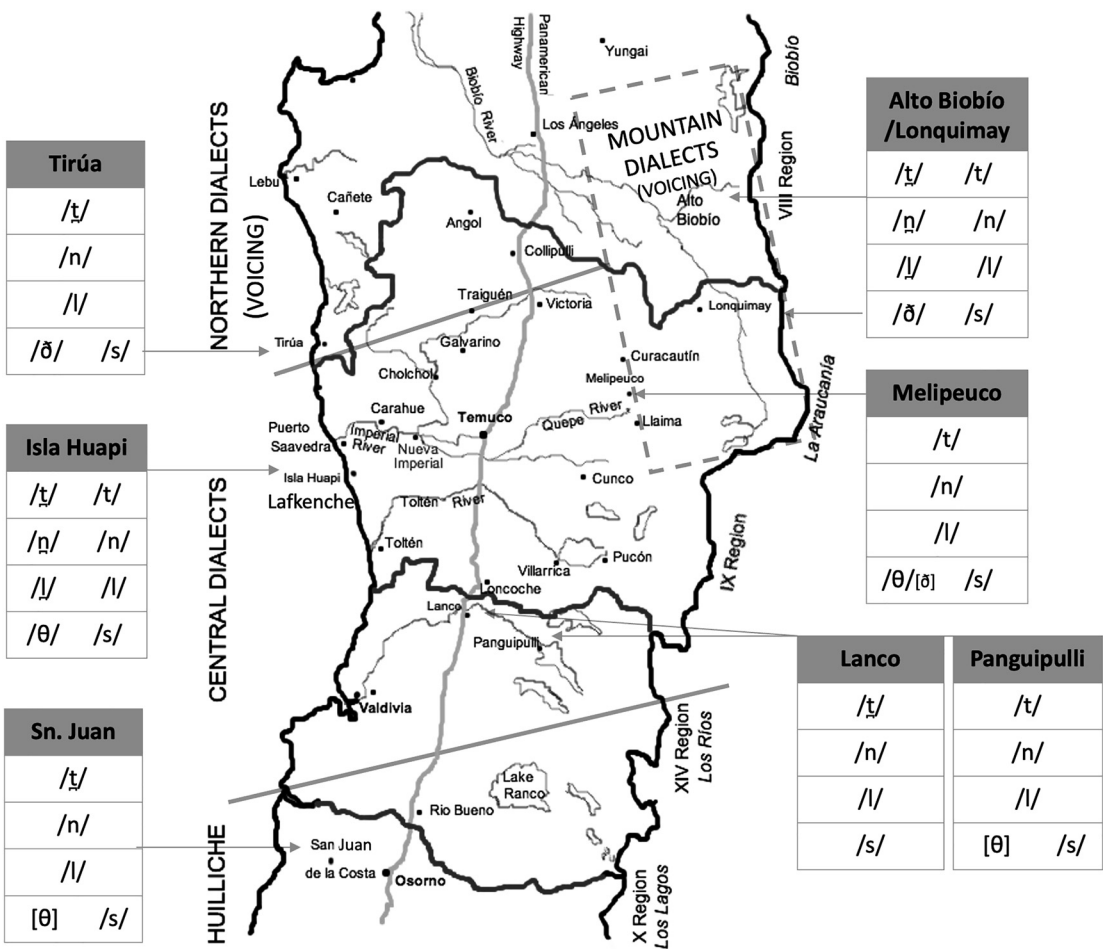


Figure 4: Dentals and alveolars across Mapudungun dialects (major areas follow Croese 1980).

#### 4.1 Voiceless fricative dialects: central and southern

The fully contrastive system in Section 2.1 corresponds to the Isla Huapi dialect, a central, coastal variety (Lafkenche). Here, Sadowsky et al. (2013) and Painequeo et al. (2018) carefully selected community members for their proficiency, being L1 Mapudungun bilinguals who still used the language regularly. This yielded clear phonological and phonetic differences between the voiceless dental and alveolar categories across manners of articulation.<sup>18</sup>

Looking further afield, we find a less clear-cut pattern. Indeed, describing the dialect of Melipeuco, in the Andean foothills, Salamanca et al. (2009) find that laterals and nasals are in free variation across dental and alveolar realizations, the latter dominating even in the dental lexical sets. Stops, however, are exclusively alveolar.<sup>19</sup> Among fricatives, alveolar /s/ and dental /θ/ contrast, with the latter alternating freely between voiceless [θ] and voiced [ð] in line with other fricatives ([f]~[v]; [ʃ]~[ʒ]). This shows the area to be near the voicing/voiceless fricative isogloss.

For the south-central dialects of Lanco and Panguipulli, Alvarez-Santullano (2016) reports speakers merging nasals and laterals on the alveolar, while the stops merge on the dental in Lanco and alveolar in Panguipulli, though alternations are rampant. Fricatives are consistently voiceless and, for the single Lanco consultant, /θ/ and /s/ have merged on the alveolar, while for the Panguipulli speaker the same process is nearing completion.








The southernmost dialect, known as Huilliche, is described by Sadowsky et al. (2015) for San Juan de la Costa. As in the Lanco dialect, stops have merged on the dental, while nasals and laterals do so on the alveolar.<sup>20</sup> For fricatives, which are voiceless ([f-ϕ-x], [θ-s-h], [ʃ]), the dental set is often realized as alveolar, but not vice versa. As a result, a merger towards /s/ is nearing completion.

#### 4.2 Voiced fricative dialects: northern and mountain

The coastal variety of Tirúa is shown by Salamanca and Quintrileo (2009) to have mostly lost the target contrast for non-fricatives (though some variation remains). Fricatives are predominantly voiced ([v-β], [ð], [ʒ]), except for /s/, which contrasts with /ð/.<sup>21</sup>

For the Alto Biobío mountain varieties (Pehuenche), the phonemic status of dentals is debated. Sánchez (1989: 293) rejects their contrastiveness while Salamanca (1997) finds contrast among stops, nasals and laterals. Salamanca et al. (2017) revisit the issue, with a larger data set including palatogram, audio,

**Table 4:** Words with <l, n, t> versus <l̥, n̥, t̥> spellings in de Valdivia (1606).

Grapheme		Entry in Valdivia's <i>vocabulary</i>		Phoneme	Present-day reflex
<l>		<i>lamuen</i>	'sister'	/l/	/lamwen/
<β>		<i>lan</i>	'death'	/l̥/	/lan/
<n>		<i>non</i>	'win'	/n/	/non/
<n̥>		<i>noyn</i>	'eat too much'	/n̥/	/nojn/
<t>		<i>tica</i>	'adobe'	/t/	/tika/
<t̥>		<i>tecan</i>	'walk'	/t̥/	/t̥sekan/
<t̥>		<i>tue</i>	'earth'	/t̥/?	/t̥ue/

<sup>18</sup> A similar, fully contrastive, voiceless system is claimed for the area around Victoria, though the source is outdated (Lagos 1984).

<sup>19</sup> This is an interesting finding, as loss of contrast tends to go towards the dominant Spanish pattern elsewhere (see the SCM data in Section 4.3). The only other exception seems to be Panguipulli, where unconditioned alternation seems to favour the alveolar.

<sup>20</sup> The erstwhile dental lateral is sometimes realized as a bi-segmental series [l̥d̥], which is roughly equivalent to Spanish <ld>.

<sup>21</sup> A further northern coastal variety – Los Álamos – is described by Saldivia and Salamanca (2020) with identical outcomes, though with some receding evidence for contrast amongst stops.

and video evidence, concluding that competent speakers consistently use dentals in the relevant lexical sets. However, among young, mobile speakers, different degrees of free variation between dentals and alveolars are evident. As with the Tirúa dialect, fricatives are consistently voiced, excepting /s/, which contrasts with /ð/. This same pattern is found in the other described Pehuenche area, Lonquimay (Sánchez and Salamanca 2015).

4.3 The sounds comparisons evidence

The wealth of phonetic and phonological studies on our target contrast is surprising for a South American language. However, the methodologies and transparency of data vary widely, making comparisons difficult. Here, the Sounds Comparisons project for Mapudungun (SCM; Sadowsky et al. 2019) gives some perspective, providing more homogeneously gathered, accessible data in the form of audio and IPA-transcribed speaker samples for 224 lexical items across 38 locations in Chile and Argentina.

A quick look at the distribution of dentals versus alveolars in key words for stops (*füt’a* ‘husband’ vs. *pütokon* ‘drink water’), nasals (*wen’üy* ‘friend’ vs. *tranan* ‘mash’) and laterals (*l’an* ‘die’ vs. *lamngen* ‘sister’) shows a striking pattern where only the *Lafkenche* items display the contrast, while elsewhere only the sounds that match the Spanish phoneme are evidenced. The reasons behind the discrepancies between the localized studies and the SCM are not altogether clear, but are likely to be attributable to the selectiveness of consultant sampling in the former.

For the fricatives (see Figure 5), however, the contrast seems much more robust across the SCM data, even if occasional overlap of categories occurs, particularly in southern and eastern dialects. Reassuringly, the fricative voicing isogloss is clearly observable.

Table 5: Voiced fricatives in seventeenth-century Mapudungun.

Grapheme	IPA	Entry in Valdivia’s vocabulary	Gloss	Modern pronunciation
<d>	ð	<i>dũgu</i>	‘word/thing’	θiŋu
<v>	v/β	<i>voru</i>	‘bone/tooth’	fozo
<r>	ʒ	<i>raũ</i>	‘clay’	zau

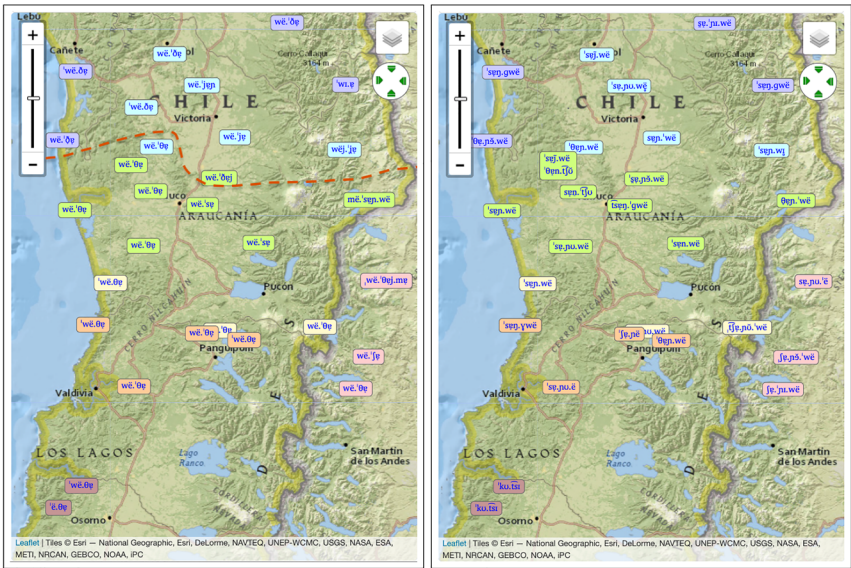


Figure 5: Pronunciations of *weda* ‘bad’ (left, fricative voicing isogloss superimposed) and *sañwe* ‘pig’ (right, from Spanish *saín* ‘animal fat’ + the instrumental suffix *-we*), in the sounds comparisons: Mapudungun database.

**Table 6:** Words with <ç>, <z>, or <s> spellings in de Valdivia (1606, 1621).

Grapheme	Spelling	Gloss	Source	Spelling	Gloss
<ç>	<i>esperança</i>	‘hope’	Spanish	<i>esperança</i>	‘hope’
<ç>	<i>çuyçuyhue</i>	‘sieve (n.)’	Quechuan	<i>suisuy</i>	‘sieve (v.)’
<ç>	<i>ç acin</i>	‘fast (v.)’	Quechuan	<i>sasiy</i>	‘fast (v.)’
<z>	<i>caliz</i>	‘cup’	Spanish	<i>cáliz</i>	‘cup’
<z>	<i>mizquilcan</i>	‘sweeten’	Quechuan	<i>misk’i</i>	‘sweet’
<z>	<i>ezñacan</i>	‘curse’	Quechuan	<i>ñakay</i>	‘damn’
<z>	<i>pizcoytu</i>	‘tops (game)’	Quechuan	<i>P’iskoinu</i>	‘tops (game)’
<z>	<i>pozco</i>	‘yeast’	Quechuan	<i>P’osko</i>	‘sour/bitter’
<s>	<i>Dios</i>	‘God’	Spanish	<i>Dios</i>	‘God’
<s>	<i>ñampas clelu</i>	‘hollow thing’	Quechuan	<i>ñan-pas</i>	‘road-other’

**Table 7:** Fricatives in northern (N) and central (C) eighteenth-century Mapudungun sources.

Febrés (N)	Havestadt (N)	Falkner (C)	Contemporary (C)	Gloss
ad	ad	az	/aθ/	‘face’
dùgu	dngu	sengu	/θiŋu	‘word, idea, thing’
mansun	mansun	(Dios)	/mansun/	‘ox’
avùln	avuln	afeln	/afelin/	‘be averse/destroy’
cura	cura	cusa	/kuʒa/	‘stone’

## 5 Changes in the dental-alveolar contrast

### 5.1 Contact and the development of new contrast

Throughout our 400-year survey, we have seen that the dental-alveolar contrast consistently rears its head in the more careful descriptions and transcriptions. This is certainly the case for /ɲ/–/n/ and /ʎ/–/l/, highlighted already by de Valdivia (1606). Contrast in stops is not explicitly observed until almost three centuries later, by Lenz (1897), yet it is unlikely to have emerged in that period, as we find some evidence – at least residual – for equivalent lexical sets across most contemporary dialect areas. The difficulty in perceiving this contrast is probably the result of the lexically rarer variant, /t̪/, being expected for L1 Spanish descriptions. Indeed, the first observations of the contrastive nature of /t/–/t̪/ are only made when native speaker judgements are taken seriously (see Section 3.3).

By analysing the graphemic repertoires of early missionaries we reconstructed the antecedent of present-day /θ/ as /ð/; a phoneme we assume to be native to the language (albeit circumscribed to root morphology, see Section 2.3). /s/, we further ascertained, emerged as a result of contact, first with Quechuan and then with Spanish. While the early recorded borrowings are few, the typological frequency of /s/ across the languages of the world (67% of PHOIBLE inventories) suggests its relative unmarkedness, and hence its ease of adoption. Placing /s/ in the otherwise symmetrical dental-alveolar system, furthermore, would have been a fairly economical change (Clements 2003). The key featural distinction between dentals and alveolars among stops, nasals, and laterals, however, seem to fail to produce the right contrast for the dentals. Indeed, dental-alveolar contrasts have long been argued to be fundamentally characterized by laminal ([+DISTRIBUTED]) versus apical ([–DISTRIBUTED]) features (Chomsky and Halle 1968; Clements 2009; Rice 2011), a pattern that does not obtain among present-day Mapungun fricatives, which are both laminal (Table 3).

The phonetic details of Spanish sibilant adaptations into Mapudungun also underscore this pattern. Indeed, while most of these borrowings show historical <s> spellings and contemporary [s̺] pronunciations (Table 7), some early Spanish <s> loans are spelled with <ch> and are still often pronounced [t͡ʃ] (Febrés 1765: <chiñur> ‘Spaniard’ <señor>). This reflects the early heterogeneity of Spanish dialects coming into contact with the Native American languages. The first group of borrowings are likely to originate in southern Peninsular *seseo* varieties with a single sibilant phoneme (laminal [s̺]=<s>), while the latter probably come from *distinción* dialects such as Castilian, which distinguish [s̺] and [s̠] (<ç/z> and <s>). Crucially, apico-alveolar [s̺] was likely perceptually and featurally closer to the Mapudungun voiceless postalveolar affricate /t͡ʃ/ = <ch>, than to the voiced dental fricative /ð/ = <d> (Hasler and Soto 2012: 98) or, indeed, to the incoming laminal [s̺]. The population, power, and lexical dynamics that led to borrowings coming from one dialect or another are unclear (see Sanz-Sánchez [2019] for a pan-American view). However, the pattern gives further evidence that <s> was never apical in Mapudungun, but must have eventually contrasted with /θ/ via a different feature than the other dental-alveolar pairs. A well-established candidate for this role is [±STRIDENT] (cf. Kim et al. 2015), as given in Table 8.

While there were other strident phones in pre-contact Mapudungun, the feature [STRIDENT] was not key to any phonemic contrasts. If we take features to be specified in a language only if they are contrastive (as in Modified Contrastive Specification; see Dresher 2009; Hall 2011), the feature [+STRIDENT] in /t͡ʃ/ is redundant because Mapudungun has no other affricates with the specification [−DISTRIBUTED, −ANTERIOR]. However, the adoption of /s/ meant that [STRIDENT] must have become specified in the contrastive system of Mapudungun. This innovation is particularly interesting in that it involves a far less economical change to the language’s contrastive system than adapting Spanish /s/ to fit the apical series.

5.2 Fricative voicing: diatopy and diachrony

Compared to the languages of Africa and Eurasia, the Americas—and the Southern Cone in particular—make little use of voicing contrasts (see the WALS data in Maddieson 2013). Historically, Mapudungun lacks obstruent voicing altogether, with the quirky distributional fact that fricatives in northern dialects are, by default, voiced, while in central and south dialects they are voiceless. Here, I have observed that the isogloss separating these varieties must precede the written record. In the northern, voiced-fricative dialects, however, the eventual phonemicization of /s/ would have created a less predictable voicing pattern. This new contrast, I will argue next, is likely to have played a role in the preservation of both members of the dental-alveolar fricative pair, despite ongoing language marginalization and loss of vitality.

5.3 Loss of contrast

Mapudungun is in the process of losing the dental-alveolar contrast. Yet this development is not uniform across dialects, speakers, and manners of articulation. Polar extremes are seen in the Isla Huapi variety, where competent speakers seem to preserve a robust four-manner contrast, and in the Huilliche variety, where the few remaining speakers have almost completely merged the dental-alveolar pairs across all four manners,

Table 8: Proposed features for key Mapudungun coronals.

	Distributed	Strident	Anterior
/t n l/	−	−	+
/t̪ n̪ l̪ θ/	+	−	+
/s/	+	+	+
/t͡ʃ/	−	+	−

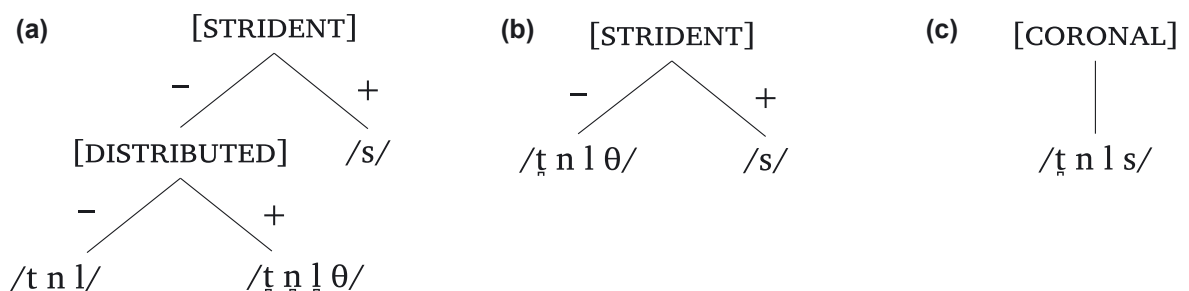
always in favour of the sound matching the Spanish phoneme. These two poles also mirror the loss of fluency and reduced transmission in said communities. Detailed comparative data for the vitality of Mapudungun dialects is limited, yet we can ascertain that central Lafkenche varieties are at once remote and vital, with cultural and oral literature traditions very much alive (Painequeo et al. 2018). Huilliche, on the other hand, is spoken by a very small number of elders and has long been identified as moribund (Alvarez-Santullano 1992; Sadowsky et al. 2015).<sup>22</sup>

Among central dialects, Melipeuco, Panguipulli, and Lanco varieties show loss of the dental-alveolar contrast in stops, nasals, and laterals. While Melipeuco speakers preserve the fricative contrast, Panguipulli speakers appear to be in the process of merging them (on /s/), a process that is complete in Lanco. The reports in the relevant descriptions highlight changes to the communities' linguistic makeup as a result of increased contact with major urban settlements (Melipeuco, near Temuco) and greater mobility (the Panamerican highway cross-sections Lanco).

Mountain dialects are recognizably well preserved, due to their remoteness (Gundermann et al. 2011). Here, dental-alveolar contrast is maintained throughout (Salamanca et al. 2017). In northern coastal varieties (Tirúa, Los Álamos), however, vitality is lower and interaction with non-indigenous society, more intense (Gundermann et al. 2011). Unsurprisingly, robust contrast persists only among fricatives (Salamanca and Quintrileo 2009; Saldivia and Salamanca 2020).

Beyond the clear correspondence between vitality and contrast, we see greater degrees of contrast-maintenance among fricatives. This subcategory is not only distinct in being the most recently developed dental-alveolar pair, it is also set apart by articulatory detail (Section 2.1), frequency patterns (Section 2.3), and featural specifications (Section 5.1). A closer look at diatopy, however, suggests that contrast-preservation is also related to the fricative voicing patterns. Where fricatives are voiceless and other dental-alveolar contrasts are lost, the tendency is for loss of contrast among fricatives too (see Lanco, Panguipulli, and San Juan). Where fricatives are historically voiced (northern and mountain dialects), we see that it is possible for these to preserve the dental-alveolar contrast, despite its loss among stops, nasals, and laterals. We see this to be the case in Tirúa and, to the extent that fricatives alternate voicing in Melipeuco, we see it there too.<sup>23</sup>

The available data, therefore, suggests that among the northern, voiced-fricative varieties, the dental-alveolar contrast is supported by a voicing contrast. That is, the salience of the voicing contrast amongst increasingly Spanish-dominant speakers is likely to facilitate the maintenance of the dental contrast in fricatives. From a featural perspective (in Modified Contrastive Specification), we may formalize the change as follows. In voiceless dialects, [ $\pm$  DISTRIBUTED] is being removed from the bottom of the feature hierarchy (Figure 6a–b), closely followed by [ $\pm$  STRIDENT] (Figure 6b–c). In voicing dialects [ $\pm$  VOICE] – heretofore a redundant, enhancement feature – has become specified for fricatives, maintaining the key contrast (Figure 7a–c).



**Figure 6:** Proposed stages of feature-specification loss in voiceless fricative dialects of Mapudungun.

<sup>22</sup> The main argument in this latter paper is, precisely, that Huilliche should not be seen as a separate language from other Mapudungun dialects – as has been claimed elsewhere (e.g. it is given the code [huh] in Eberhard et al. 2020) – but rather that its more substantial phonic differences are the result of advanced attrition.

<sup>23</sup> The account of Alto Biobío given by Sánchez (1989) also follows this trend.

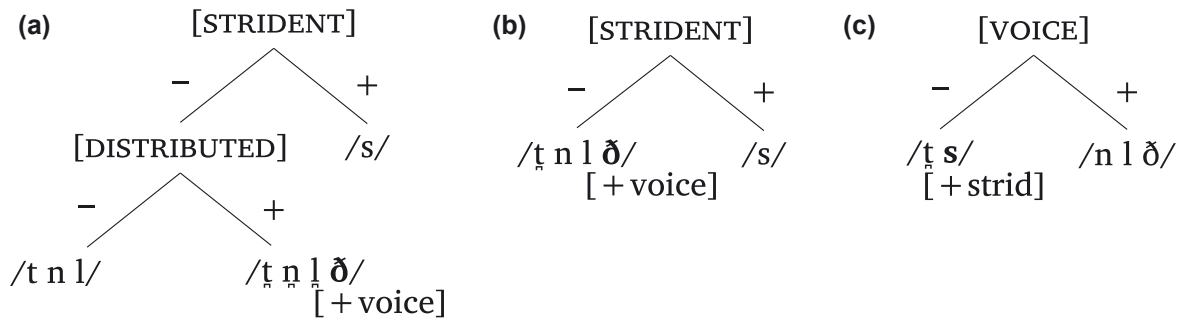


Figure 7: Proposed stages of feature-specification re-ranking in voiced fricative dialects of Mapudungun.

## 6 Conclusions

The Mapudungun data presented here points to the fact that, while typologically fairly rare, the dental-alveolar contrast can be maintained and even expanded over time in contexts of linguistic vitality, even with no significant areal support and substantial imbalance in frequency. In cases of loss of linguistic vitality, nonetheless, the contrast tends to quickly disappear unless additional features can be relied upon for its maintenance. Under the asymmetric contact conditions of Mapudungun vis-à-vis Spanish, many dialects have followed this path to contrast loss.

Upon closer inspection, however, not all dental-alveolar contrasts are equivalent. Indeed, the fricative pair differs from the stops, nasals, and laterals not only by virtue of being newly developed, but also in lacking a laminal-apical distinction. From a typological perspective, this is interesting, given that other languages that extensively exploit the lamino-dental versus apico-alveolar contrast, either lack fricatives altogether (e.g. Australian languages; see Fletcher and Butcher 2014) or do not exploit the contrast amongst them (e.g. Dravidian languages; see Arsenault 2012).

I have shown that, despite the theoretical possibility of joining a well-established laminal-apical contrastive system, the /s/ phoneme fails to do so. As a result, there is no evidence for the integration of fricatives into such an “economical” system. Whether this is the result of pressures emerging from contact conditions, or from structural constraints alone, remains impossible to determine. The new phoneme, /s/, has brought with it, furthermore, a new voicing contrast in the northernmost dialects, which enhances the dental-alveolar opposition, further dispensing with the laminal-apical contrast. At bottom, the integration of this new, unmarked segment is a contact-induced change, but one with Trojan horse-like consequences for the language’s overarching system of contrasts.

Finally, I hope to have shown that detailed examination of the historical record, as well as close dialectal comparisons (which take native speaker intuitions seriously) are key tools for allowing us to turn back the sands of time and view what Indigenous American languages have gained and lost.

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