A typological study of lateral fricatives: Preliminary findings

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Submitted to Eitan Grossman.

Lateral fricatives are not very common in the world's languages, yet are not extremely uncommon. They are found in languages from various language families, spoken in diverse areas. This short study aims at providing a typological overview of these segments (§ 1), surveying particular case studies (§ 2), and discussing motivations for the diachronic pathways and morphophonological alternations demonstrated by these case studies (§ 3).

1 *Typological overview*[1]

The prevalence of specific phonological segments varies greatly: some are extremely common, yet most are vanishingly rare, as can be seen in fig. 1.[2] Both extremities pose difficulties for typological description: the most common ones are so common and occur in such diverse types of phonological systems that one can hardly generalize anything non-trivial about them, and the rare ones provide too little information (about a half of the segments are represented only in a single inventory; this is marked by 1524 on the horizontal axis in the figure). To borrow the metaphor used in other fields, there are however segments which are in a 'Goldilocks zone': they are not too rare, yet not too common. The alveolar lateral fricatives are such segments.

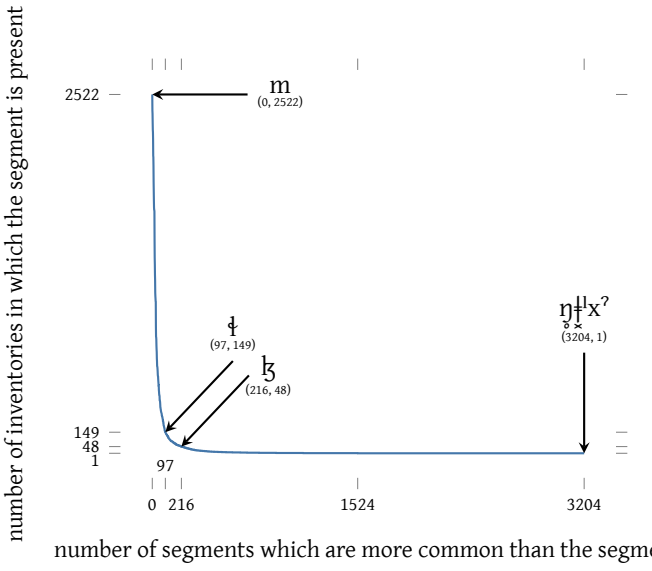


Figure 1: Representation of segments in PHOIBLE (Moran and McCloy 2019).

Segments are arranged along the blue line. The vertical axis represents how common a segment is in terms of the number of inventories in which it is present; the horizontal axis represents how many segments are more common than the segment in question. For example, /ɮ/ occurs in 48 inventories and 216 segments are more common than it; the most common segment, for comparison, is /m/, which occurs in 2522 inventories and has no segments that are more common than it.

The steep decline shows how a small group of segments is represented in a large portion of the world's languages, leaving a very long tail. The lateral fricatives are located in the higher (leftmost in the figure) part of this tail.

In general lateral fricatives are implicationally found in languages with lateral approximants (Maddieson (2013) lists 47 languages as '/l/ and lateral obstruent' but only 8 as 'no /l/, but lateral obstruents'; see also Steiner 1977, p. 9), but this is weakly predictive, as /l/ is quite widespread to begin with: the total proportion of languages with /l/ in Maddieson (2013) is

[1] Ladefoged and Maddieson (1996, § 6.3) give a survey of laterals other than the voiced lateral approximants. This typological overview is intended to complement it. See also Maddieson (2013).

[2] The PHOIBLE data in CSV format — downloaded from the Git repository in February 20, 2019 (`phoible.org/download`) — is used for figs. 1 and 2.

$\frac{388+47}{95+388+29+47+8} \approx 0.77$, while the proportion in languages with lateral obstruents is only slightly higher: $\frac{47}{47+8} \approx 0.85$.

Figure 2 shows the number of inventories in PHOIBLE that include alveolar or dental fricatives and affricates. The voiceless fricatives here greatly outnumber the voiced ones, as is the case with most fricatives (MADDIESON 1984, §§ 3.3 and 3.4)[3]. The 'voicing ratio' in PHOIBLE is somewhat higher than in Maddieson's quota sample (UPSID, see ibid., § 10.2): $\frac{48+3+2}{149+24+9} \approx 0.29$ rather than $\frac{5+2+0}{13+17+0} \approx 0.23$ (ibid., § 3.3). The voiceless affricates are about half as common as the voiceless fricatives, and the voiced ones show a much lower ratio of about a fifth in comparison to the voiced fricatives; this difference is due to the prevalence of voiceless lateral affricates in the languages of North America (see fig. 3). In addition, see MADDIESON (ibid., p. 78) regarding the distribution of various features of lateral segments.

[3] STEINER (1977, p. 10) presents another possible contributing factor for the relative rarity of /ɮ/: the ubiquitous voiced lateral approximants (of which /l/ is by far the most common) tend to discourage the formation and/or retention of /ɮ/, phoneme which would diminish their margin of safety (in other words, the distinction between them is not salient enough).

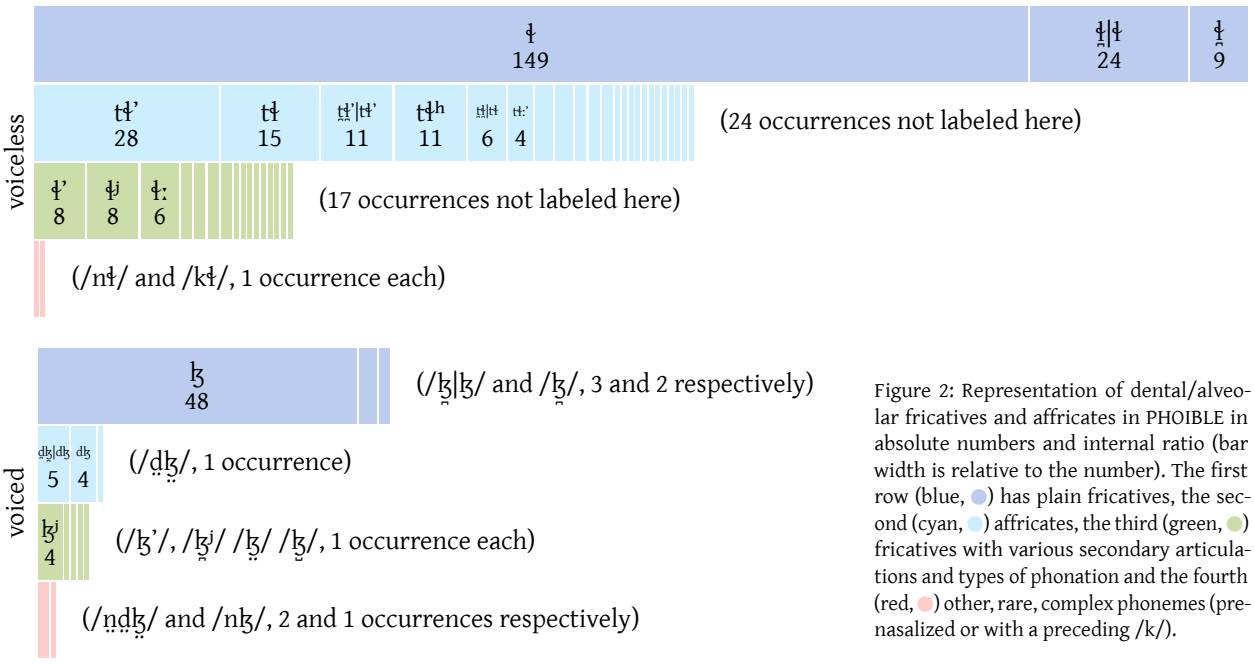


Figure 2: Representation of dental/alveolar fricatives and affricates in PHOIBLE in absolute numbers and internal ratio (bar width is relative to the number). The first row (blue, ●) has plain fricatives, the second (cyan, ●) affricates, the third (green, ●) fricatives with various secondary articulations and types of phonation and the fourth (red, ●) other, rare, complex phonemes (prenasalized or with a preceding /k/).

I count dental lateral fricatives here together with alveolar ones because the distinction between them is very rare. In fact, the only case of phonemic [ɬ]:[ɬ̪] opposition I am aware of is in Mapuche (Araucanian; Chile, Argentina), where /l̪/ and /l/ are phonemic and are realized as their fricative allophones [ɬ̪] and [ɬ] in utterance-final position (SADOWSKY et al. 2013); for example:

/kɐ̪ˈɣəl̪/ [kɜˈɣəɬ̪] 'phlegm that is spit'
/kɐ̪ˈəl/ [kɜˈəɬ] 'a different song'

The geographical distribution of the lateral fricatives (top) and affricates (bottom) is presented in fig. 3; voiceless segments are given on the left and voiced ones on the right.[4] /ɬ/ is the most widespread lateral fricative/affricate, and is found in varying densities in all the continents except perhaps Australia.

The maps can demonstrate how, broadly speaking, languages with voiced fricatives/affricates make a subset of languages with their voiceless counterparts; this agrees with the general principle given in LASS (1984, § 7.6.3.ix):

> The number of voiceless fricatives is likely to be greater than that of voiced; and there is likely to be an implicational relation between a voiced fricative

[4] For technical reasons I had to choose only one phoneme per map. I chose the most common representative in the database for each group (/ɬ/, /ɮ/, /tɬ’/, /d̤ʒ̤|dʒ/). For future versions of this paper I will learn how to plot locations on a map using the raw data so I can overlay information.

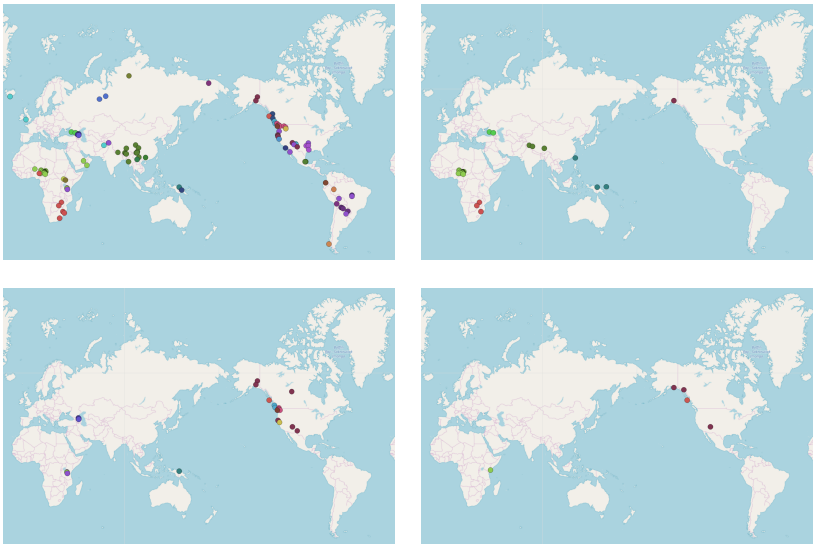


Figure 3: The geographical distribution of the lateral fricatives /ɬ/ (voiceless, top left), /ɮ/ (voiced, top right), /tɬʼ/ (voiceless, bottom left) and /d̪ɮ|dɮ/ (voiced, bottom right) in PHOIBLE.

> and its voiceless cognate. The second statement is more weakly predictive than the first, and truer for fricatives than for stops[5].

[5] Lass (1984, § 7.6.1) includes affricates under the wider term of *stops*.

Thus, for the most part /ɮ/ is implicationally found where /ɬ/ is: eastern Nigeria and northern Cameroun in green circles and Bantu languages to the south-east of Africa in red ones, with Ahtena (Northern Athabaskan, Na-Dené; Alaska) being the sole American language with a voiced lateral fricative in the database (dark reddish-brown), while voiceless lateral fricatives are very prevalent in this continent.

Similarly, voiced lateral affricates are found mainly in Tanzania and western North America, where voiceless lateral affricates are also found.[6] See Maddieson (2013):

[6] This has to be refined by overlaying maps.

> If a language has a lateral affricate in its consonant inventory, then this generally entails the presence of a lateral fricative [...] this observation makes a meaningful prediction, since 88% of the languages with affricates also have fricatives.

Comparing the distribution of /ɬ/ (top left) with that of /tɬʼ/ (bottom left) demonstrates how voiceless lateral fricatives are found all across the Americas, yet the voiceless lateral affricates are an areal North American phenomenon.

Lateral fricatives which are pronounced further to the back are much rarer, found in a few languages each:[7] the retroflex /ɭ̊˔/ (/ɭ˔/) and /ɮ̠/ (/ɭ˔/), the palatal /ʎ̝̊/ (/ʎ̝̊/) and /ʎ̝/, and the velar /ꞎ̟/ (/ʟ̝̊/) and /ʟ̝/. On the whole, they are found in languages that have alveolar lateral fricative(s), such as the retroflex /ɭ̊˔/ in Toda (a Dravidian language from Tamil Nāḍu, India, which also has an alveolar /ɬ/; Shalev, Ladefoged, and Bhaskararao 1994; Spajić, Ladefoged, and Bhaskararao 1994), the velar /ꞎ̟/ in Wahgi (a Chimbu–Wahgi language from New Guinea which also has a dental /ɬ̪ʲ/; Phillips 1976, § 1.1.2.9) or the three-way /ɬ/, /ɮ/ and /ʎ̝̊/ in Bura (a Chadic language from Nigeria totalling five laterals with its two approximants, /l/ and /ʎ/; Grønnum 2005, pp. 154–155). This implicational universal is not absolute: Archi (Northeast Caucasian; Archib, Dagestan) has five (!) palato-velar lateral fricatives (with distinctions of voicing, length and labialization)

[7] Due to their rarity, most have no official, non-compound symbol in IPA; ⟨ɭ̊˔⟩, ⟨ɮ̠⟩, ⟨ʎ̝̊⟩ and ⟨ꞎ̟⟩ are non-official, extended symbols.

and four more /k-/ palato-velar lateral affricates, but no alveolar or dental lateral fricatives (Chumakina, Corbett, and Brown 2008).

To the best of my knowledge, the voiceless alveolar lateral approximant [l̥] is not reported to contrast in any language with the voiceless alveolar lateral fricative [ɬ]. Although they are phonetically distinct and should be distinguished in description (Maddieson and Emmorey 1984), the difference between them seems not to be salient enough for languages to phonologize an /l̥/:/ɬ/ distinction. Phonetically, [l̥] is less intense, has less noise in the higher end of the spectrum and has longer voicing in the later stages of its articulation (Maddieson and Emmorey 1984, pp. 186–187; Ladefoged and Maddieson 1996, p. 198). Asu, Nolan, and Schötz (2015) report that their experimental data demonstrate a range of variance between the discrete approximant:fricative categories; while this calls for refining linguistic descriptions, it does not contradict the findings or conclusions of Maddieson and Emmorey (1984), who describe the differences in terms of degree, not as completely categorical divisions.

2 Case studies

2.1 Welsh

Welsh is a Brythonic Celtic language (Insular Celtic, Indo-European) spoken mainly in Wales by more than half a million speakers, virtually all of whom are bilingual with English (about a fifth of the population). Along with other features, including syntactic and morphological ones (Haspelmath 2001), its phonology differs greatly from that of other Western European languages in its proximity, having areally-unusual sounds such as voiceless nasals (/m̥/, /n̥/ and /ŋ̊/, spelt ⟨mh⟩, ⟨nh⟩ and ⟨ngh⟩) and a voiceless alveolar lateral fricative (/ɬ/, spelt ⟨ll⟩).

This lateral fricative originates from Proto-Brythonic (< Proto-Celtic < Proto-Indo-European) **l-* (a voiced lateral approximant) and **sl-*[8] in word-initial position and from non-lenited **L* and **LL*[9] in all positions (Jackson 1953, §§ 91, 93, 127; Schrijver 1995, § 5.1). In Late Brythonic **L* and **-LL-* stood side by side with lenited **l* (possibly having an optional voiceless [l̥(:)] realization already); in Primitive Welsh the realization became obligatorily voiceless; by the 10th century /ɬ/ was fully established (Jackson 1953, § 93).

Thus, **l* did not change indiscriminately into /ɬ/: **l* in all positions which did not change into /ɬ/ remained /l/ in Welsh. This ultimately resulted in a phonological /ɬ/:/l/ distinction, with minimal pairs such as *dal* /-l/ 'to continue, to hold, to catch' < Proto-Brythonic **dalg-* < **del(ə)gʰ-* and *dall* /-ɬ/ 'blind' < Celtic **dụ̊allos* < **dụ̊l̥los*[10] < Proto-Indo-European **dʰ(e)wel-*.

The connection between /l/ and /ɬ/ in Welsh does not stop at diachrony; they are connected synchronically as well. In order for us to discuss this synchronic connection, the notion of *consonant mutation* must be introduced (Hannahs 2011; Ball and Müller 1992). It is a feature of all modern Celtic languages that, very broadly, refers to morphologized[11] phonological alternations in the initial consonant of a word (or of a component within compounds); see Zimmer (2005) and Grijzenhout (2011) for typological

[8] Through Brythonic **s-* > **h-*, thus **sl-* > **hl-*, regular development; see Schrijver 1995, § IX.

[9] In Celtic historical linguistics capital letters are used for indicating non-lenited consonants.

[10] Here ⟨l̥⟩ denotes a syllabic **l*, as it is customary in Indo-European historical linguistics, and not a voiceless alveolar lateral approximant [l̥].

[11] The phenomenon started as purely allophonic and then went morphologization; see Hickey 1996, § 4.

discussion and Hickey (1996) for a diachronic-typological study). Table 1 gives an overview of the initial consonant mutations in Welsh.

Radical		Soft		Nasal		Aspirate	
p	/p/	b	/b/	mh	/m̥/	ph	/f/
t	/t/	d	/d/	nh	/n̥/	th	/θ/
c	/k/	g	/g/	ngh	/ŋ̊/	ch	/χ/
b	/b/	f	/v/	m	/m/		
d	/d/	dd	/ð/	n	/m/		
g	/g/	Ø	//	ng	/ŋ/		
ll	**/ɬ/**	**l**	**/l/**				
rh	/r̥/	r	/r/				
m	/m/	f	/v/				
(ts	/t͡ʃ/)	(j	/d͡ʒ/)				

Table 1: An overview of the consonant mutations in Welsh.

In order to clarify by example (on the right), let us consider the third person possessive pronouns (ibid., § 4.2); *ei* /i/ followed by an aspirate mutation indicates a 3.sg.f possessor, *ei* /i/ followed by a soft mutation (also called 'lenition') indicates a 3.sg.m possessor and *eu* /i/ followed by the radical (no mutation) indicates 3.pl possessors (⟨ei⟩ and ⟨eu⟩ are homonyms, differing only in orthography).

tad	/ta:d/	father
ei thad	/i θa:d/	her father
ei dad	/i da:d/	his father
eu tad	/i ta:d/	their father

Now, the relevant point is that synchronically /l/ is the soft-mutated ('lenited') form of /ɬ/. This can be demonstrated by the third person possessive pronouns as before (on the right; empty cells in table 1 imply no mutation). From a historical linguistic point of view, this can be seen as a continuation of the **l:*L* opposition referred to above, but in synchronic terms the Welsh mutation system ties /ɬ/ and /l/ together in morphology. In a sense, the /ɬ/→/l/ soft mutation is comparable with the voicing in the /p/→/b/, /t/→/d/, /k/→/g/ and /r̥/→/r/ soft mutations, but /ɬ/ and /l/ differ not only in voicing but also in manner of articulation (a fricative obstruent and an approximant, respectively); see Ball (1990) concerning analysis. Regarding the diachronic devoicing of Brythonic */l/ into Welsh /ɬ/, not stopping at the intermediate [l̥], I offer the explanation that this change might be linked to the phonetic properties of [l̥] (in particular the measurable voicing in the later stage of its articulation; see Maddieson and Emmorey 1984): although in naïve phonological terms it is [l̥] that is the voiceless counterpart of /l/, in actuality it is /ɬ/ that can play this role better, as it is more prototypically voiceless.

llygaid	/ˈɬəgaɨd/	eyes
ei llygaid	/i ˈɬəgaɨd/	her eyes
ei lygaid	/i ˈləgaɨd/	his eyes
eu llygaid	/i ˈɬəgaɨd/	their eyes

To the best of my knowledge, none of the few[12] publications written on phonotactic constraints in Welsh deal with the specificities of the phonotactics of /ɬ/. In order to begin to fill this gap I ran queries on a word-list of total length of 22923 entries, extracted from a digital dictionary (Nodine 2003) in order to check where *ll* /ɬ/ occurs.[13] Spoken and written languages are of course different, but the following results can give an approximation to the status of /ɬ/ in spoken Welsh, in the absence of direct phonological data based on the spoken language.

- No initial *llC-* or medial *-CllC-* occur.

[12] Czerniak (2015, p. 32) counts five previous publications: Hannahs (2013, § 3.1.2), Iosad (2012), Awbery (1984) and two later books by Awbery (1986 and 2010).

[13] These quick queries can confirm certain combinations occur in the written language, but they cannot reject the possibility of combinations that maybe are absent from the word-list but are present in actual use. Nevertheless, the word-list is long and varied enough to give a relatively high degree of certainty. Querying a dictionary proved more effective for this purpose than querying a lexical database such as CEG (Ellis et al. 2001).

- Word-final *-llC* is limited to numerous occurrences of *-llt* (Jones 1984, p. 43) and one loan-word containing *-lltr* (*cwlltr* ‘coulter’, from Latin *cultrum*, which have an alternative spelling with no *-lltr*, in which an epenthetic copy vowel is inserted[14]: *cwlltwr*).
- Word-final *-Cll* is limited to one loan-word and its compound derivatives: *iarll* ‘earl’, from Old Norse *jarl* ‘earl; (*poet.*) a highborn, noble man or warrior’.
- Word-medial *-CllV-* is virtually limited to cases of compound or suffix boundaries between the *C* and *ll*: mostly *-nll-* and *-rll-*, with a few cases of *-mll-*, *-cll-*, *-frll-*, *-rnll-*, *-gll-*, *-fnll-*, *-sll-* and *-rmll-*.
- Word-medial *-VllC-* seems to have similar limitations with regards to morphological boundaries (excluding cases of elements ending with *-llt* followed by an element beginning with a vowel). By order of number of occurrences, these combinations are attested: *-llt-*, *-llg-*, *-llf-*, *-lltr-*, *-lln-*, *-llh-*, *-llbr-*, *-llr-*, *-llbl-*, *-llm-*, *-lltn-*, *-lltg-*, *-llff-*, *-llddr-*, *-lldd-*, *-lld-*, *-lltl-*, *-lltgl-*, *-lltf-*, *-lltb-*, *-ll-l-*[15], *-llfr-*.
- *-ll(-)* occurs after all vowels but not after all diphthongs (the more conservative North Wales forms are given here in IPA transcription):
  - it occurs within the boundaries of one morpheme after the /-i̯/ diphthongs *ae* /ɑːi̯/ and *wy* /ʊ̯i̯, ʊi̯/ and the /-i̯/ diphthongs *ai* /ai̯/ and *ei* /əi̯/;
  - it occurs in a separate morpheme (the adjectival suffix *-llyd, -lyd*) after *ew* /ɛu̯, eːu̯/ in *rhewllyd* ‘icy’ (from *rhew* ‘ice’) and *drewllyd* ‘stinking’ (from *drewi* ‘to stink’), both have *-ewlyd-* variants *rhewlyd* and *drewlyd*;
  - in the said dictionary there were no occurrences of *ll* after the /-i̯/ diphthongs *au* /ai̯/, *eu* /əi̯/, *ey* /əi̯/, *oe* /ɔi̯, ɔːi̯/[16] and *ou* /ɔi̯, ɔːi̯/, the /-i̯/ dipthong *oi* /ɔi̯/, or after the /-u̯/ diphthongs *aw* /au̯, ɑːu̯/, *iw* /ɪu̯/, *ow* /ɔu̯/, *uw* /iu̯/ and *yw* /ɨu̯, əu̯/. Therefore, it does not occur after /-u̯/ within morphological boundaries.

Summarizing the results, *ll* is limited mainly to the following positions: word-initial followed by a vowel; word-final after a vowel; intervocal; word-medial with a preceding or following consonant across morpheme boundaries or *-llt+V-*; word-final *-llt* (as well as *-lltr* and *-rll* in a few loan-words); following certain diphthongs.

The second element in compounds is usually lenited, making the soft mutation a *Fügemorphem* (binding morpheme; see Shisha-Halevy (2003, § 4.a.4)). This has obvious phonotactic implications on /ɬ/, as it is usually softened to /l/ in compounds.

2.2 Sinitic

The genealogy of Sinitic languages (or ‘dialects’) is far from a simple one. Continuous language contact between them and the phonetic opacity of the Chinese logographic writing system make it difficult to draw definite conclusions concerning the relationship between these languages and to reconstruct proto-languages. This subsection deals mainly with two Sinitic languages in which older sibilants developed into voiceless lateral fricatives: Táishān (a Yuè language) and Púxiān (a Mǐn language); see fig. 4 for a map with these languages marked within the greater context of Chinese language

[14] See Hannahs 2013, §5.1 for a discussion of this phenomenon.

[15] In *all-lein* ‘off-line’, a neologism compounding native *all-* ‘extra-, ex-, off-’ and borrowed *lein* ‘line’.

[16] *troell* ‘spinning-wheel’ (from *tro* ‘rotation’ or *troi* ‘to turn, to spin’ + diminutive suffix *-ell*) has no diphthong but *o+e*. Orthographically it can be written as *tröell*.

groups, and map 7.2 in Sousa (2015, p. 167) for some Sinitic languages with lateral fricatives, including these two.

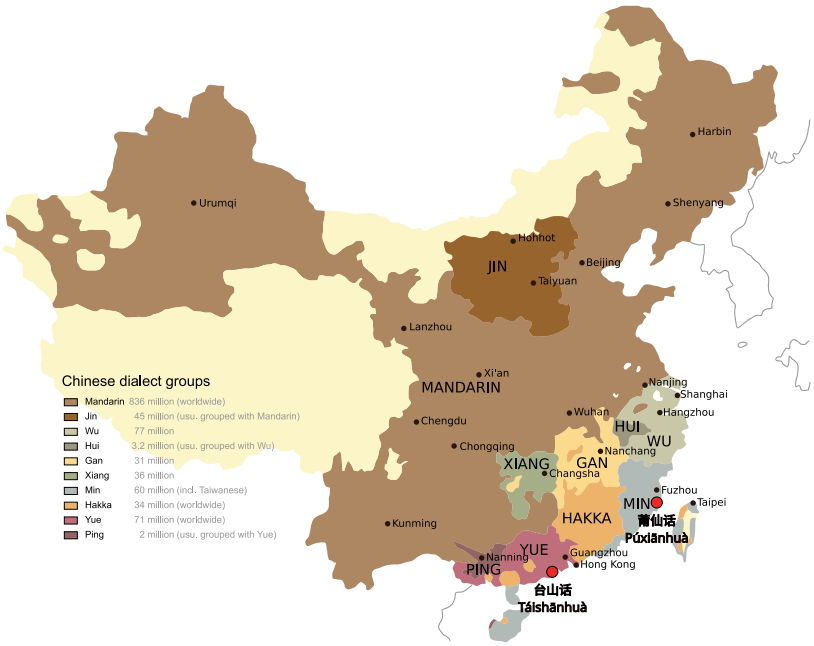


Figure 4: A general map of Sinitic language groups (from Wikimedia Commons, based on Wurm et al. 1987). The two languages under discussion are marked with red circles.

According to Cheng (1973, p. 299f.) the development of Táishān exhibits a push-chain phenomenon from Middle Chinese[17], pushing the /s/ and /z/ fricatives of the dental series ('Dent. II') out of the boundaries of the existing phonological inventory and into a new territory: a voiceless lateral fricative /ɬ/. In Maddieson and Emmorey's (1984, p. 187) study this phoneme in Táishān was realized as a voiceless dental lateral fricative [ɬ̪], varied with [θ] (a voiceless dental non-sibilant fricative) in the speech of several of their speakers.

According to Sousa (2015, pp. 166–168) having /ɬ/ or /θ/ (depending on accent and language) is an areal phenomenon. He discusses the possible influence of Kra-Dai languages (non-Sinitic) in the area and points out these sounds are found in languages in several non-contiguous areas (see map 7.2 in ibid., p. 167). One of these languages is Púxiān.

Púxiān exhibits lateral reflexes for a wider scale of sibilants.[18] Judging from the transliterated texts in Nakajima (1979) and comparing them with Táishān forms from S. Li (n.d.) and the Middle Chinese forms they developed from I compiled table 2, adding Mandarin and Standard Cantonese forms for completeness (Mandarin being the most common variety of all Chinese groups and Standard Cantonese being the most common Yuè variety). The last three rows show how Middle Chinese /ʃʏ-/, /ʑ/ and /d͡ʑ/ did not developed into /ɬ/ in Táishān, yet in Púxiān their analogues did. It should be noted that Púxiān, being a Mǐn dialect, is not simply a direct descendent that can be traced back to Middle Chinese, as Mǐn dialects preserve archaisms from before Middle Chinese (Norman 1988, § 9.4).

Chen (2018) discusses the Xiānyóu dialect of Púxiān. Table 1[19] ('Initial consonants (occurring in C_1 slot)')[20] in § 2.1.1 there shows no sibilant consonants save the affricates *ts-* and *ts^h-*, as sibilant fricatives merged into a lateral /ɬ/ phoneme. The lack of an /s/ phoneme of some kind, in particular

[17] Most Chinese languages, including Yuè, can be traced back to a language stage called Middle Chinese, recorded in the 601 CE rhyme dictionary *Qièyùn*.

[18] See Liú (2007) for dialectological background.

[19] For a very similar table without reference to a specific dialect of Púxiān see table 1 in Wu (2010, § 1.4.1). Both tables lack sibilant fricatives.

[20] Sinitic languages as a whole show a very limited consonantal paradigm in syllable-final position (C_2). Thus, the relevant position for the current discussion is syllable-initial.

	meaning	Middle Chinese	Táishān	Púxiān		Mandarin		Standard Cantonese		
三	three	/sam/	/ɬam³³/	/ɬo³³/		*sān*	/sa̠n⁵⁵/	*saam¹*	/sa:m⁵⁵/	
四	four	/siiᴴ/	/ɬi³³/	/ɬi⁵²/		*sì*	/sz̩⁵¹/	*sei³, si³*	/sei̯³³, si:³³/	
新	new	/siɪn/	/ɬin³³/	/ɬiŋ/		*xīn*	/ɕin⁵⁵/	*san¹*	/sɐn⁵⁵/	
生	live	/ʃɤæŋ⁽ᴴ⁾/	/saŋ³³/	/ɬã, tsʰã/	(coll.)	*shēng*	/ʂɤŋ⁵⁵/	*saang¹*	/sa:ŋ⁵⁵/	(coll.)
	be born			/ɬɛŋ⁵⁵/	(lit.)			*sang¹*	/sɐŋ⁵⁵/	(lit.)
食	eat, ...	/ʑɨkˉ/	/sɛt³²/	/ɬie²¹/		*(shí)*	(/ʂz̩³⁵/)	*sik⁶*	/sɪkˉ²/	
坐	sit	/d͡zuɑᵡ/	/tɔ³³/	/ɬœy⁵²/		*zuò*	/t͡sṵɔ⁵¹/	*co⁵*	/t͡sʰɔ:¹³/	(coll.)
								zo⁶	/t͡sɔ:²²/	(lit.)

Table 2: A comparison of reflexes for sibilant phonemes in Táishān and Púxiān, with Mandarin and Standard Cantonese (Standard Yuè) for completeness, showing all sibilant reflexes. Mandarin is given in *pīnyīn* translation and Cantonese in *jyut⁶ping³*, both followed by IPA transcription.

in a language that *has* other fricatives, is rather rare crosslinguistically (Lass 1984, § 7.6.2; Maddieson 1984, § 3.1).

Of special interest for our discussion — especially in connection with the previous subsection dealing with Welsh — is Chen (2018, §§ 3–4), which deals with a morphophonological phenomenon he calls *initial assimilation* (after 声母類化 *shēngmǔ lèihuà*, a term coined by Tao (1930)) in Xiānyóu. As Yang (2015, n. 2 on p. 2) notes, this term is problematic and may be misleading because it does not cover the actual properties of the phenomenon (e.g. not all alternations covered by it are in fact assimilations). She offers the term *consonant mutation* as a more apt one; I adopt this term here because it is more accurate and benefits from being used as a general linguistic term.[21] The consonant mutations in Mǐn languages are a type of morphophonological alternation of the onset of the second element in high-juncture phrases consisting of two elements (primarily compounds); the nature of the alternation depends on the rhyme[22] of the first element and the onset of the second one (Chen 2018; Wu 2010, § 1.4.1).

Table 3 is based on table 5 in Chen (2018) and gives an overview of the consonant mutations in Xiānyóu.

[21] The fact Yang (2015) deals with another language (Fúzhōu, an Eastern Mǐn language) is not relevant: the consonant mutation systems in Fúzhōu and Púxiān share many properties in common and can (and should) share a term to describe them.

[22] In Chinese linguistics a *rhyme* refers to the nucleus of a syllable + an optional coda.

		a (C)V?._	b (C)V._V	c (C)Ṽ._V	d (C)V._Ṽ or (C)Ṽ._Ṽ	e (C)(V)N._R
1	p, pʰ		β	β~m	m	m
2	t, tʰ, **ɬ**, ts, tsʰ		**l**	**l~n**	n	n
3	k, kʰ, h, ʔ		∅	∅	∅	ŋ
4	m, n, l, ŋ					

Table 3: Reproduction of table 5 in Chen (2018) with stylistic changes for clarity. ⟨_⟩ designates the mutated consonant; ⟨C⟩ an initial consonant (of the previous word); ⟨V⟩ a non-nasal vowel, diphthong or triphthong; ⟨Ṽ⟩ a nasal vowel; ⟨N⟩ a nasal consonant; ⟨R⟩ a rhyme; ⟨∅⟩ a zero initial. An empty cell designates no alternation. The realization of the glottal stop coda (/-ʔ/) in column *a* depends on the following consonant ([p], [t] or [k] followed by a bilabial, alveolar or velar consonant, respectively), resulting in gemination with plosives. Emphasis mine.

Before discussing the relevance of the Xiānyóu consonant mutations to this study, let us clarify by providing some examples from Chen (ibid.), demonstrating various mutations in table 4.

mutation	first element		second element		compound	
1a	/piʔ²⁴/	‘honey’	/pʰaŋ⁵⁵/	‘bee’	[pip³⁵.pʰaŋ⁵⁴]	‘honeybee’
1b	/tsau⁵²/	‘fireplace’	/piŋ⁵⁵/	‘edge’	[tsau⁴⁴.βiŋ⁵⁴]	‘the edge of the fireplace’
2b	/tsʰui⁵²/	‘mouth’	/tɔ⁵⁵/	‘dry’	[tsʰui⁴⁴.lɔ⁵⁴]	‘thirsty’
2b	/tua¹¹/	‘big’	/**ɬya**²⁴/	‘snake’	[tua²⁴.**lya**²⁴]	‘(big?) snake’
3e	/aŋ²⁴/	‘red’	/kou⁵⁵/	‘mushroom’	[aŋ²⁴.ŋõũ⁵⁴]	‘red mushroom’
4b	/hi¹¹/	‘ear’	/laŋ²⁴/	‘deaf’	[çi²⁴.laŋ²⁴]	‘deaf’

Table 4: Examples for Xiānyóu mutations in compounds. Emphasis mine.

While there are evident differences between the consonant mutation systems in Welsh and in Xiānyóu (both in the actual phonological alternations — that operate in markedly different phonological systems — and in their use, syntax and function[23]), there are several striking similarities: column *b* in table 3 is roughly analogous to the Welsh soft mutation, column *e* to the nasal mutation, columns *c* and *d* combine properties of columns *b* ('soft mutation') and *e* ('nasal mutation'), and column *a* seems to resemble the historical predecessor of the modern aspirate mutation[24]. The origin of the soft mutation is intervocalic lenition (Jackson 1953, §§ 131–143), like in column *b*, and that of the nasal mutation is assimilation to a preceding nasal consonant (ibid., §§ 186–189), like in column *e*.

The point of likening the two systems is to demonstrate similar treatment of /ɬ/ in somewhat similar morphophonological systems: not only both languages have an /ɬ/ phoneme, and not only both languages have a consonant mutation system, both mutate /ɬ/ to /l/. While in Welsh the connection between /ɬ/ and /l/ is both synchronic and diachronic, Xiānyóu shows similar synchronic connection while its /ɬ/ has no diachronic connection to /l/ (as /ɬ/ developed from sibilant fricatives).[25]

Consonant mutations in Sinitic languages are not limited to Púxiān. This phenomenon is found in other, Eastern, Mǐn languages such as Fúzhōu (Yang 2015, § 2.2).[26] The Fúzhōu analogue to column *b* in table 3 is given in Yang (ibid., (6), p. 5): the relevant fact for our interest is that /t-/, /tʰ-/ and /s-/ are mutated to [l-]. As stated above, Púxiān /ɬ-/ derives from earlier sibilant fricatives; here the Fúzhōu sibilant fricative /s-/ (a cognate of Púxiān /ɬ-/) shows a similar synchronic behaviour to Púxiān /ɬ-/.

Another phenomenon concerning lateral fricatives in Sinitic languages is that of lateralization. It is quite limited, and occurs in Yìyáng (from the New Xiāng group), as demonstrated in table 5. Bu (2018, pp. 55–56) discusses the explanation given by Xia (2008) for the change: an intermediate /ɮ-/ stage between the (post-)alveolar consonants and /l-/: at first the stops merged into their corresponding fricatives, then the (post-)alveolar fricatives all merged into /ɮ-/, and finally /ɮ-/ > /l-/. This does not explain Middle Chinese 爬 *bua* > Yìyáng *la*, though.

	長	常	柴	賤	乘	尋	茶	蛇	爬
MC	ɖʰiɐŋ	dʑiɐŋ	dʐɯæ	dziɛn	ʑiŋ	zim	ɖʰɯa	ʑia	bɯa
Yìyáng	lõ	lõ	lai	liẽ	lən	lin	la	la	la

Table 5: Lateralization in Yìyáng; reproduced from Bu (2018, table 8, p. 55). MC stands for Middle Chinese.

2.3 Semitic

While the previous subsection discussed scenarios in which sibilant fricatives develop into lateral ones, this section demonstrates the opposite direction.

Two[27] lateral fricatives are reconstructed in Proto-Semitic, usually designated as ⟨*ś⟩ and ⟨*ṣ́⟩ (or ⟨*ŝ⟩ and ⟨*ṣ̂⟩) in the Semitist literature (a dot diacritic marks a phoneme as 'emphatic'; see Kogan 2011, § 1.3.1). In all contemporary Semitic languages apart from Modern South Arabian languages, and in some ancient languages as well, these phonemes did not remain lateral: in most cases they merged with existing sibilant phonemes. See table 6 for regular correspondences.

[23] One fundamental difference is the fact that the Welsh mutations are not dependent on (morpho-)phonological contact but are a part of larger syntactic structures, while the Xiānyóu seem to be dependent on phonological contact (which is much more common in the world's languages). The Welsh soft mutation, for example, serves as a copular link in the *i- cum infinitivo* nexal pattern (a *that*-clause), as discussed by Shisha-Halevy (2003, § 4.a.2); for example: *Y pity yw fod rhaid i drychineb ddigwydd cyn inni ddysgu'r gwirionedd* 'The pity is that it is necessary for a disaster to happen before we learn (lit. before for us to learn) the truth' (*ddigwydd* /ð-/ and *ddysgu* /ð-/ are the soft-mutated forms of *digwydd* /d-/ 'to happen' and *dysgu* /d-/ 'to learn', the soft mutation being required as a part of the *i- cum infinitivo* pattern).

[24] The fricativization of /p/, /t/ and /k/ is a development of earlier **pp*, **tt* and **kk*, which is not limited to mutations; see Jackson (1953, §§ 145–147, 183–185).

[25] One phonotactic corollary of the change of word-initial **l-* > /ɬ-/ in Welsh is the very limited number of words in Modern Welsh that begin with an /l-/, most of them post-change loanwords such as *lôn* /lɔ:n/ 'lane' and *lafant* /laˈvant/ 'lavender'. On the other hand, phonemic /l-/:/ɬ-/ oppositions are prevalent in Xiānyóu (e.g. 時 [ɬi²⁴] 'time' versus 梨 [li²⁴] 'pear').

[26] Chen (2018, § 6) reports that some scholars, such as R. Li and Yao (2008), hold the view that Púxiān was influenced by Eastern Mǐn dialects. Wu (2010, p. 21) states consonant mutation is a phenomenon common to Mǐn (in general?).

[27] Another view reconstructs an additional voiced lateral fricative, **ź* (**ẑ*) (Voigt 1992; Goldenberg 2012, p. 71).

PS	Akk.	Ugr.	Hbr.	Syr.	Arb.	Sab.	Gez.	Tgr., Tna.	Amh.	Har.	Gur.	Mhr.	Jib.	Soq.
*s	s	s	s	s	s	s_3	s	s, š	s, š	s, š	s, š	s	s	s
*š	š	š	š	š	s	s_1	s	s, š	s, š	s, š	s, š	š, h	š, s	š, h
*ṣ	ṣ	ṣ	ṣ	ṣ	ṣ	ṣ	ṣ	ṣ, č̣	ṭ, č̣	ṭ, č̣	ṭ, č̣	ṣ, ṣ̌	ṣ	ṣ
*ś	š	š	ś	s	š	s_2	ś	s, š	s, š	s, š	s, š	ś	ś	ś
*ṣ́	ṣ	ṣ	ṣ	ʿ	ḍ	ṣ́	ṣ́	ṣ, č̣	ṭ, č̣	ṭ, č̣	ṭ, č̣	ź	ẓ́	ẓ́

Table 6: Regular correspondences of the Proto-Semitic consonants; reproduced from the relevant rows in table 6.2 in Kogan (2011, § 1.2), substituting circumflex notation (⟨*ŝ⟩/⟨*ŝ́⟩) with the more common acute accent (⟨*ś⟩/⟨*ṣ́⟩) notation.

The reconstruction of lateral fricatives in Proto-Semitic goes back to Richard Lepsius in 1861, but it was Steiner (1977), later followed by Steiner (1991), that was decisive for the wide recognition of the hypothesis. Steiner (1977) is structured by lines of evidence, from diverse directions (see Kogan (2011, §1.3.3) for a short overview). I will mention some of these lines of evidence here, because of their general benefit for understanding lateral fricatives.

The most direct evidence is the fact that Modern South Arabian languages preserve lateral fricative reflexes for *ś and *ṣ́ (/ɬ/ and /ɬˤ~ɬ'/ respectively); see Steiner (1977, ch. 2f.) and Kogan (2011, § 1.3.3.1).[28] Modern South Arabian languages are represented in table 6 by Meheri *(Mhr.)*, Ǧībbali *(Jib.)* and Soqotri *(Soq.)* in the rightmost columns; they are descendant from Ancient South Arabian languages, represented in the table by Sabaic (abbreviated as *Sab.*). Evidence from a marginal, however conservative, group of languages cannot suffice. Luckily, ancient Semitic languages provide ample evidence.

While there are obviously no recordings from earlier times, early grammarians can provide invaluable information. Sībawayhi (c. 760–796) is one of the most important grammarians in the native Arabic grammatical tradition. Concerning the *muḫraǧ* (مخرج 'place of articulation') of ض (*ḍād*, which is pronounced [dˤ] in most contemporary Arabic dialects) he writes in his *Kitāb*:

> *min bayni ʾawwali ḥāffati l-lisāni wa-mā yalīhi mina l-ʾaḍrās*
>
> 'between the beginning of the tongue's edge and the corresponding molars'

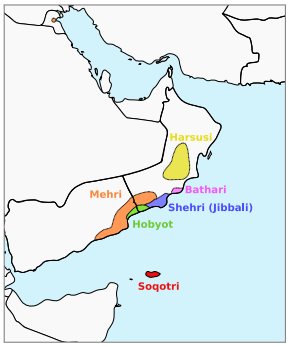
This, when compared with the similar *muḫraǧ* of ل *(lām)*, which is beyond doubt an /l/ phoneme (voiced lateral approximant), implies a lateral articulation of *ḍ* (< Proto-Semitic *ṣ́), presumably [ɮˤ] or [d͡ɮˤ] (see Steiner (1977, ch. 4) for a detailed discussion; see also Kogan (2011, § 1.3.3.2)).

In addition to the descriptive evidence from Sībawayhi's times and dialect the fact that Arabic came in contact with numerous languages which borrowed words from it can provide further evidence for the lateral articulation of *ḍ* (see Steiner 1977, ch. 5–8; Kogan 2011, § 1.3.3.4; K. Versteegh 1999). Table 7 demonstrates some lateral phonemes or phoneme sequences in words which were borrowed from Arabic words containing *ḍ*.

language	loanword	gloss		Arabic form
Spanish	*alcal**d**e*	'judge, mayor'	<	*ʾal-qāḍ(ī)*
Malay	***dl**oha*	'morning'	<	*ḍuḥā*
Hausa	*hai**l**a̰*	'menstruation'	<	*ḥayḍ*
Somali	*ár**l**i*	'country'	<	*ʾarḍ*

Table 7: Loanwords from Arabic words containing *ḍ*.

[28] Note that 'Arabian', in the geographical sense, is to distinguished from 'Arabic'; these languages are spoken in the south of the Arabian peninsula.



Source: Wikimedia Commons.

Evidence from loan words is not limited to Arabic *ḍ*. βάλσαμον *(bálsamon)* is the Greek name of the plant *Commiphora gileadensis*, treasured in the ancient world for its sap which was used in perfumes and medicine. The Greek word is of a certain Semitic origin (Frisk 1960, βάλσαμον, p. 217); see Steiner (1977, ch. 16) for a detail discussion about the path of borrowing and Kogan (2011, § 1.3.3.18) for a summary. The donor word was Hebrew בֹּשֶׂם[29] *bōśɛm* or בָּשָׂם *bāśām*, or a cognate from another Semitic donor (Phoenician? South Arabian?). Here, in a similar manner to Spanish *alcalde* and Malay *dloha*[30], a lateral phoneme is split into two phonemes (see § 4.1). Similar evidence can be observed from the Hebrew ethnonym כַּשְׂדִּים *kaśdīm* 'Chaldaeans' in comparison to Akkadian *kaldu* or *kaldāy- (kal-da-a-a)* (> Aramaic *kaldāy* > Septuagint Greek χαλδαίοι *kʰaldaíoi*; see Steiner (1977, ch. 18) and Kogan (2011, § 1.3.3.20)) and from the epigraphic Gəʿəz place name ምዐ *m(ä)ṡ(ä)*, rendered in Greek as μάτλια *mátlia* (Rodinson 1981; Weninger 1998).

Another line of evidence is the phonotactic incompatibility of the Semitic lateral fricatives with the lateral approximant **l* (see Steiner 1977, ch. 13, 1991, pp. 1504–1506; Kogan 2011, § 1.3.3.6).

The evidence discussed here (direct evidence from living Semitic languages, the writings of early grammarians, loan-words, rendition of names in Greek and phonotactics) can shed light on lateral fricatives in language history, grammar and language contact.

As stated above, all contemporary Semitic languages apart from Modern South Arabian languages lost their lateral fricative phonemes: in most cases they merged into sibilant phonemes, in Aramaic/Syrian into ʿ /ʕ/ and in Arabic it changed to *ḍ* ([dˤ] in most dialects). It is that probable language contact is a contributing factor in this widespread change, which took place over a long period (from at least ancient Akkadian in one end to late antiquity Arabian in the other); the remote and relatively isolated South Arabians being an exception. Notice that no Semitic language demonstrates a */ɬ(')/ > /l/ change: this can be due to the said language contact and/or can indicate some 'hissing' (sibilant) quality in the articulation of the original Semitic lateral fricatives, which resulted in full assibilation.

The Modern South Arabian languages show that lateral fricatives *can* be very stable: without getting into the vexed question of dating Proto-Semitic, stability and continuity are demonstrated here over a great deal of time.[31] Evidence for the degree of influence of language contact on the stability of lateral fricatives can be obtained from another case. Ball, Müller, and Munro (2001) conducted an experimental study of the acquisition of Welsh phonology in bilingual Welsh-English children. They found clear differences in the acquisition of /ɬ/ between Welsh-dominant and English-dominant subjects: in all age groups the English-dominant produced /ɬ/ less accurately. Only in the last age group (Group E, age range 4;6–5;0) the Welsh-dominant subjects achieved 100% accuracy, while the English-dominant ones achieved 81%, 67% and 50% for initial, medial and final positions respectively in that age group. As imperfect acquisition can impede intergenerational retention and stability, this study can shed light on the retention of the Semitic lateral fricatives (as well as other linguistic features) in South Arabian languages, whose speakers live on the edge of the Semitic world, bordered by deserts

Commiphora gileadensis, an illustration by Petronella J.M. Pas (1881); from Wikimedia Commons.

[29] Concerning the orthographic double duty (polyphony) of the Hebrew ⟨ש⟩ *(šīn)*, which was used for both *š* /ʃ/ and *ś* /ɬ/, see Rendsburg (2013–, § 2.1) and Goldenberg (2012, § 7.3). Such polyphony is not unique to ⟨ש⟩: ⟨ח⟩ *(ḥēṭ)* was used for both *ḫ* and *ḥ*, and ⟨ע⟩ *(ʿayin)* was used for both *ǵ* and ʿ (Rendsburg 2013–, § 2.2).

[30] Malay *dl* may reflect Arabic [d͡ʒˤ], if that was indeed the realization in the Arabic variety that influenced Malay.

[31] One could argue these two or three lateral phonemes go back to an even earlier, Proto-Afro-Asiatic stage (see, for example, Orel and Stolbova 1995; Ehret 1995; Bomhard 2008, §8), but it is quite problematic from an epistemological point of view: over such long periods of time the comparative method cannot work as well and many of the reconstructions are not scientifically valid; see Steiner 1977, p. 159f.

and the ocean (or water from all sides in the case of the island dwelling Soqotri people).

2.4 Mongolian

The Khalkha dialect is the most widely spoken and best documented dialect of Mongolian. One rather rare feature of its phonological inventory is the existence of a voiced lateral alveolar fricative /ɮ/[32] (written as ⟨л⟩ in the Cyrillic Mongolian alphabet) while it lacks a voiced lateral alveolar approximant /l/ (see Svantesson et al. (2005, § 2.4); Maddieson (2013) lists only 8 languages out of 567 (1.41%) as 'no /l/, but lateral obstruents'). This state of things is the result of an /l/ > /ɮ/ change, which was to the best of my knowledge unconditioned. This change is not shared by other dialects (Janhunen 2003, p. 157). As discussed in § 2.2, Xiānyóu also has a rare feature in its phonological inventory — the lack of sibilant fricatives, especially when it has a fricative (/ɬ/) and sibilant affricates (/ts/ and /tsʰ/) — which is the result of an unconditioned change as well, of the sibilant fricatives to /ɬ/. There is a structural difference, though, between the two: while the Mongolian /l/ > /ɮ/ change of phonetic material did not change the phonological system in terms of oppositions[33], the case in Xiānyóu is that of a phonemic merger. See Bybee (2008) for discussion of the diachronic dimension of crosslinguistic universals (and rarities).

It is maybe due to this reason (no /l/:/ɮ/ opposition) that the actual fricative articulation is not mentioned in some of the linguistic literature (see Svantesson et al. 2005, § 2.4): for example, while earlier Ramstedt (1902) does refer to it, Poppe (1970) discusses the phoneme he writes as /l/ in § 2.117 (liquids) — not in § 2.115 (fricatives) — and gives [L, l, lʲ, ɬ, ɬʲ[34]] as allophones. The fact that it is written with plain ⟨л⟩ (a Cyrillic grapheme that usually denotes /l/) may contribute to this.

Phonotactically, /ɮ/ does not occur in word-initial position in native words. Nevertheless, the contact with languages such as Tibetan and Russian broadened the scope of /ɮ/ in loan-words; for example, лам *lam* /ɮam/ 'lama' (from Tibetan བླ་མ *bla ma* /la˩.ma˩/) and лавраант *lavraant* [ɮawrantʰ] 'laboratory assistant' (from Russian лаборант *laborant* [ləbɐˈrant]); see Svantesson et al. (2005, § 3.3). In addition, /ɬ/ occurs in a few loan-words of Tibetan origin — reflecting Tibetan /l̥/ (Maddieson and Emmorey 1984) — the only common one being лхагва *lhagva* /ɬɑgw/ [ɬaʁʷ] 'Wednesday' (from Tibetan ལྷག་པ *lhag pa* /l̥a(k˩)˨˩˦.pa˩/); orthographically it is written ⟨лх⟩ *lh* in a similar manner to Tibetan ལྷ *lh* /l̥/ (a ligature digraph combining ལ *l* and ྷ *h*).

In articulation, some speakers devoice /ɮ/ into an [ɬ] (Karlsson 2005, § 0.3.4; Svantesson et al. 2005, § 2.4), but it is still distinguishable from the /ɬ/ of Tibetan loanwords, the latter having higher intensity and more high-frequency noise (Svantesson et al. 2005, § 2.4).

3 Motivations for diachronic pathways and morphophonological alternations

In the previous section several pathways and morphophonological alternations have been demonstrated, a synopsis of which is given as table 8.

[32] There is also an /ɮʲ/, as a part of a wide system of palatalization (Svantesson et al. 2005, §§ 2.6, 3.2.1).

[33] Using de Saussure's chess analogy (Saussure 2011, part 1, ch. 5), this can be likened to substituting a knight piece made of one material with a knight piece made of another material: it has no effect on the game with regards to its system.

[34] Note: ⟨ɬ⟩ (a velarized alveolar lateral approximant or a 'dark *l*' in most varieties of English) is to be distinguished from ⟨ɬ⟩, although the glyphs look similar.

		diachronic			synchronic
section	language	original phoneme(s)		reflex(es)	morphophonological alternation
§ 2.1	Welsh	*/l/	>	/ɬ/	/ɬ/→/l/ mutation
§ 2.2	Táishān	*/s/	>	/ɬ/	
	Xiānyóu (Púxiān)	various sibilants	>	/ɬ/	/ɬ/→/l/ mutation
§ 2.3	Most Semitic languages	*/ɬ/, */ɬ'/	>	mostly sibilants	
§ 2.4	Khalkha Mongolian	*/l/	>	/ɮ/	

Table 8: Synopsis of discussed pathways and morphophonological alternations.

These pathways are by no means exhaustive, as there are additional sources for lateral fricatives and additional targets of diachronic change from lateral fricatives; see Steiner (1977, n. 4 on p. 11) for some other sources for /ɬ/.

In the discussed cases two main phonemes recur as diachronically related to lateral fricatives: /l/ and /s/ (as well as other sibilants). This is not unexpected as both have affinities with the lateral fricatives. Production-wise, both /l/ and /s/ share a place of articulation and a partial manner of articulation with /ɬ/ (/l/ by being lateral and /s/ by being fricative); see table 9. Perception-wise, /s/ is more acoustically similar to /ɬ/ than /l/ is, as demonstrated by fig. 5, with high intensity and noise in the higher end of the spectrum and lower in the lower end; see Gordon, Barthmaier, and Sands (2002) for a detailed acoustic study. As a kind of a bridge, the /ɬ/ phoneme in Xiānyóu shows both a diachronic connection with sibilants and a morphophonological connection with /l/ (as do other alveolar phonemes: /t/, /tʰ/, /ts/ and /tsʰ/).

	voice-less	alveo-lar	lateral	frica-tive
ɬ	+	+	+	+
l	–	+	+	–
s	+	+	–	+

Table 9: Articulatory features of /ɬ/, /l/ and /s/.

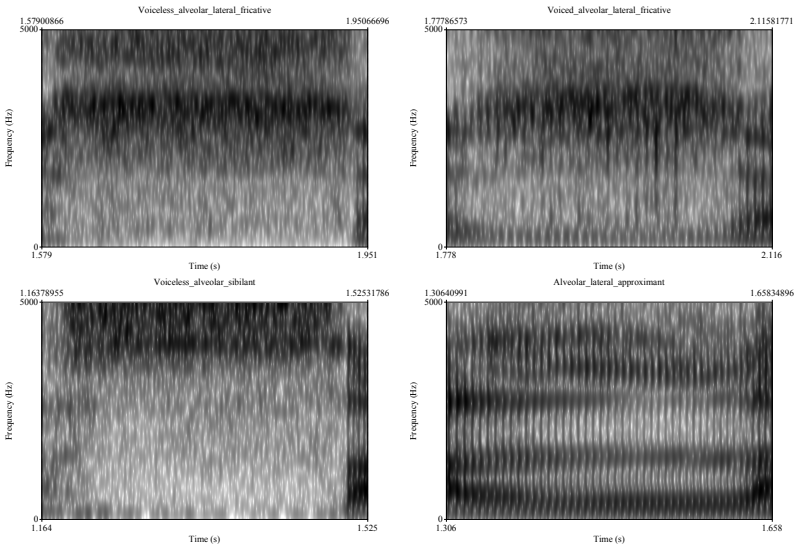


Figure 5: Spectograms of /ɬ/ (top left), /ɮ/ (top right), /s/ (bottom left) and /l/ bottom right. The spectograms were produced using Praat, with sound files obtained from the respective Wikipedia pages. The recordings are of the segments in question uttered between /a/ vowels, which can be seen in the edges.

Concerning the contribution of perception and production factors in the diachrony of lateral fricatives, the results of Ball, Müller, and Munro (2001) can shed some light, as they suggest it is perception rather than production that is the dominant feature in the acquisition of the (Welsh) lateral fricative. They analyze the substitutions children use for this phoneme when they have not acquired /ɬ/ perfectly yet, and these substitutions seem to be chosen for they acoustic characteristics rather then similarity in production.

Acquisition by children plays a major role in intergenerational transmission of language.

4 Conclusion

This paper presented some very preliminary findings concerning aspects of lateral fricatives in the world's languages. It touched upon quantitative, structural and geographical phonological typology, phonological change and diachronic pathways, morphophonology, phonotactics, loan-word phonology, language contact, and typological universals and rara. Much is yet to be done in order to gain a better understanding of these phonemes, and I hope this paper contributes towards that.

4.1 Venues for further research

One way our understanding can improve is to analyze aggregated information from databases. Such databases provide a lower resolution but wider typological view in comparison to case studies, which makes the lion's share of the paper in its current form; both ways complement each other. Among the relevant databases are BDPROTO (Marsico et al. 2018; phonological inventories from ancient and reconstructed languages), PHOIBLE (Moran and McCloy 2019; PHOIBLE has been used in this paper but can yield much more information), LAPSyD (Maddieson, Flavier, et al. 2013; phonological systems), P-base (Mielke 2008; phonological rules), the World Phonotactics Database (Donohue et al. 2013), the Database of Eurasian Phonological Inventories (Nikolaev, Nikulin, and Kukhto 2015) and SegBo (an in-progress survey of phonological segment borrowing, by Grossman, Nikolaev, Moran et al.).

My hope is to broaden the scope of the paper for a future, published version in three ways:

- employing the said databases in expanding and delving deeper into the wide-scale typology of lateral fricatives,
- examining more case studies in order to observe the similarities and differences in the roles lateral fricatives play in the diachrony and synchrony of different languages,
- discussing topics which were not discussed at all or merely touched upon in the current version.

  Such topics include the following:

The voiced lateral fricative. Only a single case study of /ɮ/ is discussed in the current version (Mongolian, § 2.4).

The lateral affricates. As shown in fig. 3 (bottom maps) and stated above, the geographic distribution of these phonemes is mainly limited to two geographical areas: Tanzania and western North America. This fact has to be taken into account in any typological or historical discussion of the lateral affricates.

The internal relationship between lateral fricatives / affricates. Many languages have several lateral fricative or affricate phonemes; do they show morphophonological or other interrelations?

Phonological (and orthographic) subsitutions. Imperfect imitations of phonological segments occur in two main scenarios: when speakers of other languages, with different phonological inventories, encounter a foreign language and during the period of first language acquisition in children (see Ball, Müller, and Munro 2001 for Welsh and Mowrer and Burger 1991 for Xhosa, two languages with lateral fricatives). The renditions of the acoustically distinctive[35] lateral fricatives — which many foreigners find difficult to pronounce and children master on a relatively late age (Ball, Müller, and Munro 2001) — are relevant for synchronic-typological linguistic description of these phonemes, as well as diachronic one (because of intergenerational transmission, as discussed above). Spanish *alcalde*, Malay *dloha*, Hausa *hailą*, Somali *árli* and Greek βάλσαμον *bálsamon*, χαλδαίοι *kʰaldaíoi* and μάτλια *mátlia* (§ 2.3) are some examples. Welsh surnames, first names and place names provide many examples for imperfect renditions of /ɬ/ by English speakers. For example, Morgan and Prys (1985) lists under the common Welsh surname *Llwyd* (from Welsh *llwyd* /ɬʊɨd/ 'grey, brown, faint, wan, muddy (of water)') dozens of spelling variations, including *Floyd*, *Flewitt*, *Luyd* and *Thloyd*. Most variations seem to begin with *Fl-*, thus splitting the features of /ɬ/ into sequential fricative and lateral components; cf. the anglicized Muscogee Creek name *Thlopthlocco* (from Creek *Rvp-Rakko*; ⟨r⟩ designates /ɬ/ in the traditional orthography, see Martin, McKane Mauldin, and McGirt (2011, § 9)). See Steiner (1977, pp. 124–126) for references to cases of such renditions of lateral fricatives in Modern South Arabian languages, Welsh, Adygian, Avar and Zulu by foreigners.

Orthography. On a similar note: how are the phonemes in question written in the orthographies of languages that have them in their inventories, either as proper phonemes or as allophones of other phonemes. This question is 'para-phonological', but it can offer a glimpse into the way people perceive these sounds: either people from within the speech community or from without, such as linguists who devise writing system for the use of communities speaking languages with no writing tradition. Steiner (ibid., n. 1 on p. 10 and n. 5 on p. 11) lists some symbols for /ɬ/ and /ɮ/. Although not academic *per se* the respective Wikipedia pages lists many examples in orthography and IPA transcription. The history of the IPA symbols ⟨ɬ⟩ and ⟨ɮ⟩ is a meta-linguistic question; according to Association phonétique internationale (1928) they became official in 1928, on the basis of published linguistic works, but ten years later ⟨ɮ⟩ was replaced by another, graphically similar symbol ⟨ʝ⟩, only to be later re-introduced. Its shape and official name (the IPA handbook lists it as 'L-Ezh ligature' and in Unicode it is called latin small letter lezh) suggest it is a ligature of ⟨l⟩ and ⟨ʒ⟩ ('ezh'); is this a case similar to the *fl* or *thl* representation discussed above, splitting the features between two components?

Borrowability and language areas. Examples like the phonological and orthographic substitutions discussed above demonstrate cases in which these sounds resist borrowing; yet the maps in fig. 3 suggest language areas

[35] Speakers of languages with lateral fricatives seem to be aware of the uniqueness of these sounds, at least in areas where these sounds are uncommon. For example, with regards to the uniqueness of sound of Arabic *ḍ* in the linguistic landscape of Arabic, the language itself was traditionally called لغة الضاد *luġat aḍ-ḍād* 'the language of the *ḍād*' (K. Versteegh and C. H. M. Versteegh 2014, p. 121). Similarly, in Tench (2012), when working with a group of men who spoke Tera (Chadic; Nigeriaw), the author writes he was 'astonished to discover Welsh "ll"s in their language' and had 'no expectation of hearing a distinctively Welsh sound out there'.

where they are shared between languages of different genealogical affiliation.

Dialectal variation. Some languages exhibit dialectal variation with regards to the sounds in question. For example, the northern dialects of Norwegian, from Trondheim and northwards, devoice /l/ after a short vowel and before a voiceless stop; Kristoffersen (2000, n. 21 on p. 79) describes it as a voiceless lateral fricative (/ɬ/), while Vanvik (1979, p. 36) describes it as a voiceless lateral approximant (/l̥/). In other dialects of Norwegian it is basically voiced in all positions.

⁘

I wish to finish this paper with a quotation from a talk by Welsh poet, playwright and translator Gillian Clarke.[36] While the theory suggested in it can be easily disproved by a glance at fig. 3 (top left), this does not diminish whatsoever its poetic quality...

> My favourite sound is the double *l*, and it's that [ɬ::] sound, and I've got a completely unproved theory that is because three sides of Wales is surrounded by the sea and most of the people live in those three sides, and the sound of the tide breaking on the shore is a kind of [ɬə] sound. My completely ridiculous theory is that this sound developed in the Welsh language (and as far as I know, not in any other language at all) because we're all *sea people*.

[36] The talk is available on YouTube: https://youtu.be/H8tHFuvRJAo?t=219

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