A Typological Overview of Lateral Fricatives in Southern Bantu Languages*

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This paper aims to provide a typological overview on the group-internal variation of lateral fricatives in selected southern Bantu languages. Based on phonetic observations about attested realisations in sample languages and their distributional patterns, we propose several hypothetical principles that explain observable variations, which include overall preference of voiceless lateral fricatives over voiced counterparts, implicational hierarchy that defines possible configuration of phonemic lateral fricatives in attested consonant inventories, and a phonotactic restriction that blocks a voiceless lateral fricatives to occur in a post-nasal position. We further discuss that through these principles the attested variation can be recognised as a continuum reflecting degrees of restrictiveness on lateral fricatives. We conclude the paper by addressing possible directions of further investigation especially on the emergence of lateral fricatives as a yet unsolved question.

Keywords: lateral fricatives, Bantu languages, phonetic typology, S Zone languages

DOI: https://doi.org/10.15026/0002000628

* This research is written as part of the ILCAA joint research project "Phonetic typology from cross-linguistic perspectives (PhonTyp)" (2021–2023). The research has been funded by a Kakenhi Grant (C) 20K00578. This work was also supported by JSPS KAKENHI Promotion of Joint International Research (Fostering Joint International Research (B)) Grant Number 21KK0005, and the Kakenhi (B) Grant 23H00622. Any errors remain our own.

1. Introduction

It is widely recognised that the Bantu language family, consisting of about 500 languages spread in vast areas of Sub-Saharan Africa (cf. Hammerström 2019), generally has a relatively small consonant inventory with a limited set of articulatory features (cf. Maddieson & Sands 2019). The simplicity of the consonant inventory reconstructed for Proto Bantu, which consists of two series of obstruents contrasting voiceless /p, t, c, k/ vs. voiced /b, d, j, ɡ/, latter of which could have been a series of continuants, with the nasal series /m, n, ɲ, ŋ/ (cf. Meeussen 1967: 83, Hyman 2019: 128), is still a common basis of a variety of phonemic systems found in many present-day Bantu languages. Most of the contemporary languages also have developed a series of fricatives through the process known as Bantu Spirantisation (Shadeberg 1994/95), where stop consonants are fricativised when followed by the first-grade high vowels, traditionally called 'super-high vowels' (cf. Maddieson & Sands 2019: 89). The final outcomes of the process, which are /f, v/ triggered by the highest back vowel and /s, z/ by the highest front vowel, are the most typical, and in many cases only distinctive fricatives in the phonemic inventory (Maddieson & Sands 2019: 90, see also 2.1 below).

However, this may not be the case in southern Bantu languages.[1] Especially those classified into zone S in the referential classification by Guthrie (1967–71), which is a southern-most group in Eastern Bantu languages, are said to have developed a complex system of consonants probably due to contact with surrounding non-Bantu languages including the languages spoken in Kalahari Basin area (traditionally called Khoesan lanaguages, mentioned as KBA languages hereafter), or to internal innovation (cf. Maddieson & Sands 2019: 90, Sands & Gunnink 2019, Gunnink, Chousou-Polydouri and Bostoen 2023, among others). At least three types of relatively complicated fricative sounds can be identified as those exclusively observed in zone S languages, which are i) 'whistled' fricatives[2] (cf. Lee-Kim *et al.* 2014), ii) a hetero-organic sequence of fricatives[3] (Ladefoged & Maddieson 1996: 330–331), and iii) lateral fricatives, the last of which is the focus of this article. In the following, we will discuss phonetic details of the lateral fricatives observed in the selected zone S languages, namely Northern Sotho [S32], Southern Ndebele [S407], Xhosa [S41], Zulu [S42], Swati [S43], and Tsonga [S53] (see Figure 1 for their geographical locations), based on the first-hand data collected in a series of field recording sessions with

1) Not only zone S languages but south-western Savannah languages including languages in zones K and L also tend to have developed a relatively complex system especially in terms of fricatives. This topic, however, is beyond the scope of this paper.

2) According to Lee-Kim *et al.* (2014), 'whistled' (or 'whistling') fricatives are observed in a zone S language Tsonga [S53], where the sounds are produced through a vertical narrowing of the lips, rather than a simple labialization with protrusion of the lips, with a retroflex lingual gesture.

3) Hetero-organic fricatives are the segments which have been described as double-articulated fricatives in the literature, e.g., Lombard (1985) for Northern Sotho [S32]: [f͡s] as in *βofsa* 'youth', [f͡ʃ] as in *leffeːra* 'coward', and [β͡ʒ] as in *βʒalɯa* 'beer'. However, Ladefoged & Maddieson (1996: 330–331) recognise the sound as a phonetic sequence rather than a single sound with two simultaneous fricative articulations.

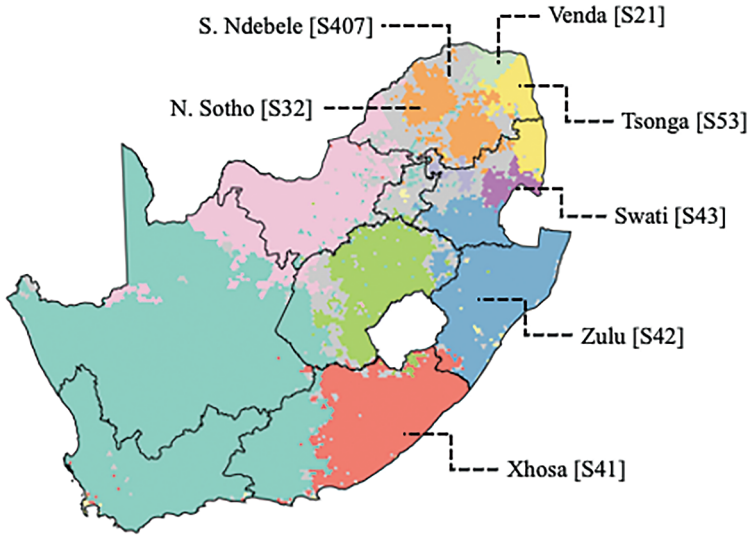


Figure 1 Map of Bantu languages in South Africa[4)]

relatively young speakers of each target language. Based on the empirical data, we will provide a tentative overview of the typological variation of the lateral fricatives attested in the sample languages.

The remaining part of this paper is organised as follows. In Section 2, we will introduce information on fricatives in Bantu from an intra-genetic and areal typological point of view. Section 3 provides basic observations of the attested phonetic realisations of lateral fricatives in the sample languages and summarises the distribution of lateral fricatives in terms of different phonetic environments. Based on the observation, in Section 4 we will argue on what kind of typological generalisation can be made from the attested variation of lateral fricatives throughout zone S languages. Section 5 concludes the article with a summary of the discussions and further questions to be investigated in the future research.

2. Fricatives in Bantu

2.1 Cross-Bantu Overview of the Fricative Series

The general tendency is that Bantu languages have relatively a small set of fricative consonants as Maddieson & Sands (2019: 90) point out: "[m]ost of the languages have relatively limited sets of fricatives of the cross-linguistically common types". Table. 1 shows a list of fricative consonants in the phonemic inventory of the selected sample languages consisting of at least two languages from all Guthrie zones.[5)]

4) Source: https://www.reddit.com/media?url=https%3A%2F%2Fi.redd.it%2F1uhm4svry5661.png

5) The primary source of the phonemic inventory of each sample language is collected from grammatical sketches included in Nurse & Philippson (2003) and Van de Velde *et al.* (2019). The secondary source, which is to fill the gap of geographical zones that are not covered by the primary sources, is supplied by the PHOIBLE database (Moran and McCloy 2019) and other additional sources shown in the table.

Table 1 List of fricative phonemes in sample languages[6)]

language name	bilab	lab-den	den	alv	pal-alv/pal	lat	vel/uvu	glt	source
Basaá [A43]				s				h	Hyman (2003: 259)
Nen [A44]		f		s			x	h	Mous (2003: 284)
Kpâʔ [A53]		f, v		s, z					Guarisma (2003: 308)
Makaa [A83]		f, v		s, z	ʃ, ʒ			h	Heath (2003: 336)
Kwakum [A91]		f, (v)			ʃ, ʃʰ				Njantcho & van de Velde (2019: 384)
Tsogo [B31]	β	f		s			ɣ		van der Veen (2003: 378–379)
Nsong [B85d]		f, v		s, z	ʃ, ʒ			h	Koni Muluwa & Bostoen (2019: 416)
Babole [C101]				s				h	Leitch (2003: 394)
Pagibete [C401]		f, v		s, z					Reeder (2019: 452)
Lega [D25]		(f, v)		s, z	(ʃ)				Botne (2003: 425–426)
Zimba [D26]		f		s					Kutsch Lojenga (2019: 476)
Bila [D32]	ɸ			s				h	Kutsch Lojenga (2003: 456)
Chuka [E541]	(β)		ð				(ɣ)		Kanana (2011)
Rombo [E623]		f, (v)		s, (z)	ʃ			h	DS's Fieldnote
Hangaza [JD65]	β	f, v		s, z	ʃ, ʒ			h	Rubagumya (2006) in UPSID[7)]
Rwanda [JD61]	β	f, v		s, z, ʂ, ʐ	ɕ			h	Walker *et al.* (2008)
Jita [JE25]		f		s	(ʃ)				Kagaya (2005)
Mara [JE40]		(f)		s	(ʃ)			h	Aunio *et al.* (2019: 507)
Langi [F33]		f, v		s, z	ʃ			h	Dunham (2005) in UPSID
Mbugwe [F34]		f		s	ʃ				Wilhelmsen (2019: 535)
Kami [G36]		f, v		s, z				h	Petzell & Aunio (2019: 565)
Ngazidja [G44a]	β	f, v	(θ, ð)	s, z	ʃ, (ʒ)		(x, ɣ)	h	Patin *et al.* (2019: 593)
Vwanji [G66]		f		s					Eaton (2019: 618)
Kituba [H10a]		f, v		s, z				h	Chanard (2006) in UPSID
Hungana [H42]		f		s, z				h	Takizala (1974) in UPSID
Fipa [M30]		f, v		s, z	ʃ, ʒ				Riedel & Bickmore (2013) in UPSID
Bemba [M42]	β	f		s	ʃ				Hamann & Kula (2015)

Chimpoto [N14]		v		s, z	ʃ, ʃʷ		ɣ	h, hʷ, hʸ	Botne (2019: 698)
Manda [N11]		f, v		s	ʃ		ɣ	h	Bernander (2017)
Matuumbi [P13]				(s)					Odden (2003: 532)
Yao [P21]		(f)		s					Odden (2003: 532)
Makonde [P23]				s	(ʃ)			h	Odden (2003: 532)
Makhuwa [P31]		v		s	ʃ			h	Kisseberth (2003: 549)
Cuwabo [P34]		f, v	ð	s, z	(ʃ)				Guérois (2019: 734)
Samba [L12a]		f, v		s, (z)	ʃ			h	van Acker & Bostoen (2020)
Lunda [L52]		f, v		s, z	ʃ, ʒ			h	Kawasha (2006)
Luvale [K14]		f, v		s, z	ʃ, ʒ			h	Sommer (2003: 568)
Luyana [K31]	β	f		s, z	ʃ				Sommer (2003: 568)
Kwangari [K33]	β	f, v		s	ʃ			h	Sommer (2003: 568)
Gciriku [K38b]	β	f, v			ʃ		ɣ	h	Sommer (2003: 568)
Totela [K41]	β	f		s, z	(ʃ)			(h), hʷ	Crane (2019: 650)
Mbukushu [K43]		f, v	θ, ð		ʃ		ɣ	h	Sommer (2003: 568)
Umbundu [R11]		f, v		s				h	Sommer (2003: 568)
Ndonga [R22]		f, v	θ, ð	s, z	ʃ, (ʒ)		x, ɣ	h	Sommer (2003: 568)
Herero [R31]		v	θ, ð					h	Elderkin (2003: 582)
Yeyi [R41]		f, v		s, z	ʃ, ʒ			h	Sommer (2003: 568)
Venda [S21]	ɸ, β	f, v		s, z, s̠, z̠	ʃ, ʒ		x, (ɣ)	ɦ	Nemakhavhani (2002)
Tswana [S31]		(f)		s	ʃ		χ	h	Bennett *et al.* (2016)
Xhosa [S41]		f, v		s, z	ʃ	ɬ, ɮ̠	x, ɣ̠	h, ɦ̠	Gowlett (2003: 615)
Tsonga[8] [S53]	ɸ, β	v, v̠		s, z	ʃ, ʒ	ɬ	x	ɦ	Gowlett (2003: 615), Baumbach (1987: 3–16)
Copi [S61]		f		s, s͡w	(ʃ)	(ɬ)		ɦ̠	Gowlett (2003: 615)

6) The abbreviations in Table 1 are as follows: bilab for bilabials, lab-den for labio-dentals, den for dentals, alv for alveolars, pal-alv for palatal-alveolars, pal for palatals, lat for laterals, vel for velars, uvu for uvulars, and glt for glottals.

7) UPSID data is taken from https://phoible.org/contributors/UPSID.

8) /v̠/ and /ɬ/ are missing in Baumbach (1987).

Table 2 Geographical distribution of fricative phonemes: comparison between south (zones K, R, and S) and non-south

	bilab	lab-den	den	alv	pal-alv/ pal	lat	vel/uvu	glt
lgs attested (total)	**13**	45	**6**	46	34	**3**	**13**	35
percentage (total)	0.25	0.88	0.12	0.90	0.67	0.06	0.25	0.69
lgs attested (south: K, R, S)[9]	6	15	3	12	13	3	7	14
percentage (south)	**0.40**	1.00	**0.20**	0.80	0.87	**0.20**	**0.47**	0.93
percentage (south/total)	0.46	0.33	0.50	0.26	0.38	**1.00**	0.54	0.40
lgs attested (non-south)	7	30	3	34	21	0	6	21
percentage (non-south)	**0.19**	0.83	**0.08**	0.94	0.58	**0.00**	**0.17**	0.58
percentage (non-south/total)	0.54	0.67	0.50	0.74	0.62	0.00	0.46	0.60

As summarised in Table 2, the most typical fricative types found across Bantu languages are alveolars /s, z/ (90%, 46 out of the 51 sample languages) and labiodentals /f, v/ (88%), both of which are cross-linguistically common. Palato-alveolars /ʃ, ʒ/ and the glottal /h/ are the second common group, which are geographically distributed in wide areas. What is striking is the remaining types of fricatives. Bilabials /ɸ, β/ and velars + uvulars /x, ɣ; χ, ʁ/ are less common across Bantu languages, i.e., both appear in 25% of sample languages, but also the distribution in non-south languages are further limited (19% for bilabials and 17% for velars + uvulars). Dentals /θ, ð/ show the similar distribution but they must have been introduced through lexical borrowing from languages in recent contact at least in some cases e.g., Ngazidja [G44a] from Arabic (Patin *et al.* 2019: 592). Most importantly, lateral fricatives /ɬ, ɮ/, the rarest throughout the Bantu area, are exclusively attested in zone S.

2.2 South as a Phonological Area

Lateral fricatives being attested exclusively in zone S has been argued in a wider context of inter-genetic areal typology. Discussing segmental as well as suprasegmental features that characterise South as one of the phonological areas in Africa, among which are North, East, Rift, Center and Sudanic, Clements and Rialland (2008: 82)[10] propose that 'lateral obstruents' as one of such features shared among languages spoken in the Kalahari Basin area (KBA languages). It should also be pointed out that interestingly KBA languages have not developed a rich system of fricatives and most of them do not have lateral fricatives in their phonemic inventory (cf. Nakagawa 2014). However, it is still

9) This classification is simply based on geographical adjacency and is not based on any historical consideration about genetic affinity, for which there seems no controversial classification has been established so far (cf. Naumann & Bibiko 2016). For example, Nurse & Philippson (2003b: 171) tentatively propose "Zone S: S20–30–40–?S50–?S60, plus P30" as 'Southeast' according to Janson's (1991/2) proposal.

10) Clements & Rialland (2008: 82) "A third zone, the South, is sharply delineated by the remaining features [...]: ejective and aspirated stops, clicks, and slack voiced stops. To these features we could add their characteristic series of lateral affricates and fricatives. All these features are widely shared by Khoisan and Bantu languages in the region."

plausible that manipulation of the lateral as a phonological areal feature, which is directly associated with articulatory control of both or either side(s) of the tongue body, can be shared by languages across phylogenetic boundaries since such areal features may not be necessarily fully reflected on every language within the area, especially on 'newcomers' which are less influenced by such contact effect[11] (cf. Güldemann & Fehn 2017, Güldemann 2011. as cited in Naumann & Bibiko 2016).

Based on their own survey on Bantu and non-Bantu KBA language of the area, Naumann & Bibiko (2016) argue that lateral fricatives themselves may not be included in a set of areal features of South as a meta-phylogenetic linguistic area but are southeastern 'Bantu' areal feature. Besides the issue whether lateral fricatives, or more broadly lateral obstruents, should be part of areal features or not, what is significant in the scope of this paper is that there is internal variation in terms of distribution of different types of lateral fricatives in different phonetic environment, which in turn may shed light on typological generalisation of diversification and diffusion as well as diachronic processes of innovation.

3. Data from Southern Bantu Languages

The data in this section comes from a project about Bantu languages in Southern Africa, which collects phonetic data from multiple speakers to investigate segmental and suprasegmental patterns of the six sample languages, namely Venda [S21; VEN], Northern Sotho [S32; NSO], Southern Ndebele [S407; NBL], Xhosa [S41; XHO], Zulu [S42; ZUL], Swati [S43; SSW], and Tsonga [S53; TSO]. We conducted recording sessions in local environments where each language is spoken in its speech communities in 2022 and 2023. Data are collected through an organised questionnaire consisting of sample sentences composed of the basic vocabulary (mainly from Swadesh's 200-word list), which were embedded in frame sentences varying in tone yielding various combinations of segmental and suprasegmental features, such as syllable structures, phonotactic variation as well as tonal properties of lexical items. The use of Swadesh list was decided to collect a set of samples, which enables a comparative study of the seven target languages. As for the lateral fricative sounds, which are the main focus of this article, only the Venda language does not have a lateral fricative in its phoneme inventory. To allow readers to compare phonetic realizations of the fricatives in the same position, this section shares representative examples from the six languages with lateral fricatives[12]. A note about the entire corpus is in order. The stimuli were constructed from a list of 176 items that include target words (nouns, verbs, adjectives from the Swadesh list). These targets were embedded in low and

11) Naumann & Bibiko (2016) "... [S]ubstrate interference contributed repeatedly to creating linguistic similarities [in Nguni, Tswana, and Afrikaans] with Kalahari Basin languages (or at least maintaining existing ones) but has not been strong enough to make the newcomers "full" members of the area." Güldemann & Fehn (in prep.: 18; cf. also Güldemann 2010: 572f.)

12) Plots that appear in this section are taken from a larger set of recorded data of 8 South African Bantu languages. We show representative realisations of words that contain target lateral fricatives. Detailed phonetic studies of these lateral fricatives await future studies.

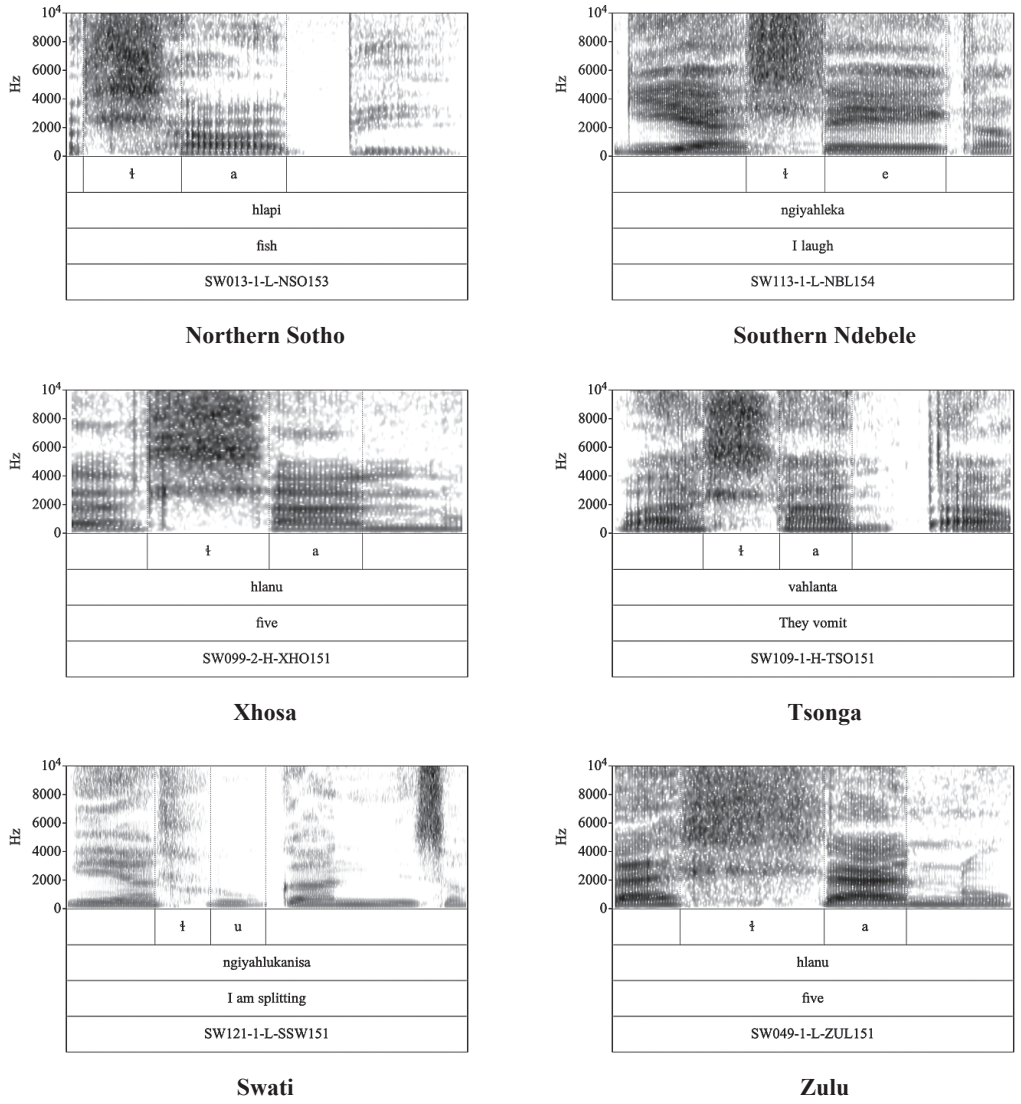


Figure 2 Voiceless lateral fricatives in the stem-initial position in six languages

high tone contexts and were produced twice, yielding 704 tokens per participant (176 items * 2 tonal contexts * 2 repetitions). The stimuli were recorded from 8 Venda and 8 Northern Sotho speakers (5682 tokens per language), as well as 12 Southern Ndebele and 12 Tsonga speakers (8448 per language). The recordings were made by one Xhosa speaker and one Zulu speaker. Altogether, 29668 tokens with or without lateral fricatives consist of our corpus.

3.1 Voiceless Lateral Fricative [ɬ]

The voiceless lateral fricative [ɬ] in Northern Sotho, Southern Ndebele, Xhosa, Zulu, Swati, and Tsonga shows distributional differences. While all six languages allow voiceless lateral fricatives in the stem-initial position and the word-medial position, only Zulu, Swati

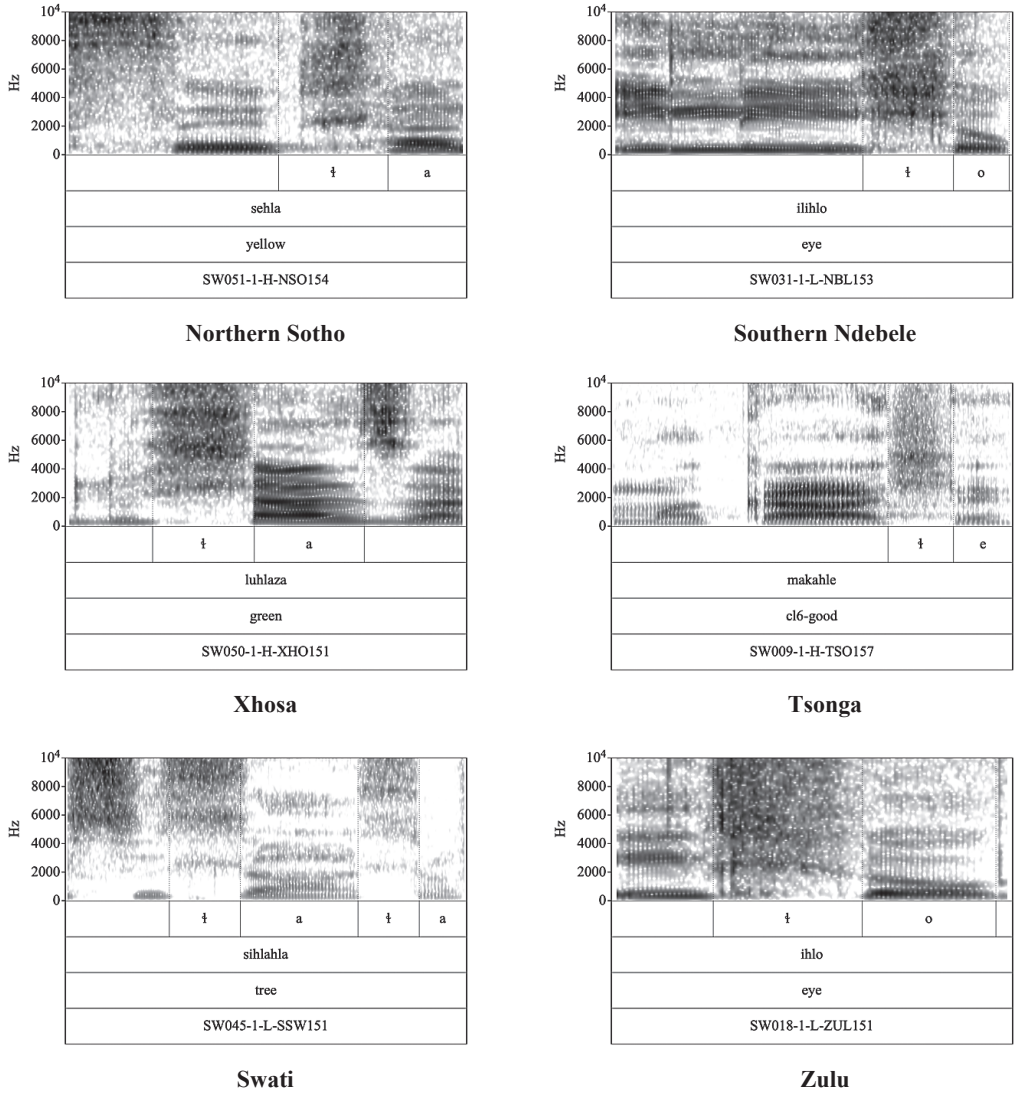
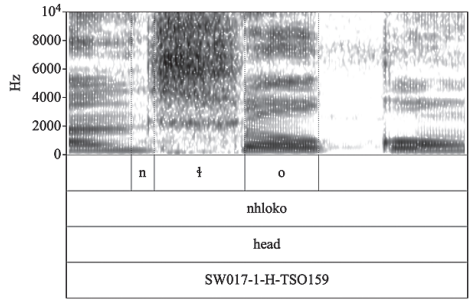


Figure 3 Voiceless lateral fricatives in the word-medial position in six languages

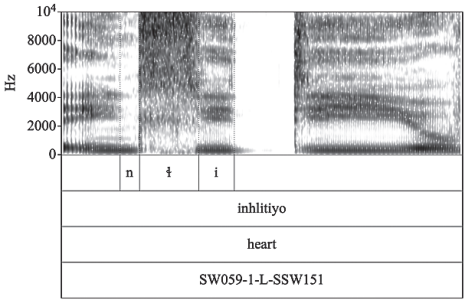
and Tsonga have [ɬ] after a nasal consonant.

3.1.1 Stem-initial

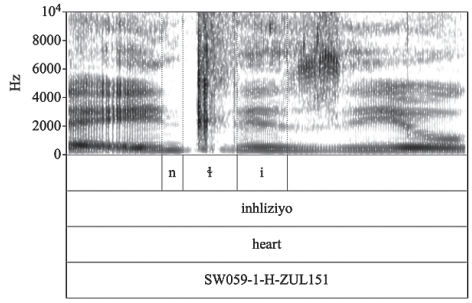
Examples from Northern Sotho, Southern Ndebele, Xhosa, Zulu, Swati, and Tsonga are shown in figure 2. In each plot, the first tier is annotated for a lateral fricative and the following vowel, which is taken from a target embedded in a frame sentence. The voiceless fricative is spelt as *hl* in the orthographic description given in the second tier. The second to the last tier is a token ID, and the bottom tier is the ID number for each token when it is stored in an archive.



a. Tsonga



b. Swati



c. Zulu

Figure 4 Voiceless lateral fricatives in the post-nasal position in three languages

3.1.2 Word-medial Position

Voiceless lateral fricatives in Northern Sotho, Southern Ndebele, Xhosa, Zulu, Swati, and Tsonga also appear in word-medial position as shown in figure 3. When compared with the acoustic signals in figure 2, the lateral fricatives in the word-medial position show similarities with those in the stem-initial position.

3.1.3 Post-nasal Voiceless Lateral Fricatives

Only three languages (Zulu, Swati, Tsonga) exhibit lateral fricatives in the post-nasal position. As studies on post-nasal plosives have shown, voiceless plosives are less preferred after a nasal (cf. Pater 1999). This tendency to avoid voiceless obstruents after a nasal extends to lateral fricatives.

3.2 Voiced Lateral Fricative [ɮ]

3.2.1 Stem-initial

Except for Northern Sotho, the voiced lateral fricative is observed in Southern Ndebele, Xhosa, Zulu, and Swati, and Tsonga, as shown in figure 5 (the sound is spelled as *dl* in the orthographic description). The realization of voiced lateral fricative shows voicing throughout the entire fricative (as in Xhosa and S. Ndebele), or partially (Tsonga, Swati).

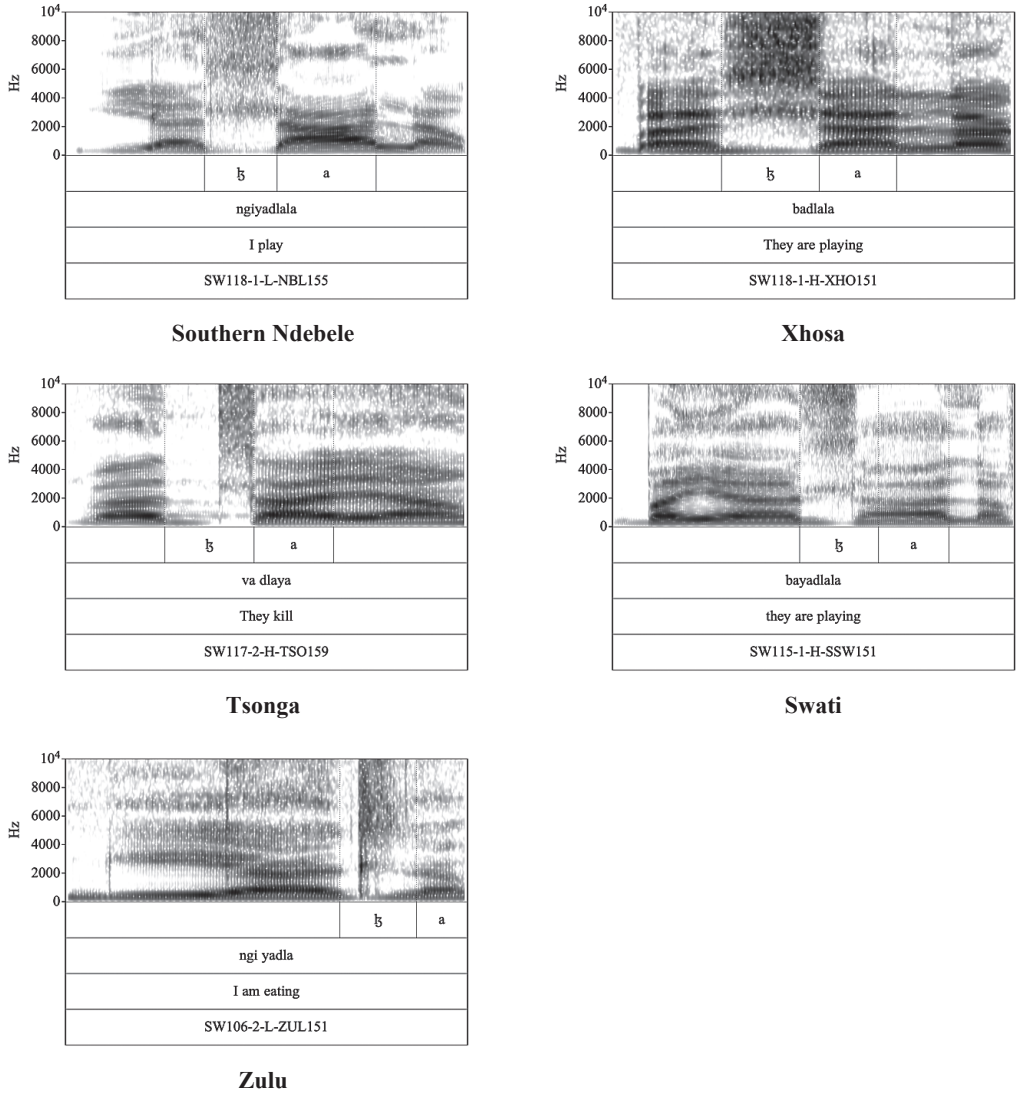


Figure 5 Voiced lateral fricatives in the stem-initial position in five languages

3.2.2 Word-medial Position

Four languages, namely Southern Ndebele, Xhosa, Zulu, and Swati have voiced lateral fricatives in the word-medial position. In our data set, Northern Sotho and Tsonga[13] do not have such examples.

3.2.3 Post-nasal Position

Five languages in figure 7, namely Southern Ndebele, Xhosa, Zulu, Swati, and Tsonga

13) Our data has an accidental gap because we only took words that appear in the Swadesh list of the languages. Examining Cuenod (1967) reveals that Tsonga has a voiced lateral fricative between vowels as in *-bádlama* 'to lie in one's stomach', *swidlikí* 'residue of fat rendering'.

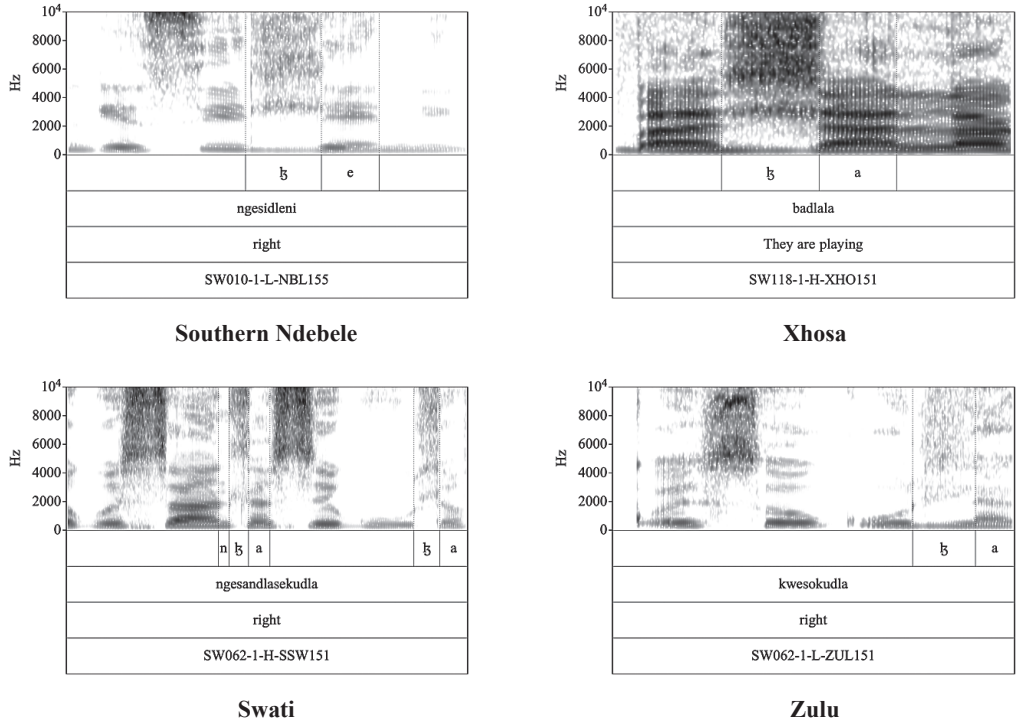


Figure 6 Voiced lateral fricatives in the word-medial position in four languages

have examples with voiced lateral fricatives after a nasal consonant. Compared to the nasal consonant before a voiceless lateral fricative in figure 4, the duration of the nasal consonant is longer[14)].

14) The average nasal duration before a voiced lateral fricative of the five languages was 71 ms, whereas the average duration of the nasal before a voiceless lateral fricative was 49 ms. Detailed phonetic studies on the duration of the nasal consonant awaits future research.

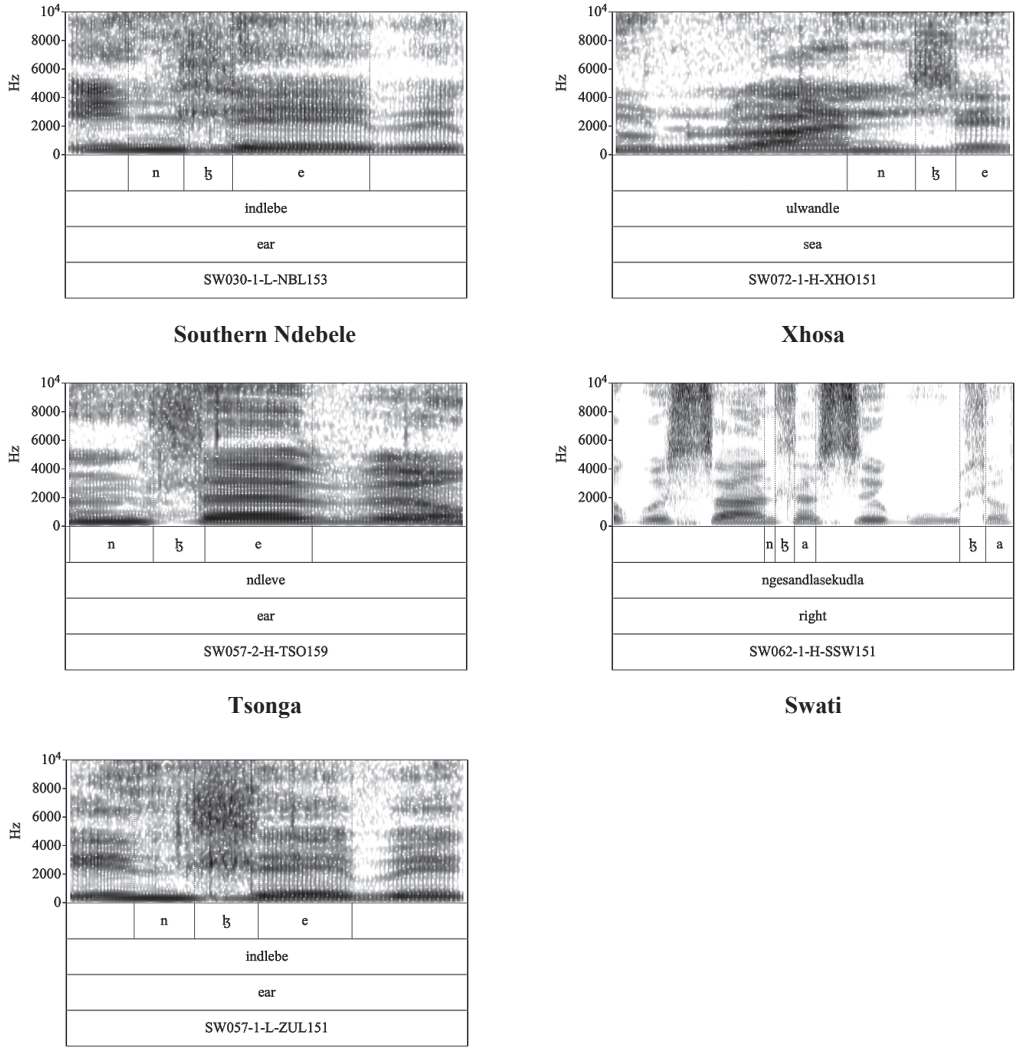


Figure 7 Voiced lateral fricatives in the post-nasal position in five languages

3.3 Summary

The distribution of lateral fricatives in each language is shown in table 3. For both segments (voiceless or voiced), three environments are examined. For example, in our Zulu data, voiceless lateral fricative [ɬ] appears 22% of the time in the stem-initial position, 33% in word-medial position, and 11% in post-nasal position, but voiced lateral fricative appears more after a nasal (17%) than stem-initial or word-medial positions. In Northern Sotho, Southern Ndebele and Xhosa, voiceless lateral fricative does not appear in post-nasal position. The distribution of the voiceless lateral fricative [ɬ] seems to be roughly equal between stem-initial and word-medial position in Northern Sotho, which does not have the voiced lateral fricative. When both [ɬ] and [ɮ] are possible in a language, voiceless lateral

Table 3 Distribution of the voice and voiceless lateral fricatives in different Phonological environments

	[ɬ]			[ɮ]		
	#R[	V_V	N_	#R[	V_V	N_
Venda [S21]	0.00	0.00	0.00	0.00	0.00	0.00
N. Sotho [S32]	0.53	0.47	0.00	0.00	0.00	0.00
S. Ndebele [S407]	0.46	0.18	0.00	0.04	0.14	0.18
Xhosa [S41]	0.20	0.40	0.00	0.07	0.07	0.27
Zulu [S42]	0.22	0.33	0.11	0.11	0.06	0.17
Swati [S43]	0.28	0.17	0.17	0.11	0.06	0.22
Tsonga [S53]	0.42	0.26	0.16	0.05	N/A	0.11

Table 4 Implicational hierarchy about the distribution of voiced and voiceless lateral fricatives[15]

no lateral fricatives[16]	> /ɬ/[17]	> /ɬ, ɮ/
Venda [S21] (Tswana [S31])	N. Sotho [S32] (Copi [S61])	S. Ndebele [S407], Xhosa [S41], Zulu [S42], Swati [S43], Tsonga [S53]

fricative is more frequent (about 60–70% of the time) as in Southern Ndebele, Xhosa, and Tsonga. Nguni languages such as Zulu, Swati, Xhosa and Southern Ndebele show one fifth of the voiced lateral fricative appear in the word-medial position or in post-nasal position. In Tsonga, [ɬ] is found in more than 80%, with less frequency of the voiced lateral fricative.

4. Tentative Typological Generalisation

Based on the observation of six Bantu languages from zone S presented in Section 3, some salient typological tendencies about the distribution patterns of lateral fricatives can be generalised as in (1).

(1) Possible generalisation of the typological tendencies of lateral fricatives in southern Bantu

a. A language that has a voiced lateral fricatives in its phonemic inventory, it must also have a voiceless lateral fricatives and not vice versa.

b. In all languages that allow both lateral fricatives, a voiceless lateral fricatives occurs more frequently than a voiced counterpart.

c. In some languages, there is a positional restriction that a voiceless lateral fricatives does not occur in a post-nasal position.

d. In all languages that allow both lateral fricatives, voiced lateral fricatives show preference to occur in post-nasal positions.

15) We agree with the reviewer pointed out that this implicational relationship may only hold for Bantu languages that have lateral fricatives. We do not mean to implicate all Bantu languages in this hierarchy.

16) The absence of phonemic lateral fricatives in Venda and Tswana can also be confirmed by Nemakhavhani (2002) and Bennett *et al.* (2016), respectively.

17) The absence of phonemic voiced lateral fricatives in Copi can also be confirmed by Gowlett (2003: 615).

Table 5 Positional restrictions on a voiceless lateral fricatives in post-nasal positions

/N-ɬ/ disallowed			/N-ɬ/ allowed		
N. Sotho [S32]	S. Ndebele [S407]	Xhosa [S41]	Zulu [S42]	Swati [S43]	Tsonga [S53]

In this section, we will further discuss the natures of each generalised phenomenon and possible typological implications suggested by them.

4.1 Implicational Relation between Voiceless and Voiced Lateral Fricatives

The first generalization (1)a about the distribution of voiced and voiceless lateral fricatives within a single system, i.e., there is no such a language that has only voiced lateral fricatives and lacks voiceless lateral fricatives, can be formalised as an implicational statement in (2).

(2) If a language has a phonemic voiced lateral fricative, it also has a voiceless counterpart.

Table 4 shows actual distribution based on our observation with additional information from Naumann & Bibiko (2016).

This generalisation can be seen as a typical realisation of a wider cross-linguistic implicational tendency about voice contrast of obstruents, i.e., in a phonemic system where obstruents do not have voice contrast, it is voiceless that is expected to be present in such a system (cf. Maddieson 2013).

What is significant in the context of intra-genetic variation is that the cutting line between the presence and absence of the lesser counterpart /ɮ/ is drawn within a single group of the referential classification. It should be noted, however, that the referential classification, Guthrie's coding system is not meant to be a classification directly reflecting genealogical branching (Schadeberg 2003, Nurse & Philippson 2003b, Philippson & Grollemund 2019, among others). Nevertheless, it is still significant that the systematic variation can be observed within the same unit, S30 in this case, which is geographically distributed between southern S40 where majority of languages have both lateral fricatives and the remaining northern groups including S20 where lateral fricatives are not entirely attested.

4.2 Frequency of Voiceless Lateral Fricatives over Voiced Counterpart

The generalisation in (1)b is a qualitative tendency that in languages with both voiced and voiceless lateral fricatives, a voiceless counterpart tends to appear more frequently.

(3) In a language where both voiceless and voiced lateral fricatives are present, voiceless lateral fricatives tend to appear more frequently than the voiced counterpart.

In all languages with both lateral fricatives, more than 60% of occurrences in our sample tokens are voiceless, i.e., S. Ndebele 64%, Xhosa 60%, Tsonga 84%, Swati 61%, Zulu 67%. Whereas the sample tokens are quite limited in number, this tendency of relative frequency

can be seen as a natural reflection of the cross-linguistic tendency of higher occurrence rate of a voiceless lateral fricative than a voiced one as stated in (2).

4.3 Occurrence Frequency in Terms of Post-nasal Position

As discussed in 3.1.3, a positional restriction that blocks a voiceless lateral fricative to occur in post-nasal positions is attested in some languages (1)c. This restriction can be paraphrased as a statement of implicational tendency as in (4).

(4) If a language allows a voiceless lateral fricative to occur in post-nasal positions, it also occurs in stem-initial and inter-vocalic positions.

This restriction seems to work not only in N. Sotho [S32], which only has a voiceless lateral fricatives and lacks a voiced lateral fricatives in its inventory, but also in languages with both lateral fricatives such as S. Ndebele [S407] and Xhosa [S41]. On the other hand, voiceless lateral fricatives do occur in post-nasal positions in Zulu [S42], Swati [S43], and Tsonga [S53], all of which have both types of lateral fricatives in its phonemic inventory.

Just as in the case of availability of voiced lateral fricatives addressed in 4.1, whether the restriction rule is in effect or not may vary even within a single unit of classification. Moreover, it should be worth noting that the unit in question, Nguni (S40), is clearly a group of a genetic unity rather than of mere geographical vicinity (cf. Nurse and Philippson 2003b: 169–170). In this respect, it is necessary to investigate possible factors that cause the internal variation, which, in turn, would provide us significant insights to understand the historical process of development or loss of lateral fricatives.

4.4 Relative Preference of the Post-nasal Position

On the other hand, the post-nasal is the preferred position for a voiced lateral fricative. As shown in Table 3, in all five languages in our sample that have a phonemic voiced lateral fricatives, the number of its occurrence in the post-nasal position exceeds the total numbers of occurrence in all other phonotactic environments, i.e., in word initial and word-medial positions.

(5) If voiceless fricatives appear in the post-nasal positions, voiced lateral fricatives occur in the same environment as well.

What may be directly suggested by this tendency is that lateral fricatives may also be the target of voicing effect triggered by the preceding homorganic nasal, i.e., post-nasal voicing as a typical segmental process of Bantu phonology. The typological tendency in (5) accounts for the pattern in Southern Ndebele and Xhosa since voiceless lateral fricatives do not occur after the nasal even though the voiceless version can occur elsewhere. In Zulu, Swati and Tsonga, however, the statement in (5) seems to be strong because voiceless lateral fricatives do occur after nasals. Nasals can be followed by a voiceless sound as it was shown during a debate about clusters when a nasal is followed by an obstruent.

Pater (1999) proposes the constraint against a sequence of nasal and a voiceless obstruent (*NC$_{\text{o}}$), which is based on observations where Australian languages satisfy the constraint by deleting the nasal, by denasalizing the nasal or by voicing the post-nasal obstruent. Responding to this proposal, Hyman (2001) raises doubts and suggests that the *NC$_{\text{o}}$ constraint is not phonetically grounded because it is possible to have voiceless obstruents after a nasal such as in Sotho-Tswana. Follow-up studies (Solé *et al.* 2010 on Shekgalagari, and Gouskova *et al.* 2011 on Tswana) argue that the post-nasal devoicing can be explained by phonetically grounded constraints. If lateral fricatives behave akin to obstruents, the distribution of voiceless and voiced lateral fricatives in Table 3 is compatible with (5); the presence of voiceless lateral fricative after a nasal implies that voiced lateral fricatives are also allowed.

Phonemic stability of the voiced lateral fricatives may be measured by the dependency ratio of its occurrence in post-nasal positions, i.e., in the languages where the occurrence of voiced lateral fricatives depends relatively highly on post-nasal environments, e.g., Xhosa (27%) and Swati (22%), voiced lateral fricatives may be less distinctive than other phonemes. This kind of phonemic stability is also a crucial part of the phonemic status of lateral fricatives and thus would be a significant topic of further investigation to better understand the synchronic diversity as well as to shed light on the diachronic process of emergence, development, and loss of lateral fricatives in those languages.

5. Conclusion

We have discussed basic phonetic and phonotactic features of lateral fricatives as one of the relatively complex types of fricative sounds only attested in specific zone S languages across Bantu, aiming to present its typological overview. The general observation is that the lateral fricatives in selected Bantu S languages follow cross-linguistically typical distribution patterns of fricatives, or obstruents in general, e.g., there holds an implicational hierarchy that explains non-existence of a language with voiced lateral fricatives and lacking voiceless lateral fricatives, which is motivated by the general principle of the voicing contrast of obstruents, i.e., the preference of the voiceless over voiced when lacking the contrast. We also argued that the realisation of lateral fricatives can be significantly affected by positional restrictions associated with a post-nasal position where voiceless lateral fricatives can be blocked while a voiced counterpart prefers to occur.

Whereas such cross-linguistically common tendencies hold in general, we have also pointed out internal variation in terms of attested types of lateral fricatives and their phonotactic distribution. First, there is a typological continuum between languages lacking lateral fricatives at all, which include Venda [S21] and Tswana [S31] spoken in the north, and those with both a voiceless and voiced lateral fricatives, which are entire S40 languages spoken in further south. The languages having a voiceless lateral fricatives only are found sporadically in S30 (and S60 according to Naumann & Bibiko (2016)). Second, there is further variation in terms of a positional restriction by which a voiceless lateral fricatives

is blocked in post-nasal positions. This restriction applies not only to N. Sotho [S32] as a language that has only a voiceless lateral fricatives, but also to those spoken in the northern area of S40, namely S. Ndebele [S407] and Xhosa [S41]. These distributional patterns can be summarised in Table 6a and 6b.

Table 6a Relative restrictedness of lateral fricatives in sample languages

N. Sotho [S32]	S. Ndebele [S407]	Xhosa [S41]	Zulu [S42]	Swati [S43]	Tsonga [S53]
highly restricted	> restricted		> no restriction		
/ɬ/	> /ɬ, ɮ/				
/N-ɬ/ disallowed			> /N-ɬ/ allowed		

Table 6b Relative restrictedness of lateral fricatives in sample languages (another visualisation)

	/ɬ/	/ɮ/	/N-ɬ/	
Venda [S21]	*	*	*	no lateral fricatives
N. Sotho [S32]	✓	*	*	highly restricted
S. Ndebele [S407]	✓	✓	*	restricted
Xhosa [S41]	✓	✓	*	
Zulu [S42]	✓	✓	✓	no restriction
Swati [S43]	✓	✓	✓	
Tsonga [S53]	✓	✓	✓	

As shown in the table, this summarised distribution pattern may suggest a cline of the typological restriction on the phonological status of the lateral fricatives across languages. At one extreme is the most liberal languages that allow both voiceless and voiced lateral fricatives without positional restrictions, while the other extreme is the language lacking lateral fricatives at all. In the middle are two categories. One is the languages where both types of lateral fricatives are attested but the positional restriction should be applied to voiceless lateral fricatives. The other is a more restricted type in that only a voiceless lateral fricative is available in the phonemic inventory.

To conclude the paper, it would be worth addressing remaining questions and directions of the further investigation. The first and foremost is to collect an extensive range of data from as many dialects/varieties as possible, in order not only to draw a more fine-grained picture of internal variation, but also to find out more precise typological parameters that better explain the attested variation, which in turn shed light a diachronic process of emergence, development, and (possible) loss of lateral fricatives.

Another crucial point is exactly about the emergence of the lateral fricatives. Maddieson & Sands (2019: 90)[18] address that the development of relatively complex fricatives including lateral fricatives can be accounted for either by innovation or by contact with surrounding languages including phylogenetically distinct KBA languages.

18) "Most of the languages have relatively limited sets of fricatives of the cross-linguistically common types, although lateral fricatives (and affricates) have developed in or been borrowed into a number of the southern languages..."

Concerning the development process, Blench (2006: 3) explicitly claims that lateral fricatives must have developed as local innovation. Major argumentations are based in the fact that i) at least several realizations of lateral fricatives can be identified as regular correspondence with the specific PB phoneme */c/, suggesting that lateral fricatives emerged through a local process of internal sound change. Another piece of evidence is that interestingly lateral fricatives are missing in the huge inventory of the consonantal systems of KBA languages, i.e., there is no possibility of direct borrowing. On the other hand, as briefly mentioned in 2.2, given that the areal features may not have to be fully inherited, there remains a possibility that only relevant features, in this case those related to lateral articulation, are 'borrowed' and, in turn, triggered the emergence of the lateral fricatives by combining with other pre-existing features in the original consonantal system of the languages in question. To decipher a more detailed picture of the historical process of emergence of lateral fricatives, more extensive data are necessary to carry out an extensive investigation from historical-comparative as well as micro-typological perspectives.

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