A Typological Investigation of Evidence for [sg] in Fricatives*

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1. Introduction

- Vaux (1998) argues that voiceless fricatives are, in the unmarked case, phonologically specified as [spread glottis] ([sg]). In languages which observe this preference, then, we should find evidence that fricatives pattern with [sg] (aspirated) stops.

- In this paper, we present a typological investigation of the status of [sg] fricatives in obstruent inventories.

(1) Phonological evidence for [sg] fricatives: New Julfa Armenian laryngeal assimilation (Vaux 1998)
  - Fricatives pattern with aspirated ([sg]) stops
  - Future prefix /k/ surfaces as a plain voiceless stop before a vowel or plain voiceless stop (2a),
  - as voiced [g] before a plain voiced consonant (2b),
  - *but* as aspirated [k^h] preceding an aspirated stop, aspirated affricate *or* **voiceless fricative** (2c).

(2) New Julfa Armenian Future Tense (adapted from Vaux 1998:499)

a.	/k-ert^h-a-m/	[kert^{h}am]	'I will go'
	/k-t-a-m/	[kətam]	'I will give'
	/k-kien-a-m/	[kəkienam]	'I will exist'
b.	/k-bzz-a-m/	[gəbəzzam]	'I will buzz'
	/k-l-a-m/	[gəlam]	'I will cry'
c.	/k-t^{h}oʁ-n-ie-m/	[k^{h}ət^{h}oʁniem]	'I will allow'
	/k-tʃ^{h}ap^h-ie-m/	[k^{h}ətʃ^{h}aphiem]	'I will measure'
	/k-χnd-a-m/	[k^{h}əχəndam]	'I will laugh'
	/k-savor-ie-m/	[k^{h}əsavoriem]	'I will grow accustomed to'

- It is widely claimed that there is partial devoicing of sonorant consonants in English after /p/, /t/, and /k/ (e.g., *please*, *tray*, *crank*). This is usually understood as being the same as the aspiration that occurs before vowels, though the two cases are typically transcribed differently.

- Whether it is assumed that the stop contrast in English is one of [sg] or [voice], the devoicing of sonorants is usually understood as occurring after [sg] stops. This is because, even on analyses that assume that [voice] is the phonological feature of contrast, it is assumed that the voiceless stops are specified phonetically as [sg].

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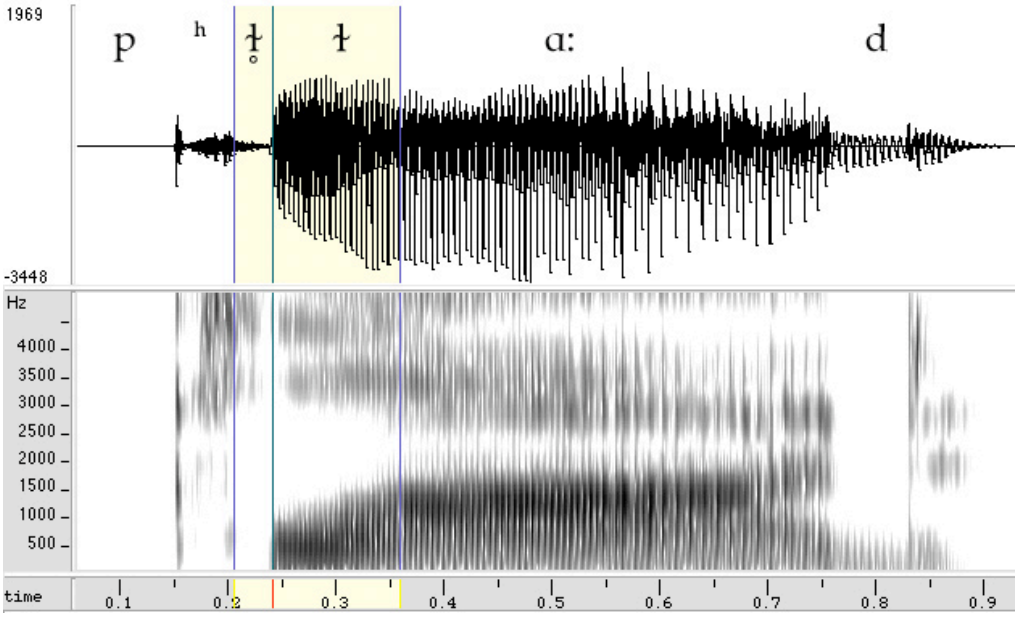
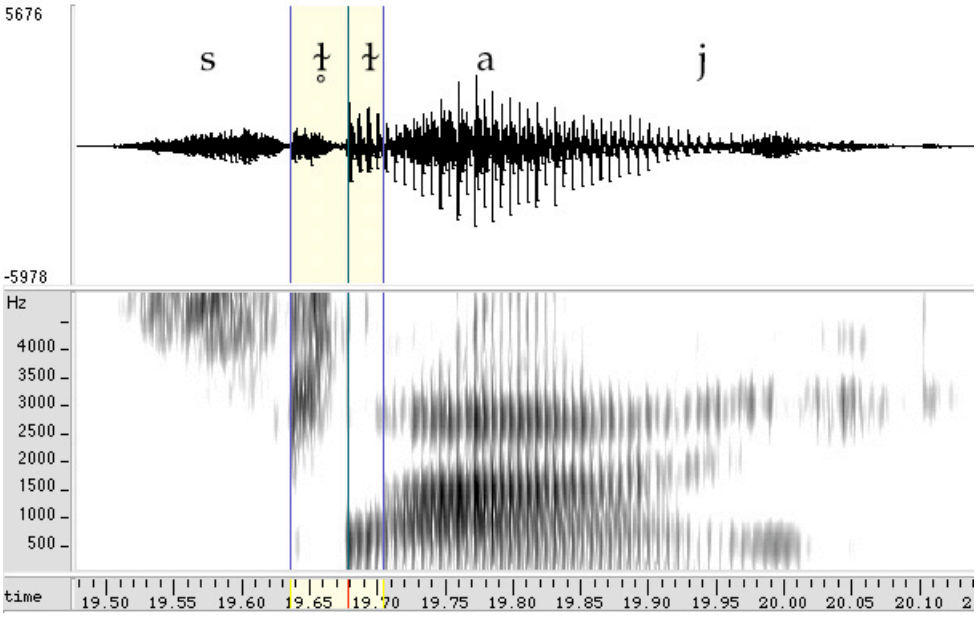
(3) Sonorant devoicing in English initial /pl/ cluster (*plod*; female speaker)



- What happens after /s/? Most discussions of English are silent on this issue, with occasional claims that there is the same devoicing of sonorant consonants after /s/ (and other voiceless fricatives), but with no citations (c.f. Brinton 2000, Hayes 2008).

- However, Docherty (1992) does report on experiments that address this question explicitly. He claims that there is clear evidence of sonorant consonant devoicing after /s/ in English (e.g., *sly*). This devoicing, of course, is expected if we assume that English voiceless fricatives are specified as [sg] and that sonorants are partially devoiced after [sg] obstruents.

(4) Sonorant devoicing in American English initial /sl/ cluster (*sly*; female speaker)



2. Some Results of Our Investigations

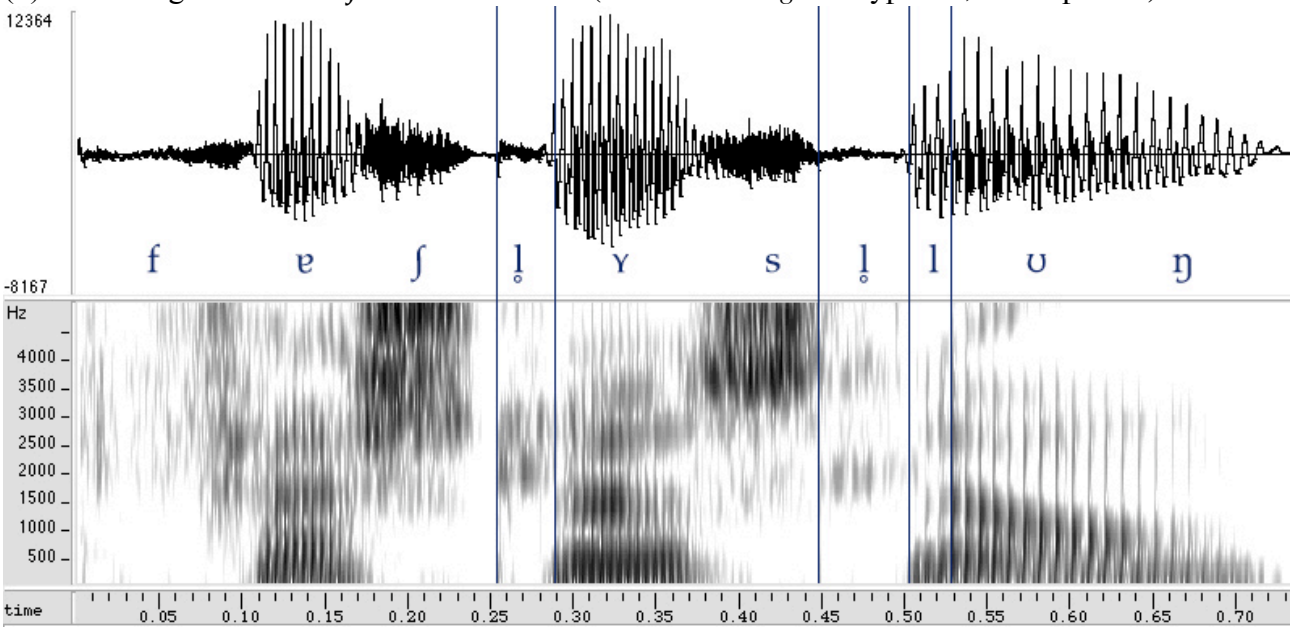
Q: Are sonorant consonants *always* devoiced after voiceless fricatives?

- Since Vaux (1998) provides evidence that voiceless fricatives are [sg] in several languages, and since Kingston (1990) suggests that voiceless fricatives are typically produced with glottal spreading, we might reasonably expect that sonorant devoicing after a voiceless fricative is a general process cross-linguistically.

2.1 German

- We have argued elsewhere (Beckman et al., to appear), for independent reasons, that [sg] is phonologically specified on voiceless fricatives in German.
- There is phonetic evidence to support this claim, as shown in (5) below.

(5) Devoicing in German /ʃl/ and /sl/ clusters (*Verschlüsslung* 'encryption'; male speaker)



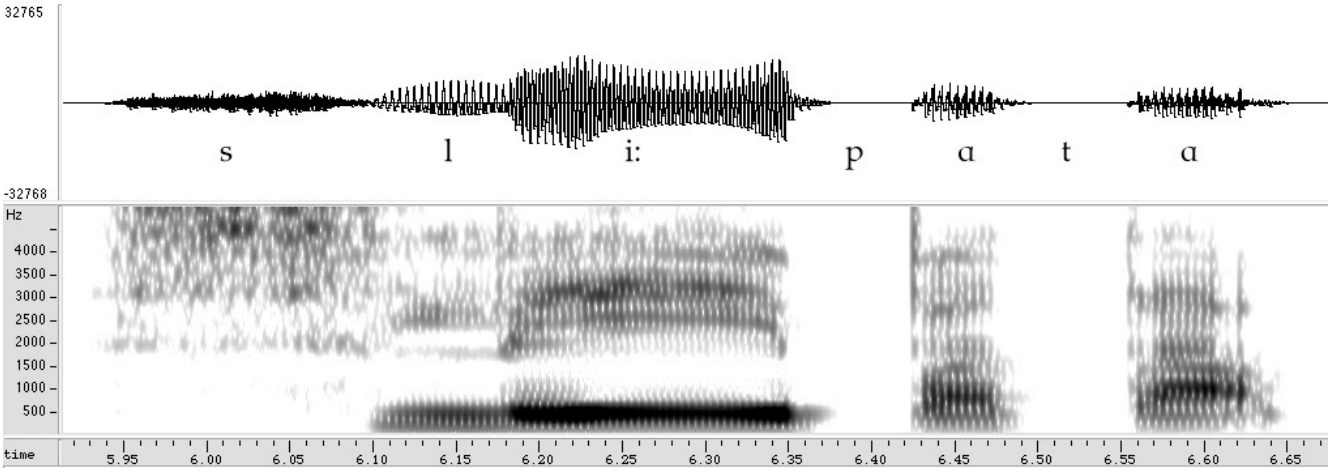
In this example, which is typical of the speakers of Standard German we have recorded in Bielefeld, Germany, there is near total devoicing of both laterals in the utterance.

2.2 Finnish

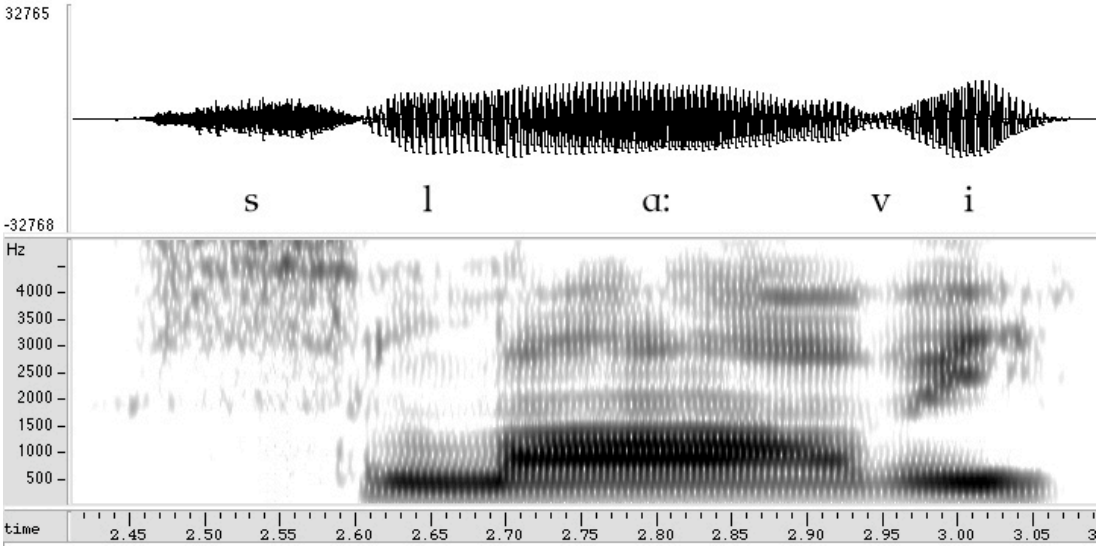
- Finnish, on the other hand, does not exhibit this devoicing. (Note, however, that native Finnish words do not contain such clusters, although they do occur in loans.)

(6) No devoicing in Finnish /sl/ clusters

a. *sliipata* ‘to grind’; female speaker



b. *slaavi* ‘Slav’; female speaker



- Kristoffersen (2007) suggests that in languages where there is no voicing contrast (e.g. there is /s/, but no /z/) the fricative is not specified as [sg].

- Finnish lacks a laryngeal contrast in its fricative inventory. So, if we assume that Finnish fricatives are not specified as [sg] either phonologically or phonetically, then we can explain the difference between German and Finnish.

Interim summary: We have seen that sonorant devoicing is not a necessary consequence in post-voiceless fricative position. In German, we do find robust devoicing in this position, but Finnish does not exhibit the phenomenon.

Intriguingly, it appears that the occurrence of post-fricative devoicing can be correlated with the structure of the fricative inventory in the language:

- In German (and English), where there is a contrast, there is devoicing—suggesting that the fricatives are specified as [sg]. (Note also that New Julfa Armenian, where Vaux argues that the vls. fricatives are [sg], is another example in which there is a laryngeal contrast in the fricative inventory.)
- In Finnish, on the other hand, where there is only a single series of vls. fricatives, there is no devoicing—suggesting that the fricatives are *not* specified as [sg].

***Question**: Can it really be this simple? Is it the case that there is no [sg] specification when there is no laryngeal contrast in the fricatives, and an [sg] specification when there is a laryngeal contrast?*

***Answer:** NO!*

3. Further Investigations: Icelandic, Swedish, Norwegian, and Russian

3.1 Icelandic

- In Icelandic, there is phonological evidence that /s/ is specified for [sg], though the language lacks a laryngeal contrast in fricatives at this place of articulation.

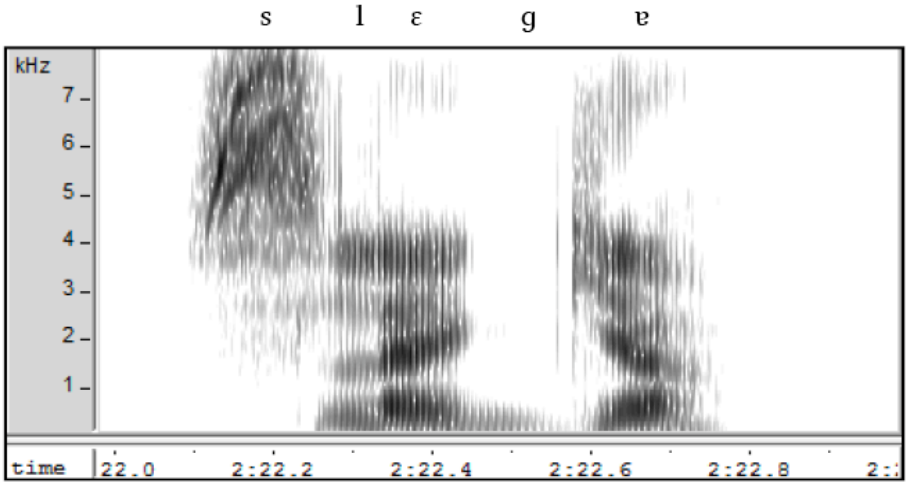
(7) Devoicing of sonorants in Icelandic (Thráinsson 1994:151)

	[fa:r]	‘fare (nom.)’	[far̥s]	‘fare (gen)’
cf.	[fu:l]	‘sour (fem.)’	[ful̥t]	‘sour (neut.)’
	[fɪ:m]	‘nimble (fem.)’	[fɪn̥t]	‘nimble (neut.)’

3.2 Swedish

- At first glance, Swedish appears to be very much like Finnish, in that there is no laryngeal contrast in the sibilant fricatives, and very little, if any, devoicing of sonorant consonants following /s/ (see (8)).

(8) Swedish *slägga* ‘sledgehammer’ (male speaker)



- However, although there is apparently little or no no devoicing of /l/ following /s/ in Swedish, there is evidence that in Central Standard (CS) Swedish, /s/ is [sg] (Helgason 2002).

- Helgason (2002:138) reports that word-medial and word-final fricatives, like fortis (aspirated or [sg]) stops, exhibit devoicing of the preceding vowel. Such devoicing, known as preaspiration, is characterized by a period of breathy voice before the sibilant frication.

(9) Preaspiration with Central Standard Swedish /s/ (Helgason 2002:138)

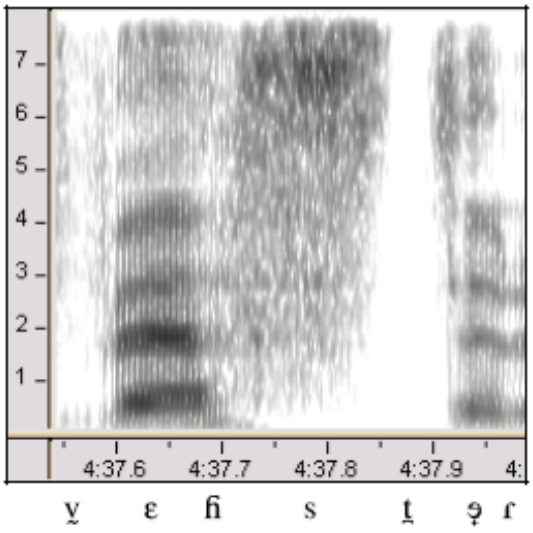


Figure 4–26. Subj. CK: *[...rätt]* ***väster****[ut]* '…due west'

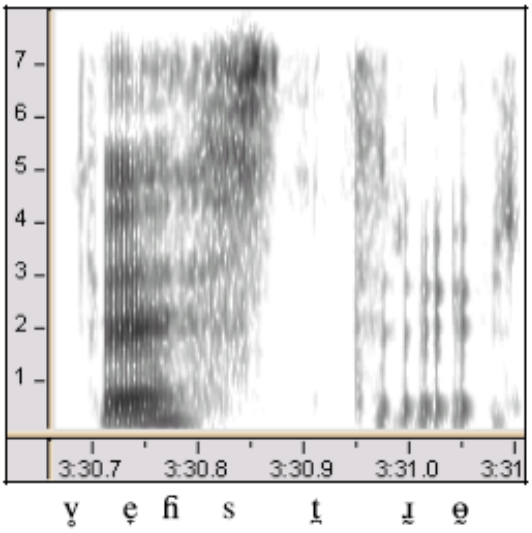


Figure 4–27. Subj. FS: ***västerut*** 'westwards'

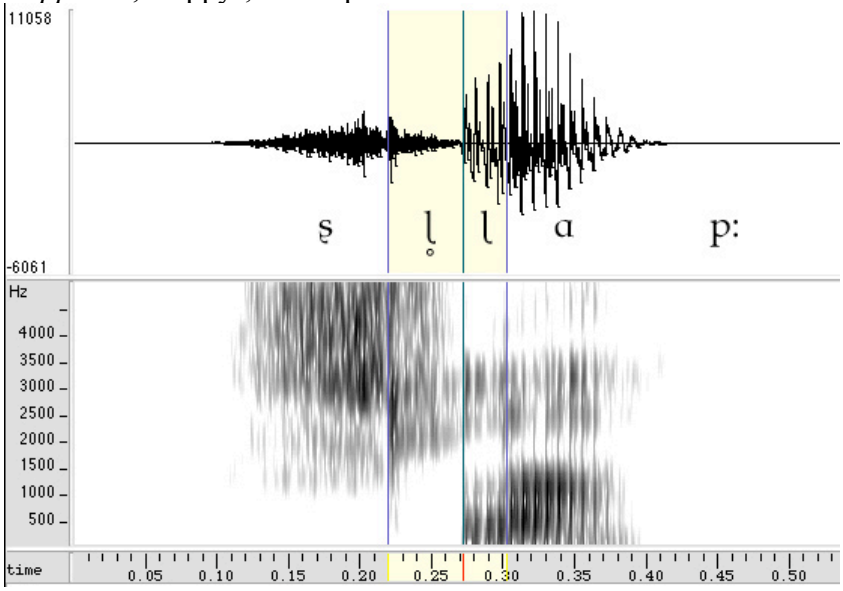
3.3 Norwegian

- Speakers from the Trøndelag region, recorded in Trondheim, Norway, have devoicing of sonorant consonants following /s/. In this variety, there is no laryngeal contrast between /s/ and/z/.[1]

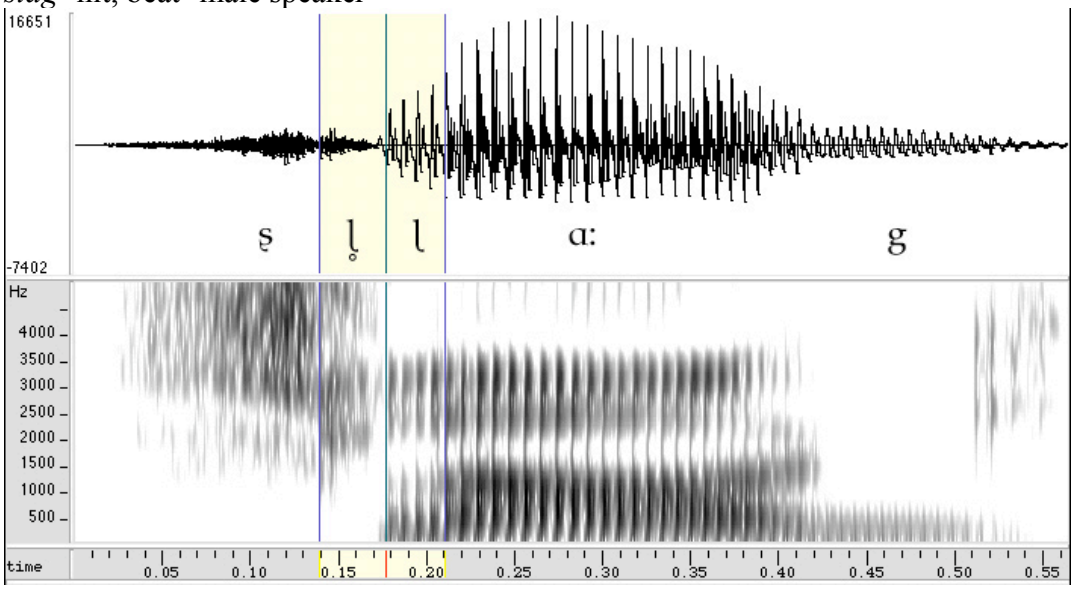
[1] In the variety of Norwegian described by Kristoffersen (2007), Urban Eastern (UE) Norwegian, voiceless stops are aspirated, and there is partial devoicing of sonorant consonants following these stops ([ˈpl̥ɑs] 'place'). However, Kristoffersen reports that there is no devoicing of sonorant consonants following /s/ ([ˈsɭo:] 'to beat'), although there is following /f/ ([ˈfɻi:] 'free'). Kristoffersen notes (p.c.) that his claims were based upon introspection, rather than acoustic analysis. We have not seen spectrograms illustrating the putative lack of devoicing of /l/ following /s/, and do not know if there is other evidence of [sg] in UE Norwegian /s/, such as the devoicing of preceding vowels in word-medial and word-final position.

(10) Sonorant devoicing in the Trøndelag dialect of Norwegian

a. *slapp* 'lax, sloppy'; male speaker



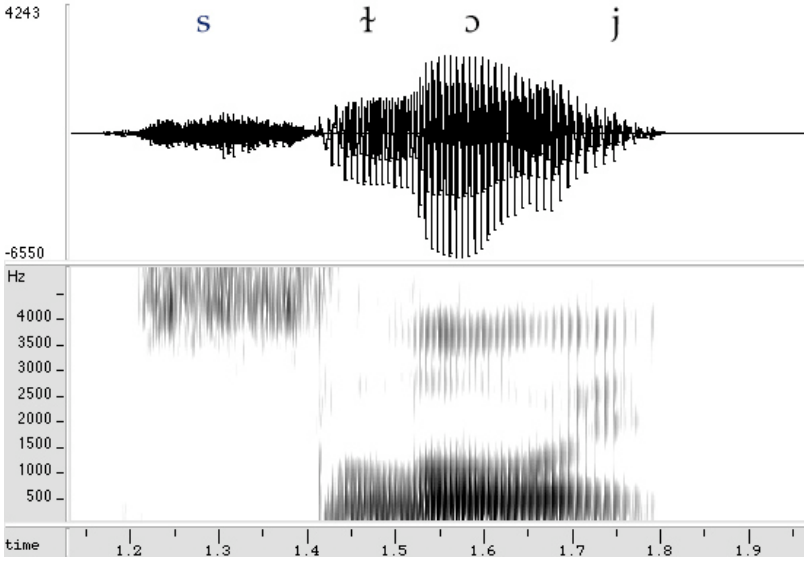
b. *slag* 'hit, beat' male speaker



3.4 Russian

- Russian has a laryngeal contrast in the fricatives, but there is no evidence that the voiceless fricatives are specified as [sg].

(11) No devoicing in Russian /sl/ clusters (*sloj* 'layer'; male speaker)



4. Discussion

- To summarize, looking at the evidence in these languages for the [sg] specification of voiceless strident fricatives, it appears as if anything goes: There is evidence that the voiceless stridents are [sg] regardless of whether there is a laryngeal contrast, as illustrated in (12).

(12)

Laryngeal contrast?	[sg] on sibilant(s)?	Language
No	No	Finnish
No	Yes	Swedish, Icelandic
Yes	No	Russian
Yes	Yes	German, English

- If, however, we consider the stop inventory, it appears that there is a generalization after all: If a language has [sg] stops, then [sg] is present in the fricatives.

(13)

[sg] in stops?	Contrast in sibilants?	**[sg] on sibilant(s)?**	Language
NO	No	**No**	Finnish
	Yes	**No**	Russian
YES	No	**Yes**	Swedish, Icelandic
	Yes	**Yes**	German, English

- Are Vaux's examples consistent with the claim that fricatives are only specified as [sg] if there are [sg] stops?

- Vaux (1998:509-10) states:
  "The laryngeal specifications of the fricatives in the languages considered in this article cannot be derived from the structure of the stop inventory. In a two-series laryngeal system contrasting plain voiced and voiceless aspirated obstruents, such as we find in Standard Western Armenian, one could say that the voiceless fricatives are predictably [+spread] because all voiceless obstruents are [+spread]. This reasoning cannot work for languages like New Julfa or Sanskrit, though, where voiceless obstruents are not predictably [+spread], nor are voiced obstruents predictably [-spread].

- But we are not suggesting that voiceless fricatives of a language are [sg] if the stops of the language are *predictably* [sg]; rather we are suggesting that [sg] occurs in the voiceless fricatives iff [sg] occurs in stops (either predictably or contrastively).

- There is one apparent counterexample that is discussed by Vaux (1998:504). In the Seville dialect of Spanish, debuccalization of coda /s/ is reported to induce aspiration on a following voiceless stop ([loh p^haðreh] *los padres*).

- This example might be open to alternative interpretations since it is evidence only about word-final /s/, not /s/ in general. We have argued elsewhere that in German there is a constraint requiring that all obstruents are [sg] in word-final position. It might be that a similar constraint is operative in Sevillan Spanish.

- More languages need to be considered. Our findings are intriguing, showing some apparent gaps in the typology. At this point, we've found no languages in which there are [sg] stops but not [sg] fricatives; arguably, pending a full analysis of the Seville dialect of Spanish, we are also missing languages in which there are no [sg] stops, but voiceless fricatives are [sg]. But there is much work still to be done.

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