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Salish Emphatics

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1. Introduction[1]

This paper discusses Salish 'retracted' alveolar and 'uvular' consonants. Kuipers (1981) has argued for a classificational combination of these consonants. The aim of this paper is to provide evidence from St'át'imcets (Lillooet) that 'retracted' alveolars and 'uvulars' can be combined a single category that is equivalent to what Semiticists refer to as 'emphatics'. The proposed reanalysis will be based on acoustic, perceptual, and phonological findings.

The St'á'timcets consonantal inventory is seen in Table 1. The relatively large size of this inventory is due in part to the use of labialisation secondary articulation (as on /kʷ/) and superimposed ejective airstream (glottalisation, as on /kˀ/); these are sometimes combined (as on /kˀʷ/). I will argue that the language also makes use of secondary uvularisation (as on /k̠/, transcribed in other works on St'át'imcets, e.g., van Eijk 1985, among others, as /q/); this is sometimes combined with labialisation and/or glottalisation (as on /k̠ˀʷ/, transcribed elsewhere as /qˀʷ/).

There are two major differences between the inventory in Table 1 and that standardly assumed since the documentation of the language by van Eijk (1985). The inventory proposed here (i) contains no uvular /q qˀ qʷ qˀʷ χ χʷ/ and (ii) includes several secondarily uvularised consonants (emphatics), in non-emphatic/emphatic pairs (e.g., /z/ ~ /z̠/, /k/ ~ /k̠/). This affects the transcription of certain St'át'imcets consonants, as summarised in the Table 2.

The outline of this paper is as follows. §2 summarises previous claims regarding the St'át'imcets consonantal inventory. §3 and §4 address certain issues concerning what have been previously analysed as 'retracted' /z̠ z̠'/ and [s̠ c̠ l̠ l̠']. §5 presents the arguments for recognising the St'át'imcets 'retracted' consonants and 'uvulars' as a single set of underlying emphatics /s̠ c̠ l̠ l̠ˀ z̠ z̠ˀ k̠ k̠ˀ k̠ʷ k̠ˀʷ x̠ x̠ʷ/. Finally, §6 concludes this paper.

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OBSTRUENTS							
LAB	ALV	ALV LAT	POST-ALV	PAL	VEL	UV	GL
p	t		c c̓		k k̓		
p̓		ƛ̓	c̓		k̓ k̓̓		
					kʷ k̓ʷ		
					kʔʷ k̓̓ʷ		
		ɬ	s s̓		x x̓		
					xʷ x̓ʷ		
RESONANTS							
m	n						
m̓	n̓						
							ʔ
							h
	z z̓	l l̓		j	ɣ	ʕ	
	z̓ z̓̓	l̓ l̓̓		j̓	ɣ̓	ʕ̓	
					w	ʕʷ	
					w̓	ʕʔʷ	

Table 1. St'át'imcets Underlying Consonantal Inventory

van Eijk's analysis		VAN EIJK (1985) TRANSCRIPTION	TRANSCRIPTION PROPOSED IN THIS PAPER	analysis proposed in this paper
	a.	/q/	/k̓/	
'uvulars'	b.	/q̓/	/k̓̓/	emphatic
	c.	/qʷ/	/k̓ʷ/	velars
	d.	/q̓ʷ/	/k̓̓ʷ/	(not uvulars)
	e.	/χ̆/	/x̓/	
	f.	/χ̆ʷ/	/x̓ʷ/	
	g.	/z/ (some occurrences)	/z̓/	
'retracted'	h.	/z'/ (some occurrences)	/z̓̓/	emphatic
consonants	i.	[s̬]	/s̓/	alveolars
	j.	[c̬]	/c̓/	
	k.	[l̬]	/l̓/	
	l.	[l̬']	/l̓̓/	

Table 2. Summary of the Reanalysis Proposed in this Paper

2. Previous Analyses of the St'át'imcets' Consonantal Inventory

Van Eijk's (1985:2) analysis of the St'át'imcets surface consonantal inventory is seen in Table 3. In his transcription, a dot under the symbol denotes 'retraction'.

		Obstruents			Resonants		
		Plosives		Fric.			
		Plain	Glott.		Plain	Glott.	
Labial		p	p'		m	m'	Nasals
Dental-lateral	Dental	t			n	n'	
	Lateral		ƛ'	ɬ	l l̰	l' l̰'	Liquids
Dental-Palatal	Dental		c'		z	z'	
	Palatal	c ç		s ʂ	y	y'	
Velar	Unrounded	k	k'	x	ɣ	ɣ'	
	Rounded	k^w	k'^w	x^w			
Uvular	Unrounded	q	q'	χ	ʕ	ʕ'	Glides
	Rounded	q^w	q'^w	$χ^w$	$ʕ^w$	$ʕ'^w$	
Laryngeal	Unrounded				h	ʔ	
	Rounded				w	w'	

Table 3. Van Eijk's (1985) St'átimcets Surface Consonantal Inventory

The articulation of the St'át'imcets consonants given a new analysis in this paper (those in Table 2) will now be described. This will be based primarily on the observations of Van Eijk (1985). (There is no articulatory, that is, no x-ray, EMG, etc., data on Salish.) Previous theoretical analyses of those segments will then be summarised.

Van Eijk (1985:11) describes the articulation of the 'uvulars' as follows: "The point of articulation of the uvulars is quite close to that of the velars; the fricatives $x̆$ $x̆^w$ have a rather sharp friction which sets them apart from the velars x x^w (in the same way, q' q'^w are mainly distinguished by their fricative offglide from k' k'^w)." Regarding the quality of a vowel in the environment of the uvulars, he notes [p.12]: "the main variants of.. a i u are [ɛ e o] when not in the position —(ʔ)Q, but [a̰ ɛ/ḛ ɔ] when in the position —(ʔ)Q," where Q = a uvular consonant and 'ḛ' "resembles the vowel of German 'mehr'" [p.3].

As for the alveolars /z z'/, van Eijk does not distinguish two types of these segments, as I will propose there are in §3. Cited as p.c. by Egesdal & Thompson (1993:100), he describes them as "very lax dental/interdental spirants, their laxness being particularly noticeable in postvocalic position, where /z z'/ sound like /l l'/, especially in the Mount Currie [= Lower St'át'imcets] dialect where [l l'] are actually the preferred

pronunciation." Van Eijk (p.c.) defines 'lax' as meaning that "there is an almost complete relaxing of the tongue muscles, with just enough energy left to make the required articulation." Egesdal & Thompson (1993:100) refer to /z z'/ as 'retracting' consonants. They describe them as 'velarised', but do not define what they mean by 'velarised'. As for vowel quality in the environment of these segments van Eijk (1985:8) notes: "In the positions —z and —z' the opposition a ~ a̟ is neutralized in M[ount Currie = Lower St'át'imcets], and only the retracted vowel is pronounced here... of i ~ i̟ and ə ~ ə̟ only i and ə are found here; as for u ~ u̟, in M only u̟ is pronounced." Egesdal & Thompson (1993:103) note that in certain forms 'retracted' low vowels do not occur immediately preceding /z z'/. Implying the analysis 'low vowels are 'retracted' immediately preceding /z/ or /z'/, they attribute this to a /z/ or /z'/ that "may be losing its retractive effect on a preceding vowel." The sort of data on which their analysis is based will be presented shortly.

Van Eijk (1985:3) describes the post-alveolars [s̟ c̟] and lateral resonants [l̟ l̟'] as 'velarised', stating that [s] "resembles Arabic *sād* [ص, [s̟]]." This identification of 'retraction' with Arabic emphasis suggests that van Eijk (and Egesdal & Thompson, as noted above) may have used 'velarised' to mean 'secondarily uvularised' ('emphatic'). 'Velarised' is the label given Arabic emphatics in earlier studies of Arabic, such as Obrecht (1968). Van Eijk (1985:40-42), following Kuipers (1973, 1981), describes 'retracted' [s̟ c̟ l̟ l̟'] as occurring in 'retracted roots'. Some 'retracted root' examples van Eijk provides [p.40] are seen in (1).

(1) a. √qə̟l̟ 'bad'
b. √lə̟s̟ 'to cave in'
c. √sa̟l̟ 'to drip in a string (like syrup)'
c. √c'i̟p' 'to pinch'
b. √k'ə̟l̟ 'to make a mark by scratching'

I interpret van Eijk's analysis as claiming that 'retracted roots' are identified for those words in which 'retracted' vowels or [s̟ c̟ l̟ l̟'] occur, and the 'retraction' of those segments cannot be attributed to any segmental source (a 'uvular' or one of /z z'/).

Theoretical studies of St'át'imcets (Remnant 1990, Bessell 1992) have assumed that the St'át'imcets underlying inventory contains all the consonants seen in Table 3, except the 'retracted' segments [s̟ c̟ l̟ l̟']. These have been analysed as surface 'retracted alveolars', the outputs of morphemic 'retraction' triggered by 'retracted roots', as identified by van Eijk. Remnant and Bessell analyse vowel alternations in the context of 'uvulars' and /z/ or /z'/ as retraction of the vowels induced by the immediately following uvular, /z/ or /z'/ (where ʔ sometimes intervenes between the uvular and the vowel, with no consequence for the 'retraction').

3. Underlying 'Retracted' /z̰ z̰'/ vs. 'Non-retracted' /z z'/

This section readdresses the observation of Egesdal & Thompson (1993) that 'retracted' vowels do not always occur immediately preceding St'á'timcets /z z'/. I will propose that this is evidence that the language has underlyingly 'non-retracted'/'retracted' "/z/ ~ /z̰/, /z'/ ~ /z̰'/" pairs, to be clarified in §5 as underlying non-emphatic/emphatic pairs, /z/ ~ /ẓ/ , /zˀ/ ~ /ẓˀ/.

Egesdal & Thompson [1993:103] cite the dialectal variant [ƛ'laz'] (*[ƛ'la̰z']) 'canoe' as an example of lack of 'retraction' on a vowel immediately preceding a /z/ or /z'/. (Their example is here converted to van Eijk's transcription. I interpret Egesdahl & Thompson as implying that both [ƛ'la̰z'] with 'retracted' [a̰], and [ƛ'laz'] with 'non-retracted' [a] are observed, but that the ungrammatical form, above (which I have added for clarity), is unacceptable in the (sub)dialect that has [ƛ'laz'] with non-retracted [a].) Further examples showing lack of 'retraction' before /z(')/ are seen in (2). These forms are not cited as such examples by van Eijk or Egesdahl & Thompson, but are found in the corpus provided by my consultants.

(2) a. [múzmit] (*[mṵzmit]) 'pitiful'
b. [s-ʕáz-xal] (*[s-ʕá̰z-xal]) 'something that one has piled up'
c. [xnǐ z'-a̰z'] (*[xnḭ̌ z'-a̰z']) 'gooseberry bush'

Egesdal & Thompson attribute the existence of forms like [ƛ'laz'] and (2a,b) to a /z/ that is 'losing velarisation'. For forms like (2c), they claim [p.103] that, in general, "*i* does not retract before *z* [that is, before /z/ or /z'/].

However, I suggest that, since those /z z'/s that trigger 'retraction' and those that do not are unpredictable, their distinction must be underlying. On this basis, I propose that the exceptions just discussed indicate not /z z'/s that are 'losing retraction', but that there are underlying 'non-retracted/retracted' "/z/ ~ /ẓ/, /z'/ ~ /ẓ'/" pairs. It will be argued shortly that these are actually underlying non-emphatic/emphatic pairs, /z/ ~ /ẓ/, /zˀ/ ~ /ẓˀ/.

The generalisations, noted above, that 'retracted' [ḭ] and [ə̰] are never observed preceding any of the "z"-series consonants will not be pursued here.

4. Underlying 'Retracted' Alveolars /s̰ c̰ l̰ l̰'/

As discussed above, previous analyses of St'át'imcets (van Eijk 1985, Remnant 1990, Bessell 1992) have assumed that 'retracted' [s̰ c̰ l̰ l̰'] occur in 'retracted roots'. Remnant and Bessell claim them to be the outputs of 'morphemic retraction', that is, that underlying non-retracted /s c l l'/ → 'retracted' [s̰ c̰ l̰ l̰'] via a floating 'retraction' feature. A retraction feature, associated with certain root morphemes, is proposed elsewhere for other Salish languages; see Doak (1989) and Kuipers (1973, 1981, 1990).

However, Bessell & Czaykowska-Higgins (1991:5-7) argue on the basis of distributional evidence that Salish surface 'retracted' consonants are actually underlyingly

'retracted'. Discussing 'retracted roots' in Nxa'amxcin (Moses-Columbian, Interior Salish), they state:

> "In Nxa'amxcin retraction on alveolar consonants and on vowels... is not predictable in roots... Of these 56 roots [their 'retracted root' corpus], 22 contain no underlying vowel. The existence of so many vowelless retracting roots indicates that retraction cannot be underlyingly associated with vowels. There thus remain two options: 1) that it is a floating feature; 2) that it is associated with consonants underlyingly... [E]very retracting root in Nxa'amxcin contains at least one alveolar consonant... Given the correlation between retraction and the presence of an alveolar in the root, we suggest that retraction is an underlying property of alveolar consonants, and that, therefore, Nxa'amxcin has two series of alveolars, one retracted and the other unretracted."

Statistics on the 'retracted roots' in the van Eijk (1987) St'át'imcets dictionary concur with Bessell & Czaykowska-Higgins' findings for Nxa'amxcin, as follows: Of the 150 'retracted roots' in the dictionary, 23% are vowelless and 82% contain an alveolar from the set /s c l l'/. (Figures cited here are rounded. For this check, roots were identified as vowelless if their only vowel is schwa; see Kinkade 1993, *to appear* and Shaw 1996 for the arguments for the nonunderlying status of St'át'imcets schwa.) Given this distribution, following Bessell & Czaykowska-Higgins' (1991) conclusion for Nxa'amxcin, it is here claimed that St'át'imcets 'retracted' alveolars are themselves the segmental triggers for the 'retraction' observed in 'retracted roots', that is, that 'retracted' [s̟ c̟ l̟ l̟'] are in fact underlying 'retracting' /s̟ c̟ l̟ l̟'/. However, the next section will argue that these and other underlyingly 'retracted' segments are actually underlying emphatics.[2]

5. Evidence that St'át'imcets 'Retracted' Consonants and 'Uvulars' Constitute a Class of Emphatic Consonants

Previous literature has suggested a connection between Salish 'retracted' consonants and Arabic emphatics. Kuipers (1973:11), discussing the phonetic nature of Salish 'retraction', states: "one can think of... an 'emphatic' glottal stop, etc." Van Eijk (1985:3) describes St'át'imcets 'retracted [s̟]' as 'velarised', 'resembling' the Arabic emphatic *sād* ([ṣ]). As noted earlier, Van Eijk's term, 'velarised', is the same term used in early studies of Arabic to describe Arabic emphatics. Bessell & Czaykowska-Higgins (1991:7, 12) describe the phonetic and phonological effects of 'retraction' as "similar to those of Arabic emphasis" and describe 'retracted' consonants as 'parallel' to Arabic emphatics. Bessell (1992:74) states that Salish and Arabic both have 'pharyngealised' consonants. Her term 'pharyngealised' is another term that has been frequently used in studies of Arabic to describe Arabic emphatics (see Lehn 1963, among others). Finally,

[2]Of the 18% of 'retracted' roots in the van Eijk dictionary that do not contain one of /s c l l'/, 15% contain another alveolar (/t/, /c'/, /ɬ/, /x̣ʷ/, or /n/), and 3% contain a labials (/p/ or /m/). These exceptions are addressed in Shahin (*in preparation*).

Woldu (1981), though not explicitly mentioning Salish, states that (besides Arabic) "[e]mphatic consonants are found in... Amerindian and other languages".

This section will present acoustic and perceptual support for recognising St'át'imcets 'uvulars' /q q' q^w q'^w χ $χ^w$/, and 'retracted' alveolars /z̟ z̟' s̟ c̟ l̟ l̟'/ as underlying emphatic consonants. Most importantly, it will also present phonological evidence that they are emphatics. On the basis of the phonological evidence and supporting acoustic and perceptual findings, I will propose that the 'uvulars' are emphatic velars, /k̠ k̠ˤ k̠ʷ k̠ˤʷ x̠ x̠ʷ/, and the 'retracted' alveolars are emphatic alveolars, /z̠ z̠ˤ s̠ c̠ l̠ l̠ˤ/.

5.1. Acoustic Support

Articulatory data from Arabic have shown that emphatics are both pharyngealised and uvularised (see Ali & Daniloff 1972, Dolgopolsky 1977, Lehn 1963, McCarthy 1994, among others). These gestures have been shown to result in a raised F_1 and a lowered F_2 in the acoustic signal (see Bonnot 1977, 1979, Card 1983, Ghazeli 1977, Obrecht, 1968, Woldu 1981, Younes 1982, among others). If St'át'imcets 'uvulars', and 'retracted' alveolars are emphatics, they would be expected to have a higher F_1 and a lower F_2 than the velars /k k' k^w k'^w/, 'non-retracted' alveolars /z z' s c l l'/, respectively.

For this study, two tokens each of velar /k/ and 'uvular' '/q/', and 'non-retracted' /l'/ and 'retracted' [l̟'] were analysed for their F_1, F_2 values. Formant frequencies for /k/ and '/q/' were measured at the CV transition; those for [l']/[l̟'] were measured at the consonant's midpoint. The values are seen in Table 4, which also identifies the forms in which the tokens appeared.

Velar /k/ and 'uvular' '/q/' were also analysed for the frequency of energy concentration in their burst. A spectrogram of two tokens each of [kə] and '[qə]', spliced from two tokens each of the words [kəwáʔtu] (fem. name), and [qə̟l̟-wí̟l̟'x] 'to get rotten', is seen in (3). The spectrogram shows a lower concentration of burst energy for '[q]' than for [k]. Underneath the spectrogram, narrowband spectral cross-sections are given. These were taken at burst midpoint, and also show the lower burst energy concentration for '[q]' than for [k].

a. F_1, F_2 values of *k* vs. 'uvular' '*q*' in the forms [kəwáʔtu] (fem. name) and [qə̣l̩-wi̱ ́l̩'x] 'to get rotten', respectively; measured at *kV* and '*q*'*V* transitions; 2 tokens per type, as seen; 1 speaker)

	F_1	F_2
k	482	1525
k	506	1545
'*q*'	675	1285
'*q*'	670	1295

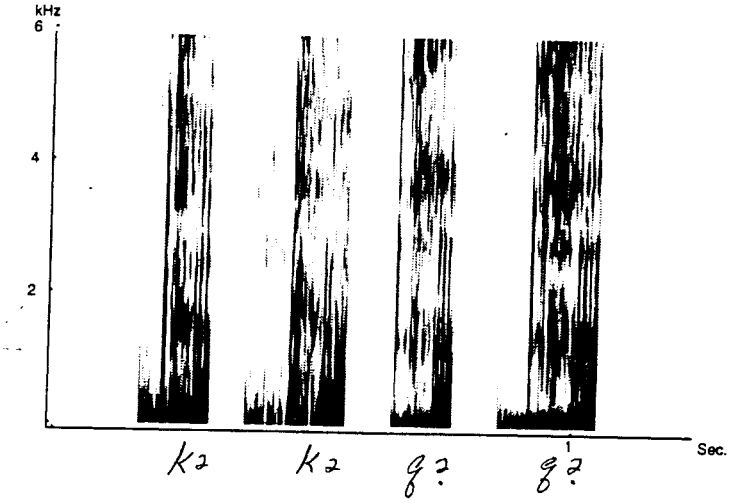
b. F_1, F_2 values of 'non-retracted' *l'* vs. 'retracted' *l̩'* in the forms [ʔama-wil'x] 'to get better', [qə̣l̩-wi̱l̩'x] 'to get rotten', respectively; ([l̩'] analysed is bolded and enlarged in the transcription just given); measured *l'*/*l̩'* midpoint; 2 tokens per type, as seen; 1 speaker)

	F_1	F_2
l'	444	1860
l'	454	1869
l'	571	1003
l'	552	1003

Table 4. F_1, F_2 Values of St'at'imcets 'Uvular' '/q/' vs. Velar /k/ and 'Retracted' vs. 'Non-retracted' Alveolar /l(̣')/

Spectrograms and spectra showing the raised F_1 and lowered F_2 of 'retracted' [l̩] over that of non-retracted' [l] are given in (3). The spectrogram is of two tokens each of [əl] and [ə̣l̩], spliced from two tokens each of the words [ci-cəl-úsaʔ] 'fresh fruit' (Upper dialect) and [qə̣l̩-wi̱l̩'x] 'to get rotten'. Spectra underneath the spectrogram show the F_1 and F_2 values at the midpoint of [l] and [l̩].

(3) spectrogram of two *kə* tokens and two '*qə*' tokens, from two tokens each of the words [kəwáʔtu] (fem. name), and [qə̣ɬ-wɪ̓ ɬ'x] 'to get rotten'; burst + vowel onset shown

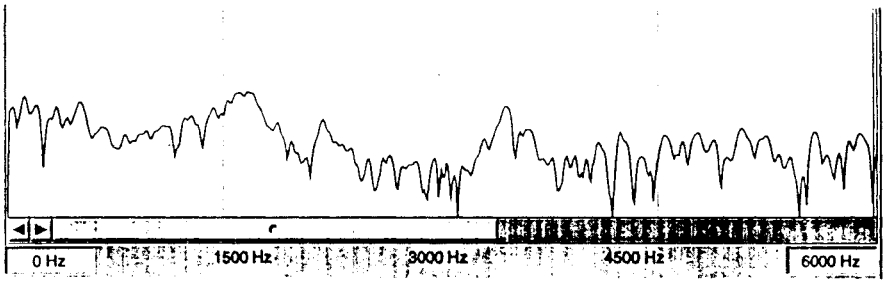


spectra:

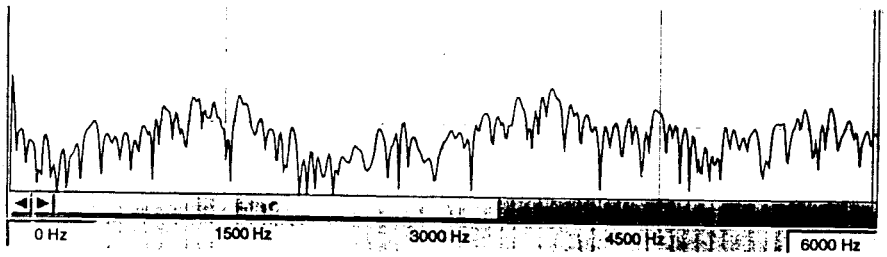
1) midpoint of burst of first *k* token above; peak at 1625 Hz

2) midpoint of burst of second '*q*' token above; peak at 1480 Hz

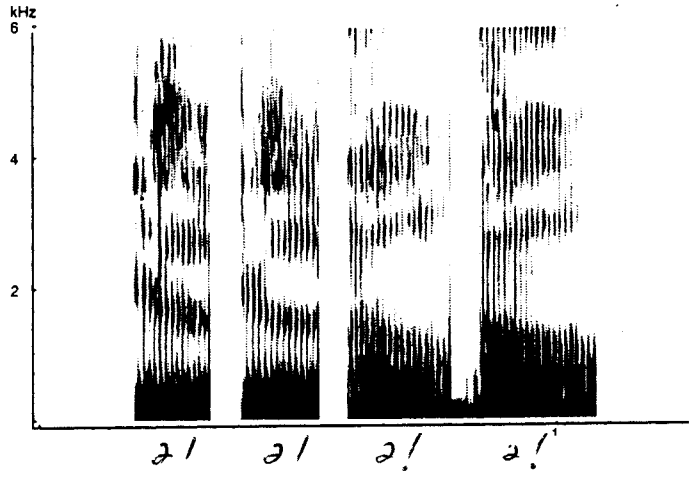
1)



2)



(4) spectrogram of two *əl* tokens and two *ə̣ḷ* tokens, from two tokens each of the words [ci-cəl-úsaʔ] 'fresh fruit' (Upper dialect) and [qə̣ḷ-wi̯ḷ'x] 'to get rotten' ([ḷ] analysed enlarged and bolded in the transcription just given); vowel offset + *l*/*ḷ* shown

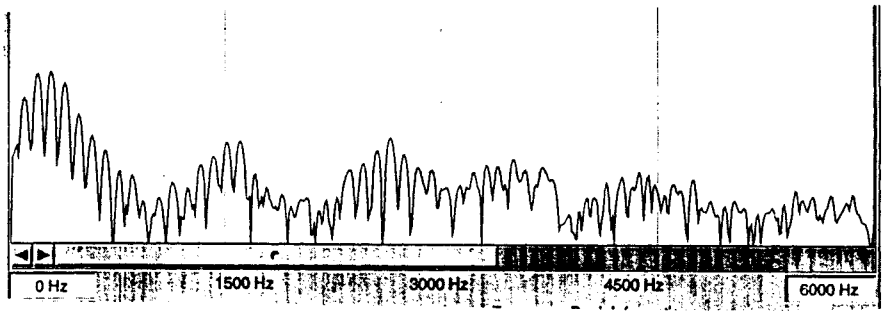


spectra:

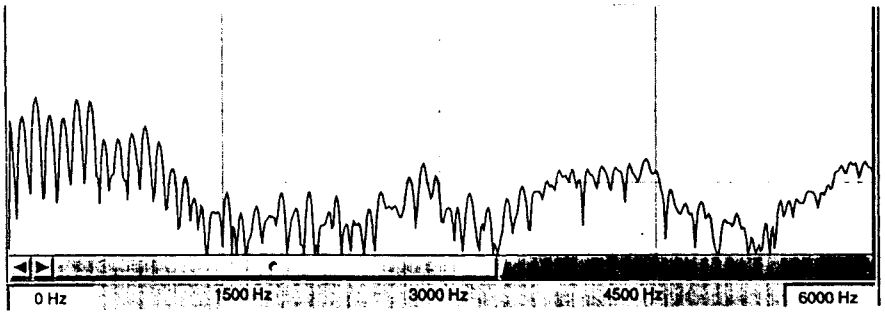
1) midpoint of *l* of first *l* token above; F1 = 262 Hz, F2 = 1559 Hz

2) midpoint of *ḷ* of second *ḷ* token above; F1 = 516 Hz, F2 = 934 Hz

1)



2)



The data in Table 4 and in (3) and (4) show that, for the tokens analysed, the 'uvular' '/q/' and 'retracted' alveolar [l̪(')] have a higher F_1 and a lower F_2 than velar /k/ and the 'non-retracting' alveolar /l(')/, respectively. The burst of plosive '/q/' has a lower-frequency energy concentration than the burst of velar /k/. These findings are consistent with findings on emphatic consonants in Arabic (see Al-Ani 1970, Younes 1982, among others) and, under a reliable articulation-to-acoustics mapping (such as one through the model of Stevens & House 1955), they support the interpretation that St'á'timcets 'uvulars' and 'retracted' alveolars, like Arabic emphatics, are produced with pharyngealisation and uvularisation gestures. As a final note, in the only other acoustic study of St'át'imcets that I am aware of, Thompson (1993, *unpublished*) reports a clearly lowered F_2 for 'retracted' /z̪ z̪'/.

Findings corroborating those just presented for St'át'imcets are reported by Bessell & Czaykowska-Higgins (1991) and Bessell (1992) for Nxa'amxcin Salish. Those two studies examined the formant values of Nxa'amxcin vowels in various segmental contexts. Both found that uvulars and 'retracted' alveolars consistently induce a raised F_1 on preceding vowels (Nxa'amxcin has no /z̪ z̪'/). Formant values in Bessell (1992:80) show a pattern of both a raised F_1 and a lowered F_2 conditioned by the 'retracted' alveolars. The values she reports for her consultant MM, an adult female, are seen in Table 5. The relevant comparisons in this table are between nucleus values per vowel across plain and 'retracted' contexts, and between offset values per vowel across plain and 'retracted' contexts (e.g., F_1 i: 427 ~ 499 onset, 374 ~ 397 nucleus).

	/_alveolar				/_retracted alveolar			
	nucleus		offset		nucleus		offset	
	F_1	F_2	F_1	F_2	F_1	F_2	F_1	F_2
i	427	2245	374	2281	499	2170	397	2319
u	435	1271	346	1240	605	1081	457	1229
a	708	1797	541	1966	869	1500	737	1641
ə	569	1490	478	1667	639	1470	550	1350

Table 5. Nxa'amxcin Data Showing Both Raised F_1 and Lowered F_2 for 'Retracted' Alveolars (from Bessell 1992:80)

These findings from Nxa'amxcin support the interpretation that 'retracted' consonants in Nxa'amxcin Salish are also produced with both pharyngealisation and uvularisation gestures, which are the postvelar gestures of emphatics.

In sum, the acoustic findings reported in this section support an analysis of St'át'imcets 'uvulars' and 'retracted' alveolars as emphatics: /k k$^{\text{ʔ}}$ k$^{\text{w}}$ k$^{\text{ʔw}}$ x x$^{\text{w}}$ z z$^{\text{ʔ}}$ s c l l$^{\text{ʔ}}$/.

5.2. Perceptual Support

Further support comes from a pilot perceptual study of the St'át'imcets segments under scrutiny. In this study, four literate, native Arabic speakers (three Palestinian speakers, one Syrian speaker) were instructed to judge whether a given St'át'imcets 'uvular', or 'retracted' alveolar was Arabic *kāf* (ك, /k/) or *qāf* (ق, /k̞/), *sīn* (س, /s/) or *sād* (ص, /ṣ̞/), *thal* (ذ, /ð/) or *thā* (ظ, /ð̞/), *lam* (ل, /l/) or *lam mfaxxama* /l̞/, as in [ʌ́l̞.l̞ ɑh] 'God', which was denoted by the judges as 'ڸ'. (There is no Arabic letter to denote emphatic /l̞/.) All the judges are linguistically untrained. Nine tokens of Lower St'át'imcets consonants were tested, representing a total of five types (ignoring glottalisation). Each token was presented in a taperecorded carrier word. The judges were instructed to write the Arabic letter corresponding to what they perceived each St'át'imcets token to be. They were permitted to rehear each word up to four times. Their judgments are presented in Table 6. (In each word in the table, judged tokens are bolded and enlarged. Forms are in van Eijk's transcription, although dots are added under the vowel and [ḷ'] in word 2, under the vowel in word 4, and under [ạ] and [ẓ(')] in words 8 and 9, to denote 'retraction' not marked by van Eijk 1987. Glosses are from van Eijk 1987, except for word 7, which is a form provided by one of my consultants. 'J' = judge).

As seen from Table 6, the rate of emphatic identification was high. For all the judges, the judgements for '/q(')/', /ḷ/ and /ṣ/ (and /k/) were unequivocal. There was some equivocation over the identification of /ẓ(')/ which, for the speaker who provided the test tokens, varies between interdental and alveolar articulation. One of the judges commented that, for the taperecorded speaker, /ð̞/ must have changed to /z̞/ like in Egyptian Arabic.

These preliminary results could be interpreted as showing not that the 'uvulars' or 'retracted' consonants were perceived as Arabic emphatics, but that, given the task, the Arabic emphatics were just the closest thing around. However, given the absolutely clear judgments for '/q(')/', /ḷ'/. and /ṣ/, I suggest that the results further suggest that St'át'imcets 'uvulars' and 'retracted' alveolars are emphatic consonants.

	Carrier Word (token judged bolded & enlarged)		Judgment J1	J2	J3	J4
1.	[**qə̣l**]	'bad'	ق	ق	ق	ق
2.	[qə̣l'**q**]	'rose'	ق	ق	ق	ق
3.	[n.**k'**áx-a**ɬ**c'a**ʔ**]	'constipation'	ك	ك	ك	ك
4	[mə**q'**]	'to get stuffed, to eat too much'	ق	ق	ق	ق
5.	[n.s̱á**l'**-**l̓'**-əc]	'to drool, slobber (e.g., like cows)'	ص	ص	ص	ص
6.	[n.s̱á**l'**-**l̓'**-əc]	'to drool, slobber (e.g., like cows)'	ل	ل	ل	ل
7.	[**k**awá**ʔ**tu]	(fem. name)	ك	ك	ك	ك
8.	[c'úq^{w}a**z'**]	'fish, (any kind of) salmon'	ظ	ظ	س	ظ
9.	[məxá**z**]	'huckleberry'	ظ	ظ	ذ	ظ

Table 6. Results of Perceptual Test of Lower St'át'imcets Consonants

5.3. Phonological Evidence

This section will present phonological evidence that St'át'imcets 'uvulars' and 'retracted' alveolars are emphatics. It will be shown that they pattern as a class in triggering uvularisation harmony ('emphasis spread'), a harmony also found in Arabic (see Card 1983, Ghazeli 1977, Herzallah 1990, Maamouri 1967, Younes 1982, among others).

First, however, consider independent evidence that these segments form a natural class: in St'át'imcets, roots of the type 'ÇVQ' are banned (van Eijk 1985:9), where 'Ç' denotes a 'retracted' consonant and 'Q' denotes a 'uvular' consonant. In another Salish language, Southern Okanagan (Southern Salish), 'retracted' /r̓ r̓'/ are banned as C_2 in a root with a 'uvular' as C_1 (see Egesdal & Thompson 1993, Kinkade & Thompson 1974, Kuipers 1981,). There must be some feature(s) that Salish 'uvulars' and 'retracted' alveolars share so they form a class for these co-occurrence restrictions.

On the basis of the acoustic and perceptual findings presented in the previous two sections, and anticipating the uvularisation harmony facts to be presented immediately below, I propose that the 'retracted' alveolars /z̓ z̓' s̓ c̓ l̓ l̓'/ are emphatic consonants. But the remaining question concerns the nature of the 'uvulars'. Are they simple uvulars or emphatic velars? I suggest that the answer lies in the harmony observed in data like that in (5). In (5) St'át'imcets 'uvulars' and 'retracting' consonants are seen functioning as a

natural class in triggering a harmony. This harmony affects the non-high vowels, that is, [ə] and /a/, and certain consonants. No other consonants trigger this harmony, including the pharyngeals; this is seen in (6).

(5) Harmony triggered by 'uvulars' and 'retracted alveolars': 'retracted' [ə̠ a̠] (instead of 'non-retracted' [ə a]) and 'retracted' consonants occur immediately preceding the trigger

a. [xʷʔa̠z] (*[xʷʔaz])	'not'
b. [tə̠x̆] (*[təx̆])	'bitter'
c. [s-pə̠lxʷ] (*[s-pəlxʷ])	'to stick out from something'
d. [mə̠q'] (*[məq'])	'to get stuffed, to eat too much'
e. [n̠sa̠l'-l̠'-əc] (*[nsa̠l'-l̠'-əc], *[n̠sa̠l'-l̠'-əc], etc.)	'to drool, slobber (e.g., like cows)'
f. [c̠qʷ-ánaʔ] (*[cqʷ-ánaʔ])	'lynx'

(6) The harmony seen in (5) not triggered by consonants that are not 'uvulars' or 'retracted' alveolars

a. [pəckɬ] (*[pə̠ckɬ], *[pə̠c̠kɬ], *[pəckɬ̠], etc.)	'leaf'
b. [kaɬás] (*[ka̠ɬá̠s], *[kaɬá̠s̠], etc.)	'three'
c. [ƛ̓paʔ] (*[ƛ̓pa̠ʔ], *[ƛ̠̓pa̠ʔ], *[ƛ̠̓paʔ], etc.)	'marrow'
d. [cáʕ-n] (*[cá̠ʕ-n], *[c̠á̠ʕ-n], *[cáʕ-n̠], etc.)	'to rip, tear something, tr.'
e. [máʕəs] (*[má̠ʕəs], *[m̠á̠ʕəs], etc.)	'maggot'

By the harmony in (5), schwa and the low vowel surface as backed [ə̠] and [a̠], respectively, and certain consonants surface 'retracted', as seen in (5e,f). See Shahin (*in preparation*) for further details of this harmony, and acoustic findings that support the analysis just given. The harmony effects seen above are similar to those observed in Arabic (see Card 1983, Ghazeli 1977, Herzallah 1990, Maamouri 1967, Younes 1977, among others).

'Retracted' consonants have been identified above as emphatics. Since the backed vowels and surface emphatic consonants result from the same harmony, the backed vowels must also be emphatic. A triggering class for the uvularisation harmony in (5) is possible only if the St'át'imcets 'uvulars' are emphatic velars. Were they primary uvulars, they would lack the secondary uvularisation articulation necessary to trigger the harmony. For primary uvulars, uvularisation is a primary articulation. Crosslinguistic evidence that primary uvulars lack secondary uvular articulation comes from Arabic, in which the primary uvulars /χ ʁ/ do not trigger uvularisation harmony. Evidently, as in Arabic (see Dolgopolsky 1977, among others), the primary velar and secondary uvular articulations of St'at'imcets emphatic velars are phonetically fused.

6. Conclusion

This paper has presented phonological evidence that St'át'imcets 'uvulars' and 'retracted' alveolars are a class of emphatic consonants. Acoustic and perceptual findings that support this identification were also reported. On the basis of what has been presented, I propose that '/q q' q^w q'^w χ̬ χ̬ʷ/' are emphatic velars /k̬ k̬ˀ k̬ʷ k̬ˀʷ x̬ x̬ʷ/, and that the 'retracted' alveolars /z̬ z̬' s̬ c̬ l̬ l̬'/ are emphatic alveolars /z̬ z̬ˀ s̬ c̬ l̬ l̬ˀ/. I suggest that this reanalysis is appropriate for Salish in general, although close investigation of other Salish languages might be necessary to confirm this.

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