

Stress and glottalized sonorants in Shuswap

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The Salish languages are renowned for their tolerance of consonant clustering and their large inventories of consonants. In this paper I will offer an account of the distribution of glottalized sonorants ([+constricted glottis]) in Shuswap (Sh), an Interior Salish language spoken in British Columbia. The analysis will involve the use of both autosegmental and metrical phonology, requiring interaction between the systems in the spirit of prosodic morphology (McCarthy & Prince 1990). There are two descriptions of Shuswap dialects, Northern (Kuipers 1974) and Southern (Gibson 1973). I will concentrate on the Northern dialect, and make some comparisons with the Southern dialect at the end of the paper.

(1) SHUSWAP CONSONANTS

		[-SON]		[+SON]	
		[+CG]	[+CONT]		[+CG]
LABIAL		p	p̣	m	ṃ
CORONAL	alveolar	t	ṭ	s	ṇ
	lateral			ɬ	ḷ
	distributed	c	c̣		ṛ
DORSAL	palatal			ɣ	ɣ̣
	velar	k	ḳ	x	ɣ̣
	uvular	q	q̣	χ	ɣ̣
	labio-velar	k°	ḳ°	x°	ẉ
	labio-uvular	q°	q̣°	χ°	ɣ̣°
LARYNGEAL		ʔ		h	

Note that there are some departures from normal IPA usage. The uvular fricatives (χ, χ^w) are transcribed as χ, χ°. The odd symbol ɣ̣ is the non-syllabic counterpart of ə.

(2) VOWELS

	[-BACK]	[+BACK]		
		[-ROUND]	[+ROUND]	
[+HIGH]	i		u	[-LOW]
	e	ə	o	
[-HIGH]		a		[+LOW]

The glottalized resonants, in particular, have been of concern in phonological descriptions of these languages. Sonorant glottalization is identified with morphological processes and moves freely about the word. This has proved problematic: in discussing Kalispel (Ka), Vogt (1940), for example, rather than putting glottalized sonorants into the table of consonants, includes the statement "[a]ll the sonorants may occur glottalized" at the bottom of the table. Of Coeur d'Alene (Cr), Reichard says

- (3) The unusual consonants *ṃ, ẉ, ṇ, ỵ, ḷ, ṛ, ɣ̣^w* belong to a series which take the glottalization for grammatical reasons...
Reichard (1938 §50)

In Shuswap, Kuipers (§1.2) while describing the resonants says that "[the] members of this group can become glottalized due to the same morphophonemic processes." The glottalization of Shuswap sonorants is sensitive to both stress and syllabification. We will address this problem through the use of metrical and autosegmental phonology in tandem.

Stress

Shuswap stress is similar to the other Interior Salish stress systems, such as Spokane (Sp, Carlson 1976, 1989, Carlson & Bates 1990), Columbian (Cm, Czaykowska-Higgins 1990), Colville (Cv, Mattina 1973) and Okanagan (Ok, Watkins 1970). Stress in Salish is largely determined morphologically. Descriptively, roots are divided into strong and weak types, and suffixes into strong, variable and weak (vowelless). Stress placement is often described as a hierarchy with the highest member in the word receiving the stress:

- (4) STRESS HIERARCHY
strong suffix > strong root > variable suffix > weak root
[> weak (vowelless) suffix]

The following statements from Kuipers express his observations, consistent with this stress hierarchy:

- (5) Sh§13.2 *Stress-types*.
Verbs of all transitive classes except that with *-nwént-*, which always has the stress on the suffix, fall into two types depending on whether they are I base-stressed or II suffix-stressed.

(6) Sh§13.8 *Alternative stress.*

A number of suffix-stressed verbs have alternative forms with stress on the root, which in all these cases has the vowel *i* ...

Examples of the various combinations in the different languages follow. A lone strong suffix will attract stress, even when it occurs with a strong root:

(7) STRONG ROOT + STRONG SUFFIX

Sh:	[t̥x̥yésxnm̄]	t-√x̥éy-ésx̥n-m	<i>to heat stones</i>
Cm:	[k̄im̄x̄ikn]	k-√?im̄x-ikn	<i>loc-move-back</i>
Cv:	[x°knúntx°]	√x°úk-nú-n-t-ix°	<i>pull out-success</i>
Sp:	[k°l̄ncút]	√k°ú'l̄-nt-sút	<i>make-trans-refl</i>

(8) WEAK ROOT + STRONG SUFFIX

Cv:	[x̄stw̄ilx]	√x̄as-t-w̄ilx	<i>good</i>
Cm:	[nckckq̄inn]	n-√ckck-q̄in-n-t-∅-n	<i>loc-hit rep-top-cntrl-tr-3so-1ss</i>
Sh:	[q̄mnw̄éns]	√q̄am-nw̄ént-s	<i>he accidentally swallowed</i>

With only variable suffixes, strong roots retain stress:

(9) STRONG ROOT + VARIABLE SUFFIX

Sh:	[p̄ic̄ncn]	√p̄ic̄-nt-ci-en	<i>I squeeze you</i>
Cm:	[sac̄im̄xx°]	sac-√?im̄x-mix	<i>impf-move-impf</i>
Cv:	[x°úkntx°]	√x°úk-n-t-ix°	<i>pull out</i>
Ok:	[wékncn]	√wék-n-ce-n	<i>see-compl-2so-1ss</i>
Sp:	[k°ú'l̄ntx°]	√k°ú'l̄-nt-ex°	<i>make-trans-2s</i>

However, weak roots lose stress to a following variable suffix:

(10) WEAK ROOT + VARIABLE SUFFIX

Sh:	[l̄x̄ntélt]	√lēx̄-nt-el-t	<i>We were squealed on</i>
Cm:	[ckncás]	√ck-n-t-sa-s	<i>hit-cntrl-tr-1so-3s</i>
Cv:	[x̄x°p̄ntin]	√x̄ax°-p-n-t-in	<i>hang</i>
Ok:	[ca?ncén]	√ca?-n-ce-n	<i>punch-compl-2so-1ss</i>
Sp:	[šl̄ntéx°]	√šil-nt-ex°	<i>chop-trans-2s</i>

The hierarchy in (4) suffices to describe all the Interior Salish languages when there is a *unique* strongest item in a word. Interestingly, when a word consists of a root and more than one suffix of a given type, the languages differ in the stress placement. Words

containing more than one strong suffix show different stress patterns in the different languages:

(11) STRONG ROOT + ... STRONG SUFFIX + ... STRONG SUFFIX

Cm:	[kas̄piqcncút̄x°]	kas-√piq-cin-cút-mix	<i>irr-cook-food-refl-impf</i>
Cv:	[ksk°l̄kstm̄ista?x]	k̄s-s-√k°ú'l̄-ikst-m-i-sút-x-a?-x	<i>irr-abs-make-hand-mid-sec-refl-inc</i>
Sp:	[?am̄x°sncut̄néye?y]	√?am̄x°-us-nt-sút-tn-éye?-y	<i>shave-face-trans-refl-inst-seem-cont</i>

As we have also seen, weak roots lose stress to variable suffixes; words having more than one variable suffix (and no strong suffixes) following a weak root are also stressed differently:

(12) WEAK ROOT + ... VARIABLE SUFFIX + ... VARIABLE SUFFIX

Sh:	[l̄x̄ncin]	√lēx̄-nt-ci-en	<i>I squeal on you</i>
Cm:	[ckstwás]	√ck-n-stu-wa-s	<i>hit-cntrl-caus-TO-3ss</i>
Cv:	[n̄x̄sáqstxn]	n-√x̄as-aqst-xan	<i>loc-good-rear-legs</i>
Sp:	[šl̄ncin]	√šil-nt-si-en	<i>chop-trans-2obj-1subj</i>

The location of the suffix with stress in such words in the various languages is summarized in (13):

(13) STRESS PLACEMENT WITH MORPHEMES OF LIKE "STRENGTH"

Word Form	Cm	Cv	Ok	Sh	Sp	
root + strong*	last	first	last	last	last	suffix
weak root + variable*	last	first	last	first	first	suffix

This table does not capture all the intricacies of Salish stress; there seems also to be interaction between the type of suffix (somatic *versus* grammatical) and stress. Even without such eventual elaborations, the patterning of stresses is theoretically intriguing.

Stress Parameters & Rules

The system of stress assignment in Halle & Vergnaud (1987) is based on the construction of a metrical grid above the organizing tier. The possible stress systems of languages are not atomic, but rather consist of a conjunction of units of minimal contrast, the *parameters*. As an example of a minimal contrast, consider the difference between the stress patterns of Latvian and French (taken from Halle & Vergnaud):

- (14) Latvian: word initial stress (e.g. *Látvija*)
 French: word final stress (e.g. *originalité*)

They show a minimal contrast in the location of stress, for stress is assigned to an extreme in both cases, in Latvian to the first stressable element and in French to the last. Thus, these languages are similar in some respects (one stress per word) and different in others (which end receives stress). The parameter describing this difference is the *headedness* of the constituent, Latvian is *left-headed*; French *right-headed*.

Another minimal contrast is the size of the constituents. This contrast is described by the enumeration of the types of constituents available. The types of feet include binary (i.e. at most two elements) and unbounded. Halle & Vergnaud use the following parameter set:

- (15) STRESS PARAMETERS
- | | |
|--------------|---|
| [± BND] | constituents are (not) bounded |
| [± HT] | heads are (not) constituent terminal |
| [R/L] | constituents are right (left) headed |
| [L→R, R→L] | construct constituents from left (right) edge |
| [± CONFLATE] | lines 1 and 2 are (not) conflated |

Thus, Latvian and French share constituent-final heads and unbounded constituents [+HT -BND]. However, they differ on which end the head appears on, Latvian placing it on the left, French on the right:

- (16) LATVIAN FRENCH
- | | | |
|--------------|--------------|--------|
| * | * | line 1 |
| (* * *) | (* * * * *) | line 0 |
| Latvija | originalité | |
| [+HT -BND L] | [+HT -BND R] | |

Along with the stress parameters there are *rules* of grid construction, identifying elements with special properties. The line 0 grid marks, for example, are introduced by a rule, of the form:

- (17) LINE 0 PROJECTION
Project a line 0 mark for each vowel (or rimal element ...)

and in some "quantity sensitive" systems, some line 1 marks are introduced by the rule:

- (18) LINE 1 REALIZATION OF QUANTITY SENSITIVITY
Project a line 1 mark for each heavy syllable

One of the major concerns is the proper balance between rules and parameters, for in many cases the examples of attested rules are not numerous, allowing for a characterization into parameters (Dresher 1990 offers extrametricality and foot construction as examples).

Boundary Placement

In more recent work, Halle (1990) has shown that there are three types of quantity systems: two line 0 marks (MORAS), line 1 mark placement and line 0 boundary placement. Halle & Kenstowicz (1991), employing evidence from Turkish and Diyari, further show that there are two types of idiosyncratic stress, line 1 marks and line 0 boundaries. The introduction of boundaries can serve, like the Stress Erasure Convention, to move stress along in a word. So, there are two ways to move stress in a morphologically complex word: wipe out previous stress structure (the cyclic approach) or mark some morphemes as starting (or ending) feet (the boundary approach). Idsardi (1991) argues that Salish stress cannot be captured with a cyclic account; it requires the lexical placement of boundaries. Salish stress is generally placed on the *last* foot, so adding new feet to the end of the word causes stress to shift to the right. The morphemes and stress parameters in the various languages are:

(19)

		Cv	Cm	Ok	Sh	Sp
ROOTS	strong	(...)	(...)	(...)	(...)	(...)
	weak (... (
SUFFIXES	strong	(...)	(...)	(...)	(...)	(...)
	variable
LINE 0	BND	-	-	-	-	-
	HEADED	L	L	L	L	L
LINE 1	BND	-	-	-	-	-
	HEADED	L	R	R	R	R
	XPOS	yes	no	no	no	no

Parametric differences among the languages yield the three language types. Lexically, morphemes are marked for idiosyncratic foot boundaries, indicated by "("; those morphemes notated "..." impose no foot requirements. Each language builds left-headed feet and the word stress falls on the last foot in all the Interior Salish languages except for Cv, where it falls on the second foot. In Sh and Sp weak roots require any subsequent material (even variable suffixes) to be separately footed and thus capable of bearing word stress.

Weak roots with variable suffixes in Cm, Ok and Cv contain no lexical boundaries. Line 0 is parsed only where lexical boundaries exist, that is the feet are inferred, not constructed. When no feet are induced by lexical boundaries, line 1 parameters are applied directly to line 0 (yielding in Cm a "reverse" foot).

(20)	Cm/Ok	Sh/Sp	Cv
	* (* * *) (* *) (*)	* (* * *) (* *) (*)	* <*> (* *) (* *) (*)
s + s + s	(s+(s+(s	(s+(s+(s	(s+(s+(s
	* (* * *) (* *) (*)	* (* * *) (* *) (*)	* <*> (* *) (* *) (*)
w + s + s	w+(s+(s	w+(s+(s	w+(s+(s
	* (* (* * *)	* (* (* * *)	* (* (* * *)
s + v + v	(s+ v+ v	(s+ v+ v	(s+ v+ v
	* (. . .)	* (* *)	* <.> (. .)
w + v + v	w+ v+ v	w(+ v+ v	w+ v+ v

Extrapolation and extrametricality are impossible when there is only one mark in the domain, yielding for Cv the equivalency of "second" stress and "last" stress when only one or two line 1 marks project. In the case when no line 1 marks project, the line 1 parameters are again applied to line 0 (indicated here by periods on line 1).

(21) STRONG ROOT WITH STRONG SUFFIX

*
(* *)
(*) (*)

t + (šey + (esxn + m → tšyésxnm¹ *to heat stones*

(22) WEAK ROOT WITH STRONG SUFFIX

*
(* *)
(*) (*)

(qəm(+ (nwent + s → qmnwéns *he swallowed accidentally*

(23) STRONG ROOT WITH VARIABLE SUFFIXES

*
(* *)
(* * *)

(pic¹ + nt + ci + en → picncn *I squeeze you*

(24) WEAK ROOT WITH VARIABLE SUFFIXES

*
(* *)
(*) (* *)

(leš(+ nt + ci + en → lšncin *I squeel on you*

The non-cyclic account of stress placement allows some morphological junctures to persist as metrical boundaries. Consequently, stress can be "read off" the morphological representation, without the obfuscating effects of the Stress Erasure Convention. Since the lexical stresses have some degree of permanence, the stress patterns are more nearly surface-transparent, presumably easing the task of the language learner (cf. Dresher & Kaye 1990).

However, more remains to be said about the realization of vowels in Shuswap. Unstressed vowels other than ə are frequently deleted, requiring rules of clash resolution and syncope:

(25) CLASH RESOLUTION

*
* → ∅ / \bar{x} * 1
* 0

(26) SYNCOPE

* 1
v → ∅ / \bar{x} * 0
=

Clash resolution feeds syncope, yielding the large surface consonant clusters common in these languages.

Syllabification

Shuswap syllabification is similar to other Salish systems. Large consonant clusters occur, but all sonorants can function as syllable peaks. Kuipers (§1) outlines the situation:

- (27) ... The consonants fall into 22 obstruents (K) and 15 resonants (R).
Though the latter can form the peak of an unstressed syllable ... they are classed as consonants because they do not occur as stressed vowels
...

As in Bella Coola, resonants are syllabic when not adjacent to a vowel, or, in Kuipers terms when they are in "vocalic position", defined (§ 2.3.1) as:

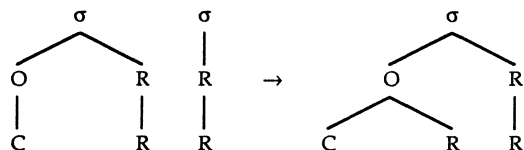
- (28) ... first of all T_T and T_# ...
Of two consecutive resonant neither of which adjoins a vowel the first is consonantal and the second vocalic ...

Following Idsardi (1990) syllabification in Sh creates C(V)R syllables. This system of syllabification then allows the characterization of the sonorants able to bear glottalization: only rimal sonorants can appear glottalized. Kuipers (§ 5.3.1) puts it:

- (29) ... a glottalized resonant (symbolized \dot{R}) can occur only after a vowel or in vocalic position

Thus, VRV sequences syllabify (VR)(V), that is, intervocalic resonants are syllabified with the *preceding* vowel. The effect of this can be seen when ...CR stems are followed by vowel initial or RC initial suffixes, discussed below. The rule eliminating hiatus is:

- (30) HIATUS RESOLUTION



Idsardi (1990) argues for the same hiatus rule in Bella Coola phonology, but in the Bella Coola morphology the syllables are kept separate.

Sonorant Glottalization

In Shuswap, glottalization of resonants can be a floating feature listed along with a morpheme. As Kuipers (§5.1) puts it:

- (31) Glottalized resonants can be characteristic of certain morphemes as such.

There are minimal pairs in roots:

- (32) MINIMAL PAIRS
 $\dot{q}ey-$ *set up a structure*
 $qey-$ *write*

however, the glottalization can move when suffixes are added:

- (33) DISPLACEMENT OF GLOTTALIZATION
 $\dot{q}y-\acute{e}m$ *write-itr* ($\dot{v}qey$)

and affixes can add glottalization:

- (34) GLOTTALIZATION ADDED BY SUFFIX
 $s-t-\dot{q}ey-qn$ *shed* ($\dot{v}qey$)

- (35) GLOTTALIZATION ADDED BY PREFIX
 $si\dot{x}-n-s$ *he moves it*
 $t-si\dot{x}-\acute{n}-s$ *he ladles it over.*

The location of the glottalization is, in order of preference:¹

- (36) RESONANT GLOTTALIZATION HIERARCHY
- | | | |
|----------------------------|--|--------------------------|
| post-stress sonorant | $s-t-\dot{q}ey-qn$ | <i>shed</i> |
| syllable following stress: | | |
| sonorant | $x-si\dot{x}-\acute{n}-s$ | <i>he ladles it over</i> |
| vowel | $\acute{t}k\acute{a}p\acute{e}p\acute{y}\acute{e}$ | <i>small dishpan</i> |
| stressed vowel | $t-x^{\circ}l-x^{\circ}l-\acute{e}\acute{t}p$ | <i>gooseberry bush</i> |

It is evident that the autosegmental association of the glottal feature to sonorants is governed by the prosodic organization of the word. Following the general tenets of McCarthy & Prince (1990), we may say that the word is *circumscribed* to get the domain for the association of the feature. Further metrical structure is built on another plane to locate the precise position of glottalization. In McCarthy & Prince there are two sorts of circumscription, positive and negative. Borrowing this terminology, we can use positive circumscription to denote the stressed foot, and negative circumscription to denote the remaining material. Since the stressed vowel can in some cases bear the glottalization, it is clear that Shuswap resonant glottalization must employ positive circumscription.

Computing sonorant glottalization

After the word is positively circumscribed to restrict SG to the material in the stressed foot, a separate metrical plane is constructed according to the rules and parameters:

- (37) SHUSWAP SONORANT GLOTTALIZATION PARAMETERS
 positive demarcation based on stress-plane (domain = foot)
 project sonorant rimal elements on line 0'
 mark left-most element of line 0' extrametrical
 LINE 0': [-BND, L]
 associate [+constricted glottis] with head (no spreading)

¹ The transcription are modified somewhat from Kuipers (1974). What I am notating \dot{v} corresponds to $v?$ in Kuipers (1974).

The glottalization is then realized on the most prominent element. The behaviour of stress and glottalization (associated with the suffix $-iləp$) with strong and weak roots is shown below. (Underlining indicates the circumscribed material, \emptyset indicates syncopated vowels, and \circ indicates onsets created by resyllabification.)

- (38) STRONG ROOT
- | | | |
|---------------------|----|----------------------------------|
| * | 2 | |
| (*) | 1 | } |
| (*) | 0 | |
| (s e y - i l ə p) | | |
| \emptyset \circ | | } <i>stress</i> |
| <*> (*) | 0' | |
| * | 1' | } <i>sonorant glottalization</i> |
- [seyləp] *soft foundation of boughs*

The l of $-iləp$ is no longer a possible target for glottalization due to resyllabification following the deletion of the preceding vowel. After i deletes, the resulting syllable (1), consisting of a single sonorant, is subject to the rule of hiatus, making it the onset to the following syllable (ləp).

- (39) WEAK ROOT
- | | | |
|----------------------------|-----------|--|
| * | * | |
| (*) | (*) | |
| (c l i l x ^o) | - i l ə p | |
| \emptyset \circ | | |
| <*> (*) | * | |
- [cɫix^oiləp] *chair*

In this case syncope causes two l 's to abut, this is resolved by deleting one of them:

- (40) $ll \rightarrow l$

Hiatus created by suffixation also causes resyllabification:

- (41)
- | | | |
|--------------------------------|---------|--|
| * | * | |
| (*) | (*) | |
| t + (x̄ e y + (e s x n + m) | | |
| \emptyset \circ | \circ | |
| <*> (*) | * | |
- [tx̄yésznm̩] *to heat stones*

A cogent example of the mobility of sonorant glottalization is given in the comparison of (41) with (42), with glottalization paralleling stress:

- (42) [tx̄yésznm̩-kn] *I heat stones*

When no following sonorant is available for glottalization, [+CG] is assigned to the following vowel:

- (43) VOWEL GLOTTALIZATION
- | | |
|-----------------------------------|-------|
| * | |
| (*) | |
| (*) | (*) |
| (? i x̄ ^o + i l ə p) | |
| \emptyset \circ | |
| <*> | (*) |
| | * |
- [ʔix̄^ol'əp] *broom (lit sweep-floor)*

And when ə bears glottalization, it is realized as e :

- (44) $\text{ə} \rightarrow e / _$

Even when there is a following sonorant in rimal position, if there are intervening positions glottalization shows up in the first position after the stress:

- (45) GLOTTALIZATION DISTANCE RESTRICTED
- | | |
|------------------------------------|-------|
| * | |
| (*) | |
| (*) | (*) |
| (c i q + l e x ^o + m) | |
| <*> | (*) |
| | * |
- [ciqléx^om] *dig the ground*

The glottalization in reduplicated forms also conforms to the same calculation. Glottalization shows up only in post-tonic position:

- (46) REDUPLICATED FORMS
- | | | |
|--|-------------|--|
| * | * | |
| (*) | (*) | |
| (*) | (*) | |
| s + t + (x ^o u l + (x ^o u x ^o l) | | |
| \emptyset | \emptyset | |
| <*> | (*) | |
| | * | |
- [stx^olxúx^ol] *a type of gooseberry*

This theory predicts that the stressed vowel should be able to bear glottalization when there is no following sonorant or vowel. There is one form that I have found which shows exactly this:

(47) GLOTTALIZATION OF STRESSED VOWEL

(*	*	*)
(*	*	*)
t +	(x° u l +	(x° u l +	(e l p)
	Ø	Ø	Ø	Ø
		(*)		
		*		
[tx°lx°l'ɛɪp]	<i>gooseberry bush</i>			

The mobile, limited distribution of glottalized sonorants in Shuswap can be described through the association of a floating feature to a metrically prominent position. This system ensures that the glottalization falls near or on the stress. Thus our analysis accounts for the facts of Shuswap stress and sonorant glottalization, and the interaction between them. Sonorant glottalization is calculated metrically, on a subpart of the word demarcated by the stress plane.

Comparison with Southern Shuswap

The data from Southern Shuswap (Gibson 1973) is not as clear as that from Kuipers (1974). Gibson gives the following statement for "laryngeal placement":

- (48) §2.18. Laryngeal placement. // -ʔ // *permanent* accompanies the last resonant coda in the word (it is realized phonetically as a glottalized resonant [m̥ n̥ l̥ ɥ̥ w̥]).

Where there is no resonant coda, the laryngeal remains as a word final consonant, with the exception of // -tn // *implement*, where the laryngeal shifts although the resonant remains.

One cognate discussed in both descriptions, √qey̥ *write*, in Southern Shuswap does not display rightward displacement of glottalization along with stress:

- (49) [q̥iʔx̥itə] q̥ey̥-xi-tə *you write to him!*

However, Gibson notes one form displaying a rightward shift of glottalization:

- (50) §3.233. // -n̥w̥ɛn̥ // ...

k̥°ulə n̥w̥ɛxt̥n̥ *I managed to make it for her (benefactive)*

Note that when benefactive // -xi // occurs, ʔ occurs with the following resonant rather than a preceding one. These are the only examples in which the general order of laryngeal placement is reversed

Southern Shuswap has more or less the same variety of environments of glottalized sonorants:

(51) V̥R TYPES

suk̥°ə min̥		<i>butcher knife</i>
x°ú ɥ̥		<i>come on!</i>
xə ʔə q° umi n̥	x-ʔq°-min-ʔ	<i>sewing machine</i>
p̥ilə xə	p̥il-xn-ʔ	<i>skirt</i>
x°ú ləkə	x°ú l-ə kəʔ	<i>drill</i>

(52) V̥C*V̥ TYPES

tef̥upəʔ		<i>great grandchild</i>
təmətət̥étuʔs kə	t-mut-te-té-t-ews k-en	<i>I rode horseback a while</i>

(53) V̥C*R TYPES

xə q̥əʔ úst̥n̥		<i>wedge</i>
xi yə q° ipət̥n̥	x-yə q°-ip-tn-ʔ	<i>fireplace</i>
xə ɪə q° ume ʔ	x-ɪə q°-min-ʔ	<i>cup</i>
snik̥əmeʔ	s-nik̥-min-ʔ	<i>sawdust</i>

(54) V̥ʔ TYPES

x°ux°ulé ʔ	<i>meadowlark</i>
wiʔ	<i>finish</i>
q̥°é ʔq	<i>squawfish</i>

however, we are missing crucial cases to correctly determine the sonorant glottalization parameters. The ones posited for Northern Shuswap will suffice for this set of data, but further investigation of more complicated post-stress environments must be done.

Conclusions

The distribution of stress and glottalization in Shuswap provides interesting support for the metrical theory of Halle and Vergnaud (1987). It clearly demonstrates that stress in this language is not syllable based, but vowel based, thus providing evidence for the projection of a class of *stress bearing units* over which the stress is calculated. Further, the syllabification of sonorants as syllable peaks and as codas where-ever possible is required to account for the glottalization patterns. This shows that maximization of onsets is not universal. It also shows that a separate metrical plane is built for the glottal-bearing units, distinct from the stress-bearing units. The question of constituent or end-based theories of prosodic mapping cannot be addressed from the limited set of facts available here, and must await more data.

The glottalization processes also offer other interesting insights. The most interesting of these is the lack of any evidence for effects of interference from the glottalization of sonorants, stops and the appearance of the glottal stop. These effects are also present in Coeur d'Alene, where Cole's (1987) account makes crucial use of the morphemic tier hypothesis. Further investigation of the Salish laryngeal and pharyngeal prosodies should help decide whether tier segregation is based on morphological structure, metrics, syllable structure, feature geometry, or some combination of these. The Salish languages appear to be an excellent proving ground for this issue.

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 ICSL *Proceedings of the International Conference on Salish and Neighboring Languages*
 IJAL *International Journal of American Linguistics*
 LI *Linguistic Inquiry*
 NLLT *Natural Language and Linguistic Theory*
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