Word internal constituency in Sḵwx̱wú7mesh (Squamish Salish)*

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In this paper we examine the stress patterns of Squamish words and we argue that they provide evidence for word internal constituency. In particular, we propose that stress is assigned within the Prosodic Stem constituent. We argue that non-reduplicative prefixes are outside the domain for stress assignment, so they do not receive stress. Reduplicative prefixes, in contrast, are in the Prosodic Stem with the root, so they do receive stress when the basic pattern predicts they should. We also show that weak suffixes are in the Prosodic Stem with the root since the basic pattern is observed when weak suffixes are attached to roots. Evidence from stress also shows us that strong suffixes begin a new domain for stress assignment since adjacent stresses are permitted when they are attached to roots with final stress. In analysing these facts we use Optimality Theory which is a constraint-based model. Within Optimality Theory we show that all these facts can be accounted for with the constraints and rankings which account for the basic pattern.

1 Introduction[1]

(1a) suggests that in Squamish stress is applied to the leftmost vowel of a word. However, there are some prefixes which are never stressed as in (1b) and there are some prefixes which do get stressed as in (1c). Lastly, as is illustrated in (1d), there are also some suffixes which attract stress.

(1)	a.	[méχaɬ]	<míx̱alh>	'black bear'
	b.	[ti-lám']	<ti-lám'>	'build a house'
	c.	[k'^{w}á-k'^{w}ay']	<kw'á-kw'ay'>	'be (very) hungry'
	d.	[pɔʃʔɔɬɬ]	<push=úllh>	'kitten (lit. 'young cat')'

The goal of this paper is to explain these apparent exceptional stress patterns. In doing so, we claim that there are at least two phonological constituents internal to the Squamish word: Prosodic Stem (PS) and Prosodic Word (PW) These domains are outlined in (2):

(2) Phonological structure

[$_{PW}$ PREFIXES [$_{PS}$ RED ROOT =LS1 $_{PS}$] [$_{PS}$ =LS2] $_{PW}$]
PW=Prosodic Word
PS=Prosodic Stem

We also claim that stress is assigned within the PS and that a Squamish PW can contain more than one PS.

We begin our discussion in section 2 with the basic stress pattern. From there in section 3 we discuss non-reduplicative prefixes and in section 4 we move on to our discussion of reduplicative prefixes. Next, in section 5 we examine strong and weak suffixes. In section 6 we present the morphological structure of Squamish based on evidence presented in examining stress and affixation. We conclude our paper by presenting some theoretical consequences in section 7.

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[1] Squamish is a Coast Salish language spoken in the Burrard Inlet and Howe Sound area around Vancouver, British Columbia. There are less than twenty fluent native speakers remaining, the youngest in his late sixties. Data in this paper stems from both the Squamish Grammar (Kuipers 1967) and original fieldwork. Data is presented in both the orthography (arrow brackets) used by the Squamish Nation (see Appendix for Key) and the IPA.

2 The basic stress pattern[2]

In this section, we outline the basic stress pattern in Squamish and demonstrate how four crucially ranked constraints within an Optimality Theory framework account for this pattern.

2.1 The generalizations

Squamish exhibits a trochaic stress pattern in which feet are built syllabically; this is to say that the leftmost syllable in a bisyllabic word bears stress. This is illustrated by the data in (3):

(3)	a.	[(nétʃim)]	<níchim>	'speak, talk'
	b.	[(méχaɬ)]	<míxalh>	'black bear'

However, the Squamish stress system is quality sensitive whereby lower and peripheral vowels prefer stress over higher and central vowels[3]. In Squamish this quality sensitivity manifests itself as a preference for stress on full vowels rather than schwa[4]; consequently, the trochaic pattern becomes iambic when the leftmost syllable contains a schwa. This is to say that when there is a schwa in the first syllable and a full vowel in the second syllable, the full vowel bears stress; thus the creation of an iambic syllable is preferred over the stressing of a schwa in a trochaic syllable. This is illustrated by the data in (4):

(4)	a.	[(wənáχ^{w})]	<wenáxw>	'true/truth'
	b.	[(sq^{w}əmáy')]	<skwemáy'>	'dog'

Schwa's resistance to stress has been documented for other Coast Salish languages, for example, Lushootseed (Urbanczyk 1996), Cowichan (Bianco 1996) and Musqueam (Shaw et al. 1999).

When there are no full vowels, for example, in a bisyllabic word containing only schwas, the foot reverts back to a trochaic one whereby the leftmost schwa bears stress, as in (5).

(5)	a.	[(t'ə́ləm)]	<t'élem>	'bark from a wild cherry tree'
	b.	[(wə́χəs)]	<wéxes>	'frog'[5]

While trisyllabic words are uncommon in Squamish (Dyck 2000 states approximately 2%), the few that are observed demonstrate that trochaic feet are built iteratively from left to right in Squamish. In trisyllabic forms that have full vowels in each syllable, primary stress falls on the initial syllable and secondary stress falls on the final syllable.[6]

(6)	a.	[(sxóxo)(p̀ìt)]	<shúhupìt>	'rabbit'
	b.	[(mála)(lòs)]	<mélalùs>	'racoon'

Since the morphologically simple words follow a basic pattern with no exceptions, the data examined thus far do not provide evidence for positing more than one level of representation at the phonological level. The structure motivated thus far is given in (7):

(7) Phonological Structure
[PW ROOT]

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[2]See Bar-el (1998), Bar-el & Watt (1998), Watt (1998) for further discussion.

[3]See Kenstowicz (1996) for further discussion.

[4]Note that high vowels are dispreferred for stress in Squamish as well, though this property is not discussed here.

[5]This stress pattern is recorded from fieldwork sessions; Kuipers (1967) marks stress in this word on the second syllable.

[6] These words are morphologically complex in that they can be broken down into smaller units, but they have been grammaticized. Since trisyllabic morphologically simplex roots are extremely rare, we assume these words as being representative of the stress pattern.

Evidence for a distinction between the PS and the PW comes from morphologically complex forms which are discussed in later sections.

The generalizations discussed in this section can be straightforwardly captured by invoking an Alignment constraint and Prosodic markedness constraints within an Optimality Theory framework (Prince and Smolensky 1993, McCarthy and Prince 1993 and others).

2.2 The analysis

The fact that Squamish prefers left-headed (trochaic) feet is accounted for by the alignment constraint in (8):

(8) **HEAD-L:ALIGN L(H, FT)**
For every foot, align the head of that foot with the left edge of the foot

This constraint ensures that feet do not surface as iambs. Violations of this constraint are calculated on a foot by foot basis such that every foot whose head is not at the left edge will incur a mark. Note, however, that monosyllabic feet that are stressed vacuously satisfy this constraint (though they violate foot-binarity). In other words, a single syllable that is stressed can be considered to be both left-headed and right-headed.

The property of having bisyllabic feet in Squamish is captured by the constraint in (9):

(9) **FOOT BIN$_\sigma$**[7]
Feet are binary at the syllabic level

This constraint ensures that binarity is not at the moraic level, for example. Violations of this constraint are calculated by foot; that is, every foot that is not binary at the syllabic level will incur a mark.

Squamish, like many other languages, prefer to parse all syllables into feet. In Optimality Theory, this preference is expressed by the constraint in (10):

(10) **PARSE-σ:**
Parse all syllables in the stress domain into feet

We refer here to a "stress domain", which we will motivate in section three of this paper.[8] Violations of this constraint are calculated by syllables such that every syllable that is left unparsed incurs one violation of the constraint.

We have argued that Squamish is a quality sensitive system and capture the fact that in Squamish schwa is the least preferred vowel for stress by invoking the constraint in (11)[9]:

(11) ***P/ə** (Kenstowicz 1996)
Schwa cannot head a foot

This constraint ensures that schwa will only get stress when there is no other full vowel available for stress. Violations of this constraint are calculated by vowel and thus every schwa that is stressed will incur a mark.

Each of the constraints which were discussed above are crucially ranked with respect to each other. Firstly, we notice that it is better to leave some syllables unparsed (i.e. violate Parse-σ) or create an iamb instead of a trochee (violate Head-L) than it is to stress a schwa (violate *P/ə). This is illustrated by the rankings in (12):

(12) a. *P/ə >> PARSE-σ
b. *P/ə >> HEAD-L

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[7]Thus far, there is no evidence for moraic consonants in Squamish; we therefore refer to syllabic feet and not moraic feet.
[8]Note that at this point in the analysis the reference to stress domain is not crucial in capturing the basic stress facts.
[9] Schwa resists stress in other Salish languages: St'át'imcets (Lillooet) (Shaw &Roberts 1994), Lushootseed (Urbanczyk 1996), Cowichan (Bianco 1996) and Musqueam (Shaw et al. 1999), to name a few. Shaw et al. (1999) claim that Musqueam is quantity sensitive and they invoke a stress-to-weight constraint which accomplishes the same task in the grammar, but with a different motivation. Independently of schwa, there is evidence that the Squamish stress system is quality sensitive (see Bar-el 1998 and Bar-el and Watt 1998), so we invoke the peak prominence constraint as opposed to stress-to-weight for this reason.

The ranking of PARSE-σ over FT BIN_{σ} captures the fact that Squamish allows degenerate feet. That is, it better to parse all syllables into feet (obey Parse-σ) even if it means that some feet may be monosyllabic (violate Foot-Bin_{σ}). This is illustrated by the ranking in (13):

(13) PARSE-σ >> FT BIN_{σ}

We further observe that it is more important to parse all syllables into feet (obey Parse-σ) than it is to stress the leftmost syllable of a foot (obey Head-L). This is captured by the ranking in (14):

(14) PARSE-σ >> HEAD-L

Finally, the ranking of FT BIN_{σ} over HEAD-L suggests that it is more important to have binary branching feet (obey Foot-Bin_{σ}) than it is to stress the leftmost syllable of a foot (obey Head-L). This is illustrated by the ranking in (15):

(15) FT BIN_{σ}>> HEAD-L

These rankings are summarized in (16):

(16) Summary of crucial rankings
***P/ə >> Parse-σ >> Foot-Bin_{σ} >> Head-L**

The tableaux in (17) through (19) illustrate how the ranking of these four constraints selects the optimal candidates for each type of data given in (3) through (5) above. Beginning with bisyllabic words containing two full vowels, candidate (a) is selected as the optimal one since it does not violate any of the constraints while each of the other candidates violate at least one constraint. This is illustrated by the tableau in (17):

(17) Bisyllabic word with two full vowels[10]

/słanay'/ 'lady'	*P/ə	PARSE-σ	FT-BIN_{σ}	HEAD-L
☞a. (słánay')				
b. (słanáy')				*!
c. (słá)nay'		*!	*	
d. sła(náy')		*!	*	

Candidate (a) is the optimal candidate because it violates no constraint, while the other, non-optimal candidates, violate at least one constraint. Candidate (a) contains no schwas and thus incurs no violations of *P/ə . Both syllables of candidate (a) are parsed into a foot, thus no violations of Parse-σ are marked. The foot is a bisyllabic one thus no violations of Foot-Bin_{σ} are incurred. Finally, the leftmost syllable of the foot bears stress, and thus candidate (a) does not incur any violations of the constraint Head-L. Candidate (b) is not selected as the optimal candidate because it incurs a fatal violation of Head-L since its rightmost syllable, as opposed to its leftmost syllable, bears stress. Candidate (c) is not selected as the optimal candidate because it only parses one of its two syllables into a foot and therefore violates Parse.

Tableau (18) illustrates that the ranking of the four constraints correctly predicts the optimal candidate given a bisyllabic word containing a schwa in its leftmost syllable.

[10] The inputs in all tableaux contain surface vowels. An analysis of how vowel quality is derived is beyond the scope of this talk; for a discussion on the interaction of vowel quality and stress in Squamish, see Bar-el (1998) and Bar-el and Watt (1998).

(18) Bisyllabic word with a schwa in the first syllable

/wənáχ^{w}/ 'truth'	*P/ə	PARSE-σ	FT-BIN$_{σ}$	HEAD-L
☞a. (wənáχ^{w})				*
b. (wénaχ^{w})	*!			
c. wə(náχ^{w})		*!	*	
d. (wə́)naχ^{w}	*!	*	*	

Candidate (a) is the winning candidate since it only incurs one violation of the lowest ranked constraint (Head-L), while each of the other candidates violate one or more of the higher ranked constraints.

Lastly, as is shown by the tableau in (19), in bisyllabic words containing a schwa in both syllables, the candidate in which the leftmost vowel bears primary stress are selected as optimal.[11]

(19) Bisyllabic forms which contain a schwa in both syllables

/χətəʔ/ 'far'	*P/ə	PARSE-σ	FT-BIN$_{σ}$	HEAD-L
☞a. (χétəʔ)	*			
b. (χətéʔ)	*			*!
c. (χə́)təʔ	*	*!	*	
d. χə(téʔ)	*	*!	*	

Although candidate (a) violates the highest ranked constraint, so do all the other candidates, thus that constraint is not the deciding constraint. After *P/ə, candidate (a) does not violate any other constraint, whereas candidates (b) through (c) violate at least one constraint after *P/ə.

To summarize, in this section we have illustrated the basic stress pattern in Squamish and have argued that in an Optimality Theory framework, these generalizations can be captured via the crucial ranking of four constraints. In the following section we examine how the same four constraints with the addition of a fifth constraint can capture the stress pattern in longer words containing non-reduplicative prefixes.

3 Non-reduplicative prefixes

In Squamish, non-reduplicative prefixes never bear stress, even when they are in a stress bearing position, that is the leftmost full vowel or the leftmost schwa of a word. This is illustrated by the data in (20):

(20) a. [ti-lám'] <ti-lam'>
make-house 'build a house'

b. [ti-náʔ] <ti-ná7>
from-LOC 'be from'

In contrast to morphologically simplex words containing only schwas in which the leftmost vowel will bear stress, non-reduplicative prefixes containing schwas never bear stress even when they are the leftmost schwa in a word containing only schwas. This is illustrated by the data in (21)

[11] We assume that every word must have stress. This assumption rules out a candidate in which no syllables are parsed into feet.

(21) a. [ʔəs-sə́q'] <7es-sék̲'>
STAT- 'half'

b. [ɬəɬ-tʃə́tʃ°mx] <lhelh-chéchmx>
ingest-resin/gum 'chew resin/gum'

The stress properties of non-reduplicative prefixes motivate two phonological domains in the Squamish word since non-reduplicative prefixes are clearly outside the stress assigning domain and never bear stress. We propose that stress is assigned within the PS and that non-reduplicative prefixes are outside of the PS in the PW. The structure we motivate is illustrated in (22):

(22) Phonological Structure
[PW PREFIXES [PS ROOT] PW]

Czaykowska-Higgins (1998) reaches the same conclusion partly based on stress facts for Moses-Columbia. In the following sub-section we demonstrate how Optimality Theory is able to capture the levels of phonological structure in a straightforward way.

3.1 The analysis

To account for the stress patterns of non-reduplicative prefixes, we invoke one additional constraint. The stressed syllable is found at the left edge of the PS and not the PW and thus we need an alignment constraint to capture this generalization. This constraint is given in (23):

(23) **ALIGN-L (PS, FT):**
For every PS, align the left edge of that PS with the left edge of a Foot

This alignment constraint is evaluated by syllables such that for every syllable that the PS is misaligned from a foot one violation is incurred.

The alignment constraint in (23) is crucially ranked above three of the constraints discussed in section 2 above. The ranking of ALIGN-L over HEAD-L, FT-BIN$_\sigma$ and *P/ə indicate that it is more important to align the PS with a foot than it is to (i) stress the left syllable of a foot (ii) have binary feet and (iii) avoid stressing schwa. These preferences are indicated by the rankings in (24):

(24) a. ALIGN-L >> HEAD-L
b. ALIGN-L >> FT-BIN$_\sigma$
c. ALIGN-L >> *P/ə

The following tableaux show that with the addition of another alignment constraint couched within the constraint ranking already established, optimal candidates are predicted for both types of non-reduplicated prefixes. The tableau in (25) illustrates that the correct candidate is selected for a form whose non-reduplicative prefix contains a full vowel:

(25) A root and a non-reduplicative prefix, both containing full vowels

/ti-lam'/ 'be from'	ALIGN-L	*P/ə	PARSE-σ	FT-BIN$_\sigma$	HD-L
☞a. [PWti-[PS(lám')]]				*	
b. [PW(ti-[PSlám')]]	*!		*		*
c. [PW(tí-[PSlam')]]	*!		*		
d. [PW(tí-)[PS(lám')]]				**!	

While candidate (a) violates the second lowest constraint (Foot-Bin$_\sigma$), it is selected as the optimal candidate because all other candidates violate higher ranked constraints.

The tableau in (26) illustrates that the correct candidate is selected for a form whose non-reduplicative prefix contains a schwa:

(26) A root and a non-reduplicative prefix, both containing full vowels

/ʔəs-t'əqʷ'/ 'a half'	ALIGN-L	*P/ə	PARSE-σ	FT-BIN$_{σ}$	HD-L
☞a. [$_{PW}$ʔəs-[$_{PS}$(t'éqʷ')]]		*		*	
b. [$_{PW}$(ʔəs-[$_{PS}$t'éqʷ')]]	*!	*			
c. [$_{PW}$(ʔés-[$_{PS}$t'əqʷ')]]	*!	*			
d.[$_{PW}$(ʔés-)[$_{PS}$(t'éqʷ')]]		**!			

While all candidates violate the high-ranked *P/ə , candidates (b) and (c) are ruled out because they violate the highest ranked constraint and of candidate (a) and (d), candidate (a) incurs the least number of violations of *P/ə and is thus selected as the optimal candidate.

In this section we have argued that non-reduplicative prefixes are outside of the PS and consequently provide evidence that the PS is distinct from the PW. In the following section we examine reduplicative prefixes and illustrate the ways in which they differ from non-reduplicative prefixes.

4 Reduplicative prefixes

Reduplicated roots exhibit the same stress pattern observed in simplex roots. In this section we will discuss these prefixes in detail and show how they fit straightforwardly in the domain-based analysis of stress we are proposing.

4.1 The generalizations

There are two types of reduplicants in Squamish that prefix to the root: CVC and CV.[12] CVC reduplicants are copies of the first and third segment of the root, and always contain schwa. CV reduplicants are copies of the first two segments of the root regardless of the vowel quality of the root vowel. Reduplicants exhibit the same stress pattern as roots: primary stress falls on the leftmost full vowel, otherwise the leftmost schwa, while secondary stress is alternating.

When a monosyllabic root containing a schwa is prefixed with a CVC reduplicant, the reduplicant bears primary stress. This is illustrated by the data in (27):

(27)	a.	xéch-xech	[χétʃ-χətʃ]	'remember'
	b.	kwél-kwel	[qʷél-qʷəl]	'talkative'

However, when a bisyllabic root containing a schwa in the first syllable and a full vowel in the second is prefixed with a CVC reduplicant, primary stress falls on the full vowel of the root and the reduplicant bears secondary stress. This is illustrated by the data in (28):

(28)	a.	s-nèx-nexwílh[13]	[snèxʷ-nəxʷíɬ]	'canoes'
	b.	s-kwèm-kwemáy'	[sqʷèmqʷəmáy']	'dogs'

Finally, when a root containing a full vowel in its first syllable is prefixed with a CVC reduplicant, the leftmost full vowel of the root bears primary stress. This is illustrated by the data in (29):

(29)	a.	lem-lám'	[ləm-lám']	'houses'
	b.	k'ex-k'íx	[q'əχ-q'éχ]	'black'
	c.	kwep-kwúpits	[kʷəp-kʷópic]	'elder siblings'

[12]See Bar-el (2000) and Kuipers (1967) for further description and analysis on Squamish reduplication patterns.
[13] Note that this word is prefixed with a nominalizer that is not part of the base for reduplication.

When a monosyllabic root is prefixed with a CV reduplicant, primary stress falls on the reduplicant. This is illustrated by the data in (30):

(30) a.	kw'á-kw'ay'	[k'^{w}á-k'^{w}ay']	'be (very) hungry'
b.	mé-mi7	[mə́-məy̓]	'sink'
c.	t'á-t'ayàk̲'	[t'á-tayàq]	'angry'

However, when a bisyllabic root containing a schwa in the first syllable and a full vowel in the second is prefixed with a CV reduplicant, primary stress falls on the full vowel of the root and the reduplicant bears secondary stress. This is shown by the data in (31).

(31) a.	xè-x̲ew7ís	[χə̀-χəw̓ís]	'be newly wed'
b.	7es-chè-chew7át	[ʔəs-tʃə̀-tʃəw'át]	'clever'
c.	xè-x̲ehám	[χə̀-χəxam]	'crybaby' / 'a group crying'

To account for these generalizations we propose that reduplicants are contained within the PS. The prosodic structure of Squamish motivated thus far is outlined in (32):

(32) Phonological Structure
[PW PREFIXES [PS RED ROOT] PS]

Recall from the discussion in section 2 on the basic stress pattern that Squamish builds syllabic trochees. As a result adjacent stresses are prohibited within a stress domain in Squamish because stress is alternating. The constraints established to this point select the incorrect optimal candidates since the there is no constraint which prohibits adjacent stressed syllables. The constraint we introduce to solve this problem is formalized in (33):

(33) ***CLASH**
Adjacent stressed syllables are prohibited within a PS

This constraint is evaluated by syllable clashes; that is, for every two adjacent stressed syllables, one violation of *Clash is incurred. This new constraint is crucially ranked with respect to two previously established constraints.

Of all the constraints required to derive the stress patterns discussed in this paper, the *Clash constraint is highest ranked. In Squamish we observe that it is more important to avoid two adjacent stresses in a PS than it is to parse all syllables into feet and to stress the left syllable of a foot. This is illustrated by the two crucial rankings in (34):

(34) a. *CLASH >> PARSE-σ
b. *CLASH >> HEAD-L

The tableaux in (35) and (36) demonstrate that with the established constraint ranking both CVC and CV reduplication can be accounted for. Given a bisyllabic root containing a full vowel in each of its syllables that is prefixed with a CVC reduplicant, the correct optimal candidate is selected. This is illustrated by the tableau in (35):

(35) Bisyllabic root containing full vowels+CVC reduplicant containing schwa

/məχ-miχaɬ/ 'black bears'	*CLSH	ALIGN-L	*P/ə	PARSE-σ	FT-BIN$_\sigma$	HD-L
☞a. [PW[PS(məχ-mí)χaɬ]PW]				*		*
b. [PW[PSməχ-(míχaɬ)]PW]		*!		*		
c. [PW[PS(məχ-mí)(χáɬ)]PW]	*!				*	*
d. [PW[PS(méχ-mi)(χáɬ)]PW]			*!		*	
e. [PW[PS(méχ-mi)χaɬ]PW]			*!	*		

Candidate (a) is selected as the optimal candidate because it violates low ranked constraints while candidates (b) through (e) violate a high ranked constraints. Notice that without the *Clash constraint, candidate (c) would be incorrectly predicted as the optimal candidate.

The correct optimal candidate is predicted in a word containing a bisyllabic root with a schwa followed by a full vowel and prefix a CV reduplicant to it (containing a schwa). This is illustrated by the tableau in (36):

(36) Bisyllabic root with schwa and a full vowel+CV reduplicant with schwa

/χə-χəwʔis/ 'be newly wed'	*CLSH	ALIGN-L	*P/ə	PARSE-σ	FT-BIN$_\sigma$	HD-L
☞a. [PW[PS(χə̀-χəw)(ʔis)]PW]			*		*	
b. [PW[PS(χə̀-)(χəwʔis)]PW]			*		*	*!
c. [PW[PS(χə̀-)(χə́w)(ʔis)]PW]	*!**		**		***	
d. [PW[PSχə-(χə́w)(ʔis)]PW]	*!*	*	*	*	**	
e. [PW[PS(χə́-)(χə̀wʔis)]PW]	*!*		**		*	

Candidates (c) through (e) are all ruled out because they each violate *Clash. While candidate (a) and (b) violate the same constraints (*P/ə and Foot-Bin$_\sigma$), candidate (a) is selected as the optimal candidate because it violates no other constraints.

In this section we have shown that reduplicative prefixes have the same stress properties as roots, but they exhibit a different stress pattern from other prefixes. We have demonstrated that reduplicative prefixes in Squamish are found within the PS constituent since they are subject to the basic stress rules. In the following section we examine the stress patterns observed at the right edge of the root, that is, morphologically complex forms containing strong and weak suffixes.

5 Strong and weak suffixes

Strong suffixes present some apparent exceptions to the basic pattern since they are stress attracting.[14] In this section we show that these "exceptions" are straightforwardly captured in our domains approach to analysing the Squamish stress system.

5.1 The generalizations

Not all suffixes attract stress in Squamish. Weak suffixes (LS_1) never receive primary stress when preceded by a root which contains a full vowel; in other words, the basic stress pattern is observed. However, strong suffixes (LS_2) receive primary stress without exception. These are the suffixes which exhibit the exceptional pattern. In this paper we examine the following four suffixes.

[14] There is also the variable lexical suffix which surfaces with at least secondary stress. Since it is not crucial, it is excluded from this discussion.

(37) Weak and strong suffixes

	Orthography	Phonetic Transcription	Gloss	Shape
Weak	=ach	=atʃ	'hand/wrist'	VC
	=us	=us/ɔs	'face'	VC
Strong	=ullh	=ɔlɬ	'young specimen'	VCC
	=alh	=aɬ	'times/instances'	VC

As shown in (38) and (39), the weak suffixes (LS_1) *-ach* 'hand' and *-us* 'face' do not attract stress and the basic stress pattern is observed.

(38) *-ach* 'hand'

a. **<ts'lhulhach>**
√ts'ɬɔɬ=atʃ
cold=hand
[ts'ɬɔ́ɬatʃ]
'having cold hands'

b. **<t'u7ach>**
√t'ɔʔ=atʃ
sprain=hand
[t'ɔ́ʔatʃ]
'sprained wrist/hand'

c. **<chichipach>**
tʃetʃip=atʃ
ticklish =hand
[tʃétʃipàtʃ]
'ticklish hand'

(39) *-us* 'face'

a. **<kix̲us>**
√qɛχ=ɔs
=face
[qɛ́χɔs]
'blind'

b. **<ts'esp'i7us>**
√ts'əsp'eʔ=ɔs
ugly=face
[ts'əsp'éʔɔs]
'ugly faced'

c. **<chichipus>**
tʃetʃip=ɔs
ticklish=face
[tʃétʃipɔ̀s]
'ticklish face'

In contrast, the strong lexical suffixes (LS_2) *-ullh* 'young specimen' and *-alh* 'times/instances' are stress attracting. The basic pattern predicts primary stress to fall on the first syllable and secondary stress to fall on the final syllable of a trisyllabic word; instead primary stress falls on the final syllable, as shown by the following data.

(40) *-ullh* 'young specimen'

a. **<pushullh>**
√pɔʃ=ʔɔlɬ
cat=young.specimen
[pɔʃʔɔ́lɬ]
'kitten'

b. **<mix̲alhullh>**
√mɛχaɬ=ʔɔlɬ
bear=young.specimen
[mɛ̀χaɬʔɔ́lɬ]
'cub'

(41) *-alh* 'times/instances'

a. **<kw'inalh>**
√k^{w}'en=aɬ
how.many=times/instances
[k^{w}'enáɬ]
'how many times'

b. **<7upenalh>**
√ʔopen=aɬ
ten=times/instances
[ʔòpənáɬ]
'ten times'

c. **<sixwalhullh>**
√sex^{W}aɬ=ʔɔlɬ
child=young.specimen
[sèxwaɬʔɔ́lɬ]
'young child'

c. **<7an7us=alh>**
√ʔanʔos=aɬ
two=times/instances
[ʔànʔosáɬ]
'two times'

d. **<musmusullh>**
√mòsməs=ʔɔlɬ
cow=young.specimen
[mòsməsʔɔ́lɬ]
'calf'

The basic pattern predicts trisyllabic words with schwa in the first syllable to surface with one stress on the second syllable; instead, they surface with a stress on the second and third syllable: strong suffixes always bear stress, even if it means stressing adjacent syllables, as shown in (42)

(42) a. **<skwemay'ullh>**
√sq^{w}əmay'=ɔlɬ
dog=young.specimen
[sq^{w}əmày'ɔ́lɬ]
'puppy'

b. **<stekiw'ullh>**
√stəqew'=ɔlɬ
horse=young.specimen
[stəqèw'ɔ́lɬ]
'colt'

The basic pattern also predicts that words with four syllables should surface with primary stress on the first and secondary stress on the third syllable only. Again, strong suffixes always bear stress, even if it means stressing adjacent syllables, as shown by the data in (43).

(43) a. **<sxuxupitullh>**
√sxoxopet=ɔlɬ
rabbit=young.specimen
[sxòxopèt?ɔ́lɬ]
'baby rabbit'

b. **<xa7utsenalh>**[15]
√χaʔòtsən=áɬ
four=times/instances
[χaχʔòtsənáɬ]
'four times'

To account for these facts, we propose that strong lexical suffixes (LS_2) begin a new domain for stress assignment, thus they begin a second PS. The proposed phonological structure is outlined in (44).

(44) Phonological Structure
[PW PREFIXES- [PS RED- ROOT= LS_1 PS] [=LS_2 PS] PW]

To account for the patterns with respect to weak and strong suffixes, no new constraints need to be introduced since the basic pattern is observed within each PS. In (45) where a weak suffix is attached to a monosyllabic root, the correct optimal candidate (i.e. the one with initial stress) is predicted.

[15] It is unclear at this point why stress is irregular in the root. Note that the root has also surfaced with a schwa in the first syllable.

(45) Monosyllabic root + weak suffix

/t'o?=atʃ/ 'sprained wrist/hand'	*CLSH	ALIGN-L	*P/ə	PARSE-σ	FT-BIN$_\sigma$	HD-L
☞a. [PW[PS(t'ó?=atʃ)]PW]						
b. [PW[PS(t'o?=átʃ)]PW]						*!
c. [PW[PS(t'ó?)=(átʃ)]PW]					*!*	
d. [PW[PS(t'ó?)=atʃ]PW]				*!	*	

Again the correct optimal candidate is predicted with the same constraints when a trisyllabic root has a strong suffix attached to it. Candidate (a) is optimal since it violates no constraints, while candidates (b) to (d) violate at least one constraint. This is the case since the domain for stress assignment is the PS and the strong "stress attracting" suffix begins a new PS. In these cases, it is predicted that there will always be more than one stress on a word and that adjacent stresses are permitted. As shown in the data in (40) to (43) both these predictions are true. The *Clash constraint is not relevant to this tableau since it is evaluated within the PS.

The tableau in (46) also shows that the correct candidate wins if we assume that the strong suffix begins a new domain for stress assignment and stress is assigned within the PS.

(46) Trisyllabic root + strong suffix[16]

/sxoxopit=ʔɔɬ/ 'young rabbit/bunny'	*CLSH	ALIGN-L	*P/ə	PARSE-σ	FT-BIN σ	HD-L
☞a.[PW[PS(sxóxo)(pét)][PS(=ʔɔɬ)]PW]					**	
b.[PW[PS(sxóxo)(pét][PS=ʔɔɬ)]PW]		*!				
c.[PW[PS(sxóxo)pet][PS(=ʔɔɬ)]PW]				*!	*	
d.[PW[PS(sxó)(xópet)][PS(=ʔɔɬ)]PW]	*!				**	

In conclusion, what we have shown in this section is that weak lexical suffixes are contained in the same domain for stress assignment as the prosodic root and that strong lexical suffixes begin a new domain for stress assignment. We showed that if we assume that the strong lexical suffixes begin a new PS, then a seemingly irregular stress pattern can be accounted for in a straightforward way.

6 Morphological structure

Czaykowska-Higgins (1998) motivates the following morphological structure of Nxaʔamcín (Moses-Columbia) based on evidence from the syntactic vs. lexical behaviour of affixes.

(47) Morphological Structure of Moses Columbia

[MW ASP[MS LOC RED[MRROOT] MR RED PA LS]MS LS TR O S]MW
TR ASP

(Czaykowska-Higgins 1998)

The Morphological Root (MR)contains only obligatory material, the Morphological Stem (MS) contains lexical material and the Morphological Word (MW) contains material relevant to the morphosyntax. Based on Czaykowska-Higgins' structure and the work of other Salish researchers, we propose the following preliminary morphological analysis of lexical suffixes in Squamish.

A possible analysis of these suffixes is that the weak (LS_1) lexical suffixes are incorporated by the predicate to which they are attached; this has been proposed for other Salish languages (see Gerdts & Hinkson 1996, Czaykowska-Higgins, Willet and Bart 1996, Mithun 1997, Gerdts 1998). If we assume that this is the case for Squamish, the next question which arises is, is it a syntactic process (Baker 1988) or a lexical process

[16] Primary stress prefers full vowels and where there are two PS's, it falls on the rightmost PS. A markedness constraint and an alignment constraint would capture these generalizations. We leave formalizing this to future research.

(Rosen 1989)? Some preliminary data show that incorporation of lexical suffixes is a lexical process. The data in (48) shows that a direct object can be expressed overtly.

(48) a. na xewtl'-nexw-as **ta sxen'-s**
AUX break-OOCtr-3S DET foot-3POSS
'he accidentally broke his foot' (EL 03-04-00)
b. na xewtl'-nexw-as **ta naxch-s**
AUX break-OOCtr-3S DET hand-3POSS
'he accidentally broke his hand' (EL 03-04-00)

In (49) we see a lexical suffix can express the same object.

(49) a. na xewtl'-**shen**-nexw-as
AUX break-foot-OOCTR-3S
'he accidentally broke his foot' (EL 03-04-00)
b. na xewtl'-**ach**-nexw-as
AUX break-hand-OOCTR-3S
'he accidentally broke his hand' (EL 03-04-00)

Interestingly, the data in (50) shows us that both a lexical suffix and an overt object with the same referent can surface in the same sentence.

(50) a. na xewtl'=**ach**-nexw-as lha Lisa **ta naxch-s**
AUX break=hand-OOCTR-3SUB F.DET Lisa DET hand-3POSS
'Lisa broke her arm' (TC; 03-05-00)
b. na xewtl'=**shen**-nexw-as **ta nixkwy'shens**
AUX break=foot-OOCTR-3S DET toe
'he broke the toe' (EL; 08-05-00)

According to Rosen (1989) if incorporation is a syntactic process then the direct object could not be doubled because there would be a trace occupying the overt direct object position. As a result, incorporation must be a lexical process in Squamish. Since incorporation seems to be a lexical and not a syntactic process, according to the Morphological Structure proposed by Czaykowska-Higgins (1998), weak lexical suffixes belong in the MS and not in the MW. [17]

7 Theoretical Consequences and Conclusions

In this paper we have shown that in Squamish there are at least two prosodic constituents: PS and PW. The motivation for these constituents comes from the stress assignment facts in Squamish. More specifically, since non-reduplicative prefixes are never stressed and stress is trochaic from left to right, it is clear that these prefixes are outside of the domain for stress assignment (i.e., the PS) and in some other constituent; namely, the PW. In this paper we have also argued that there can be more than one PS within a PW since strong suffixes begin a new domain for stress assignment. Evidence for this comes from the allowance of adjacent stresses when strong suffixes are attached to roots ending in a stressed syllable. Further investigation could potentially reveal further prosodic constituency in Squamish, however, the evidence presented to this point in our research points to the existence of two such constituents.

Our analysis supports previous claims for a sublexical hierarchy: Downing (1999) for Bantu and Czaykowska-Higgins (1998) for Moses-Columbia. If it turns out that MS and PS are distinct in Squamish, this supports the claim that there is an indirect mapping between (morpho)syntax and phonology (Nespor and Vogel 1986, Czaykowska-Higgins 1998 amongst others).

Some interesting questions which arise from this research are as follows: (i) are there other processes that make reference to these or other prosodic domains?, (ii) are there other strong suffixes in Squamish? what do they all have in common? what makes them strong?, (iii) should morphological constituency be defined in terms of the three domains outlined by Czaykowska-Higgins (1998) or is there evidence that something

[17] We leave looking at strong suffixes in this light to future research.

different is going on in Squamish? and, lastly, (iv) does Squamish stress reflect morphosyntactic structure as is claimed by Rivithiadou (1999) for other Salish languages? We leave all these questions to future research.

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Appendix: Key to Squamish Orthography

Orthography	IPA	Orthography	IPA
p	p	kw	k^w
p’	p’	kw’	$k’^w$
m	m	xw	x^w
m’	m’	k̲	q
t	t	k̲’	q’
t’	t’	k̲w	q^w
ts	ts	k̲w’	$q’^w$
ts’	ts’	x̲	χ
s	s	x̲w	$χ^w$
n	n	h	h,x
ch	tʃ	w	w
ch’	tʃ’	y	j
sh	ʃ	y’	j’
lh	ɬ	e	ə
tl’	tl’	i	i,e,ɛ
l	l	u	u,o,ɔ
k	k	a	a
k’	k’	7	ʔ