St'át'imcets transitive paradigm suffix alternations[*]

Marion Gerda Caldecott
University of British Columbia

1.   Introduction

Glottalised resonants have been used in the debate on the nature of the phonetics-phonology interface to argue for (Steriade 1997) and against (Howe and Pulleyblank 2001) the involvement of fine phonetic details such as timing in phonology. Howe and Pulleyblank (2001,2004) use the behaviour of glottalised resonants to argue for a 'modular' view of the phonetics-phonology interface. Fine phonetic detail such as timing does not necessarily play a role in the phonology. It may, but not in the direct manner proposed by Steriade (1997), which uses glottalised resonants to show that the timing of the glottal closure in relation to the oral closure timing plays an active role in the phonology.

This paper will show that glottalised resonants can contribute not only to the phonetics-phonology interface, but also to the debate on the nature of the morphology-phonology interface (the interaction between word-formation and phonological behaviour).   In St'át'imcets, an Interior Salish language, the phonological behaviour of glottalised resonants in some suffixes is conditioned by the phonetic cues to stress. At the morphological interface, a systematic alternation outside the expected context reveals cyclical effects, which have traditionally proven difficult for Optimality Theory (OT). The data present a further challenge to OT, in that the cyclical effects appear to be outside-in (more derived forms affect less derived forms), rather than the more common inside-out. The proposed analysis argues in favour of McCarthy's (2003)'s notion of Optimal Paradigms (OP) over other theories that deal with cyclicity, because it does not assign the base any special status, and in fact predicts the 'attraction to the unmarked' effect evident here. The data is accounted for by the interaction between a phonetically-grounded markedness constraint, a faithfulness constraint and an OP identity constraint.

I will begin by presenting background information about St'át'imcets and the suffixes that undergo alternation. In Section 3), I will lay out the [-min] transitiviser data and discuss previous generalisations.

Section 4 provides a brief outline of the St'át'imcets stress system, while Section 5 provides a re-analysis of the data in concrete terms. Section 6 gives us the OT analysis and discusses the challenges these data pose for the theory. Section 7 concludes the paper.

2.   Background

St'át'imcets is an Interior Salish language spoken in south-western Interior British Columbia from Pavilion (Ts'k'wáylacw) in the northeast to Port Douglas (Xáxtsa7) in the southwest. It is also known as Lillooet.   The consonant inventory is found below:

(1)   Phoneme chart (adapted from Van Eijk 1997)

		Lab	Alv	Lat	Dent	Pal	Velar	Labio-velar	Uvular	Labio-uvular	Glottal
Stop	plain	p	t				k	k^w	q	q^w	ʔ
	ejective	p̓					k̓	$k̓^w$		$q̓^w$	
Affricate	plain				c̣	č̓					
	ejective			ƛ̓	c̓,c̣̓						
Fricative			s	ɬ		š	x	x^w	χ	$χ^w$	h
Resonant	plain	m	n	l, ḷ	z	y	ɣ	w	ʕ	$ʕ^w$	
	glottalised	m̓	n̓	l̓, ḷ̓	z̓	y̓	ɣ̓	w̓	ʕ̓	$ʕ̓^w$	

St'át'imcets is representative of other Salish languages in having extensive place of articulation contrasts, and opposing plain vs. glottalised segments in both obstruents and resonants.   Van Eijk (1997) groups the segments highlighted in the table above as glottalised resonants.[1]   These complex consonants are produced with both an oral and a sub-oral articulation. Glottalised resonants can be categorized according to the timing of the sub-oral articulation with respect to the oral articulation (pre-glottalised, post-glottalised etc.) and the manner (method of constriction).

2.1   Alternating Suffixes in St'át'imcets

van Eijk (1987) includes fifteen suffixes with glottal alternation in the list of suffixes. Most of these have become lexicalised, so that the glottal alternation is no longer synchronically predictable. In other words, whether the glottalised or non-glottalised suffix appears is lexically determined (Henry Davis p.c.). The remaining seven suffixes, all related to the transitive paradigm, undergo alternation in the same, predictable context.
       The suffixes which undergo alternation come from three categories: transitivising suffixes ([-min]~[-min̓], [-nun]~[-nun̓] and [-Vn]~[-Vn̓]~[-ən]), object suffixes ([-tum̓x]~[-tumx] (1sgObj), [-tum̓i(n)]~[-tumi(n)[2]] (2sgObj), [-tan̓i]~[-tani] (3plObj co-occurring with 1sgSubj) and a non-topical subject marker ([-taḷi]~[-tali]). This paper will focus on the most uniform and straightforward alternation--the transitiviser [-min̓].

---

[1] Bird and Caldecott (2004b) has shown that, while they may form a phonological natural class, they form a phonetically unnatural class.

[2] The (n) represents the fact that /n/ is often dropped preceding other object suffixes, but always retained word-finally.

3.   -Miṅ Transitivising Suffix

The generalization governing this alternation appears straightforward: The final /n/ is glottalised after unstressed vowels (2) and plain after stressed vowels (3):

(2)   a. ƛ̓íq-miṅ   ˈCome and get it!'
       b. ƛ̓íq-miṅ-aš   'S/he arrived for it'
       c. ƛ̓ìq-miṅ-ítaš   'They arrived for it'
       d. šqʷál̓-miṅ   'Report on him/her!'
       e. šqʷál̓-miṅ-aš   'S/he reports on him/her'
       f. šqʷal̓-miṅ-ítaš   'They reported on him/her'

(3)   a. ʔiʔwaʔ-mín-aš   'S/he went with him/her'
       b. ʔiʔwaʔ-mín-itaš   'They went with him/her'
       c. ptakʷɬ-mín-aš   'He returned for it'
       d. ptakʷɬ-mín-itaš   'They returned for it'

This basic pattern is complicated by the following data, in which a plain resonant surfaces following an unstressed vowel:

(4)   a. ʔíʔwaʔ-min   'Accompany him/her!'
       b. ptákʷɬ-min   'Tell a legend about him/her!'
       c. p̓án̓t-min   ˈReturn for it!'

These data raise the following question: Why does a glottalised resonant follow the unstressed vowel in (2a-f) and a plain resonant follow the identical unstressed vowel in (4a-c)? If we consider previous generalisations, stress, and the potential of stress, are used to define the context of alternation.
      Van Eijk (1997:114) describes the situation in the following way: ˝The distribution between -min and -min' is as follows: We have -min under stress, and in those cases where it may attract the stress in subsequent extensions... -min' where it cannot attract stress".
Davis (in prep:4) makes the following generalization: ˝The glottalisation on the *[n]* in *-min(')*, unlike that on *Vn(')*, is predictable. It is dependent on stress. If the *[i]* in *-min* is either <u>stressed</u> or in a position where it <u>could get stressed</u>, the *[n]* is <u>not</u> glottalised"
      What Davis and van Eijk mean by 'potentially' stressed is independent of vowel quality, and concerns the position of the vowel in the word. Stress in St'át'imcets shifts with addition of suffixes. If we compare the examples in (3) and (4) we see that they contain the same roots, the difference being the presence of object suffixes in (3). The addition of suffixes means stress no longer falls on the root but on the /-min/ suffix in the examples in (3). It is the cases in (4) that van Eijk and Davis consider potentially stressed, because the addition of suffixes would mean they *are* stressed in further derivations.
      These descriptions are interesting for a number of reasons. First, why should glottalisation be dependent on the absence of stress? According to de Lacy (2005:261), there should be no interaction between subsegmental features and prosodic positions (This issue will not be considered in this paper, but see

Caldecott (in press) for a discussion.). Second, how can we account for alternations in a *potential* context (those in (4))? Both previous generalisations, while descriptively adequate make assumptions of cyclicity with respect to word formation. Phonological processes are generally understood to occur in specific contexts which motivate the alternation, and it is unclear how Optimality Theory will cope with a context defined by being potentially under stress (i.e. the form in question is not stressed; rather, other forms derived from that form are).

To further complicate matters, cyclical effects are normally understood to apply from the inside-out rather than the outside-in, as seen in these data. The potential addition of suffixes (as in (3)) drives the neutralisation of the resonant in the less-derived form (as in (4)).

I propose an analysis in which foot structure enables us to define a concrete and explicit context in which to situate the alternation, and demonstrate that by appealing to McCarthy (2003) Optimal Paradigms, we can account for the outside-in nature of the cyclical effects in the data. Before we can refer to prosodic structure to define the relevant context, we must understand how the St'át'imcets stress system functions.

4. Stress

Stress is St'át'imcets is partly lexically predictable, and shifts predictably with the addition of suffixes. Based on van Eijk (1985), Roberts and Shaw (1994) make the following generalizations:[3]

- Feet are trochaic and assigned left to right.
- Prosodic Words are right-headed (i.e. RIGHTMOST determines designation of main-stress foot)

(5) a. (čúɬ-uṅ)   'to point at'
     b. (čúɬ-uṅ)-lkaxʷ   'you pointed at him'
     c.(čùɬ-uṅ)-(túmuɬ)   'point at us!'
     d. (čuɬ-uṅ)-(túmuɬ)-kaxʷ 'you pointed at us'
     e. (čùɬ-uṅ)-(tùmuɬ)-(káɬ'ap) 'you folks pointed at us'

The data in (5) show that primary stress surfaces on the right-most foot of the word and that feet are trochaic and assigned from left to right. We also see that secondary stress occurs on the heads of pre-tonic feet. Primary stress is always on the right-most foot of the word, but stress may not fall on the final vowel of a word (as we can see from b. and d.).

Following Roberts and Shaw (1994), final syllables such as the ones in the examples above are treated as unparsed. Roberts and Shaw (1994) use the interaction of NON-FINALITY (prohibiting stress on the final mora) and FOOT-BIN (banning incomplete feet)) to account for these unparsed feet. If these final

---

[3] Unless otherwise specified, data is taken from Roberts and Shaw (1994) (not re-elicited), renumbered and transcribed in phonetic script to fit with the present paper.

syllables were parsed into feet, RIGHTMOST would predict them to be stressed, which they are not.

- Schwa is dispreferred as head: it only receives primary stress if there are no full vowels in the word; otherwise the first full vowel receives primary stress

(6)   a. (mə́c-ən)   'to write' it
         b. (lə́ʕʷ-ən)   'to hide it'
         c. məc-(xál)   'to write (intr.)'
         d. (lə̀ʕʷ-ən)-(ɬkán)   'I hid it'

If we compare the examples in a. and b. to those in c. and d. we can see that a full vowel in word will be stressed over a schwa, even if this violates other stress constraints (like the NON-FINALITY constraint).

- Root-final/lexical suffix consonant clusters count as moraic for stress

(7)   a. √(pán̓t)-min
        b. √(pàn̓t)-(mín-aš) *(pán̓t-min)-aš
        c. √(pàn̓t)-(mín-it)aš *(pan̓t-min)-(ítaš)   (Caldecott 2004)

St'át'imcets stress is complicated by the fact that a consonant cluster at the end of a root or lexical suffix counts as moraic for stress. That means that roots such as the one in (7) behave as bimoaraic, rather than monomoraic. If they were treated as monomoraic, we'd expect primary stress to fall on the root vowel in (b) and on the final foot in (c). Outside of the root/lexical suffix, a 3 or 4 consonant cluster is considered weighty enough for stress (Davis in prep: Chapter 46).

    In summary, Roberts and Shaw (1994:7) propose the following as core constraints:

FT-FORM	Head-Left [= TROCHEE]
ALIGN-FT-L	Align (Ft, L, PrWd, L)
ALIGN-HEAD-R	[= RIGHTMOST]
NONFINALITY	The prosodic head of the word does not fall on the word-final mora
FT-BIN	Feet are binary

A more in-depth discussion of St'át'imcets stress is outside the purview of this paper, and the reader is referred to Roberts and Shaw (1994) for a complete account. For our purposes, the constraints above will be combined into a constraint block:

STRESS	stress must be trochaic, words are right-headed, feet must be binary, and schwa is non-moraic but nuclear, root final consonant clusters are moraic

With the St'át'imcets stress system now established, we are able to situate the alternation in a concrete context by referring to foot structure. The glottalised suffix always surfaces in the weak position of a foot. This will be demonstrated in the section below.

5.   Re-generalisations

Using foot structure, we are able to describe the context for alternation in the following way: the glottalised resonant surfaces with mono-moraic roots so the suffix is always in weak position and the vowel is never stressed:

(8)   a. (ƛíq-miṅ)   ˈCome and get it!'
       b. (ƛíq-miṅ)-aš   'S/he arrived for it'
       c. (ƛıq-miṅ)-(ítaš)   'They arrived for it'

The plain resonant surfaces when /-min/ is in the head of foot (i.e. with bimoraic roots) as in (9), or in unparsed syllables (as in (10))

(9)   a. (ʔíʔwaʔ)-(mín-aš)   'S/he went with him/her'
       b. (ʔíʔwaʔ)-(mín-it)aš   'They went with him/her'
       c. (ptàkʷɬ)-(mín-aš)   'He told a legend about for him/her'
       d. (ptàkʷɬ)-(mín-it)aš   'They told a legend him/her'

(10)   a. (ʔíʔwaʔ)-min   'Accompany him/her!'
       b. (ptákʷɬ)-min   'Tell a legend about him/her!'
       c. (ṗáṅt)-min   ˈCome back for it!'

Forming generalisations by referring to foot structure enables us to situate the alternation in a concrete context and to avoid reference to ˈpotentially' stressed positions. Now that we can accurately predict where the alternation occurs, we can proceed with an OT analysis.

6.   OT Analysis

This analysis assumes the underlying glottalised resonant is neutralised following a stressed vowel. The phonetically grounded constraint *STRESS/CG reflects an articulatory conflict between stress cues (raised pitch) and glottalisation cues associated with glottalised resonants (lowered pitch).[4] The alternation is accounted for by the interaction between *STRESS/CG, a faithfulness constraint, and the STRESS constraint, which ensures appropriate stress assignment.

---

[4] For more on the phonetic grounding for this constraint and potential problems see Caldecott (in prep) as well as Bird (2003) and Bird & Caldecott (2004a). The interaction between phonetic characteristics and phonological behaviour will not be considered in this paper.

*STRESS/CG   No glottalisation on a resonant following a stressed vowel

MAX (CG)   All glottalisation in the input must be realised in the output

The constraints are ranked in the following way:

-     STRESS,*STRESS/CG>>MAX (CG)

This ranking can be seen in the following tableaux:

(11)   Accounting for neutralisation

UR /ptakʷɬ-miṅ-aš/	STRESS	*STRESS/CG	MAX (CG)
→a. (ptàkʷɬ)-(mín-aš)			*!
b. (ptàkʷɬ)-(mín̓-aš)		*!	
c. (ptákʷɬ)-(mìn̓-aš)	*!		
d. ptakʷɬ-miṅ-as (no stress)	*!		

Candidate a., our winning candidate, neutralizes the glottalised resonant following a stressed vowel thus satisfying *STRESS/CG. It violates MAX (CG) but because MAX (CG) is the lowes ranked constraint, it still emerges victorious. Candidate b. retains glottalisation on the resonant, satisfying MAX (CG), but violating the higher ranked *STRESS/CG constraint. Candidates c. and d. violate STRESS; in the first case, by attempting to satisfy both ,*STRESS/CG and MAX (CG), and in the second case, by losing stress all together.

      The tableau in (12) shows that the proposed ranking can account for a surface glottalised resonant as well.

(12)   Accounting for surface glottalised resonant

UR /ƛ̓iq-miṅ-it-aš/	STRESS	*CG/STRESS	MAX (CG)
→a. (ƛ̓ɩq-mi)(ṅ-ítaš)			
b. (ƛ̓ɩq-mi)(n-ítaš)			*!

Candidate a. is our winning candidate with no violations. Candidate b. neutralizes the resonant outside the predicted context and thus violates MAX (CG). These data are straightforwardly accounted for by the ranking proposed. A problem arises, however, when we attempt to account for neutralization outside the predicted context, as in tableau (13):

(13)   Accounting for neutralisation in unparsed syllable
(� indicates unintended winner)

UR /ptakʷɬ-mín̓/	STRESS	*CG/STRESS	MAX (CG)
→a. (ptákʷɬ)-min			*!
☞b. (ptákʷɬ)-min̓			

Candidate a. is the correct surface form, but candidate b., which retains glottalisation on the resonant, is ruled the winning candidate with no violations. Neutralization outside the marked environment rules out candidate a. as the winner. How can we account for this neutralization where it is not expected? The answer lies in appealing to the notion of paradigm levelling.

Paradigm Levelling is the "...systematic generalization of one allomorph to positions where it is phonologically unjustified or unexpected" (Steriade 2000:1). In order to account for this alternation outside the predicted context (i.e. the tableau in (13)), we must appeal to paradigm levelling, in particular McCarthy (2003) Optimal Paradigms, which seeks to "...account for surface resemblances among morphologically related words" (2003:1). He explains the theory as follows: "In OP, candidates consist of entire inflectional paradigms. Within each candidate paradigm, there is a correspondence relation from every paradigm member to every other paradigm member. Faithfulness constraints on this intraparadigmatic correspondence relation resist alternation within the paradigm... "

If we apply the notion of OP to St'át'imcets, it would mean that for all members of the paradigm involving the same ROOT+TRANS+SUFFIXES, the transitiviser suffixes must have identical glottalisation features. For example, in order for us to understand /-min̓/ as part of the paradigm, it must be consistently glottalised or non-glottalised in that set. In a tableau we will compare all members in one paradigm not only to the input form, but also to each other. It means the introduction of a new type of constraint, namely OP-ID (feature), which compares the inflected forms to each other. For us, this will be OP-ID (CG):

OP-ID (CG)   All members within a candidate set must have
                        identical (cg) values (for corresponding <u>segments</u>
                        across those member forms, like in IO-IDENT)

Because uniformity of glottalisation across ROOT+TRANS+SUFFIXES is more vital than faithfulness to the underlying representation, we must rank OP-ID (CG) above MAX (CG). *CG/STRESS and STRESS must also outrank MAX(CG). The crucial ranking of these constraints then is :

    STRESS,*STRESS/CG, OP-ID (CG)>>MAX (CG)

In the following tableau, we can see this ranking and how OP works. The candidate sets consist of all ROOT+TRANSITIVISER+PERSON SUFFIXES. These forms are compared to the input, using the Max constraint, and to one another, using the OP-ID (CG) constraint.

(14)   Demonstrating the Optimal Paradigm constraint

UR /ptakʷɬ+miń+aš+itaš/	STRESS	*STRESS /CG	OP-ID (CG)	MAX (CG)
a. (ptákʷɬ)-miń, (ptàkʷɬ)-(míń-aš), (ptàkʷɬ)-(míń-i)taš...		*!*...		
b. (ptákʷɬ)-miń, (ptàkʷɬ)-(mín-aš), (ptàkʷɬ)-(mín-i)taš...			*!*...	**...
→c. (ptákʷɬ)-min, (ptàkʷɬ)-(mín-aš), (ptàkʷɬ)-(mín-i)taš...				***...

In OP, violation marks are summed for each member of the set. Candidate set a. maintains glottalised [-miń] in all possible derivations in the paradigm. While this satisfies OP-ID (CG) and MAX (CG), it violates *STRESS/CG for every form with a stressed vowel followed by a glottalised resonant. and is ruled out. Candidate b., the candidate set predicted by our previous ranking, is ruled out by the new OP-ID (CG) constraint. The basic form corresponds to the input, but not to other forms in the paradigm. It violates OP for every pair of members which do not have identical glottalisation on corresponding segments. Because OP-ID (CG) outranks MAX (CG), Candidate c., which violates the lowest ranked MAX (CG) for every non-glottalised suffix, wins.

While the addition of the OP constraint has enabled us to account for the alternation outside the markedness context, one further complication must be addressed. There is an asymmetry in St'át'imcets with respect to faithfulness of glottalised resonants between roots and affixes. For example, consider the root: [páńt-min]. Here, the glottaliseed reosnants in the root is retained, even though it follows a stressed vowel (We do not get *[pánt-min]). Abstracting away from the OP part of the analysis, we can see how a single Max constraint will not predict the correct surface form for in the next tableau:

(15) Ranking cannot account for glottalised resonant retention in roots

UR /√páńt-miń/	STRESS	*STRESS/CG	MAX (CG)
→a. √(páńt)-min		*!	*
☜b. √(pánt)-min			**!

Candidat a. is the correct surface form, but is ruled out because it violates *STRESS/CG, which is ranked higher than MAX (CG). Candidate b. is our unintended winner, which violates Max twice by neutralising both glottalised resonants, but satisfies *STRESS/CG.

In order to resolve this issue, MAX (CG) must be broken into MAX-CG (ROOT) and MAX-CG (AFFIX), giving us the following ranking:

- STRESS, MAX-CG (ROOT)>>*STRESS/CG>>MAX-CG(AFFIX)

This ranking can be seen in the tableau below:

(16)   Root-faithfulness outranks *STRESS/CG and affix-faithfulness

UR /pánt-min/	STRESS	MAX-CG (ROOT)	*STRESS/ CG	MAX-CG (AFFIX)
→a. (pánt)-min			*!	*
b. (pánt)-min		*!		*

Candidate a. , our winning candidate now violates only lower ranked constraints, namely *STRESS/CG and MAX-CG (ROOT), while candidate b. violates the higher-ranked MAX-CG (AFFIX).

As we saw in the tableaux above, the concept of Optimal Paradigms can account for why neutralization occurs outside the expected context. The proposed analysis uses McCarthy's Optimal Paradigms rather than Steriade (2000)'s Paradigm Uniformity or Orgun's (1996) Sign-Based Morphology because OP does not attribute any special status to the base. The data presented above is unique in that the cyclical effects involved apply from the outside in, rather than the inside-out. In other words, 'more' derived forms seem to affect 'less' derived forms, rather than the vice-versa. In OP, levelling favours the less marked paradigm member(s) regardless of whether this is the 'base' or not.

Other theories that attempt to account for cyclical effects do attribute special status to the base. For example, Steriade's (2000) Paradigm Uniformity (PU), compares derivative forms to base forms. Steriade uses constraints of the form PU (feature) to force uniformity between a derived form and it's base. This cannot account for the data presented here because comparing the more derived form to the basic form would incorrectly predict the direction of faithfulness. In the St'át'imcets data, the less derived form is being faithful to the more derived form, not vice-versa.

Another theory dealing with cyclicity is Orgun (1996) Sign-Based Morphology. According to this theory as well, the outside-in nature of these cyclical effects should not be possible: "...a morphologically simpler constituent affects the form of a morphologically more complex constituent of which it is part, but not vice-versa" (14).

While OP can account for the data, it brings with it some problems. In particular, there are learnability issues highlighted by St'át'imcets morphology. In OP, all the members of a paradigm are included in the candidate set. Candidates consist of entire inflectional paradigms, where an inflectional paradigm contains all and only the words based on a single lexeme. In these data, the paradigm would have to include all forms that would shift stress off of the root (or lexeme); in other words, all forms that could make up the Prosodic Word. Following Roberts and Shaw (1994), the stress domain (or Prosodic Word) in St'át'imcets begins at the left edge of the root, and does not include

prefixes.[5]. The representation below by Davis (in prep) illustrates the stress domain in St'át'imcets.

(16) [$_{\text{Prosodic word}}$[$_{\text{stem}}$[$_{\text{root}}$root + lexical suffixes]other suffixes + pronominal enclitics]other enclitics]

     Because stress shifts with the addition of suffixes, and it is the more derived forms that affect more basic forms, candidate sets would have to include all person/number suffixes/ question markers and enclitics. The definition of 'paradigm' is therefore called into question: If paradigms consists of every form related to a lexeme, every imperative form must be compared to every other form in the stress paradigm, including, for example, questions. This seems not only counter-intuitive, but the large constraint sets would pose an unmanageable burden for the learner.

7.   Conclusion

The St'át'imcets transitivising suffix alternations challenge our models of two interfaces: the phonetics-phonology interface and the phonology-morphology interface. The *STRESS/GLOTTAL constraint is 'grounded' in the phonetics (evidence in the language of cues to stress involving raised pitch while cues to glottalisation involve lowered pitch (Bird 2003)). There are some issues surrounding this constraint, and what sort of effect the phonetic realisation of stress and glottalisation cues have on each other, and how this is portrayed in the phonology (see Caldecott in prep).

     This paper focuses on the phonology-morphology interface. How words are formed has an impact on the phonological behaviour of the glottalised resonants in /-min/ transitivising suffixes. The context of alternation is determined by the prosodic category 'foot', but neutralisation outside of the context referred to by the markedness constraint requires appealing to paradigm levelling. These data provide support for the OP over other paradigm levelling theories because of how it treats the outside-in nature of the morphological effects. OP does not predict any special status for the base, but rather predicts faithfulness in the direction of the unmarked. The learnability issues associated with OP, however, suggest other solutions must be considered. Future research will focus on the phonetic differences between the suffix vowels in unstressed position compared to those in unparsed position. Quantifiable differences would shed more light on the interaction between phonetics and phonology, and indicate whether the generalisations proposed in this analysis are accurate. As with all research into indigenous languages, time is of the essence.

References

Archangeli, Diana. and Doug Pulleyblank. 1994. *Grounded phonology.* Cambridge, MA: MIT Press.

---

[5] According to (van Eijk 1997:17) There are five prefixes which do take stress: lá- 'in', 7á- 'towards', lhlá- 'from', kná- 'around' and the formative 7í-)

Bird, Sonya. 2003. *The phonetics of St'át'imcets glottalised resonants.* Paper presented at ICSNL 38, Lillooet, BC.

Bird, Sonya and Marion Caldecott. 2004a. *Glottalisation in St'át'imcets: a change in progress.* Poster presented at the 147th meeting of the ASA, New York, NY.

Bird, Sonya and Marion Caldecott. 2004b. Timing Differences in St'át'imcets glottalised resonants: Linguistic or Biomechanical? In *The Proceedings of the 10th Australian International Conference on Speech Science and Technology.* Sydney, Australia. 328-333.

Caldecott, Marion. 1999. *A comparison of glottalised resonants Senchothen and St'át'imcets.* MA thesis. University of British Columbia.

Caldecott, Marion. 2004. *St'át'imcets /-min'/ transitivising suffix alternations: A case for paradigm levelling?* In the Proceedings of ICSNL 39, UBC Woking Papers in Linguistics, UBC.

Caldecott, Marion. In press. St'át'imcets Transitive Paradigm Glottal Alternations. *MIT Working Papers on Endangered and Less Familiar Languages: Salishan Volume*

Carlson, Barry, John Esling and Katie Fraser. 2001. Nuuchahnulth. *Journal of the IPA* 31: 275-279

Davis, Henry. in prep. *A Teaching Grammar of St'át'imcets.*

De Lacy, Paul. 2005. *Markedness: Reduction and Preservation in Phonology,* to be published by Cambridge University Press.

Howe, Darin. and Doug Pulleyblank. 2001. Patterns and timing of glottalisation. *Phonology* 18: 45-80.

Howe, D. and D. Pulleyblank. (2004). Harmonic scales as faithfulness. *CJL* 49:1-49

McCarthy, John. 2003. *Optimal Paradigms.* ms

Maddieson, Ian. 1984. *Patterns of Sound.* Cambridge, MA: Cambridge University Press.

Matthewson, Lisa. 1994. *Optimality and Syllable Structure in St'át'imcets.* Ms. UBC

Mielke, Jeff. 2004. *The Emergence of Distinctive Features.* PhD. Dissertation. Ohio State University

Orgun, Cemil Orhan. 1996. *Sign-based Morphology and Phonology with Special Attention to Optimality Theory.* PhD. dissertation, UC Berkeley.

Roberts, Taylor and Patricia A. Shaw. 1994. Optimality in the St'át'imcets (Lillooet Salish) stress system. Ms. UBC

Steriade, Donca. 1997. *Phonetics in phonology: the case of laryngeal neutralization.* Manuscript.

Steriade, Donca. 2000. Paradigm uniformity and the phonetics-phonology boundary. In Michael B. Broe and Janet B Pierrehumbert. (eds). *Papers in Laboratory Phonology V: Acquisition and the Lexicon.* Cambridge: Cambridge University Press, 313-335.

Van Eijk, Jan. 1985. *The Lillooet Language: Phonology, Morphology, Syntax.* Phd. Dissertation. Mt. Currie.

Van Eijk, Jan. 1987. *A Lillooet-English Dictionary.* Ms. Mt Currie.

Van Eijk, Jan. 1997. *The Lillooet Language: Phonology, Morphology, Syntax.* Vancouver: UBC Press.