The next line contains the progressive prefix and contrasts Pheasants attempts to keep walking as he is interrupted by the threatening dogs.

25. lə-/ʔuχʷ.
prog-/go

'He would be going along (and they would threaten him).'

Due to time constraints, I must close this presentation here, with Pheasant in a predicament; I hope to expand this presentation at the conference. This introductory treatment should illustrate the applicability of Smith's (1998) framework to Lushootseed aspect.

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Toward an Analysis of Schwa in Sliammon*

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Stressed schwa "tends to occur only in closed syllables in Salish languages."
Kinkade (1997: 206)

1. Introduction

The goal of this paper is to present a preliminary analysis of the representation and distribution of schwa (ə) in Sliammon, and to show how a surface constraint (or constraints) which bans schwa in stressed open syllables (informally abbreviated as, *Cə́) plays a central role in the organization of the grammar of the language[1]. This phonological constraint when combined with other constraints within the grammar has far-reaching implications for the phonological and morphological structure of the language. The examples of the role of (*Cə́) discussed in this paper are (1) the surface realization of glottalized resonants, (2) Onset Formation, as outlined in (3) and discussed in detail in §4. The constraint *Cə́ also plays a role in determining Control Transitive allomorphy §5.1, and helps to provide an explanation for the lack of non-reduplicative consonantal (C-) prefixes in the language §5.2.

In Blake (1992: 43-45), I observe that schwa in Sliammon tends to occur in the following two contexts: (a) in an unstressed closed syllable (i.e. CəC syllable) or (b) in an open syllable which bears primary stress (Cə́), as illustrated by the data in (1-2).

(1) Schwa in closed syllables: CəC

Input	ə-epenthesis	Output	Gloss	Source
pq-pq	pəqpəq	[pʌ́qʰpʌqʰ]	*all white*	MG 1988: 129
t̓in-ʔm	t̓inʔəm	[t̓ɛ́nʔəm]	*to barbecue (fish)*	MG 1988: 434
čitux̌ʷn	čitux̌ʷən	[čítux̌ʷən]	*blackberry*	MG 1988: 61

* Sliammon [ʔáyʔajúθəm] is a West Coast Salish language spoken just north of Powell River on the Malaspina Peninsula at Sliammon, B.C. The term "Sliammon" is used here as a cover term to refer to the language of the Sliammon, Klahoose, and Homalco people. I am most grateful to the Sliammon Chief and Council, the Sliammon Treaty Society, and Sliammon Elders for permission to study their language. Thanks to Patricia A. Shaw for helpful discussion regarding issues contained in this paper. Special thanks to Paul Kroeber for detailed feedback and comments, on a previous draft. All errors are of course my own responsibility. I acknowledge support from UBC University Graduate Fellowship 1994-1995 and SSHRCC grant #410-92-1629 awarded to Dr. Patricia A. Shaw. My continued research on the language has also been generously supported from a grant from the Melville and Elizabeth Jacobs Funds (1996), SSHRCC Doctoral Fellowship #752-96-1924, and TLEF Grant, awarded to Dr. Patricia A. Shaw. Forms cited from the TLEF project are labelled (Cedar-to-CDROM).

[1]In the discussion which follows I will be referring to surface structure constraints of the kind used within Optimality Theory (OT); however, the reader is referred to my dissertation (Blake in prep) for the formal theoretical analysis. The goal in this paper is to present the data with discussion of the kinds of constraints which drive the analysis.

(2) Schwa in stressed open syllables: Cə́

Input	ə-epenthesis	Output	Gloss	Source
χʷƛ̓aǰ	χʷə́ƛ̓aǰ	[χʷə́ƛ̓ɑy]	*mountain goat*	MG 1988: 497
χʷƛ̓aǰ=ukʷ-t [2]	χʷə́ƛ̓aǰukʷt	[χʷə́ƛ̓aǰʊkʷʰtʰ]	*m. goat blanket*	MG 1988: 252
ƛəpxʷ-REDInch	ƛ̓ə́ƛəpxʷ	[ƛ̓ə́ƛəpxʷ]	*become broken*	MG 1988: 151
t̓ᶿkʷa [3]	t̓ᶿə́kʷa	[t̓ᶿə́kʷa]	*edible root*	MG 1988: 12

Although schwa *does* appear to occur in stressed open syllables as shown by the data in (2) above, there are also a number of strategies which are employed in order to avoid stressed schwa in an open syllable, as shown by the data in (3).

(3) Avoidance of stressed schwa in an open syllable

Input	ə-epenthesis	Output/ Syllabification	Gloss	Processes
θy̓m	θəy̓əm	θáʔ . yɪm	*to sink*	R' restructuring
θt̓ᶿm	θət̓ᶿəm	θáʔ . t̓ᶿəm	*jig for cod*	O' restructuring
t̓al̓m	t̓al̓əm	t̓ál̓ . ləm	*cedar sticks*	Onset formation
pxʷm[-i-]	pəxʷim	pú . xʷem	*steam*	V-strengthening

What all of these strategies in (3) have in common is that they prevent schwa from occuring in a stressed open syllable, thus satisfying the constraint *Cə́.

[2]Abbreviations used in the morpheme-by-morpheme glosses are as follows: =introduces a lexical suffix. RED-reduplicative prefix, Inch-inchoative, Imp-imperfective, Dim-diminutive. A period is used to indicate syllable boundaries. Starred forms * are judged as ungrammatical by Sliammon speakers. The data which appear in this paper are based on my fieldnotes (1988-1999). Special thanks to my the Sliammon, Klahoose, Homalco language consultants living in Sliammon for their patience, and expertise. Forms from these fieldnotes are cited with the consultants initials, followed by the date (day/month/year) and utterance number. Mrs. Mary George (MG) Mrs. Agnes McGee (AM), Mrs. Sue Pielle (SP), Mrs. Marion Harry (MH), Mrs. Eva Hanson (EH), Mrs. Helen Hanson (HH), Mrs. Elsie Paul (EP), Mrs. Phyllis Dominic (PD), Mr. Joe Mitchell (JM), Mr. Pete Harry (PH), Mrs. Annie Dominick (AD), Mr. Dave Dominick (DD).

[3]This edible root grows in clumps and is prepared in a traditional rock-pit fire. It is steamed, peeled and eaten. MG calls them 'Indian bananas' due to their characteristic yellow colour, clustering bunches, and the fact that they are easily peeled (once cooked). This root, along with sea urchin, is considered a delicacy. The plant itself is a fine-stemed fern. These roots may well be the rhizomes of the spiny woodfern.

The contrast between (2-3) raises the following question: under what set of conditions does schwa occur in (stressed) open syllables? I propose here that the constraint which aligns the head of the prosodic word (PrWd) to the left-edge of the lexical stem outranks the constraint against (stressed) schwa in an open syllable. This means that it is more important for primary stress to be properly aligned with the left-edge of the stem domain than it is to obey the constraint which bans stressed schwa in open syllables[4]. In this context schwa will occur in a stressed open syllable, if no other strategy mitigates against it.

This paper is a long over-due presentation of research which I began in the context of my M.A. Thesis (Blake 1992) and constitutes current work in progress. The material presented in this paper is part of my doctoral dissertation (Blake, in prep.). I also hope that this adds to the cross-linguistic studies of schwa in other Salish languages: Bagemihl (1991) on Bella Coola, Matthewson (1994) on St'át'imcets (Lillooet), Shaw (1993, 1994), Roberts (1993), Roberts & Shaw (1994) on St'át'imcets (Lillooet), Bianco (1996) on Cowichan, Willet and Czycowska-Higgins (1995) on Nxa'amxcín (Moses-Columbian), and Kinkade (1997) for Upper Chehalis, so that a cross-linguistic picture of the behaviour of this vowel emerges.

Sliammon provides a rich testing ground regarding the representation of schwa, the brief neutral vowel [ə] which shows special phonological properties in many languages. It is argued here, that there are three different "kinds" of schwa in Sliammon, as evidenced by their phonological behaviour: (i) excrescent schwas, (ii) epenthetic schwas, and (iii) reduced full vowels, which have the same prosodic structure as schwa. I present examples and discussion of each one in turn. In the next section, I present the consonant and vowel inventory of Sliammon followed by my assumptions regarding the prosodic and melodic representation of schwa §1.2, before turning to further discussion regarding its surface distribution.

[4]Also the morphological constraints on the satisfaction of a reduplicative prefix may outrank the phonological constraints against Cə.

1.1 Sliammon Consonants and Vowels

(4) **Sliammon Phonemic Inventory** (adapted from Blake 1992)

POA Manner	Labial	Interdental	Dental/ Alveolar	Lateral	Alveo-Palatal Palatals	Velar	Uvular	Glottal
Plosives [-cont] plain glottalized	p p̓	t^{θ} = ç t^{θ}' = ç'	t t̓	ƛ ƛ̓	č č'	k k^w k̓ $k̓^w$	q q^w q̓ $q̓^w$	
Fricatives		θ	s	ł	š	(x) x^w	χ $χ^w$	h
Resonants [son] plain glottalized	m m̓		n n̓	l l̓ L L'	y y̓ ǰ = Y ǰ = Y'	w w̓ g=W g=W'		ʔ
Vowels					i	u [ə] a		

Note: /L/ → [w ~ y ~ ʔ ~ ł]; /ǰ/ → [ǰ ~ y ~ i ~ č]; /g/ → [g ~ w ~ u ~ x^w].

It is worth making a couple of comments with respect to the vowel inventory. The vowel contrast in Sliammon is low/non-low distinction. The non-low vowels /i, u/ are often realized as [e, o] respectively. I have changed my former usage of /e, o, a/ in order to minimize transcription differences between authors writing on Sliammon, and to also make it easier for those wishing to do comparative research in Salish; this is a point also made by Kinkade (1997: 212, fn.1). It should be noted however that the symbols /i, u/ are abbreviations for a set of phonological features, which I argue are specified as follows: /i/ COR, /u/ LAB [rd], and /a/ DOR [low]. This means that within a theory of markedness, /i/ with it's COR specification is the least-marked full vowel in the system. This will have implications for the analysis of diminutive reduplication, plural -vg suffixation, control transitive allomorphy, and so on -- implications which are beyond the scope of the present paper. The surface height of the non-low vowels /i, u/ is determined by the height of adjacent consonants, via consonant-vowel (C-V) feature sharing. The alveopalatal and palatal consonants are specified as COR DOR [hi], labio-velar consonants are LAB [rd], DOR [hi] whereas the post-velar consonants have a PHAR node. Uvulars are

specified as PHAR DOR, whereas laryngeals are PHAR. /i, u/ are [i, u] next to alveopalatals/palatals, whereas they are [e, o] in the environment of post-velars, and labials for example. For further discussion regarding the consonantal and vocalic system in Sliammon see Blake (1992, in prep), Watanabe (1994).

Now let's turn to a discussion of the prosodic and featural representation of schwa. Schwa [ə], on the other hand, is represented as a bare Nucleus (NUC) which lacks phonological features, and is coloured by adjacent consonants, as stated above.

1.2 The Representation of Schwa

I adopt Shaw's (1993, 1994) Nuclear Moraic Model in which schwa is Nuclear, and non-moraic. The representation for schwa is given in (5). In addition to the prosodic representation of this vowel (i.e. a bare nucleus), it should be noted that schwa lacks inherent vowel place features, as argued in Blake (1992).

(5) Nuc

Full vowels, on the other hand, are represented as both Nuclear and moraic, as in (6). The full vowels /i, u, a/ dominate the vocalic place features (f).

(6) Nuc
μ
[αf]

Kroeber (1989: 108) claims that schwa and the surface variants of schwa are generally "lax and a bit shorter than the allophones of non-schwa vowels, at least in stressed open syllables." The fact that schwa is shorter than the full vowels /i, u, a/ is encoded here by a difference in their moraic structure.

The proposal that schwa is non-moraic in Sliammon is supported by the phonological behaviour of [CəC] weak roots versus [CVC, CəCC] roots (cf. Blake 1992:40-42). As Kroeber (1989: 109-110) points out there are at least three cases in which CəC roots behave differently from CVC and CəRC roots. First, in the formation of CV- Imperfective reduplication, both CVC and CəRC roots retain their root vowel, whereas CəC roots lose their vowel. Secondly, both CVC and CəRC roots have a vowel which occurs before the transitive suffix, whereas CəC roots do not take this "linking" vowel. Finally, although all roots seem to lose their vowel in CV-diminutive reduplication, CVC roots copy the root vowel as the vowel of the affix, whereas CəC roots take Ci- as the reduplicative prefix rather than a Cə- prefix. The fact that CVC and CəRC roots pattern together suggests that they share a common structural representation. In this paper, it is proposed that CVC and CəRC roots are both bimoraic (CVC$\mu\mu$ and CəCC$\mu\mu$) whereas CəC roots are monomoraic (CəCμ) thus in part reflecting the special non-moraic status of schwa.

It is also claimed here that schwa lacks inherent phonological features as shown by the representation in (5) above, and as such is subject to colouration by adjacent consonants (and vocalic nuclei). (cf. Blake 1992:35-42). The range of phonetic colouration of schwa is shown by the data in (7).

(7) **Schwa Colouration**

Input + ə-epenthesis	Output	Gloss	Source
məƛ̓	[mʌ́ƛ̓ ~ mə́ƛ̓]	*calm (water)*	MG 1988: 673
šəm̓-šəm	[šɩ́m̓šɩm]	*it's already dried*	Cedar-to-CDROM
tək̓ʷ-at	[tʊ́k̓ʷtʰ]	*pull it*	MG 1988: 410
ƛ̓əχʷay	[ƛ̓ə́ʷχʷʌy ~ ƛ̓ɔ́χʷʌy]	*chum, dog salmon*	MG 1988:184
səχəm	[sʌ́χʌm]	*racing canoe*	MG 1988: 63
qəp̓-qap̓=awus	[qʌ́p̓qap̓awᵊs]	*bats*	MG 1988: 137
məʔ-at	[máʔtʰ]	*take it*	MG 1988: 435
məʔƛ̓-məƛ̓	[máʔᵃƛ̓ᵊmʌtʰ] a ~ ɑ	*always calm*	MG 1988: 675
q̓əq̓tx̌ʷ	[q̓áq̓ᵊtxʷ]	*burning*	EH 27/04/99: 31
šəm̓-it	[šɛ́ʔᵊmɛtʰ]	*dried*	Cedar-to-CDROM
ʔiɬtən	[ʔɛ́ɬtən]	*to eat ; food*	EH 27/04/99: 18

Epenthetic schwa in Sliammon is coloured by the spreading or sharing of adjacent consonantal articulator nodes (LAB, COR, DOR, PHAR) and the features they dominate, with a fair degree of variation[5]. Schwa becomes [ɩ ~ ɨ] in the environment of alveopalatals, palatals and plain velars. Schwa is realized as [ʊ] in the environment of labio-velars whereas it is slightly lower rounded schwa [əʷ ~ ɔ] in the environment of labialized uvulars. Schwa is lowered to [ʌ] in the context of plain uvulars, whereas it is lowered to a brief [a] in the environment of laryngeals /h, ʔ/. Davis (1970) and Urbanczyk (1999), suggest that schwa becomes [ɛ] when it occurs after an alveopalatal and before a laryngeal. This appears to extend to all plain post-velars, so that when schwa occurs after an alveopalatal and before a plain uvular stop, it is also realized as [ɛ], given this view. Blake (1992, 1995), and Watanabe (1994) make a slightly different claim in which schwa neutralizes with the low vowel /a/ before a laryngeal, and then assimilates to the preceding alveo-palatal yielding [ɛ][6]. What is striking about schwa in Sliammon is that it has a wide range of phonetic variability; the surface realization of this vowel varies both across speakers and across tokens from the same speaker.

In this paper, I claim that the surface distribution of schwa in Sliammon is predictable from surface prosodic constraints. For example, schwa surfaces between a word-initial consonant cluster in order to satisfy the high-ranking constraint against complex onsets in the language. Schwa is also epenthesized in order to satisfy Proper Headedness, the requirement that the syllable which is the head of the prosodic word has a nucleus, as shown by the contrast between stressed initial Cə́C syllables versus final Minor syllables: CC which contain a syllabic obstruent, as will be argued in §4.3. Kinkade (1997: 208) argues that epenthetic schwa in Upper Chehalis is both *non-moraic* and *unspecified for phonological features*, providing comparative evidence supporting the proposed representation of schwa in Sliammon.

[5]Matthewson (1994: 4) in her discussion of Lillooet schwa states that "consonants on both sides of /ə/ colour its realization, in a non-discrete fashion, suggesting phonetic interpolation effects rather than phonological processes." This is likely the case in Sliammon as well given the range of variation in its surface realization as well as its variable realization both between speakers, and from the same speaker on different occasions.

[6]Within the Nuclear Moraic Model adopted here, there maybe a way to tell between the two analyses. If schwa neutralizes with /a/, then it may well take on the prosodic characteristics of the full vowel, i.e. it would be nuclear and moraic. If schwa is simply coloured by the preceding and following consonants, then the prosodic structure of this vowel likely remains unchanged. In this case, the resúlting vowel would be nuclear but crucially non-moraic, given my current assumptions. It will important therefore to note any observable differences in behaviour of surface [ɛ] which could be attributed to a difference in phonological weight. This issue is beyond the scope of the present paper, but I refer the interested reader to my dissertation for further discussion.

In this paper, I argue that there are three different schwas in Sliammon, as evidenced by their phonological behaviour. The first distinction to be made is the difference between excrescent versus epenthetic schwas.

2. Excrescent Schwas

Sliammon has many excrescent schwas. It is essential to maintain the distinction between "excrescent" vowels as opposed to "epenthetic" vowels in Sliammon. In his paper on syllable structure in Bella Coola, Bagemihl (1991: 600) discusses the characterisitcs of excrescent vowels, following work by Levin (1987)[7]. These generalizations are presented in (8) below:

(8) Excrescent vowels

a. The *quality* of an excrescent vowel is variable, frequently tends towards schwa, and is generally determined by phonetic coarticulation effects. The surface quality of an excrescent vowel does not necessarily correspond to any of the underlying vowel qualities of the language.

b. The insertion of an excrescent schwa is triggered by the need for *a transition between adjacent articulations*, and is *not* inserted in order to syllabify stray consonants. Phonological rules do not refer to an excrescent schwa.

Excrescent schwas in Sliammon are transcribed here as a brief raised schwa [ᵊ]. The central point to be made in this section is that these brief transitional schwas show the same cluster of properties attributed to excrescent vowels in (8.a-b) above.

The data in (9.a-e) show an excrescent schwa in the environment of a resonant whereas (9.f) shows excrescent schwa between two identical stops. The data in (9.g) show that a very brief excrescent vowel is also heard after stressed [ɛ́] or [é]. A comparison of the syllabification of forms in (9) columns 2-3 show that excrescent schwas are not considered separate syllable peaks by Sliammon consultants[8].

[7]Matthewson (1994), Bianco (1996), and Kinkade (1997) present similar argumentation, citing Bagemihl's (1991) research on syllable structure in Bella Coola.

[8]A detailed analysis of syllabifiction is not presented here. The interested reader should refer to Blake (1992) or Blake (in prep.) for details.

(9) Excrescent Schwa

Input	Output/Syll	*Syll Peak	Gloss	Source
a. yp̓-at	yíp̓t ~ ᵊyíp̓tʰ	*[ʔ]ᵊ . yíp̓tʰ	*break it*	MG23/04/98: 9
b. yč̓[-i-]	yíč̓ ~ ᵊyíč̓	*[ʔ]ᵊ . yíč̓	*full*	MG 1988: 370
c. mƛ̓-mut	mʌ́ƛ̓ᵊ . mòtʰ	*mʌ́ . ƛ̓ᵊ . mòt	*very calm*	MG 1988: 674
d. Imp-χaˑɬ-mut	χá . χaˑɬᵊ . mòtʰ	*χá . χa . ɬᵊ. mòt	*he's really tall*	MG12/06/98:16
e. qayχ	qáyᵊ . χ	*qá . yᵊχ	*Mink*	AM28/06/97:46
f. čt-at-as	č̓ítᵊ . təs	*č̓í . tᵊ . təs	*he cut it*	EH27/04/99:74
g. pilq	péᵊ . lʌqʰ	*pé . [ʔ]ᵊ . lʌq	*bracket fungus*	MG09/06/98:16

It seems worthwhile to note that excrescent schwa occurs between an obstruent and following resonant or vice versa, and provides a transition between consonants with different major class features. The obstruent is unmarked for the feature [sonorant] whereas resonants are specified for the feature [sonorant]. Contrast this with what happens in (9.g). Here the excrescent schwa occurs between a front non-low vowel [e] and a following resonant. In this case, the excrescent vowel provides a transition between adjacent sonorant segments with different place of articulation. Given my present analysis of the phonology and morphology of the language there does not seem to be any evidence that these excrescent vowels are referred to by any rule or constraint within the grammar. I conclude therefore that these schwas are phonologically inactive and therefore excrescent.

2.1 Echo Vowels

Davis (1970: 25) notes that the realization of the glottal phoneme /ʔ/ in Sliammon "is that of partial, not complete closure." He states that "laryngeal constriction ['] rather than a stop [ʔ] most often occurs." There is often an echo vowel, represented here as a brief raised excrescent vowel, after the partial glottal closure, as shown by the data in column two[9].

(10) Echo Vowels

Input	Output	Syllabification	*Syllable peak	Gloss	Source
xʷʔ	[xʷáʔᵃ]	xʷaʔ	* xʷá . ʔᵃ	*no*	MG30/06/97:17
qʷl̓	[qʷʊ́lʔᵊ]	qʷʊ́lʔ	*qʷʊ́l . ʔᵊ	*come*	MG23/04/98:26
tl̓č[i]	[táʔᵃlɪč]	táʔ . lɪč	*tá . ʔᵃ . lɪč	*round*	AM29/06/97:13
qaw̓um	[qáʔᵃwʊm]	qáʔ . wʊm	*qá . ʔᵃ . wʊm	*eye*	AM30/06/97:6
q̓w̓utᶿ	[q̓áʔᵃwutᶿ]	q̓áʔ . wutᶿ	*q̓á . ʔᵃ . wutᶿ	*uvula*	AM30/06/97:24
ʔil̓-it	[ʔɛʔᵋlɛtʰ]	ʔɛ́ʔ . lɛtʰ	*ʔɛ́ . ʔᵋ . lɛtʰ	*shallow*	MG04/06/98:39

[9] As was pointed out to me by Ian Maddieson (p.c. 1998), it seems likely that this echo vowel may be better understood as a broken vowel in which the glottal [ʔ] simply represents the most prominent glottal pulse during the articulation of a creaky vowel. These creaky vowels would perhaps be better represented as [aa̰], a vowel which is oral for approximately the first half of its duration, and creaky for approximately the second half of its duration.

Echo vowels, like excrescent schwas, are not considered separate syllable peaks by Sliammon consultants, as shown by a comparison of the data in (10) columns three and four.

Since excrescent vowels and echo vowels are not referred to by phonological constraints nor do they figure into the prosodic structure of the language (i.e. they are not syllabified as syllable nuclei), they are not discussed further. However, it is worth emphasizing that anyone working on the language must make the distinction between excrescent versus epenthetic schwas. The next section presents an analysis of epenthetic schwa.

2.2 Epenthetic Schwa

There are other schwas in Sliammon, transcribed here as [ə], which are considered a separate syllable peak by Sliammon speakers, as shown by the data in (11). This is in contrast to the cases of excrescent schwa in (9) above. Recall from §1.2, that schwa lacks inherent vocalic place features, and as such is subject to colouration from adjacent consonants. Note: focus on the stressed schwa in the first syllable of each form.

(11) Schwa functions as a syllable peak

Input	Output	Syllabification	Gloss	Source
np=šn	nə́pšɪn	nə́p . šɪn	*tripped*	EH 27/04/99: 25
t̓lk̓[-i-]	t̓ə́lɪk̓ ~ t̓ʌ́lɪk̓	t̓ə́l . lɪk̓	*a hole*	EH 27/04/99: 57
čt-at-as	č̓ə́tᵊtəs ~ č̓ítᵊtas	č̓ə́t . təs	*he cut it*	EH 27/04/99: 74
Imp-tk̓ʷ-at-as	tə́tk̓ʷətʌs	tə́t . k̓ʷə . tʌs .	*he's pulling it*	EH 04/06/99: 29

There are also many sets of morphologically related words in Sliammon which show schwa-zero alternations: ə ~ Ø . Given this alternation, we need to determine the context(s) in which schwa surfaces and those contexts in which is does not, and whether or not the distribution of this vowel is predictable. There are a number of recent proposals for other Salish languages, Matthewson (1994), Roberts and Shaw (1995), Kinkade (1997) that schwa is not present in underlying representation rather it's distribution is claimed to be entirely predictable.

Epenthetic schwas in Sliammon will not be included in the underlying representation since their distribution and surface realization is claimed to be predictable. Schwa is epenthesized for purposes of stress assignment, or to syllabify a word-internal stranded consonant, whereas schwa is not epenthesized in metrically weak word-final syllables, as will be shown in §4.3.

Consider the following predicates which can be used as nouns, and their corresponding diminutive forms which show that surface schwa alternates with zero: (ə ~ Ø).

My research confirms that weak roots take Ci- as the diminutive reduplicative prefix rather than Cə-, as in column three. Diminutive is also marked by glottalization of the rightmost resonant (with a number of complexities), and may also take the diminutive suffix /-uɬ/ in addition to the Ci- reduplicative prefix. (cf. Blake (1992, 1995), Watanabe (1994), and Blake (in prep) for a more detailed analysis of the diminutive.) The point which is of relevance here is the presence and absence of schwa between the first and second consonants of the root.

(12) Epenthetic Schwa[10]

Root	Noun: [ə]	Diminutive: Ø	Gloss
pqʷ	pə́qʷay	pí-p . qʷaẏ	*'rotten wood; bit of rotten wood'*
θẏaɬ	θə́ẏaɬ	θí-θ . yaɬ	*'lake; small lake'*
kʷṅay	kʷə́ṅay	kʷí-kʷ . naẏ	*'lid; small lid'*
ƛ̓χʷay	ƛ̓ə́χʷay	ƛ̓í-ƛ̓ . χʷaẏ	*'dog salmon; small dog salmon'*
pskt	pə́skət	pí-p . ski . tuɬ	*'biscuit; small biscuit'*
nxʷiɬ	nə́xʷiɬ	ní-n . xʷiɬ	*'dugout canoe; small dugout canoe'*
sχm	sə́χəm	sí-s . χim	*'racing canoe; small racing canoe'*
ms	mə́s	mí-ṁ . suɬ	*'mink; small mink'*
sṁa	sə́ṁa	sí-s . ṁa . ʔuɬ	*'blue mussel; small blue mussel'*

In (12) column two, schwa epenthesis occurs between the first two consonants (C_1 and C_2) in order to syllabify this initial consonant cluster since there is a highly ranked constraint against complex onsets (*Complex Onset) in Sliammon. Contrast this with the diminutive examples in column three in which the first consonant (C_1) functions as the coda to the first syllable whereas the second consonant (C_2) is the onset to the second syllable. Since the consonants are syllabified, schwa epenthesis is not required[11].

As a further instance of ə alternating with Ø, consider the following perfective and imperfective pairs in (13).

[10]Please note that the data in (12) are abstract representations and do not accurately reflect the surface phonetic forms. They are provided as such in order to illustrate the schwa-zero alternations more clearly. The corresponding surface forms show the following additional properties: epenthetic schwa is coloured by adjacent consonants, vowel height assimilation of full vowels, vowel reduction, vowel strengthening, glottalization, deglottalization, and glottal restructuring. The phonetic forms are as follows: [pɔ́qʷʌy], [pépqʷʌẏ]; [θáʔᵊyɛɬ], [θíθᵊyɛɬ]; [kʷáʔᵊnʌy], [kʷíkʷᵊnʌẏ]; [ƛ̓ʷɔ́χʷay], [ƛ̓éƛ̓χʷaẏ]; [pə́skɩt], [pépskʸi:tòɬ]; [núxʷɩɬ] ~ [nʊ́xʷɩɬ], [nínxʷɩɬ]; [sʌ́χʌm], [sísχɛm]; [mʌ́s], [mɛ́ʔᵋmsuɬ]; [sáʔma], [sísṁaʔòɬ].

[11]Note that forms like sə́χəm *'racing canoe'* show that schwa epenthesis also occurs between an obstruent and a following resonant since codas with sonority reversals are disallowed The role of sonority on syllabification will not be discussed further here. See Bianco (1996, 1998) for the role of sonority in syllabification/metrical structure in Cowichan, for example.

(13) Epenthetic Schwa

Root	Perfective: [ə]	Imperfective: Ø	Gloss
ƛpxʷ	ƛə́pxʷ	ƛə́-ƛpxʷač	*'break; I'm breaking it'*
θt̓ᶿ-m	θə́t̓ᶿəm	θə́-θt̓ᶿəṁč	*'jig for cod; I'm jigging'*
ǰƛ̓	ǰə́ƛ̓	ǰə́-ǰƛ̓ [ǰí:ƛ̓]	*'run; he's running'*
nš-m	nə́šəm	nə́-ṅšəm	*'swim; swimming'*
k̓ʷɬ	k̓ʷə́ɬ	k̓ʷə́-k̓ʷɬ	*'spill; spilling'*
kʷɬ	kʷə́ɬt	kʷə́-kʷɬt	*'untie it; untying it'*
č̓ɬ	č̓ə́ɬ	č̓ə-č̓ɬ	*'rain; raining'*
χʷƛ̓	χʷə́ƛ̓igan	χʷə́-χʷƛ̓igan	*'half full; half filling things'*

In (13) column two, schwa occurs between the first two consonants (C_1 and C_2) in order to syllabify this initial consonant cluster, just as in (12) above. Contrast this with the imperfective examples in column three in which the first consonant (C_1) functions as the coda to the first syllable whereas the second consonant (C_2) is the onset to the second syllable. In this case, the consonants are syllabified, alleviating the need for epenthetic schwa.

All Sliammon scholars to date have noted that primary stress in the language tends to be word-initial. This is analyzed here as a high-ranked constraint which ensures that the left-edge of the prosodic word (PrWd) is aligned with the left-edge of the lexical stem. Schwa is required in order to satisfy Proper Headedness which ensures that the head of the foot receiving primary stress (v́) has a syllable containing a nucleus. By epenthesizing schwa between C_1 and C_2, the syllable structure constraint which strongly disprefers complex onsets (*Complex Onset) in the language is also satisfied.

To summarize, epenthetic schwa in Sliammon plays two important functions: (i) it provides a nucleus which satisfies the constraint which ensures that the foot which is head of the prosodic word is properly headed, and (ii) epenthetic schwa satisfies syllable structure constraints, the one discussed briefly here is the ban on complex onsets. The fact that epenthetic schwa does not occur in word-final syllables is discussed in §4.

3.0 Strengthening of Stressed Syllables

Kager (1995: 367) notes that "stress tends to be enhanced segmentally: stressed syllables may be strengthened by vowel lengthening or by gemination, while stressless syllables may be weaked by vowel reduction." Clear cases of phonological vowel lengthening in stressed open syllables are difficult to find in Sliammon, although it is worth mentioning that full vowels in stressed open syllables do tend to be phonetically lengthened (generally transcribed as half-long). In the next section §3.1, I present cases of intervocalic resonants (ambisyllabic /geminate) which appear to enhance the prominence of the syllable bearing primary stress. In §3.2, I show that full vowels in an unstressed syllable undergo vowel reduction. Vowel reduction is viewed as a strategy which enhances the prominence of the stressed syllable by adding a mora.

Consider the following data which suggests that ambisyllabicity (gemination?) of intervocalic resonants involves strengthening of the stressed syllable, as shown by the data in (14-15).

3.1 Ambisyllabicity

The data in (14-15) show that an intervocalic resonant is systematically parsed by speakers as the coda to the preceding syllable and as the onset to the following syllable. This occurs with CC and CCC roots in (14), and with roots containing a full vowel in (15).

(14) Ambisyllabicity with CC and CCC Roots

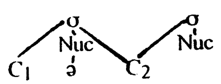
Input	Output	Syllabification	Gloss	Source
qʷl̓-a čxʷm	[qʷʊ́l̓æčxʷʊm]	qʷə́l̓ . læč . xʷəm	*Are you sg. coming?*	MG 23/04/98: 29
qʷl̓-a čap sm	[qʷʊ́l̓æčɩpsəm]	qʷə́l̓ . læ . čɩp . səm	*Are you pl. coming?*	MG 23/04/98: 30
wn-m-min	[wə́namɩn]	wə́n . na . mɩn	*a drill*	EH 27/04/99: 58
k̓lθ[-i-]	[k̓ɩ́lɩθ]	k̓ə́l . lɩθ	*crooked*	EH 06/05/99: 2
t̓lk̓[-i-]	[t̓ʌ́lɩk̓]	t̓ə́l . lɩk̓	*a hole*	EH 27/04/99: 57

(15) Ambisyllabicity with full vowel roots

Input	Output	Syllabification	Gloss	Source
ʔimaθ	[ʔɛ́məθ]	ʔɛ́m . məθ	*grandchild*	EH 27/04/99
ʔayiš	[ʔáyiš ~ ʔáyɩš]	ʔáy . yɩš	*man's sister*	EH 27/04/99: 6
ʔayaʔ-s	[ʔáyɛʔs]	ʔáy . yɛʔs	*his house*	EH 27/04/99: 11
REDPL-ǰanxʷ	[ǰɩ́nǰɛ̀nʊxʷ]	ǰə́n . ǰɛ̀n . nəxʷ	*lots of fish*	EH 27/04/99: 23
kul=awtxʷ	[kʷúlàwt(xʷ)]	kʷúl . làwtʰ	*school*	EH 27/04/99: 49

As indicated by the syllabification in (14-15) column three, an intervocalic resonant is parsed into both syllables. Ambi-syllabicity, a term which means "belonging to both syllables" is often represented as in (16).

(16)



The resonant C_2 occupies both the coda of the first syllable, and the onset of the second syllable, hence the term "ambi-syllabic".

The question which remains unanswered at this point is whether of not "ambisyllabic" resonant is moraic or not? (i.e. is it truly ambi-syllabic or is it a geminate?) If all coda consonants are moraic in the language as evidenced by compensatory lengthening, stress facts, etc., then there is no inherent length contrast in consonants in the language. If ambi-syllabic consonants are non-moraic then these are the only non-moraic coda consonants in the language. As mentioned before however there are many questions. Native speakers certainly syllabify these strings differently, and Harris (1981) writing on Island Comox wrote these consonants as geminates. Paul Kroeber (p.c.) notes that these consonants may be longer in duration, judging from his own transcriptions of Sliammon, but that this needs to be check instrumentally.

Not only is the prominence of the head of the stress foot enhanced if possible via ambisyllabicity (gemination), but the prominence of the unstressed syllable is also reduced, by reduction of a full vowel /i, u, a/, as is shown in the next section.

3.2 Vowel Reduction

The central claim in this section is that a "reduced full vowel" has the prosodic properties of schwa, in that it is realized as a non-moraic nucleus (NUC), yet maintains the featural specification of the underlying full vowel. The metrical (foot) structure of the language becomes important in showing where and when vowel reduction takes place.

Syllables in Sliammon are grouped together into left-dominant feet (or trochees), Blake (1992, 1995, in prep.), Urbanczyk (1999.b). Trochaic feet are ideally bi-moraic (μμ) (that is they satisfy FtBinμ) but may be tri-moraic (μμμ) (i.e. an "uneven" trochee), under pressure to incorporate moras into syllables (Parse-μ-to-σ), and incorporate syllables into the foot (Parse-σ-to Foot).

Vowel reduction appears to be driven by the metrical foot structure of the language in the following way. Vowel reduction, which is analyzed here as the loss of a mora <μ> associated with the weak syllable of a metrical foot, occurs in at least two contexts: (i) in order to create a single bisyllabic trimoraic foot, and (ii) in order to create a well-balanced bi-syllabic bi-moraic trochee. Consider each case in turn.

3.2.1 Bisyllabic Trimoraic Foot

In the first case, vowel reduction reduces the total number of moras from four to three so that both syllables can be incorporated into a single metrical foot. As shown by the examples in (17), the vowel in the unstressed syllable is "reduced" in the surface form: /a/→ [ʌ] as in (17.a), /i/ → [ɩ] as in (17.b), and /u/ → [ʊ] as in (17.c). This vowel reduction is interpreted as a reduction in vowel *quantity* (i.e. the loss of a mora). Note that in (17.b) it is the second foot in (t̓ᶿíy)$_{Ft}$(<u>č̓àʔgɩčʰ</u>)$_{Ft}$ 'twisted spine' which undergoes reduction, as indicated by the foot structures in columns three and four.

(17) Vowel reduction occurs in metrically weak (unstressed) syllable
(μμ . Nucμ μ) → (μμ . Nuc<μ> μ) *(μμ . μμ)

Input	Output	V-reduction	*V-reduction	Gloss	Source
sup=nač	[sópnʌč]	(sóp$_{\mu\mu}$. nʌč$_{\mu}$)	*(sóp$_{\mu\mu}$. nač$_{\mu\mu}$)	*tail*	MG 1988: 551
t̓ᶿiyč̓=aǧič	[t̓ᶿíyč̓àʔgɩčʰ]	(č̓àʔ$_{\mu\mu}$.gɩč$_{\mu}$)	*(č̓àʔ$_{\mu\mu}$.gič$_{\mu\mu}$)	*twisted spine*	AM 27/06/98: 23
šʔt-mut	[šɛ́ʔtᵊmʊtʰ]	(šɛ́ʔt$_{\mu\mu}$.mʊt$_{\mu}$)	*(šɛ́ʔt$_{\mu\mu}$. mut$_{\mu\mu}$)	*very high*	EH11/06/99:10

Vowel reduction is analyzed here as the loss of the mora associated with the vowel in the second syllable without any alteration to either its nuclear or featural content. The examples in (17) show that there is pressure to group two syllables into a single foot (FtBin σ) however feet are maximally tri-moraic in Sliammon. The strategy which the language utilizes in order to satisfy these conflicting constraints is Vowel reduction -- the underparsing or deletion of a mora (*Max-μ).

Since the head of the foot (i.e. the stressed syllable) prefers to be prominent, it is the weak syllable which surfaces as mono-moraic, excluding surface forms like the ones in (18).

(18) Vowel Reduction in a stressed syllable is blocked

a.	vowel reduction <μ>	*(sɔ́p$_{\mu}$. nač$_{\mu\mu}$)	3 moras
b.	vowel reduction <μ>	*(čàʔ$_{\mu}$. gič$_{\mu\mu}$)	3 moras
c.	vowel reduction <μ>	*(šέʔt$_{\mu}$. mut$_{\mu\mu}$)	3 moras

Recall that stress is strictly word-initial in Sliammon regardless of the quality of the initial vowel (Davis (1970), Hagège (1981), Kroeber (1989), Blake (1992, 1995), Watanabe (1994), and Urbanczyk (1999)). In (17) above, vowel reduction <μ> not only allows both syllables to be incorporated into a single metrical foot, but it also enhances the relative prominance of the head of the foot.

3.2.2 Bisyllabic Bimoraic Foot

Kager (1995: 400) in his summary of stress systems states that languages which have moraic trochees "are predicted to display processes that increase durational evenness within the foot." He cites Prince who analyzes "shortening" as a process that "modifies an uneven trochee into a rhythmically balanced even bi-moraic trochee". This is represented here as shown in (19).

(19) $(\acute{\sigma}_{\mu\mu}\ \sigma_{\mu})_{Ft} \rightarrow (\acute{\sigma}_{\mu}\ \sigma_{\mu})_{Ft}$

The claim made here is similar to what happens in Sliammon As shown by the Sliammon data in (20), vowel reduction (loss of a mora) creates an optimal bi-moraic trochee, a foot in which each syllable contains one mora: $(\mu\ .\ \mu)_{Ft}$.

(20) Vowel reduction: (μ . Nucμ μ) → (μ . Nuc <μ> μ) *(μ . μμ)

Input	Output	V-reduction	*V-reduction	Gloss	Source
qigaθ	[qégʌθ]	(qé$_{\mu}$. gʌθ$_{\mu}$)	*(qé$_{\mu}$. gaθ$_{\mu\mu}$)	*deer*	EH04/06/99:16
miǰaθ	[míȷ̌ɪθ]	(mí$_{\mu}$. ȷ̌ɪθ$_{\mu}$)	*(mí$_{\mu}$. ǰaθ$_{\mu\mu}$)	*flesh, meat*	AM03/06/98:5
qʷup=aq̇	[qʷó·pʌq̇]	(qʷó$_{\mu}$. pʌq̇$_{\mu}$)	*(qʷó$_{\mu}$.paq̇$_{\mu\mu}$)	*pubic hair*	AM03/06/98:8
sit̓-at	[sít̓ʌt]	(sí$_{\mu}$. t̓ʌt$_{\mu}$)	*(sí$_{\mu}$. t̓at$_{\mu\mu}$)	*throw it away*	AM 05/06/98: 3
gaqiθ	[gáqεθ]	(gá$_{\mu}$. qεθ$_{\mu}$)	*(gá$_{\mu}$. qeθ$_{\mu\mu}$)	*husband*	HH15/04/99:17
qχ-mut	[qʌ́χᵊmʊtʰ]	(qə́χ$_{\mu}$. mʊt$_{\mu}$)	*(qə́χ$_{\mu}$. mut$_{\mu\mu}$)	*many, lots*	EH14/01/99:15
č̓t-at-as	[č̓ítᵊtʌs]	(č̓ít$_{\mu}$. təs$_{\mu}$)	*(č̓ə́t$_{\mu}$. tas$_{\mu\mu}$)	*he cut it*	EH27/04/99: 74

Since stress is always fixed on the word-initial syllable in Sliammon[12], surface candidates like those in the fourth column are ill-formed since the weak member of the foot is heavier (μμ) than the head of the foot (μ). The loss of a mora <μ> is therefore a minimal violation of faithfulness which ensures that the phonological weight of the head of the foot is equal to or greater than the phonological weight of the non-head. It also creates an even bi-moraic trochee.

The data in (21) below shows that vowel reduction also occurs in the weak member of the foot, even though it creates a bi-moraic first syllable ($\sigma_{\mu\mu}$) followed by a non-moraic second syllable (σ) within a single foot. Again, this not only creates a bimoraic foot but also enhances the prominence of the head of the foot.

(21)

Input	Output	V-reduction	*V-reduction	Gloss	Source
tiʔta	[tíʔtʌ] ~ [tí:tʌ]	(tíʔ$_{\mu\mu}$. tʌ)	*(tíʔ$_{\mu\mu}$. ta$_{\mu}$)	*that one*	AM03/06/98:29
θiʔθa	[θíʔθʌ] ~ [θí:θʌ]	(θíʔ$_{\mu\mu}$. θʌ)	*(θíʔ$_{\mu\mu}$. θa$_{\mu}$)	*that one (f)*	AM03/06/98:30

Further, data like those in (22) shows that the first syllable is bimoraic, since vowel reduction occurs in the metrically weak syllable.

(22)

Input	Output	V-reduction	*V-reduction	Gloss	Source
q̇ga	[q̇áʔgʌ]	(q̇áʔ$_{\mu\mu}$. gʌ)	*(q̇áʔ$_{\mu\mu}$. ga$_{\mu}$)	cane; w.stick	AM 04/06/98:42

If the first syllable were mono-moraic then there would be no need for vowel reduction to take place. In fact, I would predict that vowel reduction would be blocked, if this were the case *(q̇áʔ$_{\mu}$. gʌ), since mono-moraic feet are clearly less optimal than bi-moraic ones, as will be shown in §3.2.3 below.

In Blake (1992, 1995) I argued on independent grounds that coda consonants must be moraic since the loss of a coda consonant triggers compensatory lengthening of the preceding vowel.

[12]There are a number of important question with respect to the phonetic correlates of stress/metrical prominence in Sliammon. In early elicitation, I noted primary stress on the first syllable in the word with subsequent prominant syllables having high pitch, and as a consequence secondary stresses were generally not transcribed. My research on secondary stress shows that many words have primary stress on the word-initial syllable, however there is a growing body of data involving Lexical Suffixes (LS) in which the primary stress (and highest pitch) appears to be on the lexical suffix, and a secondary stress occurs in word-initial position, such as /χawšin=aġič/ bone=spinal column [χàwšináʔgɪčʰ] 'spine' (AM 30/06/97: 37), /q̇uw=an̓a/ Root=ear [q̇ʷòwaʔána] 'ear' (AM 30/06/97: 28), /χʷaẇ=iqʷ=uǰa/ Root=elongated.object=hand [χʷàʔwεqʷóʔɟε] 'finger' (AM 30/06/97: 39). Watanabe (1998) has also reported the important contrastive function of pitch in Sliammon. For further details cf. Watanabe (1998), Blake (in prep).

The stress data in (23) provides further evidence that [ʔ] in coda position is moraic since [šĭʔ] counts as heavy.

(23) **ʔ codas are moraic**

a. /sp̓=šin-ʾuɬ č/ hit=leg-past 1sg.Su. [sʌ́p̓šĭʔᵊnòɬčʰ] 'I got hit on the leg' (EH 11/06/99: 50)

a'. (sʌ́p̓$_\mu$)Ft (šĭʔ$_{\mu\mu}$)Ft (nòɬ$_{\mu\mu}$) č$_\mu$)Ft

Consider the data in the next section which shows the environment in which vowel reduction is blocked.

3.2.3 Vowel Reduction is Blocked

Although many post-tonic full vowels surface as their reduced counterpart, there are a systematic set of cases in which vowel reduction tends to be blocked. In the examples given in (24), a full vowel appears in the phonetic output instead of a reduced vowel.

(24) Vowel reduction is blocked: ($\mu\mu$) → *(μ) all data: (AM 27-28/06/97)

Output form	Morafication / Footing	*Vowel Reduction	Gloss
[gágeθègʌn]	(gá$_\mu$. ge$_\mu$)(θè$_\mu$. gʌn$_\mu$)	*(gá$_\mu$. gɛ)(θè$_\mu$. gʌn$_\mu$)	*doe, female deer*
[túwumày̓ɛ]	(tú$_\mu$. wu$_\mu$)(mà$_\mu$. y̓a$_\mu$)	*(tú$_\mu$. wʊ)(mà$_\mu$. y̓a$_\mu$)	*cold wind, Westerly*
[t̓ᶿát̓ᶿawùšɩn]	(t̓ᶿá$_\mu$. t̓ᶿa$_\mu$)(wù$_\mu$. šɩn$_\mu$)	*(t̓ᶿá$_\mu$. t̓ᶿʌ)(wù$_\mu$. šɩn$_\mu$)	*hail*
[k̓ʷásasàʔʌq]	(k̓ʷá$_\mu$. sa$_\mu$)(sà$_\mu$. ʔʌq$_\mu$)	*(k̓ʷá$_\mu$. sʌ)(sà$_\mu$. ʔʌq$_\mu$)	*becoming warmer*
[náč̓awĭgɩɬ]	(ná$_\mu$. č̓a$_\mu$)(wĭ$_\mu$. gɩɬ$_\mu$)	*(ná$_\mu$. č̓ʌ)(wĭ$_\mu$. gɩɬ$_\mu$)	*one boat*
[ƛ̓áχajùnɩs]	(ƛ̓á$_\mu$. χa$_\mu$)(ǰù$_\mu$. nɩs$_\mu$)	*(ƛ̓á$_\mu$. χʌ)(ǰù$_\mu$. nɩs$_\mu$)	*wisdom teeth*
[tátoθènʌč]	(tá$_\mu$. to$_\mu$)(θè$_\mu$. nʌč$_\mu$)	*(tá$_\mu$. tɔ)(θè$_\mu$. nʌč$_\mu$)	*gluteous muscle*

Vowel reduction does not seem to take place as freely in a bimoraic, bi-syllabic foot of the form (Cv́$_\mu$)(Cv$_\mu$) as shown by a comparison between the data in column two and the less optimal forms in column three. If vowel reduction is the loss of a mora, then we can explain why it is blocked in this context. Vowel reduction in this context would create a less optimal mono-moraic (σ_μ σ) foot, as suggested above.[11]

I conclude that the constraint which ensures that feet are minimally bi-moraic (FtBinμ) must be high ranked. This is contrasted with cases like those in (20) in which vowel reduction *does* take place in order to ensure that feet are binary at the moraic level.

[11] It is not that degenerate (mono-moraic) feet do not occur in Sliammon -- they seem to occur only under pressure from higher ranked constraints within the grammar, such as the one that aligns the head of the prosodic word with the left edge of the lexical stem. Vowel reduction is driven by the need to parse-σs into metrical feet, and by FtBinμ, and Weight-to-Stress.

3.3 The Representation of Vowel Reduction

A reduced vowel is analyzed here as a nuclear non-moraic vowel which has the place specifications of the underlying full vowel, as shown in (25).

(25) NUC
RN
Place
[αf]

Within derivational frameworks, this would be analyzed as the loss of a mora, as shown in (26). Notice that the vocalic place features remain unchanged.

(26) NUC → NUC
μ
RN RN
Place Place
[αf] [αf]

Notice that this phonological representation is distinct from epenthetic schwa [NUC] which is devoid of inherent place features. Epenthetic schwa is realized as [ɩ~ɨ, ɛ, ʊ, ɔ, ʌ, ă] (where [ă] is shorter in duration than [a]) depending on the adjacent consonants and vowels, as shown in §1.2.

The distinction between reduced vowel and epenthetic schwa is manifested in surface representations in Sliammon. Consider the examples in (27) in which the surface quality of epenthetic schwa [ə] is distinct from a reduced full vowel in the same consonantal (i.e. phonological) environment. This is seen most clearly from a comparison of the following stative and non-stative pairs. The non-stative form comes first followed by the stative form marked by [-i-] insertion. Consider the following data which shows that the surface realization of epenthetic schwa [ʌ ~ ʊ] is distinct from /i/ [ɩ ~ ɛ] in post-tonic position. The vowels being discussed are underlined in column two.

(27) Statives: epenthetic schwa ≠ reduced full vowel data from (MG 06/98)

Input	[ə] versus i	Output	*Vquality	Gloss
puh-ʔm	puhʔ<u>ə</u>m	[púhʔʌm]		*to blow (as wind)*
puh-ʔm[-i-]	puhʔ<u>i</u>m	[púhʔɛm]	*[púhʔ<u>ʌ</u>m]	*it's windy*
skʷm	səkʷ<u>ə</u>m	[sʊ́kʷʊm]		*to shiver*
skʷm[-i-]	səkʷ<u>i</u>m	[sʊ́kʷɛm]	*[sʊ́kʷ<u>ʌ</u>m]	*shivering (state)*

Consider the forms for 'shiver' and 'shivering (state)'. Between the labio-velar consonant kʷ and final m, epenthetic schwa is realized as [ʊ], as in the form səkʷəm [sʊ́kʷʊm] 'to shiver'. Compare that with the surface realization of /i/ in the identical phonological context in the form for səkʷ<u>i</u>m [sʊ́kʷɛm] 'shivering'. The vowel /i/ surfaces as [ɛ] retaining it's coronal (COR) (or DOR [-back]) place features. As shown by a comparison of columns three and four, /i/ is not realized as [ʌ]. If vowel reduction were the loss of features accompanied by colouration by adjacent consonants, one would expect the surface realization to be the same (or similar given their difference in phonological weight).

I conclude that the realization of epenthetic schwa is distinct from the realization of some reduced full vowels in *the same phonological environment* , as shown by the data in (27). This seems to support a view that vowel reduction is the loss of a mora, and crucially not the loss of the vowel features associated with the underlying full vowel, as illustrated in (25-26).

Diminutive and non-diminutive pairs in (28) provide another case in point. Roots with a full vowel take CV-diminutive reduplication whereas vowelless roots (CC) take Ci- diminutive reduplication. In addition, a number of diminutive forms also have a diminutive suffix -i which seems to occur at the right-edge of the root domain. Consider the following data which shows that the surface realization of epenthetic schwa [ʌ ~ ə ~ ʊ] is distinct from /i/ which surfaces in post-tonic position as [ɪ ~ ɛ]. The relevant vowels are underlined in column two.

(28) Diminutives: epenthetic schwa ≠ reduced full vowel

Input	**[ə] versus i**	**Output**	**Gloss**	**Source**
χus-m	χusə̲m	[χʷósʌm]	*soapberry*	(AM 09/06/98:44)
DIM-χus-i-m+ʔ	χuχsi̲m̓	[χʷóχʷsɪm̓]	*small soapberry*	(AM 09/06/98:47)
χʷil̓-m	χʷil̓ə̲m	[χʷɛ́ʔᵊlʌm]	*rope*	(AM16/06/98:39)
DIM-χʷil̓-i-m+ʔ	χʷiχʷli̲m̓	[χʷɛ́χʷlɛm̓]	*string, thread*	(AM16/06/98:40)
q̓ʷat̓-m	q̓ʷat̓ə̲m	[q̓ʷát̓əm]	*river*	(MG 1988: 223)
DIM-q̓ʷat̓-i-m+ʔ	q̓ʷaq̓ʷt̓i̲m̓	[q̓ʷáq̓ʷᵊt̓ɛm̓]	*small river, creek*	(MG 1988: 225)
pilq [14]	pilə̲q	[péᵊlʌq]	*bracket fungus*	(MG09/06/98:16)
DIM-pil-i-q	pipəli̲q	[pé:pəlɛq]	*small b. fungus*	(MG09/06/98:17)
ƛ̓l̓=aq̓-n	ƛ̓əl̓aq̓ə̲n	[ƛ̓áʔᵊlaq̓ʌn]	*slug*	(MG/EP25/06/98:4)
DIM-ƛ̓l̓=aq̓-i-n+ʔ	ƛ̓i-ƛ̓əl̓aq̓i̲n̓	[ƛ̓íƛ̓aʔᵊlàq̓ɛn̓]	*small slug*	(MG/EP25/06/98:6)
t̓g̓-q̓ʷ	t̓əg̓ə̲q̓ʷ	[t̓áʔᵊgʊq̓ʷ]	*clay*	(AM 29/06/98:26)
RED-t̓g̓-i-q̓ʷ+ʔ	t̓i-t̓əg̓i̲q̓ʷ	[t̓ít̓aʔᵊgɛq̓ʷ]	*bit of clay*	(AM 29/06/98:28)

Consider the forms for 'bracket fungus; mushroom' and 'small bracket fungus'. Between the consonant [l] and final uvular stop [q], epenthetic schwa is realized as [ʌ], as in the form [péᵊlʌ̲q] piləq 'bracket fungus; mushroom'. Compare that with the surface realization of /i/ in the same phonological context in the form for [pé:pəlɛ̲q] pipəliq 'small bracket fungus'. The vowel /i/ surfaces as [ɛ] after [l] and before [q], and not as [ʌ], as indicated by the ungrammatical form *[pé:pəlʌ̲q]. If vowel reduction were the loss of features accompanied by colouration by adjacent consonants, we would be unable to explain the surface vowel contrast.

[14] For some speakers this root means 'mushroom'.

The contrast between /i/ and epenthetic schwa in stressed position is shown by the minimal pair in (29).

(29) ə́ versus í

Input	**[ə] versus i**	**Output**	**Gloss**	**Source**
/p̓q̓/	p̓əq̓	[p̓ʌ́q̓]	*smoke*	(MH 27/08/98)
/p̓iq̓/	p̓iq̓	[p̓éq̓ ~ p̓ɛ́q̓]	*wide*	(Cedar-to-CDROM)

The final pair in (28) above shows that epenthetic schwa surfaces as rounded [ʊ] in the context of a following labialized consonant: t̓əg̓ə̲q̓ʷ [t̓áʔᵊgʊq̓ʷ] 'clay'. Contrast this with the surface realization of the vowel /i/ in the same context, as illustrated by the form t̓i-t̓əg̓iq̓ʷ [t̓ít̓aʔᵊgɛq̓ʷ] 'a bit of clay'. Here, the resulting vowel [ɛ] is the lax counterpart of the non-low vowel /i/, and shows no rounding assimilation. Again, the surface variant of the reduced full vowel /i/ is distinct from the allophone of epenthetic schwa in the same context: [ɛ] versus [ʊ].

The other data in (28) is confounded somewhat by the presence of a final glottalized resonant so that the phonological context of the related diminutive and non-diminutive pairs is not exactly identical. It can still be argued however that the resulting surface quality of the reduced full vowel could not be attributed to the nature of adjacent consonants[15].

In the data sets in (27-28) above, I purposefully selected examples involving an [-i-] infix in order to ensure that the relevant form contained an underlying full vowel in non-initial position. Paul Kroeber (p.c.) points out that it will be important to find examples not involving infixes in order to show that the facts presented here are not in someway restricted to these morphological contexts.

The claim made in this section is that full vowel reduction in Sliammon is *not the loss of the phonological features associated with the vowel* rather it is construed as the loss of phonological weight, i.e. as the loss of a mora. The resulting "reduced" full vowel has the prosodic representation of schwa since it is Nuclear (NUC) but non-moraic.

4.0 Phonological Impact of *Cə́.

In the next section, it is observed that the main strategy used in order to avoid *Cə́ in Sliammon is to close the syllable with a moraic coda consonant: Cə́C$_{\mu}$.

As we have observed stressed schwa in an open syllable tends to be avoided, if possible. It seems important to consider what generalization(s) the constraint *Cə́ captures. (Cə)σ constitutes a superlight syllable which, within the framework adopted here, is a Nuclear element but has no moraic content, as argued by Shaw (1993, 1994). Optimal syllables are both nuclear and moraic; that is they satisfy the constraint which states that all syllables have nuclei (σNuc), and they have phonological weight, represented here in terms of moras. A schwa in an open

[15] This raises an interesting issue in Sliammon. If full vowel reduction is driven by metrical considerations, then perhaps glottalized consonants (obstruents and resonants) do not affect the quality of unstressed vowels, though laryngeals [ʔ, h] do. cf. Blake (in prep) for further discussion.

syllable fails to satisfy the constraint on phonological weight. As already argued the stressed syllable also prefers to be prominent, if possible.

Schwa is inserted in order to receive stress (thus satisfying Proper Headedness); however, stressed schwa in an open syllable fails to satisfy the constraint that all syllables have phonological weight (σMora cf. Shaw 1996) and the constraint which enhances the metrical prominence of the head of the foot (Peak Prom., or Weight-to-Stress). In order to avoid these constraint violations, the open Cə syllable is closed with a moraic coda consonant.

In Sliammon the syllable which is the head of the foot prefers to be minimally mono-moraic, if possible. Consider the following discussion of glottal restructuring which appears to prevent schwa from occurring in a stressed open syllable.

4.1 Glottal Restructuring Blake (1992), Watanabe (1994), Blake (1995a &b, 1998)

In Sliammon, underlying glottalized resonants (R') often surface sequentially as in (30-33). In (30), an intervocalic glottalized resonant surfaces as [ʔR], the glottal portion precedes the resonant (pre-glottalized).

(30) R' → [ʔR]

Input	Output	Gloss	Source
saṁa	[sáʔma]	*blue mussel*	MG 1988: 51
č̓ṁ=uǰa	[č̓éʔᵊmoʔǰɛʰ]	*cold hands*	MG 1988: 572
ƛ̓iṅa	[ƛ̓ɛ́ʔᵋna]	*oolichan oil*	SP12/06/96: 83
t̓iṅiqʷ	[t̓éʔnəqʷʰ]	*salmonberry*	MG 1988: 100
χʷil̓m	[χʷɛ́ʔᵊlʌm]	*rope*	AM16/06/98: 39
ʔal̓as	[ʔáʔləs]	*sea cucumber*	SP12/06/96: 86
qaẏa	[qáʔyɛ]	*water*	AM 27/06/98:16
p̓aẏan	[p̓áʔᵊyɩn ~ p̓áʔᵊyɛn]	*bark*	AM 27/06/98: 8
qʷaẇiɬ	[qʷáʔᵃwɩɬ]	*pitch, gum*	AM 08/06/98: 3
kʷaẇč / kʷaẇič	[kʷáʔᵊwɩčʰ]	*sturgeon*	JM 24/06/98

When the glottalized resonant occurs in word-final position the glottal portion follows the resonant (post-glottalized), as shown by the stressed forms in (31). Watanabe (1994:224) states that the "resonant is chopped off abruptly by the closure of the glottis, or the closure may occur somewhere in the middle of the resonant. .. In such cases, an echo of the resonant, often voiceless, is heard after the glottal closure is released, i.e. [mʔᵐ ~ ʔm] for example." Watanabe (1994) cites [tʌ́ʔm ~ tʌ́ʔᵐ] 'belt' and [tə́nʔⁿ] 'that one' as examples. Consider the additional data in (31) which support this position.

(31) /R'/ → [Rʔ]

Input	Output	Gloss	Source
tṁ	[tʌ́mʔ]	*belt*	AM 03/06/98: 45
qʷl̓	[qʷɔ́lʔ ~ qʷʌ́lʔ]	*to come*	MG 23/06/98: 26
tẇ	[túwʔʷ]	*ice*	MG 24/06/98: 13
tam kʷ šiṅ	[tám kʷ šínʔ]	*What was that?*	AM 23/06/98: 51
pal̓	[pálʔ]	*heron*	MG 1988: 30
čuẏ	[čúyʔ]	*child, young*	MG 1988: 141
tač̓iẇ	[táʔč̓ɛ̀wʔʷ]	*full moon*	MG 24/06/98
q̓ɬuṅ	[q̓ʌ́ɬònʔ] check stress	*bow of the boat*	MG 10/06/98: 39

In unstressed syllables in (32), /R'/ tends to surface with creaky voice articulation, indicated with an apostrophe following the resonant[16]. The laryngealized resonants [R'] seem to lack the distinctive full glottal closure (or strong glottal pulse) [Rʔ ~ RʔR] associated with the examples in (31) above.

(32) /R'/ → [R']

Input	Output	Gloss	Source
hiyuṁ	[héyuṁ]	*seagull*	MG 1988: 35
REDPL-ʔal̓as	[ʔʌ́l-ʔal̓ʌs]	*sea cucumbers*	MG 1988: 628
REDPL-saẏǰa	[sísaẏǰɛ]	*leaves*	MG 1988: 665
qʷɬ=aẏ	[qʷə́ɬaẏ ~ qʷʊ́ɬaẏ]	*driftwood*	AM 04/06/98: 29
χaẇs	[χáẇs]	*new*	EH 11/06/99: 4

Reduplicative facts show that glottalized resonants pattern as unitary segments with respect to these morpho-phonological processes, and thus motivate the existence of /R'/. Harris (1981) for Island Comox, Davis (1978), Blake (1992) and Watanabe (1994) posit underlying glottalized resonants /R'/ in Sliammon, a position which entails that the surface distribution of [R'] is entirely predictable.

Blake (1992) claims that the prosodic position in the syllable plays an important role in determining the distribution of /R'/. Glottalized resonants tend to be banned in non-moraic (syllable onset) position as evidenced by the lack of word-initial [R'] in the language. In word-internal onset positions, glottalized resonants are restructured as in (30) above, whereas glottalized resonants occur freely in moraic (coda) position either word-internally or word-finally[17].

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[16] Creaky-voice sounds lack complete closure of the vocal cords. In the articulation of creaky voice or laryngealized sounds, "the arytenoid cartilages are tightly together, so that the vocal cords vibrate only at the other end" Ladefoged (1982: 129).

[17] The following example provides a single counter-example to the generalization that there are no word-initial glottalized resonants: /IMP-ẇuw-m/ [ẇúʔᵊ . wu .wəm] 'singing' (MG 1988: 622).

Blake (1995) makes two additional observations: (i) foot structure (i.e. stress assignment) plays an important role in determining the surface realization of glottalized resonants, and to a lesser extent (ii) the features of the adjacent consonants and vowels also play a role. The surface realization of /R'/ is then governed by a number of different factors:

(33) (a) syllable structure
(b) foot structure
(c) melodic structure (features) (not discussed here)

In Blake (1995), I proposed that there are metrical properties governing the realization of glottalized resonants (R'). The pattern which was observed was as follows. Glottalized resonants (R') are transcribed as having a complete glottal closure and release [Rʔ] in a stressed word-final syllable, as shown by the data in (31), whereas glottalized resonants are realized with creaky voice [R'] in unstressed syllables, as shown by the data in (32). This is summarized in (34).

(34) Foot Strucuture and R'

(i) CVR' → [CVRʔ] post-glottalized (full glottal closure) in a stressed syllable
(ii) CVR' → [...CVR'] creaky voice (partial glottal closure) in an unstressed syllable

(i) maximal syllable in metrically prominent position (primary stress)
(ii) non-maximal syllable in metrically weak position

Consider another context in which glottalized resonants are realized sequentially. A word-internal, intervocalic glottalized resonant is restructured so that the glottal portion of the glottalized resonant remains in coda (moraic) position. The resonant portion functions as the onset to the following syllable as illustrated by the data in (35), satisfying the high ranking constraint that all syllables in the language have an onset. Recall that a brief echo vowel is often present upon release of the glottal closure.

(35)

Input	Output	*R'/non-moraic	Gloss	Source
qʷaṅ=iqʷɬa	[qʷáʔᵃ . nʊqʷ . ɬa]	*[qʷá . ṅʊqʷ . ɬa]	*knee*	MG 1988: 313
ɬaṅ=ukʷ	[ɬáʔᵃ . nʊkʷʰ]	*[ɬá . ṅʊkʷʰ]	*mountain goat skin*	MG 1988: 517
č̓ṁ=uja	[č̓éʔᵊ. moʔ . ǰɛʰ]	*[č̓é . ṁoʔ . ǰɛʰ]	*cold hands*	MG 1988: 572

The generalization which emerges is that syllables which are metrically prominent prefer to be heavy (bimoraic). It is proposed here, following Blake (1995), that glottalized resonants /R'/ are sets of phonological features which can be reconfigured in order to satisfy this constraint on metrical prominence.

Having introduced the way in which /R'/ surface, consider the following examples in (36) which show that restructuring avoid stressed schwa in an open syllable, and therefore satisfies the constraint: *Cə́. Since the sonorant obstruents /Y, Y', W, W'/, written here as /ǰ, ǰ̓, g, g̓/, function as resonants (i.e. they pattern with the resonants in processes involving resonant glottalization), I have included examples with /g̓/ here. See Blake (1992, 1995, in prep.) for argumentation re resonant status of /ǰ, ǰ̓, g, g̓/.

(36) C_2 is a glottalized resonant

Input	Output	*Cə́ ; *R'/onset	Gloss	Source
p̓ṁa	[p̓áʔᵊma]	*p̓ə́ . ṁa	*wooden float*	AM 16/06/98:11
šṁ-it	[šɛ́ʔᵊmɛtʰ]	*šə́ . ṁɛt	*dried*	Cedar-to-CDROM
kʷṅay	[kʷáʔᵊnʌy]	*kʷə́ . ṅʌy	*cover, lid*	AM 23/06/98: 59
θẏ-m	[θáʔᵊyɨm]	*θə́ . ẏəm	*to sink*	MG 1988: 365
ɬ̓g̓=itᶿa-m ga	[ɬ̓áʔᵃgitᶿəm ga]	*ɬ̓ə́ . g̓itᶿəm ga	*take it off!*	MG 21/04/98: 11
q̓g̓a	[q̓áʔga]	*q̓ə́ . g̓a	*walking stick*	AM 04/06/98: 42
tṁ=us-tn	[táʔᵊmòstn̩]	*tə́ . ṁòstn̩	*headband*	AM 03/06/98: 54
tṁ=iws-tn	[táʔmewstən]	*tə́ . ṁewstən	*garter (stockings)*	AM 04/06/98: 41
tṁ=igan-tn	[táʔmegàtn̩]	*tə́ . ṁegàtn̩	*s.t. tied around waist*	AM 03/06/98: 44

Compare the output in column two with the unattested forms (marked by * to indicate their ungrammaticality) in column three. The surface forms involve (i) schwa epenthesis, (ii) the restructuring of the glottalized resonant [ʔR] with loss of laryngealization on R, and (iii) lowering of schwa to [a] before the glottal. The surface forms in column two *avoid* violations of at least two constraints in the language: (a) the constraint which bans schwa in a stressed open syllable (*Cə́), and (b) the constraint against glottalized resonants in non-moraic (syllable onset) position Contrast this with the *forms in column three which violate both of these constraints. Since the output candidates satisfy both *Cə́ and *R'/onset, one would not expect to find surface forms of the shape: [CáʔR'V ...] since this would still violate *R'/onset. Forms like [CáR' . V] are ruled out by high-ranking constraint that all syllables have onsets in Sliammon.

In Blake (1995, 1998), I claim that the glottal portion is moraic and satisfies the following Stress-to-Weight Principle (SWP)

(37) Stress-to-Weight (SWP) A syllable which is stressed prefers to be heavy.

Since the glottal portion is moraic (as can be shown independently by compensatory lengthening facts - Blake (1992, 1995)), the surface output [Cáʔμ] better satisfies the constraint in (37) than [Cə́] does. Within the framework presented here [Cə́] is non-moraic whereas [Cáʔμ] is mono-moraic (at least). I have avoided the question regarding the moraic status of [a] from schwa. That is, is the resulting structure mono-moraic [Cáʔμ] or bi-moraic [Cáʔμμ]?

As mentioned in Blake (1995, 1998), Urbanczyk (1999.a), glottalized obstruents also tend to involve restructuring of the glottal portion of the ejective, but with retention of the laryngealization associated with the obstruent. Contrast what happens to glottalized resonants with the behavior of glottalized obstruents in the same position, as shown by the Sliammon data in (38).

(38) C_2 is a glottalized obstruent

Input	Output	*Cə́	Gloss	Source
gq̓=iʔpan	[gʌ́ʔq̓ɛ:pʌn]	*gə́ . q̓ɛ:pʌn	*it has no lid*	MG/MH 08/96: 6
χʷƛ̓=igan	[χʷáʔƛ̓egən]	*χʷə́ . ƛ̓egən	*half full*	MG 1988: 373
θt̓ᶿ-ɪn	[θáʔt̓ᶿəm]	*θə́ . t̓ᶿəm	*jig for cod*	AM 16/06/98: 47
kt̓=iqʷ=uj̓a	[kʸέʔt̓ɛqʷòʔjɛ]	*kʸə́ . t̓ɛqʷòʔjɛ	*pinky (finger)*	AM 1997

These surface forms involve (i) schwa epenthesis, (ii) the restructuring of the glottalized obstruent [ʔO'] with retention of glottalization associated with the obstruent, and (iii) lowering of schwa to [a] before the glottal. The surface forms in column two *avoid* violations of the constraint which bans schwa in a stressed open syllable (*Cə́), whereas the ungrammatical examples in column three violate this constraint. Since the output candidates in column two satisfy *Cə́, and glottalized obstruents are not restricted in syllable-initial position, no other changes between the input and the output take place.

Kroeber (1989: 107) notes that "a number of instances of surface short ɑ are in fact produced from underlying ə", as shown in (39).

(39) ə → ɑʔ / #C___C'V

where C' is a glottalized stop or affricate, and #=word boundary

Notice that the formulation given by Kroeber includes the word boundary # indicating that this set of properties hold at the left-edge of the word domain. Primary stress is also strictly aligned with the left-edge of the word in Sliammon, so that this generalization appears to be capturing a property of the syllable bearing primary stress (i.e. the head of the prosodic word). Urbanczyk (1999.a) notes that stress is the crucial condition, not the fact that these examples occur word-initially in her discussion of parallel forms in Klahoose.

To summarize, the claim I am making here for why glottalized obstruents become [ʔO'] is the same one made for the treatment of glottalized resonants presented in (40).

(40) Since optimal syllables have both a nucleus and phonological weight (moras), it is better for schwa to occur in a stressed syllable closed by a moraic coda consonant [Cə́Cμ] than for schwa to occur in an open stressed syllable (Cə́) which has no moraic content.

(C stands for any consonant: resonant or obstruent).

Consider another strategy which appears to be used in order to avoid *Cə́, namely Onset Formation.

4.2 Onset Formation

There are a few cases in which the lateral l-like release of a syllable-final [ɬ] appears to function as the onset to the following syllable. Again this appears to have the effect of preventing a non-moraic nucleus (i.e. schwa) from occurring in a stressed open syllable.

(41)

Input	Output	Syllabification	Gloss	Source
qʷɬay̓	[qʷʊ́ɬlay̓] ~ [qʷə́ɬlay̓]	qʷə́ɬ . lay̓	*driftwood*	AM 04/06/98: 29
qʷɬay̓=šn	[qʷʊ́ɬlèšɪn] ~ [qʷʊ́ɬˡèšɪn]	qʷə́ɬ . lè . šɪn .	*shoes*	AM 04/06/98: 28)
qʷɬay̓=šn	[qʷə́ɬlèy̓šɪn][18]	qʷə́ɬ . lèy̓ . šɪn .	*shoes*	EH 22/04/98: 4)
t̓aɬm	[t̓áɬˡəm]	t̓áɬ . ləm	*cedar sticks*	MG 1988: 97)

Note that the syllabification provided by the speakers indicates that the [l] release functions as the onset to the second syllable.

4.3 Further Implications: Minor Syllables

Shaw (1993, 1995, 1996) discusses the role of minor syllables in Berber, Mon-Khmer, and Salish languages. A minor syllable is comprised of an onset consonant followed by a syllabic obstruent. Within Shaw's Nuclear Moraic Model which I adopt here, a minor syllable is mono-moraic, but non-nuclear : (CCμ). Shaw (1996) also refers to minor syllables as "headless" syllables since they do not contain a nucleus. Shaw (1996: 4) in her discussion of headless syllables and their interaction with stress, states that a headless syllable has the following properties: (a) it cannot meet the requirements of either σNuc or Proper Headedness, (b) it is constrained to metrically weak positions, and (c) it is mono-moraic (i.e. metrically light).

As argued in Blake (1995, in prep) Sliammon has minor syllables, as shown by the data in (42). The syllabification reflects the speaker's judgements; the syllable boundary is marked with a period.

[18] I recorded a different surface form for this lexical item from MG (1988: 94) : [qʷʌ́ɬeʔšɨn] 'shoes' in which the /ay̓/ is realized as [eʔ] suggesting vowel reduction (loss of a mora) and glottal restructuring. Note that this form is marked with primary stress alone.

(42) **Minor Syllables**

Input	Output	Gloss	Source
ť$^{\theta}$amq^{w}ł	ť$^{\theta}$ám . q^{w}ł	*cloud*	(MG 1988: 392)
saˑł-tx^{w}	sáˑł . tx^{w}	*woman*	(MG 1988: 143)
q̓tx^{w}	q̓ʌ́ʔ . tx^{w} ~ q̓áʔ . tx^{w}	*the fire*	(EH 27/04/99: 30)
IMP-q̓tx^{w}	q̓áq̓ . tx^{w}	*burning*	(EH 27/04/99: 31)
	púʔ . px^{w}	*kindling*	(EH 27/04/99: 33)
χť$^{\theta}$-at	χáʔ . ť$^{\theta}$t^{h}	*weigh s.t.*	(EH 27/04/99: 50)

As can be seen from the data in (42), minor syllables in Sliammon do not occur in the stressed syllable (i.e. as the head of a metrical foot). This follows from the high-ranking of Proper Headedness which ensures that the head of each foot contains a vocalic nucleus. Furthermore, word-initial CC-clusters drive schwa epenthesis, as shown in (42) and illustrated below in (43).

(43) *Cć$_{\mu}$ leads to schwa epenthesis C[ə́]C$_{\mu}$

Notice that there is a kind of complementary distribution between the locus of stressed schwa and the occurrence of minor syllables in Sliammon. Epenthetic schwa is inserted in order to satisfy Proper Headedness, defined here in (44), following Shaw's (1996) formulation.

(44) Proper Headedness

> The prosodic word (PrWd) is headed by a foot (Ft) which is headed by a syllable which is headed by a nucleus (Nuc)

Consider the following set of examples which contain a word-final minor syllable.

(45) word-final minor syllables (data from MG 06/98)

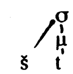
Input	Output	*ə-epenthesis	Gloss
/k̓^{w}ʔiš-it št/	(k̓^{w}ə́ . ʔe)(šit . št^{h})	*(k̓^{w}ə́ . ʔe)(šit . šət^{h})	*we're standing up*
/tg=qin-at-ˋuł št/	(túw . qɛ)(tòł . št^{h})	*(túw . qɛ)(tòł . šət^{h})	*we answered it*
/IMP-θiq=nač-ˋuł št/	(θέ)(θὲq. na)(č̓ùł. št^{h})	*(θέ)(θὲq.na)(č̓ùł.šət)	*we were digging roots*
/IMP-q̓at$^{\theta}$-ag=mix^{w} št/ [19]	(q̓á . q̓a)(t$^{\theta}$àw)(mìx^{w}. št)	*(q̓á . q̓a)(t$^{\theta}$àw)(mìx^{w}. šət)	*we're gathering people*

Compare the output form in column two with the ungrammatical forms in column three. As can be observed from the foot structure, the minor syllable (št$_{\mu}$) occurs in unstressed position. If schwa epenthesis in Sliammon is driven by the need to satisfy Proper Headedness, then it is unnecessary to epenthesize schwa into a metrically weak (non-head) position. Basically, schwa

[19] This predicate means 'to gather people together from different places', and is related to the word kathaumixw 'a gathering together of different peoples' which is the name given to the International Choral Festival held in Powell River once every two years.

is epenthesized in order to be stressed. The minor syllable (št) has the following internal structure, in keeping with the Shaw's Nuclear Moraic Model. The š functions as the onset to a syllable which is mono-moraic but lacks a Nucleus.

(46)



5.0 Morphological and Syntactic Impact of *Cə́.

5.1 Control Transitive Allomorphy

CVC and CəRC roots take a "linking vowel" with the addition of the control transitive suffix -t, whereas CəC roots do not, as noted by Kroeber (1989: 109-110), Blake (1992:40-42). It is proposed here that the control transitivizer is /-at/, and that the presence and absence of the vowel associated with this suffix is phonologically conditioned.

The data in (47) shows the effect of vowel reduction on the vowel of the Control Transitivizer /-at/, as well as limited vowel harmony. When the vowel of the control transitivizer is within the domain of the left-most foot -- the foot which is the head of the prosodic word -- vowel harmony takes place, as shown by the data in (47). The harmonic vowel of the transitivizer is basically a copy of the root vowel, but is reduced to lax: [ʊ, ɔ, ɩ, ɛ, ʌ] in unstressed position.

(47) **Control Transitivizer /-at/ with Full Vowel Roots (CVC)**

Input	Output	*v-deletion	Gloss	Source
q̓is-at	[q̓έ·sɛt]	*[q̓έst]	*to tie it*	MG/SP30/08/96:14
yiq̓-at	[yέq̓ɛt]	*[yέq̓t]	*disgusted with it; need it*	MG/MH 30/08/97:153
nip-at	[nέpɛt^{h}]	*[nέpt^{h}]	*council, lecture s.o.*	MG 12/06/98: 6
ɟuθ-at	[ɟúθʊt^{h}]	*[ɟúθt^{h}]	*push it*	MG 1988: 406
muɟ̓-at	[móʔɟʊt^{h}]	*[móy̓t]	*aim at it*	MG 21/04/98:12
ť ut$^{\theta}$-at	[ť óť$^{\theta}$ɔt^{h}]	*[ť óť$^{\theta}$t^{h}]	*shoot s.t.*	SP 28/08/97: 23
sup-at	[só·pʊt^{h}]	*[sópt^{h}]	*chop it*	MG/MH 29/08/97:76
č̓ag-at	[č̓έgʌt^{h}]	*[č̓έwt]	*help him/her*	MG 1988: 356
yaχ-at č	[yέχʌč]	*[yέχč]	*I remembered it*	Cedar-to-CDROM
θap-at	[θápʌt]	*[θápt]	*bathe s.o.*	MG/MH 29/08/97: 32
han-at	[há·nʌt^{h}]	*[hánt]	*applaud s.t./s.o.*	MG/MH 30/08/97:133

Kroeber (1989) state that CəC roots do not take a linking vowel with the control transitivizer. This is shown by the data in (48).

(48) Control transitivizer with Weak Roots (CC)

Input	Output	*Cə́	Gloss	Source
yṗ-at	[yíṗtʰ]	*yə́ . ṗʌt	*break it*	MG 23/04/98: 9
t̓ᶿkʷ-at	[t̓ᶿúkʷtʰ]	*t̓ᶿə́ . kʷʌt	*wipe it*	MG 1998
tk̇ʷ-at	[túk̇ʷtʰ]	*tə́ . k̇ʷʌt	*pull it*	MG 1988: 410
sq̇-at	[sʌ́q̇tʰ]	*sə́ . q̇ʌt	*peel off s.t. (cherry bark)*	MG/MH:29/08/97:71
gq̇ʷ-at	[gɔ́q̇ʷtʰ]	*gə́ . q̇ʷʌt	*drag it*	MG 1988: 465
kʷɬ-at	[kʷə́ɬtʰ]	*kʷə́ . ɬʌt	*untie, untangle it*	MG 1988: 461
k̇ʷš-at [20]	[k̇ʷíšt]	*k̇ʷə́ . šʌt	*count it*	MG 30/06/97: 29
mχ-at	[mʌ́χt]	*mə́ . χʌt	*cut s.t. in half*	MG 30/06/97: 2.a
t̓χ-at	[t̓íχtʰ]	*t̓ə́ . χʌt	*flick s.t. with finger*	SP 28/08/97: 25
ym-at	[yímtʰ]	*yə́ . mʌt	*kick s.t.*	MG/MH 30/08/97:156
k̇ʷn-at	[k̇ʷʌt ~ k̇ʷʊt]	*k̇ʷə́ . nʌt	*look at it*	SP 28/08/97: 91
mʔ-at	[máʔtʰ]	*mə́ . ʔʌt	*take it*	MG 1988: 435

As can be seen from a comparison between the forms in (48) column 2 and those in column 3, deletion of the vowel associated with the control transitivizer occurs in order to prevent a violation of *Cə́.

This approach receives support from the behavior of weak roots containing three consonants, as illustrated by the data in (49).

(49) Control transitivizer with CCC Roots

Input	Output	*v-deletion	Gloss	Source
ƛpxʷ-at-ˋuɬ č	[ƛə́pxʷatʊɬč]	*[ƛə́pxʷtʊɬč]	*I broke it*	MG 1988: 152
qmƛ̓-at-awɬ	[qʌ́mƛ̓atàwɬ]	*[qʌ́mƛ̓tàwɬ]	*massage e.o.*	AM 28/06/97: 3
t̓ᶿmχ-at	[t̓ᶿʌ́mχʌt]	*[t̓ᶿʌ́mχt]	*erase it in one's mind*	SP 28/08/97: 8
qkʷm-at-θut	[qʌ́kʷmàθot]	*[qʌ́kʷᵊmθotʰ]	*to stop doing s.t.*	MG 16/06/98: 29.a
ṗyč̓-at	[ṗí·č̓ətʰ]	*[ṗí·č̓tʰ]	*to turn over, flip*	MG 1988: 469
χyt̓ᶿ-at	[χét̓ᶿatʰ]	*[χét̓ᶿtʰ]	*talk roughly to s.o.*	MH/SP 30/08/97: 79

As can be seen from the surface forms in column two the vowel of the transitivizer surfaces since stressed schwa does not appear in an open syllable. The third consonant of the root (C_3) functions as the onset to the following syllable, and schwa occurs in a Cə́C syllable in the first four forms. In the last two forms '*to turn over*' and '*talk roughly*' the glide which is the second consonant of the root vocalizes, so that a full vowel occupies the syllable nucleus rather than schwa.

[20] This predicate [k̇ʷíšt] is also used to mean 'confess your sins' (SP 27/08/96: 361).

5.1.1 Control transitivizer with "exceptional" Weak Roots (CC)

The following examples provide crucial evidence that the shape of the control transitivizer cannot be determined by root-shape alone. Previous descriptive generalizations state that weak roots of the form CəC take -t as the shape of the control transitivizer. In this section, I argue that root shape is not what is crucial here but rather whether or not the resulting surface form leaves schwa in a stressed open syllable or not. It is the constraint *Cə́ drives deletion of the vowel associated with the control transitivizer /-at/.

Notice that the forms in (50) below involve CR' roots where C_2 is a glottalized resonant. Since *Cə́ and *R'/onset drive the restructuring of the glottalized resonant as argued in §4.1 above. Since the constraint which bans schwa in a stressed open syllable (*Cə́) is satisfied by the glottal in the coda of the stressed syllable, there is no need to delete the vowel associated with the transitivizer as well. Within a grammar of surface constraints, constraint violation is minimal. The vowel /a/ of the transitivizer undergoes reduction as described above in order to further enhance the prominence of the stressed syllable.

(50)

Input	Output	*v-deletion	Gloss	Source
šṁ-at	[šɛ́ʔᵊmʌtʰ]	*[šəʔ. mtʰ]	*dry it*	MH/SP 30/08/97: 9
tġ-at	[táʔgʌt]	*[təʔ.gt]	*freeze s.t.*	AM 1997
χẇ-at-θut	[χʷáʔwaθòt]	*[χʷəʔ.waθotʰ]	*build a fire*	SP 30/08/97: 111

The effects of the constraints are summarized in (51)

(51) /šṁ-at/

	input	Constraint
šə́ṁ-at	syllabification: ə epenthesis	Proper Headedness
šə́ʔ . mat	glottal restructuring	satisfies *Cə
šɛ́ʔ . mat	schwa colouration	C-V feature sharing
šɛ́ʔ. mʌt	vowel reduction	reduce weight of non-head

5.1.2 Implications

The final t of the control transitivizer deletes when it is followed by a coronal affricate ([-continuant]) such as [č, t̓ᶿ], as shown by the data in (52). The constraint *COR COR bans coronal [-continuants] between an affix and a following subject clitic (including fused subject/future forms like t̓ᶿəm).

(52) **t-deletion**

Input	Output	*COR-COR	Gloss	Source
č̓at-at	[č̓ɛ́tʌt]	(root-affix)	*cut it up*	MG 03/06/98: 23
č̓at-at čx^w	[č̓ɛ́tʌčx^w]	*č̓ɛ́tʌt čx^w	*you cut it up*	MG 03/06/98: 24.a
č̓at-at t^θm	[č̓ɛ́tʌt^θəm]	*č̓ɛ́tʌt t^θəm	*I will cut it up*	MG 03/06/98
č̓at-at-ˈuɬ č	[č̓ɛ́tʌtoˑɬč]	(root-affix)	*I already cut it up*	MG 03/06/98: 26.a
č̓at-at č	[č̓ɛ́tʌč]	*č̓ɛ́tʌt č	*I cut it up*	MG 03/06/98: 25
ɬq̓^w-aθut	[ɬóq̓^wθot]	*ɬə́q̓^wtθot	*feather-self*	AM 28/06/97: 72
šq-aθut	[šə́qθot]	*šə́qtθot	*sigh*	Cedar-to-CDROM
šq̓-aθut [21]	[šʌ́q̓θot^h]	*šə́q̓tθot	*legs spread out*	Cedar-to-CDROM
ɬp-aθut	[ɬʌ́p^hθot]	*ɬə́ptθot	*snub s.o.*	MG/MH29/08/97: 99

There are cases in which the final t of the transitive suffix is subject to deletion, and the vowel /-a/ of the transitivizer is also constrained to delete due to *Cə́. This results in forms which have no surface realization for the control transitive morpheme /-at/, as shown by the data in the (x') examples in (53). The examples in (53.a-53.c) show that these roots take the control transtivizer /-at/.

(53)

	Input	Output	Gloss	Source
a.	gq̓^w-at-as	[góq̓^wtəs]	*he dragged it*	EH 06/05/99:16
a'.	gq̓^w-at čan	[góq̓^wčɩn]	*I dragged it*	EH 06/05/99: 17
b.	IMP-sl-m [22]	[sə́səl̲ə̲m]	*turning*	MG 1988: 474
b'.	sl-at čx^w	[sə́lčx^w]	*you spin it*	MG 1988: 473
c.	tq-at	[tə́qt ~ tʌ́qt]	*close it*	EH 21/01/99: 1
c'.	tq-at čan sm	[tə́qčɩn səm]	*I'll close it*	EH 01/04/99: 14

Notice that the gloss for the (x') examples clearly indicates that these forms are semantically transitive. The sentence in (54) provides syntactic support for this position since the direct object can be expressed by an overt Noun Phrase (NP), [tə ʔɛ́mɩn] 'the door'.

[21] This predicate means 'legs spread out in an unbecoming manner'. It could also be used in a more modern context to refer to a number of different stretching positions in an aerobics class, for example. The meaning is determined by the context in which it is used.

[22] This root indicates a circular motion, as you would turn a glass, or the continual rotation of a Ferriswheel, for example. The root /sl/ is underlined to indicated that it is an inherently retracted root (or a root with an underlying PHAR feature which targets vowels and coronal consonants). cf Remnant (1990), Bessel (1992) for a similar analysis for Lillooet (Salish).

(54)

tq-at	čan	sm	tə	ʔimin
close-CTr	1sgSu	Fut	det	door

[tə́qčɩn səm tə ʔɛ́mɩn]

'I'll close the door' (EH 01/04/99: 14)

If the verb were intransitive, then one would expect an oblique NP headed by the preposition ʔə, as in (54'), however, this is not the observed surface form.

(54')

*tq-at	čan	sm	ʔə	tə	ʔimin
close-CTr	1sgSu	Fut	Obl	det	door

*[tə́qčɩn səm ʔə tə ʔɛ́mɩn]

'I'll close the door' (EH 01/04/99: 14)

5.2 Lack of s-Nominalizer and C-Prefixes in Sliammon

One of the striking properties of Sliammon is the absence of the lexical nominalizing prefix s- which is found in all of the other Salish languages (cf. Davis 1970:15). Compare the Sliammon (Sl) and Sechelt (Se) forms in (55) which show the absence of this widespread prefix in Sliammon. Sechelt data from Beaumont (1985), abbreviated RCB.

(55)

a.	[núx^wɩɬ]		'dugout canoe'	(Sl/MG 26/07/88: 62)
a'.	[snə́x^wíɬ]	<snéxwílh>	'canoe'	(Se/RCB 1985:24)
b.	[q̓^wéy̓^əχ]		'wood'	(Sl/MG 22/10/88:198)
b.	[q̓^wʌ́y̓χ]		'firewood'	(Sl/MG 23/05/98: 32)
b'.	[sq̓^wʌ́yɩχ]	<skw'éyex>	'firewood'	(Se/RCB 1985:143)
c.	[χ^wʌ́s]		'animal fat, lard'	(Sl/MG23/10/88: 332)
c.	[χ^wʌ́s]		'animal fat, lard'	(Sl/AM 27/06/97: 4)
c'.	[sχ^wʌ́s]	<sxwes>	'grease'	(Se/RCB 1985:276)
d.	[túmɩš]		'man'	(Sl/MG 22/10/88:141)
d'.	[stómɩš]	<stúmish>	'man'	(Se/RCB 1985:24)

Sliammon also lacks non-reduplicative consonantal prefixes (C-) often found in other Salish languages.

In this paper it is argued that the lack of non-reduplicative prefixes in general follows from (i) the constraint on stressed schwas in open syllables (*Cə́), and (ii) from the undominated constraint which requires that the left-edge of the PrWd is aligned with the left-edge of the lexical stem. Reduplicative prefixes in the language are within the domain of stem-formation, as well as within the domain of the prosodic word since they receive primary stress in word-initial position. Consider what would happen if a non-reduplicative prefix were posited in the input form.

(56)	/s-CVCV/	*[sə́ . CvCv] ə-epenthesis	*Cə́
	/s-CVCV/	*[sCv́Cv]	*Complex onset
	/s-CVCV/	*[sCvCv́]	*Foot Form: trochaic
	/s-CVCV/	[Cv́Cv]	*Affix faith

It is argued here that if a C- prefix were posited in the input that the surface constraint in the grammar would militate against surface realization of that prefix at the cost of underparsing the features associated with /C- /.

6.0 Conclusions

This is a paper which presents work in progress on the representation and distribution of schwa in Sliammon. Schwa is claimed to be (i) Nuclear and (ii) non-moraic. Initial findings regarding the distribution of epenthetic schwa show that schwa tends to be epenthesized at the left-edge of the word for purposes of stress assignment. Schwa is not epenthesized into word-final clusters which exceed limitations on syllabification. Instead a CC-cluster is parsed as a Minor syllable. These findings explain the asymmetry between the beginnings of words in Sliammon which generally allow a single pre-vocalic consonant (as onset), and the ends of words in which there are as many as three post-vocalic consonants. (cf. Blake 1992: 57) The final CC often constitutes a minor syllable (onset and syllabic obstruent).

It was also shown that there are constraints in Sliammon which prevent schwa from occurring in a stressed open syllable. This constraint *(Cə́) is shown to have implications not only for the phonology but also for the morpho-syntactic structure of the language.

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