Towards an Analysis of Syllable Structure in Nxaʔamxcín[1]

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Introduction

Salish languages are well known for having long and complex consonant clusters. Consequently the languages have for many years been of interest to those studying universal properties of syllable structure. Some of the earliest work on Salish syllables focussed on Nuxalk (Bella Coola) and ranged from an account which assumed that the language has no syllable structure (Newman 1947) to one which assumed that all segments are potentially syllabic (Hoard 1978). More recently, Bagemihl (1991) has proposed that although Nuxalk has lengthy consonant clusters, it nevertheless has simple syllables: in particular he argued for a maximal CRVVC syllable template in Nuxalk. His arguments are taken primarily from reduplication facts in Nuxalk and are couched within the framework of Prosodic Morphology, which assumes that nonconcatenative morphology acts on and creates prosodic units (see McCarthy and Prince 1986). Bagemihl's work sparked further investigations into the syllable structure of other Salish languages, such as Bates and Carlson's (1992, to appear) analysis of Npoqínišcn (Spokane) and Jimmie's (1994) work on Nɬeʔképmx (Thompson). These works argue for maximal CVC syllables in both languages. Matthewson's (1994) recent analysis of Sƛ̓áƛ̓imcets (Lillooet) within an Optimality framework (McCarthy and Prince 1993, Prince and Smolensky 1993) argues for a CCVCC trimoraic maximal syllable in Lillooet (C_1, $C_2 \neq R$) based on epenthesis facts.

Like Nuxalk, Nxaʔamxcín (Moses-Columbia Salish) permits lengthy consonant clusters word-initially, medially and finally, as seen in examples like snkɬxʷpáw̓stən 'clothesline', tk̓əmə̣lq̣stxən 'shin' and scílksq̓t 'Friday'. Like the other languages as well, it also has simple syllables. In this paper we argue that the maximal syllable of Nxaʔamxcín is of the form CVC, a bimoraic closed syllable. Our arguments for a CVC syllable are based on reduplication facts, morphology and the behaviour of schwa. For those segments that do not constitute part of a CVC syllable (i.e. stray consonants), we argue that their prosodic licensing is determined by consonantal classification. We claim that unsyllabified resonants must be syllabified and therefore induce epenthesis. We show that glottal stop patterns with the resonants

[1] This work could not have been done without the teachings of the many speakers who have worked with M. D. Kinkade, and of course our own teachers Agatha Bart, Elizabeth Davis and Mary Marchand. We are grateful to M. D. Kinkade for discussion and for allowing us access to his Nxaʔamxcín files. This research has been supported by the Social Sciences and Humanities Research Council of Canada (Research Grant #410-92-1587 to Czaykowska-Higgins and a Doctoral Fellowship to Willett) and the Jacobs Research Funds (Grant to Czaykowska-Higgins).

with respect to syllabification and should, therefore, be considered a resonant. Following Bagemihl (1991), we argue that unsyllabified stops are prosodically licensed by a mora node. (The status of fricatives is still unclear). Finally, we argue that Nxaʔamxcín has two types of inserted vowels: schwa is epenthetic and obligatory in those environments in which it is required to prosodically license unsyllabified resonants and to bear stress; it is excrescent and optional in all other positions, serving as a release for obstruents, and as a transitional element between syllables.

The paper is organized as follows. Since schwas play such an important role in the grammar of syllable structure we begin in section 1.0 by briefly laying out the difference between schwa and other vowels and distinguishing between epenthesis and excrescence. Section 2.0 provides the principal arguments for the CVC bimoraic syllable. Section 3.0 discusses unsyllabified consonants, arguing for epenthesis before resonants, and moraic licensing of stops. Section 4.0 discusses excrescent schwas in more detail. And section 5.0 suggests that syllabification takes place on the root domain before it accesses any affixes.

1.0 Schwa Versus Full Vowels

Nxaʔamxcín has the following underlying vowel inventory:

(1)
i u
a

The vowels in (1) are termed "full vowels" and they are unpredictable with respect to quality and position. In addition to these 3 vowels, Nxaʔamxcín has a fourth vowel that appears in surface forms, and that we shall call "schwa." Schwa is distinguished from full vowels in two ways: first, its vowel quality is entirely predictable from its environment. In fact schwa adopts its place of articulation from a following or (more rarely) a preceding consonant. The variable quality of schwa is outlined in (2):

(2)				
	i/_y(')	ʊ/_Cʷ, labial	a,æ/_pharyngeal	ə/elsewhere
	u/_w(')	ə^/_velar	a/_ʔ, h	
	ɨ/_alveolar, labial		aˇ/_uvular	

(Czaykowska-Higgins 1993a:219)

Second, unlike full vowels, the position in which schwa appears is completely predictable (see below). Given this predictability of quality and position we assume that schwa is not present in underlying representation in Nxaʔamxcín (see Czaykowska-Higgins 1993a).

The position in which schwa appears depends on a number of factors. It is important to note initially that there are actually four sources of schwa in Nxaʔamxcín (see Kinkade to appear).[2] The first source of schwa is epenthesis, the second is excrescence, the third is nasal to vowel shifts, and the fourth is vowel reduction. In this paper we are concerned with epenthetic and excrescent schwas, since only these are especially relevant to an understanding of syllable structure. We do briefly describe nasal to vowel shifts, and vowel reduction at the end of this section for the sake of completeness.

Both epenthetic and excrescent schwas are inserted by rule. The difference between them is not immediately obvious from examining transcriptions since both types of inserted vowel have been transcribed by researchers on Nxaʔamxcín in one of two ways: as small raised svarabakhti vowels (e.g. kł̓óčᵊčp 'junk/small things lodged or hung up along the shore'), or as "full" schwas (e.g. kł̓óčə̲čsq̓t 'an outline or silhouette seen on the skyline'). It is only by examining the distribution of all types of schwas, and by taking independently established properties of Nxaʔamxcín syllable structure into consideration that one is able to distinguish between the two types. Broadly speaking, epenthetic vowels are obligatorily inserted to license unsyllabified resonants or to bear stress, while excrescent vowels are optionally inserted between syllables and between unsyllabified obstruents to serve as transitional elements.

The two positions in which epenthetic schwa surfaces are as follows: (i) between C_1 and C_2 of a vowelless root that has been assigned surface stress, as in (3a); (ii) in the environment of an unsyllabified resonant, as in (3b):[3]

(3) a. **łə̲́px̣ʷ**
√łpx̣ʷ
burn, scorch

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[2]Most of the examples in this paper are taken from the earlier files of M.D. Kinkade. In these early files Kinkade transcribed most forms in broad phonetic notation. The later files are for the most part in phonemic notation and since we have not yet been able to check the pronunciation of forms from the later files we have tried to confine ourselves to forms where we are sure of the phonetic transcription.

[3]The abbreviations in this paper are as follows: AUG = augmentative, AUT = autonomous, C = causative, CHAR = characteristic, CONT = continuative, CTR = control, DIM = diminutive, IMP = imperfective, INCH = inchoative, IND = indirective, INSTR = instrument, LOC = locative, MID = middle, NA = nominalizing affix, NOM = nominalizer, O = object, OC = out-of-control, RECIP = reciprocal, REFL = reflexive, REP = repetitive, s = singular, S = subject, STAT = stative, TO = topical object, TR = transitive, UNR = unrealized.

b. **máłə̲m**
√mał-m
rest-MID
rest

In both cases these schwas are inserted for prosodic reasons and are therefore present in the phonology. Schwas surfacing outside of these environments are not epenthetic.

Excrescent schwas surface at the phonetic level only, are not affected by any phonological processes in the language and are optional (Levin 1987). Thus while epenthetic schwa is prosodically licensed, we claim the same is not true of excrescent schwa in Nxaʔamxcín.

The two sources of schwas that will not be further discussed in this paper are vowel reduction and nasal to vowel shifts. In vowel reduction full vowels are reduced to schwa in unstressed positions (sometimes unstressed vowels may be entirely deleted). This is illustrated in the following example where the unstressed root kʷan is reduced to kʷən.

(4) **kʷə̲nksntwáxʷ**
√kʷan=akst-n-t-waxʷ
grab=hand-CTR-TR-RECIP
get married

Schwas that surface as a result of vowel reduction should be considered full vowels underlyingly.[4]

A fourth source of schwa is the nasal to vowel shift. This form of schwa results when a vowel is deleted and an adjacent nasal surfaces as schwa. Such a process occurs with the suffixes -mix 'imperfective' and -mix 'person, people' when these do not bear surface stress, as in (5) and (6):

(5) a. **sacməxʷtmíx**
sac-√mxʷ-t-mix
CONT-laugh-STAT-IMP
he's laughing

---

[4]There are two possible analyses of vowel reduction. The first assumes that reduced vowels result from debuccalization (deletion) of the place features of the vowel with subsequent realization of schwa, or deletion of the vowel position. The second assumes that both the vowel position and features are deleted and that epenthesis may or may not occur subsequently, depending on properties of the resulting consonant cluster. We do not decide between these analyses here. Both analyses are compatible with our general claims.

b. kaswəlq̓ʷátkʷə̲xʷ
ka-s-√wlq̓ʷ=atkʷ-mix
UNR-CONT-swallow=water-IMP
he's going to drink

(6) a. sq̓iy̓míx
s-√q̓iy̓=mix
NOM-write=person
school children

b. sḥáptnə̲xʷ
sḥaptn=mix
Nez Perce=person
Nez Perce Indians

As the (a) examples illustrate, when the suffixes are stressed the -mix form surfaces. However, when unstressed the vowel is deleted, the place of articulation of the nasal is transferred to the following consonant, and a schwa surfaces in the position of the nasal. This nasal to schwa shift is morphologically restricted in Nxaʔamxcín (see Kinkade 1991, to appear).

We turn now to arguments for the basic syllable. Epenthesis and excrescence are exemplified more fully in subsequent sections.

2.0 The Maximal Syllable

In this section we argue that the maximal syllable in Nxaʔamxcín is CVC in form. The arguments that we put forward suggest that neither complex onsets nor complex codas are permitted in the language. In addition we provide some preliminary evidence that this maximal syllable is bimoraic.

2.1 No Complex Onsets

Evidence that complex onsets do not exist in Nxaʔamxcín comes from six different sources. The first is the position of schwa in CCC roots that have been assigned surface stress. When epenthesis takes place for stress-related reasons, schwa always surfaces between C_1 and C_2 of the root. Some examples are given in (7):

(7) a. pə̲́ck
√pck
dull

b. tə̲́mxʷ
√tmxʷ
worn, ragged

Given Onset Maximization (Itô 1989), when an epenthetic vowel is inserted into a vowelless root it should allow for the maximal onset allowed by the language. If complex onsets were permitted we would expect schwa to be inserted between C_2 and C_3, maximizing C_1 and C_2 as the onset with the resulting forms *pcək and * tməxʷ. Note that neither type of onset violates the sonority hierarchy and, therefore, could not be ruled out for sonority reasons. Since these forms do not surface, one can conclude that complex onsets are not permitted.

The second piece of evidence for a simple syllable hypothesis comes from characteristic reduplication. These forms are discussed in more detail in Czaykowska-Higgins (1993b) who states that they mark a "general characterizing quality". The reduplicative template is CVC in form and copies the first full syllable of a root. This is shown for the following CVCCVC root (the characteristic morpheme is underlined):

(8) sƚámƚ̲a̲m̲kaʔ
s-√ƚamkʔ+ƚam
NOM-daughter-CHAR
daughters

Given that stress is never assigned to prefixes in Nxaʔamxcín, the characteristic morpheme is clearly suffixal. As shown in (8), the first full syllable ƚam is copied. This syllable also serves as the affixation base for the characteristic suffix (otherwise forms such as * ƚámkaʔƚ̲a̲m̲ would surface).

If complex onsets were permissible in Nxaʔamxcín, then CCVC would be the first full syllable of the root and we would expect a CCVC root to reduplicate as a CCVC suffix, resulting in a CCVC+CCVC form. This is not the case however as example (9) illustrates (note that the vowel a is excrescent):

(9) q̓ax̣íl̲x̣̲i̲l̲
√q̓x̣il+x̣il
two+CHAR
2 people

What is copied is not the full root, but rather the first (in this case the only) full syllable. This is schematized in figure 1.

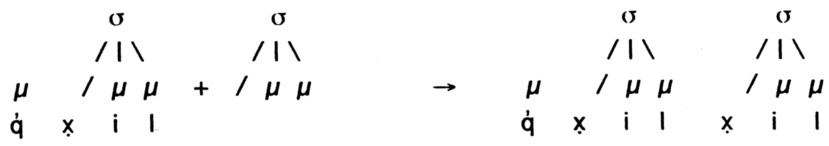

figure 1

Figure 1 illustrates that the characteristic suffix surfaces as x̣il. Since q̇ is not part of the reduplicative suffix, we assume it is not included in the full syllable and therefore does not form a complex onset with x̣. (The prosodic licensing of q̇ is addressed in section 3.2.)

The third source of evidence supporting a simple onset hypothesis involves C_2-reduplication forms. Kinkade (1982) describes C_2-reduplication as a productive process that reduplicates the second consonant of a root. Thus, $C_1VC_2(C_3)$ roots surface as $C_1VC_2C_2(C_3)$, and $C_1C_2VC_3$ roots surface as $C_1C_2C_2VC_3$. This is illustrated in (10):

(10) a. ʔackʷóss
ʔac-√kʷus+s
STAT-wrinkle+OC
wrinkled face (insult)

b. q̇áli̇xʷ
√q̇alxʷ+i̇
hang down+OC
something hanging

c. ċq̇ʷq̇ʷúnl̇əxʷ
√ċq̇ʷun+q̇ʷ=ul̇əxʷ
name+OC=land
land gets named

d. pttíx̣ʷəxʷ
√ptix̣ʷ+t-mix
spit+OC-IMP
spitting a lot.

Czaykowska-Higgins (1992) analyzes these forms as having an empty mora inserted after the initial mora of the root. We assume that the features of the right adjacent consonant are subsequently spread to fill the empty position. This is demonstrated in figure 2 for (10a).

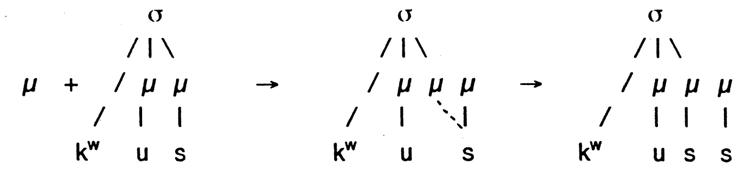

figure 2

If complex onsets were permitted, then the first mora of the root would be the vowel (see figure 3), and the second mora would be C_3 in (10c) and (d). One would therefore expect the out-of-control morpheme to be inserted after the vowel, and not before, resulting in the incorrect forms * ċq̇ʷúnnl̇əxʷ and * ptíx̣ʷx̣ʷəxʷ. (The prosodic status of the first consonant in (c) and (d) is discussed in section 3.2.)

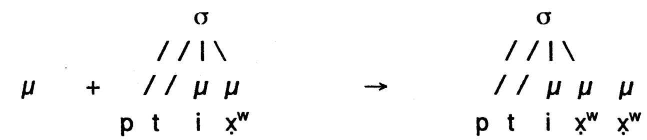

figure 3

The inchoative morpheme -ʔ-, which is also inserted after the initial mora of a root, provides a fourth argument for simple onsets[5]. Some inchoative examples are given in (11) (taken from Kinkade 1989):

(11) a. cíx
lukewarm

naċíʔx
na-√cix-ʔ
LOC-heat-INCH
water gets warm

[5]There are actually two inchoative allomorphs. The glottal stop surfaces with full vowel roots, while the suffix -p surfaces with roots that have no underlying vowel. A similar pattern is found in other Interior languages as well (Carlson 1993, Kuipers 1974, Thompson and Thompson 1992 and van Eijk 1985, 1987.)

b. ṗíq
ripe, bake, roast

ṗíʔq
√ṗiq-ʔ
ripe-INCH
it's ripe, it's cooked

c. c̓q̓ʷún-m
√c̓q̓ʷun-m
name-MID
say, pronounce, name

c̓aʔq̓ʷúṅm
√c̓q̓ʷun-ʔ-m
name-INCH-MID
read

(11a) and (b) illustrate that the affix surfaces after the vowel in a CVC root, while (11c) shows that in CCV(C) roots it appears after the initial consonant. (We discuss the appearance of the epenthetic vowel a in this example in section 3.1.3). As is the case in C_2-reduplication, it is clear that the first consonant of the CCV root in (11c) cannot constitute part of the onset otherwise we would expect the form * c̓q̓ʷúʔṅm to surface. Thus it appears that c̓ counts as the initial mora of the root and, therefore, does not form a complex onset with q̓ʷ. (We elaborate on this analysis in section 3.2.)

The repetitive construction provides a fifth type of evidence for simple syllables. Following Bates and Carlson's (1992, to appear) analysis of Spokane repetitive forms, we assume that the repetitive affix in Nxaʔamxcín is that given in figure 4:

```
σ
|
μ
|
a
```

figure 4

Two patterns emerge with the repetitive affix. First, with CVC roots we find $C_1aC_1VC_2$ forms (12a-c), and with CCVC roots we find $C_1aC_2VC_3$ forms (12d):

(12) a. ṁaṁíẏəm
ṁa-√ṁẏ-m
REP-write-MID
give news

b. statə́x̣ʷx̣ʷ
s-ta-√tx̣ʷ+x̣ʷ
NOM-REP-stop+OC
convulsions

c. sẇaẇəlq̓əm
s-ẇa-√ẇlq̓-m
NOM-REP-swallow-MID
pills

d. snpatíx̣ʷmn
s-n-a-√ptix̣ʷ=min
NOM-LOC-REP-spit=INSTR
spittoon

We view the (12a-d) forms as involving the prefixation of the repetitive morpheme to the first syllable of the root. In the (12a-c) CVC root forms, we claim (following Bates and Carlson) that there is spreading of the initial consonant of the root in order to provide a required onset for the repetitive morpheme. This is illustrated in figure 5 for (12a):

```
σ       σ              σ     σ              σ     σ
|      /|\            /|    /|\            /|    /|\
μ  + / μ μ     →     ( μ   / μ μ     →    / μ   / μ μ
a    ṁ  i ẏ           \a  ṁ  i ẏ          ṁ  a  ṁ  i ẏ
```

figure 5

If the initial C of a CCVC root constitutes part of an onset, we would expect the form * paptíx̣ʷ in (12d). If we assume that the first consonant in (12d) is not part of the onset, and that the repetitive morpheme prefixes onto the first syllable of a root (as in figure 6), then we can readily account for the form in (12d).

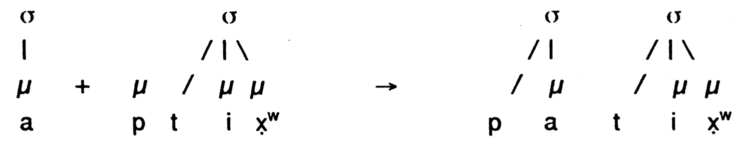

figure 6

(We address the issue of the prosodic licensing of p in ptíx̣ʷ in section 3.2.)

Finally, the sixth source of evidence supporting a simple onset analysis is the appearance of schwas in CCVC, CRVC, RCVC and RRVC roots. In all of these cases, an excrescent (a,b) or epenthetic (c,d) schwa can surface after the first consonant resulting in CəCVC, CəRVC, RəCVC and RəRVC forms, as shown in (13):

(13) a. pə́tíx̣ʷ
√ptix̣ʷ
spit

b. ṫuwáẏt
√ṫwáẏt
cry hard

c. yək̓ám̓
√yk̓am
we agree

d. mənák RəR
√mnak
excrement

While there is variation as to how often schwa appears in this position, it can always optionally surface between C_1 and C_2 suggesting that C_1 is not syllabified and, therefore, is not part of the onset of the syllable.

2.2 No Complex Codas

The evidence against complex codas is not as strong as that given against complex onsets. Nonetheless, two sets of facts suggest that complex codas are not permissible in the language. The first set involves characteristic reduplication forms. We saw in section 2.1 that characteristic reduplication copies the first full syllable of a root. If complex codas were permitted in Nxaʔamxcín, then the characteristic forms of CVCC roots should copy the whole CVCC form. Some examples of CVCC roots are given in (14):

(14) a. péčpečxʷt
√picxʷ+pic-t
disgust+CHAR-STAT
disgusting

b. ʔiɬʔiɬnúl
√ʔiɬn+ʔiɬ-ul
eat+CHAR-NA
he wants to eat all the time

c. kálᵊkalᵊx
√kalx+kal
hand+CHAR
hands

d. tk̓ʷénk̓ʷenx
t-√k̓ʷinx+k̓ʷin
LOC-how many+CHAR
how many people

The CVCC roots in (14) show that the characteristic template does not copy the whole root but rather C_1VC_2. Each of the CVCC, CVCR and CVRC forms in (14) copy only the first three segments. If the final CC, CR, and RC clusters formed complex codas and were therefore part of the first full syllable of the root, then one might expect both consonants to be copied as part of the characteristic reduplication. Given that they are not both copied, we can assume that only the first consonant of the cluster is syllabified as a coda. This assumption is further justified by the fact that the final C of the CVCC root is not part of the targetted base for affixation. We can conclude from this that this final C does not form a constituent with the rest of the root.

A second argument for simple codas comes from schwa's appearance in VCC, VRC, VCR and VRR sequences. Some examples are given in (15):

(15) VCC a. kɬwákʷukʷ
kɬ-√wakʷ+kʷ
LOC-hide+OC
he went out of sight

VRC b. c̓ələx̣əncás
√c̓lx̣-n-t-sa-s
scratch-CTR-TR-1sCO-3S
he is scratching me

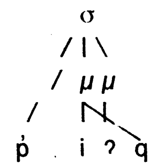

figure 9

A segmental analysis (e.g. insert morpheme after second segment from left edge) may account for the inchoative pattern in CVC roots such as **ṗiq**, but does not explain why CCV(C) roots such as **ċq̓ʷun** (**ċq̓ʷúnm** 'say, pronounce, name') surface as **ċaʔq̓ʷun** rather than **ċq̓ʷʔun**.

A prosodic analysis in which the inchoative is inserted after the initial mora of the root accounts for all forms without further stipulation if one considers CVC syllables to be bimoraic (figure 8). Thus, the inchoative morpheme will follow the vowel in a CVC root like **ṗiʔq**. (CCVC roots are discussed in section 3.2).

3.0 Stray Consonants

We have argued that the maximal syllable in Nxaʔamxcín is CVC. However, it was noted in the introduction that Nxaʔamxcín tolerates lengthy consonant clusters. If it is correct that CVC is the maximal syllable, then how are the consonants that do not form part of a CVC syllable prosodically licensed? We claim that resonants (m, m̓, n, n̓, r, r̓, y, ẏ, l, l̓, ḷ, ḷ̓, w, ẇ, ʕ, ʕ̓, ʕʷ, ʕ̓ʷ, ʔ) must be syllabified and are therefore licensed by epenthesis, whereas obstruents (stops) (p, ṗ, t, t̓, c, ċ, c̣, ƛ̓, k, k̓, kʷ, k̓ʷ, q, q̓, qʷ, q̓ʷ) are not syllabified and therefore must be moraically licensed. The status of fricatives remains to be examined.

3.1 Epenthesis

Unsyllabified resonants obligatorily induce epenthesis in order to be syllabified. Nxaʔamxcín epenthesis involves the insertion of a nucleus, which we represent here as a mora node, to the left of an unsyllabified resonant (or to the right of the resonant if an onset is required (see section 3.1.4)). Once the nucleus is inserted, one of two possibilities result. First, schwa is inserted to fill the nucleus node and the resonant is subsequently syllabified as a coda. This is schematized is figure 10.

VCR	c.	**sċċə́k̓əl̓**	
		s-ċ+√čk̓l̓	
		NOM-DIM+cone	
		cone	
VRR	d.	**stəm̓tám̓əl̓**	
		s-təm+√tam̓l̓	
		NOM-AUG+grizzly bear	
		grizzly bear	

In all of these cases schwa can either optionally (15a-b) or obligatorily (15c-d) surface between the two consonants following the root vowel. If these formed a complex coda, then neither epenthetic nor excrescent schwa should surface between the two as both would be contained within a syllable constituent. Given that schwa insertion is possible, one can conclude that complex codas are prohibited.

2.3 Bimoraicity

There is some evidence that CVC syllables in Nxaʔamxcín are bimoraic. This evidence comes from the inchoative forms discussed in section 2.1. Consider example (11b): **ṗí-ʔ-q** 'it's ripe, it's cooked'. If Nxaʔamxcín maximal syllables were monomoraic, and it is assumed that monomoraic syllables take the shape illustrated in figure 7, then it would appear that the inchoative morpheme -ʔ- would be inserted between two segments dominated by the same mora.

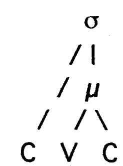

figure 7

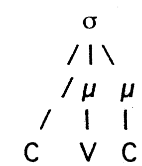

figure 8

Given the monomoraic structure in figure 7, it would be impossible to account for the positioning of the inchoative marker in **ṗí-ʔ-q** in prosodic terms. The morpheme would not proceed or follow a prosodic constituent, but rather would have to be inserted into a prosodic constituent, as illustrated in figure 9.

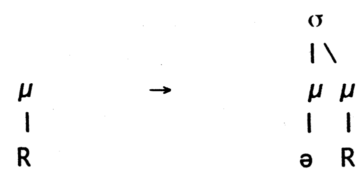

figure 10

A second possibility is for the resonant to spread onto the nucleus and surface as syllabic. This is illustrated in figure 11. Note that we assume that the resonant is delinked from the second mora in most cases. See section 3.1.2 for evidence for this assumption.

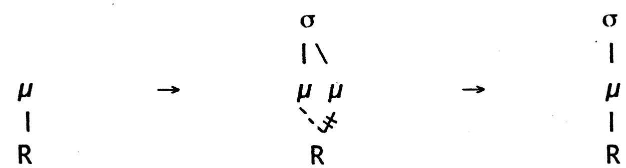

figure 11

The different resonants exhibit different patterns with respect to epenthesis and we discuss each of these in turn.

3.1.1 Nasals, Liquids and Pharyngeal Resonants

When a nasal, liquid or pharyngeal resonant (N) is not syllabified as part of a CVC syllable, one of two things takes place. First, schwa is inserted before the N and the resonant becomes a coda (figure 10). This is exemplified in (16):

(16) a. **skm̓ə́qʷə̲l̓**
s-k-√mqʷl̓
NOM-LOC-fishtrap
fishtrap

b. **ɬ̓ipə̲ncút**
ɬ̓ip-n-cut
jump-CTR-REFL
jump, hop

A second possible option is that the resonant itself becomes syllabic (figure 11). Some examples are given in (17):

(17) a. yə́r'r̩'
√yər'+r'
tangled+OC
tangled up

b. sx̣ʷə́ʕʷx̣ʷʕ̩ʷ
s-√x̣ʷʕʷ+x̣ʷʕʷ
NOM-fox+CHAR
fox

c. c̓əl̓ᵊxʷálpsn̩tm̩
√c̓l̓xʷ=alps-n-t-m
frame=back part of the neck-CTR-TR-MID
he grabbed it by the neck

d. n̩m̩̓m̓ə̣l̓
n-m̓-√m̓l̓
LOC-DIM-warm
lukewarm (of liquid)

Given that all unsyllabified resonants are subject to one of the above patterns, we assume that the language requires all nasals, liquids and pharyngeal resonants to be associated with a syllable node.

3.1.2 Glides

The glides pattern with the nasals, liquids and pharyngeal resonants in that they either induce epenthesis of schwa followed by spreading of the glide's features onto the vowel position giving the effect of glottalization, or themselves become syllabic.[6] As is the case with unsyllabified N's, schwa is epenthesized to the left of the glide which may subsequently be syllabified as a coda (figure 10). Some examples are given in (18):

(18) a. ḥáw̓i̲y
√ḥaw̓y
make, do

[6]We actually only have data with the glides **w** and **w̓** surfacing as syllabic. We have found no cases of syllabic y or ẏ and it is not clear if this is an accidental or a systematic gap.

b. **hapiẏəwíləm**
√hapẏ=wil-m
unload=container-MID
unload a canoe

In a number of cases, the place of articulation of the glide is transferred to the epenthetic schwa and the glide is usually deleted. Evidence that the second mora is deleted comes from the fact that such cases never surface as long vowels. This process is illustrated in figure 12. (Note that if the glide is glottalized ẏ or ẇ, the glottal feature remains on the second mora after delinking of the glide.)

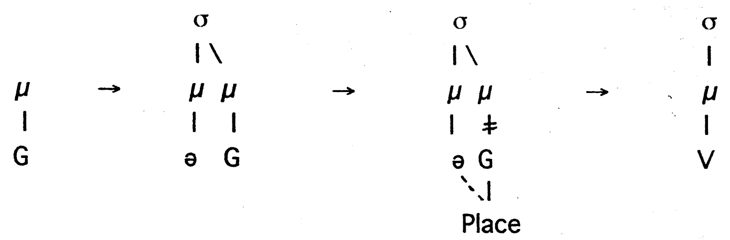

figure 11

Some examples of this are given in (19):

(19) a. **schá̓ẇi**
sc-√ḥaẇy
CONT-make
make, do

b. **nap̓ə́x̣ʷi?**
na-√p̓x̣ʷẏ
LOC-cough
choke, cough up

c. **tawxítus**
√taw-xit-wa-s
buy-IND-TO-3S
she bought it for him/her

d. **tá?o?o**
√taẇ-?
rain-INCH
rain

Examples (19b) and (d) show that when a glottalized glide spreads its place features onto the epenthetic vowel and is delinked from the second mora, the glottal feature surfaces as glottal stop.

In (19c) the glide **w** is left unsyllabified as a result of the deletion of the vowel a in the suffix **wa**. Schwa is then inserted to the left of the glide adopting its place of articulation, and the glide is subsequently deleted. In (19d), once the inchoative affix is inserted after the root vowel, the glide **ẇ** is no longer in coda position and is, therefore, unsyllabified. Thus, schwa is epenthesized, adopts its place of articulation from the following glide, and the glide is subsequently deleted leaving behind the glottal feature.

It is also possible for the glide itself to become syllabic when a syllable nucleus is epenthesized (figure 11). This is shown in the following examples:

(20) a. **wwáwələx**
w+√waw-ilx
DIM+talk-AUT
speak, talk

b. **ẇẇéɬoẇeɬ**[7]
ẇ+√ẇiɬ+ẇiɬ
DIM+√sandpiper+CHAR
sandpiper

In both of these cases the C_1-reduplicative prefix is in an unsyllabified position, and the glide surfaces as syllabic in order to be prosodically licensed.

3.1.3 Glottal Stop

Glottal stop patterns with the resonants in Nxa?amxcín in that it never surfaces as unsyllabified. Instead, like the nasals, liquids, pharyngeal resonants and the glides it always induces epenthesis to its left. Unlike the other resonants, however, epenthesis always results in a surface V and never in a "syllabic" glottal. This is shown in the following examples:

(21) a. **mə́lx̣a?**
√mlx̣?
tell a lie

---

[7] The syllabic diacritic in this example was not recorded in the original transcription.

b. ana?
=an?
ear

c. ċa?q̓ʷúńm
√ċq̓ʷun-?-m
read-INCH-MID
read

d. sna?a?q̓míx
s-√nq̓-?+?-mix
CONT-rot-INCH+OC-IMP
it's rotting

The vowel that is consistently epenthesized before a glottal stop is the low vowel a. This may be a schwa that has been lowered by the adjacent glottal. However there is evidence suggesting that glottal stop is placeless in Nxa?amxcín (see Bessell and Czaykowska-Higgins 1993), and if that is the case then it is difficult to explain the coarticulatory effects that a placeless segment has on a placeless vowel. Thus, it is possible that the epenthetic vowel in these cases may not be the underspecified vowel schwa but rather the unmarked full vowel, namely a.

3.1.4 Word-Initial Resonants

At the beginning of section 3.1 we stated that epenthetic schwa is inserted to the left of unsyllabified resonants. There is one environment, however, in which epenthetic schwa is inserted to the right of the stray resonant, namely when that resonant is in word-intial (or root domain-initial (section 5.0)) position. This is seen in the following examples:

(22) a. yək̓ám̓
√yk̓ám̓
we agree

cf. 20. RR → RR
RO → RəO ?
no, see (13a)

b. məċúɬt
√mċuɬt
pus

The insertion of an epenthetic vowel to the left of the unsyllabified resonant in these cases would create an onsetless syllable: * əyk̓ám̓ and * əmċúɬt. There is a requirement in Nxa?amxcín, as in many other languages, that all syllables have an

onset, therefore in cases like (22a) and (b) the epenthetic vowel is inserted to the right of the resonant.

3.2 Obstruents

There is some evidence that obstruents need not be syllabified in Nxa?amxcín. This appears to be the case at least for the stops. Whether or not this is true of fricatives requires further investigation. The evidence for unsyllabified stops comes from repetitive, C_2-reduplication and inchoative forms.

As seen with repetitive forms of CCVC roots in section 2.0, when the repetitive morpheme is affixed to these roots it surfaces between C_1 and C_2 of the root, suggesting that these do not form a complex onset, as in p-a-tix̣ʷ. If p is not part of the CVC syllable, then how is it prosodically licensed? We assume Bagemihl's (1991) analysis of moraic licensing and suggest that p is affiliated with a mora but not with a syllable node (figure 6 repeated below). This moraic affiliation is sufficient to prosodically license the stop. (The same is not true for the resonants since they require epenthesis.)

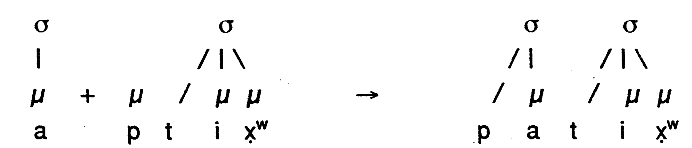

figure 6

The repetitive forms do suggest that a stop can be unsyllabified, however they do not provide evidence that the stop is associated with a mora. Evidence for this can be found in C_2-reduplication and inchoative forms. Both of these pattern together in that they target the same positions in a root: namely CV_C(C) and C_CVC. The distribution of these morphemes can be easily accounted for if two assumptions are made: first, that each of these is constrained to surface after the first mora in a root; and second, that all unsyllabified stops are associated with a mora. This is demonstrated in figure 13 and 14.

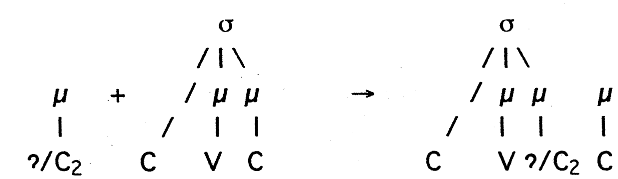

figure 13

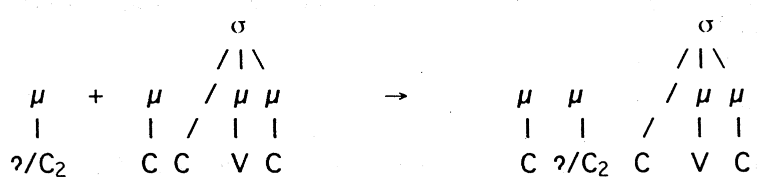

figure 14

In assuming that the first C of a CCVC root is moraic, it is possible to prosodically define the distribution of the C_2 and inchoative morphemes. If the initial consonant in a CCVC root were not moraic, then it would be difficult to account for the fact that both morphemes surface after the initial C in such roots and not after V, as is the case with CVC roots. Thus, a moraic analysis of unsyllabified obstruents gives us the most explanatory power with respect to C_2-reduplication and the -ʔ- inchoative morpheme.

An interesting point that distinguishes stops from resonants is aspiration. It appears that when a stop is in a coda or an unsyllabified position it can get aspirated. This is shown in (23):

(23) a. [ʔaraʃ‹íkʷʰ]
/ʔarasíkʷ/
turtle

b. [kʰtʰpánᵊʔʌn]
/ktpánəʔan/
k-√tp=anʔ-t-ø-n
LOC-cover=ear-TR-3O-1sS
I covered it

c. [t̓əkʷʰpʰ]
/t̓ə́kʷp/
√t̓kʷ-p
burst-INCH
burst, blow away

In the above examples the coda stops and unsyllabified stops are aspirated, however the stops in onset position are not. Thus, there are two types of positions here that pattern together: coda position and unsyllabified position. If we assume that unsyllabified stops are moraic, then we can tie these two positions together prosodically and claim that all moraic stops in Nxaʔamxcín can be aspirated. This excludes all stops in onset position.

4.0 Excrescent Schwa

We argued above that there are two sources of schwa insertion that are phonological (i.e. epenthetic). These are the schwas that are inserted in vowelless roots for stress assignment purposes, and those that are epenthesized in order to syllabify a stray resonant. These two sources, however, do not account for all the cases of schwas that surface (although they do account for all phonological insertions). Many more instances of schwa are audible and we claim that these cases are excrescent. Following Levin (1987) we assume that they are present for articulatory reasons and serve a transitional rather than a prosodic purpose. The epenthetic schwas are present to fulfil prosodic requirements and are therefore obligatory. The excrescent schwas, however, surface only at the phonetic level and since their presence is not required for any phonological purposes, they are optional.

Excrescent schwas have been transcribed as schwa or as raised vowels. The distribution of these schwas follows a simple rule: they are never inserted into syllables. Thus, in a CVC sequence an excrescent schwa never surfaces immediately following the onset or immediately before the coda.[8] They appear at syllable boundaries and between unsyllabified obstruents. This is shown in (24):

(24)	a.	ʔac.xʷáy.ə̲qən	pile of dirt
	b.	ʔax̣.ə̲mén	sister of Mattie Grunlose
	c.	ʔáy.ə̲x̣ʷ.t	tired, worn out
	d.	(s).č.xə̲ .ʔét	first, in front
	e.	c̓.ə̲p̓.q̓ə.mə.náws	to stick together
	f.	k.ɬ.k̓ən̓.ᵊk̓ən̓.p̓.ə̲c̓.nák.sən	cuffs

(24a) and (b) illustrate that an excrescent schwa may surface between a coda and an onset. (24c) has an excrescent schwa between a coda and an unsyllabified obstruent, (24d) between an unsyllabified obstruent and an onset. And finally, (24e) and (f) show that excrescent schwas can surface between two unsyllabified obstruents.[9] The data

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8There are what appear to be exceptions to this rule in the data, however note that these all involve uvular consonants.

ʔéléᵊx̣ Charlie Keller

čéᵋqʷt copper coloured; copper

This kind of on-glide in the environment of uvulars is not uncommon cross-linguistically, and we therefore do not treat these cases as exceptions to the rule.

9The excrescent schwas that surface between unsyllabified obstruents are a form of release, and may alternate with aspiration.

in (24) further support our analysis that Nxaʔamxcín has a maximal syllable CVC since excrescent schwas respect the CVC boundary, thus suggesting that CVC forms a constituent.[10]

5.0 Levels of Syllabification

There is some evidence that the root is syllabified before any affixes are accessed. This evidence comes from epenthesis facts. Consider the following examples:

(25) a. ḥaẇi̱yáɬxʷ
√ḥaẇy=aɬxʷ
make=house
put up a tipi

b. nkʷn̩alqʷptúɬn
n-√k̓ʷan=alqʷp-tuɬ-ø-n
LOC-take(sg.obj.)=throat-IND-3O-1sS
I took it out of his mouth

Each of the roots in (25) has a final resonant which is either preceded by an epenthetic schwa (25a) or is itself syllabified (25b). Immediately following the resonant, however, is a vowel-initial suffix. One might expect that the unsyllabified resonant could be syllabified as the onset to the following vowel. What is not clear is why epenthesis takes place when the resonant is in an apparently syllabifiable position. We suggest that this epenthesis occurs because the root is syllabified before the following suffix is added on. Thus, epenthesis would be required to ensure that the root final resonant is prosodically licensed at the first level of syllabification.

If there were no resyllabification of the root, the vowel initial suffix would appear to violate a requirement in the language that all syllables must have onsets. We suggest that this requirement is actually met, and that the resonant is ambisyllabic.

It is possible that the epenthetic schwas in (25) are actually excrescent and that the resonant is licensed as an onset only. However, as was noted in the previous section, excrescent schwas are optional and the schwas that surface in (25) and similar examples are present quite consistently in the data.

[10] Although excrescent schwa is optional, we have observed a number of general tendencies that seem to govern its appearance. In particular, it seems that excrescent schwa is most likely to appear if either a preceeding or a following consonant is a resonant; the second most likely position for its appearance is before a velar or uvular fricative; and it is least likely to appear between obstruents. More work needs to be done to determine if these observations are in fact correct.

6.0 Conclusion

This paper has argued for a maximal CVC syllable in Nxaʔamxcín. We have proposed that stray resonants must be syllabified through epenthesis, and that stray obstruents (stops) are moraically licensed. The evidence we have presented for simple onsets and codas is, individually, suggestive. However the evidence combined provides strong support for a maximal syllable that is CVC in form. In addition, we have argued for a difference between epenthetic and excrescent schwa, claiming that epenthetic schwa surfaces under two conditions only, while excrescent schwa can surface quite freely outside of syllables.

There are a number of issues that are left unresolved, and we outline two of them here. First, the status of fricatives is unclear. In an example like ləplápst 'you (pl.)' we do not know if s can serve as a syllable peak like the resonants, or if it is moraically licensed like the obstruents. One possible source of evidence against grouping fricatives together with the resonants is that no schwa surfaces before unsyllabified fricatives. Further research is in order to determine where the fricatives fit in with respect to prosodic licensing.

Second, the question of ambisyllabicity remains open. We have suggested this as a possibility in order to account for seemingly unnecessary epenthesis in certain roots. Our analysis that resonants may be ambisyllabic is speculative at this point.

Although there are a number of unresolved issues, the evidence from Nxaʔamxcín does seem to show clearly that, as in other Salish languages whose syllable structures have been analyzed, Nxaʔamxcín has simple syllables.

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