# Syllable Structure in Bella Coola

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## 1. Introduction

Bella Coola, a Salish language spoken on the central coast of British Columbia, is notorious for its enormous consonant clusters, and in particular for having words that contain no vowels whatsoever. Examples of such obstruent-only words are given in (1), where it can be seen that vowelless sentences may be constructed in this language as well.[1] These sequences are not just phonologically, but also phonetically vowelless, in that no epenthetic vowels surface in the strings-- they are simply pronounced as uninterrupted sequences of voiceless obstruents. (SL= Nater 1977; BCL=Nater 1984; N=Newman 1971; SD=Saunders & Davis 1972)

(1) a. ɬq — 'wet' (SL 37)
b. ɬχt — 'stone' (SL 19)
c. cǩɬp — 'rib' (SL 20)
d. ɬχʷtɬcxʷ — 'You spat on me' (Hoard 1978:68)
e. xɬp̓χʷɬtɬpɬɬs kʷč — 'Then he had had in his possession a bunchberry plant.' (BCL 5)
f. ǩxɬɬcxʷ sɬχʷtɬɬc — 'You had seen that I had gone through the passage.' (BCL 5)

Needless to say, this phenomenon has caused considerable confusion since it first came to light, particularly for researchers attempting to determine the syllabification system of the language. A summary of some of the hypotheses which it has inspired are given in (2), illustrated for the sample word **čktskʷč** 'he arrived'.

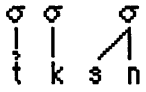
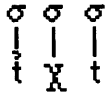
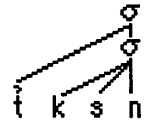
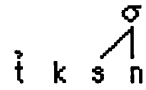
(2)

| Source | Syllabification | Number of Syllables | |
|---|---|---|---|
| Newman (1947) | čktsk$^{w}$č | Ø | Note: |
| Hockett (1955) | č.k.t.s.k$^{w}$.č | 6 | . = syllable boundary |
| Greenberg (1962) | čkt̩sk$^{w}$č | 2 ? | C̩ = syllabic element |
| Fudge (1976) | č*.k*t.sk$^{w}$*č | 3 | * = null/zero peak |
| Hoard (1978) | č̩.k̩.ts̩.k̩$^{w}$.č̩ | 5 | |

While many people have speculated about possible syllable structures for Bella Coola, no-one has yet explored the implications of these various proposals. If, for example, the language has no syllables at the phonological level (as Newman (1947) hypothesizes), what does this entail for syllable theory in general?; conversely, if the language allows syllabic obstruents (e.g. Hoard (1978)), what are the ramifications of this elsewhere in the phonology/morphology of the language? In this paper I will attempt to resolve some of these questions by outlining a complete theory of syllable structure for Bella Coola; in the process, I will provide further support to certain aspects of moraic and prosodic phonology (Hyman 1985, McCarthy & Prince 1986, Itô 1986, Zec 1988).

I will consider four possible hypotheses concerning syllable structure in Bella Coola, schematized in (3).

(3)

| | 'lake' | 'shoot with a bow' | 'stone' |
|---|---|---|---|
| a. No Syllable Hypothesis (NSH) | c a ɬ | t̩ k s n | t̩ χ t |
| b. Obstruent Syllabicity Hypothesis (OSH) |  |  |  |
| c. Complex Syllable Hypothesis (CSH) |  |  |  |
| d. Simple Syllable Hypothesis (SSH) |  |  |  |

The first, which I call the No Syllable Hypothesis, assumes that no words in the language have any syllable structure, including words that contain sonorant segments. The second hypothesis I call the Obstruent Syllabicity Hypothesis, diagrammed in (3b). This hypothesis assumes that obstruents may occupy nucleus position in the syllable; the particular version I have given here is based on the transcriptions provided by Hoard (1978), and can be formalized as a syllabification algorithm similar to that proposed by Dell and Elmedlaoui (1985,

1988) in their work on syllabic obstruents in Berber. The third hypothesis is the Complex Syllable Hypothesis, shown in (3c). This hypothesis assumes that only sonorant segments may be syllable nuclei; it also assumes that all obstruents present in a string with a sonorant nucleus must be exhaustively syllabified. The version I have diagrammed here is based on the syllabification system proposed by Levin (1985), in which segments which respect the sonority hierarchy are incorporated while those which violate it are adjoined.

Finally, the fourth hypothesis which I will consider, and ultimately argue for, is the Simple Syllable Hypothesis (SSH), given in (3d). This hypothesis also assumes that only sonorant segments may be syllable nuclei. In contrst to the CSH, however, a much more restricted syllable shape is posited: only two consonants in onset position (where the second must be a sonorant), and only one in coda position. All other segments remain unsyllabified.

## 2. Evidence for the Simple Syllable Hypothesis

The No Syllable Hypothesis can be rejected fairly straightforwardly on a number of grounds, and I will not devote much time to it. Syllabicity alternations are pervasive in Bella Coola-- as shown in (4), high vowels regularly alternate with glides, and syllabic resonants alternate with their non-syllabic counterparts. These alternations are essentially identical to those found in other languages (cf. Levin 1985, Guerssel 1986), where they are taken to be paradigm instantiations of the presence of syllables.

(4) a. Diminutive suffix (Newman 1971:35)

| | | |
|---|---|---|
| **ɬn̥χʷ** | **ɬn̥χʷ-i** | 'head' |
| **saƛa** | **saaƛa-y** | 'spoon canoe' (VL) |
| **qaɬayu** | **qaɬayw-i** | 'fish hook' |

b. Other morpheme concatenations (BCL 17)

| | | | |
|---|---|---|---|
| **ti** 'firm' | + **-aɬ** 'feet' | → **tyaɬ** | 'standing firmly' |
| **ču** 'grey' | + **-iiχʷ** 'hair' | → **čwiiχʷ** | '(having) grey hair' |
| **stn̥** 'wood' | + **-aaɬ** 'spoon' | → **stnaaɬ** | 'wooden spoon' |

In addition, a number of allophonic rules determining vowel quality in Bella Coola refer to the classic word-boundary/consonant disjunction, which again is a standard diagnostic of syllables. A few of these processes are illustrated in (5); see Nater (1984: 5) for more examples.

(5) a. *Lowering before a tautosyllabic resonant* (BCL 5)

**i → e, u → o** / ___ [+son] ]$_\sigma$

/sim/ → [sem] 'rope made of cedar limbs' vs. [čimæ] 'intestines'

/tums/ → [toms] 'breast' vs. [citumæ] 'to sleep'

b. *Centralizing before a tautosyllabic rounded velar*

**a** → ʌ / ___ $K^w$ ]$_\sigma$

/klax$^w$/ → [k$^y$lʌx$^w$] 'muskrat' vs. /sax$^w$a/ → [sæx$^w$æ] 'dipnet'

I will assume, then, that Bella Coola does have syllables of some kind on at least some of its words.

Evidence to decide between the other three hypotheses is furnished by the reduplication system of the language. Bella Coola has the three basic reduplication patterns given in (6): descriptively, these are CV, CVC, and V, all prefixing. (Reduplication usually carries a diminutive or continuative meaning, though there is no correlation between affix shape and semantic function.)

| (6) | Plain | With Syncope |
|---|---|---|
| a. CV- | qayt→qaqayt-i | kaƛay→kakƛay (N34) |
| | 'hat→toadstool-dim.' (N38) | 'humpback salmon→dim.' |
| b. CVC- | yaɬk-→yaɬyaɬk- | silin→silslin-i |
| | 'do too much→contin.' (N35) | 'kidney→dim.' (N37) |
| c. V- | ɬixɬala→ʔiɬixɬala-y | ƛ̓inax$^{w}$→ʔiƛ̓naax$^{w}$-i |
| | 'robin→dim.' (BCL 109) | 'crab→dim.' (VL) (N37) |

Each of these may be combined with a lexically-conditioned process of syncope which deletes the first stem vowel (cf. Broselow (1983) for a statement of this rule in related Salish languages). Reduplication is also often accompanied by secondary phonological processes of vowel lengthening (indicated with VL after a gloss) or shortening, and spirantization or occlusivization of uvulars. Again, these processes are lexically conditioned. It should also be noted that sonorant consonants function as ordinary syllable heads in this language-- for example, they participate in all the basic patterns of reduplication, they undergo a morphological process of 'habituative' lengthening just like vowels (Saunders and Davis 1972), and as noted before, they undergo the same syllabicity alternations as vowels.

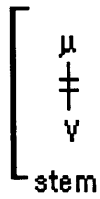
I will analyze the basic reduplication patterns within McCarthy and Prince's (1986) prosodic morphology framework by utilizing two basic reduplicative templates: a bimoraic syllable (for the CVC pattern), and the core syllable (for the CV pattern) (7a). These are combined with two auxiliary processes: syncope, formalized in (7.b.i), and a process of initial consonant deletion (ICD), given in (7.b.ii), which deletes the first onset of a word.

(7) a. Templates

$$CVC = \sigma_{\mu\mu} \quad CV = \sigma_{core}$$

b. Auxiliary processes

i. **Syncope:** delink first stem vowel (lexically conditioned)




ii. **Initial C-Deletion (ICD):**

$C \rightarrow \emptyset / [_{Word} [_{\sigma}$ ——

**applies to lexically-marked forms under reduplication**

The V-pattern is analyzed as a combination of the core syllable template plus initial consonant deletion, rather than as prespecification of a glottal stop on a core syllable, for the following reason. As shown in (8), Bella Coola contrasts forms which are underlyingly vowel-initial with those that begin underlyingly with a glottal stop. Underlyingly glottal-initial forms retain the glottal stop under prefixation, as shown in (8a), while vowel initial forms do not (8b) (though the latter undergo ʔ-epenthesis if no prefix is added). V-reduplicated forms pattern with the vowel-initial forms, as illustrated in (8c-d). Since the glottal stop is not retained under prefixation, it must be epenthetic, and therefore it cannot be part of the reduplicative affix.[2] (All examples are from Nater (1984).)

| | | | | | |
|---|---|---|---|---|---|
| (8) a. | ʔatma | 'to die' | ʔa-ɬ-ʔatma | 'dead' | /ʔatma/ |
| | ʔm̥t | 'to sit down' | s-ʔm̥t-sta | 'chair' | /ʔmt/ |
| b. | ʔaƛ̓s-mx | 'back inhabitants' | tx-aƛ̓s-aaχ | 'back of the house' | /aƛ̓s/ |
| | ʔn̥ƛ̓ | 'dark, obscure' | s-n̥ƛ̓ | 'darkness' | /nƛ̓/ |

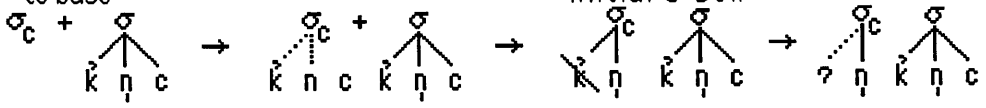
c. V- Redup: pus → s-upus-ɬp; *s?upusɬp 'to grow → young willow tree'

d. V-/Syncope: kal → ʔa-ɬ-akl-ii; *ʔaɬʔaklii 'right → to be right, correct'

The derivation of a V-reduplicated form is given in (9): following copy and association in (b), the initial consonant is deleted, and an epenthetic glottal stop is added (provided the sonorant remains word-initial; cf. the derivation in (16)).

(9) $\sigma_C$ Redup with Initial C-Del: k̓n̥c → ʔn̥k̓n̥c-ɬsperm whale → dim.'

a. Affixation to base b. Copy, Association: c. Stray Erasure, Initial C-Del: d. ʔ-Epen:




So far I have only been considering reduplication on bases that contain sonorant segments, and these behave fairly regularly, given what we know about reduplication in other languages. What about vowelless words-- how are they reduplicated? If the Obstruent Syllabicity Hypothesis were correct, we would expect bare obstruents to be copied, but this is not in fact what happens. The majority of vowelless words do not participate in reduplication at all. Of those that do, something very interesting happens: as shown in (10), these items can only be

reduplicated if a sonorant segment (either n or i) is first inserted into the base prior to the application of reduplication.

| | | | |
|---|---|---|---|
| (10)a. $\sigma_C$ Redup: | Base: | ɬq̓- | 'slap' |
| | n insertion: | ɬn̩q̓- | |
| | Redup: | ɬn̩ɬn̩q̓- | 'slap-contin.' (N36) |
| b. $\sigma_{\mu\mu}$ Redup: | Base: | kɬ- | 'fall' |
| | n insertion: | kn̩ɬ- | |
| | Redup: | kn̩ɬkn̩ɬ- | 'fall-contin.' (N36) |
| c. $\sigma_{\mu\mu}$ Redup with Initial C-Deletion: | | | |
| | Base: | čs | 'noisy' (BCL 109) |
| | i insertion: | čis | |
| | Redup: | čisčis | |
| | Initial C-Deletion: | isčis | |
| | ʔ-Epen, V-Length: | ʔisčiis | 'to make noise with tools' |
| d. $\sigma_{\mu\mu}$ Redup with Syncope: | | | |
| | Base: | sχ- | 'peel' |
| | i insertion: | siχ- | |
| | Redup: | siχsiχ- | |
| | Syncope: | siχsχ- | 'peel-cont.' (N36) |

This argues strongly against the OSH: these forms show that obstruent-only words by themselves are phonologically inert with respect to reduplication, since they have no syllables to copy or to serve as affixation sites. They can only participate in reduplication if a syllable is provided through insertion of a sonorant segment.

Next, consider the behaviour of words that contain a sonorant segment but have initial obstruent clusters, exemplified for core syllable reduplication in (11).

| | | | | |
|---|---|---|---|---|
| (11) a.#CC bases: | p̓ɬa- | → | p̓ɬaɬa- | 'wink, bat the eyes → contin.' (N37) |
| | tqn̩k- | → | tqn̩qn̩k- | 'be under → underwear' (N38) |
| b.#CCC bases: | tq̓ɬa | → | tq̓ɬaaɬa-y | 'knife → dim.' (VL) (N 37) |
| | t̓ksn̩- | → | t̓ksn̩sn̩- | 'shoot with a bow → cont.' (N38) |
| c.#CCCC bases: | qpsta- | → | qpstata- | 'to taste → iterative (actual)' (SD 5) |
| | pɬtkn̩ | → | pɬtkn̩kn̩-ɬp | 'bark of bitter cherry tree→~ tree' |

There are two unexpected aspects to reduplication of these items: first, the initial cluster is not copied, rather, only the first CV sequence of the word is copied; and second, the reduplicative prefix lodges not word-initially, but before the first CV-

sequence of the word. These patterns are consistent across all reduplication types, as illustrated in (12).

(12) a. $\sigma_C$/Sync: sx$^w$panił → sx$^w$paapnił-i 'deer → dim.' (VL)

b. $\sigma_{\mu\mu}$ ck$^w$-aɬ → ck$^w$aɬk$^w$aɬ 'heavy-feet → to walk heavily'

c. $\sigma_{\mu\mu}$/Sync: sq$^w$ciɬ → sq$^w$ciiɬcɬ-i 'ventral posterior fin → dim.'

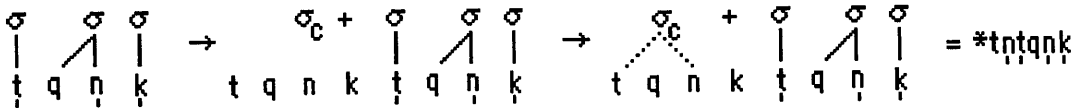
d. $\sigma_C$/ICD: ɬk̓$^w$ɬ̓x- → ɬɬ̓k̓$^w$ɬ̓x- 'become old → contin.'

e. $\sigma_C$/ICD,Sync: stala → satla-ɬp 'hemlock bark → hemlock-tree'

Sources: a: N37; b: BCL 108; c: N38; d: N36; e: BCL 112

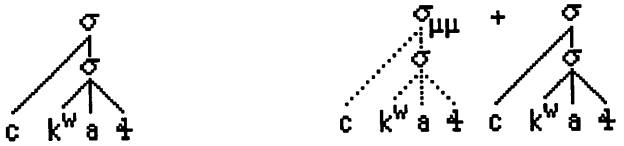
Under the OSH, these patterns are problematic. As shown in the derivation of 'underwear' (from 11a) in (13), if obstruents are assumed to be syllabic, two things go wrong: the initial segments of the cluster are copied, and the reduplicative prefix lodges word-initially. This is regardless of whether mapping of the syllable nucleus proceeds directly to the sonorant segment, as shown in (c),or if mapping were to pick up the second obstruent to yield *tq̓tq̓nk.

(13)a. Base form: b. Affixation & copy: c. Mapping:




Similar problems are encountered by the Complex Syllable Hypothesis, illustrated in (14) for the derivation of ck$^w$aɬk$^w$aɬ 'to walk heavily' (12b) with the bimoraic syllable template. Once again, the initial cluster is incorrectly copied in its entirety, and the affix does not lodge in the correct location.

(14)a. Base form: b. Affixation, Copy, & Mapping: c. *Output:

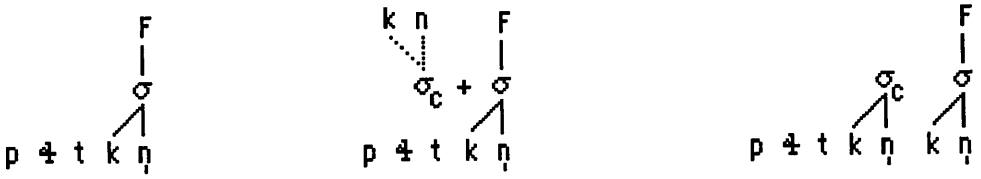



*ck$^w$aɬck$^w$aɬ

In contrast, the correct patterns can be derived straightforwardly under the Simple Syllable Hypothesis. Let me first outline the major tenets of this hypothesis which I will be adopting for Bella Coola. First, only sonorant segments may be syllable nuclei, and the syllable template permits a maximum of two consonants in onset position, constrained by sonority requirements to yield at most an obstruent-resonant sequence. The maximum syllable shape is therefore CRVVC (where R =[+son]). Syllabification applies from left to right. Taken together, these assumptions entail nonexhaustive syllabification, in that segments which cannot be incorporated into the syllable template remain unsyllabified. For reduplication, I assume that templates are prefixed to the foot, where quantity-sensitive, unbounded feet are constructed from the right margin of a word.[3]

The application of core-syllable reduplication to a word with an initial obstruent cluster is shown in (15) ('bitter cherry tree' from 11c). As illustrated in (b), the initial obstruents are not copied because they do not belong to the prosodic constituency of the word (following the standard assumption that only segments belonging to the affixation target are copied; cf. Broselow & McCarthy 1983); the affix lodges before the first CV-sequence because it is prefixed (and linearized) directly to the foot, which leaves the initial obstruents outside of its domain.

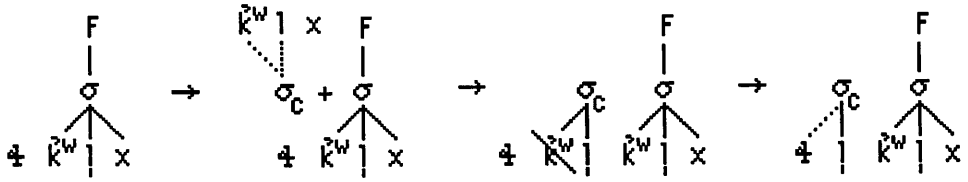
(15)a. Base form: b. Affixation, Copy, & Mapping c. Linearization:



For a word which does not begin with an obstruent cluster, such as **milix$^{w}$**→ **milmilix$^{w}$-ɬp** 'bear berry→ bear berry plant' (BCL 108) the derivation proceeds straightforwardly as well. In this case, the affix lodges word-initially because foot and word boundaries coincide; no segments are excluded from the prosodic constituency, so all are copied as well.

The derivation of the V-reduplicated form **ɬl̓k$^{w}$l̓x-** 'become old, cont.' (12d) is given in (16). Following linearization in (c), the initial onset is deleted; since there is a stray consonant already present in the string, this is syllabified into onset position and no glottal stop is inserted.

(16)a. Base form: b. Redup: c. Linearization, Initial C-Del: d. Resyllabif:



Evidence that the Bella Coola syllable template allows obstruent-resonant sequences initially is provided by the reduplicated forms in (17): here the affix copies the initial obstruent-resonant cluster and lodges immediately prior to it. If CR clusters were not tautosyllabic, we would expect e.g. ***stq$^{w}$lulus-i** for 'black bear snare (diminutive)'. (Notice also the syllabicity alternations in the copied resonants.)

(17) a. $\sigma_C$: **x$^{w}$naɬ** → **x$^{w}$n̓x$^{w}$naaɬ-i** 'spring of water→dim.' (VL) (N36)

**stq$^{w}$lus** → **stq$^{w}$l̓q$^{w}$lus-i** 'black bear snare → dim.' (N37)

b. $\sigma_C$/ICD: **p̓wi** → **ʔup̓wii** 'halibut → dim.' (VL) (BCL 109)

**sk̓ma** → **sm̓k̓m̓n-i** 'comb → dim.' (N:36)

## 3. Moraic Licensing

Having established that the Simple Syllable Hypothesis is indeed correct for Bella Coola, we must now ask how it is that this language permits segments to remain syllabically unaffiliated. Itô's (1986) principle of Prosodic Licensing, operating in conjunction with Stray Erasure, should serve to ensure that no unsyllabified segments ever surface in a language-- they will either be deleted, or receive epenthetic vowels, if the language has resort to that option. Why is it, then, that such segments are not deleted in Bella Coola?

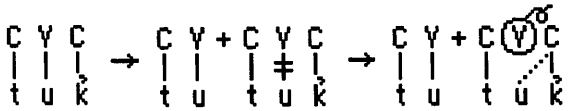
In other languages we could appeal to extraprosodicity to explain the persistence of peripheral unsyllabified segments. Such an explanation is not available for Bella Coola, though, for a number of reasons. First, not all syllabically unaffiliated segments are peripheral-- there are numerous occurrences of medial unsyllabified segments in monomorphemic forms, such as **tanksta** 'ear' (SL 17), **čawɬmin** 'name of village' (SL 23), and **sukʷptus** 'mountain lion' (SL 33) (unsyllabified consonants are underlined in these forms). Second, even peripheral unsyllabified segments do not delete when they are no longer at the edge of a word or morpheme, as in **ʔaɬps-** 'to eat' + **-tu** 'causative' → **ʔaɬpstu** 'to cause to eat, feed', not ***ʔaɬtu** (which we would expect if the syllabically unaffiliated segments were extraprosodic). Third, it has been argued convincingly by Hayes (1982), Myers (1987), and others that extraprosodicity can only target genuine phonological constituents. The problem in Bella Coola is that the segments which would have to be marked as extraprosodic do not form a well-defined constituent-- all initial consonants except the one immediately preceding a resonant must be exempt, which could be anywhere from one segment (**qʷtuc** 'carving knife' (SL 51)) all the way up to three segments (**qʷskta** 'spool for net-string' (SL 51)). Finally, extraprosodicity is useless in explaining the examples of vowelless words, since presumably the entire word would have to be marked extraprosodic in these cases (which is patently disallowed in any theory of extraprosodicity).

A second possible explanation for the persistence of unsyllabified segments in Bella Coola is that this language simply lacks Stray Erasure. However, there is strong evidence for the presence of Stray Erasure in Bella Coola. First of all, copied segments which are not mapped onto a template in reduplication do not persist-- they get deleted. Secondly, and more importantly, a process of labial docking which applies in syncopated reduplicated forms reveals the operation of Stray Erasure. As first noted by Bessell (1988), if a round vowel is syncopated adjacent to a velar consonant, that rounding shows up as labialization on the velar segment (exemplified in (18a)). This is analyzed as docking of the round vowel onto the velar following syncope, as schematized in (18b).

(18) a. **tuk-** → **tutkʷ-** 'stretch→contin.' (N34)

**ɬuka** → **ɬuuɬkʷn-i** 'mink→dimin.' (VL) (BCL 110)

**sukta** → **suuskʷtn-i** 'cloth→dimin.' (VL) (N36)

b. 


The important thing about this process is that it shows syncope must delink rather than delete the vowel, since the syncopated vowel exhibits classic stability effects. However, if syncope merely delinks the vowel, there must be some way to get rid of the vowels which do not undergo labial docking-- and this is of course Stray Erasure.

Given, then, that Bella Coola has an active process of Stray Erasure and extraprosodicity cannot be invoked, we need an alternative explanation for the persistence of unsyllabified segments. I will adopt a proposal originally put forward by Zec (1988) that in some languages the prosodic category of 'mora' can perform the licensing function that is usually attributed to the 'syllable'. I will also adopt Hyman's (1985) original suggestion that all segments start out underlyingly with their own moras. These may be subsequently lost if the segment is syllabified into onset position (or into coda position, if they do not count as heavy). As shown in (19), I propose that Stray Erasure is parametrized with respect to where in the prosodic hierarchy the notion of 'unlicensed' is defined-- for most languages this point of reference is the constituent 'syllable', while Bella Coola invokes the marked option of 'mora'.[4]

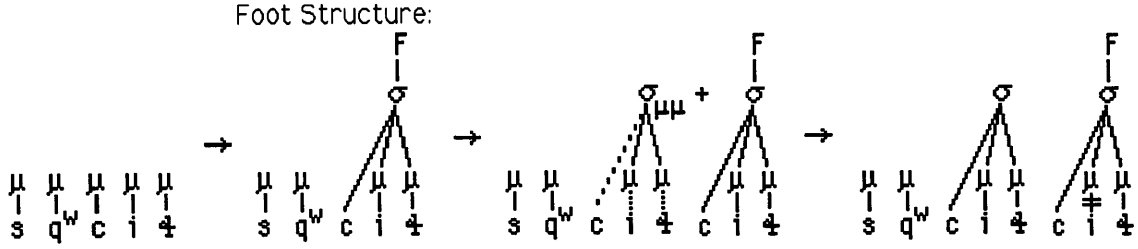
(19) **Stray Erasure**: Delete unlicensed units.

Cut-off point: mora/$(\text{syllable})_{\text{default}}$

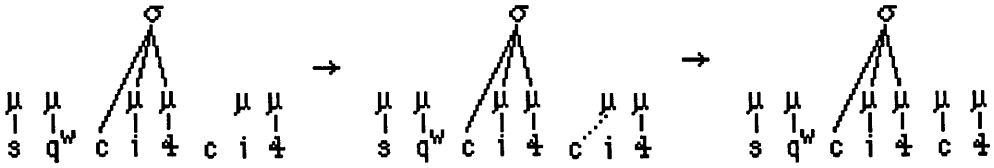
Thus, in Bella Coola, solely the moraic affiliation of a segment can suffice to license it, i.e. segments linked to either the $\mu$ or $\sigma$ level escape Stray Erasure.

The way moraic licensing works is illustrated in the derivation of the syncopated reduplication form **sq$^{w}$ciiɬcɬ-i** 'ventral posterior fin, dim.' (from (12c)) in (20). Here I make use of Hayes' (1989) principle of Parasitic Delinking, which states that syllable structure is deleted when there is no overt nuclear segment (in this case, when a syllable loses its vowel through syncope). As shown in (20a), the form starts out with underlying moras on all segments, one of which is lost when prosodic structure is erected in (b). After reduplication and syncope in (c-d), Parasitic Delinking eliminates the prosodic structure on the base (e). The initial segment of the base is then free to re-associate to the empty mora (f), while the syncopated vowel is lost by Stray Erasure (g). (Suffixation of -i 'diminutive' and V-lengthening are not shown.)

(20)a. UR: b. Syllabif., Foot Structure: c. Redup: d. Syncope:



e. Parasitic Delinking: f. Assoc. Conventions: g. Stray Erasure:



Further evidence for moraic licensing in Bella Coola is provided by two other phenomena: the distribution of glottal stop, and the interaction of the 'potential' infix with CV- reduplication. The data in (21) summarize the distribution of glottal stop.

| | | | | |
|---|---|---|---|---|
| (21) a. | #ʔV... | *...V?# | ʔat | 'herring eggs' (SL 56) |
| b. | #CʔV... | *...V?C# | sʔulm | 'stakes in lahal game' (SL 33) |
| c. | ...VCʔV... | *...V?CV... | χnuɬʔa | 'name of sorcerer' (SL 50) |
| d. | ...VʔV... | *...CʔC... | nunuʔaws | 'stingy with food' (SL 35) |

Essentially, this segment can only occur prevocalically. However, we cannot simply say that ʔ is always inserted before a vowel to provide an obligatory onset, since as I showed earlier not all instances of initial ʔ are epenthetic. Furthermore, the language does allow onsetless syllables word-medially, and minimal pairs can be provided to contrast with each of the items in (21), indicating that ʔ is indeed phonemic in all contexts where it occurs. However, the gaps in this distribution can be captured with the single constraint in (22), which says that ʔ cannot surface as a moraic segment.

(22) * μ
|
ʔ

Only prevocalically will it be able to escape this constraint, since postvocalically or interconsonantally it cannot avoid bearing its own mora.

The constraint in (22) also predicts that a floating glottal stop should not be able to dock onto a free mora during the course of a derivation. This is exactly the case in CVC-/ syncopated reduplications when the base form begins with ʔ:

(23) a. ʔaƛ̓anuɬ → ʔaƛ̓ƛ̓anuɬ-ɬp 'gooseberry→ ~ plant' (BCL 111)

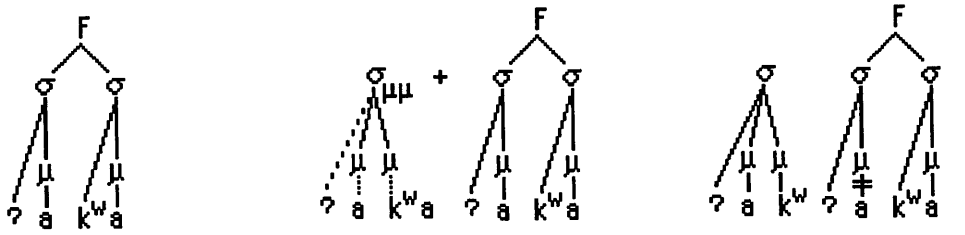
b. ʔakʷa → ʔic-ʔakʷkʷa 'to buy→to be shopping' (BCL 111)

c. ʔixa → ʔixxn-i 'foot→dim.' (N37)

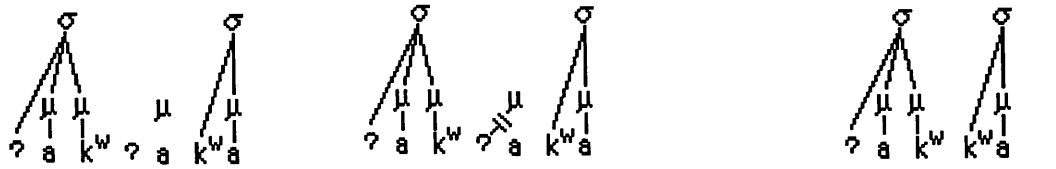
d. ʔaciwa → ʔaacciwn-i 'belly→dim.' (VL) (N37)

Superficially, these items appear to exhibit an entirely unrelated form of reduplication, involving copying of the second consonant. However, these are actually examples of regular CVC- reduplication; their unique pattern results from the fact that the glottal stop set free by parasitic delinking is prevented (by the constraint in (22)) from docking onto the mora vacated by syncope. This is illustrated in the derivation of 'to be shopping' in (24).

(24)a. Base form: b. $\sigma_{\mu\mu}$ Reduplication: c. Stray Erasure, Sync:



d. Parasitic Delinking: e. Assoc. Conventions: blocked f. Stray Erasure:

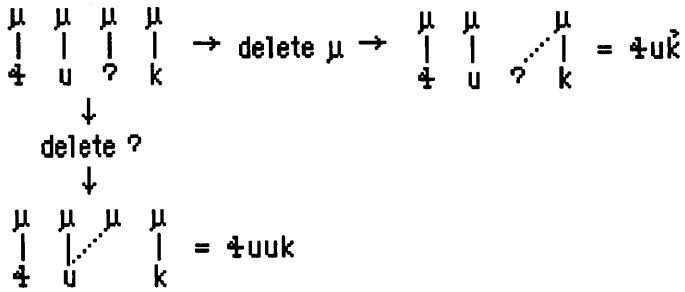


In (24e), the glottal stop is unable to dock onto the free mora since to do so would violate (22); consequently, it is unlicensed and gets deleted by Stray Erasure.

Further evidence for the constraint in (22) is provided by words that underlyingly contain a glottal stop in a position where it cannot lose its mora through syllabification, i.e. postvocalically. Consider the items in (25) (from Nater 1984:19), which all show free variation between vowel lengthening and glottalization on a following consonant.

| | | | |
|---|---|---|---|
| (25) a. | √ɬuuk ~ √ɬuk̓ | 'repulsive' | /ɬuʔk/ |
| b. | -aaqʷs ~ -aq̓ʷs | 'eye' | /aʔqʷs/ |
| c. | puuyaas ~ puy̓aas | 'Labrador (Indian) tea' | /puʔyaas/ |
| d. | p̓kiiwa ~ p̓kiẇa | 'kind of box' | /pikiʔwa/ |

Assuming that these items have a postvocalic glottal stop underlyingly (as shown in the last column), the variations exhibited by these forms can be seen as alternative strategies to avoid moraic glottal stop. As illustrated in (26), there are really only two things that can be done when a representation violates (22): either delete the mora (and transfer the glottalization onto the following segment), or else delete the ʔ (and fill the empty mora via compensatory lengthening).

(26) 


Finally, another argument for moraic licensing-- and the status of the mora as a bona fide prosodic constituent-- is provided by the Bella Coola infix '-n-', glossed as the 'potential' form of a verb. This infix is always used in combination with CV- reduplication, and indicates that "the action is not occurring at the moment of the utterance" (Saunders and Davis 1972:2). In the examples in (27), the infix has been underlined.

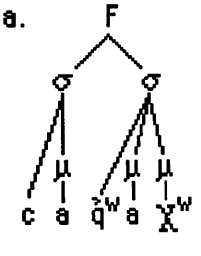
(27) a. lɪs →lɪn̲lɪs 'to push→iterative potential' (SD 2)

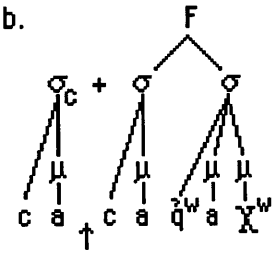
caq̌$^{w}$aχ$^{w}$ →can̲caq̌$^{w}$aχ$^{w}$ 'to be upright→iterative poten.' (SD 5)

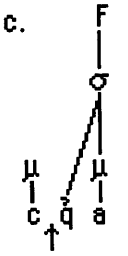
b. cq̓a →cn̲cn̲q̓a 'to rip something→iterative poten.' (SD 5)

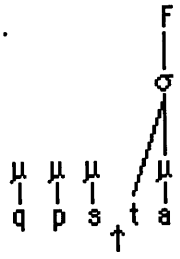
qpsta →qpsn̲sn̲ta 'to taste something→iterative poten.' (SD 6)

This infix is unusual for two reasons: first, it has a different infixation site depending on whether the word begins with an obstruent cluster or not (it appears after the first syllable in a word without an initial cluster (27a), and before the first syllable in a word with a cluster (27b)); and second, it appears twice in a word beginning with an obstruent cluster. In fact, we can provide a simple, nonstipulative explanation for both of these anomalies once we examine the prosodic structures of the words involved. These are given in (28a-d), with the infixation location indicated by an arrow.

(28) a. 


b. 


c. 


d. 


From these items it can be seen that the 'potential' morpheme has a uniform and consistent infixation location: it is prefixed to the foot, provided there is some preceding prosodic constituent (mora or syllable) that it can be incorporated into or syllabified with. This is formalized in (29).

(29) n 'potential' / ] ___ [$_{F}$

For words that begin with obstruent clusters, this context is met in the base (unreduplicated) form of the word, since these items have at least one moraic constituent preceding each foot (28c-d). Hence, infixation applies before reduplication and the sonorant infix gets copied, appearing twice in the output. For words which are exhaustively syllabified in the base form, however, infixation

cannot yet apply (28a), since there is no prosodic constituent preceding the foot. After reduplication has applied, though, an initial syllable is added (28b), thereby creating the required prosodic structure for infixation to take place.

## 4. Conclusion

All previous discussions of Bella Coola have assumed that whatever is unusual about this language must be attributed in some way to its syllables: either it allows obstruents to be syllabic, or it allows syllables to contain only onsets as overt segments, or it has no syllables whatsoever, etc. In this paper I have shown that, on the contrary, Bella Coola's syllables are completely ordinary, and quite in line with what is found in other languages. In fact, its syllables are considerably simpler than other languages'. This is supported by a diverse array of evidence: reduplication and infixation patterns, syllabicity alternations, allophonic vowel variations, and the defective distribution of ʔ. What makes Bella Coola unusual is that it does not delete segments which cannot be syllabified-- it only deletes those which cannot be moraified, i.e those which remain unlinked to the prosodic constituent of mora.

## NOTES

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[1]Bella Coola has the following inventory:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| p | t | c | | k | $k^w$ | q | $q^w$ | |
| ṗ | ṫ | ċ | x̌ | ǩ | $ǩ^w$ | q̇ | $q̇^w$ | ʔ |
| | | s | ɬ | x | $x^w$ | χ | $χ^w$ | (h) |
| m~m̩ | n~n̩ | | l~l̩ | y~i | w~u | a | | |

c is an alveolar affricate; h is a marginal phoneme; syllabicity of sonorant segments is marked in all the examples given in this paper, although this is predictable (cf. §2); vowels (and also sonorant consonants) may occur long or "doubled" (Nater 1984:17), written as **ii, uu,** etc. Syllabic sonorant consonants usually surface with a preceding excrescent vowel of variable quality, tending toward [ə].

[2]Initial deletion may also combine with the bimoraic syllable template to yield a VC- pattern, as in **ċusm → ʔusċusm-i** 'evening→ early evening' (BCL 109).

[3]Although both Newman (1947:132) and Nater (1984:28) report that stress in Bella Coola tends to be quite variable, there do appear to be several consistent patterns. Typically, stress falls on the last vowel (= syllabic sonorant) of a word, provided it is followed by at least one obstruent. When the final vowel is in an open syllable or several sequences of resonants are involved, different stress patterns are involved, the complexities of which I will not go into here (cf. Nater 1984:28). Obviously, this analysis must be considered preliminary until a

complete description and theoretical analysis of the stress system of the language have been worked out.

[4]It would also be possible to parametrize Prosodic Licensing, to the effect that either μ or σ is designated as the lowest constituent in the hierarchy which may function as a licensor; however, I have chosen to leave this principle as general as possible and parametrize Stray Erasure instead, parallel (but not identical) to the parametrization of Stray Epenthesis proposed by Itô (1986).

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