NOTES ON TSIMSHIAN REDUPLICATION[1]

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The Tsimshianist in attempting a pedagogical application of the analysis of reduplication must question anew the Chomskean notions of competence/description and explanation. The reduplication data are little short of chaotic. There are at least five regular formal types of reduplication. Each of these formal types (declension-conjugations) has both inflectional (plural) and derivational (intensive, iterative, natural species) functions. The formal class membership of any particular lexical item is neither absolutely random nor absolutely determined. The same is true of the morphophonological characteristics of syllable peaks in reduplication. Only in the absence of any pedagogical tactic whatsoever, i.e., only in the memorization of each reduplication, can one achieve total sufficiency. Even a set of phonetically motivated probabilistic statements, the tactic with the greatest sufficiency success, leaves much to be desired.

Speakers of Coast Tsimshian inflect nouns for number (singular and plural) and cause each verb to agree in number with its absolutive, i.e., with its intransitive subject or direct object. Nouns and verbs are divided into at least thirteen lexical classes according to how the plural is indicated. Most of these classes (eight) are semantically marked, i.e., they can be characterized

[1]The first part of this paper, dealing with reduplication classes, was read at the American Anthropological Association Meetings in Los Angeles in November of 1978. I have included it here because several persons from the Salish Conference have asked to have a written copy and because the second part of this paper, on the nature of the vowel in reduplicated affixes, builds on the first part and was developed out of the discussion of the earlier paper.

as a group semantically as well as inflectionally, e.g., cyclical temporal entities such as seasons and seasonal activities are pluralized by the prefix gʏik-. GʏikÞ is also a verbal or adverbial proclitic which means "again."

Five of these thirteen inflectional classes, however, are semantically unmarked. These unmarked classes are each defined by a different and particular reduplicative mechanism to express the plural number. Reduplication is probably the ordinary or unmarked way to indicate the plural number for the noun and for the verb agreement.

Reduplication is also used as a derivational device, and as such has multiple semantic function. Leaving aside the semantic intricacies of Tsimshian reduplication, I will focus this paper on the five reduplicative plural classes, on the morphological and phonological determinants of membership in these classes, on the nature of the vowel in the reduplicated affixes, and on the phonological determinants of such vowels.

1. In describing the five reduplication mechanisms, I use the term "model" to refer to that particular syllable in the singular form that is to be copied. The term "copy" refers to the reduplicated plural indicating affix. The term "model release" refers to the first consonant of the model syllable. The term "model arrest" refers to the first consonant after the model's syllabic peak as long as it is part of the same syllable, e.g., sƛúHnsk[2] siksƛú?unsk (to teach (loan: from "school"); sƛuH- MODEL; sik- COPY; s- MODEL RELEASE; -H- MODEL ARREST).

The Appendix lists all of the examples of the reduplicative plural that occur in Dunn (1978).

1.1 In the first or CVk- class, the model is the first syllable of the singular form. A copy of the model release is prefixed to the first syllable with an intervening vowel+k. This is the largest and phonologically most regular of the reduplication classes. CVk- is currently the productive mechanism for plural formation.

[2]H represents a falling pitch with a concomitant centralizing glide.

Most loan words from English belong to this class. Younger speakers tend to use this mechanism more extensively than older speakers.

1.2 The second or CVx̣- class, like the CVk- class, uses the first syllable of the singular as the model. A copy of the model release is prefixed to the first syllable of the singular form with an intervening vowel+x̣. This reduplicative mechanism may represent a variant of the CVk-. The k∿x alternation is a synchronic feature of both Nass-Gitksan and Southern Tsimshian phonology. The CVx̣ class is small and contains only words with a uvular segment (though the uvular is not always in the model itself).

In these first two classes the model is the first syllable of the singular form. In the remaining three inflection classes the model is the principal syllable and not necessarily the first syllable of the singular form. The principal syllable is the one that carries the word's primary stress.

1.3 In the third or CVC- class copies of the model release and arrest are prefixed directly to the principal syllable. Thus the copy may occur after other prefixes or proclitics in the word. A vowel occurs between the two consonants of the copy. This class, like the first class, is large and fairly regular in its phonology.[3]

1.4 In the fourth or CV-prefix class a copy of the model release is prefixed, with a vowel, directly to the model. This class is smaller than CVk- and CVC- and exhibits greater phonological irregularity.

1.5 In the fifth or CV-infix class a copy of the model release is inserted with a vowel between the syllable peak of the model and the model arrest. This is the smallest and most irregular of the reduplication classes.

The five reduplication classes can be ordered along a three-fold continuum: regular to irregular, common to

[3]Almost all derivational reduplication is CVC- type.

rare, naive morphological strategy to sophisticated morphological strategy (See Figure 1). The CVk- class

large class, regular, simple morphology, productive.			small class, irregular, complex morphology, not productive.
CVk- (CVx̣)	CVC-	CV-	-CV

Figure 1. The Scaling of Inflection Classes.

on the one hand is regular, common, and productive. The CV-infix class on the other hand is rare and quite irregular. The CVk- class exhibits a reduplication mechanism that requires no morphological sophistication on the part of the speaker: one need copy only the first sound of the singular form and prefix it with a Vk-. The CV-infix class exhibits a reduplication mechanism considerably more complex: one must infix the first sound of the principal syllable between its syllable peak and arrest. The CV-infix class is neither productive nor morphologically transparent.

1.6 Inflection class membership is morphologically and phonologically conditioned, i.e., certain morphological and phonological characteristics of words predispose them for one class as opposed to another. Some of these predisposing factors are trivial since they are the result of the reduplicative mechanism itself, some are categorial and some are variable.

An example of a trivial predisposing factor is the fact that no word belonging to the CVC- class can have a model with an empty or null arrest. There are others, but they are of no theoretical interest and I will omit further discussion of them.

Some categorial or nearly categorial predisposing factors are:

1.6.1 When the model release is p, k, or x̣ (i.e., noncoronal) and when it is part of a consonant cluster, the word belongs to the CV-prefix class.

1.6.2 When the model release is coronal, specifically l, n or s, and when it is part of a cluster, the word is either CVk- or CVx̣- class.

1.6.3 No CVC- class words have model initial clusters.

1.6.4 All CVx̣- class words have at least one uvular segment in the singular form.

The variable factors were derived by the use of the χ^2 test for non-random association from the data summarized in Tables 1 and 2.

	CVk-	CVx̣-	CVC-	CV-	-CV	totals
labial	7	2	7	5	1	22
alveolar	51	4	13	11	8	87
velar/uvular	9	2	22	8	2	43
laryngeal	18	3	7	2	1	31
totals	85	11	49	26	12	183

Table 1. Inflection Class Distribution according to Model Release.

	CVk-	CVx̣-	CVC-	CV-	-CV	totals
labial	7	3	8	1	0	19
alveolar	32	0	35	12	1	80
velar/uvular	25	4	5	4	5	43
Ø	21	4	1	9	6	41
totals	85	11	49	26	12	183

Table 2. Inflection Class Distribution according to Model Arrest.

1.6.5 The distribution of initial (model release) consonants according to position of articulation is not random (χ^2=20.05, p<.001) in CVk- class words.

1.6.6 CVk- words tend to have a dental consonant as the model release (χ^2=8.99, p<.01). 60% of the CVk- class words begin with a dental (alveolar) consonant. 59% of dental initial models occur in CVk- class words.

1.6.7 CVk- words tend not to have velar or uvular consonants as the model release (χ^2=13.5, p<.001). Only 10% of CVk- class words are velar/uvular initial. Only 21% of velar/uvular initial models occur in CVk- words.

1.6.8 The distribution of model initial sounds according to position of articulation is not random in CVC- class words (χ^2=19.8, p<.001).

1.6.9 CVC- class words tend not to have alveolar initial models (χ^2=10.7, p<.01). 27% of CVC- words are alveolar initial, i.e., have alveolar model release. 15% of alveolar initial models occur in CVC- class words.

1.6.10 More velar /uvular initial models occur in CVC- class words than is expected by chance (χ^2=15.5, p<.001). 45% of CVC- class words have velar/uvular initial models. 51% of velar/uvular initial models occur in CVC- words.

1.6.11 The distribution of model arrests according to position of articulation is probably random in CVk- words.

1.6.12 Models with dental arrest tend to be CVC- class (χ^2=22.83, p<.001). 71% of CVC- class words have dental arrest models. 44% of dental arrest models occur in CVC- class words.

1.6.13 Models with velar/uvular arrest tend not to occur in CVC- class words (χ^2=9.38, p<.01). 10% of CVC- class words have velar/uvular model arrest. 12% of velar-uvular arrest models occur in the CVC- class.

Statistical manipulation of these data indicates that there is a preferred syllable structure for reduplication copies and that this preferred syllable structure acts as a predisposing factor in determining the inflection class membership of lexical items. The preferred syllable structure is CVC- where the syllable release differs in position of articulation from the syllable arrest. 79% of inflectional reduplications have CVC- copies. 91% of CVC- copies (includes CVk- class words) have different position release and arrest. Therefore if the model release is velar/uvular, the

word will tend to be CVC- class. But if the model release is not velar/uvular, the word will tend to be CVk- class.

1.7 Part of the explanation of the current distribution of words in the various inflection classes is most certainly to be found in the history of the Tsimshian language and especially in the evolution of its reduplicative mechanisms. The CV-infix class may represent surviving relics of the oldest type of Tsimshian reduplication. It is the smallest, most opaque and most irregular of the inflection classes. If the infix class does represent an archaic morphology, it is clearly out of sync with the contemporary Tsimshian preference for prepositioning inflectional material. Then the change from CV-infix to CV-prefix makes a logical second step in this very tentative reconstruction of the history of Tsimshian reduplication. A third possible step is the elaboration of the CV-prefix into a number of allomorphs, e.g., CV- for words with open arrest models, CVx̣- for words with uvular segments, CVk- for words beginning with non-velar sounds, and gVC- for words ending in non-velar sounds. In a fourth hypothetical stage the various allomorphs of the third stage might have fallen into disuse, with only the CVk- mechanism remaining productive.

A detailed study of the phonological structure of the data presented in the appendix makes possible the identification of prototypes for the successive innovations hypothesized in the preceding paragraph.

1.7.1 The change from CV-infix to CV-prefix might be indicated in

plɑksk, plí·plɑksk exhausted.

The -k and -x̣ arrests have a suppressing (lowering and backing) effect on preceding vowel. Alternately, their absence allows the vowel to move forward and up. This is a synchronic phenomenon in Tsimshian. In the infixing mechanism the copy intervenes between the +back arrest, allowing the vowel to (re)emerge:

#plɑ#⁄plɑ⁄ksk → plí·plɑksk.

Since the second syllable of the plural has the same

vowel as the singular, the word might have been misanalyzed so that the first syllable of the plural was interpreted as the copy. In this manner a CV-prefix mechanism might have been established. There are other words that might have been similarly misinterpreted:

ɬek, ɬíɬɨk bent,

sɑx̣, sé·sɑx̣ sharp,

wáʔɑ, wáẘəx̣ dig.

1.7.2 The change from a CV- prefix to a CVC- prefix might be indicated in

gʏiɋá·k, ɖaygʏiɋák hip, waist,

ɬáʔyəsk, ɬəlɬáʔyəsk climb.

These plurals exhibit an assimilatory syllable strengthening process whereby a non-vowel segment is inserted between the plural affix and the word:

. . .a⁄gʏ . . . → . . .ay⁄gʏ . . . ,

. . .ə⁄ɬ . . . → . . .əl⁄ɬ . . . .

This is a synchronic phenomenon in Tsimshian. This type of assimilatory syllable strengthening may have led to another misinterpretation whereby two consonant reduplication arose.

1.8 The most useful pedagogical treatment of the reduplicative plural will be one which integrates reduplication with the other plural forming strategies. The student should first learn the semantically marked plural classes (iteratives, intensives, distributives, natural species). Then the reduplication mechanisms should be taught as general, semantically unmarked, ways to form the plural. The CVk- type should be learned first with the understanding that it is used most frequently for words beginning with non velar/uvular segments. Then the CVx̣- type should be learned as a special variant of CVk-. Next the CVC- type should be taught with the understanding that it is used most often for words beginning with a velar/uvular sound. This tactic is revisionistic in that it revives CVC- as a productive mechanism. The student should be aware of the fact that the ideal copy syllable involves consonants of

different position of articulation. Throughout this sequence the student must learn the exceptions as irregular forms. Finally the CV-prefix and CV-infix types should be learned, primarily as unusual and irregular forms.

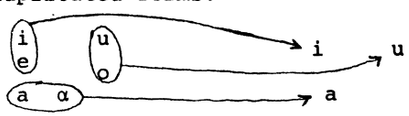
2. The determination of the vowel in the reduplicated copy syllables constitutes one of the most intriguing aspects of Tsimshian morphophonology. There are a number of possible explanantions for copy vowels. The vowel might be copied from the model syllable:

$$\underset{1}{C}\ \underset{2}{V}\ \underset{3}{C} \rightarrow 1\ 2\ 3\ 1\ 2\ 3.$$

The vowel might be reduplicated and then assimilated to the other elements in the copy:

$$\begin{bmatrix} C \\ \alpha\text{feat } x \end{bmatrix}_1 V_2 \begin{bmatrix} C \\ \beta\text{feat } y \end{bmatrix}_3 \rightarrow 1 \begin{bmatrix} 2 \\ \alpha\text{feat } x \\ \beta\text{feat } y \end{bmatrix} 3\ 1\ 2\ 3.$$

The vowel might be copied from a reduced system of affix vowels, i.e., there might be some type of vowel harmony in reduplicated forms:



stem vowels affix vowels.

The vowel in the copy syllable might be epenthetic:

$$\underset{1}{C}\ \underset{2}{V}\ \underset{3}{C} \rightarrow 1\ V'\ 3\ 1\ 2\ 3.$$

An epenthetic vowel might be assimilated to other elements in the copy:

$$\begin{bmatrix} C \\ \alpha\text{feat } x \end{bmatrix}_1 V_2 \begin{bmatrix} C \\ \beta\text{feat } y \end{bmatrix}_3 \rightarrow 1 \begin{bmatrix} V' \\ \alpha\text{feat } x \\ \beta\text{feat } y \end{bmatrix} 3\ 1\ 2\ 3.$$

An epenthetic vowel might be weakened or strengthened because of its co-occurrence with other elements in the copy.

I will discuss each of these possibilities in turn. This discussion will be based on the data from the regular reduplication classes, i.e., 1 (CVk-) and 3 (CVC-) in the appendix.

2.1 Of the 85 CVk- words only 25 have the same vowel in the model and copy (discounting differences in length):

ʔakʔala·ys	dᶻikdᶻi·ɣ̓	tˢəktˢəla·sik
ʔakʔala·sk	gɑkgɑq̓	tˢəktˢəla·
ʔakʔamalk	hakha·ps	tˢiktˢimho·n
ʔakʔana·s	hakhaɬəbi·sk	ʔakʔalx̣
ʔakʔano·l	hakhaɬeṗa	ʔakʔaʔtˢik
hakhaps	hakhaɬgʸi·k	hakhaks
hakhax̣besx̣	hakhaɬo	mookmooksk
ʔakʔaytk	hukhuHtk	gʸikgʸiHk.
dᶻikdᶻi·s		

Of the 49 CVC- words only 11 have the same vowel in the model and copy:

ʔadᶻʔadᶻiks	gɑsgɑwsk	lugʸisgʸiHs
ʔalʔalgʸəx̣	hasha·tˢ	lukolḱol
gʸisgʸi·Hsk	hashaHs	luɬəpɬəp.
gɑngɑn	ḱʸilḱʸiʔnəm	

Since it will account for only 27% of the data (36/134), the straightforward copying of model syllable vowels appears to have little explanatory value.

2.2 It is possible to increase the amount of data accounted for by assuming the model vowels are copied and then some are assimilated to the consonants in the copy.
The vowel i occurs frequently (23/36) in copies that begin with d, s, ɬ, t, tˢ, or dᶻ, i.e., with coronal, non-lateral, non-nasal segments:

dikdasx̣	siksḱuʔunsk	tˢiktˢm̥mow
dikdu·ɬk	sikswedə	tˢiktˢo·xs
dikdu·s	siksx̣ɑn	tˢiktˢuHṗ
dᶻikdᶻi·s	tikta·lsgmtˢo·x̣s	sumsikswəntk
dᶻikdᶻi·ɣ̓	tˢiktˢalt'	tiktək̓
sikseyp	tˢiktˢaʔlks	dildal
siksgʷaytk	tˢiktˢimhoon	dildu·ls
siksgʸet		dipdu·Hp.

Three of these words appear in the lists in 2.1 above.
The fronting and raising of vowels after coronal

segments constitutes an assimilation of sorts (high, front ≡ coronal):

$$V \rightarrow \begin{bmatrix}+\text{high}\\-\text{back}\end{bmatrix} / \begin{bmatrix}+\text{coronal}\\-\text{lateral}\\-\text{nasal}\end{bmatrix}\_\_\_\_.$$

A copy rule along with this assimilation rule will account for 56 of the 134 data items in 1 and 2 of the appendix, thus raising the sufficiency score to 42%.

The vowel a occurs in most copies (22/25) that begin with a laryngeal glide. 20 of these occur in the lists in 2.1 above. The other two are ʔakʔoks and ʔayʔo·y. These latter two both have an o(·) in the model. The Tsimshian o is an open o and should be considered +low. The fronting of the o in these two words is assimilatory because the glottal stop is both low and -back:

$$\begin{bmatrix}V\\+\text{low}\end{bmatrix} \rightarrow [-\text{back}] / \begin{bmatrix}+\text{low}\\-\text{back}\end{bmatrix}\_\_\_\_.$$

This rule only raises the sufficiency score to 43% (58/134).

Words beginning with an uvular have an ɑ in the copy:

qɑkqɑq	qɑlqol
qɑkqo·m	qɑsqawsk
qɑnqɑn	qɑsqos
qɑlqawlg	qɑlqoliq.
qɑsqɑwsk	

Three of these appear in the lists in 2.1. Of the remaining six, four involve models with o and two involve models with a. Only in the latter two is there a clear assimilation:

$$V \rightarrow \begin{bmatrix}+\text{back}\\+\text{low}\end{bmatrix} / \begin{bmatrix}+\text{back}\\-\text{high}\end{bmatrix}\_\_\_\_.$$

This rule raises the sufficiency score to 45% (60/134).

Most words (10/13) beginning with a lateral have an ə for the copy vowel, but this can hardly be viewed as an assimilation:

ləkla·kʷs	ləklu?wel
ləklaɣ̓	ɬəkɬatˢ
ləkla?abɬ	ɬəkɬgʷɬi·n
ləklobiɬˢaɣ̓	ɬəkɬpun
ləklu·t	luɬəpɬəp.

Four out of eight words beginning with a b or p̓ have an ɨ for the copy vowel, but this is a dissimilatory phenomenon (+anterior ≠ +back):

bɨkbe·d	bɨlba·ʔɬx
p̓ɨkp̓iʔiɬosk	bɨsbasəqn̓.

2.3 A reduced affix vowel system or some kind of affix-stem vowel harmony is not a possibility because the vowel inventory in the copies is nearly as diverse as that in the models. This fact also excludes as a possibility the reduction of the copied or epenthetic vowels where such reduction would be due to the lack/reduction of stress:

i i· ɨ ɯ· u u·	i ɨ u
e e· ə	ə
a a· ɑ ɑ· o o·	a ɑ o o·
model vowels	copy vowels.

The major difference between the two vowel systems is that the copy system consists regularly of short vowels only (there is one exception in the data). The e does not occur in CVk- or CVC- copies, but it does occur in other reduplication class copies. In any event the e and a are freely varying allophones. There is no straightforward, simple relationship between model and copy vowels, e.g., the model vowel a occurs in words with the copy vowels i, ɨ, ə, a, and ɑ. The copy vowel a occurs in words with the model vowels i·, a, a·, o, and o·.

2.4 If one were to assume that the copy vowel is epenthetic and that it is i (the most frequently occurring copy vowel), one could account for only 32% (43/134) of the data.

2.5 The data presented in section 2.2 indicate that the reduplicated affix vowels are in fact epenthetic, i.e., that they depend very little on the nature of the model vowel, and that they are determined primarily by the copy release, i.e., the first consonant of the affix. An expanded statement of the release-vowel dependencies discussed in section 2.2 will account for 68% (91/134)

of the data:

V → i/{d,dᶻ,s,t,ɬ,tˢ,y,ẏ,kʸ,gʸ,kʷ,gʷ,w}____(42/69),

V → a/{h,ʔ}____(22/25),

V → ə/{l,ɬ,m,n}____(14/23),

V → ɑ/{ġ,q̇}____(9/9),

V → ɨ/{b,ṗ}____(4/8).

Although the sufficiency of such an epenthesis-plus-adjustment tactic is greater than the other possibilities (see Table 3), the phonetic motivation for the copy release/copy vowel associations is hardly apparent.

	sufficiency expressed as % of data accounted for
determinants:	
reduplication of the model vowel	27
reduplication w/ assimilation	45
vowel harmony	0
epenthetic i	32
epenthesis w/ assimilation, weakening, & strengthening	68

Table 3. Sufficiency of Possbile Vowel Determinants.

3. In this section of the paper I explore the possibility that reduplication affix vowels can be explained in terms of strength harmony, i.e., that weak copy vowels occur with weak copy releases and strong copy vowels occur with strong copy releases. In order to discuss this possibility it is necessary to briefly review some of the developments in phonological theory dealing with strength hierarchies and strength parameters.

3.1 James Foley (1977), working in some of the same directions as Theo Vennemann (see e.g., 1972) and Joan

Hooper (1976), has identified a number of possibly universal strength paramemters whereby human speech sounds are scaled. I will review here only those of his parameters that I find useful for studying Tsimshian reduplication. These are his α, ρ, η, and ω parameters. The α parameter is used to measure a consonant's strength in resisting lenition, i.e., voicing and spirantization (Foley 1977:28-32). Labials resist lenition the best, i.e., are the strongest along the α parameter. Velars resist lenition least well and are thus weakest along this parameter. In Tsimshian the uvular sounds are more susceptible to lenition than are the velars. I have taken the liberty of adding them to Foley's α parameter:

uvular velar dental labial

1 2 3 4 → α.

The ρ parameter measures resonance (Foley 1977:35-39, 145) and the tendency to vocalize, i.e., to develop as a separate syllable. The greater the resonance the greater the tendency to vocalize. Foley sees vocalization as a kind of strengthening. The higher the ρ parameter value the greater the resonance:

stops spirants nasals liquids glides vowels

1 2 3 4 5 6 → ρ.

Figure 2 places some of the Tsimshian copy release sounds in an αρ grid:

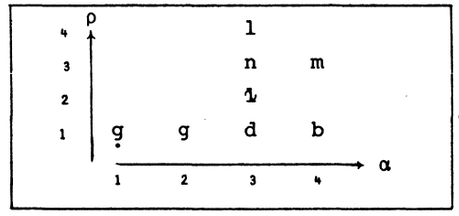


Figure 2. αρ Grid for some Tsimshian consonants.

The g has an αρ value of 2; the m and l each have an αρ value of 7.

The η parameter (Foley 1977:44-48) indicates the tendency for vowels to (among other things) nasalize. Since he sees nasalization as strengthening, the higher the η value the greater the tendency to nasalize and thus the stronger the vowel. The η value scale corresponds to vowel height: the lower the vowel the greater its tendency to nasalize and the higher its η value.

The ω parameter (Foley 1977:44-48) measures a vowel's ability to resist elision. Since back vowels undergo elision less frequently than front vowels, back vowels have the higher ω value. Figure 3 shows some Tsimshian reduplication copy vowels in the ηω grid:

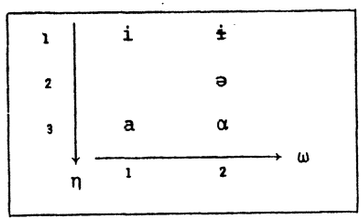


Figure 3. ηω Grid for some Tsimshian vowels.

The i has an ηω value of 2; the α has an ηω value of 5.

3.2 Table 4 shows the copy release:syllable peak associations found in the data under consideration. It is primarily from this data summary that the following analysis of reduplication affix vowels proceeds.

3.3 This analysis can achieve a greatly improved sufficiency if it posits a progressive and variable assimilation of epenthetic vowels where that assimilation is partly in terms of articulatory features and partly in terms of strength parameters. The epenthetic vowel is assimilated in terms of articulatory features to glides and uvulars; it is assimilated in terms of strength parameters to consonants that agree in height and backness, i.e., [+consonantal, αback, αhigh].

If the epenthetic vowel is schwa (ə), then the copy vowel assimilates nonsonorant glides (ʔ and h) in the

		syllable peaks in reduplicated affixes								
		i	ɨ	u	ə	a	α	o·	N̥	L̥
initial consonants	velar	11	1	2	1	-	-	1	-	-
	dental (-lateral, -nasal)	23	3	-	10	-	-	-	2	-
	labial (-nasal)	2	4	-	-	1	-	-	-	1
	l̥	2	1	-	4	-	-	-	1	-
	n̥	1	-	-	1	-	-	-	-	-
	m	-	1	1	3	-	-	1	-	-
	l	-	1	-	6	-	-	-	-	-
	y	6	2	-	1	-	-	-	-	-
	w	2	3	-	1	-	-	-	-	-
	ʔ or h	-	-	1	2	22	-	-	-	-
	uvular	-	-	-	-	-	9	-	-	-

Table 4. Copy release and syllable peak associations.

features low and back in 88% of the data items:

$$\left[C\{{}^{C}_{k}\}\right]_{\substack{copy \\ 1\ 2}} \rightarrow 1\ ə\ 2;$$

$$ə \rightarrow a/\{{}^{ʔ}_{h}\}\_\_\_, \text{ 88\% of the time, i.e.,}$$

$$V_{copy} \rightarrow \begin{bmatrix}+low\\-back\end{bmatrix}/\begin{bmatrix}+low\\-back\end{bmatrix}\_\_\_\_, \ f=.88.$$

The copy vowel assimilates sonorant glides for the feature high 87% of the time:

$$ə \rightarrow \{i,ɨ\}/\{w,y\}\_\_\_\_, \text{ i.e.,}$$

$$V_{copy} \rightarrow |+high|/\begin{bmatrix}+sonorant\\+high\end{bmatrix}\_\_\_\_, \ f=.87.$$

The rasied copy vowel then fronts after (the -back) y 75% of the time:

$$\dot{\imath} \rightarrow i / y\_\_\_\_, \text{ i.e.,}$$

$$\begin{bmatrix} V \\ +high \end{bmatrix}_{copy} \rightarrow [-back] / \begin{bmatrix} +sonorant \\ +high \\ -back \end{bmatrix} \_\_\_\_, \quad f=.75.$$

For the remaining copy releases (segments that are +consonantal, αhigh, αback) the affinity between copy release and peak is not to be found in conventional features but rather in similarities in strength. Table 5 shows the αρ and ηω values of affix associated releases and peaks and the frequency (derived from Table 4) of each association:

	ηω			
	2(i)	3(ɨ,u)	4(a,o)	other(N̩,L̩)
αρ				
3 (velar)	.6875	.1875	.1250	.0000
4 (dental, -lateral, -nasal)	.6053	.0789	.2632	.0526
5 (labial, -nasal)	.2500	.5000	.1250	.1250
5 (L̩)	.2500	.1250	.5000	.1250
6 (n)	.5000	.0000	.5000	.0000
7 (m)	.0000	.3333	.6667	.0000
7 (l)	.0000	.1429	.8571	.0000

Table 5. Strength Associations.

The epenthetic vowel ə(η2) is raised, i.e., reduced in η value if the preceding release is +consonantal, αhigh, αback and has an αρ value of less than eight:

$$ə \rightarrow \{i, \dot{\imath}\} / \{\text{velar, dental, labial, nasal, lateral}\} \_\_\_\_, \text{ i.e.,}$$

$$V_{copy} \rightarrow [+high] / \begin{bmatrix} +consonantal \\ \alpha high \\ \alpha back \end{bmatrix} \_\_\_\_.$$

If the αρ is seven, the vowel raises in .2381 of the data examples. If the αρ is six, the vowel raises in .5000 of the data examples. If the αρ is five, the raising frequency is .5625. With an αρ of four the raising is .6842. Finally with an αρ of three the vowel raises 87.5% of the time. The lower the αρ strength of the release, the more likely is the epenthetic vowel to lose η strength:

$$V_{copy} \rightarrow [1\eta] / \begin{bmatrix} +consonantal \\ \alpha high \\ \alpha back \\ <8\alpha\rho \end{bmatrix} \_\_\_\_, \quad \begin{array}{l} f=.8750(\alpha\rho 3), \\ .6842(\alpha\rho 4), \\ .5626(\alpha\rho 5), \\ .5000(\alpha\rho 6), \\ .2381(\alpha\rho 7), \\ .0000(\alpha\rho>7). \end{array}$$

"Reduced," i.e., raised, copy vowels may be fronted if the αρ value of the preceding release is less than seven:

$$\dot{\imath}_{copy} \rightarrow i, \text{ i.e.,}$$

$$\begin{bmatrix} V \\ +high \end{bmatrix}_{copy} \rightarrow [-back].$$

This vowel fronting, loss of ω value, has a frequency of .5000 if the αρ of the release is six, .2500 when αρ is five, .6053 with 4αρ, and .6875 with 3αρ, i.e., the lower the αρ strength, the more likely is the raised epenthetic vowel to lose ω strength:

$$\begin{bmatrix} V \\ 1\eta \end{bmatrix}_{copy} \rightarrow [1\omega] / [<7\alpha\rho] \_\_\_\_, \quad \begin{array}{l} f=.6875(\alpha\rho 3), \\ .6053(\alpha\rho 4), \\ .2500(\alpha\rho 5), \\ .5000(\alpha\rho 6), \\ .0000(\alpha\rho>6). \end{array}$$

3.4 The analysis in 3.3 proposes a number of natural (phonetically motivated) explanations for the realization of vowels in reduplication copy syllables. This

analysis is far more sufficient than any of the other possibilities discussed in section 2. Unfortunately it is not the kind of analysis that can provide the student of the language with sufficient competence. There is so much "play" in this analysis that it will be of little help in predicting the plural form of any newly encountered lexical item, that is to say, it claims that there is a great deal more room for variation than has actually been observed. Nevertheless it appears to be the only useful alternative to a burdensome, unstructured exercise in memorization. The teaching application of this analysis will involve setting up the most frequently occurring variants as normal or rule governed. The other variants must then be learned as exceptions. A knowledge of the principles of assimilation and strength harmony might be useful but also dangerous as they could easily lead to an unacceptably large number of overgeneralization errors.

APPENDIX

1. first inflection class (CVk-)

ʔalá·ys, ʔakʔalá·ys, lazy
ʔalá·skʷ, ʔakʔalá·skʷ, weak
ʔamálk, ʔakʔamálk, scab
ʔaná·s, ʔakʔaná·s, skin
ʔanó·l, ʔakʔanó·l, allow
ʔap, hakháps, bee
ʔɑx̣bésx̣, hakhax̣bésx̣, saw (tool)
ʔaytk, ʔakʔáytk, call by name
be·d, bɨkbé·d, bed
dasx̣, dikdásx̣, squirrel
dɑx̣ɬ, dəkdáx̣ɬ, hammer
du·ɬk, dikdú·ɬk, basket
du·s, dikdú·s, cat
dᶻi·s, dᶻikdᶻí·s, weir
dᶻi·ʏ̝, dᶻikdᶻí·ʏ̝, dolphin
gʷɨdá·tˢ, gukgʷɨdá·tˢ, jacket
gʷisnabáʔalə, gukgʷisnabáʔalə, button blanket
g̣a·x̣, g̣ɑkg̣áq, black bass
g̣o·m, g̣ɑkg̣ó·m, ashes
ha·p̣s, hakhá·p̣s, cover
haɬəbí·sk, hakhaɬəbí·sk, knife
haɬép̣a, hakhaɬép̣a, knife
haɬgʏ́·k, hakhaɬgʏ́·k, shore
halo, hakhálo, cloth
huHtk, hukhúHtk, call
la·kʷs, ləklá·kʷs, light

ʏ̝ The ʏ̝ represents a high, back, unrounded glide.

laɣ, ləkláɣ, trout
láʔabɬ, ləkláʔabɬ, twinkle
libeɬˢáɣ, ləklobiɬˢáɣ, kidney
lu·t, ləklú·t, wedge
lúʔwɬ, ləklúʔwel, drip
ɬaHtˢ, ɬəkɬátˢ, scraper
ɬaχs, ɬikɬáχs, claw
ɬgʷɬí·n, ɬəkɬgʷɬí·nə, steep valley
ɬpun, ɬəkɬpún, whale
ɬú·Hnti, ɬikɬúHnti, angry
máɬiɬk, məkmá·ɬiɬk, tell
mihó·ks, mɨkmihó·ks, fragrant
mi·Hlk, məkmí·Hlk, dance
mo·lksχ, mukmó·lsk, sour
nəlúHɬk, nəknəlú·ɬk, nest
n̓ɬánagn̓, n̓ɬɨkɬánagn̓, barrel
n̓ɬómsk, nikəʔn̓lómsk, sacred
ṕíʔiɬosk, ṕɨkṕíʔiɬosk, a square of dried seaweed
seʔmχ, səkséʔmχ, butter clam
sesó·, sɨksesó·, rattle (noun)
seyp, sikséyp, bone
sgʷaytk, siksgʷáytk, stop
sgʸet, siksgʸét, spider
sḱuHnsk, siksḱúʔunsk, teach
stu·l, sikstú·l, accompany
swédə, sikswédə, sweater
sχan, siksχán, mat
ta·lsgm̓ɬˢó·Hχs, tikta·lsgm̓ɬˢó·χs, stocking
ɬˢal, ɬˢikɬˢált, face
ɬˢaʔlks, ɬˢikɬˢáʔlks, whirlpool

ɬˢaskʷ, ɬˢəkɬˢáskʷ, louse
ɬˢəlá·sik, ɬˢəkɬˢəlá·sik, canyon
ɬˢəlá·, ɬˢəkɬˢəlá·, basket
ɬˢiɬináʔa, ɬˢɨkɬˢiɬináʔa, apron
ɬˢm̓hó·n, ɬˢikɬˢimhó·n, grey cod
ɬˢm̓mú·, ɬˢikɬˢm̓mów, ear
ɬˢo·χs, ɬˢikɬˢó·χs, shoe
ɬˢuHp, ɬˢikɬˢúHp, tail
ẃa·n, wɨkẃá·n, tooth
ẃey, wɨkẃéy, find
woyt, wɨkwóʔyt, invite
yáwɬm̓χ, yikyáwɬm̓χ, advise
ye·y, yikyé·y, fat
yetˢk, yɨkyétˢk, animal
yeχɬ, yikyéχɬ, spit
yu·sɬ, yɨkyú·sɬ, basket
ý́u·ta, yiký́ú·ta, man
ý́u·tk, ý́iký́ú·tk, carry around the neck
ʔalχ, ʔakʔálχ, ʔalʔálχ[5], angry
ʔáʔtˢik, ʔakʔáʔtˢik, ʔáʔadᶻik[5], straight
swəntk, sumsikswə́ntk[5], blow
gʸiHk, gʸikgʸíHk[6], fly (noun)
haks, hakháks[6], scold
ḱʸak, ḱʸikḱʸák[6], choke
mo·ksk, mo·kmó·ksk[6], white
ʔoks, ʔakʔóks[6], fall
saksk, səksáksk[6], clean

[5]These words have multiple class membership.
[6]These words are ambiguous as to class membership.

ɬək, ɬikɬək[7] terrace (noun)
ɬˢakʸ, ɬˢəkʸɬˢák[7] extinguished

2. second inflection class (CVx̣-)
ʔa·dᶻəq, ʔəx̣ʔá·dᶻəq, reach across
béʔəx̣, bɑx̣béʔəx̣, tear up
dɑʔáx̣ɬk, dɑx̣dɑʔáx̣ɬk, able
dí·lm̓x̣, dɑx̣dí·lm̓x̣, answer
q̓o·mtk, gɑx̣g̓ó·mtk, hope
sx̣ɑytˢk, səx̣sáytˢk, hurt
wo·mx̣k, wəx̣wó·məsk, suffer
yá·mgɑsk, yəx̣yá·mgɑsk, lure
ʔax̣ɬk, ʔax̣ʔáɬk[7] reach
ha·x̣k, hax̣há·x̣k[7] overburdened
p̓ɑx̣s, p̓ix̣p̓áx̣s[7] leggings

3. third inflection class (CVC-)
ʔa·m, ʔəmʔá·m, good
ʔádᶻiks, ʔadᶻʔádᶻiks, arrogant
ʔagʷi·ɬéms, ʔagʷi·ɬm̓ɬéms, grandchild's spouse
ʔálgʸəx̣, ʔalʔálgʸəx̣, speak
ʔáʔpɑx̣, ʔəpʔáʔpɑx̣, remember
ba·l, bilbá·l, feel
bá·ʔɬx̣, bɨlbá·ʔɬx̣, ghost
básɑg̓n̓, bɨsbásəg̓n̓, divide
dá·msəx̣, dm̓dá·msəx̣, faint
dal, dildál, fight
dəx̣dém, dɑx̣dm̓dám, hold fast

[7]These words are ambiguous as to class membership.

didú·ls, dildú·ls, alive
du·Hp, dipdú·Hp, base of a mountain
dᶻep, dᶻəpdᶻép, make
gʷatk, gʷətgʷátk, lost
gʷelk, gʷiləgʷéHlk, burn
gʸélɨks, gʸilgʸálks, feel
gʸeɬk, gʸiɬgʸéɬk, stab
gʸi·Hsk, gʸisgʸí·Hsk, miss
g̓ɑldᶻáp, g̓ɑldᶻəpdᶻáp, town
g̓ɑn, g̓ɑng̓án, tree
g̓ɑwlg, g̓ɑlg̓áwlg, wind around
g̓ɑwsk, g̓ɑsg̓áwsk, narrow
g̓ol, g̓ɑlg̓ól, empty
ha·tˢ, hashá·tˢ, stump
haHs, hasháHs, dog
ḱʷəs, gʷisgʷás, break
ḱʸiʔném, ḱʸilḱʸiʔném, give
lo·p, lɨpló·p, rock
lugʸíHs, lugʸisgʸíHs, be wrong
luḱól, luḱolḱól, alone
luɬép, luɬəpɬép, deep hole
ma·tg, mətmátg, dirty
naygʸéɬxs, naygʸiɬgʸéɬx̣s, tattoo
ʔo·y, ʔayʔó·y, throw
p̓álgʸɨx̣sk, p̓ɬp̓álgʸɨx̣sk, heavy
p̓í·ɬn̓, p̓aɬp̓í·ɬn̓, crush
q̓awsk, q̓asq̓áwsk, unripe
q̓os, g̓ɑsg̓ós, jump
q̓oylq, g̓ɑlg̓óliq, dull
sagʷá·tk, gʷitgʷá·tk, disappear

tɬˢap, tɬˢəptɬˢáp, town
wa·, wətwá·, meet
wəs, wiswə́s, blanket
wéli, wilwéli, carry
yeltk, yəlyéltk, drill
yeɬk, yilyéɬk, smooth
ba·ɬ, biɬbá·ɬ; beɬ, bibéɬ;[8] butcher
gŵ·daχ, gɨtgŵ·daχ; gŵ·dəχ, gɨgŵ·dəχ;[8] ask

4. fourth inflexion class (CV-)
da·lg̣, dɨdá·lg̣, rebuke
da·w, dudá·w, ice
dᶻaɬ, dᶻɨdᶻáɬ, consume
gʸiq́á·k, q́aygʸiq́ák, waist, hip
g̣uHk, g̣uhg̣ú·k, kill
gŵ·daχ, gɨgŵ·daχ, ask
há?yin, hahá?yin, place upright
holtk, hahóltk, full
ksi·w, ksuksí·w, scraper
ksɯ·hú·tk, ksɯ·hɨhú·tk, call out
ḱa·?lk, wuq́aq́á·?lk, thief
ɬaχ, lilá̱q, needle
laχdí·, didí·, hill
ɬá?ayəsk, ɬəlɬá?ayəsk, climb
naH, ne?ná·, snowshoe
pɬoHn, bəpɬóHn, sea otter
ptal, buptál, rib
pte·ltk, bupté·ltk, climb

[8]These words have multiple class membership.

pɬˢa·n, bupɬˢá·n, totem pole
pɬˢih, bupɬˢíh, comb
q́ah, q́aq́á·h, wound
q́o, q́aq́ó, back
siHpk, sisí·pk, sick
sm̩?ó·ygʸit, sm̩gʸigʸét, chief
ɬú?usk, ɬuɬú?usk, butcher knife
tɬˢm̩?á·tk, tɬˢɨɬˢm̩?á·tk, sweet

5. fifth inflection class (-CV)
haná?a, haná?n̩q, woman
kʷdi·, ləkʷdí·di, hungry
lóg̣ask, ló·lg̣ask, wet
loχ, loHlt, rotten
ɬek, ɬíɬɨk, bent
ná?aχ, ná·?nəχ, dress
plaksk, plí·plaksk, exhausted
saχ, sé·saχ, sharp
tɬˢo·, tɬˢó·tɬˢəχt, split
wá?a, wá?wəχ, dig
yo·ks, yó·yəks, wash
yuHtˢk, yú?itˢk, necklace

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How to Get Things Done in Bella Coola: The Expression of Mood

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In this paper we examine the expression of mood in Bella Coola, a Salishan language spoken on the central coast of British Columbia, Canada.[1] We will consider some of the formal and semantic properties of individual moods, and discuss some of the criteria for the recognition of a system of moods. We will also introduce and detail a complex of roots that function only in conjunction with non-Indicative mood morphology and conclude with an examination of the grammar of mood and some comments on possible historical origins.

Bella Coola has three mutually exclusive morphemes that, when added to stems, have the function of shifting the mood from the Indicative to some other. A morpheme that belongs to this class will be called a Modal. These appear in lieu of the normal Indicative suffixation. Consider the following Intransitive forms:

(1) ʔaxap-ʔit
go-
'You can go now'

(2) ʔaxap-na
'Try and go'

(3) ʔaxap-nas
'Go and find out'

The elements ʔit, na, and nas differ in at least two ways from another class of elements that occurs to the right of predicates, viz. Particles.[2] First, Modals do not follow additional morphological expression of Agents as the Particles do.[3] In the third person singular, the Agent is normally marked by -Ø in the Intransitive, and