

Coast Tsimshian Plural Formation

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0. Introduction¹

Coast Tsimshian is a language spoken on the coast of northern British Columbia, Canada, and southern Alaska. The number of the speakers is around 500 (Krauss 1994). Genetically, it belongs to the Tsimshianic language family, which consists of three languages, Coast Tsimshian (hereafter cited as CT), Southern Tsimshian, and Nass-Gitksan, which consists of two dialects, Nass and Gitksan.

CT has some processes for plural formation. Previous descriptions on CT plural formation are in Boas (1911) and Dunn (1979a, 1979b, 1981). In this paper, I attempt to describe these processes in more detail, according to their types. The nouns and verbs make use of one or more than one of them to form their plurals. These processes are reduplication, affixation, suppletives, and isomorphics. Of these four processes, reduplication is the most common way to make plurals. There are, though, a few words which cannot be explained by any one of them.

The phonemic inventory of this language is shown in the appendix.

1. Meaning and use

The nouns and the verbs form the plural in the same way. The plural forms of verbs are generally used when the subject of an intransitive verb or the object of a transitive verb, the patient, is more than one.

<u>SG</u>	<u>PL</u>
háp 'lid'	hapháp 'lids' (hap- CVC-)
ʔú:mɪ 'pail'	ʔuʔú:mɪ 'pails' (ʔu- CV-)
nahápa ʔú:mɪ	'lid of a pail' (na- POSS, -a CN)
nahaphápa ʔuʔú:mɪ	'the lids of the pails'
sí:pk 'sick'	səpsí:pk '(plural subjects) sick' (səp- CVC-)
nan sí:pkə́nu	'I was sick.' (na PAST, -n 1SG, -ə́nu 1SG.Sbj)
səpsí:pka qasəsi:t	'Her legs are sore.'
	(-a CN, qasəsi: 'leg, foot (PL)', -t 3POSS)
kʰi:mk 'to wipe'	li:mk 'to wipe (plural patients)'
	(lə- an affix to form plurals)
kʰi:mkʷu halitxó:xk	'I wipe the table.'
	(-u 1SG.Ag, halitxó:xk 'table (SG)')

C₁-model and the one, from which C₂ is copied, is called C₂-model. While C₁ is the same as C₁-model in a great many examples, there are a number of words where is added some change on the process to copy C₂ from C₂-model, such as deglottalization. C₁-model and C₂-model are abbreviated to C_{1m} and C_{2m} respectively in the reduplication formula.

Reduplication can have other functions than indicating plurality. Dunn (1979a:27) writes that reduplicated derivations function to express repeated activity or state of being (iterative), intensification, natural species, and body parts.

1. repetition: it is indicated by the reduplication that the activity is performed repeatedly.

ɬaxɬaxsa tú:sa halitá: 'The cat is scratching the chair.'

(ɬax- CVC-, ɬaxs 'to scratch', -a CN, tú:s 'cat', -a CN, halitá: 'chair')

səksəwánu sáwənsk 'I blow a piece of paper repeatedly.'

(sək- CVC-, səwán 'to blow', -u 1SG.Ag, sáwənsk 'paper')

2. emphasis

səmhawháwju 'What I say is really true.'

(səmháw 'to tell the truth', haw- CVC-, -ju 1SG.Sbj)

3. word formation (derivation): reduplication is used to form words. In this process, vowels other than {ə} are sometimes used.

ʔanʔón (CVC-*ʔón²) 'hand, arm'

kʷəskʷás (CVC-*kʷás) 'steller's jay, bluejay'

kʷikʷó:ks (CV-*kʷó:ks) 'to float'

məmó:mq̄ (CV-*mó:q̄-CVC) 'to smile'

For some more examples of the words using the process of CVC-, CV- or -CVC reduplication,³ see each section of 2.1.1. - 2.1.3. No examples were found using -CV reduplication as a means of word formation, which are not found in Dunn (1979a), either.

2.1.1. Reduplication 1 (R1): CVC- Reduplication

2.1.1.1. Reduplication 1-C (R1-C)⁴

This is one of the commonest processes to make plurals. CVC- is reduplicated before the stem.⁵⁻⁶

The reduplication formula is:

{(...-)C₁VC₂-C_{1m}(C)VC_{2m}(...)}

The first consonant of the stem is used as C₁-model. If the stem begins with a consonant cluster, the first consonant is used. The first consonant after the stem-initial vowel is used as C₂-model, i.e., if the initial syllable of the stem is closed with a consonant/consonant

cluster, that consonant/the first consonant is used as C₂-model, and if it is open, the first consonant of the following syllable is used as C₂-model.⁷

There is a hiatus between C₂ and the following consonant (C₁-model) and even when C₂ is a stop⁸ and C₁-model is a glottal stop, it never happens that C₂ merges with the following sound and is pronounced as an ejective. C₂ is generally pronounced unreleased, although it could be aspirated in deliberate speech.

The vowel in the reduplicated syllable is {ə}, which appears as /i/, /a/, or /ə/ on the surface after the morphophonemic rules are applied.⁹ Examples are below.

k ^ɨ f:s [g ^ɨ f:s]	k ^ɨ isk ^ɨ f:s [g ^ɨ isg ^ɨ f:s]	'wrong'
jáɬk [jéɬk]	jiɬjáɬk [jɨɬjéɬk]	'smooth'
ʔáks [ʔáks]	ʔakʔáks [ʔakʔáks]	'wet'
xólk [xól.k]	xalxólk [xalxól.k]	'crispy'
ɬáxs [ɬáxs]	ɬaxɬáxs [ɬaxɬáxs]	'to scratch'
qásk ^ɨ ɬi [q'ásk ^ɨ ɬi]	qasqásk ^ɨ ɬi [q'asq'ásk ^ɨ ɬi]	'unripe'
ʔalá:js [ʔalá:js]	ʔalʔalá:js [ʔalʔalá:js]	'lazy'
mák [ʔmák]	məkmək [ʔmikʔmák]	'to catch (on a net)'
sáksk [sáksk]	səksáksk [sɨksáksk]	'clean'
k ^w á:nks [g ^w á:nks]	k ^w ənk ^w á:nks [g ^w əng ^w á:nks]	'cooked/faded'

When C₂-model is a back velar stop,¹⁰ a morphophonemic rule (back velar fricativization) is applied and the stop is changed to corresponding fricative, /x/ (after C₂-deglottalization, if C₂-model is glottalized).¹¹

čé:q [ts'é:x]	čaxčé:q [ts'axts'é:x]	'to lick'
cóq [dzóx]	caxcóq [dzaχdzóx]	'to live'
wá:q [wáʔax]	waxwá:q [waxwáʔax]	'to dig'
luk ^ɨ f:s [lug ^ɨ f:s]	luk ^ɨ isk ^ɨ f:s [lug ^ɨ isg ^ɨ f:s]	'wrong' (lu- 'really')
k ^ɨ ɬiʔóksk	k ^ɨ ɬiʔakʔóksk	'to fall down'
[k ^ɨ ɬiʔóksk]	[k ^ɨ ɬiʔakʔóksk]	(k ^ɨ ɬi- 'downwards')
k ^ɨ istəmí:s	k ^ɨ istəmtəmí:s	'to copy (writing)'
[g ^ɨ ist'ɨmí:s]	[g ^ɨ ist'ɨmt'ɨmí:s]	(k ^ɨ is- 'away to another place')

There are some examples where R1-C is used as the process for word formation.

ksətaxtó:q [ksət'axt'ó:x]	'orange'	(< tó:q 'to suck')(ksə- 'fluid')
hamhóm [hamhóm.]	'ankle'	(<?)
k ^w əsk ^w á:s [g ^w əsg ^w á:s]	'steller's jay, bluejay'	(<?)

k^ʰisik^wəlk^wálk [g^ʰisig^wəlg^wáɫ.k] 'northern light'

(<k^wálk 'to burn, burnt, fire') (k^ʰisi- 'down river, downstream')

If there is a semivowel (/j, w/)¹² after the stem-initial vowel and it is followed by another consonant, not the semivowel but the following consonant is used as C₂-model.

qáwsk [Gáú.sk] qasqáwsk [GasGáú.sk] 'narrow'
qáwn [Gáw^ən] qanqáwn [GanGáw^ən] 'to chew'

But when the semivowel is the only consonant after the stem-initial vowel, it is used as C₂-model.

ʔòj [ʔòj] ʔajʔòj [ʔajʔòj] 'to throw'

Examples using R1-C for word formation with a semivowel as C₂-model:

qáwqá:w [q^ʰáwq^ʰá:w] 'crow' (<?)
hawháw [hawháú.] 'lion' (< háw 'to say')

C₂-deglottalization

When C₂-model is a glottalized consonant, deglottalization occurs and its corresponding plain sound is used as C₂.

káməɫ [k^ʰámɫ] kəm^hkáməɫ [k^ʰ+mk^ʰámɫ] 'to pinch'
ʔá:pəq [ʔá:p^həq] ʔapʔá:pəq [ʔapʔá:p^həq] 'to remember'
wá:q [wá^həq] waxwá:q [waxwá^həq] 'to dig'
qó:jtəks qatqó:jtəks 'to arrive'
[Gó:jʔt'əks] [GatGó:jʔt'əks]

Examples of R1-C with C₂-deglottalization used for word formation:

hathótəxk [hathótʔt'əxk] 'to boil' (<?)
hatháwtəsk [hatháwt'əsk] 'whistle' (<?)

C₂-deaspiration ?

There is one example which has a voiceless aspirated stop as its C₂-model.

SG PL
[ʔè:p^hən] [ʔapʔè:p^hən] 'light'

Its C₂, i.e., the [p] in the plural is pronounced voiceless and generally unreleased, being followed by a glottal stop (C₁-model), though it could be aspirated in deliberate speech. This C₂ is considered as a plain stop, /p/, because aspirated stop, /p^h/, appears only before vowels or word boundary and is always pronounced aspirated, never being unreleased. The word above could be written phonemically:

ʔè:p^hən [ʔè:p^hən] ʔapʔè:p^hən [ʔapʔè:p^hən] 'light'

Though this is the only example, we might be able to postulate another rule, i.e.,

when C₂-model is an aspirated consonant, C₂ is the corresponding plain sound.

Now it might be possible to unite this rule together with the preceding one, C₂-deglottalization, into a single rule, which might be called "C₂-neutralization." If C₂-model is aspirated or glottalized, it is changed to a corresponding plain consonant in C₂-position, no matter whether C₂ is an obstruent or a sonorant. Thus, there could appear in C₂-position only the most unmarked series, i.e., the plain series, and not the aspirated or glottalized ones.¹³

2.1.1.1.1. R1-C irregulars

The following example has its C₁ glottalized, although C₁-model is not a glottalized sound.

nəksuní:sk ¹⁴	həkəkəsuní:sk	'window'
[nʰksuní:sk]	[ʔnʰkɪksuní:sk]	

The following is the only example that has two consonants in C₂-position, i.e., the reduplicated syllable has a form CVCC-.

mó:ksk [mó:ksk]	məksmó:ksk [mʰksmó:ksk]	'white'
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2.1.1.1.2. R1-C+A

A few plurals are found in which R1-C is used together with A (affixation).

R1-C+A1

čál [ts'ál]	qačəlčál [qats'ɪts'ál]	'face'
pán [bán·]	qapənpán [gabɪnbán·]	'belly'

Both examples above could be used without {qa-} with no differences in the meaning.

R1-C+A2

ʔask'á:paq	ʔasləplá:paq	'talkative'
[ʔasg'á:baχ]	[ʔaslɪplá:baχ]	

2.1.1.2. Reduplication 1-k (R1-k)

In this CVC-reduplication, C₂ is always /k/. This process might be considered to have spread from R1-C words which have a simple velar C₂-model. There are, however, also words which make use of this process, though not having a simple velar as C₂-model. {C₁ək-} is attached word-initially, wherever the stem lies. There are words in R1-k which have only one open syllable, that are not found in R1-C. When the word has a proclitic, {C₁ək-} is attached before the proclitic. The reduplication formula is:

{C₁æk-C_{1m}...}

The {ə} in the reduplicated syllable appears as /i/, /a/, or /ə/ phonemically.¹⁵

jú:təsk [jú:t'ɪsk]	jikjú:təsk [jikjú:t'ɪsk]	'scarf, necklace'
qajá:k [qajá:k]	qakqajá:k [qakqajá:k]	'grey'
ʔè:sk [ʔè:sk]	ʔakʔè:sk [ʔakʔè:sk]	'to promise'
pó: [p'ó:]	pəkpó: [p'ɪkp'ó:]	'broken'
tú:ɪk [dú:ɪk]	təktú:ɪk [dɪkdú:ɪk]	'basket'
təmqáws [t'əmqáw.s]	təktəmqáws [t'əkt'əmqáw.s]	'head'
(təm-, ¹⁶ qáws 'hair')		
məwác ^h a [mɪʔwátsh ^a]	məkməwác ^h a [mɪkɪʔwátsh ^a]	'crazy'
(mə- 'like', wác ^h a 'land otter')		
haxsámi [haxsámi]	hakhaxsámi [hakhaxsámi]	'steakknife'
(ha- INSTR, x- 'to eat', sámi 'meat')		
k ^w əs ^h əpála	k ^w əkk ^w əs ^h əpála	'button blanket'
[g ^w əs ^h əpála]	[g ^w əkk ^w əs ^h əpála]	
(k ^w əs- 'blanket', əpála 'button')		

This process, R1-k, is the most productive one. Many borrowings belong to this type.

pó:t [bó:t]	pəkpó:t [bɪkbó:t]	'boat'
sí:c [sí:ts]	səksí:c [sɪksɪ:ts]	'sheet'

There are a few examples of compounds which have the reduplicated syllable after the proclitic. These words have a stem whose plural is also formed with R1-k.

hukʔá:t [hukʔá:t]	hukʔakʔá:t [hukʔakʔá:t]	'fisherman'
(huk- nomen actoris)		
cf. ʔá:t [ʔá:t]	ʔakʔá:t [ʔakʔá:t]	'to fish (with a net), net'
čəmsáwənsk	čəmsəksáwənsk	'paper bag'
[ts'ɪmsáwənsk]	[ts'ɪmsɪksáwənsk]	(čəm- 'in')
cf. sáwənsk	səksáwənsk [sɪksáwənsk]	'paper'
[sáwənsk]		

2.1.1.3. Reduplication 1-x (R1-x)

In this CVC-reduplication, C₂ is always /x/. As the case of R1-k, this process might be considered to have spread from R1-C for words which have a back velar C₂-model.¹⁷ There are, however, also words which make use of this process, though not having a back velar C₂-model. /C₁ax-/ is reduplicated before the stem. The reduplication formula is:

/(...-)C₁ax-C_{1m}.../¹⁸

tó:jaxs [dó:jaxs]	taxtó:jaxs [daxdó:jaxs]	'strong'
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ti:ləmxk [di:ləmxk]	taxti:ləmxk [daxdi:ləmxk]	'to answer'
tó:ʔsk	taxtó:ʔsk	'to suck'
[t'óʔɔsk/t'óʔesk]	[t'axt'óʔɔsk/t'axt'óʔesk]	

2.1.1.3.1. R1-x irregulars

In the following example, C₁ is glottalized, although C₁-model is not.

txó: [txó:]	taxtxó: [t'axtxó:]	'wide'
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2.1.1.4. Reduplication 1-t (R1-t)

A few examples were found where C₂ is /t/. This process is not reported in Dunn (1979a, 1979b, 1981) but Boas (1911:371) has a brief description of it. {C₁ət-} is attached to the stem. The reduplication formula is:

{(...-)C ₁ ət-C _{1m} ...}		
wá: [ʔwá:]	wətwá: [ʔwətʔwá:]	'to find'
kʷá:ɳ [kʷ'áʔan]	kʷətʔkʷá:ɳ [kʷ'ətʔkʷ'áʔan]	'to lose'
qalʔó [qalʔó]	qalʔatʔó [qalʔatʔó]	'to drop'

As in the cases of R1-C and R1-k, there is a hiatus after the reduplicated syllable and the [t] is never pronounced as an ejective even when followed by [ʔ]. The C₂, /t/, is generally pronounced with no audible release.

2.1.2. Reduplication 2 (R2): CV- Reduplication

R2 is formed by prefixing C₁V- to the stem. The reduplication formula is:

{(...-)C₁V-C_{1m}...}

V is generally {ə}. As the morphophonemic rules are applied after CV-reduplication, the {ə} appears as /i/, /a/, /u/ or /ə/ phonemically.¹⁹

k'át [g'ét]	k'ik'át [g'ig'ét]	'person'
sájp [sái·p/séi·p]	səsájp [sisái·p/síséi·p]	'bone'
wá:p [wá:p]	wəwá:p [uwá:p]	'house'
ló:ks [ló:ks]	ləló:ks [l̩ló:ks]	'to float'
ʔálk'aq	ʔaʔálk'aq	'to speak, to talk'
[ʔálg'ax/ʔáljax]	[ʔaʔálg'ax/ʔaʔáljax]	

qá: [q'á:]	qáqá: [q'əq'á:] ²⁰	'wound'
k'ú: [g'ú:]	k'uk'ú: [g'u'g'ú:]	'to shoot'

There are a few examples of R2 used for word formation. The following examples indicate singular except /tətálpk/.

tətú:ls [dədú:ls] 'alive'²¹ (<?)

məmə:mə [m̩m̩ó:ʔm̩ʰχ] 'to smile' (??)
 kʷukʷáalks [gʷugʷáɫ·ks] 'shiny' (< kʷáalk 'to burn, burnt, fire')
 tətálpk [dədál·pk] 'soon' (< tálpk 'short')

2.1.2.1. R2 irregulars

There are some plurals made by R2 in which the vowels in the reduplicated syllable could not be explained by underlying {ə}. In the following two examples are used short vowels which have the same quality as the long stem vowel.

tí: [dɪ:] tití: [dɪʰdɪ:] 'hill'
 ʔú:mɪ [ʔu:mɪ] ʔuʔú:mɪ [ʔuʔú:mɪ] 'pail'

/a/ is used in the next two examples.

lutó: [ludó:] lutató: [ludaʰdó:] 'to put in, to pack'
 lutʰó: [lutʰó:] lutʰatʰó: [lutʰaʰtʰó:] 'to put in'

2.1.2.2. R2+A

R2 is used together with A1 (affixation 1 → 2.2.1.1.) in the following example.

sájp [sái·p/séi·p] qasəsájp 'bone'
 [gasɪsái·p/gasɪséi·p]

2.1.3. Reduplication 3 (R3): -CVC Reduplication

In R3, -CVC Reduplication, the reduplicated syllable is not prefixed to the stem, or word-initially, but attached right after C₂-model. C₁-model and C₂-model are the consonants flanking the stem vowel which carries stress. Thus, when the stem vowel is followed by only one consonant, which is C₂-model, -CVC is suffixed to that and when the stem vowel is followed by more than one consonant, the reduplicated syllable is inserted right after the first one of them. There is no word in this type whose stem ends in a vowel.

The reduplication formula is:

$$\{(\dots)C_{1m}\check{V}C_{2m}-C_{1\theta}C_{2}(-\dots)\}^{22}$$

C₂-model is a simple or back velar, stop or fricative, plain or glottalized.

sáq [sáχ] sá:saq [sá:sax] 'sharp'
 xpáq [χbáχ] xpá:paq [χbá:baχ] 'to fold'
 láxs [láχs] lá:laxs [lá:laxs] 'to bathe'

When there is a semivowel after the stem vowel which is in turn followed by a stop, not the semivowel but the stop is used as C₂-model, as seen in R1-C formation, and the reduplicated syllable is suffixed to the

stop.

sájk [sáʔik]	sí:sæk [sí:sɨk]	'to pull'
	(from {sajk-sæk})	

C₂-model deletion and compensatory lengthening

After -C₁əC₂ is reduplicated, C₂-model is deleted and the stem vowel, if it is short, is lengthened.²³ When the stem vowel is originally long, it does not change its length.

	sáq-səq	xpáq-pəq	láx-ləx-s
C ₂ -model deletion and			
compensatory lengthening	sá:səq	xpá:pəq	lá:ləxs
ə-variation	sá:saq	xpá:paq	lá:laxs
OUTPUT	[sá:saχ]	[χpá:baχ]	[lá:laχs]

ə-deletion

{ə} in the reduplicated syllable is deleted when preceded by a sonorant and followed by a stop which is in turn followed by a vowel or a word boundary.

lôq [lôχ]	lô:lq [lô:l ^a χ]	'rotten'
lôqaksk	lô:lqaksk [lô:l ^a aksk]	'wet'
	[lôqaksk/lô ^a aksk]	
haná:q̣ [haná:ʔaχ]	haná:nq̣ [haná:ʔnaχ]	'girl, woman'

These processes are illustrated as follows:

	lôq-ləq	lôq-ləq-aksk	haná:q̣-nəq̣
C ₂ -model deletion and			
compens. lengthening	lô:ləq	lô:ləqaksk	haná:nəq̣
ə-deletion	lô:lq	lô:lqaksk	haná:nq̣
OUTPUT	[lô:l ^a χ]	[lô:l ^a aksk]	[haná:ʔnaχ]

Below are examples where ə-deletion does not occur between a sonorant and a stop. In the first one, it does not occur because the stop, i.e., C₂, is followed by a consonant:

jó:ks [jó:ks]	jó:jiks [jó:jɨks]	'to wash' ²⁴
jáq [ʔjáχ]	já:jaq [ʔjá:jaχ]	'to hang'

The question remains why the ə is not deleted in the second example. It might have something to do with the fact that its C₁-model is glottalized. Its C₁ might have been glottalized, or, still might be pronounced glottalized by some speakers, and the ə-deletion might occur only after unglottalized sonorants. To make it sure, more data should be collected in the future.

C₂-deglottalization

There are a few words in which C₂-deglottalization occurs, while it does not occur in some words such as /haná:q̄:/haná:nq̄/ 'girl, woman (SG:PL)'.
[haná:q̄] → [haná:nq̄]

ʔá:q̄ [ʔá:ʔaχ]	ʔá:ʔaq [ʔá:ʔaχ]	'to bite'
sájk̄ [sá:ʔik]	sí:sæk [sí:sʔk]	'to pull'
	ʔá:q̄-ʔəq	sájk̄-sæk
aj>i: alternation	—————	sí:ksæk
C ₂ -model deletion	ʔá:ʔəq	sí:sæk
ə-variation	ʔá:ʔaq	—————
OUTPUT	[ʔá:ʔaχ]	[sí:sʔk]

ak>i:/ aj>i: alternation

There occurs in R3 ak>i: or aj>i: alternation, which are seen also in A2 (affixation 2 → 2.2.1.2.).

náks [náks]	qaní:nəksk	'spouse, married'
	[qaní:nəksk/qaní:nəksk]	
kʷták [kʷdák]	ləkʷtí:tək [ləkʷdɪ:dɪk]	'to shoot'
hukkʷták [hukkʷdák]	hukləkʷtí:tək	'good hunter'
	[hukləkʷdɪ:dɪk]	
sájk̄ [sá:ʔik]	sí:sæk [sí:sʔk]	'to pull'

As far as words with ak>i: alternation show, these rules are considered to be applied prior to C₂-model deletion, i.e., before the k is deleted.

	qa-nák-nək-sk	sájk̄-sæk
ak>i:/ aj>i: alternation	qaní:nəksk	sí:ksæk
C ₂ -model deletion	—————	sí:sæk
OUTPUT	[qaní:nəksk]	[sí:sʔk]

If the ak>i: alternation is applied after C₂-model deletion and compensatory lengthening, it would derive a wrong plural form:

	qa-nák-nək-sk	
C ₂ -model deletion and compensatory lengthening	qaná:nəksk	
ak>i: alternation	—————	
	*/qaná:nəksk/	

The following example uses R3 for word formation together with R2.
məmó:mq̄ [məmó:ʔmʷaχ] 'to smile' (<?)

2.1.3.1. R3 irregulars

In the following example, C₁ is deglottalized.

jáq [ʔjáχ] já:jaq [ʔjá:jaχ] 'to hang'
 In the next example, /a/ is added word-finally.

wá:q̇ [wáʔaχ] wá:wqa [wá:wʔq'a] 'to dig'

2.1.3.2. R3+A

There are some plurals where R3 is used together with A (affixation).

R3+A1

ná:q̇ [náʔaχ]	qaná:nq̇ [qaná:ʔnaχ]	'dress'
náks [náks]	qaní:nəksk	'spouse, married'
	[qaní:nəksk/qaní:nəksk]	
xpáq [χbáχ]	qaxpá:paq [qaxbá:baχ]	'to fold' ²⁵
láxs [láχs]	qalá:laxs [qalá:laxs]	'branch' ²⁶

These processes are illustrated as follows:

	qa-ná:q̇-nəq̇	qanáq̇-nək-sk	qa-xpáq-pəq	qaláχ-ləχ-s
ak>i: alternation	_____	qaní:nəksk	_____	_____
C ₂ -model deletion & compens. lengthen.	qaná:nəq̇	_____	qaxpá:pəq	qalá:ləxs
ə-deletion	qaná:nq̇	_____	_____	_____
ə-variation	_____	_____	qaxpá:paq	qalá:laxs
OUTPUT	[qaná:ʔnaχ]	[qaní:nəksk]	[qaxbá:baχ]	[qalá:laxs]

R3+A2

kʷták [kʷdák]	ləkʷtí:tək [ləkʷdɪ:dɪk]	'to shoot'
kʷtáxs [kʷdákχs]	ləkʷtá:təxs	'to leave'
	[ləkʷdá:dəχs]	
	lə-kʷták-tək	lə-kʷtáχ-təχ-s
ak>i: alternation	ləkʷtí:tək	_____
C ₂ -model deletion and compensatory lengthening	_____	ləkʷtá:təxs
ə-variation	_____	ləkʷtá:təxs
OUTPUT	[ləkʷdɪ:dɪk]	[ləkʷdá:dəχs]

2.1.3.3. R3+S

In the following plural, the plurality is indicated by R3 and S (suppletives). Though */máxsk/ is already a suppletive plural of /hájtk/, it is not used by itself, but always with R3. There are words, however, containing a proclitic and /hájtk/, which make their plural either with or without R3, examples of which will be listed in 2.2.2.1.

hájtk [háí·tk] *máxsk [máχsk] 'to stand'
 má:maxsk [má:məχsk]
 máx-məx-sk

C₂-model deletion and

compensatory lengthening má:məxsk
 ə-variation má:maxsk
 OUTPUT [má:məχsk]

2.1.4. Reduplication 4 (R4): -CV Reduplication

There are some, though not many, words which form their plurals by suffixing -C₁V to the stem.

The reduplication formula is:

{(...)_{C_{1m}V}-C₁ə(-...)}
 (in this formula, "˘" indicates either stress, fading or unfading)

The {ə} in the reduplicated syllable is changed to /a/ by a morphophonemic rule.²⁷

ʔiʔé: [ʔiʔé:]	ʔiʔé:ʔa [ʔiʔé:ʔa]	'to bleed'
ʔò: [ʔò:]	ʔò:ʔa [ʔò:ʔa]	'(fish) to swim, (boat) to go'
kʷəʔʔò:tk	kʷəʔʔò:ʔa [gʷəʔʔò:ʔa]	'to crawl'
[gʷəʔʔò:tk]		

stress change

The fading stress in the singular becomes unfading in the plural as in the examples above.

2.1.4.1. R4 irregular

In the following example, /kʰ/ is attached word-finally after ə-variation.

nó: [nó:]	qanó:nakʰ [qanó:nak]	'mother'
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2.1.4.2. R4+A

There are a few examples where R4 and A (affixation) are used at the same time.

nó: [nó:]	qanó:nakʰ [qanó:nak]	'mother'	(R4+A1)
kʷtí: [kʷdí:]	ləkʷtí:ʔa [ləkʷdí:ʔa]	'hungry'	(R4+A2)

The next example takes {-tə} at the same time (→ 2.2.1.3.1.).

jú: [jú:]	ləjú:jta [lʔjú:jda]	'to hide'	(R4+A2)
-----------	---------------------	-----------	---------

In this example, the same ə-deletion rule as seen in R3 occurs, i.e., {ə} in the reduplicated syllable is deleted when preceded by an

(unglottalized?) sonorant and followed by a stop which is followed in turn by a vowel or word boundary.

2.2. Non-reduplicative processes

2.2.1. Affixation (A)

One of the processes to make plurals is affixation. There are two prefixes used to make plurals, {qa-} and {lə-}. In most cases they are prefixed word-initially, but there are also some cases where they are prefixed right before the stems but after proclitics.

2.2.1.1. Affixation 1 (A1): {qa-}

There are a number of words which make their plurals by prefixing {qa-} stem-initially. The plurals made by means of this prefix are called "distributives" (Dunn 1979a:21) and are to be translated 'each one his/her own ____.' Nouns indicating something such as body parts or kinship terms generally make their plural with this prefix. Some other nouns, of which every individual is considered to possess only one piece, seem to use this prefix, too, and also many intransitive verbs seem to use it.

<u>SG</u>	<u>PL</u>	
mó:s [mó:s]	qamó:s ²⁸ [qamó:s]	'thumb'
čəmú: [ts'ímú:]	qačəmú: ²⁸ [qats'ímú:]	'ear'
řəmktí: [řimkdi:]	qařəmktí: ²⁹ [qařimkdi:]	'(woman's) brother, (man's) sister'
nəktá: [nikdá:]	qanəktá: ²⁹ [qanikdá:]	'aunt'
xsò: [χsò:]	qaxsò: [qaxsò:]	'canoe'
mì:lk [mì:lk]	qamì:lk [qamì:lk]	'to dance'
pí:k [bí?ik]	qapí:k [qabi?ik]	'to tell a lie'
čá:ɥ [ts'á:ɥ]	qačá:ɥ [qats'á:ɥ]	'guts'
có:q [dzó:χ]	qacó:q [qadzó:χ]	'ashamed'

There are only very few transitive verbs which make use of {qa-}.

xli:wən [χli:wən]	qaxli:wən [qaxli:wən]	'to squeeze'
ksəčá:ɥ [ksɪts'á:ɥ]	ksaqəčá:ɥ [ksaqats'á:ɥ]	'to gut (fish)' (ksə-/ksa- 'fluid')
səcó:q [sɪdzó:χ]	saqacó:q [saqadzó:χ]	'to embarrass' (sə-/sa- 'to make')

As already mentioned, {qa-} is prefixed stem-initially in many cases but there are also cases where it is attached before the proclitic, as in the following example.³⁰

hak ^w ták [hak ^w dák]	qahak ^w ták [qahak ^w dák]	'bow'
---	---	-------

2.2.1.1.1. A1 irregular

In the following example, the glottal stop in the singular alternates with /s/ in the plural and the vowel /a/ is weakened to /ə/.

ʔasi: [ʔasi:] qasəsi: [qasəsi:] 'leg, foot'

In the next example, the /q/ is glottalized.

ʔukstá:wɪ [ʔuksdá:wɪ] ʔuksqatá:wɪ [ʔuksq'adá:wɪ] 'to fall overboard'

2.2.1.1.2. Affixation 2 (A2): {lə-}

There is another prefix to make plurals, which is {lə-}.³¹ As Boas (1911:380) says, plurals formed by this prefix are preeminently verbal plurals. It is attached stem-initially.

pá:s [bá:s]	ləpá:s [ləbá:s]	'scared'
spám [sp'ám.]	ləspám [ləsp'ám.]	'to cough'
lí:ntk [lí:ntk]	ləlí:ntk [ləlí:ntk]	'to growl'
hukpá:s [hukbá:s]	hukləpá:s [hukləbá:s]	'scary'

(huk- nomen actoris)

In the formation of plurals by this prefix, following rules are applied:

velar deletion and ə-deletion

There are some words which have a stem-initial velar stop that alternates with /l/ in their plurals.

kʲámk [gʲém:k] lámk [lám:k] 'hot, warm'

It is considered that there occur intervocalic velar deletion and ə-deletion in these words.

velar deletion: stem-initial velar stop is deleted when preceded by {lə-} and followed by a vowel.

ə-deletion: ə is deleted when it lies adjacent to a vowel.

ə-deletion is applied after velar deletion.

Here are some more examples:

kʲáps [gʲáps]	láps [láps]	'high'
kʲí:m̩k [gʲí:m̩k]	lí:m̩k [lí:m̩k]	'to wipe'
kʲó:ks [gʲó:ks]	ló:ks [ló:ks]	'(plane) to land'

These processes are illustrated as follows:

	lə-kʲáps	lə-kʲí:m̩k	lə-kʲó:ks
velar deletion	ləáps	ləí:m̩k	ləó:ks
ə-deletion	láps	lí:m̩k	ló:ks
OUTPUT	[láps]	[lí:m̩k]	[ló:ks]

The velar deletion is not applied if the velar stop is followed by a

consonant.

kʷtí: [kʷdɪ:] ləkʷtí:ta [ləkʷdɪ:da] 'hungry'
(*lətí:ta)

Most of the examples involve a front velar as the examples above. There are, however, found also cases having a simple velar or a back velar. Though the following is a quite irregular and the only example which involves a rounded velar, it might show that the deletion is not applied to rounded velar.

kʷálk [gʷál·k] ləkʷú:la [ləgʷú:lə] 'to burn'

I have found so far no glottalized velars in these cases.

ak>i:/ aj>i:/ ʊ:>u: alternation

There are some words which have different vowels in the singular and the plural. When the stem begins with a velar followed by /ak/, /aj/, or /ʊ:/, these /ak/, /aj/, and /ʊ:/ alternate with /i:/, /i:/, and /u:/ respectively.

káksk [gáksk] lí:təksk [lí:dɪksk] 'to wake up, to be awake'
qájna [gájna] lí:na [lí:na] 'to fall down'
kú:nks [gú:nks] lú:nks [lú:nks] 'dry, to dry'

In the first example, it is considered that there occurs an alternation, ak>i:. See 2.2.1.3.1. for the illustration of the process to form /lí:təksk/. In the second and the third example, aj>i: and ʊ:>u: alternations occur, which would be illustrated as follows:

	lə-qájna	lə-kú:nks
velar deletion	ləájna	ləú:nks
aj>i:/ʊ:>u:	ləí:na	ləú:nks
ə-deletion	lí:na	lú:nks
OUTPUT	[lí:na]	[lú:nks]

2.2.1.2.1. A2 irregulars

In the following example, /o/ is lengthened and some sounds are added.

xstóq [xst'óx] laxstó:jaq [laxst'ó:jaχ] 'to sleep'

In the next example, short /a/ alternates with long /e:/.

hátəks [hádɪks] lahé:təks [lahé:dɪks] 'to swim'

2.2.1.3. A+A

After velar deletion and ə-deletion are applied, the existence of {lə-} becomes blurred and pleonastic {lə-} is re-added.

kʲí:m̩k [gʲí:m̩k] ləlí:m̩k [l̩lí:m̩k]³² 'to wipe'

kʰó:ks [gʰó:ks] ləló:ks [l̩ló:ks] 'to float'

These processes are illustrated as follows:

	lə-kʰi:m	lə-kʰó:ks
velar deletion	ləi:m	ləó:ks
ə-deletion	li:m	ló:ks
lə-	ləli:m	ləló:ks
OUTPUT	[l̩li:m]	[l̩ló:ks]

Though this pleonastic /lə/ could also be considered as the reduplicated syllable of R2, not as {lə-}, there is no way to decide which. They are treated here as A+A just because the examples I collected so far are all verbal plurals and, as already mentioned, plurals formed by {lə-} are preeminently verbal plurals.

2.2.1.3.1. A+{-tə}

There is an affix which is used to make plurals together with one of the affixes, {qa-} or {lə-}. It is {-tə}, which cannot make plurals by itself. It is attached stem-finally. The {ə} of {-tə} is realized as /a/ in many cases by a morphophonemic rule.³³

kʰəskú: [kʰəsgú:]	qaʰkʰəskú:ta	'happy'
	[qaʰkʰəsgú:da]	
sí:n [sí:n]	ləsí:nta [l̩sí:nda]	'dizzy, drunk'
wá:j [wá:j]	ləwá:jta [ləwá:jda]	'paddle'
lusəksú: [lusiksú:]	luləsəksú:ta	'to wet (one's pants)'
	[luləsiksú:da]	
káksk [gáksk]	lí:təksk [lí:d̩ksk]	'to wake up, awake'

The last example seems hard to explain but could be explained easily when the word /káksk/ is supposed to consist of a stem *{kák} and a suffix {-ksk},³⁴ the second {k} of the root being deleted on the surface followed by another {k}.

	lə-kák-tə-ksk
ak>i: alternation	ləkí:təksk
velar deletion	ləí:təksk
ə-deletion	lí:təksk
OUTPUT	[lí:d̩ksk]

2.2.1.4. A+S

In the following examples, A (A1/A2) is used together with S (suppletive. → 2.2.2.).

kʰú:ʰk [kʰú:ʰk]	qakʰkú: [gakʰkú:]	'child'
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transitive verbs

cak ^w [dzák ^w]	tú:n [dú ^w un]	'to kill'
máq [máχ]	táɿ [t'áɿ]	'to put'
ká: [gá:]	tóq [dóχ]	'to take'

The next example is either intransitive or transitive:

skú: [sgú:]	tó: [dó:]	'to lie, to lay'
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nouns

ɿk ^w ú:ɿk [ɿg ^w ú:ɿk]	kɿkú: [kɿgú:]	'child (son or daughter)'
ɿk ^w uwó:mɿk	kapətkú:ɿk	'child (the young)'
[ɿg ^w uwó:mɿk]	[k'abitgú:ɿk]	

proclitics

ɿk ^w u- [ɿg ^w u]	kapə- [k'abɿ]	'small'
ks- [ks]	t ^h a- [t ^h a]	'extreme'

as in

ɿk ^w utú:s [ɿg ^w udú:s]	kapətú:s [k'abɿdú:s]	'kitten'
ɿk ^w uhâ:s [ɿg ^w uhâ:s]	kapahâ:s [k'abahâ:s] ³⁹	'puppy'
ksqó:q [ksqó:χ]	t ^h aqó:q [t ^h aqó:χ]	'to go first, to be first'

When a word consists of a proclitic/proclitics and a stem that suppletes, its plural is also formed with S, sometimes together with another process, as written in the following section, 2.2.2.1.

halinò:k ^h	halilá:ɿk [haɿlilá:ɿk]	'bed'
[haɿlinò:k]	(ha- INSTR, li- 'on', nò:k ^h 'to lie (down)')	
halitá: [haɿlit'á:]	haliwán [haɿliwán·] ⁴⁰	'chair' (tá: 'to sit')
səpás [sɿp'ás]	səmáxs [sɿmáχs]	'to grow (vt)'
	(sə- 'to make', pás 'to grow')	
sapá: [sabá:]	saqóɿ [saq'óɿ]	'to pass away, to get off'
	(sa- 'off', pá: 'to run')	
txaskú: [txəsgú:]	txató: [txədó:]	'to lay down'
	(txa- 'down on', skú: 'to lie, to lay')	
manká: [mangá:]	mantóq [mandóχ]	'to pick up'
	(man- 'upwards', ká: 'to take')	
čənsčák [ts'ɿnsdzák]	čənstú: [ts'ɿnsdú:]	'widow, widower'
	(čəns- 'away', čák 'to die, dead')	

2.2.2.1. S+R

There are some plurals which make use of both S and R. In the following example, S is used together with R1-k.

halitá: [haɿlit'á:]	hakhaliwán [hakhaɿliwán·]	'chair'
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In the next example, S is used together with R2.

ləkstá: [lɛkst'á:] ləkswəwán [lɛksuwán.] 'island'

There is also a plural form in which S and R3 are used at the same time. It is /má:maxsk/, which is a reduplicated form of /máxsk/. Though */máxsk/ is originally a suppletive plural of /hájtk/, it is not used by itself,⁴¹ but always with R3, as /má:maxsk/. There are words, though, containing a proclitic and /hájtk/ which make their plural either with or without R3.

hájtk [háí·tk]	*máxsk [máχsk]	'to stand'
	má:maxsk [má:maχsk]	
qalksahájtk	qalksəməxsk ⁴²	'to have diarrhea,
[qalksahái·tk]	[qalksɪməχsk]	to stand through the
	qalksəmə:má:maxsk ⁴²	doorway'
	[qalksɪmə:má:maχsk]	(qalksa-/qalksə-
		'through')

2.2.3. Isomorphics (I)

There are a number of words which have the same form for the singular and the plural. Many of them are nouns referring to natural species but there are also some other nouns and intransitive/transitive verbs.

SG/PL

só:ɫ [sts'ó:l]	'beaver'	qé:n [gé:n]	'skunk'	ksá: [ksá:]	'shark'
lí:ck [lí:tsk]	'snow goose'	txáw [txéu·]	'halibut'		
qapó:q [gabó:χ]	'cockle'	qanáw [qanáu·]	'frog'		
ksí:ʔ [ksí:ʔ]	'lizard'	sk'át [sg'ét]	'spider'		
čásk ^w [ts'ásk ^w]	'louse'	ǰáns [ǰjén·s]	'leaf'		
wáɪ [wáɪ]	'yellow cedar'	laxtá: [laxt'á:]	'lake'		
pijá:ɫs [bijá:ɫs]	'star'	mé:q [mé:χ]	'pine cone'		
xá: [χá:]	'slave' ⁴³	qáwəs [gáʔwəs]	'newborn baby girl'		
póá:n [pts'á:n]	'totem pole'	ǰá:t [ǰáʔat]	'ball'		
qók [gók]	'basket'	pá: [bá:] ⁴⁴	'to go on a boat'		
wò: [ʔwò:]	'to invite'				

2.2.4. Others

There are some words having plurals which seem to have some relation to the singular forms and are neither to be called S nor to be explained either by A or R.

<u>SG</u>	<u>PL</u>	
wák ^ɟ [wék ^ɟ /wék]	wák ^ɟ hə [wék ^ɟ hə/wék ^ɟ hə]	'(man's) brother'
hój [hói·]	hó:ja [hó:ja]	'to use'

qáq [q'áχ]	qá:q [q'á:χ]	'open' ⁴⁵
ksú: [ksú:]	ksó:q [ksó:χ]	'to go out'
sitjá:w [sitjá:w]	sətitjá:w [sɪditjá:w]	'to change'
wi:ńák [ʔwi:ʔnák]	nəńú:ntk [nʔnú:ntk]	'long, tall'

3. Final remarks

In this paper, those processes of CT for plural formation have been discussed: reduplication (CVC-, CV-, -CVC and -CV), affixation (qa- and lə-), suppletives, and isomorphics. There remain, however, problems as "irregulars" or "C₂-neutralization" in R1-C. To solve these problems, more data should be collected in the future.

Appendix

Consonant inventory

		bi-	alve-	v e l a r			glot-	
		labial	olar	front	simple	rounded	back	glot-
		tal						
obstruents								
stops	plain	p	t c	k ^ʃ	k	k ^w	q	
	aspirated	p ^h	t ^h c ^h	k ^{ʃh}	k ^h	k ^{w^h}		
	glottalized	p̰	t̰ c̰	k̰ ^ʃ	k̰	k̰ ^w	q̰	ʔ
fricatives			s ʃ				x	h
sonorants	plain	m	n l	j	ɥ	w		
	glot.	m̰	n̰ l̰	j̰	ɥ̰	w̰		

Vowel inventory

long	i:	u:	u:	short	i	ɯ	u
	e:	o:			ə	o	
	a:				a		

Stress

unfading [ˈ] and fading [ˌ]

The vowels which carry fading stress do not stay strong and high in pitch, but become weaker and/or lower. The duration of long vowels with fading stress is often shorter than that of the ones with unfading stress. The short vowels which carry fading stress are always found to be followed by a (plain) sonorant, that is always short, while (plain) sonorants which follow a short vowel with unfading stress are lengthened in the ultima. These "lengthened" sonorants are indicated with [·] in this paper, as [wán·] ('to sit (PL)').

Notes

1. This is a slightly abridged and revised version of the latter part of my MA thesis presented to Hokkaido University in January 1995.

I thank the people of Hartley Bay, especially Mrs. Mildred Wilson, for sharing their knowledge of "Sm'algyax", literally meaning 'real language' and used for the Coast Tsimshian language. I also thank Dr. Jeff Leer for reading my thesis and giving suggestive advices.

Abbreviations used are: 1/3 (first/third person); A (affixation); Ag (agent); C_{1m}/C_{2m} (C_1 -model/ C_2 -model); CN (connective); I (isomorphic); INSTR (instrumental); PAST(past tense); PL (plural); POSS (possessive); PRES (present tense); R (reduplication); S (suppletive); Sbj (subject); SG (singular); vt (transitive verb).

The phonetic representation follows the IPA in principle, except the following two: ɺ is used for voiceless lateral sonorant; : is used for ː. In the phonemic representation, x is used for back velar fricative, χ, because CT has only one velar fricative.

In this paper, the phonetic representation is put into brackets [] and the morphophonemic representation is put into braces {}. The phonemic representation is put into slash marks // in the text but has no marks in the examples.

2. Though not used by itself, this stem is seen in other words as well:

jiksʔóntk 'to wash hands'

(jiks- 'to wash', -tk medial or semi-reflexive)

maʔón 'elbow' (ma- 'like')

lo:paʔón 'muscle' (lò:p 'rock', -a- CN)

3. Dunn (1979a:27-31) gives further examples of these.
4. As explained below, this "C", final consonant of the reduplicated syllable of this type, is selected based on a consonant in the singular form (which is C_2 -model), while the final consonants of the reduplicated syllables in R1-k (→ 2.1.1.2.), R1-x (→ 2.1.1.3.) and R1-t (→ 2.1.1.4.) (i.e., /k/, /x/ and /t/) are selected regardless of any consonant in the singular.
5. The word "stem" here in this paper refers to the part of words stripped of productive affixes.
6. Dunn (1979a:16) describes this process as:
the first consonant of the principal syllable (the one with primary stress) + a vowel + the first consonant after the vowel are all prefixed directly to the principal syllable.
This description holds true in many cases, but actually it is not always so. There are examples such as below:

k'ilám [k'ílám·]	k'ilk'ilám [k'ílk'ílám·]	'to give'
ʔalá:js [ʔalá:js]	ʔalʔalá:js [ʔalʔalá:js]	'lazy'
haʔáxk [haʔáxk]	hathaʔáxk [hathaʔáxk]	'bad, spoiled'

In these words, the reduplicated syllables are prefixed not to the "principal" syllables, but to unstressed ones. Therefore, it would be better simply to say that the reduplicated syllable is prefixed to the stem. CT stems are not always monosyllabic but also could be multisyllabic. When the stem is multisyllabic, the stress does not always fall on the first syllable. If the stem is monosyllabic or multisyllabic with its stress on the first syllable, it is true that the reduplicated syllable is prefixed to the stressed syllable and the first consonant of the stressed syllable is copied to C₁. If, though, the stem is multisyllabic with the stress on another syllable than the first one, the reduplicated syllable is not prefixed directly to the stressed syllable, but to the unstressed first syllable, as in the examples above.

7. There is no word in R1-C which has only one open syllable.
8. The term "stops" is to be taken to include affricates.
9. {ə} becomes /i/ after a front velar and becomes /a/ before/after a back velar or a glottal. These rules about {ə} are called hereafter "ə-variation".
10. /q/ is normally realized as [χ] in word-final position, where the distinction between /q/ and /x/ is neutralized. Whether a word-final [χ] is considered to be /q/ or /x/ is known by attaching a suffix beginning with a vowel.
 - /lí:cq/ [lí:tsχ] 'to read'
 - /lí:cqu púk/ [lí:tsgv búk] 'I am reading a book.'
 - (-u 1SG.A, púk 'book')
 - /wó:px/ [wó:pχ] 'forehead'
 - /wó:pxu/ [wó:pχv] 'my forehead' (-u 1SG.POSS)
11. {q} is fricativized to /x/ before a consonant.
12. Though there might be words which have a /ɰ/ instead of /j/ or /w/ before the C₂-model, I have not collected any example so far.
13. There are also found examples as follows:

hákʷɪ [hákʷɪ]	hakhákʷɪ [hakhákʷɪ]	'to gaff'
lákʷəl [lákʷ'əl]	ləklákʷəl	'to wrap up, to cover'
	[lɪklákʷ'əl/lɪklákʷəl]	
ɪák'in [ɪék'in]	ɪəkɪák'in [ɪɪkɪék'in]	'to bend'

These plurals are considered as R1-k (→ 2.1.1.2.), but it might be also possible to consider them as R1-C having a "neutralized" C₂.

If this is true, C₂-model, which is a front or rounded velar, is changed to a simple velar in C₂ position.

14. I observed another form, /ksə́nəksuní:sk/ [ksíʔnəksuní:sk], from another speaker. {ksə-} is a proclitic meaning 'fluid/fresh' (Boas 1911:331). It is possible that the initial /n/ of /nəksuní:sk/ was glottalized originally.
15. See note 9.
16. {təm-} is a proclitic which is "of very indefinite significance" (Boas 1911:330). Dunn (1979:42) describes it as "(locative, stative, tangent, above, perpendicular)."
17. Considering the fact that all examples of R1-x I have observed so far have a long vowel, however, it is also possible that these words originally contained the form */CVx/, instead of /CV:/, e.g.:

/tó:jaxs/ < */tóxjaxs/ 'strong'
 /tí:ləmxk/ < */tíxləmxk/ 'to answer'

According to Hindle and Rigsby (1973), the word for 'strong' in Gitksan is "daxgat" (in Gitksan orthography), whose latter part is considered to come from "gat," meaning 'man.' Also in Nass, the word for 'strong' is /taǰk'át/ (/ǰ/ represents back velar fricative, same as /x/ in CT, but it contrasts with front velar "/x/" in Nass.) The deletion of a velar obstruent and the compensatory lengthening of the preceding vowel is also found in the process of R3.

18. On the analogy of R1-k, this reduplication formula might be {(...-)C₁əq-C_{1m}...} underlyingly. (q → x / _ C)
19. {ə} becomes /u/ after a rounded velar stop in an open syllable. See also note 9.
20. [ʰ] offglide is often inserted after short vowels in open syllables.
21. Its plural is /təltú:ls/ formed by R1-C from */tú:ls/.
22. Though the analysis by -CVC seems to be easier to explain the vowel quality in the reduplicated syllable and the deglottalization as in /sí:sək/, it could be also considered an old type of prefixing reduplication with stress shift. When the stem has more than one consonant initially, they are all copied in the plural. The processes to derive the plurals would be, then, as follows:

sáq 'sharp' > (R) saqsáq > sa:sáq > sá:saq
 xpáq 'to fold' > (R) xpaqxpáq > xpa:páq > xpá:paq
 láxs 'to bathe' > (R) laxláxs > la:láxs > lá:laxs
 sájk 'to pull' > (R) saksájk > si:sájk > sí:sajk > sí:sək
 > sí:sək
 lóq 'rotten' > (R) loqlóq > lo:lóq > ló:loq > ló:ləq > ló:lq

lóqaksk 'wet' > (R) loqlóqaksk > lo:lóqaksk > ló:loqaksk
 > ló:ləqaksk > ló:lqaksk
 haná:q̇ 'girl, woman' > (R) hanaqná:q̇ > hana:ná:q̇ > haná:na:q̇
 > haná:nəq̇ > haná:nq̇
 jó:ks 'to wash' > (R) jokjó:ks > jo:jó:ks > jó:jo:ks > jó:jəks
 > jó:jiks

The reduplicated syllable in this type is considered to have a vowel which has the same quality as the stem vowel. The vowel which used to carry the stress is reduced to /ə/ after the stress shift. In the fourth example above ('to pull'), /k̥/ is used as C₂-model, because the preceding consonant is a semivowel, which is deglottalized in C₂-position, just as in R1-C.

23. Although not all the short vowels have corresponding long vowels, all short vowels which could carry stress (i, a, o, u and ʊ) have their corresponding long vowels (i:, a:, o:, u: and ʊ:) and there arises no problem about this in R3-formation. Actually there appear only three long vowels in R3-plurals: /i:/, /a:/ and /o:/.
24. This word forms the plural also with R1, /jikjó:ks/. The difference between these two is not clear.
25. /xpá:paq/, without A1, is also used as plural. These two forms are observed to be used in the same context and the strict difference between them is not clear.
26. The other forms, /lá:laxs/ and /qaláxs/, are also used as plural.
27. See note 9.
28. The first one (/qamó:s/) means 'thumb(s) of plural people'. Its plural is formed by isomorphics in the meaning of 'both thumbs of one person'. The second example (/qačəmə:/) could mean either 'ear(s) of plural people' or 'both ears of one person'.
29. /qačəmk̥t̥i:/ means 'brother(s)/sister(s) of plural people'. Its plural is formed by reduplication in the meaning of 'brothers/sisters of one person': /čəkm̥k̥t̥i:/. The prefixed form of the next example, /qanəktá:/ could mean either 'aunt(s) of plural people' or 'aunts of one person'.
30. Though I used the term "proclitics" after former studies, there are cases where the connection between these and the following words is strong and they are rather like prefixes than proclitics. This problem needs further investigation in the future.
31. Dunn (1979a:23) calls this process "intensives" and states that this element is related to "lu'kwil or lu'wil" (he uses CT orthography. it is /lúkw̥əl/ according to my analysis.) meaning 'very', of which I

- am doubtful, because the vowels after /l/ are different (/u/ and /ə/) and the plurals formed by this process have not been observed to have "intensive" meaning at all in my data. Tarpent (1983:162) reports the existence of the same prefix in Nass which she considers originated from lVk- (this corresponds to lək- in CT).
32. This form was observed only once. /lɪ:mk/ is generally used for the plural of /kʰɪ:mk/.
 33. {ə} becomes /a/ when preceded by a morpheme boundary (there could be a consonant in between) and followed by a word boundary.
 34. While *[kák] does not occur by itself, the suffix {-ksk} is observed in other words as well, such as /lɔqaksk/ (see 2.1.3.). Though I am not sure of its meaning at present, Tarpent (1987:700f.) reports the existence of a corresponding suffix, which she further analyzes into a suffix of undetermined meaning ("but seems to be 'incomplete, recurrent, meant to occur whenever the opportunity arises'"), followed by an antipassive suffix.
 35. I have not collected enough data to tell the difference between the one with A2 and the one without it.
 36. Booker (1982:15) defines the number suppletion as "the replacement of a verb root with a phonologically unrelated form to agree ergatively with the number of the subject of an intransitive and the object of a transitive verb."
 37. This plural form is used only to mean 'to arrive on a boat'. When 'arriving by car, plane or other vehicles', isomorphic /páck/ is used.
 38. Booker (1982:19) groups it in 'transitive,' but it is an intransitive verb and cannot be used with an object.

jak^wa já:wɣk^wu 'I am eating.' (jak^wa PRES, -u 1SG.Sbj)

*jak^wa já:wɣk^wu ʔaná:j (ʔaná:j 'bread')

To mean 'to eat' with an object noun, the proclitic, {x-}, is generally used, which transforms nouns into intransitive verbs.

jak^wa xʔaná:ju 'I am eating bread.'

(jak^wa PRES, x- 'to eat', ʔaná:j 'bread', -u 1SG.Sbj)

jak^wa xhó:n ʔól 'A bear is eating a fish.'

(jak^wa PRES, x- 'to eat', hó:n 'fish', ʔól 'bear')
 39. The form, {kəpə-}, is an underlying one and the {ə} appears on the surface as /a/ when followed by a glottal.
 40. Also /hakhaliwán/.
 41. This form is used, however, as the plural of /páck/ 'to arrive (on a boat), which is already cited in the preceding section.

42. These two forms are used in the same meaning.
43. It might have something to do with the fact that, according to Leer (p.c.), the word for 'slave' is classified as non-human in Tlingit, the neighboring language of CT.
44. This word is also used in the meaning 'to run' and then it forms its plural with S (/ǵǵǵ/).
45. Tarpent (1983:171-2) reports that this word makes its plural by R3 in Nass (ǵaq - ǵá:ʔax). It might be also possible to consider that the plural is formed by R3 (→ 2.1.3.), where the ǵ is somehow deleted:

ǵáǵǵǵǵǵ > ǵá:ǵǵǵ > ǵá:ǵǵ > ǵá:ǵ

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Coast Tsimshian Plural Formation

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Summary

In Coast Tsimshian, a language spoken in British Columbia, Canada, and Alaska, the nouns and the verbs form the plurals by means of one/ more than one process. There are words which have two plurals formed by two different processes. These plurals could be the same meaning or have different meanings. The processes for plural formation are reduplication, affixation, suppletives, and isomorphics, of which reduplication is the most common way. Reduplication is classified into four major types according to the structure of the reduplicated syllable and the position where it is attached. The commonest and the most productive type reduplicates CVC-. Many borrowings form their plural by means of this process. Other types of reduplication reduplicate CV-, -CVC, and -CV. The affixes used for plural formation are {qa-} and {ləd-}, the former of which form "distributive" plurals meaning 'each one his/her own____.' Some words have phonologically unrelated forms for the singular and the plural (suppletives). Most of the words which belong to this type are intransitive verbs. A number of words have the same form for the singular and the plural (isomorphics). Many of them are nouns referring to natural species. There are a few words whose plurals cannot be explained by any one of these processes.