HARDENING AND WEAKENING IN KWAKIUTL

by

PETER JOHN WILSON

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Abstract

This thesis demonstrates that the Kwakiutl processes known as *hardening* and *weakening* are based on two synchronic phonological processes; *assimilation* and *deletion*. *Hardening* sees stem-final voiceless obstruents assimilate *glottalization*, while *weakening* sees them assimilate *voicing*. The following suffix-initial segments that cause this assimilation are subsequently deleted in certain environments. Rules are presented which generate the appropriate *hardened* or *weakened* form. To this end, the phonological processes involved in *hardening* and *weakening*, particularly *assimilation* and *deletion* are examined and analysed.

Previous work, done mainly by Sapir, assumed that *hardening* and *weakening* are not based on synchronic phonological processes. Instead, he hypothesized an historical solution which assumed that *assimilation* and *deletion* were the cause of *hardening* and *weakening*, but

failed to note that the processes are synchronic. This thesis, therefore, furthers previous work by showing that hardening and weakening are based on synchronic processes, and begins the task of constructing an encompassing analysis.

Unfortunately, I am not able to show that every occurrence of *hardening* or *weakening* is predictable. In the Conclusion, I speculate that the system of *relative phonological strength* proposed by Foley may account for this irregularity. It is also possible that the non-predictable data is historically based. In this thesis, however, I concentrate mainly on the predictable forms and leave aside the more obscure and less general problems for later work.

Table of Contents

List of Tables

Symbols

/ /	phonemic transcription
// //	underlying form
[ ]	phonetic transcription, Boas's transcription
{ }	morpheme brackets
cont.	continuant
asp.	aspect
nom.	nominal
opt.	optional
C	consonant
V	vowel
S.C.	stem completive
Ø	nothing
#	morpheme boundary
→	*goes to*

Introduction - Chapter 1

The Kwakiutl language of the Wakashan Linguistic Family is located on the northern portion of Vancouver Island north of Campbell River and Cape Cook, and on the mainland of British Columbia from Bute Inlet to Smith Sound. Located north of Mainland Kwakiutl are two related languages, Heiltsuk and Haisla. These three languages form the Kwakiutl linguistic division which together with the Nootkan languages combine to form the Wakashan family. There are two quite different dialect groups of Kwakiutl. One is located on the northern tip of Vancouver Island and on the mainland, while the other is spoken on the Island from Campbell River to Fort Rupert, and on the small islands at the entrance to Johnstone Strait. The latter group comprises three sub-dialects; Koskimo on the west side of Vancouver Island, Yucultа near Campbell River, and Kwakiutl proper near Alert Bay. This thesis is based on the Alert Bay dialect.

Kwakiutl shares a number of phonological features common to other languages of the Northwest Coast. There are a large number of consonants, few vowels, and many permissible consonant clusters. There are two series of resonants, glottalized and non-glottalized, a distinction between velar and uvular obstruents, and a lateral series of obstruents. In morphology Kwakiutl is polysynthetic; one Kwakiutl word is frequently translated by an entire sentence in English. Similar to many languages of the Northwest Coast Kwakiutl has a large number of suffixes with concrete reference. These are often translated by such English nouns as *house*, *water*, *head*, *hand*, and *face*. The phoneme inventory of Kwakiutl is presented on page 70.

Kwakiutl also has features not found among the many other languages of the Northwest Coast. Along with its related languages, it is noted for the many and varied phonological influences that suffixes have on stems.[3] Stems may be reduplicated and altered by suffixes. Stem vowels, stress patterns, and stem-final sounds are often subject to change and segments are occasionally inserted. The following examples

illustrate some of these effects.[4]

Reduplication (CV type)		323
wa·k - aɬa	wá·wakaɬa	
to bend - a little more	*to bend a little more*	
Vowel Change /ə/ /a·/		232
bəw - ap̓	bá·wap̓	
to leave - one another	*to leave one another*	
Insertion[5] Ø /s/		309
wak - a	wá·swək̓a	
thing - ear	*earring*	

This thesis examines one of these topics, the influence of suffixes on stem-final sounds. The major influence suffixes have on preceding sounds, and the one dealt with in this thesis, is caused by a *process of assimilation* which, of the Northwest languages, is found only in the Wakashan family. This process is triggered by the *hardening* and *weakening* suffixes.[6] The one class of suffixes, termed *hardening*, entails the glottalization of stem-final sonorants and voiceless obstruents, while the other, termed *weakening*, causes stem-final voiceless obstruents to become voiced. Both *hardening* and *weakening* suffixes sometimes require the insertion of

an epenthetic /aʔ/, /a/, /ə/, or /ʔ/ following other stem-final sounds.

A secondary type of influence that suffixes have on stem-final sounds is *spirantization*, where /ƛ/, /k/, /kʷ/, /q/, and /qʷ/ are changed to a homorganic fricative. The suffixes which begin with a consonant and do not *harden* or *weaken* stem-final sounds optionally *spirantize* them.[7] The following examples illustrate the different effects of these suffixes in contrast to a suffix that has no effect.

No Effect		321
bəkʷ - aǎxa	bəkʷáǎxa	
man - down	*man of lower rank*	
Weakening		328
bəkʷ - iɬ	bəgʷiɬ	
man - in house	*man of the house*	
Hardening		302
bəkʷ - əm	bá·ǩʷəm	
man - real	*Indian, real man*	
Spirantizing		367
bəkʷ - xdəq	baxʷdə́q	
man - exclusively by	*to kill game without weapons*	

The *process of assimilation* is related to two other features peculiar to the Kwakiutl branch of Wakashan. First, there are three complete series of stops and affricates; voiceless, voiced, and glottalized, as opposed to the other languages, which generally have only the plain-glottalized distinction. Where there are no voiced stops or affricates there is a far more limited *weakening* process. In the northern Nootkan language fricatives weaken to sonorants. Interestingly enough, of the three *weakening* suffixes in Nootka, two are cognate with Kwakiutl *weakening* suffixes. These are {iɬ} *in the house* (Kwakiutl) and {iɬ} *in the house* (Nootka); and {is} *in an open space, on the beach* (Kwakiutl) and {is} *on the beach* (Nootka).[8]

The second feature related to the process of assimilation is the *deletion* of suffix-initial segments following certain sounds. This occurs even though the resulting cluster is permissable in the language. The deletion is crucial for *hardening* and *weakening* because a stem-final sound assimilates

glottalization (*hardening*) when a suffix-initial glottal segment is deleted, and assimilates voicing (*weakening*) when a suffix-initial voiced segment is deleted. The suffix-initial segments that are deleted following voiceless obstruents are: the palatal obstruents /k̓, g, x/,[9] the alveolar obstruents /c̓, d^z, s/, and the uvular obstruents /q̓, χ/.

Deletion 367

nəp - xdəq	nápdəq
throw - exclusively by	*exclusively by throwing*

No Deletion 367

g^wad - xdəq	g^wadəxdə́q
to untie - exclusively by	*exclusively by untying*

Some suffixes lose an entire initial syllable, as the following examples illustrate.

Deletion 313

səmk - gisawi?	sə́mɣakawi?
try out oil - left behind	*left after trying out oil*

No Deletion 353

dəy - gisawi?	dí·dəgisawi?
wipe - left behind	*left after wiping*

Not all suffixes that begin with /c̓, d^z, s/ lose their initial segment following voiceless obstruents. This distinction may reflect a proposed historical merger between proto */č, c̓, ǰ, š/ and /c, c̓, d^z, s/. Possibly the suffixes which lose their initial alveolar affricate began with a proto-palatal affricate. See Chapter 5 for further remarks on this claim. The merger explains why some alveolar affricates undergo the deletion process normally associated with palato-velar sounds.[10]

In this thesis I demonstrate that the initial phonological segment of a suffix determines the effect on the final sound of a stem. A stem-final sound is said to be *hardened* when it assimilates glottalization from a suffix-initial segment, and is said to be *weakened* when it assimilates voicing from a suffix-initial segment. Glottal assimilation, *hardening*, occurs when a suffix-initial glottalized consonant is deleted. Voicing assimilation, *weakening*, occurs when either a suffix-initial voiced consonant is deleted or the suffix begins with certain sequences of vowel-consonant.

Hardening - Assimilation and Deletion 358

məx	- k̓əgaɬ	mə́n̓gaɬ
to strike	- *make a noise*	*to begin to sound like striking*

No Hardening 358

la	- k̓əgaɬ	lá k̓əgaɬ
to go	- *make a noise*	*said it goes, promise to give*

Weakening - Assimilation and Deletion 351

qət	- gəƛəla	qə́dəƛəla
slip	- *to move from a stationary place*	*to slip off from support*

No Weakening 351

k̓ən	- gəƛəla	k̓ə́ngəƛəla
get loose	- *to move from a stationary place*	*it gets loose from a place above ground*

Weakening - Assimilation 326

nəq	- ik	- əla	nə́ǧikəla
drink	- *to have something*	- *cont.*	*to drink after meal*

No Weakening 306

kəp	- əla	kəpəlá
to carry in arms	- *cont.*	*carrying in arms*

The main concern of this thesis is with the observable or surface level facts of assimilation.

The analysis exploits the observable facts of the language which concern *hardening* and *weakening*. A more abstract, or second type of exploitation concerning underlying forms, though touched on briefly, is essentially left for later work.[11]

One of the irregularities dealt with is the fact that not all *hardening* and *weakening* suffixes appear to follow the process of glottal/voicing assimilation. It is not always clear from their surface initial-segments that assimilation has taken place. Instead, some suffix-initial segment may underlie these suffixes. In his attempt to resolve the problem for both Nootka and Kwakiutl, Sapir noted that this suffix-initial segment "is most likely to have been a weak consonant that has now disappeared".[12] Unfortunatly, he assumed that *hardening* and *weakening* are not synchronic phonological processes. This caused him to miss the whole process of assimilation directly observable in Kwakiutl. Unlike Sapir, I hypothesize underlying suffix-initial segments only when a suffix *hardens* or *weakens* a stem without any observable process of assimilation. The analysis is based, by extension, on the surface facts of Kwakiutl.

This thesis is based on Boas's descriptions of Kwakiutl and on my own field work.[13] The major source of data comes from Boas's posthumously published *Kwakiutl Grammar*.[14] This work, culminating a life devoted to the study of the language, contains a wealth of information and in my opinion is far superior to his earlier grammar "The Kwakiutl Indian Language" in *The Handbook of American Indian Languages* (1911).[15] Although the second grammar is not well organized and presents many examples without a morpheme by morpheme translation, the tremendous amount of information, especially in the "Glossary of the Suffixes", and the author's deeper understanding of the language make this grammar far more useful than his earlier works.[16]

Appendix 1 page 69 presents a phonemicization of Boas's prephonemic transcription. Appendix 2 page 81 presents all of the data based on Boas in both his transcription and in my own phonemicization. Appendix 3 page 87 demonstrates on the basis of my current field work that the proposed analysis is still largely appropriate. The field data were collected from Mrs. Mary Hunt of Fort Rupert and Mrs. Freda Shaughnessy of Gilford Island. Appendix 4 presents the feature notation used in the thesis.

Most research on Kwakiutl has been done by Boas. He has written two copious grammars and numerous texts.[17] Several short grammar sketches and word lists were written before Boas's extensive studies. Of note are works by Gibbs,[18] Hall,[19] Grasserie,[20] and Tolmie and Dawson.[21] Recently a phonology of the Alert Bay dialect was written by Grubb.[22] As mentioned above, one publication regarding *hardening* and *weakening* was presented by Sapir.[23]

Footnotes for Chapter 1

1. Phonemically /kʷaˀkʷala/.

2. Data from: 1. British Columbia Provincial Museum "Native Indians Resources Map no. 12" (1956). 2. Boas, *Kwakiutl Grammar*. (1947).

3. A stem is a nuclear element to which affixes may be attached. A stem may be monomorphemic or polymorphemic.

4. The numbers on the right hand side of the page indicate the page number where the example is found in *Kwakiutl Grammar*, Boas (1947).

5. The suffix {-a} *ear* always causes /s/ to be inserted following the reduplicated CV syllable. Note that stem-final /k/ has been glottalized to /kˀ/.

6. *Hardening* and *Weakening* are traditional grammatical terms in Wakashan studies, Boas (1911, 1947) and Sapir (1938).

7. Speakers often change from one form to another when repeating a word a second time. Although there may be dialect differences with regards to the amount of spirantization in a given environment, it is difficult to make a final statement due to the lack of comparative data. The following examples are from my own field notes.

ʔik - mˀ - ən	ʔikmˀən (or) ʔixmˀən
good - aspect - I	*I'm fine*

Suffix-initial /s/ and /x/ are deleted following voiceless obstruents. Unlike the glottalized or voiced suffix-initial consonants that are deleted neither of these fricatives cause obligatory spirantization. This suggests that *spirantization* is not caused by a process of assimilation.

Deletion - Spirantization 367

bək^{w} - xdəq	bax^{w}də̄q
man - exclusively by	*to kill game without weapons*

Deletion - No Spirantization 367

mu·k^{w} - xdəq	(mə)mū·k^{w}dəq
to tie - exclusively by	*exclusively by tying*

8. Sapir, "Glottalized Continuants in Navaho, Nootka, and Kwakiutl". (1938).

9. Because there is no plain velar /k/ in Kwakiutl I write the palato-velar [k^{y}] as /k/. The same holds for all of the palato-velar sounds [k^{y}, k̓^{y}, g^{y}, x^{y}]. When a distinction is necessary the palatal marker [^{y}] is used.

10. Sapir, however, reconstructs Nootkan/č/ from Proto-Wakashan */k^{y}/ and /k/ from */k/ as the following examples from his article (1938) indicate.

Proto Wakashan	Nootka	translation
*ko?auq	ko?oq	*to berate, vituperate* (p 234).
*q?ək^{y}x̌	q?ičƛ	...*year* (p 232).

He is therefore able to derive the /n/ of Kwakiutl /x̌?ənx̌/ *season* from the */k^{y}/ of Proto-

Wakashan */q?ək^{y}x̌/ ...*year* by spirantization /k^{y}/ → /x^{y}/ and weakening /x^{y}/ → /n/. This analysis is doubtful because spirantizing never occurs in conjunction with weakening or hardening in Kwakiutl. Possibly at some point /k^{y}/ was spirantized to /x^{y}/ became fused, and was finally weakened to /n/.

In any event, Sapir's analysis still leaves the problem of Proto-Wakashan*/k/ and */k^{y}/ in present day Kwakiutl. If */k/ went to /k^{y}/ would */k^{y}/ go to /c/ (/č/ in Nootka), or would */k^{y}/ and */k/ merge into present day [k^{y}] (/k/). Clearly more work is needed in this interesting area of Proto-Wakashan reconstruction.

11. See Morin "Québécois" (1975) for the different methods of explanation and exploitation.

12. Sapir, (1938).

13. See Bibliography for Boas's work on Kwakiutl.

14. Boas, (1947).

15. Boas, (1911).

16. Boas, "Glossary of the Suffixes" in *Kwakiutl Grammar*. (1947).

17. Boas, (1911, 1947).

18. Gibbs, "Vocabulary of Kwa'kiutl" (1877).

19. Hall, "A Grammar of the Kwakiutl Language" (1888).

20. La Grasserie, *Cinq Langues de la Colombie Britannique*. (1902).

21. Tolmie and Dawson, *Comparative Vocabularies of the Indian Tribes of British Columbia*. (1884).

22. Grubb, *A Kwakiutl Phonology*. (1966).

23. Sapir, (1938).

Hardening - Chapter 2

Suffixes which begin with the following *glottal segments* cause preceding voiceless obstruents to *assimilate* the feature [+glottal]:[1] /k̓, c̓, ga?, ka?, x̌?/. The suffix-initial *glottal segment* is subsequently *deleted*. The phonological processes of *assimilation* and *deletion* constitute the *hardening* process. Suffixes beginning with the above *glottal segments* are referred to as *hardening suffixes*.

Another group of suffixes cause preceding voiceless obstruents and sonorants to assimilate the feature [+glottal]. These suffixes do not begin with any of the above glottal segments. They do not appear to begin with a *glottal segment*, nor does any evidence show that they bear an underlying suffix-initial *glottal segment*. These suffixes are referred to as *arbitrary hardening suffixes* and are examined in Chapter 4.

The following table illustrates the relationships between plain voiceless obstruents and

hardened voiceless obstruents. Voiceless stops and affricates become their homorganic glottalized counterparts, while fricatives become, for the most part, sonorants.

Table 1. Hardened Voiceless Obstruents

plain	p	t	ƛ	c	k	k^w	q	q^w
[+glot]	p̓	t̓	ƛ̓	c̓	k̓	$k̓^w$	q̓	$q̓^w$

plain	ɬ	s	x	x^w	x̌	$x̌^w$
[+glot]	l̓	y̓ or c̓	n̓	$w̓$	x̌?	$w̓$

(glottalized sonorants are [ʔm]).

The fricative /s/ arbitrarily hardens to either /c̓/ or /y̓/. The uvular fricative /x̌/ becomes /x̌?/ when it is hardened.

The following data illustrate the effects of the hardening suffixes.

Suffix-Initial /k̓/

Assimilation - Hardening 357

ʔapsut - k̓ən - i?	ʔapsúṭəni?
one side - body - nom.	*one side of body*

No Assimilation 357

ʔola - k̓ən	ʔóla k̓ən
real - body	*able bodied*

No Assimilation 357

λəm - k̓ən	λə́mk̓ən
scabby - body	*to be scabby on body*

Assimilation - Hardening 358

məx - k̓əgaɬ	mə́n̓gáɬ
to strike - make a noise	*to begin to sound like striking*

No Assimilation 358

la - k̓əgaɬ	lák̓əgaɬ
to go - make a noise	*said it goes, promise to give*

No Assimilation 358

muł - xʔid - k̓ala	muɬxʔidk̓ala
thanks - aspect - noise	*song of thanks*

Suffix-Initial /č̓/

Assimilation - Hardening 324

lak - č̓imas	líl̓akimas
hammer - classes or characteristic conditions of things	*things hammered*

No Assimilation 325

hi - c̓imas hi·c̓imas

privaledge - classes or characteristic conditions of things *of the kind belonging to*

Assimilation - Hardening 324

n̓ux^{w} - c̓imas nunəw̓imas

blue berries - classes or characteristic conditions of things *berries (as food)*

Suffix-Initial /x̌ʔ/

No Assimilation - No Deletion 373

gəl - x̌tu - d gə́lx̌tud

to crawl - on top of - aspect long object *to crawl on top*

Deletion - No Assimilation 373

wəɬ - x̌tu - d wəɬətud

by itself - on top of - aspect long object *by itself on top*

Deletion - Assimilation 305

c̓eq - x̌ʔənx̌ c̓éq̓ənx̌

winter dance - season *winter dance season*

Deletion - Assimilation 305

c̓us - x̌ʔənx̌ c̓uy̓ənx̌

to dig - season *season for digging*

No Deletion - No Assimilation 305

sək̓ - x̌ʔənx̌	sək̓áx̌ʔənx̌
five - season	*five winters, years*

Suffix-Initial /gaʔ/ and /k̓aʔ/

Deletion - Assimilation 351

ƛəp - gaʔla	ƛáˑp̓əla
spread - to perform no action without previous consideration	*to spread at once without looking*

No Deletion - No Assimilation 351

wən - gaʔla	wəwə́ngaʔla
drill - to perform no action without previous consideration	*to drill without looking*

Deletion - Assimilation 326

gəlt - k̓aʔis	gə́lt̓is
long - belly	*long belly*

No Deletion - No Assimilation

la - kaʔis - ən - d	lák̓aʔidᶻənd
to go - belly - nom. - aspect	*to enter belly, go in front of body*

Rules

The *assimilation* rule causes stem-final voiceless obstruents to assimilate the feature

[+glottal]. The *deletion* rule sees the suffix-initial glottal segments deleted following voiceless obstruents.

Assimilation

$$\begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \rightarrow [+\text{glot}] \quad / \quad \underline{\quad\quad}\# \quad \left\{ \begin{matrix} \check{x}? \\ ga? \\ ,ka? \\ ,k \\ ,c \end{matrix} \right\}$$

Deletion

$$\left\{ \begin{matrix} \check{x}? \\ ga? \\ ,ka? \\ ,k \\ ,c \end{matrix} \right\} \rightarrow \emptyset \quad / \quad \begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \quad \#\underline{\quad\quad}$$

These two rules are collapsed into the *hardening* rule.

Hardening[2]

$$X \quad \begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \quad \# \quad \left\{ \begin{matrix} \check{x}? \\ ga? \\ ,ka? \\ ,k \\ ,c \end{matrix} \right\} \quad Y$$

1	2	3	4	5 →
1	2	3	Ø	5
	[+glot]			

The stem-final voiceless obstruent (2) picks up the feature [+glottal] from the suffix-initial glottal segment (4). The suffix-initial glottal segment is deleted (4 → ∅).

<u>Irregularities</u>: /c̓/-Initial Suffixes

The *hardening* rule does not operate on all suffixes that begin with /c̓/.

No Assimilation - Spirantizing 346

hanƛ - c̓a - d   hánƛc̓od

to shoot - inside - asp.   *to shoot in*

Because there is no phonological basis which accounts for hardening or non-hardening /c̓/-initial suffixes, the opposition is analysed as morphological. Each suffix that begins with a /c̓/ that does not undergo the *hardening* rule is marked [-hardening rule]. A minus rule feature blocks the operation of the rule even though the phonological description has been met.[3]

Readjustment Rules

The *hardening* rule attaches the feature [+glottal] onto stem-final voiceless obstruents.

Voiceless stops and affricates are realized as homorganic glottalized stops and affricates when they assimilate the feature [+glottal]. The fricatives, on the other hand, cannot be realized as glottalized fricatives because no such phonemes exist in Kwakiutl. The [+glottal] fricatives are usually realized as glottalized sonorants. This is the *unmarked* case. When the fricative /s/ goes to /ˀc/ (and not /ˀy/) and the fricative /x̌/ goes to /x̌ʔ/ the correspondences are said to be *marked*.[4]

Table 2. Fricative - Sonorant Correspondences

fricative	ɬ	s	x	x^w	x̌	$x̌^w$
sonorant	ˀl	ˀy	ˀn	ˀw	-	ˀw

A series of readjustment rules are needed in order to convert [+glottal] fricatives into the appropriate surface forms. The first and second *minor readjustment rules* see /ˀs/ optionally go to /ˀc/ and /ˀx̌/ go to /x̌ʔ/ respectively.

Minor Fricative Readjustment Rule 1.[5]

$$//ˀs// \xrightarrow[\text{opt.}]{} /ˀc/$$

Minor Fricative Readjustment Rule 2

//x̌̓// → /x̌/ /?/

The main fricative readjustment rule changes /s̓/ to /y̓/, /ɬ̓/ to /l̓/, /x̓/ to /n̓/, /xʷ/ to /w̓/, and /x̌ʷ/ to /w̓/. In keeping with recent phonological tradition the main rule is ordered after the minor rules.[6]

<u>Main Fricative Readjustment Rule</u>

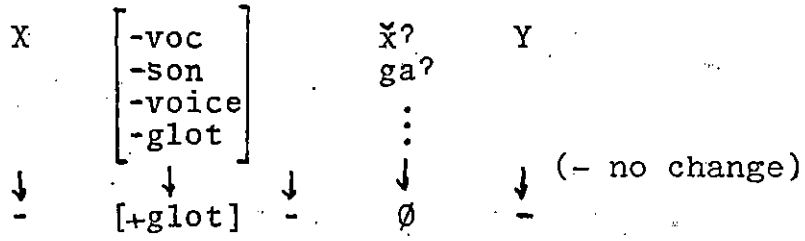
$$\begin{bmatrix} -\text{voc} \\ +\text{stri} \\ +\text{cont} \\ +\text{glot} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{son} \\ -\text{stri} \\ -\text{back} \\ +\text{voice} \\ \left\langle \begin{array}{l} -\alpha\text{ant} \\ -\alpha\text{cor} \\ \alpha\text{cont} \end{array} \right\rangle \end{bmatrix} \Big/ \quad \underset{\left\langle \begin{array}{l} -\text{lat} \\ -\text{round} \\ \alpha\text{ant} \end{array} \right\rangle}{\rule{3cm}{0.4pt}}\#$$

In this rule the environment specified by the angle brackets applies first. This part of the rule converts the irregular fricative - sonorant alternations /x/ to /n̓/ and /s/ to /y̓/. The second part of the rule changes the remaining fricatives into their closest homorganic sonorant; /ɬ/ goes to /l̓/, /xʷ/ goes to /w̓/, and /x̌ʷ/ goes to /w̓/.

Footnotes for Chapter 2

1. See Appendix 4 for a presentation of the feature notation used in this thesis.

2. Each segment of the string is assigned a number. The structural change is indicated with the numbers. X and Y are independent variables. The rule notation is similar to the following:



3. Schane, *Generative Phonology*. (1973). The suffix /ʼkəm/ is also marked [-hardening rule]. The following examples illustrate that this suffix is unlike all other /ʼk/-initial suffixes with regards to the *hardening* rule.

No Assimilation 357

qʼəs - kʼəm		qʼiˑqʼəskʼəm
eat meat - sign, omen		*sign that one will eat meat*

No Assimilation - Spirantizing 357

ʔik - kʼəm		ʔiˑʔixkʼəm
good - sign, omen		*good sign, omen*

4. The unmarked, or main, readjustment sees fricatives alternate with sonorants. The exceptions to the unmarked readjustment are considered to be marked, and are generated by *minor readjustment rules*. Minor rules are:

> "rules which only apply to a highly restricted group of items"..."Minor rules are needed to handle irregular forms, but only when there is a 'regularity' to the irregularities".
>
> (Schane, p 110)

Schane, *Generative Phonology*. (1973).

5. A glottal marker over a fricative /s̓/ indicates that the fricative has assimilated the feature [+glottal]. Double lines //s̓// indicate an underlying form. Optional rules are indicated with the abbreviation opt. All rules are obligatory unless they are marked in this manner.

6. Chomsky and Halle, *The Sound Pattern of English*. (1968). Kiparsky, "Linguistic Universals and Linguistic Change" (1968). Schane, *Generative Phonology*. (1973).

Weakening - Chapter 3

Suffixes beginning with the following *voiced segments* cause preceding voiceless obstruents to assimilate the feature [+voice]. These are /Vk, Vg, Vx, Vk^{w}, Vɬ, Vn, Vn̥, Vy, gə, and Vx̌ [-glot]/.[1] The voiced segments /gə/ and /Vx̌/ do not cause fricative voicing. The consonants /g/ and /x̌/ are subsequently deleted. The phonological process of *assimilation* or the processes of *assimilation* and *deletion* constitute the *weakening* process. Suffixes that begin with the above voiced segments are referred to as *weakening suffixes.*

Another group of suffixes cause preceding voiceless obstruents to assimilate the feature [+voice]. They do not begin with any of the above voiced segments. There does not appear, on the surface at least, to be any phonological explanation for the weakening effect of these suffixes. These suffixes are referred to as the *arbitrary weakening*

suffixes.

The following table presents the plain voiceless obstruents in contrast with their *weakened* alternates. Voiceless stops and affricates change to their homorganic voiced counterparts, while fricatives become plain resonants.

Table 3. Weakened Voiceless Obstruents

plain	p	t	ƛ	c	k	k^w	q	q^w
[+voice]	b	d	λ	d^z	g	g^w	ǧ	$ǧ^w$

plain	ɬ	s	x	x^w	x̌	$x̌^w$
[+voice]	l	y or d^z	n	w	-	w

The fricative /s/ is weakened arbitrarily to /y/ or /d^z/, while the fricative /x̌/ is not altered by weakening suffixes.

The following examples illustrate the different effects of the weakening suffixes.

Suffix-Initial /gə/

Weakening - Deletion 351

qət	- gəƛəla		qə́dəƛə́la
slip,fall	*- to move from a stationary place*		*to slip off from support*

No Deletion 351

ʔkən - gəʎəla ʔkə́ngəʎəla

get loose - to move from a stationary place *it gets loose from a place above ground*

Suffix-Initial /Vx̌ [-glot]/

Weakening - Deletion 373

nəp - x̌tu - d nəbətúd

throw - on top of - asp. long object *to throw on top*

No Affect - Deletion 373

wəɬ - x̌tu - d wəɬətud

by itself - on top of - asp. long object *by itself on top*

No Affect - No Deletion[2] 373

gəl - x̌tu - d gə́lx̌tud

to crawl - on top of - asp. long object *to crawl on top*

Suffix-Initial /Vk, Vg, Vx, Vy/

Weakening - No Deletion 326

naq - ik - əla náğikəla

drink - back - cont. *to drink after meal*

Weakening - No Deletion 326

pəʎ - axsa paλaxsá

fly - away without definite aim *to fly away*

Weakening – No Deletion 326

t̓i·k - agənsa	t̓í·gagənsa
lying on - to happen to beach meet someone while ...	*to happen to meet someone while lying on beach*

Weakening – No Deletion 312

sup - ayu	súbayu
ax - instrument	*ax*

Suffix-Initial /Vkʷ/

Weakening – No Deletion 333

maʔɬ - ukʷ - gila	mal̓úkʷila
two - person - to make something	*to take two husbands*

Weakening – No Deletion[3] 333

duqʷ - akʷ - iɬ - a	du·ǧagʷiɬa
look - beforehand - in - S.C. house	*look ahead in house*

Weakening – No Deletion 359

nək - kʷ	nəgə́kʷ
steam - passive	*steamed*

Weakening – No Deletion 359

bu·xʷ - kʷ	bəwí·kʷ
pregnant - passive	*made pregnant*

Suffix-Initial /Vn, Vˀn/

Weakening – No Deletion 304

pəlk - ənsa — pə́lgənsa

flat thing - under water, in deep water — *flat thing sinks*

Weakening – No Deletion 304

yəx - ənsa — yənə́nsa

go down quickly - under water, in deep water — *to go down quickly into deep water*

Weakening – No Deletion 325

nəp - iʔnu - d — nəbiˀnud

to throw stones - to do to one passing by - asp. — *to throw stones at someone while passing by*

Weakening – No Deletion 325

məx - iʔnu - ik - ən — məníʔnəwəkən

strike - to do to one passing by - back - I — *to strike at someone while passing by*

Suffix-Initial /Vɬ/

Weakening – No Deletion 334

ƛ̓a·qʷ - u·ɬ — ƛ̓á·ƛ̓aguɬ

red - exclusively by — *painted exclusively red*

Weakening – No Deletion 333

t̓i·s - u·ɬ — t̓á·t̓idᶻuɬ

stone - made exclusively by — *made exclusively of stone (name of a tree)*

Rules

The *assimilation* rule sees stem-final voiceless obstruents assimilate the feature [+voice]. The voiced segments /gə/ and /Vx̌ [-glot]/ do not weaken fricatives. The *deletion* rule causes /g/ and /x̌/ to be deleted following voiceless obstruents.

Assimilation

$$\begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \rightarrow [+\text{voice}] \; / \; \underline{\qquad}\#_{\langle -\text{cont} \rangle} \left\{ \begin{array}{l} \langle g \;\; ə \rangle \\ V \left\{ \begin{array}{l} \langle \check{x} \;\; [\overline{-\text{glot}}] \rangle \\ k \\ g \\ x \\ k^{w} \\ n \\ \text{'n} \\ y \end{array} \right. \end{array} \right\}$$

The angle brackets indicate that the voiced segments /gə/ and /Vx̌ [-glot] / do not weaken stem-final fricatives.

Deletion

$$1. \quad /g/ \rightarrow \emptyset \; / \; \begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \#\underline{\qquad}$$

$$2.\quad /\check{x}/ \rightarrow \emptyset \;/\; \begin{bmatrix} -voc \\ -son \\ -voice \\ -glot \end{bmatrix} \quad \# \; V \; \underline{\quad\quad}$$

The deletion and assimilation rules are collapsed into the following *weakening* rule.

Weakening

$$X \quad \begin{bmatrix} -voc \\ -son \\ -voice \\ -glot \\ \langle -cont \rangle_1 \end{bmatrix} \quad \# \quad \left\{ \begin{array}{l} \langle \langle g \rangle_2 \quad ə \rangle_1 \\ V \quad \left\{ \begin{array}{l} \langle \langle \check{x} \rangle_2 \quad [-\overline{glot}] \rangle_1 \\ k \\ g \\ x \\ k^w \\ n \\ ˀn \\ y \end{array} \right. \end{array} \right\} \quad Y$$

1	2	3	4	5 →
1	2	3	4	5
	[+voice]		$\langle \emptyset \rangle_2$	

Stem-final voiceless obstruents (2) assimilate the feature [+voice] from the suffix-initial segment (4). The angle brackets subscripted with 1 indicate that fricatives do not assimilate [+voice] from the voiced segments /gə/ and /V$\check{x}$ [$\overline{glot}$]/. The angle brackets

subscripted with 2 indicate that /g/ and /x̌/ are deleted.

Irregularities: Readjustment Rules

The *weakening* rule attaches the feature [+voice] onto stem-final voiceless obstruents. Voiceless stops and affricates become their homorganic voiced stops and affricates. Fricatives, however, cannot be realized as "voiced fricatives" because no such phonemes exist in Kwakiutl. Instead, [+voice] fricatives, like [+glottal] fricatives, are readjusted to non-fricatives. The non-fricative voiced counterparts are listed below.

Table 4. Fricative - Sonorant Correspondences

plain	ɬ	s	x	x^w	x̌	$x̌^w$
sonorant	l	y	n	w	-	w

As the table above shows, the [+voice] (weakened) fricative forms are homorganic with the [+glottal] fricative forms. (See Table 2 page 23.) The following readjustment rules are, therefore, analogous with those presented in the last chapter.

The first *minor readjustment rule* sees [+voice] /z/[4] optionally go to /d^z/, while the second one sees [+voice] /$\check{\gamma}$/ go to /$\check{x}$/.

Minor Readjustment Rule 1

$$//z// \xrightarrow[\text{opt.}]{} /d^z/$$

Minor Readjustment Rule 2

$$//\check{\gamma}// \rightarrow /\check{x}/$$

The *main fricative readjustment rule* changes [+voice] fricatives into sonorants. The rule converts /s/ to /y/, /ɬ/ to /l/, /x/ to /n/, /x^w/ to /w/, and /$\check{x}^w$/ to /w/. The rule is ordered after the minor rules.

Main Fricative Readjustment Rule

$$\begin{bmatrix} -\text{voc} \\ +\text{stri} \\ +\text{cont} \\ +\text{voice} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{son} \\ -\text{stri} \\ -\text{back} \\ +\text{voice} \\ \left\langle \begin{matrix} -\alpha\text{ant} \\ -\alpha\text{cor} \\ \alpha\text{cont} \end{matrix} \right\rangle \end{bmatrix} / \quad \underline{\qquad} \; \# \; \left\langle \begin{matrix} -\text{lat} \\ -\text{round} \\ \alpha\text{ant} \end{matrix} \right\rangle$$

In the above rule the environment specified by the angle brackets applies first. This part of the rule,

the maximal environment, converts the irregular fricative - sonorant alternations /x/ to /n/ and /s/ to /y/. The second part of the rule, the most general, changes the remaining fricatives into their closest homorganic sonorant; /ɬ/ goes to /l/, /x^w/ goes to /w/, and /$\check{x}^w$/ goes to /w/.

Why Some Suffixes Appear to Glottalize Stem-Final Sonorants

The majority of *weakening* suffixes do not affect stem-final sonorants, as the following examples illustrate.

Weakening - Stem-Final Voiceless Obstruent		334
ʔa·q^w - uɬ	ʔā·ʔağuɬ	
red - made exclusively of	*painted exclusively red*	
No Weakening - Stem-Final Sonorant		334
məl - uɬ	mā·məluɬ	
white - made exclusively of	*painted exclusively white*	

Boas noted, however, that sonorants are glottalized by some weakening suffixes.[5]

Glottalization of Stem-Final Resonant by a Weakening Suffix 301

han	- əm	hʔánəm
kettle, vessil	- *small*	*small kettle*

The Glottalization is not due to the weakening process, but rather to the process of *glottal stop insertion*. Glottal stop insertion occurs following the first vowel of a stem. The two processes are clearly separate, therefore, in stems that do not have a CV[sonorant] shape.

Weakening 301

ʔalíwas	- əm	ʔaʔlíwad^{z}əm
spruce	- *small*	*young spruce*

The process of glottal stop insertion is not formalized in the thesis.

Footnotes for Chapter 3

1. The figure [‾] stands for a segment. The sequence /Vx̌ [-glot], therefore, does not allow a glottalized sound to follow /x̌/.

2. The suffix-initial /ə/ is deleted following the stem-final sonorant.

3. The stem-final /q^w/ is weakened and *delabialized* to /ǧ/. Suffixes that begin with round vowels or vowels followed by labialized consonants delabialize stem-final voiceless labialized consonants. The letters S.C. abbreviate stem completive.

4. Fricatives that have assimilated the feature [+voice] are written as voiced fricatives for the purposes of the Minor rules. The fricative /s/ is written as /z/ and the fricative /x̌/ is written as /ɣ̌/.

5. Boas, p 227 (1947).

Further Considerations - Chapter 4

1. Irregularities: Arbitrary Hardening Suffixes

The *arbitrary hardening suffixes* cause stem-final sonorants and voiceless obstruents to pick up the feature [+glottal]. The following examples illustrate this process.

Hardening		363
wənq - q	wə́nənq̓əq[1]	
hole - inside	*having a deep hole inside*	
Hardening		363
nə́s - q	ná·c̓əq	
dry fish - inside	*fish not properly dryed inside*	
Hardening		363
han - q - əla	há̓naqəla	
dish - among more than two - cont.	*to have a dish standing among*	
Hardening		337
tikʷ - bəwi?	tí̓kʷəbəwi?	
to hang - chest	*to hang something on chest*	

The *hardening* rule below sees stem-final sonorants and voiceless obstruents pick up the feature [+glottal]. The rule is triggered by the morphological feature [+hardening], which occurs in front of "each" *arbitrary hardening suffix*. The feature [+hardening], abbreviated [+H], is subsequently deleted.[2]

Arbitrary Hardening Rule

X	[-voc, α son, α voice, -glot]	#	[+H]	Y
1	2	3	4	5 →
1	2 [+glottal]	3	Ø	5

Stem-final sonorants and voiceless obstruents (2) assimilate the feature [+glottal]. The suffix-initial *hardening segment*, in this case a morphological marker, is deleted (4 → Ø). The [+glottal] fricatives are readjusted by the readjustment rules presented in Chapter 2.

Arbitrary Weakening Suffixes

The *arbitrary weakening suffixes* see stem-final

voiceless obstruents pick up the feature [+voice]. The examples listed below illustrate this process.

Weakening		377
səp - ƛi?		səbəƛi?
canoe - moving on water, at sea		*canoe starts on water*
Weakening[3]		304
wukʷ - əs		wəwúgʷəs
bark - continuously, all the time		*bark all the time*
No Effect (stem-final /x̌/)		304
mix̌ - əs		məmé·x̌əs
sleep - continuously, all the time		*sleep all the time*
No Effect (stem-final sonorant)		304
ʔwən - əs		ʔəʔwə́ns
to hide - continuously, all the time		*hiding all the time*

The *weakening* rule causes stem-final voiceless obstruents to assimilate the feature [+voice]. The rule is triggered by the suffix-initial morphological marker [+weakening], which occurs with every *arbitrary weakening suffix*. The feature [+weakening], abbreviated [+W], is subsequently deleted.

Arbitrary Weakening Rule

X	[-voc, -son, -voice, -glot]	#	[+W]	Y
1	2	3	4	5 →
1	2 [+voice]	3	Ø	5

A stem-final voiceless obstruent (2) picks up the feature [+voice] in the above rule. The suffix-initial *weakening segment*, the morphological marker [+W], is subsequently deleted. The [+voice] fricatives are readjusted to the appropriate surface forms by the readjustment rules of Chapter 3.

2. Epenthesis: Hardening and Arbitrary Hardening Suffixes

Epenthesis does not occur between stem-final sounds and *hardening* suffixes. The examples below illustrate this fact.

No Epenthesis 357

ʔola - k̓ən	ʔółak̓ən
real - body	*able bodied*

No Epenthesis 357

ʔapsut - k̓ən - i?	ʔapsúṭ̓əni?
one side - body - nom.	*one side of body*

No Epenthesis 357

λəm - k̓ən	λə́mk̓ən
scabby - body	*to be scabby on body*

Epenthesis often occurs between stem-final sounds and *arbitrary hardening suffixes*. As the following data illustrate, the phonological environment determines whether /aʔ/, /a/, /ʔ/, or /ə/ is inserted.

Data: No Insertion

Stem-Final Voiceless Obstruent - Suffix-Initial Vowel

bək^{w} - əm	bá·k^{w}əm	302
man - real	*Indian, real man*	
məx - əm	má·n̓əm	302
to hit - real	*to hit with fist and nothing else*	

Stem-Final Sonorant - Suffix-Initial Vowel

w̓ən - əm	w̓əw̓ən̓ə́m	302
to hide - real	*really to hide*	

Stem-Final Vowel - Suffix-Initial Consonant

ʔa·le - qa	ʔáleqa	363
to search - among more than two	*to search among*	

/ə/ Insertion

Stem-Final Voiceless Obstruent - Suffix-Initial Consonant

wənq - q	wə́nənq̓əq	363
hole - inside	*having a deep hole inside*	
nəs - q	ná·c̓əq	363
dry fish - inside	*fish not properly dryed inside*	

/a/ Insertion

Stem-Final Glottalized Consonant or Voiced Obstruent - Suffix-Initial Consonant

gʷəd - q	gʷədáq	263
to untie - inside	*to untie inside*	
x̌u·kʷ - qa	x̌ú·x̌ək̓ʷaqa	363
to peel - inside	*to peel off inside*	
ǧul̓ - qa	ǧú·ʔǧəl̓aqa	363
to scoop - inside	*to scoop out inside*	

/a?/ Insertion

Stem-Final Glottalized Consonants and Voiced Obstruents		Suffix-Initial Vowel	
x̌əˀk - əm		x̌áˑkˀa?əm	302
to stay - really away		*really to stay away*	
ʷˀəd - əm		ʷˀádˑda?əm	302
cold really		*really cold*	
ɬəˀl - əm		ɬáˑla?əm	302
dead really		*really dead*	

/?/ Insertion

Stem-Final Vowel - Suffix Initial Vowel			
ta - əm		təta?əm	302
to wade - really		*really to wade*	
kˀʷa - a		kˀʷa?a	329
to sit - on rock		*to sit on rock*	

Rules

The following rules summarize the epenthesis between stem-final sounds and *arbitrary hardening suffixes.*

Epenthesis - Arbitrary Hardening Suffixes

a. $\emptyset \rightarrow$ /ə/ / voiceless obstruent # [+H]____ C Ψ

The vowel /ə/ is inserted between voiceless obstruents and consonant-initial suffixes.

b. $\emptyset \rightarrow$ /ʔ/ / V # [+H]____ V

A glottal stop is inserted between vowels and vowel-initial suffixes.

c. $\emptyset \rightarrow$ /aʔ/ / {glottalized consonant, voiced obstruent} # [+H]____ V

The segment /aʔ/ is inserted after stem-final glottalized consonants and voiced obstruents, and before suffix-initial vowels.

d. $\emptyset \rightarrow$ /a/ / {glottalized consonant, voiced obstruent} # [+H]____ C

The vowel /a/ is inserted between stem-final glottalized consonants and voiced obstruents, and suffix-initial consonants.

Weakening and Arbitrary Weakening Suffixes

Epenthesis does not usually occur between stem-final sounds and weakening suffixes. Vowel-initial weakening suffixes sometimes require the insertion of a glottal stop following stem-final vowels. As the following examples indicate, the insertion occurs when the stem-final and suffix-initial vowels cannot combine.

/ʔ/ Insertion 328

ƛ̓ʷa - iɬ	ƛ̓ʷaʔíɬ
to sit - in house	*to be seated on floor*

/ʔ/ Insertion 334

ƛ̓i·səla - u·ɬ	ƛ̓í·səlaʔuɬ
sun - completely	*sun has risen completely*

Vowels Combine 326

la - ikəla	lékəla
to go - back	*to have (someone) following (oneself)*

Vowels Combine 326

ƛ̓a - ikəla	ƛ̓ékəla
post - back	*to have post on back*

The *arbitrary weakening suffixes*, on the other hand, often require the insertion of an epenthetic segment following certain stem-final sounds. The segments /ᵃ/, /ᵊ/, /ʔ/, and /ᵃʔ/ are inserted according to the phonological environment. As the following data illustrate, the epenthesis these suffixes cause is the same as the epenthesis the *arbitrary hardening suffixes* cause.

Data: No Insertion

Stem-Final Voiceless Obstruent - Suffix-Initial Vowel

bək^{w} - əm	bábag^{w}əm	301
man - dim.	*boy*	
gənɬ - əm	gágəlnəm[4]	301
child - dim.	*little child*	

Stem-Final Sonorant - Suffix-Initial Vowel

han - əm - gaƛ̓ɬ - ayu	hanəmgáƛ̓ilayu	302
kettle - passive - at once - instrument	*kettles put down on floor*	

Stem-Final Vowel - Suffix-Initial Consonant

kəq - (ğ)u - ƛ̓i?	káquƛ̓i?	377
meet - between - at sea	*to meet on water*	

/ə/ Insertion

Stem-Final Voiceless Obstruent	–	Suffix-Initial Consonant	
səp - ƛ̓ɨ?		səbəƛ̓ɨ?	377
canoe - moving on water, at sea		*canoe starts moving on water*	

/a/ Insertion

Stem-Final Glottalized Consonant or Voiced Obstruent	–	Suffix-Initial Consonant	
k̓ʷəmɬ̓ - dᶻud		k̓ʷəmɬ̓adᶻud	345
scorch - on a flat thing		*scorched on a flat thing*	
w̓əd - dᶻu		w̓ədadᶻú·	345
cold - on a flat thing		*cold on flat*	
k̓ʷak̓ʷ - sdinaq		k̓ʷák̓ʷasdinaq	343
sitting - to work		*to work sitting*	

/a?/ Insertion

Stem-Final Glottalized Consonant or Voiced Obstruent	–	Suffix-Initial Vowel

waład - əma	wáwałada?ma	303
sweetheart - to play	*to play having a sweetheart*	
yənǩ - əma	yáyənǩə?ma[5]	303
carving - to play	*to play carving*	

/?/ Insertion

Stem-Final Vowel - Suffix-Initial Vowel

la - iɬ - əm	la?iɬəm	302
to go - into - passive	*being taken in*	

Rules

The epenthesis between stem-final sounds and the *arbitrary weakening suffixes* is summarized in the following rules.

Epenthesis - Arbitrary Weakening Suffixes

a. $\emptyset \rightarrow$ /ə/ / $\begin{matrix}\text{voiceless} \\ \text{obstruent}\end{matrix}$ # [+W]——— C

The vowel /ə/ is inserted between voiceless obstruents and consonant-initial suffixes.

b. $\emptyset \rightarrow$ /?/ / V # [+W]——— V

A glottal stop is inserted between vowels and vowel-initial suffixes.

c. $\emptyset \rightarrow$ /a?/ / $\left\{\begin{matrix}\text{glottalized} \\ \text{consonant}\end{matrix}\right\}$ ... # [+W]——— V

The segment /a?/ is inserted before suffix-initial vowels which follow stem-final glottalized consonants and voiced obstruents.

d. $\emptyset \rightarrow$ /a/ / $\left\{\begin{matrix}\text{glottalized} \\ \text{consonant}\end{matrix}\right\}$ # [+W]——— C

The vowel /a/ is inserted between suffix-initial consonants and stem-final glottalized consonants and voiced obstruents.

Rule Summary

The following rules generate the appropriate epenthetic segment between stem-final sounds and the arbitrary hardening and arbitrary weakening suffixes.

Epenthesis 1.

$$\emptyset \rightarrow \text{/ə/} \quad / \quad \begin{bmatrix}\text{-voc} \\ \text{-voice} \\ \text{-glot}\end{bmatrix} \quad \# \left\{\begin{matrix}[+H] \\ [+W]\end{matrix}\right\} \text{——} \; [\text{-voc}]$$

(voiceless obstruents) (consonant) [6]

Epenthesis 2.

$$\emptyset \rightarrow /?/ \;/\; [+\text{voc}] \quad \begin{Bmatrix}[+H]\\[+W]\end{Bmatrix} \text{——} [+\text{voc}]$$

(vowel) (vowel)

Epenthesis 3.

$$\emptyset \rightarrow /a?/ \;/\; \left\{\begin{bmatrix}-\text{voc}\\+\text{glot}\end{bmatrix}, \begin{bmatrix}-\text{voc}\\+\text{voice}\\-\text{son}\end{bmatrix}\right\} \quad \begin{Bmatrix}[+H]\\[+W]\end{Bmatrix} \text{——} [+\text{voc}]$$

(glottalized consonant, or voiced obstruent) (vowel)

Epenthesis 4.

$$\emptyset \rightarrow /a/ \;/\; \left\{\begin{bmatrix}-\text{voc}\\+\text{glot}\end{bmatrix}, \begin{bmatrix}-\text{voc}\\+\text{voice}\\-\text{son}\end{bmatrix}\right\} \quad \begin{Bmatrix}[+H]\\[+W]\end{Bmatrix} \text{——} [-\text{voc}]$$

(glottalized consonant, or voiced obstruent) (consonant)

Footnotes for Chapter 4

1. Not all /q/-initial suffixes harden stem-final sounds, as the following example illustrates.

heɬ - qənu	**héɬqənu**	**362**
sick - suddenly	*to be hit right by sickness*	

2. See Schane (1973) p 108, for a discussion of *Morphological Features.*

3. Not all suffixes that begin with the sequence /Vs/ weaken stem-final sounds.

paɤ - asdi	**páɤasdi**	**319**
fins - dried meat of ...	*dried fins*	

4. The /n/ and /l/ are metathesized. The expected form is /**gagənlən**/. Boas, p 301 (1947).

5. The vowel /a/ is reduced to /ə/ in this example.

6. The sounds abbreviated by the feature notation are explained in parentheses below.

Conclusion - Chapter 5

1. Rule Summary

This section restates and orders the rules discussed in the preceding chapters.[1] The [+glottal] and [+voice] readjustment rules are collapsed into one general rule, and the deletion and spirantization rules are formalized. Sample derivations are presented at the end of the summary illustrating the operation of the rules.

Epenthesis

The [+H] and [+W] morphological segments which trigger epenthesis are deleted by the arbitrary hardening and weakening rules mentioned in Chapter 4. The epenthesis rules, therefore, must be ordered before the arbitrary hardening and weakening rules. Epenthesis between weakening suffixes and stem-finals is not considered in this summary.

Epenthesis 1.

$$\emptyset \rightarrow /\text{ə}/ \; / \begin{bmatrix} -\text{voc} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \; \# \begin{Bmatrix} [\text{H}] \\ [\text{W}] \end{Bmatrix} \text{——} \; [-\text{voc}]$$

(voiceless obstruents) (consonants)

Epenthesis 2.

$$\emptyset \rightarrow /?/ \;/\; [+\text{voc}] \;\#\; \left\{\begin{matrix}[+H]\\[+W]\end{matrix}\right\} \text{——} [+\text{voc}]$$

(vowel) (vowel)

Epenthesis 3.

$$\emptyset \rightarrow /a?/ \;/\; \left\{\begin{matrix}[-\text{voc}\\+\text{glot}]\\[-\text{voc}\\+\text{voice}\\-\text{son}]\end{matrix}\right\} \#\left\{\begin{matrix}[+H]\\[+W]\end{matrix}\right\} \text{——} [+\text{voc}]$$

(glottalized consonant or voiced obstruent) (vowel)

Epenthesis 4.

$$\emptyset \rightarrow /a/ \;/\; \left\{\begin{matrix}[-\text{voc}\\+\text{glot}]\\[-\text{voc}\\+\text{voice}\\-\text{son}]\end{matrix}\right\} \left\{\begin{matrix}[+H]\\[+W]\end{matrix}\right\} \text{——} [-\text{voc}]$$

(glottalized consonant or voiced obstruent) (consonant)

Hardening and Weakening

The hardening, arbitrary hardening, weakening, and arbitrary weakening rules apply in a block following the epenthesis rules. These rules are unordered with respect to one another because their phonological environments are mutually exclusive.

Hardening

$$X \quad \begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \quad \# \quad \begin{Bmatrix} \check{x}? \\ ga? \\ ,ka? \\ ,k \\ ,c \end{Bmatrix} \quad y$$

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \rightarrow$$

$$1 \quad 2 \quad 3 \quad \emptyset \quad 5$$

[+glottal]

Weakening

$$X \quad \begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \\ \langle -\text{cont} \rangle_1 \end{bmatrix} \quad \# \quad \left\{ \begin{array}{ll} \langle\langle g \rangle_2 \quad \text{ə} \rangle_1 & \\ V \quad \left\{ \begin{array}{ll} \langle\langle \check{x} \rangle_2 & [-\overline{\text{glot}}] \rangle_1 \\ k & \\ g & \\ x & \\ k^w & \\ n & \\ ,n & \\ y & \end{array} \right. & \end{array} \right\} Y$$

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \rightarrow$$

$$1 \quad 2 \quad 3 \quad 4 \quad 5$$

[+voice] $\langle \emptyset \rangle_2$

Arbitrary Hardening

$$X \quad \begin{bmatrix} -\text{voc} \\ +\text{son} \\ +\text{voice} \\ -\text{glot} \end{bmatrix} \quad \# \quad [+H] \quad Y$$

1 2 3 4 5 →

1 2 3 Ø 5

[+glottal]

Arbitrary Weakening

$$X \quad \begin{bmatrix} -\text{voc} \\ -\text{son} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \quad \# \quad [+W] \quad Y$$

1 2 3 4 5 →

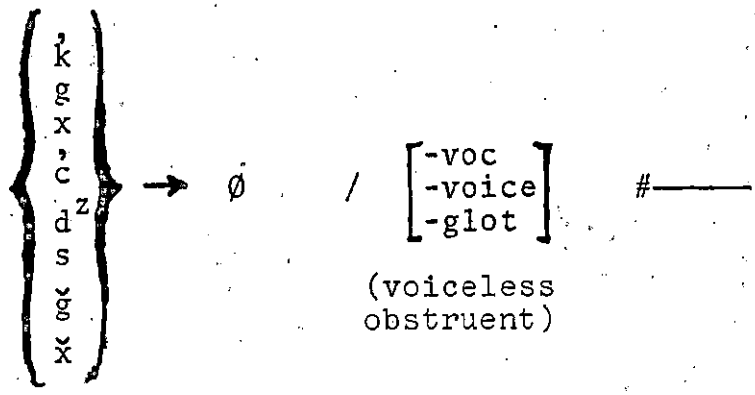
1 2 3 Ø 5

[+voice]

Deletion

The Introduction noted that the suffix-initial segments /k̓, g, x, c̓, d^z, s, ǧ, x̌/ delete following voiceless obstruents. The following rule states this process. The hardening and weakening rules delete some of these segments. These rules, therefore, are ordered before the deletion rule because they represent special cases of the rule.[2]

Deletion



Fricative Readjustment

The fricative readjustment rules apply after the above rules because they apply when a stem-final fricative has been hardened or weakened. The [+glottal] and [+voice] fricative readjustment rules of the earlier chapters are collapsed into one *main readjustment rule* and four *minor readjustment rules*. The new main rule sees [+glottal] fricatives become [+glottal] non-fricatives and [+voice] fricatives readjusted to [+voice] non-fricatives.

Minor Fricative Readjustment Rules

1. //s'// → (opt.) /c'/
2. //z// → (opt.) /d^z/
3. //x̌'// → /x̌?/
4. //ǧ// → /x̌/

Main Fricative Readjustment Rule

$$\begin{bmatrix} -\text{voc} \\ +\text{stri} \\ +\text{cont} \\ \alpha\,\text{voice} \\ -\alpha\,\text{glottal} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{son} \\ -\text{stri} \\ -\text{back} \\ +\text{voice} \\ -\alpha\,\text{glottal} \\ \left\langle \begin{matrix} -\beta\,\text{ant} \\ -\beta\,\text{cor} \\ \beta\,\text{cont} \end{matrix} \right\rangle \end{bmatrix} \quad / \quad \underline{\qquad} \# \quad \left\langle \begin{matrix} -\text{lat} \\ -\text{round} \\ \beta\,\text{ant} \end{matrix} \right\rangle$$

The first part of the rule, specified by the angle brackets, converts [+glottal] /x/ to /n̓/ and /s/ to /y̓/ and [+voice] /x/ to /n/ and /s/ to /y/. The second part of the rule converts the remaining fricatives into their closest homorganic sonorant; [+glottal] /ɬ/ goes to /l̓/, /x^{w}/ to /w̓/, and /x̌^{w}/ to /w̓/, while [+voice] /ɬ/ goes to /l/, /x^{w}/ to /w̓/, and /x̌^{w}/ to /w̓/.

Spirantization

The spirantization rule, noted in the Introduction, is ordered after all of the other rules. This process sees voiceless obstruents /ƛ, k, k^{w}, q, q^{w}/ optionally become homorganic fricatives when they are followed by a surface consonant. This rule is ordered at the end because it is triggered by a surface suffix-initial consonant.

Spirantization

$$\begin{bmatrix} -\text{voc} \\ \alpha\text{ant} \\ \alpha\text{cor} \\ \alpha\text{lat} \\ -\text{cont} \\ -\text{voice} \\ -\text{glot} \end{bmatrix} \begin{bmatrix} +\text{cont} \\ +\text{stri} \end{bmatrix} \; / \; \text{———} \# \; \begin{bmatrix} -\text{voc} \\ -\text{cont} \\ -\text{stri} \end{bmatrix}$$

The stem-final voiceless obstruents /ƛ, k, k^w, q, q^w/ are changed into homorganic fricatives preceding voiceless obstruents.

Sample Derivations

Hardening - Fricative Readjustment

məx - ˈkəgaɬ	*to strike - make a noise*	358
a. məˈx - gaɬ	hardening	
b. məˈngaɬ	fricative readjustment	
məˈngaɬ	*to begin to sound like striking*	

Hardening

ʔapsut - ˈkən - iʔ	*one side - body - nom.*	357
a. ʔapsuˈtəniʔ	hardening	
ʔapsúˈtəniʔ	*one side of body*	

Epenthesis - Arbitrary Hardening - Fricative Readjustment

nəs - [+H] q	*dry fish - inside*	363
a. nəs - [+H] ə q	epenthesis	
b. nəs̓ - əq	arbitrary hardening	
c. nəc̓ - əq	fricative readjustment	
nac̓əq	*fish not properly dryed inside*	

Weakening

bəkʷ - iɬ	*man - in the house*	328
a. bəgʷ - iɬ	weakening	
bəgʷiɬ	*man of the house*	

Weakening

qət - gəɬəla	*slip - to move from a stationary place*	351
a. qəd - əɬəla	weakening	
qə́dəɬəla	*to slip off from support*	

Deletion

nəp - xdəq	*throw,- exclusively by*	367
a. nəp - dəq	deletion	
nə́pdəq	*exclusively by throwing*	

Deletion - Spirantizing

bək^{w} - xdəq	*man - exclusively by*	367
a. bək^{w} - dəq	deletion	
b. bəx^{w} - dəq	spirantizing	
ɓax^{w}də́q	*to kill game without weapons*	

Epenthesis - Arbitrary Weakening

səp - [+W] ƛi?	*canoe - moving on water*	377
a. səp - [+W] ə ƛi?	epenthesis	
b. səb - əƛi?	arbitrary weakening	
səbəƛi?	*canoe starts on water*	

2. Order of Application

The hardening, arbitrary hardening, weakening, and arbitrary weakening rules apply in a left to right order, as the following example illustrates.

du·q - ak^{w} - iɬ - a	*look - beforehand - in - S.C. house*	360
a. du·ǧ - ak^{w} - iɬ - a	weakening	
b. du·ǧ - ag^{w} - iɬ - a	weakening	
du·ǧag^{w}iɬa	*look ahead in house*	

An incorrect form is generated when the rule applies right to left.

du·q - ak^{w} - iɬ - a	*look – beforehand – in – S.C. house*	
a. duq - ag^{w} - iɬ - a	weakening	(incorrect application)
*duqag^{w}iɬa		

The suffix-initial segment /ag^{w}/ does not weaken stem-final sounds.

3. Speculations

There is no phonetic reason why the suffix-initial segments that are involved in hardening and weakening should be different from those that are not. Why, for example, should suffix-initial /p̓/ not cause stem-final voiceless obstruents to assimilate glottalization? Clearly there is something different about the suffix-initial segments that trigger these two processes. In this section of the chapter I speculate on a possible solution to this question by appealing to Foley's concept of relative phonological strength. No doubt a clear understanding of this problem will allow greater insight into the arbitrary hardening and weakening suffixes.[3]

Foley's solution to problems analogous to the one seen in Kwakiutl is to assign a system of relative phonological strength to the sounds of the language. Often sounds that are phonetically very similar but which undergo different processes do not have the same phonological strengths. Such is the case for German (Foley) and Umpila (Harris and O'Grady).[4]

In Kwakiutl the sounds that are deleted following voiceless obstruents may not be "as strong as" their relative counterparts that are not deleted. /p̓/ would therefore be stronger than /k̓/, /x̌/ stronger than /x/, and /b/ stronger than /g/. In this light *deletion* is understood as a process whereby "weak" suffix-initial segments are dropped and *assimilation* is understood as a process where certain stem-final sounds assimilate the voicing and glottal characteristics from following "weak" segments.

The hardening and weakening rules can be summarized by the following statement:

> A stem-final voiceless obstruent assimilates the voicing and glottal characteristics from suffix-initial "weak" segments. The suffix-

initial segments that begin with consonants are subsequently deleted.

This hypothesis, in short, is far from a formal analysis. It does provide a good foundation for further work. Interestingly enough, the "weak" articulatory areas of Kwakiutl, mainly the palato-velars, are also the "weak" areas for both German and Umpila.[5]

4. Conclusions

This thesis has shown that hardening and weakening are based on two synchronic phonological processes; assimilation and deletion. Generative rules have been presented which formalize the rules involved in the two processes. In concluding that hardening and weakening are based on phonological processes the thesis has opened a large area of research. Speculations have shown that questions concerning the systems underlying these processes provide for considerable work in the future.

Footnotes for Chapter 5

1. See Schane (1973) p 84, for rule ordering.

2. The suffixes beginning with /č/, /d^z/, or /s/ that do not undergo deletion (see Introduction for discussion) are marked [-deletion rule].

3. Foley, "Assimilation of Phonological Strength in Germanic" (1973).

4. Foley, (1973). Harris and O'Grady, "An Analysis of the Progressive Morpheme in Umpila Verbs: A Revision of a Former Attempt" (1976).

5. See Foley (1973) and Harris and O'Grady (1976).

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Phoneme Inventory - Appendix 1

There are forty two consonant phonemes in Kwakiutl and six vowels. Stress and two degrees of vowel length, long and short, are phonemic. The phoneme chart is presented on the following page.

This analysis is based on Boas's data and nearly concurs with the analysis based on my own field data taken from the present day language. Now, vowel length is rarely heard and is predictable. Stress may also be predictable, however, more work is needed in order to discover the present day phonemic system.

Consonants

The consonant phonemes listed are from Boas's 1947 analysis. I have replaced some of his orthographic symbols with more current ones. The chart below lists the changes.[1]

Boas	Current Symbol	
p!	p̓	glottalized p
ɛ	ʔ	glottal stop
L̥	λ	lateral affricate (voiced)

Phoneme Chart

	Bilabial	*Alveolar plain*	*affricate*	*lateral*	*Palato-Velar*	*Velar labial*	*Uvular*	*labial*	*Glottal*
Stops									
voiceless	p	t	c	ƛ	k	k^w	q	q^w	ʔ
voiced	b	d	d^z	λ	g	g^w	ǧ	$ǧ^w$	
glottalized	p̓	t̓	c̓	ƛ̓	k̓	k^w̓	q̓	q^w̓	
Fricatives			s	ɬ	x	x^w	x̌	$x̌^w$	h
Sonorants									
plain	m	n		l	y	w			
glottalized	m̓	n̓		l̓	y̓	w̓			

Vowels

high

i u

front e ə o *back*

a

low

Length

short	V
long	V·

Stess V́

Boas	Current Symbol	
x	$\breve{x}$	uvular fricative
x•	x	palato-velar fricative [x^y]
g	$\breve{g}$	uvular voiced stop
k•	k	palato-velar stop [k^y]
ts	c	alveolar affricate
dz	d^z	alveolar affricate (voiced)
k^u	k^w	labialized velar
kw	k^w	labialized velar

In Kwakiutl only one consonant may occur in word initial position. Pre-glottalized sonorants are therefore, analysed phonemically as glottalized sonorants because they may occur in this position. Post-glottalized sonorants are analysed as a sonorant followed by a glottal stop. Such segments do not occur word-initially. The following minimal pair illustrates that pre- and post- glottalized sonorants must be phonemically separate.

1. [han?aqəla] /han?aqəla/ *to place a dish among*

2. [ha?naqəla] /ha̓naqəla/ *to have a dish standing among*

Derivations

1. han - q - əla *dish - inside - cont.*

   hanha - q - əla Stem Expansion

   han?a - q - əla /h/ → /?/ non-word initial

   /han?aqəla/ *to place a dish among*

2. han - aq - əla *dish - among more than two - cont.*

   ha?n - aq - əla Hardening (Arbitrary)

   /hanaqəla/ *to have a dish standing among*

Vowels

The vowel phonemes listed above represent a phonemicization of Boas's non-phonemic transcription. The following vowel chart represents the relationship between the two analyses.[2]

High	[i]			[u]	
Front	[e] [ä]	[ə]	[a], [ă]	[o] [â]	Back
			Low		

/i/ - [i] and [e] /u/ - [u] and [o]

/e/ - [ä] /o/ - [â]

/a/ - [a] and [ă] /ə/ - [ə]

Although Boas was aware of the phonemic principle as the following quotation points out, he continued to use his own transcription throughout his work.

> "e, i and o, u are each pair one phoneme. They are always dipthongized. The degree of dipthongization varies considerably individually and in various villages. In Newetee in 1886, I heard commonly in accented syllables ai, in short syllables e^{i} or i^{i} according to the accompanying consonants. Front consonants, particularly palatalized and labialized consonants emphasize the i tinge, back consonants the e tinge. The same holds true for u and o." (p 207).

He preferred to use his earlier orthography, rejecting such innovations as the glottal marker /'/, in order to keep all of his material comparable.[3]

The following examples present an attestation of the vowel phonemes. Boas's transcription is listed on the right hand side of the page.

/i/ vs. V

?awáy'i?		[?ăwá?yi?] 263
/i/ ~ /a/	*he (abs.) is quiet, chaste*	

ʔawáʔya?	[ʔăwáʔya?]	263
	he (abs. invis.) is quiet, chaste	
ʔamáʔyi?	[ʔămáʔye?]	263
/i/, [e] ~ /a/	*he (abs.) is small*	
ʔamáʔya?	[ʔămáʔya]	263
	he (abs. invis.) is small	
cəyí?	[cəyé?]	262
/i/, [e] ~ /e/, [a]	*he (abs.) draws water*	
cəyé?	[cəyä?]	262
	he (abs. invis.) draws water	
məxʔidi?	[məxʔide?]	261
/i/, [e] ~ /u/, [o]	*he (abs.) strikes*	
məxʔidu?	[məxʔido?]	261
	he (near. vis) strikes	
ʔukʷini?	[ʔokʷine?]	247
/i/, ~ /ə/	*body*	
ʔukʷəni?	[ʔokʷəne?]	247
	ones own body	

	c̓í·ɬc̓əkʷ	[c̓é·ɬc̓əkʷ]	248
/i·/, [e·] ~ /ə/	*various kinds of birds*		
	c̓ə́ɬc̓əkʷ	[c̓ə́ɬc̓əkʷ]	248
	short		
	bí·liɬ	[bé·liɬ]	250
/i·/, [e·] ~ /u·/, [o·]	*loose things scattered on floor*		
	bú·liɬ	[bó·liɬ]	250
	lump on floor		

/a/ vs. V

	c̓ác̓adağəm	[c̓ác̓adağəm]	222
/a/ ~ /ə/	*girl*		
	c̓ác̓ədağəm	[c̓ác̓ədağəm]	222
	girls		
	məxˀidaˀ	[məxˀidaˀ]	261
/a/ ~ /i/, [e]	*he (abs. invis) strikes*		
	məxˀidiˀ	[məxˀideˀ]	261
	he (abs.) strikes		

wá·ɬdəm		[wá·ɬdəm]	222
/a·/ ~ /o·/, [â·]	*word (sg.)*		
wó·ɬdəm		[wâ·ɬdəm]	222
	word (pl.)		
yáq̓ʷima		[yáq̓ʷema]	249
/a/ ~ /e/, [a]	*potlatch gift (sg.)*		
yéq̓ʷima		[yâq̓ʷema]	249
	potlatch gift (pl.)		

/o/ vs. ɣ

bəgʷíɬ		[bəgʷíɬ]	328
/o/, [â] ~ /a/	*man of the house*		
bəgʷóɬ		[bəgʷâɬ]	334
	ugly man		

/u/ vs. V

k̓útəla		[k̓ótəla]	306
/u/, [o] ~ /a/	*salmon*		
k̓átəla		[k̓átəla]	306
	what is used for painting		

The data below list a few examples from my own field data contrasted with corresponding examples from Boas's work. The examples taken from Boas are listed in his transcription and in my phonemicization.[4]

1.a	/hamá?ɬolá/	*twenty two*	field notes
b	/hamá?ɬola/	'' ''	Boas 277
c	[hămá?ɬâla]	'' ''	Boas 277
2.a	/gíksukola/	*201-299 being a bundle together*	
b	/gexsukola/	——''——	278
c	[gäxsokâla]	——''——	278
3.a	/hamoǧola/	*twenty three*	
b	/hamuǧola/	'' ''	277
c	[hămoǧâla]	'' ''	277
4.a	/mu/	*four*	
b	/mu/	''	276
c	[mo]	''	276
5.a	/?amé?s/	*you are small*	
b	/?amé?s/	'' '' ''	263
c	[?ămá?s]	'' '' ''	263
6.a	/məx?i/	*he punched (abs.)*	
b	/məxi?/	——''——	261
c	[məxé?]	——''——	261

Length and Stress

Both length and stress are written in all of Boas's work on Kwakiutl. One stress mark [V́], and two degrees of length, [V] short and [V̄] long, are indicated. A third degree of length, very short, is used for the low central vowel [ă]. The following minimal pairs show that both stress and two degrees of vowel length, long and short, are phonemic. The very short vowel [ă] is predictable from the stress pattern.

Length	/a·/ vs. /a/	
bā̆wap	*to leave behind for a while*	314
bā·wap	*to leave each other*	314
	[a] vs. [ă] (predicted by stress)	
[ʔā̆wā̆ka]	*slow*	221
[ʔă̆wā́ka]	*porpoise dives*	221
Stress		
tā́sʔəla	*to hit on head without consideration; as women do in wailing*	

t̓asʔəlá — *to hit head at once*

ʔík̓ənx̌iʔ — *it is on top edge (sg.)*

ʔik̓ə́nx̌iʔ — *it is on top edge (pl.)*

Footnotes for Appendix 1

1. Boas, (1947). The palato-velar obstruents are normally written /k^y, $\acute{k}^y$, g^y, x^y/ or /$\underset{\frown}{k}$, $\acute{\underset{\frown}{k}}$, $\underset{\frown}{g}$, $\underset{\frown}{x}$/. The voiced alveolar affricate is commonly written /$\widehat{dz}$/.

2. Boas, (1947). Boas's transcription is indicated with [ ] brackets in this chapter.

3. Boas, (1947) p 207.

4. Boas, (1947). a. field data, b. Boas, phonemic transcription, c. Boas, original transcription.

5. Boas, (1947).

Appendix 2

The data presented in the text of the thesis are written in Boas's transcription and in my phonemicization. The phonemic transcription is listed on the left hand side of the page. Boas's orthographic symbols are replaced with more current ones. See Appendix 1 for a list of the changes. The vowel /ɛ/ is written as /ə/.

Chapter 1.

wá·wakaɬa	wą́wakaɬa
bá·wap̓	bą́wap̓
wá·swək̓a	wą́swək̓a
bəkʷáx̌a	bəkʷáx̌a
bəgʷiɬ	bəgʷiɬ
bá·k̓ʷəm	bą́k̓ʷəm
baxʷdə́q	baxʷdə́q
nápdəq	nápdəq
gʷadəxdə́q	gʷadəxdə́q
sə́myakawi?	səmyakawi?

dí·dəgisawi?	dídəgisawi?
mə́ngaɬ	mə́?ngaɬ
lákəgaɬ	lákəgaɬ
qədəɬəla	qədəɬəla
kə́ngəɬəla	kə́ngəɬəla
nə́ǧikəla	nə́ǧikəla
kəpəlá	kəpəlá
baxʷdə́q	baxʷdə́q
(mə)mú·kʷdəq	(mə)mə́kʷdəq

Chapter 2.

?apsútəni?	ʔapsə́tənə?
?ólakən	ʔálakən
ɬə́mkən	ɬə́mkən
mə́ngaɬ	mə́?ngaɬ
lákəgaɬ	lákəgaɬ
mulx?idkala	mo?lx?idkala
lílakimas	lélakemas
hí·cimas	hə́cemas
nunəwímas	nónwémas
gəlx̌tud	gəlx̌tod
wəɬətud	wəɬətod
cə́qənx̌	cə́qənx̌

c̓uy̓ənx̌	c̓o?yənx̌
sək̓áx̌?ənx̌	sək̓áx̌?ənx̌
ƛá·p̓əla	ƛáp̓əla
wəwə́nga?la	wəwə́nga?la
gə́l̓tis	gə́l̓tes
lák̓a?idᶻənd	lák̓a?edzənd
hánɬc̓od	hánɬc̓ad
q̓í·q̓əsk̓əm	q̓íq̓əsk̓əm
?i·?ix̌k̓əm	ɐ?ex̌k̓əm

Chapter 3

qə́dəƛə́la	qə́dəƛə́la
k̓ə́ngəƛəla	k̓ə́ngəƛəla
nəbətúd	nəbətód
wəɬətud	wəɬətod
gə́lx̌tud	gə́lx̌tod
nág̓ikəla	nág̓ekəla
p̓aλaxsá	p̓aλaxsá
t̓í·gagənsa	t̓ɛ́gagənsa
súbayu	sóbayu
maɬúkʷila	ma?ɬókʷila
du·g̓agʷiɬa	dɔ̄g̓agʷiɬa
nəgə́kʷ	nəgə́kʷ

bəwí·kʷ	bəwékʷ
pélgənsa	pélgənsa
yənənsa	yənənsa
nəbíʔnud	nəbéʔnod
mənínəwiʔ	menéʔnəweʔ
ʔá·ʔaguɬ	ʔáʔagoɬ
tá·tid uɬ	tátedzoɬ
ʔá·ʔaguɬ	ʔáʔagoɬ
mʔá·məluɬ	ʔmáʔmeloɬ
hánəm	háʔnəm
ʔaʔlíwad əm	aʔlíwadzəm

Chapter 4.

wénwənqəq	wénwənqəq
ná·cəq	náʔcəq
hánaqəla	háʔnaqəla
tíkʷəbəwiʔ	tékʷəbəweʔ
səbəʔiʔ	səbəʔeʔ
wəwúgʷəs	wəwógʷəs
məmí·xəs	məméxəs
ʔəwʔéns	ʔəʔwéns
ʔólakən	álakən
ʔapsutəniʔ	ápsótəneʔ

λə́mk̓ən	λə́mk̓ən
bá·k̓ʷəm	bā́k̓ʷəm
má·n̓əm	má?nəm
ʔwəʔwən̓ə́m	ʔwəʔwəʔnə́m
ʔáleqa	álāqa
wə́nwənq̓əq	wə́nwənq̓əq
ná·c̓əq	nā́c̓əq
gʷədáq	gʷədáq
ƛ̓ú·ƛ̓ək̓ʷaqa	ƛ̓óƛ̓ək̓ʷa
ǧú·ʔǧəl̓aqa	ǧóʔǧəʔlaqa
x̌á·k̓aʔəm	x̌ā́k̓aʔəm
ʔwá·daʔəm	ʔwā́daʔəm
ɬá·laʔəm	ɬā́ʔlāʔəm
tətaʔəm	tətaʔəm
kʷaʔa	kʷāʔa
k̓ʷaʔíɬ	k̓ʷāʔíɬ
ƛ̓í·səlaʔuɬ	ƛ̓ésəlaʔuɬ
lékəla	läkəla
λékəla	λā́kəla
bábagʷəm	bábagʷəm
gágəlnəm	gágəlnəm
hanəmgál̓ilayu	hanəmgáʔlilayu
káquƛi?	káqoƛe?
səbəƛi?	səbəƛe?

k̓ʷəmɬadᶻud	k̓ʷəm?ladzod
ẇədadᶻú·	?wədadzɔ́
k̓ʷák̓ʷasdinaq	k̓ʷák̓ʷasdenaq
wáwaʎada?ma	wáwaʎada?ma
yáyənk̓ə?ma	yáyənk̓ə?ma
la?iʎəm	la?eʎəm
héɬqənu	hɛ́ɬqənu
páʎasdi	páʎasde

Chapter 5

məŋgaɬ	mə́?ngaɬ
?apsúẗəni?	ăpsótóẗəne?
ná·c̓əq	nắc̓əq
bəgʷiɬ	bəgʷiɬ
qə́dəʎəla	qə́dəʎəla
nápdəq	nápdəq
baxʷdəq	baxʷdəq
səbəʎi?	səbəʎe?
du·ǧagʷiɬa	dɔ̄ǧăgʷiɬa

Appendix 3

This appendix examines the *hardening* and *weakening* suffixes of the present day language. The data that I have collected indicate that the two associated processes operate in the same manner as they did when Boas collected his data. The hardened and weakened forms of the various stem-final sounds remains the same, with the exception of two fricatives. The labialized uvular /x̌ʷ/ is now hardened to /x̌ʷ ʼw/ (instead of /ʼw/) and the alveolar /s/ is almost exclusively hardened to /ʼc/ and weakened to /dᶻ/.

No Affect /x̌ʷ/

six̌ʷ - a	sí x̌ʷa
travel by - S.C. boat	*traveling by means of boat*

Hardening /x̌ʷ/

six̌ʷ - i	sí x̌ʷʼwi
travel - nom. by boat	*ride in a boat*

Weakening /x̌ʷ/

six̌ʷ - ayu	síwayu
travel by - instrument boat	*canoe paddle*

No Affect

q̓ʷis - səm	q̓ʷísəm
squeeze - face	*squeeze your face*

Hardening

q̓ʷis - əx̌u	q̓ʷíc̓əx̌a
squeeze - throat	*choke your throat*

Weakening

q̓ʷis - iɬbən	q̓ʷíd͡zɨɬbən
squeeze - nose	*squeeze your nose*

A group of *arbitrary hardening suffixes* and a group of *arbitrary weakening suffixes* still exist in the language. There is still no surface phonological explanation for the respective effects of these suffixes. Whether or not there are more arbitrary suffixes in todays language than in the language of Boas's time is not known yet.

Hardening

A stem-final voiceless obstruent assimilates the feature [+glottal] when followed by a suffix-initial /k̓/. The /k̓/ is subsequently deleted. The suffix-initial segment /ga?/ also operates in this manner.

No Deletion - No Affect /k̓/

bək^{w} - anəm - k̓ala	bəg^{w}ánəmk̓ala
man - formative - noise	*man's noise*

Hardening /k̓/

bək^{w} - k̓ala	bək̓^{w}ala
man - noise	*man's noise*

Hardening /k̓/

hap - k̓ən	hap̓ə́n
hair - body	*hair on body*

Hardening /k̓/

x^{w}əs - ap - k̓ən	x^{w}əd^{z}ap̓ən
hit - back - body	*hit on back of head*

Hardening /ga?-/

k̓^{w}ət̓a - ga?aƛəla	k̓^{w}ət̓áƛəla
to stick - hold on to	*stick onto something*

No Deletion - No Affect /ga?-/

sən - ga?aƛəla	sə́nga?aƛəla
to think - hold on to	*thought of an idea*

Weakening

Stem-final voiceless obstruents are weakened when they are followed by the suffix-initial voiced

segment /gə/. Certain sequences of Vowel-Consonant cause stem-final voiceless obstruents to assimilate voicing. Unfortunatly, I have not collected enough data to fully substantiate the analysis presented in Chapter 3.

Weakening /gə/

p̓əs - gəɬəla	p̓əd^{z}əɬəla
potlatch - to go in a certain direction	*to go and give a potlatch*

No Deletion - No Affect /gə/

ham̓ - gəɬəla	ham̓gəɬəla
to eat - to go in a certain direction	*to go somewhere to eat*

Weakening /Vɬ/

q̓^{w}is - iɬbən	q̓^{w}íd^{z}iɬbən
squeeze - nose	*squeeze your nose*

Order of Application

Both the hardening (and arbitrary hardening) and weakening (and arbitrary weakening) rules apply left to right.

x^{w}əs - ap - k̓ən	x^{w}əd^{z}ap̓ən
hit - back - body	*hit on back of head*

The suffix /ap/ weakens /s/ to /d^{z}/ and then the suffix /kən/ hardens /p/ to /p̚/. If the rule hardened /ap/ to /ap̚/ first, then /s/ would not be weakened because the environment [[V][+glot]] blocks weakening.

Feature Notation - Appendix 4

For the most part, the feature notation used in this thesis follows the guidelines laid down by Chomsky and Halle.[1] The distinctive feature matrix is presented following a brief discussion of the features [vocalic] and [strident].

Vocalic

The feature [vocalic] separates the vowels [+vocalic] from the consonants (obstruents and sonorants) [+vocalic]. According to Chomsky and Halle, however, vocalic sounds include voiced vowels and liquids. They state:

> "Vocalic sounds are produced with an <u>oral</u> cavity in which the most radical constriction does not exceed that found in the high vowels [i] and [u] and with the vocal cords that are positioned so as to allow spontaneous voicing; in producing non-vocalic sounds one or both of these conditions is not satisfied." (p 302).[2]

Their analysis has the effect of separating /l/ and /l̥/ from all of the other consonants, including

sonorants, in Kwakiutl. The analysis is phonetically correct, however, it does not reflect the phonological system. For example, the processes of hardening and weakening see the liquids grouped together with the other sonorants. I have, therefore, included the liquids with the non-vocalic sounds of Kwakiutl.

Strident

The feature [strident] separates the fricatives and the affricates [+strident] from the other sounds [+strident].

> "Strident sounds are marked acoustically by greater noisiness than their nonstrident counterparts." (p 329).[3]

Fricatives are [+strident] and [+continuant], while affricates are [+strident] and [-continuant].

Distinctive Feature Matrix of Kwakiutl Segments

	i e a ə o u	p p' b m m'	t t' d n n'	c c' d^{z} s	x̂ x̂' λ̂ ɬ ɬ' l l'	k k' g x y y'	k^{w} k^{w}' g^{w} x^{w} w w'	q q' ǧ x̌	q^{w} q^{w}' ǧ^{w} x̌^{w}	h ʔ
vocalic	+++++	-----	-----	--- -	------	------	- - - -	--	----	--
anterior	------	+++++	+++++	+++ +	+++++	------	- - - -	--	----	--
coronal	------	-----	+++++	+++ +	+++++	------	- - - -	--	----	--
high	++--++	-----	-----	--- -	------	+++++	+ + + +	++	----	--
back	----++	-----	-----	--- -	------	------	- - - -	--	++++	+ + + +	--
low	-+-+-	-----	-----	--- -	------	------	- - - -	--	----	--	++
round	----++	-----	-----	--- -	------	------	+ + + +	++	----	+ + + +	--
strident	------	-----	-----	+++ +	+++--	---+--	- - - +	--	---+	- - - +	--
lateral				--- -	+++++						
continuant		-----	-----	--- +	---++	---+++	- - - +	++	---+	- - - +	+-
sonorant		---++	---++	--- -	----++	----++	- - - -	++	----	- - - -	++
voice		--+--	--+--	--+ -	--+---	--+-++	- - + -	++	--+-	- - + -	--
glottal		-+--+	-+--+	-+- -	-+---+	-+---+	- + - -	-+	-+--	- + - -	++

Footnotes for Appendix 4

1. Chomsky and Halle, (1969).
2. Chomsky and Halle, (1969) p 302.
3. Chomsky and Halle, (1969) p 329.

VITA

Surname: WILSON Given Names: PETER JOHN

Place of Birth: ST.CATHARINES,ONT. Date of Birth: April 24, 1953

Educational Institutions Attended, with Dates of Entering and Leaving:

SIR GEORGE WILLIAMS UNIVERSITY, MONTREAL	1971 to 1972
UNIVERSITY OF MASSACHUSETTS, AMHERST	1974 to 1974
MCGILL UNIVERSITY, MONTREAL	1972 to 1974
UNIVERSITY OF VICTORIA, VICTORIA	1974 to 1976

Degrees,Diplomas,Etc.,Awarded, with Dates and Names of Institutions:

Diploma of Collegial Studies	*1972*	*Sir George Williams University, Montreal*
B.A. (Honors)	*1974*	*McGill University, Montreal*

Honors and Awards:

Academic Honors, 1971-1972

University of Victoria Fellowship, 1975-1976

Publications:

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HARDENING AND WEAKENING IN KWAKIUTL

Author [redacted]

PETER JOHN WILSON
Name

August 16, 1976
Date