LENITION AND GLOTTALIZATION

in

NOOTKA

by

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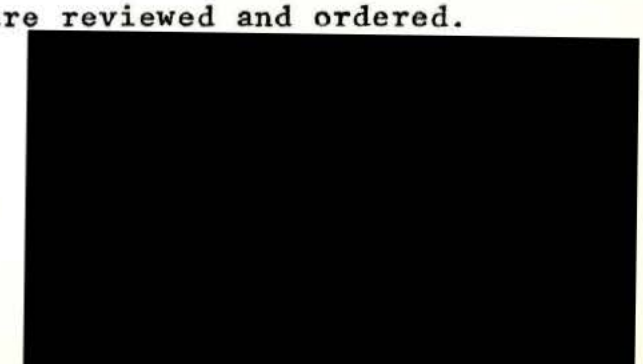
ABSTRACT

An analysis of two interrelated phonological processes, lenition and glottalization, which occur in the Nootka language, is presented. Rules which account for these two processes are posited, and are justified by alternations, other phonological rules and constraints in the language (specifically Port Alberni Nootka as spoken around 1910).

Possible exceptions to the lenition and glottalization rules are accounted for by the positing of different underlying forms.

Other rules (for example, vowel elision) needed to derive the spoken or surface form of words discussed in the thesis are also formulated. All phonological rules are reviewed and ordered.



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SYMBOL CONVENTIONS

// //	underlying form
/ /	phonemic form (omitted where no ambiguity can arise)
[ ]	1. phonetic form
	2. phonological feature(s)
	3. instructional marker in underlying form
{ }	disjunctive features or segments
⟨ ⟩	variable consonant, obligatorily deletes in specific environments
( )	optionally deletes
-	lexical suffix boundary marker
+	grammatical suffix boundary marker
#	word boundary marker
*C	unacceptable form, or proto-form
()*	unspecified number of occurrences of the bracketed segment
<u>C</u>	initial letter of a <u>proper name</u>
Vˠ	variable-length vowel
-ᶜ	lenition suffix marker
-ᵓ	glottalization suffix marker
C̰	pharyngealized phone

CHAPTER 1 INTRODUCTION

This thesis analyzes part of the phonology of the Nootka language, specifically those rules needed to describe the effect of certain suffixes on the final consonant of preceding morphemes. The processes focused on in this work have been termed "hardening" and "softening" (or "weakening" c.f. Boas 1911:430, Sapir 1911:16). "Hardening", which causes an unglottalized consonant to become glottalized, will be here termed glottalization, while "softening",which causes fricatives to become their homorganic glide, will be termed lenition.[1]

The language providing the data for this analysis is Nootka, a subgroup of the Wakashan family, whose speakers are located on the west coast of British Columbia. The family has two divisions:

1. Kwakiutlan, spoken on the central coast of the British Columbia mainland and on the northern portion of Vancouver Island, and
2. Nootkan, which is the division to be focused on in this thesis. Nootkan is subdivided into three languages: Makah, spoken on Cape Flattery, the northwest tip of the Olympic Peninsula, Nitinat, spoken on the southwest coast of Vancouver Island south of Barkley Sound, and Nootka Proper, spoken on the west coast of Vancouver Island from Barkley Sound north to Quatsino Sound. The speaker population of Nootka (Proper) was estimated in 1962 to be between 1000

and 2000, with speakers in all age groups (Chafe 1962:167).

The linguistic taxonomy assumed above is largely due to the work of Boas, Swadesh and Sapir, and has remained unchanged since Boas' original observations on Nootka-Kwakiutl relations (1911), Sapir's work on Nootka (1911), and Haas and Swadesh's work on Nitinat (1933). It was then clear that Makah stood out as different, but virtually no work was done on Makah until Jacobson started working on it in the late 1960's (1967, 1971, 1973).

Glottalization and lenition were first described by Boas in his Kwakiutl sketch (1911:430):

> "By certain grammatical processes, consonants may be weakened, hardened, or aspirated... The hardened surd [voiceless stop or affricate] becomes a fortis [glottalized stop or affricate], and the weakened fortis or surd becomes a sonant [voiced stop or affricate].. The hardening and weakening of the spirants [fricatives] reveals a number of unexpected relations of sounds... [e.g., /x̣ʷ/ weakens to /w/, hardens to /w̥/]"

The same year, Sapir noted the genetic relation of Kwakiutl and Nootka, one similarity being that

> "In both Kwakiutl and Nootka certain derivative suffixes 'harden' the final consonants of the stem; thus p, q, and ɬ become Kwakiutl p!, q! and ɛl, Nootka p!, ɛ̄, and ɛy. The 'softening' of Kwakiutl seems to be represented in Nootka by but a few stray phonetic processes." (Sapir 1911:16) [2]

Since Sapir's observations in 1911, little work has been done on the glottalization and lenition of morpheme-final consonants in Nootka, although almost every publication on Nootka has briefly recapitulated Sapir's observations. There are two articles which add something to Sapir's original observations. Sapir's "Glottalized Continuants in

Navaho, Nootka, and Kwakiutl" (1938) accounts for glottalized continuants in Nootka partly by the glottalization process.

> "The chief types of Nootka 'hardening' to these consonants [glottalized resonants] are:
>
> | | | |
> |---|---|---|
> | -n- | 'hardened' to | -n̓- |
> | -m- | | -m̓- |
> | -l- | | -y̓-, sometimes -w̓- |
> | -s- | | -y̓- |
> | -x^w- | | -w̓- |
> | -h̓- (rarely) | | -w̓- (Sapir 1938:254) |

He posits historically lost consonants in the suffixes which caused the glottalized and lenited root consonants. Swadesh's "A Structural Trend in Nootka" (1948), suggests that certain suffixes may have historically been full roots that have become bound to other roots, and are now suffixes structurally. This theory is a possible solution for the underlying forms of certain lenition suffixes.

Jacobson's work on Makah, and Nootkan in general, is the only phonological work done in Nootkan since the 1940's. During the 1950's and 1960's, the main focus in this language area was comparative. It was suggested at this time that the Wakashan family, together with Salishan and Chemakuan families, were all members of a phylum called Mosan (Swadesh 1953, Andrade 1953, Sapir 1951). This theory has since been discounted (Kinkade 1969, Klokeid 1969). It was only at the end of the 1960's that internal analytical work resumed in Nootkan, with the focus being on Makah.

To summarize, sources for this thesis include:

1. published Nootka texts (Sapir 1924, Sapir and Swadesh 1939, Haas and Swadesh 1933)

2. published analyses of Nootka phonology and morphology

3. unpublished working notes by Sapir and Swadesh 1935, and Swadesh 1937

4. articles on acoustic and articulatory phonetics, and on general phonology

5. author's fieldnotes.

The fieldnotes used in this thesis were collected during the 1974-5 and 1975-6 Winter Sessions at the University of Victoria from native speakers of Nootka. These notes include words elicited specifically to determine the influences of glottalization and lenition, as well as texts, paradigms and word lists.

One complicating factor of the sources is dialect variation. The dialect used primarily in this work is Port Alberni Nootka (čiša·ʔaṯ̓). All published work on Nootka is based on the material available in Nootka Texts which is composed of

> "the texts as originally recorded, the grammatical and lexical notes and the ethnological notes... obtained by Sapir in the years 1910 and 1913-4 among the Nootka Indians living in the neighborhood of Alberni... added to by a series of texts recorded by Alex Thomas, Sapir's chief interpreter from 1914 onwards." (Sapir and Swadesh 1939:9)

On the other hand, the sources of oral material, and the fieldnotes based on modern Nootka, are in the Ahousaht (ʕaḥu·sʔaṯ̓) and Ohiaht (ʔuʔiʔaṯ̓) dialects of Nootka, which are spoken on the west coast of Vancouver Island north of Tofino and near Bamfield respectively. Thus, there may be a certain inconsistancy and assymetry in the data. This,

however, is unavoidable, and must be borne in mind when considering the significance and validity of the findings of this paper for specific periods and dialects, since language is variable over time and space.

Phonemic Features of the Language

Before discussing glottalization and lenition, a brief sketch of Nootka will help place these processes in perspective. Areally, Nootka shares many phonological features with the Northwest Coast cultural-linguistic area. In British Columbia, this area consists of Na-dene, Wakashan, Salishan and Penutian families, excluding interior Athapascan and Kutenai languages. Shirzer summarizes the shared phonological features (relevant to Nootka) as follows:

> "Central areal traits of the North West Coast are:
> 1. glottalized stop series
> 2. s/š opposition
> 3. c/č opposition
> 4. sound: q
> 5. labiovelars phonemically distinct
> 6. one fricative series - voiceless
> 7. velar fricatives
> 8. sounds: l, ɬ, x, x̣" (Shirzer 1968:39)
>
> "There are some traits which are found in the Northwest Coast which, although they are not central areal traits, are rarely found outside of this area, and thereby contribute to the impression that the Northwest Coast (probably together with the Plateau) is a linguistic area:
> 17. pharyngeal phonemes
> 18. glottalized continuants
> "The Northwest coast can also be characterized for its
> 1. lack of one stop series languages
> 2. lack of languages with voiced fricative series
> 3. paucity of languages with 'r' sounds."
> (Shirzer 1968:40-1)

One problem for comparative study is that a given feature may be obscured by analysis (Aoki 1970:66). Nevertheless, the above generalizations do suggest that Nootka does fit into a Northwest Coast linguistic area, especially with regard to phonology, since all the above features apply to Nootka.

Nootka's phoneme inventory is as follows:[3]

TABLE I: NOOTKA PHONEME INVENTORY

	labial	alveolar	alveo-palatal	lateral	velar	labio-velar	uvular	labio-uvular	pharyngeal	glottal
stop affricate	p	t	c	č	ƛ	k	kʷ	q	qʷ		
glottalized	p̓	t̓	c̓	č̓	ƛ̓	k̓	k̓ʷ			ʕ	
fricative			s	š	ɬ	x	xʷ			ḥ	
resonant	m		n	y		w					h
glot. res.	m̓		n̓	y̓		w̓					ʔ

	high front	low	high back
short	i	a	u
variable	iˠ	aˠ	uˠ
long	i·	a·	u·

Nootka is notable for having pharyngeals /ʕ/ and /ḥ/. Historically, there were also glottalized uvulars and uvular fricatives */q̓ q̓ʷ χ̣ χ̣ʷ/, but at least for the younger

speakers, these phones are no longer distinctive. Even where these phones are granted marginal status, it is granted that these phones occur as distinctive phonemes almost only in loanwords, e.g. names of persons and places (Swadesh 1933, Jacobson 1969b:151).

Phonological Constraints

The formation of an acceptable word[4] in Nootka is due to constraints on phoneme combinations in morphemes and to how these morphemes interact in terms of word position and phonological processes. The shape of a possible morpheme is again a function of constraints, both phonetic, e.g. which features may occur adjacently, and syntactic, e.g. which morpheme boundaries inhibit certain phonological processes. The phonological rules to be discussed here are a type of constraint, since the application or non-application of such rules immediately marks a resulting form as grammatical or ungrammatical.[5]

For example, one phonological constraint in Nootka is that roots, which are word-initial (or immediately after reduplicative morphemes) may not begin with a consonant cluster or vowel. A second constraint is that although labialized consonants may occur medially, they do not occur word-finally. These constraints exemplify two different types:

1. the single-consonant type, which applies only to under-

lying forms, not to the output of rules, and is expressed by a set of structural descriptions, located in the word-formation component feeding into the lexicon. This pattern-type of constraint is here termed phonotactics.

2. the labialization constraint type, which is an environmentally-conditioned rule which may act on a dictionary entry's underlying form, or on some output of a phonological rule. Such rules must be distinct from the lexicon, since they may apply to derived forms. This type of constraint, located in the phonological component, and used to shape surface forms, is here termed a phonological rule.

Phonotactic constraints determine what constitutes a possible phoneme, morpheme, word or phonological rule in a given language. Below are listed those most relevant to determining a possible morpheme shape in Nootka:

1. The root shape is canonically /CVC(C)/, inferring that no root may begin with a vowel or a consonant cluster. Any consonant may occur root-initially, but /h/ occurs only root-initially.

2. The suffix shape is canonically /-(C)(C)VC(C)/. Suffixes may consist of consonants or a vowel only, and may begin with a consonant cluster.

3. All phonemes except glottalized ones occur morpheme-finally in underlying forms.[6]

4. Both roots and suffixes may have medial or final consonant clusters. However, there are no vowel clusters, and no geminate clusters except over morpheme boundaries,[7] e.g.

ʔu -yuʔaɬ -aƛ -ƛa· finding it again
it find now again

Glottalized consonants never start clusters, nor do they end final clusters. Rounded consonants never start clusters, nor do they end final suffix clusters.[8]

Internal Syntax

In order to describe the phonological processes which work to yield a grammatical Nootka word, it is necessary to know about Nootka morphology, or internal syntax. Swadesh briefly outlines it as follows:

> "Nootka is a polysynthetic language employing as morphological process internal change, reduplication, and suffixation. There is absolutely no compounding, incorporation, or prefixation. Suffixation... is accompanied by certain fusional processes, either mechanical, as in the case of vocalic contraction, or morphologically limited, as in the case of hardening, softening, vowel lengthening, insertion of consonants, etc." (Swadesh 1933:8)

The Nootka word is shaped as follows:

Reduplicative Morphemes - ROOT - Suffixes

The root is theoretically a lexical item which may stand alone as a word, e.g. /wik/ 'not'. Actually, roots very rarely stand alone in Nootka, since they must be accompanied by at least an aspect or a locative suffix. Only roots are word-initial, except where reduplication prefixes a copied portion of the root to the root itself. Reduplication may add semantic information to the word, namely the idea of entities, states or actions spread over time or

space, or may simply occur, without semantic significance, as a by-product of the inclusion of certain suffixes (marked as causing reduplication) in a given word. Contrast

//mu·tq -[R]// lop off distrib.	mumu·tq	lop off here and there
//ḥawiɬ -ḳuk [R]// chief resembling	ḥaḥawiɬḳuk	resembling a chief

The Nootka word is composed mostly of suffixes, which are morphologically either lexical or grammatical (Swadesh 1933:8-11).[9] These classes are differentiated as follows:

TABLE II: LEXICAL AND GRAMMATICAL SUFFIXES

	LEXICAL SUFFIXES	GRAMMATICAL SUFFIXES
Term used in Swadesh 1933	formative suffix	incremental suffix
Word position	between root and grammatical suffix	after all lexical suffixes
Boundary symbol	-	+
Morphological function	derivational[10]	inflectional
Approximate suffix total	400[11]	50

Lexical suffixes are either governing or restrictive, semantically. For a given word, restrictive suffixes each have an independant gloss, which provides an independant part of the word's meaning, and are ordered in an invariant pattern, e.g.

//yac -ˀas -⟨q⟩čikʷ// walk on moving along ground	yaċasčik	walking along on

whereas governing suffixes each have a dependant gloss (which hence includes dots '...' to show incompleteness when

entered in the lexicon), whose meaning is completed only in conjunction with the total meaning of the root-suffix combination (or theme) to which it is attached. The ordering pattern of governing suffixes is variable, with meaning change accompanying order change, e.g.

//ƛuɬ -mis -naˇkʷ// ƛuɬmisnak having [a good thing]
good thing have...

//ʕix -naˇkʷ -mis// ʕixna·kmis business of [having
sweet- have... a sweetheart]
heart ...thing

The difference between restrictive and governing suffixes[12] may be summarized as follows:

TABLE III: GOVERNING AND RESTRICTIVE SUFFIXES

	GOVERNING SUFFIXES	RESTRICTIVE SUFFIXES
Relation of suffix to preceding theme	dependant embedding, i.e. the semantic whole need not equal its components	coordinate adjoining, i.e. the semantic whole equals its components
Ordering pattern	variable	invariable, among restrictive suffixes BUT must follow the theme it modifies

In general, Nootka lexical suffixes are broader in semantic scope than those in Salish for example (Kinkade 1969, Klokeid 1974, Davis and Saunders 1974). There are not only location and body part markers, e.g. 'at the beach', 'at the lip', 'at the point, nose', as in Salish, which clearly adjoin independant semantic material to the underlying theme, but also embedding-type governing suffixes, and verbal suffixes, both of which are uncommon in Salish.

Grammatical suffixes, which pattern like restrictive suffixes in terms of ordering and semantic derivation, are subdivided into modes, preceding the paradigmatic modal and pronoun elements (including mood, time and voice markers), modals and pronouns, and those elements following the modals and pronouns (enclitics, according to Sapir and Swadesh 1939:241). The word-shape in Noota is summarized as follows:

(Reduplication) - ROOT - (Lexical Suffixes) +

(Mode + Modal + Pronoun) ++ Enclitic
(Grammatical Suffixes)

CHAPTER 2 LENITION

The first phonological process to be examined is lenition. Lenition is the regular change of fricatives to glides preceding certain suffixes, termed lenition suffixes. Compare the following roots preceding an ordinary suffix and a lenition suffix:

ROOT	ROOT plus ORDINARY SUFFIX	ROOT plus LENITION SUFFIX
/wik-/ not	wika·s not on it	wikiɬ not in the house
/hiɬ-/ locative (LOC)	hiɬa·s there (on it)	hiyiɬ (there) in the house
/ƛa-/ stick-like thing standing up	ƛa·s[1] it's standing (on it)	ƛaʔiɬ it's standing in the house

The ordinary suffix does not effect the preceding consonant. Vowel elision occurs when an ordinary suffix follows a vowel. In contrast, the lenition suffix causes the preceding /ɬ/ to change to /y/, and appears to start with /ʔ/ when it follows a vowel-final root.

One solution for the lenition suffix's shape would be that it started with /ʔ/, which effected the /ɬ/ and dropped before /k/. But compare

/wik-/ not	wikiɬ not in the house	wikʔatu not stopping
/hiɬ-/ LOC	hiyiɬ (there) in the house	hiɬʔatu stopping there

The suffix /-ʔatu/ 'stopping' begins with a /ʔ/ in all environments and has no effect on the preceding consonant.

Initial /ʔ/ cannot therefore account for the change of /ɬ/ to /y/ preceding the lenition suffix. A second solution to consider is that the /i__i/ environment might cause lenition. But compare

/hiɬ-/	hiyiɬ	hiɬink
LOC	(there) in the house	together there

It is not the /i__i/ environment that is causing the change.

Data

The lenition change is caused in Nootka by three suffixes, whose surface forms are most commonly

/-iɬ/	in the house, on the floor
/-is/	at the beach
/-ačiƛ/	inceptive, get to ..., become ...

Note their influence on the following root:

/ƛuɬ-/	ƛu̓yiɬ	(something) good in the house
	ƛuyis	(something) good at the beach
	ƛuyačiƛ	get to be good

Lenition suffixes may follow a morpheme ending in an unglottalized stop, affricate or fricative (or a vowel). Glottalized consonants, including /h/ and /ʔ/[2], may not occur morpheme-finally in underlying forms. Resonants, /m n y w/, are very rare mopheme-finally in underlying forms. /w/ never occurs morpheme-finally (c.f. p.38). /y/ occurs morpheme-finally in two types of morphemes:

1. interjections[3]
2. /CVy-/ shaped roots. This final /y/ occurs morpheme-finally on the surface only when preceding an ordinary vowel-initial suffix.[4]

The following examples show the changes undergone by Nootka consonants occurring in Morpheme-final position when they immediately precede lenition suffixes:

//wi·nap	-iɬ//	wi·napiɬ	remaining in the house
//c̓a-kʷist	-is//	c̓akʷistis	flow away from the beach
//quʔac	-iɬ//	quʔaciɬ	person in the house
//maƛ	-iɬ//	maƛiɬ	bound in the house
//wik	-iɬ//	wikiɬ	not in the house
//his-iʸkʷ	-iɬ//	hisi·kʷiɬ	moving about in the house
//ʔiq	-is//	ʔiqis	still on the beach
//t̓iqʷ	-iɬ//	t̓iqʷiɬ	sitting in the house
//nawaʸs	-is//	nawa·yis	sitting leisurely on the beach
//ƛ̓uš	-is//	ƛ̓uyis	dried on the beach
//hiɬ	-is//	hiyis	there on the beach
//tunax	-is//	tunax(ʔ)is	rushes on the beach
//c̓axʷ	-is//	c̓awis	a pointed object sticks in the beach
//ƛiḥ	-is//	ƛiḥis	pointwise on the beach
//ʔiḥʷ	-ačiƛ//	ʔiwačiƛ	get to be big

These examples show that stops and affricates are not affected when they precede lenition suffixes. Only certain fricatives are effected:

/s š ɬ/ → /y/

/xʷ ḥʷ/ → /w/

/x ḥ / remain unchanged

/ḥʷ/ as a Distinctive Phoneme

In the above description of changes caused by lenition, it is assumed that /ḥʷ/ is a distinctive phoneme. In work in Nootka (e.g. Sapir and Swadesh 1939, Swadesh 1933), /ḥʷ/ is a morphophoneme, but not a phoneme. There is, however, historical evidence for setting /ḥʷ/ as a phoneme. Jacobson (1969b:127) posits that Proto-Nootkan *x̣ and *x̣ʷ (uvular fricatives) merged as Nootka /ḥ/. He assumes that roundness became non-distinctive for pharyngeal articulations. For example

Proto-Nootkan	Nootka	Makah	
*x̣ačiˤ	ḥačiˤ	x̣ači(·)	deep down
*-inax̣ʷ	-naˤḥ	-i·dux̣ʷ	seeking...

However some cases of /ḥ/ deriving from *x̣ʷ do not behave like those from *x̣, in that some cases of /ḥ/ (←*x̣ʷ) undergo lenition and change to /w/, whereas /ḥ/ (←*x̣) does not undergo lenition but remains as /ḥ/:

Proto-Nootkan	Nootka	Plus Lenition Suffix	
*ʔix̣	ʔiḥ	ʔiḥačiɬ	get red
*ʔi·x̣ʷ	ʔi·ḥ(ʷ)	ʔi·wačiɬ	get big

Cognate words ending in morphophonemic /ḥʷ/ in Nootka, and in /x̣ʷ/ in Makah include (Jacobson 1969b:138-9):

Nootka		Makah	
ʔana-ḥʷ-	little	ʔadux̣ʷ-	as big as...
kuḥʷ-	open, hollow	kux̣ʷ-	id.
tuḥʷ-	head	tux̣ʷ-	id.
ʔi·ḥʷ-	big, large	ʔi·x̣(ʷ-)	id.

Compare

Nootka	//kuḥʷ -ᶜis -ukʷ//	kuwisuk	a pothole in our beach
	hole @ beach POSS		
Makah	//kuχʷ -ᶜiɬ//	kuwiɬ	hole in the floor
	hole in house		

The phonological distinction of underlying //ḥ// and //ḥʷ// is not exactly parallel to that of other rounded-non-rounded phoneme pairs in Nootka, since rounding is always neutralized for pharyngeal fricatives except preceding a lenition or glottalization suffix. In the environment of an ordinary vowel-initial suffix, the other rounded consonants remain rounded, whereas //ḥʷ// does not. Compare

//wik -aˇs//	wika·s	not on it
not on it		
//his -iˇkʷ -aˇs//	hisi·kʷas	going by (on it)
LOC go by on it		
//ʔiḥ -aksuɬ//	ʔiḥaksuɬ	red lips
red lips		
//ʔi·ḥʷ -aksuɬ//	ʔi·ḥaksuɬ	big lips
big lips		

Historically in Nootka, pressure to merge *χ and *χʷ (parallel to the merger of *q̓ and *q̓ʷ to Nootka /ʕ/) has conflicted with pressure to keep the reflexes of *χ and *χʷ distinct, due to alternations arising from the lenition process. Prior to the uvular to pharyngeal sound change, the following type of alternations occurred:

Root plus Ordinary Suffix	Root plus Lenition Suffix
*CVx -as	*CVx -iɬ
*CVxʷ -as	*CVw -iɬ

*CVx̣ -as	*CVx̣ -iɬ
*CVx̣ʷ -as	*CVw -iɬ

After the uvular to pharyngeal sound change, alternations such as the following could occur:

Root plus Ordinary Suffix	Root plus Lenition Suffix
CVḥ -as	CVḥ -iɬ
CVḥ -as	CVw -iɬ

Such alternations may be accounted for by either

1. having only an /ḥ/ phoneme, and marking roots whose final /ḥ/ becomes /w/ by lenition as exceptional, since /ḥ/ normally does not undergo lenition, or
2. having both /ḥ/ and /ḥʷ/ phonemes, which will allow the /ḥʷ/ phonemes to regularly change to /w/ by lenition, and having a special delabialization rule to change /ḥʷ/ to /ḥ/ in all environments except preceding lenition and glottalization suffixes.

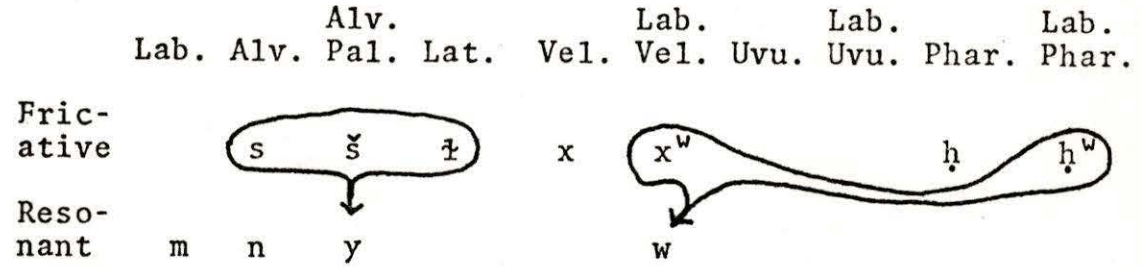
The second option, of distinctive /ḥ/ and /ḥʷ/, is chosen. Delabialization already occurs in the language (Jacobson 1969b:142), and a special delabialization rule is needed elsewhere in the grammar to account for the loss of distinctive labialization when uvular stops precede glottalization suffixes (c.f. p.75). Also, the lenition rule must already specify that round velar fricatives change to /w/, but non-round velar fricatives do not change. It is, therefore, a simplification of the lenition rule to have all round fricatives changing to /w/, but all non-round (back) fricatives remaining unchanged. Hence, in this

thesis, //ḥ^{w}// is a distinctive phoneme.

Preliminary Rule

Returning now to the lenition process, the changes summarized on page 15 may be illustrated as follows:

TABLE IV: LENITION



In order to describe the lenition process in terms of distinctive features, the general manner classes of phonemes must be described first. Resonants are [-syllabic], since they cannot "form a syllable peak in the sequence of sound events", and [+sonorant], since they have "a sum of vocal tract openings including oral,nasal and lateral passages which is larger than that found in obstruents" (Fant 1973: 178, c.f. Chomsky and Halle 1968:302, Anderson 1974:300). Fricatives are [-syllabic] and [-sonorant], as are affricates and stops. In order to differentiate fricatives from affricates and stops, a feature specifying the degree of constriction in the oral tract is needed.

In The Sound Pattern of English (1968), the feature proposed is [continuant]. A [-continuant] phone is one produced with a complete obstruction in the oral cavity,

and hence includes stops, affricates and nasals, but excludes vowels, resonants and fricatives (Minifie 1973:424). Using this feature, the lenition process could be written thus:

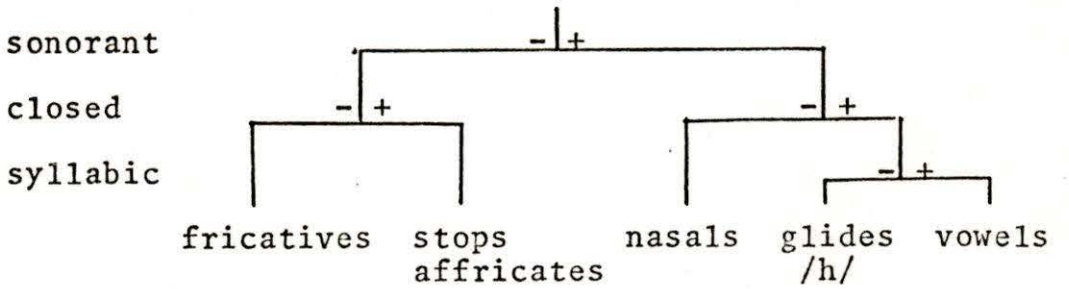
$$\begin{bmatrix} -\text{syllabic} \\ -\text{sonorant} \\ +\text{continuant} \end{bmatrix} \longrightarrow [+\text{sonorant}]$$

There are two drawbacks to the [continuant] feature. The term 'continuant' is used to apply to only those consonants with an unobstructed airstream. This is confusing, since nasals have an unobstructed airstream, through the nose, yet are [-continuant], since they do have an obstruction in the oral passage. Fant (1973:178) discusses a second problem with this feature:

> "The situation is even more complicated by the fact that the continuant-noncontinuant (stop) feature is the same as the consonantal feature, except that the degree of primary stricture is total in stops and in the closed interval of affricates but not total in the [+consonantal][+continuant] fricatives."
>
> He suggests therefore
>
> "replacing the features 'consonantal' and 'continuant' by one single feature (medially) 'closed' which is identical to the 'consonantal' feature [which separates vowels and glides from all other phones] but for an extension to separate stops and affricates from fricatives." (ibid., 178)

The feature [closed] refers to the degree of closure in the vocal tract midsaggital plane, including closures from the lips, along the palate and velum, to the glottis, and has as its acoustic correlates a reduction of formants higher than F1 (Fant 1973:180). Employing the features [syllabic], [sonorant] and [closed], the following manner classes of phonemes are derived:

TABLE V: MANNER CLASSES OF PHONEMES



Replacing the [continuant] feature with the [closed] feature, the lenition rule may be rewritten:

$$\begin{bmatrix} -\text{syllabic} \\ -\text{sonorant} \\ -\text{closed} \end{bmatrix} \longrightarrow [+\text{sonorant}]$$

The above rule changes fricatives to glides. The rule must also specify that [-back] fricatives /s š ɬ/ ⟶ [-back] glide /y/, while [+back][+round] fricatives /x^{w} ẖ^{w}/ ⟶ [+back] ([+round]) glide /w/, and [+back][-round] fricatives /x ẖ/ remain unchanged. The simplest way to express these fricative-glide relations in a rule is

$$\begin{bmatrix} -\text{syllabic} \\ -\text{sonorant} \\ -\text{closed} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{sonorant} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix}$$

The alpha-notation captures a generalization concerning the preservation of features during the lenition — derived glides must agree in backness and roundness with the underlying fricative; thus

$$\begin{bmatrix} -\text{back} \\ -\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{back} \\ -\text{round} \end{bmatrix} \qquad \begin{bmatrix} +\text{back} \\ +\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{back} \\ +\text{round} \end{bmatrix}$$

/s š ɬ/ /y/ /x^{w} ẖ^{w}/ /w/

There are no [-back][+round] fricatives or glides in Nootka,

and [+back][-round] fricatives /x ḥ/ do not undergo lenition. Such a rule suggests that /x ḥ/ simply do not share enough features with a glide to make lenition feasible.

Lenition Environment

An environment must be found for the lenition rule. The simplest way to account for lenition is to insert a morphophoneme at the beginning of lenition suffixes, as Sapir (1938) and Swadesh (1948) do:[5]

-^{c}iɬ	in the house
-^{c}is	at the beach
-^{c}ačiɬ	get to be...

This morphophonemic /^{c}/ serves only as an instruction, "apply lenition rule". It serves no explanatory function and occurs nowhere in the language except in these three suffixes. Furthermore, by using morphophonemes to distinguish lenition, glottalization and ordinary suffixes as in

-^{c}is	at the beach
-ʔas	on the ground, in the village
-as	reaching...

no correlation appears to exist, phonologically, between lenition and glottalization suffixes, despite the facts that

1. they both cause lenition

//hiɬ -^{c}is//	hiyis	(there) on the beach
//hiɬ -ʔas//	hiʸas	(there) on the ground

2. they both begin with a /ʔ/ in surface forms when follow-

ing a vowel-final morpheme

//ƛa -ᶜis//	ƛaʔis	stick-like object stands on the beach
//ƛa -ᵊas//	ƛaʔas	stick-like object stands on the ground

A more economical solution would be that the environmental factor causing lenition were a phoneme already in the language. A phoneme clearly motivated by alternations would be ideal. For example, in Nootka, there are suffixes beginning with a variable consonant, which deletes when the suffix follows a consonant-final morpheme. These variable consonants are here distinguished by bent brackets (〈C〉) from ordinary consonants, and from phonetically optional consonants, whose presence is not phonemically distinctive (e.g. (ʔ) after fricatives). If, when the underlying variable consonant deleted, it left a trace of influence (e.g. a feature change) in the preceding consonant, this would be strong evidence that an underlying variable consonant was causing lenition. However, we find no such influence on preceding fricatives, even when the deleted consonant is a [+sonorant][-closed] glide, /y/ or /w/.

Compare

//ʔaya	-〈č〉i·ɬ//	ʔayači·ɬ	making many
//ɬiḥaɬ	-〈č〉i·ɬ// making...	ɬiḥaɬi·ɬ	making mats
//ʔu	-〈w〉inkʷ//	ʔuwink	at the corner
//hiɬ	-〈w〉inkʷ// at the corner	hiɬink	(there) at the corner

//ʔu	-⟨y⟩inẏu//	ʔuyinẏu	left behind
//ʔu - iɬ	-⟨y⟩inẏu// left behind	ʔuʔiɬinẏu	being left behind in the house
//ʔu	-⟨ʔ⟩inqƛ[L]//	ʔu·ʔinqƛ	hating him
//ʔu·š	-⟨ʔ⟩inqƛ[L]// hating...	ʔu·šinqƛ	hating someone (in particular)

The loss of an underlying variable consonant, whether a stop or a resonant like /w y ʔ/, does not cause a phonological change in the preceding consonant.[6]

A Nootka phoneme causing lenition would

1. probably be a [-syllabic][+sonorant] consonant, i.e. a glide-type resonant, since the lenition rule changes only the [-sonorant] feature of the fricatives to [+sonorant]. The Nootka phonemes with this feature specification are /y w h (ẏ ẇ)/.[7]

2. have to be a phoneme which deletes following consonants. It cannot be an ordinary /y/ or /w/ for example. Yet glides which delete after consonants but occur after vowels, i.e. the <u>variable</u> consonants, do not cause lenition. There is another possible solution for the lenition-causing phoneme — a phoneme that deletes after consonants but undergoes a feature change following a vowel, preventing it from being considered a variable consonant. This phoneme is /h/.

<u>/h/ as the Lenition-causing Factor</u>

The /h/ phoneme is severely restricted in distribution in Nootka. It occurs in surface forms only at the

beginning of reduplicative and root morphemes, for example

//hap -inu⟨ɬ⟩[R]// hahapinuɬ	hair along long object	hairy legs
//his -iˀkʷ -[R] -ᶜiɬ// hihisi·kʷiɬ	LOC go by dist. in house	a bunch of people going about in house

There are cases, in very common words, where an /h/ which has become intervocalic due to CV-type reduplication alternates with /y/; compare

//hiɬ -ᵖas[R]// hihiyas	LOC at wrist	there on the wrist
//hiɬ -[R]// hiyiɬ	LOC distributive	here and there
//hiq -[R]// hihiq hiyiq	all dist.	various things

This alternation is due to two conflicting forces operating at some point in Nootka history:

1. non-initial /h/-deletion, and
2. analogical retention of /h/ in CV-type reduplication patterns (Sapir 1938:255-7)

Sapir suggests that /h/ was 'softening' or undergoing lenition to /y/ in such cases (ibid, 256). Even if /h/ is considered a fricative, it is not clear why it is shifting to a [-back] glide, when /h/ is [+back]. This changing of the [back] feature contradicts all other cases of lenition in the language. There is evidence to show that /h/ patterns, both phonetically and in Nootka phonologically, as a resonant.

Fant discusses the ambiguous status of /h/ as follows:

> "I accept the classification of glides (semi-vowels) and h-sounds given by Chomsky and Halle as [+sonorant],[-consonantal], and [-syllabic]... The presence of the unvoiced h-sound in the class of sonorants weakens the simple acoustic correlate of intensity of this class since velar fricatives display similar acoustic patterns but with more noise in the region above F2. The degree to which the intensity is associated with the vocalic formant patterns is accordingly a necessary aspect to take into account. This fact also correlates with the affinity of sonorants to be found next to the syllable nucleus."
> (Fant 1973:181)

The classification of /h/ as a sonorant on the basis of manner of articulation (all vocal tracts are large and unobstructed) is confirmed by acoustic patterns. The constraint on syllable-position for /h/ is affirmed in Nootka, where /h/ may occur only syllable-initially, and where no resonant may occur syllable-finally. Fricatives and stops, which are [-sonorant], may occur in any syllable position.

There are other language-specific characteristics which demonstrate that /h/ should be considered a resonant. It was noted above (p.25) that /h/ alternates with /y/ in high-usage reduplications. In dialectal situations, it occasionally alternates with /ʔ/ or /w/

Ohiaht	he•pinis apples	~	Port Alberni	ʔe•pinis apples
Port Alberni	hik not	~	Port Alberni	wik not

but never with fricatives. It can be heard mistakenly for /ʔ/: //ʔu -ɔ as// ʔuʔas 'about to do it' is misheard as *huʔas.
it about to...

Since all other resonants, except /h/, are found morpheme-initially in suffixes;[8] it does not appear to be

violating any general phonological pattern of Nootka to posit initial /h/ in the underlying forms of those suffixes which cause lenition:

//-hiɬ//	in the house
//-his//	at the beach
//-hačiɬ//	inceptive, get to be...

Notice what happens when a vowel-final morpheme precedes a lenition suffix:

//ta -hiɬ//	taʔiɬ	sick
sick in house		
//či· -hiɬ//	či·ʔiɬ	pulled up in the house
pull in house		
//hita-hiɬ//	hiti·ɬ	(there) in the house
LOC in house		
//ma -či -hiɬ//	mači·ɬ	(dwelling) in the house
dwell in. in house		

When the morpheme-final vowel is in the second or later syllable of a word[9], with the lenition suffix vowel in the third or later syllable, vowel elision occurs. When the morpheme-final vowel is in the word's <u>first</u> syllable, with the lenition suffix vowel in the second syllable, /ʔ/ occurs intervocalically in the surface form.

This /ʔ/ can be accounted for by a rule shifting /h/ to /ʔ/ intervocalically:

RULE 1 $\quad /h/ \rightarrow /ʔ/ \;/\; V \_\_ V$

The derivation of /ʔ/ from underlying /h/ seems plausible, due either to a phonological dissimilation of [-closed] /h/ to [+closed] /ʔ/, or to a phonetic assimilation of [-voiced] [h] to [+voiced] [ʔ], in the intervocalic environment.

The loss of /ʔ/ in third or later syllables when following a vowel is part of a <u>general</u> rule in Nootka which deletes any /ʔ/, regardless of its source, in that environment:

RULE 2 $\quad /ʔ/ \rightarrow \emptyset \;/\; CV(C)^*\ C(X)V \_\_\ V$[10]

(In such rules, C, V, and X represent consonant, vowel, and unspecified phoneme(s) respectively. Bracketed portions are optional, and starred portions ()* may be repeated an unspecified number of times.)

The <u>lenition rule</u> may now be completed, with /h/ as the lenition-causing factor:

RULE 3 $\quad \begin{bmatrix} -\text{sonorant} \\ -\text{closed} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{sonorant} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} \Big/ \_\_ - \begin{bmatrix} -\text{syllabic} \\ +\text{sonorant} \\ -\text{closed} \\ +\text{back} \\ -\text{round} \end{bmatrix}$

To account for the loss of /h/ after consonants, a fourth rule is needed:

RULE 4 $\quad /h/ \rightarrow \dot{\emptyset} \;/\; C \_\_$

Derivations of a fricative-final and of first- and second-syllable vowel-final morphemes adjoined by a lenition suffix are presented below:

	//hiɬ -hiɬ//	//ta -hiɬ//	//ma -či -hiɬ//
	LOC in house	sick in house	dwell in house
LENITION	hiy -hiɬ	ta -hiɬ	ma -či -hiɬ
/h/--/ʔ/	. . .	ta -ʔiɬ	ma -či -ʔiɬ
/ʔ/-- ∅	. . .	. . .	ma -či -iɬ
/h/-- ∅	hiy -iɬ	. . .	. . . .
VOWEL ELISION	. . .	. . .	ma -č -i·ɬ
	hiyiɬ	taʔiɬ	mačiˑɬ
	in the house	sick	in the house

Historical Evidence for /h/-initial Suffixes

There is possibly some historical support for positing an initial /h/ in at least two of the three lenition suffixes, //-hiɬ// 'in the house' and //-his// 'at the beach'. Sapir points out that

> "the ᶜ-i- [//-hi//] of ᶜ-iɬ and ᶜ-is, the two most common 'softening' [lenition] suffixes of Nootka (...) is an old demonstrative stem *hi, which obviously occurs in an important series of local and referential stems: hita-, hin-, hina- empty stem ...; his-, hist-, hisa-, hista-, hiɬ 'at that place, there' (referential). The last series of stems is formally parallel to ya·s-, ya·st-, ya·ɬ, ya· 'there, that' and to yi·s-, yi·st-, yi·ɬ, yi· 'yonder', enabling us to isolate *hi without difficulty. The meanings 'in the house' (often also 'inside' without reference to human abode) and 'on the beach' (originally, as can be shown, 'on a level stretch') are clumsy renderings of a more generalized type of orientation." (Sapir 1938:257)

It should be made clear that hita-, hin- etc. are not semantically 'empty' as Sapir contends above, and as Swadesh contends in the following passage:

> "There are three stems whose semantic value is zero. They serve as formal place holding stems to make possible the use of suffixes without involving a meaningful stem. There is one rather freely used empty stem, hin(a)-, hita, and two special empty stems, ʔam-, ʔap- and ʔust(ʔ)-, used only with restrictive location suffixes." (Swadesh 1933:93)

If a root only combines with locative suffixes, and has a derived locative meaning, it need not necessarily be semantically 'empty'. It could have a locative meaning. //ʔust-// may derive from //ʔu -Vst//, where //-Vst// is the same locative suffix found in hist(a)-, ya·st, and yi·st-. //hin(a)-// is "more freely used" in that it may

combine with state, action or location suffixes (but not with quantity, time, specification or substantive suffixes). This is still a limited distribution for a root without meaning. A more probable explanation is that //hin(a)-// is a locative which gives a spatial conotation to the meaning of the suffix it adjoins, as in

//hita -as//	hita·s	it's on the ground
//hina -i·s//	hini·s	carrying...
//hita -kʷaˣɬ//	hitakʷaɬ	absent
//hita-waḥsuɬ//	hitu·suɬ	come out

(Swadesh 1933:95)[11]

Sapir's suggestion that //-his// 'at the beach' and //-hiɬ// 'in the house' are derived from bound demonstratives which were formerly independant words seems implausible, since Nootka does not allow compounding or incorporation or words as productive processes. There is, however, evidence that such processes have occurred in the past. Swadesh posits "a relatively recent expansion of the suffixing system in Nootka thru old postposed particles becoming suffixes" (Swadesh 1948:109). Swadesh is suggesting that certain kinds of roots became dependant suffixes. Examples of suffixes which appear to have originally been roots, and which closely resemble an existing root in the language include:

	SUFFIX	ROOT
1. Modes		
	-maqšiƛ constantly	maqšiƛ- to tie

-qaˠ-tḥ	pretendedly	qa·-ʔu·ḥ-	not in earnest
-ʔak	alienable possessive	ʔa-	demonstrative

2. Modals

-waˠʔin	quotative	waˠɬ- in	treated as saying
-maˠ	indicative	ma-	dwell
-qu·, -qʷa	emphatic	qʷaˠ-	it is thus

3. Pronouns

-siˠ	I p. s.	si-	I, me
-niˠ	I p. pl.	ni·ḥʷ-	we, us

4. Enclitics

-ƛa·	again	ƛaʔu-	again

5. Lexical Suffixes

-c̓atu	on the water	c̓a-	flowing
-maɬ	moving about	maɬ-	move
-muˠt	leftover	mut-	bite off

On the basis of such evidence, it is posited that //-hiɬ// 'in the house' and //-his// 'at the beach' derive historically from root-suffix sequences //hi -iɬ// 'there in the house' and //hi -is// 'there at the beach', which for some reason lost their initial word boundary and became suffixes.

CHAPTER 3 EXCEPTIONS

/ɬʷ/ Exceptions

There are two kinds of roots which are exceptions to the lenition rule, those that appear to undergo it irregularly, and those that do not undergo it, although their structural descriptions match that of the lenition rule. In the first case, there are three morphemes in Swadesh's glossary (1939) where a final /ɬ/ is assumed to change to /w/, rather than to /y/, by lenition:

	ċi·ɬ(ʷ-)	run away from home
	-uɬ(ʷ-)	place of...
	-piʸɬ(ʷ-)	... many long bulky objects
e.g.	//tiqʷ -uɬ(ʷ) -hiɬ//	tiquwiɬ sitting at a place in the house
	sit at place in house	

Although an underlying labialized pharyngeal fricative //ḥʷ// has been posited for Nootka, this does not necessarily warrant the setting up of underlying labialization for the lateral fricative in the above morphemes. There is good evidence for underlying //ḥʷ//, and very little for "ɬʷ". First, //ḥʷ// occurs more frequently. In contrast to the three roots ending in "ɬʷ", there are at least nine roots ending in //ḥʷ//:

//ʔanaḥʷ-//	little	//ċaḥʷ-//	to adze
//tinḥʷ-//	calm sea	//ni·ḥʷ-//	we, us
//kuḥʷ-//	open, hollow	//ʔi·ḥʷ-//	big, important
//su·ḥʷ-//	silver	//ƛaḥʷ-//	at present, recently
	spring salmon		

//tuḥʷ-// head

Second, note the occurrence of <u>rounded</u> consonants in the inventory of Nootka consonant phonemes:

TABLE VI: NOOTKA CONSONANTS

p	t	c	č	ƛ	k	kʷ	q	qʷ
p̓	t̓	c̓	č̓	ƛ̓	k̓	k̓ʷ	ʕ	
		s	š	ɬ	x	xʷ	ḥ	ḥʷ
m		n	y			w	h	
m̓		n̓	y̓			w̓	ʔ	

All [+back] stops and fricatives have a distinctive [round] feature except the pharyngeal stop /ʕ/, which derives from a merger of *q̓ and *q̓ʷ (c.f. p.73). [-back] stops, affricates and fricatives <u>never</u> have rounded counterparts. There is no rounded lateral [+closed] */ƛʷ/, whereas both /xʷ/ and /ḥʷ/ have rounded [+closed] counterparts.

Third, whereas there is <u>historical</u> evidence for the setting up of an /ḥʷ/ phoneme, derived from *x̣ʷ (c.f. p.16), there is no such evidence for the derivation of "ɬʷ" from Proto-Nootkan *ɬʷ. /ɬ/ is cognate in all three Nootkan languages, and derives from Proto-Nootkan *ɬ (examples from Jacobson 1969b). Compare

NOOTKA		NITINAT		MAKAH	
ɬapḥ-	flap wings	ɬapx̣-	id.	ɬapx̣-	id.
-ḥw̓iɬim	ending in women's names	-x̣a·wi·ɬib	daughter, relatives	-x̣ʷi·ɬub	female of consanguineal of descending generation
taʕaɬ	standing, walk with cane	taʕaɬ-č	id.	taq̓aɬ-č	id.

-ḥwaɬ[L] using... -awa·ɬ[L] id. -x̣ʷa·ɬ[L] with, by means of...

Certain ɬ~ḥ and ɬ~x̣ alternations suggest that ɬ(ʷ) derived from /x̣ʷ/ through borrowing. Compare

	NOOTKA	NITINAT		MAKAH	
ḥuq-	hollow object inverted	x̣uqʷ-	id.	ɬuqʷ-	id.
ḥi·yi-	snake	x̣i·ʔukʷ-	id.	x̣i·ʔukʷ-	id.
		ɬi·ʔi	id.	ɬi·ʔiʔi	id.
-iḥta	at point, nose	-iɬt	id.	-iɬt	id.
qa·ḥ-	barbed				
qa·ɬ-	branching off				
čaḥʷ-	to adze				
čaɬ-	get split lengthwise				

Jacobson notes that in a language without /ḥ/ but with /x̣/ and /ɬ/, any /ḥ/ in a loan word would be reanalyzed as /ɬ/, e.g. Nootka ḥuqʷ- → Makah ɬuqʷ. Possibly, in a language without /x̣ x̣ʷ/ but with /ḥ ḥʷ/ and /ɬ/, any /x̣ʷ/ in a loan word might be heard and pronounced /ɬ/, e.g. Makah λux̣ → Nootka λuɬ. From Nootka, it could be borrowed back, as λuɬ, into Makah and/or Nitinat. This hypothesized borrowing pattern suggests that Nootka -uɬ(ʷ), -pi'ɬ(ʷ) and čiɬ(ʷ) are borrowings from Nitinat or Makah *-ux̣ʷ, *-pi'x̣ʷ and *čix̣ʷ respectively.

Deriving "ɬʷ" from //ɬ-hʷ//

A more probable explanation is that the "ɬʷ" in these morphemes is not due to borrowing, but rather derives

from an underlying //ɬ-ḥʷ//. This //-ḥʷ// appears to be either a stem extender or a locative morpheme. Both Haas (1972) and Jacobson (1969b:149) have noted morpheme 'doublets' in Nootka with shapes $C_1V_1C_2$ and $C_1V_1C_2\{\dot{x}, \dot{x}^w\}$, with this added consonant being termed a stem extender. Compare

čiš-	dark coloured	čišx̣-	id.
hap-	hair, fur	hapx̣-	id.
yas-	opened, V-shaped object spread apart	yasx̣-	id.
		yasx̣ʷ-	id.
pis.-	bad	pisx̣-	rough, dirty

It is not clear if this /x̣(ʷ)/ is still a distinctive phoneme in Port Alberni Nootka. Given that

1. glottalized uvulars /q̓ q̓ʷ/ and uvular fricatives /x̣ x̣ʷ/ are quite rare, and that there was a time when

> "such phonemes were lacking in Nootka, and that they have been reintroduced largely in loanwords and in neologisms such as names and onomatopoetic words." (Jacobson 1969b:144)

2. semantically-similar word pairs with contrasting /x̣(ʷ)/ and /ḥ/ occur in Nootka

ʔix̣- ~ ʔix̣ʷ-	red hot, brown	ʔiḥ-	red

it will be posited that the stem extender /x̣(ʷ)/ is in its underlying form //-ḥʷ//. The lenition rule will work regularly whether there are /x̣(ʷ)/ phonemes in Nootka or not, and there is evidence to suggest that /x̣(ʷ)/ is in free variation with /ḥ(ʷ)/.[1]

This stem extender //-ḥ(ʷ)// has several connotations:

1. opening out, extending in space (Jacobson 1969b:151),
2. pejorative, damaged-confused-abnormal (Jacobson 1969b:150)

3. greater or lesser intensity (Haas 1972:89)

The spatial connotation would fit with //-uɬ-ḥʷ// 'at the place', and //-p̓iʸɬ-ḥʷ// '...many long objects', while the pejorative connotation would fit with //c̓i·ɬ-ḥʷ// 'run away from home'. This idea of pejorative colouring is strengthened by the gloss for the Nitinat cognate c̓i·ɬ-šiƛ 'sneak away'.

The spatial-connoting stem extender //-ḥʷ// may relate to the locative formative /-ḥ/ in Nootka:

c̓aqu·ɬ	place name	c̓aqu·ɬḥ	at c̓aqu·ɬ
hiɬ	there	hiɬḥ	at that place

It may also relate to the durative formative //-ḥiʸ//, e.g.

qʷis-	do thus	qʷisḥi-	why
ḥayum-	not know something	ḥayumḥi-	not knowing, forgetting

Assuming the "ɬʷ" morphemes have the underlying forms proposed above, the loss of /ɬ/ preceding the /ḥʷ/ must be explained. The loss of /ɬ/ is common in Nootka. Root-final /ɬ/ deletes before the //-(i·)ḥ[L]// plural morpheme, e.g.

//ḥaw̓iɬ -i·ḥ[L]//	ḥaw̓i·ḥ	chiefs
chief plural		

Root-final /ɬ/ also tends to delete before the momentaneous aspect, e.g.

//hašiɬ -šiƛ//	hašičiƛ	he found out[2]

Final /ɬ/ in most suffixes deletes before lenition and glottalization suffixes, as in

//hin -aḥuʸ⟨ɬ⟩ -his//	hinaḥu?is	in front, at the beach
LOC in front at beach		

//hin -aḥuˠ⟨ɬ⟩// hinaḥuɬ in front
LOC in front

All suffixes ending in variable ⟨ɬ⟩ are locatives, e.g.

-cimu⟨ɬ⟩ on the ceiling -piˠ⟨ɬ⟩ in the middle

-⟨q⟩uˠ⟨ɬ⟩ on the face -⟨w⟩iˑḥtu⟨ɬ⟩ at the top

The variable vowels in -CV⟨ɬ⟩ suffixes, and the predominance of /u/ preceding ⟨ɬ⟩ suggests that suffixes with final variable ⟨ɬ⟩ derive from a suffix plus locative /-u⟨ɬ⟩/ sequence. This theory is supported by the occurrence of suffix doublets of the type

-qiˠ at the head -⟨q⟩uˠ⟨ɬ⟩ at the head

-quˑ at a point extending out -quˑ⟨ɬ⟩[L] at a harpoon point

It seems likely that this locative suffix /-u⟨ɬ⟩/ is the same morpheme as is found in the sequence //-uɬ-ḥʷ// 'at the place'. This analysis enables one to contrast morphemes or morpheme-sequences ending in //-ɬ// and //-ɬ-ḥʷ//, as in //-u⟨ɬ⟩// /-u⟨ɬ⟩/ locative

//-u⟨ɬ⟩-ḥʷ// /-uɬ(ʷ)/ at the place (of...)

In place names, forms end in either /-uɬ/ or /-uɬḥ/, e.g.

c̓aquˑɬ place name t̓uḥsapuɬḥ place name, Poet Nook

Similarly, we find

//c̓iˑɬ-// /c̓iˑɬ-/ running away from home

//c̓iˑɬ-ḥʷ// /c̓iˑɬ(ʷ)/ id.

On the basis of the above discussion, these three irregular morphemes will be accounted for by positing the following underlying forms:

//č̓i·ƛ -ḥʷ//	run away from home
//-p̓iʸƛ -ḥʷ//	... many long bulky objects
//-u⟨ƛ⟩ -ḥʷ//	at the place of...

Thus the derivation given at the beginning of this chapter (p.32) would be

//t̓iqʷ -u⟨ƛ⟩ -ḥʷ -hiƛ//	t̓iquwiƛ	sitting at a place
sit at stem ex. in house		in the house

The discussion of stem extenders also suggests an explanation for the three Nootka morphemes ending in /w/.[3] It may be that

ʔičw- ~ ʔič-	fat (shellfish)	ʔičx̣-ʔis	glutton

derive from *ʔičx̣ʷ → ʔičḥʷ. In the case of ʔičw-, the morpheme may have occurred so frequently with //-his// 'on the beach' (//ʔičḥʷ-his// → ʔičwis 'fat ones on the beach') that the /w/ (←//ḥʷ//) has become reanalyzed as part of the root. The second root ending in /w/ is

ti(ʸ)č- ~ ti·č-	alive	tičw-	barely alive

Although this root never alternates with a related one ending in a stem extender, it is possible that the /w/ in tičw- derives from the //-ḥʷ// stem extender with a 'not in a normal state' type of connotation (c.f. p.35). Such a connotation would fit well with a shift in meaning from 'alive' to 'barely alive'.

The third root ending in /w/ is found in

t̓a·w-	sleeping with	t̓aḥ-	sleeping on back, curled up
t̓aw-iƛ	id.		

These forms may all derive from an underlying //t̓aḥʷ-//,

which has occurred so frequently with //-hiɬ// 'in the house' (//ta̱ḥʷ-hiɬ// -→ ta̱wiɬ) that the /w/ (←-//ḥ̱ʷ//) has become part of the underlying form of the root.[4]

To summarize, morphemes originally analyzed as ending in "ɬʷ" and morphemes originally ending in /w/ (both violations of Nootka phonological patterns) can be reinterpreted so that no violation occurs. The solutions are related, since both are based on positing an underlying //ḥ̱ʷ// in the morpheme-final position, which can change to /w/ by the regular application of the lenition rule.

Lenition-blocking Morphemes — Data

The second group of morphemes which are irregular regarding lenition are the lenition-blocking morphemes (distinguished by a /.-/ morphophoneme). Lenition-blocking morphemes include:

1. morphemes ending in /s š ɬ xʷ/ which do not undergo lenition, despite meeting the structural description specified by the lenition rule, but instead have an optional (/ʔ/) inserted between the morpheme and an adjoining lenition suffix. Contrast the following pairs of words, where the first word undergoes lenition, but the second blocks lenition:

//čamas -his -na̱ḥ//	čamayisna̱ḥ	seeking something
sweet on beach seek..		sweet on the beach
//hin -aˠs. -hiɬ//	hina·s(ʔ)iɬ	on the floor in the
LOC on it in house		house

//ƛuš -hipitap// dry on beach(caus.)	ƛuyipitap	they dried it on the beach
//ƛuš. -hiɬ// pole in house	ƛuš(ʔ)iɬ	little pole in the house
//hiɬ -his// LOC at beach	hiyis	there at the beach
//miɬ. -his// together at beach	miɬ(ʔ)is	side by side at the beach

2. morphemes ending in a stop or nasal which require an obligatory /ʔ/ between that consonant and an adjoining lenition suffix. Compare

//c̓a -kʷist -his// flow move from at beach	c̓akʷistis	flow away from the beach
//ʔust. -hiɬ// LOC in house	ʔustʔiɬ	in the house
//čim.- hiɬ// fixed up in house	čimʔiɬ	bed

The irregularity of these lenition-blocking morphemes will be accounted for in this work by an underlying morpheme-final vowel.

Lenition-blocking morphemes are relatively common in Nootka. The following table lists the number of morpheme-final fricatives which do undergo lenition, and the number which do not (despite their meeting the structural description of the lenition rule):

TABLE VII: LENITION-BLOCKING FRICATIVES[5]

	s	š	ɬ	xʷ	ẖʷ
Undergo Lenition	68	27	116	39	12
Block Lenition	38	25	56	8	-

Lenition applies for virtually all [+back][+round] fricatives, whereas it applies for only a third to a half of [-back] fricatives.

Swadesh accounts for the seemingly irregular behavior of lenition-blocking morphemes by inserting a morphophoneme /.-/ between the "irregular" final consonant and the morpheme boundary hyphen (Swadesh 1939:237). Hence, in his glossary, there are contrasting pairs such as

nas-	rope lies limp
nas.-	failed, tried in vain
naš-	glad
naš.-	strong, growing densely

This /.-/ however is not a satisfactory solution. It is really an instruction which states that for a given morpheme, "Lenition may not occur, insert /?/". It must be considered as either an exception marker (comparable to a conjugation label in a Romance language), or as another phoneme in the language. In any case, it does not explain why these morphemes are exceptional.

Vowel-final Roots

The simplest explanation for why a fricative cannot undergo lenition is that something intervenes between that fricative and the lenition suffix (e.g. Swadesh's /.-/). If this lenition-blocking element is assumed to be an underlying morpheme-final vowel, then it is possible to account regularly not only for lenition-blocking fricatives (since they now

precede a vowel, not a lenition suffix), but also for /ʔ/ intervening between lenition-blocking morphemes and a lenition suffix, since a rule has already been formulated changing intervocalic /h/ to /ʔ/ (RULE 1, p.27) in order to account for the occurrence of /ʔ/ in words such as

//ta -hiɬ//	taʔiɬ	sick (in the house)
sick in house		

The optionality of the /ʔ/ after fricatives reflects a general rule in Nootka that /ʔ/ optionally deletes after a fricative:

RULE 5 $\quad /ʔ/ \rightarrow \emptyset \; / \; \begin{bmatrix} -\text{sonorant} \\ -\text{closed} \end{bmatrix} \; \_\_$ $\quad$ OPTIONAL

For example:

//yaˑɬ -hiɬ -ʔi//	yaˑyiɬʔi	one who is in the
LOC in house	yaˑyiɬi	house
demons.		

If the above solution is accepted, most morphemes blocking lenition would have the underlying form CVCV-. There are already a limited (approximately 30) number of CVCV- combining forms for roots in the language[6], e.g.

ʔaquˑ-	truthful
ʔayiˑ-	at once
ʔuˑsa-	swift strong wind

These roots do not have /ʔ/ at the surface preceding a lenition suffix, but rather have to undergo /ʔ/ deletion (RULE 2, p.28) and vowel elision as follows:

#CVCV -hVC → #CVCV -ʔVC → #CVCV -VC → #CVCVˑC

For example:

//ʔaya -hiɬ//	ʔayiˑɬ	many in the house
many in house		

There is evidence however that these CVCV- combining forms derive from an underlying root-suffix sequence. If CVC- is the canonical shape of roots, then we would expect CV_1CV_2- roots (where V_2 is a full-grade vowel) to be due to suffixation of a CV(C)- root. Clearly some of the CVCV- roots may be analyzed as root-suffix sequences. In the following examples, the CVCV- combining form as entered in the Nootka Texts glossary (1939) is listed in the left-hand column, while in the right-hand column is listed a possible root-suffix underlying form, based either on work done by Haas, Swadesh etc., or on roots and/or suffixes from the Nootka Texts glossary:

CVCV- ENTRY	POSSIBLE ROOT-SUFFIX FORM
//ʔaya-//	//ʔa- -⟨y⟩aˠ//[7]
far away, thus far	demonstrative durative
//ʔana-//	//ʔa- -na//
thus big	demons. ?
//ˈnu·pi-//	//ˈnu·- -pi//
all over	same, all ?
//ˈnu·ca-//	//ˈnu·- -ca//
facing the same way	same, all facing
//ʔu·sa-//	//ʔu- -sa[L]//
swift, loud, strong	it, he emphatic
//ˈtayu·-//	//ˈta- -yuˠ//[8]
anchored	long object ...-ed with lump
//suya·-//	//su- -⟨y⟩aˠ//
stretched out	hold durative
//ˈyu·qʷa·-//	//ˈyu·- -qʷa·//[9]
also, likewise	? thus, emphatic
//wiḥi·-//	//wiḥ- -ʔi//
on dry land	shallow, dry demonstrative

It appears, then, that there are no CVCV- roots in the language. What appear to be CVCV- roots are root-suffix sequences in their underlying forms.

Combining-forms of Roots

Given the absence of CVCV- roots, it is possible to hypothesize that original CVCV- roots have undergone a vowel-reduction change to CVCə-. The evidence for such a vowel reduction comes from a comparison of independant and combining forms of roots. The independant form of the root is that form of the root which combines with a durative, nominalizing or demonstrative suffix to derive the independant word. The combining form of the root is that form which combines with other suffixes to form extended words. Roots are here considered regular if their combining and independant forms are identical. For example:

COMBINING FORM		INDEPENDANT FORM		
//mat-//	fly	//mat- -⟨y⟩aʸ//	mata·	flying
//ta-//	drift	//ta- -⟨ʔ⟩ak//	taʔak	drifting

There are exceptions to this identity of forms:

1. the lenition-blocking suffixes, which appear to be consonant-final in the independant form, but have an inserted /ʔ/ before lenition suffixes,
2. roots which have a final /-q-/ in combining forms,
3. roots in which the final consonant changes to /-q-/ in combining forms.

The behavior of root combining forms may be compared as follows:

TABLE VII: ROOT COMBINING PATTERNS by root-final phoneme

	stop affricate	fricative	nasal	vowel
Regular	559	250	8	131
Irregular				
a. Lenition blocking, /ʔ/	6	121	13	NA
Insertion				
b. Final /-q-/	-	-	16	92
c. Final C Changes to /-q-/	2	2	83	NA
TOTAL	567	373	120	223

Stops and affricates are the most regular morpheme-final phonemes in combining forms, with only six roots blocking lenition, and two where the final consonant changes to /-q-/, e.g.

//ƛ̓uč.-//		cook food by steaming
//č̓isaˇq-//	č̓isa•p	prong on herring rake

One third of all fricatives block lenition, e.g.

//nas.-//	nasak	having given up trying
//ʕapɬ.-//	ʕapɬa•	slice fish for drying

There are also two roots where a root-final fricative changes to /-q-/, e.g.

//č̓it̓uqʷ-//	č̓it̓u•ɬ	war club

Half of the vowel-final roots have a final /-q-/ inserted in the combining form, e.g.

//hiƛ̓a-q-//	hi•ƛ̓a	quartz, Quartz Being

//ʔuɬʔu-q-//	ʔuɬʔu·	wild currants
//mituʸni-q-//	mitu·ni	Victoria

It is not clear why almost every vowel-final root which has /-q-/ in the combining form is a substantive, i.e. an animal, plant, place or thing.

Nasal-final roots appear to be virtually never regular. Of 120 roots with nasal-final independant forms, only 8 have a regular nasal-final combining form[10], e.g.

//qam-//	qama·	trapped
//ʕan-//	ʕanak	bent with weight

The other 112 nasal-final roots have one of five irregular combining patterns. In the following examples, the underlying combining form appears on the left, and the surface form of the independant form plus a derivational suffix appears in the middle column. The combining patterns are:

1. /ʔ/ insertion before lenition suffixes, e.g.

//ḥim.-//	ḥima	show
//čin.-//	čina·	hold by hair

2. /-q-/ insertion in combining form, e.g.

//kumcin-q-//	kumcin	fawn
//xʷi·ɬasim-q-//	xʷi·ɬasim	small blueberry

3. /-q-/ insertion with nasal changing to stop, e.g.

//sasit-q-//	sa·sin	hummingbird
//nicswat-q-//	nicswin	porpoise
//kayuʸp-q-//	kayu·min	panther
//qišap-q-//	qi·šim	spirit of Wolf Ritual

4. /-q-/ insertion with deletion of preceding nasal, e.g.

//ʎisʎi-q-//	ʎisʎin	paw, flipper
//mackʷa-q-//	ma•ckʷin	fly (insect)
//ċayi-q-//	ċa•yim-c	seaweed
//ʎapisa-q-//	ʎapisim	raccoon

5. nasal-to-stop shift

a. where the nasal shifts to a stop preceding a consonant, e.g.

//kan-//	katšiʎ	kneel
//tum-//	tumak	dark
	tu•pšiʎ	evening

b. where the nasal alternates with a stop, e.g.

//ċitkʷ-// ~ //ċinkʷ-//		roll over, twist
//ʕat-// ~ //ʕan-//	ʕata ~ ʕana	darn
//ċap-// ~ //ċam-//		holding on lap
//ṯimɬ.-//	ṯimɬšiʎ	blink
//tapɬ-//	tapɬšiʎ	id.

Derivation of Combining Forms of Nasal-Final Roots

Those nasal-final roots which have a /-q-/ insertion-type combining form (Types 2, 3 and 4) derive from an underlying sequence of a root plus a nominalizing suffix, either

/-im/ ~ /-ma/ ... thing

/-in/ ~ /-$\overset{i}{a}$t-q-/ absolutive

The final /-q-/ in this type of combining form appears to be the same /-q-/ inserted after many vowel-final roots. An explanation is needed for why /-q-/ insertion occurs here

after a nasal. Swadesh (1933:5) observes that

> "in pronunciation the nasal groups are characterized by a final murmered vowel usually of i-timbre."

By nasal group, he means a vowel-nasal sequence which is syllable-final. Similarly, Sapir (1938:258) notes that

> "syllabically-final m and n have a light i-murmer release, that they go back to original m, n + vowel (a, i, or o; original syllabically-final m and n become p and t), and that original a preceding such elements (m^i, n^i) regularly thins to i. After a non-initial consonant -ama (-ami, -amu) and -ana (-ani, -anu), except under conditions which we do not attempt to define here, develop to -in (i.e. in^i) and -im (i.e. im^i) respectively, whether in final or non-final position..."

The alternations of the nominalizing suffixes listed above (p.47) may be accounted for by positing their underlying forms as

//-ama//	... thing
//-ana//	absolutive

/-q-/ insertion is now a <u>regular</u> process, applying only to vowel-final forms, since nasal-final words with /-q-/ insertion-type combining forms are composed of a root plus one of the above vowel-final nominalizing suffixes. The final vowel of these nominalizing suffixes changes to a <u>reduced vowel</u> ($/^i/$ in Sapir's analysis; /ə/ here, to avoid confusion with /i/), which causes the /a/ in the preceding syllable to <u>thin</u> to /i/. For example,

	//ʔiːs -ama -q-//	
VOWEL REDUCTION	ʔiːs -amə -q-	
THINNING	ʔiːs -imə -q-	
	/ʔiːsimq-/	hook, tooth of herring rake

Vowel reduction occurs whenever a nasal-vowel sequence is syllable-final, in a non-word-initial syllable:

RULE 6 $\quad V \rightarrow /ə/ \;/\; \#\ X\ CV\ [nasal]\_\_ \left\{\begin{matrix} CV \\ \# \end{matrix}\right\}$

Thinning occurs whenever /a/ precedes a word-final nasal-/ə/ sequence, and optionally when /a/ precedes a non-word-final nasal-/ə/ sequence:

RULE 7 $\quad /a/ \rightarrow /i/ \;/\; \begin{matrix} \_\_\ [nasal]\ /ə/\ \# & \text{OBLIGATORY} \\ \_\_\ [nasal]\ /ə/ & \text{OPTIONAL} \end{matrix}$

The obligatory part of the THINNING rule accounts for the fact that there are no /-an#/ or /-am#/ -final words in Nootka, since syllable-final nasals derive from nasal-vowel sequences, which obligatorily reduce, and obligatorily cause thinning of the preceding vowel if the nasal-vowel sequence is word-final.

The vowel reduction rule interacts with a rule which changes syllable-final nasals to stops, preceding a consonant. Specifically, /m/ changes to /p/, and /n/ changes to /t/:

RULE 8 $\quad \begin{bmatrix} -\text{syllabic} \\ +\text{sonorant} \\ -\text{closed} \\ \alpha\text{labial} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{sonorant} \\ \alpha\text{labial} \end{bmatrix} \;/\; \_\_\ CV$ [11]

One might assume that reduction of syllable-final vowels (after nasals), and shifting of syllable-final nasals to stops would keep derivations distinct, i.e.

C V [nasal] V- $\longrightarrow$ C V [nasal] /ə/-

C V [nasal]$_{\alpha}$- $\longrightarrow$ C V [stop]$_{\alpha}$-

Evidently, however, some of the syllable-final nasals which shift to stops derive from nasal-reduced vowel sequences

which precede a combining /-q-/ morpheme. An optional /ə/ deletion rule accounts for this, by causing nasals, originally protected from syllable-final position by a vowel, to move into this position:

RULE 9 /ə/ → Ø / V [nasal] ___ -q- OPTIONAL

The /ə/ deletion rule allows outputs from the vowel reduction rule to feed, or meet the structural description of, the nasal-to-stop shift rule, as in

//sas -ana -q-//

VOWEL REDUCTION	sas -anə -q-
THINNING	sas -inə -q-
/ə/ DELETION	sas -in -q-
NASAL -→ STOP	sas -it -q-
	/sasitq-/ hummingbird

A fifth rule, optional nasal deletion, must be posited to account for the nasal-final combining forms in Type 4, p.47, where there is a combining /-q-/ but <u>no nasal</u>. This rule is ordered after THINNING, to allow both /-i-q-/ and /-a-q-/ combining forms, and before the nasal-to-stop shift rule, to allow both /-it-q-/ and /-i-q-/ combining forms.

RULE 10 [nasal] → Ø / V ___ -q- OPTIONAL

Nasal deletion works complementarily with the nasal-to-stop shift rule to prevent syllable-final nasals.

The ordering of the rules discussed here (rules 6 to 10) is as follows:

VOWEL REDUCTION
THINNING
/ə/ DELETION
NASAL DELETION
NASAL → STOP

Alternations of combining forms such as those for ƛipḥin 'big barnacle' are explained by the optional operation of some of the derivational rules:

	//ƛipḥ -ana-q-//		
VOWEL REDUCTION	ƛipḥ -anə-q-	ƛipḥ -anə-q-	ƛipḥ -anə-q-
THINNING	• • •	ƛipḥ -inə-q-	ƛipḥ -inə-q-
/ə/ DELETION	ƛipḥ -an -q-	• • •	ƛipḥ -in -q-
NASAL DELETION	ƛipḥ -a -q-	• • •	• • •
NASAL → STOP	• • •	• • •	ƛipḥ -it -q-
	/ƛipḥaq-/ 'big barnacle'	/ƛipḥinq-/ id.	/ƛipḥitq-/ id.

Lastly, the alternations of nasals and stops in the nasal-final combining forms of Type 5b (p.47) must be explained. Recall that the nasal-to-stop shift occurs when a nasal is in syllable-final position. Since a syllable must begin with exactly one consonant in Nootka, a root-final consonant would be syllable-final preceding a consonant-vowel sequence, i.e. # CV<u>C</u>-⋮CV ; but would not be syllable-final preceding a consonant-consonant-vowel sequence, i.e. # CV<u>C</u>- C-⋮CV (Note that syllables may end in a sequence of consonants). This alternation pattern suggests why certain nasals shift to stops, in environments which normally do not cause such a shift. The fact that either /n/ or /t/ can appear for underlying //n// preceding a consonant, as in

//ʕan-//	ʕat - CV	ʕat- ⋮CV
darn	ʕan - V	ʕa ⋮n-V
	ʕan - CCV	ʕan-C ⋮CV

may have served as an anological model allowing //n// to appear as either /n/ or /t/ before vowels, as well,[12] as in

ʕana• ~ ʕata• darning

Derivation of Lenition-blocking Roots

This analysis of combining forms has so far demonstrated that most nasal-final roots (at the surface) have regular combining forms, variation being due to the interplay of optional rules. There is an interesting parallel between the alternations for nasal-final roots having /ʔ/ insertion preceding lenition suffixes (Type 1, p.46) and those for words ending in nasal-vowel sequences. Note in the following pairs of words, where a lenition-blocking root is compared with a related vowel-final root, that the main differences between the two words in each set is the loss of the final vowel and the thinning of the medial vowel to /i/ in the first root:

čim.-	right, proper, desired	čama-	right, proper, as desired...
ʔaʔim.-	at first	ʔa̓ma-	at a proximate time (Sapir 1938: 259)
n̓im.-	in one piece	n̓ama-	only
y̓im.-	unsatisfactory undesireable	y̓ima-	id.
ḥim.-	show	ḥamat-	known, designated, singled out
ʔim.-	locative, uncomfortable position	ʔam-	right, proper locative

These alternations pattern like the words ending in a nasal-vowel sequence, e.g.

//x̓i·s -ama -q-//	x̓i·simәq- /x̓i·simq-/	hook, tooth of a herring rake

since there is a loss of the post-nasal vowel, and a thinning of the vowel preceding a nasal which has lost a following vowel. Observing that forms written like

//čim. -hiɬ//	čim?iɬ	bed
//?ust.-hiɬ//	?ust?iɬ	in the house
//ma̓ɬ. -hiɬ//	ma̓ɬ(?)iɬ	cold in the house

are pronounced with a reduced vowel /ə/ preceding the /?/

[čɪmə?ɪɬ]

[?ʊst(ə)?ɪɬ]

[ˀmʌɬ(ə?)ɪɬ]

it is assumed that these lenition-blocking roots (i.e. roots having /?/ insertion preceding lenition suffixes) have a final underlying vowel /a/ which reduces to /ə/. This vowel reduction can be combined with RULE 6 (p.49) to yield

RULE 6a $\quad V \rightarrow /ə/ \Big/ \begin{matrix} \#\ X\ CV\ [nasal]\ \_\_\ \left\{\begin{matrix} CV \\ \# \end{matrix}\right\} \\ \#\ C\ V\ C\ \_\_\ \{\pm\} \end{matrix}$

This reduced /ə/ would then account for the shift of /a/ to /i/ in the alternations cited on p.52 by the regular application of the THINNING rule.[13] This reduced vowel /ə/ would also account for the lenition-blocking roots not meeting the structural description of the lenition rule, and instead meeting the structural description of the /h/→/?/ rule. It would also explain why a suffix with alternate forms //-aḥs// (after consonants) and //-qs// (after vowels) combines with what appears to be a nasal-final morpheme as follows:

		ha?uməqs	
//haẃa -ama	-qs//	/ha?umqs/	food in a canoe
eat	..thing	in vessal	

Also note that a variable consonant (which deletes following a consonant) is retained even following a reduced vowel (which is not distinct phonemically):[14]

//ʔima -⟨w⟩inɬ//	ʔiməwinɬ	kinked neck
uncomfor- table	neck	

In order to derive the surface forms of words such as those on p.53 where a root-final vowel blocks lenition and then reduces to /ə/, it is necessary to account for the optional loss of the [əʔ] sequence after fricatives and of [ə] after stops. An optional /ə/ deletion rule is already needed for /ə/ following nasals. As long as this rule follows the lenition rule (otherwise fricatives preceding a reduced vowel would optionally undergo lenition), it may also apply to /ə/ following fricatives and stops. The /ə/ deletion rule is now written:[15]

RULE 9a $\quad /ə/ \rightarrow \emptyset \;/\; \begin{cases} /a/\ [\text{nasal}]\_\_\ \text{-q-} \\ \begin{cases} [\text{nasal}]\_\_\ \text{-q-} \\ [\text{stop}]\_\_ \\ [\text{fricative}]\_\_ \end{cases} \end{cases}$ OBLIGATORY / OPTIONAL

/ə/ rarely deletes after root nasals, as in čiməʔiɬ /čimʔiɬ/ bed. However there are cases where an underlying //CV [nasal]V-// root optionally loses the final reduced vowel, with subsequent nasal-to-stop shifting:

	//ʔama-//		
VOWEL REDUCTION	ʔamə-	ʔamə-	ʔamə-
THINNING	ʔimə-	• •	• •
/ə/ DELETION	• •	ʔam-	ʔam-
NASAL → STOP	• •	• •	ʔap- (/__ C)
	/ʔim.-/	/ʔam-/	/ʔap-/
	LOC	right, LOC	

The above comparison of lenition-blocking roots, and nasal-vowel-final combining forms, has shown that lenition-blocking roots may be accounted for by rules already needed in the grammar, if these roots are assumed to have an underlying final vowel (/a/). The following derivations illustrate how CVC(C)V- type roots

		(Sapir & Swadesh 1939)
//ʔusta-//	locative	/ʔust.-/
//čama-//	ready	/čim.-/
//m̓aɬa-//	cold	/m̓aɬ.-/

combine with a lenition suffix, //-hiɬ// 'in the house':

	//ʔusta-hiɬ//	//čama-hiɬ//	//m̓aɬa-hiɬ//
LENITION /h/→/ʔ/	ʔusta-ʔiɬ	čama-ʔiɬ	m̓aɬa-ʔiɬ
V REDUC	ʔustə-ʔiɬ	čamə-ʔiɬ	m̓aɬə-ʔiɬ
THINNING		čimə-ʔiɬ	
/ə/ DEL	ʔustəʔiɬ ʔustʔiɬ		m̓aɬəʔiɬ m̓aɬʔiɬ m̓aɬʔiɬ
/ʔ/ DEL			m̓aɬiɬ
	ʔustəʔiɬ ʔustʔiɬ /ʔustʔiɬ/	čiməʔiɬ /čimʔiɬ/	m̓aɬəʔiɬ m̓aɬʔiɬ m̓aɬiɬ /m̓aɬʔiɬ/~/m̓aɬiɬ/
	in the house	bed	cold in the house

Summary

Summarizing this discussion of exceptions to the lenition rule, we find that:

1. morphemes which appear to have a final /ɬ/ which changes to /w/ by lenition, have in their underlying forms a final //-ɬ-hʷ// sequence, and

2. morphemes which appear to have a final consonant which

blocks the lenition rule, have in their underlying forms a final //..CV// sequence.

The first type of morpheme, e.g. //čiɬ-ḥʷ// 'run away from home', does meet the structural description of the lenition rule, and undergoes it regularly. The second type of morpheme, e.g. //čama-// 'ready, proper' or //qʷiša-// 'smoking', does not meet the structural description of the lenition rule, and hence is regular in not undergoing lenition. These morphemes however do meet the structural description of the /h/ → /ʔ/ rule (they contain an intervocalic /h/) and hence are regular in undergoing this rule.

CHAPTER 4 GLOTTALIZATION

Glottalization is the second process examined in this thesis. Glottalization is defined here as a phonological process shifting an unglottalized stop, affricate or resonant to its glottalized counterpart. In Nootka, there is a phonological contrast between suffixes with a vowel, suffixes which cause lenition (posited here to begin with an /h/), and suffixes which cause glottalization. Compare

//wik -aˇs// not on it	wika·s	not on it
//wik -his// not on beach	wikis	not on the beach
//wik -ˀas// not outside	wik̓as	not outside
//ƛa -aˇs// stick on it standing	ƛa·s	(stick) standing on it
//ƛa -his// id. on beach	ƛaʔis	standing up on the beach
//ƛa -ˀas// id. outside	ƛaʔas	standing up outside

There are approximately forty-seven suffixes which cause glottalization (marked by a /ˀ/ morphophoneme).[1] These suffixes may be subcategorized by morphological class, i.e. lexical or grammatical, or by semantic class, i.e. governing or restrictive (for discussion of these terms, see p.10-11). The number of lenition and glottalization suffixes belonging to these classes is as follows:

TABLE IX: NUMBERS OF SUFFIXES

Morphological Class	LEXICAL		GRAMMATICAL
Semantic class	Governing	Restrictive	(Restrictive)
Lenition	-	3	-
Glottalization	26	14	7
TOTAL SUFFIXES	450		50

Glottalization suffixes may be either grammatical or lexical. If lexical, they may be either governing or restrictive. The semantic class to which a suffix belongs has no phonological influence, either on the suffix itself (e.g. its shape) or on the preceding morpheme. That is, restrictive and governing suffixes pattern the same, phonologically. However, the morphological class of a suffix places certain constraints on it, and on the morpheme preceding it.

Data

The following data (Swadesh 1933, Sapir and Swadesh 1939) illustrate the contrast between the derivations of forms containing a lexical glottalization suffix and those forms containing a grammatical glottalization suffix.

	LEXICAL		GRAMMATICAL
//ƛup-ɔiʸčh//	ƛupi·čh	//ʔu-sup+ɔaƛ//	ʔusupaƛ
hot time	summer	it vic- timize	SEQ he victimized (at the time)
//hupt-ɔaʸʔa//	hupta·ʔa	//hupt+ɔaƛ//	huptaƛ
hide on rocks	id.	hide	SEQ they hid

LEXICAL		GRAMMATICAL	
//yac-ˀas//	yacas		
walk outside	id.		
//miʌ-ˀiˠčh//	miʌi·čh	//wik+ˀaʌ+ˀat//	wikaʌat
rainy time	id.	not SEQ PASSIVE	it isn't...-ed
//wik-ˀas//	wikas	//wik+ˀaʌ//	wikaʌ
not outside	id.	not SEQ	it's not
//his-iˠkʷ-ˀas//	hisi·kʷas	//his-iˠkʷ+ˀaʌ//	hisi·kaʌ
LOC go by outside	going by	LOC go by SEQ	he went along
//ciq-ˀikʷ[L]//	ci·ʕik	//ciq+ˀaʌ//	ciʕaʌ
talk like...	fond of talk	talk SEQ	he talked
//tiqʷ-ˀas//	tiʕas	//yaqʷ+ˀaʌ ʔitq//	yaʕaʌʔitq
sit outside	id.	who SEQ REL	who is now
//his-ˀu·ʌ//	hiyu·ʌ	//ha·ʔuˠ-qs+ˀaʌ//	ha·ʔu·qs(ʔ)aʌ
hit on rocks (momentaneous)	id.	accompany in vessal SEQ	he went along
//ʌuš-ˀaqʌ//	ʌuyaqʌ	//ʌuš+ˀaʌ//	ʌuš(ʔ)aʌ
dry inside	id.	dry SEQ	it dried
//hiɬ-ˀaqʌ//	hiyaqʌ	//hiɬ+ˀaʌ//	hiɬ(ʔ)aʌ
LOC inside	inside	LOC SEQ	it's there
//cax̣ʷ-ˀaqʌ//	caẇaqʌ	//cax̣ʷ+ˀaʌ//	cax̣(ʔ)aʌ
spear inside	speared inside	spear SEQ	it's speared
//ʔaḥ-ˀaˠʔa//	ʔaḥʔa·ʔa	//ʔaḥ+ˀaʌ//	ʔaḥ(ʔ)aʌ
demon. on rocks	there on the rocks	demon. SEQ	at that time
//ʔanaḥʷ-ˀiʌ[L]-aq[S]//	ʔa·nuẇiʌaq	//ʔanaḥʷ+ˀaʌ ʔic//	ʔanaḥ(ʔ)aʌic
little take	very, take very little	little SEQ dimin.	he's little
//ʔam-ˀakʌi//	ʔamakʌi		
LOC in rear	in the rear[2]		

Lexical suffixes cause preceding stops, affricates and nasals to become glottalized, and cause preceding fricatives to become glottalized glides. Grammatical suffixes

cause preceding stops and affricates to become glottalized, but do not influence preceding fricatives, although an optional /ʔ/ may be inserted after fricatives in this context. Sapir and Swadesh account for this contrast between lexical glottalization and grammatical glottalization suffixes by marking every glottalization suffix with one of two distinct morphophonemes:

1. /ˀ-/ (Sapir and Swadesh 1939:238) for lexical glottalization suffixes (what they term "hardening" suffixes), or
2. /ˀ—/ (ibid.) for grammatical glottalization suffixes (what they term "semi-hardening" suffixes).

Recall that Sapir and Swadesh employed a third morphophoneme /ᶜ-/ to distinguish lenition suffixes. In their analysis, these three morphophonemes serve as distinct markers, causing words in which they appear to undergo one of three distinct and seemingly unrelated processes. Compare:

DERIVATION		Results from RULE:
//hiɬ ᶜ-iɬ//	hiyiɬ	[fricative]→[glide]/__ᶜ-
//hiɬ ˀ-aqχ//	hiʸaqχ	[fricative]→[glottalized glide]/__ˀ-
//hiɬˀ—aχ//	hiɬ(ʔ)aχ	ˀ → (ʔ)/[fricative]—__

In their analysis, these three processes, and resulting outputs, cannot be related, unless the lenition of fricatives preceding /ᶜ-/ and /ˀ-/ is collapsed into one rule as follows: [fricative]→[glide]/__$\{^{ᶜ}_{ˀ}\}$-. This solution does not show any phonological similarity between lenition and glottalization suffixes (except that they are NOT

vowel-initial suffixes), nor does it suggest why lenition or glottalization is occurring. It simply states that two independant suffix classes cause preceding phonemes to undergo the same rule.

Evidence for Variable Consonants Causing Glottalization

If there were suffixes beginning with a variable consonant //⟨C⟩// (c.f. p.23) which caused the preceding consonant to glottalize when the variable consonant was deleted, then the positing of an underlying variable consonant would be a simple solution for the glottalization suffixes. The following derivations show that suffixes beginning with an unglottalized variable consonant do not cause any such change in the preceding consonant:

//ʔu -⟨č⟩ink^{w}//	ʔuk^{w}ink	doing it together
it do together		
//hiš -⟨č⟩ink^{w}//	hišink	all doing it together
all do together		
//ʔu -⟨č⟩i•ɬ//	ʔuk^{w}i•ɬ	making it
it make ...		
//čapac -⟨č⟩i•ɬ//	čapaci•ɬ	making a canoe[3]
canoe make ...		

Nor do ones beginning with a variable glottal stop:

//ʔu -⟨ʔ⟩inqʷ[L]//	ʔu•ʔinqʷ	hating him
him hating...		
//ʔu•š -⟨ʔ⟩inqʷ[L]//	ʔu•šinqʷ	always hating someone (specified)
someone hating...		
//ɬic -⟨ʔ⟩a^{ɣ}ɬ//	ɬica•ɬ	on a fabric
fabric spread out on fabric		

Clearly, the deletion of /ʔ/ here does not influence the preceding consonant. This is of course distinct from suffixes beginning with //-ʔ..// as in

//tiˑ -ʔatu q // sink under water fall	tiˑʔatu	sink under water
//wik -ʔatu q // not fall, stop	wikʔatu	not stopping
//puʃaɬ -ʔatu q // sleep fall, stop	puʃaɬ(ʔ)atu	sleepy

where the /ʔ/ neither deletes after consonants (except that as a general rule of Nootka, /ʔ/ optionally deletes after fricatives), nor causes glottalization.[4]

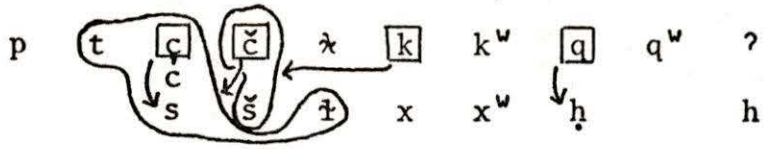
So far, no evidence has been found showing that an underlying variable consonant causes glottalization or lenition when it deletes. There is, however, another group of suffixes to be discussed — those suffixes beginning with a variable consonant followed by a second (and sometimes third) consonant. Compare for example:

//waˑ -[R] -⟨q⟩ḥ// say distr. meanwhile	wawaˑqḥ	while saying
//nuˑk -[R] -⟨q⟩ḥ// sing distr. meanwhile	nunuˑkḥ	while singing
//hita -⟨č⟩swiˇ// LOC through	hitacswi	going through
//ʔam -⟨č⟩swiˇ// LOC through	ʔapswiˑ	extending through

These variable consonants work just like those in //-⟨C⟩V// type suffixes — the variable consonant deletes when following a consonant.

The phonological shape of a variable consonant type

suffix is heavily constrained in Nootka. The underlying variable consonants which may precede consonants are posited to be: //-⟨q⟩// preceding /ḥ/, //-⟨c⟩// preceding /s/, //-⟨k⟩// preceding /š č/ and //-⟨č⟩// preceding /t c c̓ s ɬ/. For a discussion of rules needed to account for these underlying variable consonants, c.f. p.85 . These variable consonant consonant sequences may be charted as follows:



If one were to posit /ʔ/ as the underlying variable consonant causing glottalization, one would probably posit /h/ as the second phoneme, due to the pattern relations in the ⟨C⟩-C sequences charted above and to the phonological properties of /h/ (to be discussed, p.67). This //-⟨ʔ⟩h..// sequence, however, cannot account for the fact that /ʔ/ may occur as a free variant following fricatives which did not undergo glottalization (to glottalized glides). Since all other variable consonants obligatorily delete after any consonant, positing //-⟨ʔ⟩h..// type suffixes lessens the generality of the variable consonant deletion rule.[5]

Evidence for Initial /ʔ/ in a //-CC..// Suffix

None of the following underlying shapes of glottalization suffixes have been found satisfactory: //-CV..//, //-⟨C⟩V..//, or //-⟨C⟩CV..//. There is a fourth possibility. Glottalization suffixes may begin with a non-variable

consonant cluster, i.e. //-CCV..//. No clearly defined combining pattern exists for suffix-initial clusters,[6] except that no glottalized consonant begins a cluster, reflecting the constraint in Nootka that no surface cluster in any word position begins with a glottalized consonant. Glottalized consonants (especially [back] stops) are rare in the suffix-initial position generally.[7] However, the fact that glottalization suffixes cause preceding consonants to glottalize suggests that there is a glottalized segment at the beginning of such suffixes which deletes for some reason.

There is evidence suggesting that /ʔ/ is the initial consonant in the glottalization suffixes. First, there are a few pairs of cognate words in Nootka, where one member has suffix-initial /ʔ/, while the other member is a glottalization suffix:

-ʔaẏimč [L]	presaging, forcasting	-ʔaʸmač	cast spell for... auguring...
-ʔ(.)aṯ	belonging to...tribe	-ʔaṯ	residing at...
-ʔiʸčḥ	season, year of...	-ʔiʸčḥ	season, year of...[8]

No such pairs are found where glottalization suffixes alternate with suffixes beginning with any other consonant besides /ʔ/.

Second, there is the occurrence of surface /ʔ/ when a glottalization suffix follows a vowel, and when it follows a fricative which did not undergo glottalization, as in

//ʔu -ʔas//	ʔuʔas	about to do it (again)
it about to...		

//ʔu -t̓i·ʔiɬ +ʾaƛ// ʔut̓i·ʔiɬʔaƛ he imitated him
him imitate SEQ ʔuti·ʔiɬaƛ

If any consonant other than /ʔ/ is posited as the initial consonant in a glottalization suffix, then an additional rule will be required to shift that consonant to /ʔ/ in the post-vocalic and post-fricative environments.

The third piece of evidence for /ʔ/ as the initial consonant comes from phonetics. Recall that a glottalization suffix changes an obstruent or a sonorant to its glottalized counterpart. Phonetically, glottalized consonants in Nootka are ejectives,

> "formed by bringing the vocal cords tightly together and then raising and constricting the whole larynx so that the pressure of the air in the mouth and pharynx tends to be raised." (Ladefoged 1971:23)

Although, generally, obstruents tend to be post-glottalized, whereas sonorants tend to pre-glottalized, as in Nootka,

where "glottal closure is synchronous with the momentarily voiceless initial phase of the continuants, its release being immediately followed by the voiced phase of the continuant." (Sapir 1938:249)

glottalized obstruents and sonorants may be classed together as phones which have a secondary articulation of glottalic occlusion (Greenberg 1970:123-5), or in other words, a coarticulated /ʔ/.

Since all glottalized consonants, then, consist of an unglottalized phone plus /ʔ/, it is possible to hypothesize that a glottalized consonant could derive from a sequence of an unglottalized phoneme plus /ʔ/, which has combined to form one phone with a secondary articulation. This is made

more probable by the facts that consonants with secondary articulation of a glottalic occlusion (glottalized consonants) already exist in Nootka both phonemically and phonetically, and that other consonant sequences may have, as a phonetic free variant, a single consonant with secondary articulation.[9]

There is evidence from other languages that glottalized consonants may derive from combinations of phones (c.f. Sapir 1938, Greenberg 1970). Aoki's "A Note on Glottalized Consonants" (1970:65) is based on Nez Perce, a Sahaptian language, which is part of the Northwest linguistic area, an area noted for glottalized phonemes. Aoki observes that

> "There are two types of glottalized consonants in Nez Perce, in terms of their origin, (1) those etymologically irreducible, and (2) those reducible to consonant + glottal stop... Those consonants which are reducible are produced by a glottalization rule that applies across morpheme boundary. An example is ʔimíːs 'your mother', which is etymologically reducible to ʔim 'your' and ʔiːs 'mother'. The glottalization rule follows an optional word boundary deletion rule in the order of application. As a result there are some alternations of pairs of phonetic forms. For example, ʔíːnim 'my' + ʔiníːt 'house' produces two alternating phonetic forms ʔíːnim ʔiníːt and ʔíːniminíːt ." (Aoki 1970:67)[10]

The above evidence suggests that, in Nootka, glottalization suffixes have an initial /ʔ/ which for some reason merges phonetically with the preceding consonant to produce a single consonant with a glottalic secondary articulation. Since such a phonetic merging does not occur in Nootka if a consonant is followed by a suffix beginning with a /ʔ/ vowel sequence, it is hypothesized that glottalization

suffixes must begin with a /ʔ/-consonant-vowel sequence.

Evidence for /h/ as the Second Consonant

There is evidence that /h/ is the second consonant, that glottalization suffixes begin with a /ʔh/ sequence. If an /h/ is posited in glottalization suffixes, then lenition caused by either lenition or glottalization suffixes (/x^{w} ḥ^{w}/ →/w/, /s š ɬ/→/y/; c.f. p.21, 58-9) is accounted for, without redundancy, by one rule: lenition. The glottalization rule, then, describes on the glottalization of stops, affricates, nasals and the glides deriving from fricatives by the lenition rule. If the lenition rule is to apply to fricatives preceding a glottalization suffix, then the rule must specify that lenition occurs preceding /h/ or a /ʔh/ sequence.

The rule must also specify that lenition applies to fricatives only when they precede a lexical glottalization suffix. Compare

//ƛuš -ʔhas//	ƛuy̓as	//hiɬ -ʔhaqƛ//	hiy̓aqƛ
dry outside	id.	LOC inside	inside
//ƛuš +ʔhaƛ//	ƛuš(ʔ)aƛ	//hiɬ +ʔhaƛ//	hiɬ(ʔ)aƛ
dry SEQ	it's dry	LOC SEQ	it's there

This is not an irregularity in Nootka. Since all lenition suffixes (all suffixes beginning with //-h//) are lexical suffixes, one can state that lenition occurs only before lexical suffixes, never before grammatical suffixes.

This may reflect the historical derivation of gram-

matical suffixes from independant word sequences that optionally lost their word boundary (swadesh 1948) in that originally the lenition process applied only <u>within</u> words, never over word boundaries. On the other hand, the glottalization process does apply to consonants preceding either lexical or grammatical suffixes. This may reflect the fact that originally glottalization also occurred only within word boundaries (i.e. over lexical suffix boundaries), but later came to apply over <u>optionally-deleted</u> word boundaries (i.e. over grammatical suffix boundaries) as well. The extension of the glottalization process to apply over optionally-deleted word boundaries parallels the glottalization process occurring over deleted word boundaries in Nez Perce (Aoki 1970). In order to account for the lenition of fricatives preceding lexical glottalization suffixes, the lenition rule is rewritten as:

RULE 3a $$\begin{bmatrix} -\text{sonorant} \\ -\text{closed} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{sonorant} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} \Big/ \underline{\quad} - (?)h$$

(Note that the /?/ is enclosed in curved or optional brackets ( ), since it need not be present for the rule to apply. That is, its presence is optional. In contrast, phonemes enclosed in bent or variable brackets 〈 〉 delete or occur obligatorily, according to the context.)

Another justification for the positing of /h/ as the second consonant in glottalization suffixes is that a <u>deletion rule</u> for /h/ already occurs in the grammar (c.f.

p.28). Since no consonant other than intervocalic /ʔ/ occurs in surface forms at the beginning of glottalization suffixes, any consonant posited to follow the initial /ʔ/ will require a general deletion rule. The /h/ deletion rule already posited (/h/→ Ø/ C_) is needed to derive surface forms containing a lenition suffix, e.g.

//hiɬ -his//

LENITION	hiy -his	
/h/ DELETION	hiy -is	
	/hiyis/	'there at the beach'

This rule will also work to delete /h/ in glottalization suffixes, as long as the /h/ deletion rule follows the glottalization rule, since /h/ is a necessary part of the glottalizing environment, e.g.

//hiɬ -ʔhas//

LENITION	hiy -ʔhas	
GLOTTALIZATION	hiy̓ -ʔhas	
/h/ DELETION	hiy̓ -ʔas	
/ʔ/ DELETION	hiy̓ -as	
	/hiyas/	'there on the ground'

On the basis of the above evidence, it is hypothesized that the environment specified for the glottalization process is a suffix initial //ʔh// sequence.

Phonemic Output of the Glottalization Process

In order to formulate a glottalization rule, the phonological changes occurring must be accurately described. Recalling that lenition does not effect back unrounded fricatives, and does not apply over grammatical suffix

boundaries, and that morpheme final glides or glottalized consonants do not occur in Nootka, the phonological changes resulting from the glottalization rule may be charted as follows:

TABLE X: PHONEME OUTPUTS OF GLOTTALIZATION

UNDERLYING PHONEME	OUTPUT	UNDERLYING PHONEME	LENITION	OUTPUT
p	p̓	s	y	y̓
t	t̓	š	y	y̓
c	c̓	ɬ	y	y̓
č	č̓	x	CANNOT APPLY	
ƛ	ƛ̓	x^w	w	w̓
k	k̓	ẖ	CANNOT APPLY	
k^w	k̓ ~ k^w̓	$ẖ^w$	w	w̓
q	ʕ	m		m̓
q^w	ʕ	n		n̓

There are three aspects of this chart which require further discussion before a general glottalization rule can be formalized: the alternation of /k̓/ and /k^w̓/ as the output of //k^w//, the merger of the outputs of //q// and //q^w// to /ʕ/, and the significance of the glottalization of the resonants //m n y w// to /m̓ n̓ y̓ w̓/ respectively.

Delabialization

The first phenomenon to be explained is why the glottalized consonant deriving from the labialized velar

stop //kʷ// is sometimes delabialized. Compare

//his -iˠkʷ -ʔhas// hisi·k̓ʷas going by
LOC go by on ground

//his -iˠkʷ +ʔhaƛ// hisi·k̓aƛ it's this way
LOC go by SEQ

This delabialization is part of a more general rule in Nootka that causes <u>delabialization</u> when any labialized (i.e. [+round]) consonant precedes /u/, a consonant[11], a grammatical suffix or syllable boundary (Jacobson 1969:8-12). This rule is written:

RULE 11 $$\begin{bmatrix}-\text{sonorant}\\+\text{round}\end{bmatrix} \rightarrow [-\text{round}] \;/\; \_\_ \left\{ \begin{bmatrix}+\text{syllabic}\\+\text{round}\end{bmatrix},\ [-\text{syllabic}],\ + \begin{Bmatrix}\text{CV}\\\#\end{Bmatrix} \right\}$$

Compare:

//his -iˠkʷ // hisi·k going along
LOC go by

//nu·kʷ -[R]-⟨q⟩ḥ// nunu·kḥ singing meanwhile
sing distr. meanwhile

//t̓iqʷ-u⟨ɬ⟩-ḥʷ-his//t̓iquwis sitting at a place
sit at dur. at beach

//c̓axʷ +ʔhaƛ// c̓ax(ʔ)aƛ it got speared
spear SEQ

This rule then accounts for the delabialization of round consonants preceding a <u>grammatical</u> glottalization suffix. (Recall that the delabialization rule includes grammatical suffix boundaries as one of the environments specified. <u>Lexical</u> suffixes, on the other hand, are not specified as an environment for delabialization) Hence delabialization need not be specified in the glottalization rule, as long

as delabialization follows glottalization.

There is a further complication concerning delabialization (c.f. Jacobson 1969:11). Compare

//his -iˠkʷ +ʔhaƛ// LOC go by SEQ	hisi·k̓aƛ	it's over there
//nu·kʷ-[R] +ʔhaƛ// sing distr. SEQ	nunu·k̓ʷaƛ	they sang then

The underlying //kʷ// is not delabialized before a grammatical glottalization suffix, <u>if the //kʷ// follows /u/</u>. This constraint on delabialization may be expressed by specifying the environment preceding a round consonant, in the delabialization rule. There is, however, a simpler solution. Compare the above words with:

//ʔu -⟨q⟩aˠs// him daughter of..	ʔuqʷa·s	his daughter
//ḥayu -qimł// ten round objects	ḥayuqʷimł	ten round objects

We must conclude that in Nootka, [-round][+back] consonants always go to their <u>[+round]</u> counterparts when preceded by /u/ and followed by a [-round] vowel:[12]

$$\text{RULE 12} \quad \begin{bmatrix}\text{-syllabic}\\ \text{-round}\\ \text{+back}\end{bmatrix} \longrightarrow [\text{+round}] \Big/ \begin{bmatrix}\text{+syllabic}\\ \text{+round}\end{bmatrix} \_\_ \begin{bmatrix}\text{+syllabic}\\ \text{-round}\end{bmatrix}$$

even when the consonant in such a context precedes a grammatical suffix. That is, the labialization rule is <u>dominant</u> over the delabialization rule. This phonological characteristic of Nootka can be expressed by ordering the labialization rule after the delabialization rule. These two rules, delabialization and labialization, together account for the retention or loss of [+round] consonants preceding a

glottalization suffix.

Uvular Pharyngeal Relations

The second phenomenon to be explained is the occurrence of a pharyngeal stop /ʕ/ as the glottalized counterpart of uvular stops /q/ and /qʷ/. Compare

//ciq -⟨y⟩aˠ// talk dur.	ciqa·	talking
//ciq -ʔikʷ[L]// talk fond of...	ci·ʕik	fond of talking
//t̓iqʷ -aˠs// sit on it	t̓iqʷa·s	sitting (on it)
//t̓iqʷ -ʔas// sit outside	t̓iʕas	sitting outside

The origin of pharyngeal phonemes in Nootka has already been discussed (c.f. p.16). Historically, Nootka /ʕ/ derives from a merger of Proto Nootkan *q̓ and *q̓ʷ. A good justification of the existance of this sound change is found in Jacobson's "Origin of the Nootka Pharyngeals" (1969).

Phonetically, glottalized uvular stops and pharyngeal stops are distinct in both place and manner of articulation. Glottalized uvular stops are essentially an oral occlusion at the soft palate, with a secondary glottalic occlusion, and also a secondary labial articulation in the case of /q/. A "pharyngeal stop" is a phonetic impossibility. The phoneme /ʕ/ is, as Swadesh (1939:78, 1948:119) has pointed out, a pharyngealized glottal stop, i.e. an oral glottalic occlusion with a secondary pharyngeal articulation. It

must, therefore, by definition, be glottalized. Delattre (1971:129) characterizes the articulation of /ʕ/ by the sharp retraction of the tongue root, considerable raising of the larynx and the lowering and curling of the uvula along the tongue root (c.f. also Hetzron 1969:72).

Glottalized uvulars /q̓ qʷ̓/ and pharyngealized stop /ʕ/ have the same feature specifications in terms of Nootka distinctive features, except that /qʷ̓/ is [+round]:

	/q̓ ʕ/	/qʷ̓/
	[-sonorant	[-sonorant
	+closed	+closed
	+back	+back
	-high	-high
	+glottal	+glottal
	-round]	+round]

13

That is, pharyngeals and glottalized uvulars are not phonologically distinct in Nootka. Therefore, the historical shifting of Nootka glottalized uvulars to pharyngeal stop (Jacobson 1969b:153) did not change the feature specification of the phonemes concerned. Rather, this shifting is a sort of redundancy rule, adding a non-distinctive feature to a phoneme or phoneme class. In this case, the non-distinctive phonetic feature is pharyngealization, or [+retracted root] (proposed by Ladefoged 1971:62, Anderson 1974:300).[14] This redundancy rule

RULE 13 $\begin{bmatrix}-\text{sonorant}\\+\text{closed}\\+\text{back}\\-\text{high}\\+\text{glottal}\end{bmatrix} \longrightarrow$ [+retracted root]

can be applied to the output of the glottalization rule to

change glottalized uvulars to pharyngeal stops.

If this is done, however, an incorrect output arises:

	//q//	//qʷ//
GLOTTALIZATION	q̓	q̓ʷ
RETRACTION	ʕ	*ʕʷ

A rounded pharyngeal stop does not occur in Nootka surface forms. Jacobson states that such a phone cannot exist:

> "... the loss of labialization in Nootka (in glottalized uvular stops) must be understood as a concomitant of the shift to a pharyngeal position of articulation due to physiological or acoustic incompatability." (Jacobson 1969b:142)

Yet he must accept the existance of a rounded pharyngeal fricative /ḥʷ/ morphophoneme, due to alternations resulting from the lenition process (ibid. p.143).[15] It seems plausible therefore to allow a rounded pharyngeal stop /ʕʷ/ to result from the glottalization of a labialized or rounded uvular stop /qʷ/→/q̓ʷ/→/ʕ/, parallel to the shift of a plain uvular stop to a plain pharyngeal stop /q/→/q̓/→/ʕ/.

The surface neutralization of the [round] distinction can be accounted for by a low level phonetic realization rule which causes [+back][-high][+glottal][+round] stops to become [-round], thereby recapitulating the historical occurrence of the merger of rounded and unrounded pharyngeal phonemes in Nootka:

RULE 14

$$\begin{bmatrix} -\text{sonorant} \\ +\text{closed} \\ +\text{back} \\ -\text{high} \\ +\text{glottal} \\ +\text{round} \end{bmatrix} \longrightarrow [-\text{round}]$$

The derivation of a rounded uvular stop which undergoes glottalization is as follows:

	//ˈtiqʷ –ʔhas//
	sit outside
GLOTTALIZATION	ˈtiqˈʷ –ʔhas
/h/ DELETION	ˈtiqˈʷ –ʔas
/ʔ/ DELETION	ˈtiqˈʷ –as
RETRACTION	ˈtiʕʷ –as
MERGING	ˈtiʕ –as
	/ˈtiʕas/ 'sitting outside'
	[tʔɪʔʌs]

Glottalization of Nasals and Glides

The glottalization of nasals and glides is the third aspect of the glottalization process which requires added discussion before a general glottalization rule is formalized. Sapir (1938:249) justifies having a set of phonemically distinctive glottalized resonants in Nootka due to the following:

1. In Nootka, only one consonant begins a syllable. If a glottalized resonant were a /ʔ/ resonant cluster, then the initial /ʔ/ of the cluster would be syllable-final, violating the Nootka constraint that glottalized phones never end a syllable, e.g. ˈtaˈna 'child' cannot be syllabified as *ˈtaʔ:na .

2. If a glottalized resonant were a cluster, then words beginning with such a sound would begin with two consonants, violating the Nootka constraint that one and only one

consonant must begin every syllable, e.g.

mačqak	mač:qak	dirty	m̓ačkak	*?mač:kak	having jaws closed
wi•ya•	wi•:ya•	split in thin slabs	ẁi•y̓a	*?wi•?:ya	never

Additional motivation for the phonemic distinctiveness of glottalized resonants derives from the outputs of the glottalization process. When a fricative cannot undergo glottalization (if it is [+back][-round]), there is a surface /?/ between that consonant and the following glottalization suffix, e.g. //?aḥ -?haˇ?a// ?aḥ?a•?a there on the demon. on rocks rocks.

If resonants with secondary glottalic occlusion are assumed to be sequences of /?/ plus resonant, rather than distinctive phonemes, the surface phonemic output of such forms will be hard to derive from the glottalization rule. In a form where a nasal precedes the glottalization suffix, the glottalic occlusion deriving from the glottalization suffix <u>precedes</u> the nasal, e.g.

//c̓am -?hiḥ[R]//	c̓ac̓a?miḥ	getting canoes
canoe get...		

Such an analysis loses the generalization that a secondary articulation of /?/ is added to the consonant preceding a glottalization suffix. A special exception for resonants will be required, stating that there is an infixed /?/ preceding the final consonant in such a context.

On the other hand, if resonants may have a secondary glottalic articulation as a phonemically distinct phonological feature, then the derivation of resonant final (derived

or underlying) morphemes when preceding a glottalization suffix will be regular. The fact that the glottalic occlusion precedes the oral occlusion of resonants, and follows the oral occlusion of obstruents, reflects the effect of articulatory forces. It has been noted (p.65) that obstruents and resonants with glottalic occlusions may be classed together, regardless of the timing of the occlusions. This is further supported in Nootka, since there are no pre-glottalized obstruents, and no post-glottalized resonants. Hence, the glottalization rule applies to resonant final morphemes without irregularity, e.g.

//čam -ʔihiḥ[R]// čačamiḥ getting canoes
canoe get...
[čʔʌčʔʌʔmɪʔh]

The Rule

On the basis of the above discussion, the glottalization rule has been shown to be a regular process whereby, preceding a glottalization suffix, a final consonant takes on a secondary articulation, where such an articulation is phonemically (and phonetically) possible (i.e. not fricatives). No other phonemically distinct change, e.g. raising, rounding etc., occurs during the glottalization process. Assuming that the only feature change occurring for a given consonant is that specified in the rule, the glottalization rule may be written:

RULE 15 $\begin{bmatrix} -\text{syllabic} \\ \_\begin{bmatrix} -\text{sonorant} \\ -\text{closed} \end{bmatrix} \end{bmatrix} \longrightarrow [+\text{glottal}] / \_\_ \text{ ?h}$

There is a possible explanation for why glottalization occurs. Given an underlying form like //wik +?haɬ//, there is going to be a conflict: the second syllable may not begin with two consonants, i.e. *wik:?haɬ, but the first syllable may not end in a sonorant, i.e. *wik?:haɬ. This conflict is resolved by two processes, cluster simplification and consonant deletion. The /?/ is redefined as a secondary glottalic articulation in such /VC__hV/ contexts. Then a deletion rule removes /?/ after glottalized segments:

RULE 16 /?/ → Ø / [+glottal] __

This rule reflects the constraint that no [+glottal] [+glottal] consonant sequences occur in surface forms in Nootka. Then, there is an /h/ deletion rule (c.f. p.28) which deletes /h/ after consonants, and hence here allows consonants which are glottalized (by the glottalization rule) to be syllable initial.

This hypothesis gains support from Sapir's tentative reconstruction of certain Proto Nootkan and Proto Wakashan forms. Concerning the identity of the distinctive initial segment of a glottalization suffix which caused glottalization in preceding consonants, he states

> "That it was not the simple presence of a glottal stop is likely, for there are several suffixes which begin with ? that remains unabsorbed by the preceding consonant, such as -?atu 'to fall off'... There may have been a weak consonant, say h , following the ? in the case of 'hardening'[i.e. glottalization] suffixes, which had the effect of throwing the ?

back on the preceding syllable, with resultant glottal absorption or 'hardening', while the h was left to begin the following syllable. Later, when nearly all but anological h's (...) disappeared in non-initial position, the syllabic division was shifted and the appearance created of simple glottal absorption." (Sapir 1938:255)

Fant's comments on sequential constraints are also relevant:

"... there may exist rules of neural reorganization of control signals for modifying the physical manifestation of a feature in accordance with a principle of least effort articulation... Rules for speech segment durations and sound shapes have to be expressed in terms of larger phonological segments, generally several syllables defining a natural rhythmical unit interms of stress and intonation (and syllabicity)." (Fant 1973:173)

Derivations

The derivation of consonant final morphemes which undergo glottalization is illustrated below:

	//wik +ʔhaƛ//	//t̓iqʷ -ʔhas//
	not SEQ	sit outside
LENITION	. . .	. . .
GLOTTAL.	wik̓ + ʔhaƛ	t̓iq̓ʷ -ʔhas
/h/ DELETION	wik̓ + ʔaƛ	t̓iq̓ʷ -ʔas
/ʔ/ DELETION	wik̓ + aƛ	t̓iq̓ʷ - as
RETRACTION	. . .	t̓iʕʷ - as
MERGING	. . .	t̓iʕ - as
	/wik̓aƛ/	/t̓iʕas/
	it's not	sitting outside

	//hiɬ -ʔhas//
	LOC outside
LENITION	hiy -ʔhas
GLOTTAL.	hiy̓ -ʔhas
/h/ DELETION	hiy̓ -ʔas
/ʔ/ DELETION	hiy̓ -as
	/hiy̓as/ outside

Morphemes ending in a round velar /kʷ/ undergo glottalization as follows:

	//his -iˠkʷ -ʔhas// LOC go by outside	//his -iˠkʷ +ʔhaƛ// LOC go by SEQ
LENITION	. . . .	. . . .
GLOTTAL.	his -iˠk̓ʷ -ʔhas	his -iˠk̓ʷ +ʔhaƛ
/h/ DELETION	his -iˠk̓ʷ -ʔas	his -iˠk̓ʷ +ʔaƛ
/ʔ/ DELETION	his -iˠk̓ʷ -as	his -iˠk̓ʷ +aƛ
VOWEL LENGTH	his -i·k̓ʷ -as	his -i·k̓ʷ +aƛ
DELABIAL.	. . . .	his -i·k̓ +aƛ
LABIAL.	. . . .	. . . .
	/hisi·k̓ʷas/ going by	/hisi·k̓aƛ/ he went by

	//nu·kʷ -[R] +ʔhaƛ// sing distr. SEQ
LENITION	. . . .
GLOTTAL.	[R]# nu·k̓ʷ +ʔhaƛ
/h/ DELETION	[R]# nu·k̓ʷ +ʔaƛ
/ʔ/ DELETION	[R]# nu·k̓ʷ +aƛ
REDUPLICATION	nu # nu·k̓ʷ +aƛ
DELABIAL.	nu # nu·k̓ +aƛ
LABIAL.	nu # nu·k̓ʷ +aƛ
	/nunu·k̓ʷaƛ/ they sang

The derivation of a word in which a glottalization suffix follows a fricative which <u>cannot undergo lenition</u> is as follows:

	//ʔaḥ -ʔhas// demons. outside		//hiɬ +ʔhaƛ// LOC SEQ	
LENITION	. . .		. . .	
GLOTTAL.	. . .		. . .	
/h/ DELETION	ʔaḥ -ʔas		hiɬ +ʔaƛ	
/ʔ/ DELETION (OPT)	ʔaḥ+ʔas	ʔaḥas	hiɬ+ʔaƛ	hiɬ+aƛ
	'outside' /ʔaḥ(ʔ)as/		/hiɬ(ʔ)aƛ/ 'it's there'	

Exceptions

In Sapir and Swadesh's analses of Nootka, morphemes which were considered irregular when adjoined by a lenition suffix were observed to be similarly irregular when adjoined by a glottalization suffix. Since glottalization suffixes have a structural description which causes lenition, any morpheme which cannot undergo lenition will have a structural description which also prevents them from undergoing glottalization. Also, every morpheme which undergoes lenition preceding a lenition suffix will undergo lenition preceding a glottalization suffix in exactly the same way. Therefore, exceptions to the glottalization process are also exceptions to the lenition process.

It has been posited in this work that morphemes appearing to end in /ɬ/ which change to /w/ by lenition, and to /ẇ/ by glottalization, actually have a final //ɬ-ḥʷ// sequence in their underlying forms. The derivation of a word in which such a morpheme sequence precedes a glottalization suffix is as follows:

	//ƛ̓uš -u⟨ɬ⟩ -ḥʷ -ʔhas//
	dry at dur. outside
⟨ɬ⟩ DELETION	ƛ̓uš -u -ḥʷ -ʔhas
LENITION	ƛ̓uš -u -w -ʔhas
GLOTTAL.	ƛ̓uš -u -ẇ -ʔhas
/h/ DELETION	ƛ̓uš -u -ẇ -ʔas
/ʔ/ DELETION	ƛ̓uš -u -ẇ -as

/ƛ̓ušuẇas/
outdoor drying place

It has also been posited in this work that morphemes which appear to be consonant final, and yet block lenition and glottalization, actually have a final vowel, which protects the preceding consonant from being influenced by the following suffix. Roots ending in a fricative-vowel sequence which is adjoined by a glottalization suffix are derived as follows:

		//qʷisă -ʔhiˠc// smoke consume	
LENITION		• • • •	
GLOTTALIZATION		• • • •	
/h/ DELETION	qʷiša -ʔiˠc	qʷiša -ʔiˠc	qʷiša -ʔiˠc
VOWEL REDUCTION	qʷišə -ʔiˠc	qʷišə -ʔiˠc	qʷišə -ʔiˠc
/ə/ DELETION	• • •	qʷiš -ʔiˠc	qʷiš -ʔiˠc
VOWEL LENGTH	qʷišə -ʔi•c	qʷiš -ʔi•c	qʷiš -ʔi•c
/ʔ/ DELETION	• • •	• • •	qʷiš -i•c
	/qʷišʔi•c/ smoking	/qʷišʔi•c/ id.	/qʷiši•c/ id.

Roots ending in a stop-vowel or a nasal-vowel sequence which is adjoined by a glottalization suffix are derived as follows:

	//ʔusta -ʔhas// LOC outside		//ʔama -ʔhas// uncomfor table outside
LENITION	• • •		• • •
GLOTTALIZATION	• • •		• • •
/h/ DELETION	ʔusta -ʔas		ʔama -ʔas
VOWEL REDUCTION	ʔustə -ʔas		ʔamə -ʔas
THINNING	• • •		ʔimə -ʔas
/ə/ DELETION	ʔustə-ʔas	ʔust-ʔas	• • •
/ʔ/ DELETION	• • •	• • •	• • •
	/ʔustʔas/ (there) outside	/ʔustʔas/ id.	/ʔimʔas/ in an uncomfortable position on ground

CHAPTER 5 SUMMARY

Ordering

For a given language, the ordering of rules can simplify the specifications (e.g. environments or feature matrices) of certain rules and can reflect the historical ordering of those rules. Ordering rules also suggests a way in which languages change: the order, as well as the structure, of the rules may change. The rules proposed in this thesis are ordered in the following rule summary.

[R] and [L] Movement

The first operation a Nootka underlying form must undergo is a movement of instructional segments, i.e. [R] which causes reduplication of roots (CV or CVC), and [L] which causes lengthening of the root (and/or reduplicative) vowel, to word initial position, as in

//su -api⟨q⟩[L] -ʔhi·ḥ[R]//
hold up in air try to get

[L] MOVEMENT	[L]# su -api⟨q⟩-ʔhi·ḥ[R]
[R] MOVEMENT	[R]- [L]# su -api⟨q⟩-ʔhi·ḥ

(to be continued)

Due to the complexities involved in describing reduplicative and vowel length changes[1], these rules will be specified only as:

1. [L] MOVEMENT
2. [R] MOVEMENT

Postponing the phonological operations of instructional segments until immediately prior to vowel reduction will be

shown to simplify certain rules intervening.

Variable Consonant Rules

Before any phonological changes like lenition or glottalization occur, variable phonemes must either delete or gain non-variable status (c.f. p.23). The variable consonant deletion rule is

3. $\langle C \rangle \rightarrow \emptyset \;/\; C \{\pm\} \_\_$

The surface shape of a variable consonant depends on what phoneme precedes and/or follows it in a given word. Certain variable phonemes, //⟨č⟩⟨c⟩⟨š⟩//, change to /k/ when preceded by /u/ in a word. This backing rule is complicated, however, by the fact that there are cases of //⟨c⟩⟨š⟩// which do not change to /k/. This situation can be accounted for by positing that all variable consonants which change to /k/ (/u/__) derive from an underlying variable //⟨č⟩//, since the phonemes involved are in complementary distribution preceding consonants: //⟨š⟩// precedes /t/, //⟨c⟩// precedes /c c̓ s/, and //⟨č⟩// precedes /ɬ/. //⟨č⟩// is chosen as the underlying consonant, rather than *⟨c⟩ or *⟨š⟩, because /č/ also changes to /k/ preceding vowels, as in

/-či/ ~ /-kʷi/ at, in...[2]

//-⟨č⟩it// on the body, side of the canoe

whereas /š/ and /c/ never change to /k/ except in the environment: [vowel] __ [consonant]. Also, /č/ shares more distinctive features with /k/ than does /š/ or /c/.

By ordering this ⟨č⟩→⟨k⟩ rule before the ⟨č⟩→⟨š⟩ and ⟨č⟩→⟨c⟩ rules, only the [+high] consonant /č/ changes

to the [+back][+high] consonant /k/. If the backing rule applied after the ⟨č⟩→⟨š⟩ and ⟨č⟩→⟨c⟩rules, certain [-high] consonants would change to /k/ as well. Such a rule would be complicated by the fact that certain variable ⟨c⟩ do not change to /k/ after /u/. By ordering the ⟨č⟩→⟨k⟩ rule first, it may be stated as a simple assimilation rule:

4. $$\begin{bmatrix}+\text{closed}\\-\text{sonorant}\\+\text{high}\\-\text{back}\end{bmatrix} \longrightarrow [+\text{back}] \Big/ \begin{bmatrix}+\text{syllabic}\\+\text{back}\\+\text{high}\end{bmatrix} \_\_$$

The occurrence of /k/ as /k^{w}/ in certain environments is accounted for by a labialization rule later in the derivation (c.f. p.). Following the ⟨č⟩→⟨k⟩ rule, and preceding the ⟨C⟩→ C rule (which gives variable consonants full phonological status), are the rules shifting ⟨č⟩ to ⟨š⟩ or ⟨c⟩:

5. ⟨č⟩→⟨š⟩ / ___ t

6. ⟨č⟩→⟨c⟩/ ___ {c c̓ s}

Also prior to the ⟨C⟩→ C rule must be the deletion rules for variable morpheme-final consonants ⟨q⟩ and ⟨ɬ⟩, since there are non-variable final ⟨q⟩ and ⟨ɬ⟩ which do not delete, e.g. /-aq[S]/ 'very' and /-paɬ[L]/ 'along with ...' ⟨q⟩ deletes word finally, and, in a third or later syllable, syllable finally:

7. $$\langle q \rangle \longrightarrow \emptyset \Big/ \left\{ \begin{array}{l} \_\_\ \# \\ \#CV(C)^* \vdots CV(C)^* \vdots (X)\ CV \_\_ CV \end{array} \right\}$$

For example:

//qu·š -api⟨q⟩[L]// smoke up in air	qu·šapi	smoke in the air
//hič -api⟨q⟩[L] -ʔhas// torch up in air on ground	hi·čapas	torchlight above the ground

//su -api⟨q⟩[L] -ʔhi·ḥ[R]//	susu·piʕi·ḥ	trying to catch in air
hold up in air try to get		

In the second example, ⟨q⟩ is syllable final in the third syllable, and hence deletes. In the third example, ⟨q⟩ is in the second syllable, is hence retained and undergoes glottalization. Note that reduplicative morphemes do not count as syllables, nor do vowels preceded by a vowel, since a syllable in Nootka must begin with one and only one consonant.

Morpheme-final ⟨ɨ⟩ deletes preceding lenition and glottalization suffixes, i.e. suffixes beginning with //-h// or //-ʔh//, as in

//hin -aḥuˇ⟨ɨ⟩ -his//	hinaḥuʔis	in front, at the beach
LOC in front at beach		

8. $\langle ɨ \rangle \longrightarrow \emptyset \;/\; \_\_ \; (ʔ)h$

The rule assigning non-variable status can now be stated as an elsewhere rule:

9. $\langle C \rangle \longrightarrow C$

The derivation began on p.84 is continued below:

	//su -api⟨q⟩[L] -ʔhi·ḥ[R]// hold up in air try to get
[L] MOVEMENT	[L]# su -api⟨q⟩ -ʔhi·ḥ[R]
[R] MOVEMENT	[R]- [L]# su-api⟨q⟩ -ʔhi·ḥ
⟨C⟩ DELETION	· · · · · · · ·
⟨q⟩ DELETION	· · · · · · · ·
⟨C⟩ ⟶ C	[R]- [L]# su-apiq-ʔhi·ḥ

(to be cont.)

This example demonstrates that the ⟨C⟩ → C rule provides input to the glottalization rule.[3] Hence the ⟨C⟩ → C rule is ordered before the glottalization rule. It

has been shown, therefore, that all the variable consonant derivational rules must precede the lenition and glottalization rules:

RULE	4	PRECEDES	RULES 5,6
RULES	3,5,6,7,8	PRECEDE	RULE 9
RULE	8	PRECEDES	LENITION, GLOTTALIZATION
RULE	9	PRECEDES	GLOTTALIZATION

Lenition, Glottalization and Related Rules

The lenition rule, in its revised version, is

10. $$\begin{bmatrix}-\text{syllabic}\\-\text{sonorant}\\-\text{closed}\\\alpha\text{back}\\\alpha\text{round}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{sonorant}\\\alpha\text{back}\\\alpha\text{round}\end{bmatrix} \Big/ \left(\begin{bmatrix}-\text{syllabic}\\+\text{sonorant}\\+\text{closed}\\+\text{back}\\-\text{high}\end{bmatrix}_{/?/} \right) \begin{bmatrix}-\text{syllabic}\\+\text{sonorant}\\-\text{closed}\\+\text{back}\\-\text{high}\end{bmatrix}_{/h/}$$

The fact that glides which can undergo the glottalization rule usually derive from an underlying fricative which has undergone lenition demonstrates that the lenition rule must precede (in order to feed into) the glottalization rule (c.f. p.67):

11. $$\begin{bmatrix}-\text{syllabic}\\-\begin{bmatrix}-\text{sonorant}\\-\text{closed}\end{bmatrix}\end{bmatrix} \longrightarrow [+\text{glottal}] \Big/ \underline{\quad} \{\pm\}\text{?h}$$

Following the lenition and glottalization rules must come the rule accounting for /ʔ/ at the beginning of lenition suffixes following a vowel. There are two possible origins of this intervocalic /ʔ/, either that it derives from /h/ (/h/ $\longrightarrow$ /ʔ/ / V__V), or that it is

> "a mere hiatus filler, for a syllable must begin with a consonant and vocalic contraction cannot take place between an initial monosyllabic stem ending in a vowel and an initial vowel of a suffix that 'hardens' [glottalization], 'softens' [lenition], or begins with inherent -ʔ-." (Sapir 1938:257)

Compare:

//ɬa -aˠs// sticklike on it object stands	ɬa·s	it's standing on it
//ɬa -his// id. on beach	ɬa?is	it stands on the beach
//ɬa -?i -?haˠ?a// id. get to on rocks	ɬa?i·?a	it gets to stand on the rocks
//ɬa -?haˠ?a// id. on rocks	ɬa?a·?a	it stands on the rocks

Sapir contends that the /?/ in ɬa?is is due to an analogical remodelling of *ɬa-^{c}is ⟶ ɬais ⟶ ɬa?is on the model of the intervocalic /?/ which occurs when suffixes beginning with /?/ or the /^{ʔ}/ glottalization morphophoneme adjoin a vowel final root. This however seems an unnecessary complication, due to the use of a morphophoneme /^{c}/ rather than a phoneme /h/ to account for lenition. In every other case in Nootka where two full vowels are adjacent, vowel elision must occur. It seems simpler therefore to assume that there was always a consonant in the /a__i/ environment in /ɬa?is/, namely underlying //h//, rather than to assume that elision of *ɬais was blocked by analogy.

The setting up of the initial /h/ in lenition suffixes will require a rule

a. /h/ ⟶ /?/ / # C(-X)V-__V

to account for intervocalic /?/. Sapir's analysis, which derives these cases of /?/ by epenthesis, would require a rule b. Ø ⟶ /?/ # C(-X)V-$\{^{c}_{s}\}$__V

The /h/ ⟶ /?/ rule is favoured because:

1. it derives a consonant from another consonant (c.f. p.27)

2. it need not be qualified to avoid shifting all VV sequences to V?V sequences

3. it does not require the disjunctive notation { } necessary because morphophonemes $\{^{?}_{c}\}$ cannot express the phonological similarities of lenition and glottalization suffixes

4. it does not require morphophonemes as an environmental factor. Such morphophonemes are more ad hoc than initial /h/ in lenition suffixes, because they never occur at the surface in the language.

The fact that the rule must exclude reduplicative morphemes is not an isolated constraint. At least two other rules, /h/ ⟶ Ø and /?/ ⟶ Ø do not apply to reduplicative morphemes (c.f. p.91 and p.95). Since the reduplication process has not yet occurred in the derivation of a word when the /h/ ⟶ /?/ rule applies, the rule is written

12. /h/ ⟶ /?/ / V__V

This rule accounts for the difference between the derivation of a vowel-final root plus a lenition suffix, and of a vowel-final root plus a vowel-initial suffix:[4]

	//ƛa- his// sticklike on beach object stands	//ƛa- aˇs// id. on it
LENITION	• • •	• • •
GLOTTALIZATION	• • •	• • •
/h/ ⟶ /?/	ƛa?is	• • •
ELISION	• •	ƛa•s
	/ƛa?is/ it stands on the beach	/ƛa•s/ it stands on it

Since /h/⟶/ʔ/ applies when /h/ is between two vowels, even where one of the vowels reduces to /ɔ/ by a later rule, it is simpler to order the /h/⟶/ʔ/ rule before vowel reduction.[5]

There are two other rules preceding vowel reduction: reduplication (to be discussed below), and /h/ deletion. /h/ deletion is an elsewhere rule applying to non-initial /h/ phonemes which could not undergo the /h/⟶/ʔ/ rule. However, /h/ deletion does not apply in reduplicative syllables. By ordering /h/ deletion before reduplication, the rule may be expressed as

13. $/h/ \longrightarrow \emptyset / \quad X\_$ [6]

Reduplication

Although reduplication has not been investigated in this work, its position in the derivation must be preceding vowel reduction, since reduplicative morphemes copy the underlying form of the root vowel, before any vowel-quality changes take place. There are several reduplication rules, yielding both CV and CVC(C) type reduplications. These rules must apply sequentially, since one type of reduplication, associated with the iterative morpheme, applies only if no other reduplication occurs in the given word (Swadesh 1937). Since this area is beyond the scope of this thesis, the reduplication rules are abbreviated as

14. REDUPLICATION

Vowel Reduction and Related Rules

Vowel reduction occurs when a syllable-final vowel is preceded by a syllable-initial nasal which is not in a

reduplicative morphemes nor root-initial. Vowel reduction also occurs when a morpheme-final vowel is in a CVCV- type root (c.f. p.53).[7] The vowel reduction rule is written

15. $$V \rightarrow /ə/ \Big/ \begin{matrix} \# \text{ X CV} \\ \# \text{ CVC} \end{matrix} \begin{bmatrix} +\text{sonorant} \\ +\text{closed} \end{bmatrix} \_\_ \begin{Bmatrix} \text{CV} \\ \# \end{Bmatrix}$$

Vowel reduction must precede thinning, which is the shifting of /a/ to /i/ preceding a nasal-/ə/ sequence (c.f. p.49):

16. $$/a/ \rightarrow /i/ \Big/ \begin{matrix} \_\_ \begin{bmatrix} +\text{sonorant} \\ +\text{closed} \end{bmatrix} /ə/ \# \\ \_\_ \begin{bmatrix} +\text{sonorant} \\ +\text{closed} \end{bmatrix} /ə/ \end{matrix} \quad \begin{matrix} \text{OBLIGATORY} \\ \text{OPTIONAL} \end{matrix}$$

since /ə/ occurs only due to vowel reduction. The fact that /ə/ causes thinning suggests that this reduced vowel is phonetically a front or mid vowel, at least more fronted than /a/ (perhaps [ɪ˃] or [ə˂]).

An illustration of the necessity of ordering reduplication before vowel quality shifting rules is given below:

//čama -[R] -ḥ -hiɬ +ʔi//
comfortable dist. at house demons.

[R] MOVEMENT	[R]# čama -ḥ -hiɬ +ʔi
LENITION	. . . . . .
/h/ DELETION	[R]# čama -ḥ -iɬ +ʔi
REDUPLICATION	ča# čama -ḥ -iɬ +ʔi
VOWEL REDUCTION	ča# čamə -ḥ -iɬ +ʔi
THINNING	ča# čimə -ḥ -iɬ +ʔi

/čačimḥiɬʔi/
the ones lying comfortably in the house

The thinning rule, and the vowel reduction rule, must precede the /ə/ deletion rule (c.f. p.50):

17. $/ə/ \longrightarrow \emptyset \Big/ \begin{matrix} /a/\ [\text{nasal}]\ \_\_\ \text{-q-} & \text{OBLIGATORY} \\ \left\{ \begin{matrix} [\text{nasal}]\ \_\_\ \text{-q-} \\ [\text{fricative}]\ \_\_ \end{matrix} \right\} & \text{OPTIONAL} \end{matrix}$

since /ə/ is part of the environment for thinning,[8] even where the /ə/ deletes by a later rule; and /ə/ derives only from vowel reduction. /ə/ deletion is complicated by two constraints: it occurs after nasals only when preceding the combining morpheme /-q-/; and it must occur after /a/-[nasal] sequences (where the /a/ did not undergo thinning). The /ə/ deletion rule precedes nasal deletion (c.f. p.50):

18. $[\text{nasal}] \longrightarrow \emptyset \Big/ \text{V}\ \_\_\ \text{-q-}$ OPTIONAL

since nasal deletion occurs only directly before consonants (i.e. /ə/ has already deleted). Nasal deletion precedes the nasal-to-stop shifting rule (c.f. p.50):

19. $\begin{bmatrix} +\text{sonorant} \\ +\text{closed} \\ \alpha\text{labial} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{sonorant} \\ \alpha\text{labial} \end{bmatrix} \Big/ \_\_ \begin{Bmatrix} \text{CV} \\ \# \end{Bmatrix}$

The shifting of syllable-final nasals to homorganic stops is obligatory in Nootka everywhere except where such nasals have optionally deleted (by rule 18). If the nasal-stop shift rule were ordered before nasal deletion, it would have to specify that the rule applied optionally preceding the /-q-/ combining morpheme, but obligatorily for other syllable final environments:

$$*[\text{nasal}] \longrightarrow [\text{stop}] \Big/ \begin{matrix} \_\_\ \text{-q-} & \text{OPTIONAL} \\ \_\_\ \text{CV} & \text{OBLIGATORY} \end{matrix}$$

It is simpler to order optional nasal deletion first, with the nasal stop shift rule applying obligatorily to words which did not undergo nasal deletion.

The possible derivations of a nominalizing suffix plus a combining suffix //-ana-q-// illustrates how rules 15 to 19 interact:

	//-ana-q //				
VOWEL REDUCTION	-anə-q-	-anə-q-	-anə-q-	-anə-q-	-anə-q-
THINNING	• •	• •	-inə-q-	-inə-q-	-inə-q-
/ə/ DELETION	-an-q-	-an-q-	• •	-in-q-	-in-q-
NASAL DELETION	• •	-a-q-	• •	• •	-i-q-
NASAL STOP	-at-q-	• •	• •	-it-q-	• •
	/-atq-/	/-aq-/	/-inq-/	/-itq-/	/-iq-/

/ʔ/ Deletion and Related Rules

It is not clear whether the nasal deletion and nasal-stop shift rules must precede any of the following rules. /ə/ deletion, however, feeds into /ʔ/ deletion. If a fricative /ə/ sequence precedes /ʔ/, and if the /ə/ deletes, then the /ʔ/ may optionally delete, due to its immediate proximity to a fricative (c.f. p.42).

There is a second kind of /ʔ/ deletion: where /ʔ/ deletes between two full vowels. For example, /ʔ/ deletes between /a/ and /a/, but not between /ə/ and /a/, as in

	//čama -[R] -ʔas// comfortable dist. outside	//hita -ʔas// LOC outside
/h/ DELETION	ča #čama -ʔas	hita -ʔas
VOWEL REDUCTION	ča #čamə -ʔas	• • •
THINNING	ča #čimə -ʔas	• • •
/ʔ/ DELETION	• • • •	hita -as
VOWEL ELISION	• • • •	hit -a•s
	/čačimʔas/ several people (sitting) comfortably on the ground	/hita•s/ (there) on the ground

Intervocalic /ʔ/ deletion occurs in only certain syllable positions. It never occurs in the second syllable of a word, as in

//ƛa -ʔhas//	ƛaʔas	it's standing outside
sticklike outside object stands		

In the third syllable of a word, /ʔ/ deletion may not occur

1. if the third syllable is the initial syllable of the root (preceded by two reduplicative morphemes), as in

//ʔu -[R] -⟨č⟩ink^{w}[R]//	ʔuʔuʔuk^{w}ink	engaged in conversation with others
it dist. engaged in..		

2. if either of the vowels surrounding /ʔ/ is long,[9] as in

//ʔu -ʔhi·ḥ [R+L]//	ʔuʔu·ʔi·ḥ	trying to get it
it trying to get..		

3. if a monosyllabic root in the second syllable (preceded by one reduplicative morpheme) precedes a grammatical suffix in the third syllable (according to Sapir and Swadesh 1939: 237). Apart from the above exceptions, /ʔ/ deletion occurs intervocalically in third and later syllables.

There is a third type of /ʔ/ deletion: when /ʔ/ is preceded by a glottalized segment (c.f. p.79).[10] These three environments for /ʔ/ deletion — after a fricative, after a glottalized segment, and between vowels — may be combined as parts of one /ʔ/ deletion rule:

20. $/ʔ/ \rightarrow \emptyset \;/\; \left\{ \begin{array}{l} \# \; CV(C)^* \quad CV_1 \; (\pm) \_\_ \; V_1 \\ CV(C)^* \; \# \; CV_1 \; (-) \_\_ \; V_1 \\ (\#) \; CV(C)^* \; (\#)CV(C)^* \quad (\#)C(X)V_1 \; (\pm) \_\_ \; V_1 \\ [+glottal] \_\_ \\ [fricative] \_\_ \end{array} \right\}$

OPTIONAL

(where V_1 = V or $V^{\breve{}}$)

/?/ deletion is illustrated below:

	//ƛa -?i· -?haˠ?a//	//ma -[Rt L L] -?has//
	sticklike get to on	dwell plural outside
	object stands rocks	
[R] MOVEMENT	· · · ·	[Rt L+L]# ma -?has
LENITION	· · · ·	· · · · ·
/h/ DELETION	ƛa -?i· -?aˠ?a	[Rt L+L]# ma -?as
REDUPLICATION	· · · ·	ma-t-[L+L]# ma -?as
/?/ DELETION	ƛa -?i· -?aˠa	ma-t-[L+L]# ma -as
VOWEL {ELISION / LENGTH}	ƛa -?i· -?a	ma·-t- ma·s
	/ƛa?i·?a/	/ma·tma·s/
	it gets to be standing on the rocks	houses

Note that in the derivation of ƛa?i·?a, the underlying third syllable /?/ cannot delete because it is preceded by a long vowel.

As the above examples show, the /?/ deletion rule feeds into, and therefore precedes, the vowel elision rules, since vowel elision occurs between any two adjacent vowels, even where an underlying //?//, //h// or //?h// originally intervened but has undergone deletion. Vowel elision and vowel length assignment are rules beyond the scope of this paper, and are hence abbreviated as

21. VOWEL ELISION

(For a summary of these processes, c.f. Sapir and Swadesh 1939:237)

Low Level Rules

Vowel elision precedes delabialization and labialization.[11] Also prior to delabialization, however, is the uvular-to-pharyngeal retraction rule. As specified in

Chapter 4, p.74, retraction applied only to glottalized uvular stops (derived by glottalization). However, this rule can be reformulated to apply to both uvular fricatives and glottalized uvular stops:

22. $$\begin{bmatrix} -\text{sonorant} \\ +\text{back} \\ -\text{high} \\ \{-\text{closed}\ /\ +\text{glottal}\} \end{bmatrix} \longrightarrow [+\text{retracted root}]$$

If this rule, in this form, is included in the Nootka grammar, then the awkwardness of the underlying //ḥʷ// phoneme is at once resolved — at the underlying level, /ḥ/ and /ḥʷ/ would be //x̣// and //x̣ʷ// respectively, just as /ʕ/ would be //q̣//. These underlying phonemes have the same distinctive feature specifications as their surface counterparts, except that the retraction rule makes them obligatorily retracted, or pharyngealized. This analysis would also explain why surface /ḥ/ (//x̣(ʷ)//) appears syllable-finally, and preceding /ʔ/, despite the fact that phonetically, /ḥ/ is [+glottal], i.e. [h̰], and should therefore be blocked from occurring in these contexts.

Retraction precedes delabialization, since the delabialization rule must specify that pharyngealized phones (as well as /ʔ/) do not cause delabialization (c.f. Footnote 11, Chapter 4):

23. $$\begin{bmatrix} -\text{sonorant} \\ +\text{round} \end{bmatrix} \longrightarrow [-\text{round}] \Big/ \_\_ \left\{ \begin{matrix} /u/ \\ \begin{bmatrix} -\text{syllabic} \\ (-\{ʔ\ ḥ\ ʕ\}) \end{bmatrix} \\ + \\ \# \end{matrix} \right\}$$

The delabialization rule must precede the labialization rule:

24. $$\begin{bmatrix}-\text{round}\\-\text{sonorant}\\+\text{back}\end{bmatrix} \longrightarrow [+\text{round}] \Big/ \begin{bmatrix}+\text{syllabic}\\+\text{round}\end{bmatrix} \_\_ \begin{bmatrix}+\text{syllabic}\\-\text{round}\end{bmatrix}$$

since consonants with a [+round] counterpart are always [+round] in the /u_$\frac{i}{a}$/ context, specified by rule 24, regardless of other factors, e.g. those causing delabialization in rule 23, and regardless of whether the consonant was round or not in its underlying form.

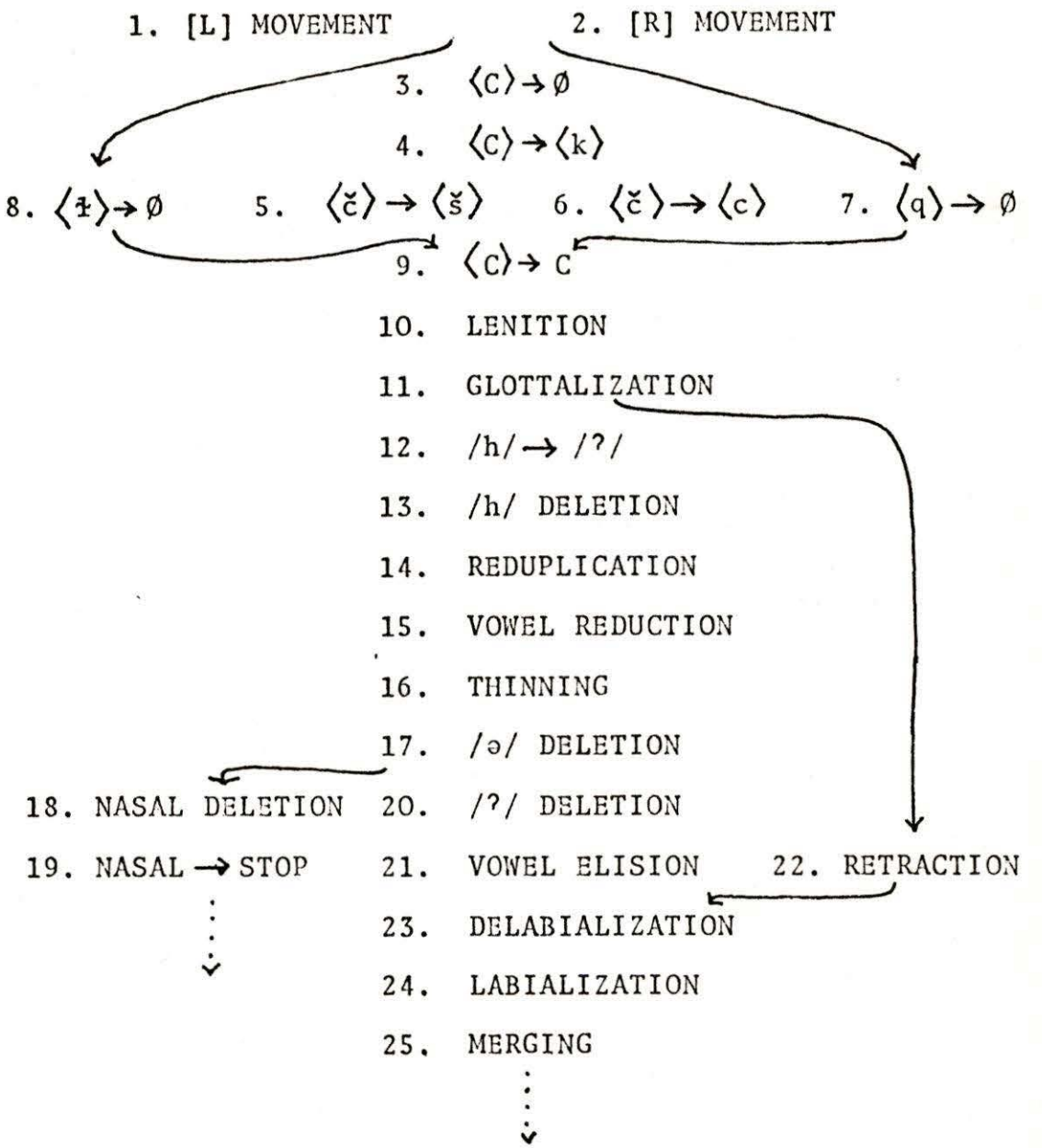
The labialization rule must precede the rule merging labialized and unlabialized pharyngeals, since these phones never occur labialized at the surface, whether or not they precede vowels and follow /u/:

25. [+retracted root] $\longrightarrow$ [-round]

This rule will account for why labialized uvular stops which are glottalized by rule 11 become non-labialized pharyngeal stops, and why the phoneme designated as /ḥ^{w}/ throughout this thesis, which might better be designated as //x̣^{w}// in underlying forms, delabializes everywhere except preceding lenition and glottalization suffixes.

Order Summary

The ordering of the 25 rules discussed in this thesis is illustrated below:



In the above rule order chart, every rule is positioned immediately prior to the rule it must precede. In other words, every rule is "shaken down" to the position nearest

to the surface level of derivation which is possible without obtaining incorrect derivations. For example, RETRACTION must follow GLOTTALIZATION, but need not precede many of the other rules discussed in this thesis. It can, therefore, be "shaken down" to a position preceding DELABIALIZATION, a rule it must precede (for a discussion of rule ordering and the concept of "shaking rules down", c.f. Chafe 1968:115).

Conclusions

This thesis has been concerned with the derivation of certain underlying Nootka forms, namely those that contain a lenition or glottalization suffix. The level of underlying forms in a given language is more abstract than levels of phonemic or phonetic forms. For example, in Nootka, we have seen that the underlying forms must specify:

1. morpheme boundaries. Due to phonological peculiarities of various morpheme classes, distinctive morpheme-initial boundary markers must be specified for roots, lexical suffixes and grammatical suffixes, as well as for the word (Anderson 1974:256, Stanley 1973:191).
2. instructional markers. The underlying form of a word may carry markers such as [R] (reduplication) or [L] (vowel lengthening) which are attached to certain morphemes or stand alone as morphemes, and which cause certain phonological processes to occur in other morphemes, especially the root, of the word.

3. variable vowels and consonants. The length of underlying variable vowels is determined by that vowel's surface syllable position. Variable consonants depend, for their surface shape, on the morpheme preceding or following them in a given word. Hence, variable vowels //V$^{\text{ˇ}}$// and consonants //⟨C⟩// must be specified as variable in the underlying form.

4. There are also underlying phonemes in Nootka which never appear on the surface, e.g. //ḥ^{w}// which either undergoes lenition to /w/, or delabializes to /ḥ/ (c.f. Brame 1972:22).

This abstractness of Nootka underlying forms suggests why there is not always a one-to-one relationship between underlying forms and surface phonemic forms. One underlying form may have two phonemically different surface forms, e.g.

//hiɬ -ʔaƛ// /hiɬʔaƛ/ ~ /hiɬaƛ/ 'it's there'
LOC SEQ

(For a similar problem in Mohawk, c.f. Postal 1968:22)

Two different underlying forms may have phonemically identical surface forms, e.g.

//ʔuk^{w}-⟨č⟩ink^{w}// /ʔuk^{w}ink/ giving together
give ...together

//ʔu -⟨č⟩ink^{w}// /ʔuk^{w}ink/ doing it together
it ...together

The derivation of underlying forms is the result of the operation of phonological rules. In this thesis, it has been shown that the phonological rules of Nootka have certain features, common to phonological rules in all languages:

1. Certain segments of a given rule may be abstract, e.g. in Nootka, the input of the /h/⟶/ʔ/ rule, /h/, never occurs intervocalically in non-reduplicative morphemes at the surface; the output of the glottalization rule when it applies to //q//, */q̓/, since glottalized uvulars always become /ʕ/ at the surface; and the environment of the ⟨q⟩ deletion rule, which is # (c.f. Postal 1968:221).

2. Rules may be environmentally conditioned, as in the rule /h/⟶ Ø / X__, or they may not be conditioned, if they are either an elsewhere rule, e.g. ⟨C⟩⟶C, or a redundancy rule, e.g. [+retracted root]⟶ [-round].

3. Rules tend to express generalizations. To specify individual phonemes in rules is considered less economical and less significant than to specify phoneme classes (Fant 1973:174, Postal 1968:300). By using distinctive features, the degree of generality and simplicity may be measured, since the less general the rule, the more features needed to formulate it. In Nootka, rules have been posited which make reference to the following significant classes:

[-syllabic]	CONSONANTS	Rules 3,9,23
[-sonorant, -closed]	FRICATIVES	Rules 10,17,20
[-sonorant, +closed]	OBSTRUENTS	Rule 19
[+sonorant, +closed]	NASALS	Rules 15,16,17,18,19
[+syllabic]	VOWELS	Rules 12,15,20,21
[+glottal]	GLOTTALIZED STOPS AND RESONANTS	Rules 11,20

[-syllabic +sonorant -closed]	GLIDES	Rule 10
[-sonorant]	STOPS FRICATIVES	Rules 23,24

Phonological changes in Nootka more often express changes of manner of articulation, e.g. [-sonorant] to [+sonorant], [-closed] to [+closed], [-glottal] to [+glottal], rather than of place of articulation, e.g. [-back] to [+back].

4. Rules appear to be ordered with respect to each other. Some rules yield outputs which are either the input or the environment of a second rule (i.e. they feed the second rule) e.g. LENITION yields glides, which are input to the GLOTTALIZATION rule. VOWEL REDUCTION yields /ə/, which is the environment for THINNING. In such cases, the first rule must precede the second.

Some rules yield outputs which meet the structural description of a segment of a second rule, but that rule may not apply. For example, LABIALIZATION yields round consonants, but those consonants may not serve as input to the DELABIALIZATION rule. In such cases, the second rule must precede the first rule (c.f. Anderson 1974:183, Kissiberth 1972:201).

5. In some cases, rules reflect historical phonological changes (c.f. Postal 1968:277). The GLOTTALIZATION rule appears to reflect a historical change in Proto Wakashan whereby //C-ʔhV// sequences shift to //Ċ-V// sequences due to the conflict between the original form of the sequences

and general Nootka constraints on syllable shape — no glottalized consonants syllable-finally, no sequences of glottalized consonants (c.f. Sapir 1938:255). The RETRAC - TION rule parallels the historical shift of glottalized uvular stops and uvular fricatives to pharyngealized stops and fricatives respectively in Nootka proper due to the articulatory crowding of back consonants (Jacobson 1969b:152). Similarly, the /h/ DELETION rule recapitulates the general loss of non-initial /h/ in Proto Wakashan (Sapir 1938:255).

6. Rules also tend to reflect general morphological and phonological constraints of the language. In Nootka, a nasal may not immediately precede a stop, phonetically. Either a fricative, full vowel or [ə] must intervene. If /ə/ DELETION applies to a nasal-/ə/-stop sequence, either the NASAL DELETION rule or the NASAL → STOP rule must apply, in order to prevent the unacceptable *nasal-stop sequence.

There is another example where rules conspire[12] to ensure that underlying forms meet surface structure constraints. In Nootka, the syllable shape must be CV(C)*. A CC sequence may not be [+glottal][+glottal], and a syllable-final consonant may not be [+glottal]. In order to obtain acceptable syllable shapes, //CVC-ʔhVC// type forms are redefined as //CVC̓-ʔhVC// by GLOTTALIZATION, which works as a kind of cluster simplification rule. /ʔ/ DELETION prevents [+glottal][+glottal] sequences, and also allows the glottalized consonant (derived by GLOTTALIZATION) to become syllable-initial. /h/ DELETION also reflects a syllable

structure constraint, since unless /h/ is deleted, the *//CVC̰-hV// form resulting from GLOTTALIZATION and /ʔ/ DELETION would still have an unacceptable syllable-final glottalized consonant.

To briefly review the rules studied in this thesis, the processes caused by lenition and glottalization suffixes are found to be regular, with the lenition process being caused by both lenition and glottalization suffixes. Lenition is the shifting of fricatives to a near homorganic glide, if one exists, in the environment of a [+back][-high] glide, /h/, whether in a lenition or glottalization suffix. Glottalization is the shifting of unglottalized consonants to their glottalized counterparts, where one exists (i.e. not fricatives), in the environment of a //ʔh..// sequence.

Exceptions to lenition (and hence to glottalization as well) are accounted for by positing an underlying //ɬ-h̰ʷ// sequence for morphemes where /ɬ/ appears to shift to /w/ by lenition, and by positing an underlying morpheme-final vowel in roots which appear to block lenition.

Lenition and glottalization must occur after the block of rules determining the output of variable consonants ⟨C⟩, since some variable consonants may serve as input to the GLOTTALIZATION rule. Lenition and glottalization must occur before the rules determining the surface outputs of 1. the /h/ and /ʔ/ phonemes, since these phonemes may delete, but must be present for LENITION and GLOTTALIZATION to

apply.

2. vowels, since lenition and glottalization must precede the /h/ → /ʔ/ rule, and /h/ → /ʔ/ must precede vowel reduction, since it applies only between full vowels. Vowel reduction precedes other vowel change rules, e.g. thinning, elision, and vowel length assignment.

3. back consonants, since the environment of the delabialization rule includes pharyngealized (i.e. [+retracted root]) phones as an exception, and the retraction rule occurs after glottalization.

4. nasals, since the loss or mutation of nasals is due to the loss of a neighbouring /ə/, caused by vowel reduction, a rule which must follow /h/ → /ʔ/, and ultimately lenition and glottalization.

Areas of Further Research

Areas needing further study in Nootka phonology are:

1. determining the exact phoneme inventory. At the underlying level, are there variable length vowels, or are they all a result of vowel elision? Are /e o/ distinctive?

2. reduplication — determining patterns, rules, constraints on the number, order and structure of reduplicative morphemes.

3. vowel quantity and quality changes — vowel elision, vowel shortening and lengthening, and variable length assignment.

4. /ʔ/ DELETION — the environment.

5. the interaction of vowel elision with delabialization and labialization.

6. historical change — comparing modern Port Alberni Nootka phonology with that of 1910 (Sapir and Swadesh 1939).

7. dialect variation —comparing Port Alberni Nootka with other Nootka dialects.

8. the influence of phoneme deletion on morphemes, e.g. compensatory processes such as vowel lengthening or reduplication appear to be added to the morpheme in such cases.

9. many areas never referred to in this thesis, such as stress assignment, epenthesis etc.

FOOTNOTES

CHAPTER 1

1 For a different use of the terms 'hardening' and 'softening', see Chomsky and Halle 1968:426, where they mean the shifting of a fricative to a stop and of a stop to an affricate respectively.

2 The symbols/ɛ / and /!/ have been replaced with /'/ for glottalization, and /ɛ̄ / has been replaced with /ʕ/ for the pharyngeal stop.

3 This inventory is based on Sapir and Swadesh 1939. Variable-length vowels may be unnecessary systematically (e.g. may be due to vowel elision) but are necessary phonemically.

4 A word is the shortest grammatical meaning-carrying portion of an utterance, whose component morphemes cannot serve independantly as words. A morpheme is the smallest linguistic unit bearing a defineable segment of meaning. It may or may not have a phonological representation at either underlying or surface levels.

5 See, for example, Lakoff 1970.

6 Glottalized phonemes may occur morpheme-finally but not word-finally in surface forms, due to the glottalization process. This is good evidence for why phonotactic constraints are not always surface constraints.

7 Again, this constraint is best handled in the lexical component. Vowel clusters do occur, over morpheme boundaries, during the derivation of a word, but they always undergo vowel elision. Geminate consonants occur only over morpheme boundaries. Hence a constraint against geminates must apply at a point where morpheme boundaries are still clearly defined.

8 There are also cooccurrence restrictions between consonants which are similar in manner and place of articulation. In roots, a [-back] fricative never adjoins a [-back] fricative. In both roots and suffixes, a [+back] stop never adjoins a [+back] stop, and a [+back] fricative never adjoins a [+back] fricative.

9 The use of the term lexical suffix as here defined stems from Kinkade 1969, Davis and Saunders 1974.

10 Although functionally, aspect markers are inflection-

al, and should therefore be classed as grammatical suffixes, they are classed as lexical suffixes, since they can be ordered before other lexical suffixes, they can cause reduplication and vowel lengthening, and also, there are lexical suffixes (both governing and restrictive) which are inherantly aspectual (Swadesh 1933).

11 Kinkade (1969) counts 578 lexical suffixes in the Nootka Texts glossary. That glossary (Sapir and Swadesh 1939), however, contains duplications. For example, of 39 suffixes beginning with /-(c,k)s../, 24 appear to be compounds of a /-(c,k)s/ suffix plus another suffix, e.g.

-(c,k)s	-ac̓us	platform for.	-ac̓us	... platform
-(c,k)s	-ac	... vessal	-ac	... vessel
-(c,k)s	-api	in the way, screened by..	-api	erect, standing in the air
-(c,k)s	-p̓iˇ(q)	on top, prevailing in combat	-p̓iˇ(q)	at the summit
-(c,k)s	-inqi	at the belly	-inqi	at the belly
-(c,k)s	-ʔatu	fall off, behind	-ʔatu(q)	fall off, come off

The glossary has many such entries which derive from combinations of morphemes

12 Some suffixes may be both governing and restrictive, e.g. /-ʔatu(q)/ 'to fall off, ... ends' or /-(q)imɬ/ 'all about, chunky-shaped, ... in size etc.' (Swadesh 1933: 8-13, 32-33, 111.., 137..).

CHAPTER 2

1 When a suffix begins with an ordinary vowel, and follows a morpheme ending in a vowel, vowel elision occurs. The resulting vowel depends on the quality and length of the underlying vowels, and on the surface vowel's syllable position in the word.

2 A justification of /h ʔ/ as resonants will be provided later

3 For example, /ʔiy/ 'shout of surprize', /waˑy/ 'say!' (compare /waˑ/ 'saying'). In Port Alberni Nootka, vocatives are often marked by a final vowel shift /a i/-→/eˑ/, /u/-→ /ɔˑ/ (Swadesh 1933:4, 1937) as in /quʔas/ -→ /quʔeˑs/ 'O man'. This vowel change may have been caused by a /ʔi/ demonstrative-vocative suffix which has dropped out in vocatives, and become /y/ in interjections, and which may

relate to the /-ʔi/ durative-demonstrative in Nootka, as in mukʷinaʔi 'Maquinna, who we've been talking about'. In Port Alberni Nootka, /a/→[ɛ]/__ʔi . Thus the morpheme-final /y/ in interjections may derive from an underlying //i//.

4 For example, /pu-/ puya· 'running', /ku-/ kuya 'catch on a hook', ku· 'hooked'. There must be, therefore, a morpheme-final /y/ in the underlying forms of such words, which appears on the surface only in syllable-initial positions.

5 Jacobson (1971) uses a /°/ morphophoneme to distinguish lenition suffixes in Makah. This /°/ is historically a rounding symbol, and may help remind the reader of the fricative-to-glide relation in the lenition process.

6 There are also cases of /y̓/ which do not cause lenition, e.g. //-⟨y̓⟩u·č [L]// 'extending out, in view'. /w/ never occurs as an optional consonant, and would not be possible in any case due to its habit of breaking into a /ʔu/ sequence intervocallically, e.g. //hina -wiɬta// hinuɬta 'get out of the canoe', which the initial segment of a lenition suffix never does.

7 It is not clear whether /y̓ w̓/ are [-closed], since they are composed of a resonant plus a secondary glottalic occlusion.

8 Numbers and examples of resonant-initial suffixes are:

Resonant	Number	Example		Resonant	Number	Example	
m	29	-ma	...thing	m̓	4	-m̓ita	concealing
n	7	-naʸkʷ	having..	n̓	7	-n̓iʸ	to come
y	6	-yin	at the bow	y̓	10	-y̓akʷ	instrument
w	11	-wiʸ	first	w̓	9	-w̓aʸt	...a part
				ʔ	9	-ʔatu	stop...

9 Where the first syllable is always the non-reduplicative root morpheme. This topic will be discussed later, c.f. p.

10 Note that in both rules 1 and 2, the syllable count must be structured so that it does not include reduplicative morphemes.

11 //hin(a)-// //hita-// 'LOC' has a momentaneous aspect as well. In pairs such as

//ʔam -⟨č⟩swiʸ//	ʔapswi·	extending through
//hita-⟨ç⟩swiʸ//	hitaçswi	go through
//hist -wiɬta//	histwiɬta	where he gets out of the canoe
//hina -w̓iɬta//	hinuɬta	get out of the canoe

//hin(a)-// //hita-// bears a distinctive connotation of action taking place in a spatially-defined context. (c.f. Swadesh 1933:96)

CHAPTER 3

1 In Ahousaht Nootka, the stem extender cognate with /x̣(ʷ)/ is /ḥ/, which phonetically sounds like [x̣] when in a stem extender, but is considered non-distinctive from [ḥ] by native speakers. Compare

Port Alberni				Ahousaht (1975)			
čiš-	dark coloured	čišx̣-	id.	čiš-	stained	čišḥ-	id.
hap-	hair(y)	hapx̣-	id.	hap-	hair(y)	haph-	fuzzy
ʔyas-	V-shaped object spread apart	ʔyasx̣ʷ-	id.	ʔyas-	id.	ʔyasḥ-	id.
ʔpiš.-	bad	pišx̣-	rough dirty	ʔpiš-	rough rude	ʔpišḥ-	mean tough

2 Initial /š/ in the momentaneous suffix becomes /č/ when following a non-round vowel.

3 Note that morphemes may have a final /w/ only in combining forms. /w/ never occurs word-finally at the surface.

4 This root //ʔtaḥʷ// 'sleeping curled up' may be related to the root //ta-// 'act with reference to a long object with objects attached or a lump in the middle' (c.f. Haas 1972:88).

5 Since //ḥʷ// is posited as a phoneme solely on evidence from the lenition and glottalization processes (as well as historical evidence), every //ḥʷ// must undergo lenition. Otherwise, the phoneme would be identified as //ḥ//.
/x ḥ/ are not included in this table, since they cannot undergo lenition in any case.

6 Only combining forms are of interest here. The majority of roots are CVC- with CVCV independant forms, due to suffixing by a durative //-⟨y⟩aˠ// or demonstrative //-ʔi// marker, e.g.

ʔas-	ʔasa·	go slantwise
yu-	yuʔi	wind blowing

7 c.f. Swadesh 1948:113

8 c.f. Haas 1972:88

9 c.f. Swadesh 1948:110

10 Of these 8, at least one //ʔkum-// ʔkuma· 'point with finger' is suspect, as we find ʔkupši· 'point'.

11 There is an interesting parallel of fricative glide and nasal stop rules in Nootka. A [-sonorant][-closed] segment becomes [+sonorant] preceding a [+sonorant] /h/, and a [+sonorant][+closed] segment becomes [-sonorant] preceding a [-sonorant] consonant.

12 Similarly, that vowel reduction applies before every /-q-/ combining morpheme is no doubt due to analogy. Originally, the environment for vowel reduction was a syllable boundary (/__CV), but this environment was reanalyzed as a following consonant, specifically /-q-/, since it is so common (e.g. occurs in the combining form of most vowel final roots). This represents a rule change:
V→/ə/ / V [nasal]__CV ---→ V→/ə/ / V [nasal]__C

13 Of the 13 nasal final roots which block lenition, only one, ḥakum.- 'princess', does not end in an /i/-nasal sequence.

14 Compare: //ʔiḥʷ-⟨w⟩inɬ// ʔiḥinɬ big neck

//ʔu -⟨w⟩inɬ// ʔuwinɬ around the neck

15 Note that /ə/ deletes after nasals only when preceding a /-q-/ combining morpheme. Also, /ə/ deletion is obligatory after a /a/-nasal sequence, since we never find combining forms ending in //anəq-// /anq-/ or //aməq-// /amq-/.

CHAPTER 4

1 For a discussion of the difficulty of determining the exact number of suffixes, c.f. Footnote 11, Chapter 1.

2 Resonants rarely occur syllable-finally in Nootka underlying forms.

3 ⟨č⟩ becomes /k/ following /u/. See p.

4 There are, according to Sapir and Swadesh (1939), two suffixes beginning with a variable glottalized consonant other than /ʔ/: //-⟨y̓⟩u·č[L]// 'extending out, in view' and //-⟨iy̓⟩ip// 'to capture, obtain'. No examples of words containing them have been found in Sapir and Swadesh 1939, Sapir 1938, Swadesh 1933, 1948 etc.

5 Nor do //-⟨ʔ⟩h..// type suffixes suggest why glottalization is occurring.

6 In Nootka, the following non-variable consonant sequences occur suffix initially: /c/ precedes /p k^w k q s ḥ y/, /č/ precedes /ḥ/, /s/ precedes /č c̓ t t̓ y/, /ḥ/ precedes /t s c n w/.

7 The number of suffixes beginning with a non-variable consonant for a given phoneme is listed below:

p	t	c	č	ƛ	k	k^w	q	q^w	m	n	y	w	
10	3	26	10			6	4	2	23	4	6	4	
p̓	t̓	c̓	č̓	ƛ̓	k̓	k^w̓	ʕ		m̓	n̓	y̓	w̓	ʔ
19	3	17	2		1	2	4		4	7	8	7	10

8 There is also a related q?ičḥ '...year, for many years' which Sapir (1938:262) thinks derives from a compounding of //-q-// 'in length' (as in //?aya-q-// 'much in length' /yaq-/ 'long') and //-?ičḥ// 'season of...'

9 For example, although /kw/ and /k^w/ are phonemically distinct in Nootka, as in wikwa·?in 'it's not, so they say' and či·k^wa· 'beating with quick beats', sometimes the /k^w/ sequence is articulated as a coarticulation [k^w], as in //kuḥ^w -his +uk^w +wa·?in// [kʊwɪsʊk^wɛ·ʔɪn^{ə}] 'there is a pothole on our beach (so I've heard)'.

10 The phonetic articulation of Nez Perce glottalized stops is a stop plus a delayed release of the inner (i.e. glottalic) closure, and of glottalized continuants is a laryngealized continuant intervocalically, and a glottal stop-voiceless continuant sequence word-finally (Aoki 1970).

11 Jacobson (1969:18) notes that in some cases a /? ḥ ʕ/ consonant does not inhibit rounding, as in

//yaq^w -?ič +?i^{ɣ}tq +?a·łła// yaq^w?ič?itq?a·łła
relative wear REL always what he always wore.

12 Jacobson (1969:12) assumes that /uku/ [uk^{w}u]. In Ahousaht, in a word such as //tuk^w -uk// tukuk 'sealion' the intervocalic /k^w/ is phonetically a velar stop with some lip-rounding, but not a /^{w}/ off glide, i.e. it is a [k]. In other words, it patterns like a consonant in syllable final position, i.e. [-round].

13 Pharyngealized stops are [-sonorant] because there is a constriction in the pharyngeal cavity, between the tongue root and the pharyngeal wall (Delattre 1971:123), whereas glottal stop has no constriction and/or closure in any cavity, but only at the glottis. /ʕ/ is therefore classed as a stop, whereas /?/ is classed as a resonant.

14 Chomsky and Halle's (1968) proposal of a feature [+low] is unacceptable, as phones with a primary glottalic

occlusion display coarticulation with neighbouring vowels, i.e. there is a glottalic readjustment to the height of neighbouring vowels (Fant 1973:181, Ladefoged 1971:63).

15 For an analysis which posits underlying labialized pharyngealized phonemes, c.f. Kinkade's "Uvular Pharyngeal Resonants in Interior Salish" (1967:231).

CHAPTER 5

1 For a detailed description of instructional morphemes and resulting processes, c.f. Sapir and Swadesh 1939:236, Swadesh 1937. Instructional markers may carry combinations of reduplicative, vowel lengthening and vowel shortening markers, and words may include several morphemes bearing various instructional markers.

2 It is not clear how the underlying form of this morpheme should be written, since although the initial consonant varies between /č/ and /kʷ/, it never deletes.

3 If these rules were not ordered, the glottalization rule would have to specify that either variable or non-variable consonants, except ⟨ɬ⟩, could undergo glottalization, except that morpheme final ⟨q⟩ could not undergo glottalization if it were in the third or later syllable of a word.

4 Sapir (1938:258) claims that analogical /ʔ/ also occurs between vowel-final monosyllabic roots and vowel-initial suffixes as in caʔak 'river', since no /ʔ/ occurs after a consonant final root like kimtak 'pole'. The variation of forms of the durative suffix in these words is regular if its underlying form is //⟨ʔ⟩ak//.

The blocking of vowel elision in ƛaʔis is not due to the different qualities of the vowels. Compare

//wi-aˇs// wi•s 'not sufficiently on it'

5 /ə/ is not a full vowel. See the vowel elision and /ʔ/ deletion rules (p.94, 96).

6 Jacobson (1968:15) notes that Makah /h/ deletes sometimes in CVC reduplicative morphemes, e.g. //his -[R L+L]// hi•si•s 'repeatedly chopping', //haš -[R L+L]// ha•ša•š 'repeatedly breathing'.

7 For a discussion of vowel shortening and loss in Makah, c.f. Jacobson 1971.

8 If /ə/ deletion preceded thinning, the rules would be written:

/ə/ → Ø / # X CV [nasal] __ CV OPTIONAL

/a/→/i/ / { X C__[nasal] /ə/ { CV / # } OBLIGATORY
          { X C__[nasal] CV OPTIONAL }

These rules do not express a clearly-defined environment for thinning (/ə/), nor do they express the constraint against */anq/ and */amq/ occurring finally in combining forms.

9 Where the /ʔ/ in third syllable is followed by a /ʔ/ in fourth syllable, neither of which can delete due to an intervening long vowel, the first /ʔ/ deletes:

```
                    //ʔu -wiˇ -ʔi· -his//
                      it point get  at beach
                         first to...
/h/ → /ʔ/             ʔu -wiˇ -ʔi· -ʔis
/ʔ/ DELETION          ʔu -wiˇ -i·  -ʔis
ELISION               ʔu -wi·      -ʔis
                         /ʔuwi·ʔis/
                  'a canoe lands at the beach'
```

This is the only example found of this type of situation. More research is required to tell what exactly causes /ʔ/ deletion, here and elsewhere.

10 This rule may have historically applied right after glottalization. Since it effects no other rules, it is here collapsed with the other /ʔ/ deletion rules.

11 Since /u/ always is the output of V-u or u-V sequences which undergo vowel elision, it is assumed that vowel elision can result in /u/ either preceding or following a back consonant. This /u/ could cause or prevent labialized variants of back consonants occurring, just as underlying //u// does:

Cu -i -ka	Cuˇ-ka	Cu·kʷa
Cakʷ -a -uC	Cakʷ -uˇC	Caku·C

12 This concept of "rule conspiracy" is from Kissiberth's "On the Functional Unity of Phonological Rules" (1970:302).

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APPENDIX — FEATURES

The theory of distinctive features assumes that, for any language, every minimal difference between phoneme pairs (e.g. the voicing distinction in English) may be expressed as a binary distinctive feature which "serves a phonemic minimal redundancy classification purpose" (Fant 1973:162). Distinctive features are, in fact, distinctive phonological categories which have phonetic correlates, and which occur in the specification of inputs, outputs and environments of the phonological rules of a language (Halle 1962:54).

Using the distinctive features specified in the rules discussed in this thesis, and plotting the various plus-minus combinations of these features, most of the Nootka phonemes may be derived. A flow chart, illustrating the derivation of Nootka phonemes from the features discussed, is presented on page 120 (its format is from Fant 1973:180).

There remain some Nootka phonemes which are not distinguished by the features specified in the rules discussed in this thesis, namely the alveolar stops, affricates and fricatives. The feature [delayed release] distinguishes affricates from stops, and the feature [lateral] distinguishes laterally-articulated alveolar phones from plain alveolar phones. Adding these two features to the ones used in this thesis, a complete feature matrix for Nootka phonemes may be created (c.f. p.121).

TABLE XII: NOOTKA PHONEME FEATURE FLOW CHART

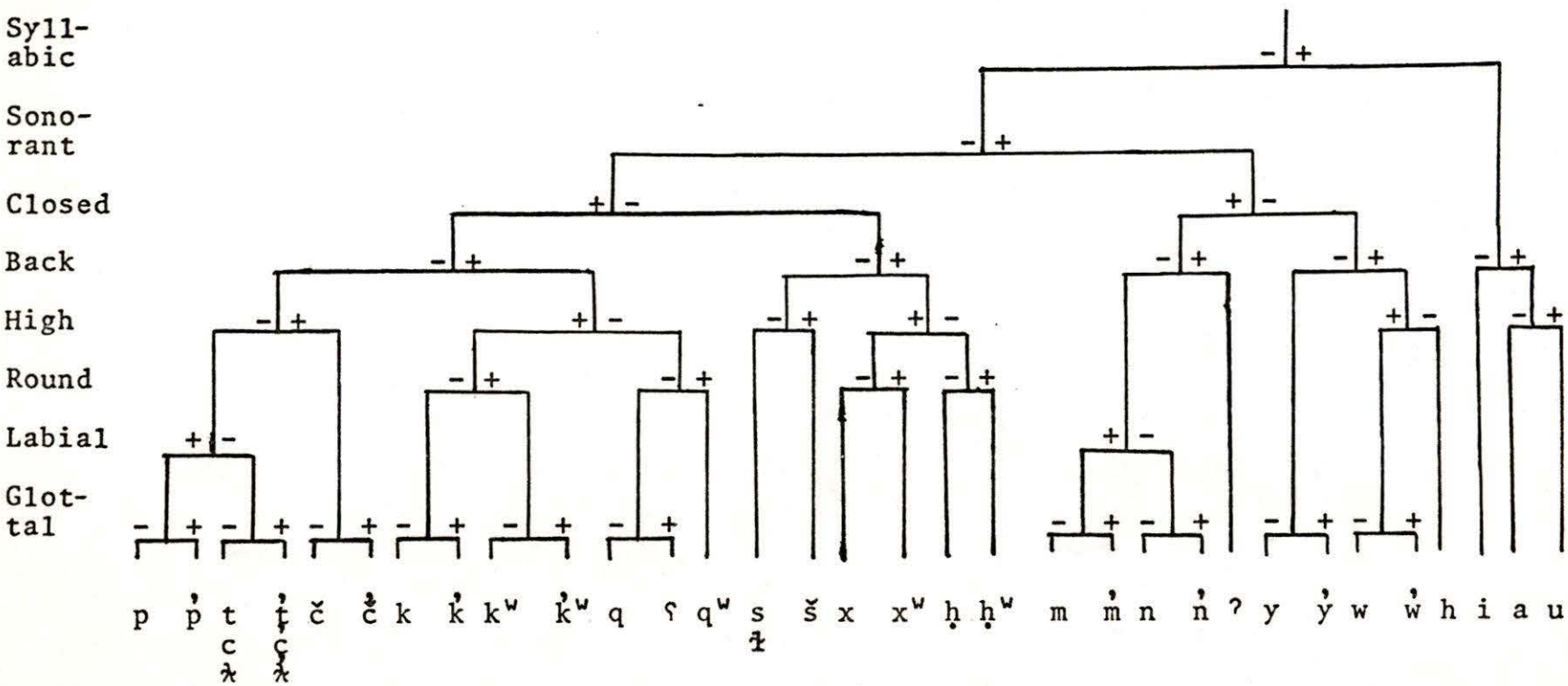

TABLE XIII: NOOTKA DISTINCTIVE FEATURE MATRIX

	p	p̓	t	t̓	c	c̓	ƛ	ƛ̓	č	č̓	k	k̓	kʷ	k̓ʷ	q	qʷ	ʕ	s	ɬ	š	x	xʷ	ḥ	ḥʷ	m	m̓	n	n̓	ʔ	y	y̓	w	w̓	h	i	a	u
Syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+
Sonorant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+
Closed	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-
Back	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	+	-	-	+	+	-	+	+
High	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+	-	-	-	-	-	-	+	+	+	+	-	+	-	+
Round	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	+	+	-	-	+
Labial	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-
Glottal	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	-	-	-	-	-	-	-	-	+	-	+	+	-	+	-	+	+	-	-
Lateral	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delayed Release	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Author [redacted]

Suzanne Maria Rose
Name

April 13, 1976
Date