

**Central Kalapuya Phonology:
The Segmental Inventory of John Hudson's Santiam**

by

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Abstract

Central Kalapuya (CK), a language of Northwest Oregon, is not well known. This thesis attempts to show, through examples drawn from Melville Jacobs' field notebooks, the basic segmental phonology of John Hudson's dialect of Santiam. It finds three laryngeal (or phonation) types among occlusives and two each among fricatives and resonants. It attempts to account for Jacobs' apostrophes (for glottalization) in several ways. These include (1) debuccalization of first members of positional geminate pairs, (2) preglottalization of resonants (and their postglottalization in word-final positions), (3) probable preglottalization of occlusives and two coronal fricatives in root-final position, as well as (4) non-ejective 'glottalized' occlusives root-initially. The feature [CONSTR] is used for (1–3), while the feature [STIFF], in complementary distribution, is used with (4). Of some interest are CK vowels: on the surface, seven short, five long, with three diphthongs; underlyingly, three in quality with three types of length (short, variable, long); two likely epenthetic vowels, one subject to harmony.

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Dedication

This thesis and any merit herein I dedicate to the native peoples of the Pacific Northwest. In particular, I dedicate them to the spirit and memory of the Central Kalapuyan people, 'ā-mīh.

Abbreviations used in this thesis

The following list includes the abbreviations for this thesis.

≡	an error in ms; a crossed-out glottal stop	B(.)	Howard Berman
(α)	α is optional (in an expression)	C	consonant
{ α , β }	α and β are disjunct features or segments	Chin	Lower (Seaside) Chinookan (= Chinook); Chinookan (family)
{ $\alpha\beta$ }	the semantic intension of ' $\alpha\beta$ '	CJ	Chinook Jargon
< α >	α as a written symbol	CK	Central Kalapuya
[α]	α phonetically; α as a (terminal) feature	CNT, COUNT	counter for time
/ α /	α as a major allophone	COLL	collective plural
// α //	α as a phoneme (underlying segment)	COM	comitative
α	α as a morpheme (underlying root)	COMPL	complementizer
§	section (in this thesis)	CONT	continuous (Type 3 reduplication)
-	morphological boundary	CONTR	contrastive mode
-	verb (or occ. noun) prefix-stem boundary		
—	clitic relation		
&	also	DEF	definate
+	base-reduplicant boundary	DEM	demonstrative
#	word boundary, verb-prefix-stem bound.	Deriv	derivational
##	clause boundary	DET	separable determiner
1	first person	DETR	separable determiner for things
2	second person	DIM	diminutive
3	third person	dir	direction
μ	mora	DIR	directional
μ_N	nuclear (vowel) mora	DIST	distal
μ_R	rhyme (resonant, coda or C) mora	Dt	determiner category
σ	syllable	DUR	durative, iterative
ABS	absolutive (pronominal case)		
ACC	accusative (pronominal case)	EH	Eustace Howard, as recorded by J.
ACT	active, action	EMPH	emphatic
ADV	adverb	EP	epenthetic V
ADVL	adverbial	esp.	especially
Ah	Ahantsayuk (as in G.'s ms of 2 CK dial.)	EXIST	existential copula
ANTIPAS	antipassive		
AOR	orist tense/aspect	f	and the following page (ff: ...pages)
APPL	applicative	F	fricative
ARG	argument	F(.)	Leo J. Frachtenberg, French
ASSER	assertive	FEM	feminine (gender)
Athap.	Athapascan	f.t.	formtype in Berman's slip files
ATTR	attributive mode (= REL)	FUT	future tense/aspect
AUG	AUGMENT(ative); Type 1 reduplication		
AUT	autonomous, inceptive		
AUX	auxiliary		

G	glide	NK	Northern Kalapuya
G(.)	Albert S. Gatschet	NMCONJ	nominal conjugational particle set
glot.	glottalization	NOM	nominal
GN	<i>Grammatical Notes</i> (F., NAA ms 1923-d)	NOMCONJ	nominal conjugational prefix set
GR	grammatical relations	NOMIN	nominalizer
h	hither (toward the speaker, cislocative)	NP	Nez Perce
id.	identical (with the preceding example)	Nu	(syllabic) nucleus
IMP	imperative	NW	northwest
INC	inceptive	O, O _b	obstruent
INCH	inchoative	OBJ	objective
IND	indicative mode; independent	OBL	oblique (nominal case prefix; verb suffix)
INDEF	indefinite	O _c	occlusive
INF	infinitive	occ	occasionally
INT	INTENS(ive), Type 2 reduplication	ON	onset
INTR	intransitive (/stative)	ONOMAT	onomatopoeia, onomatopoeic
ITER	iterative aspect; subspect of INTENS	OOC	out of control
J(.)	Melville Jacobs	OR	Oregon
JH	John Hudson, as recorded by J.	p.	person
J(19)45	Jacobs 1945 (<i>Kalapuya Texts</i>)	p. c.	personal communication
L(.)	Lewis, author of this thesis	p-d.	present-day
LBA	Laura Blackerty Albertson, as recorded by Jacobs (Yonkalla, SK)	PART	participial
lit.	literally	PASS	passive
LK	Louis Kenoyer, as recorded by Jacobs (Twalatin, NK)	PERF	perfective aspect
LOC	locative mode (= OBL case), locative; locus (DIR), center of action	PK	Proto-Kalapuya(n)
MASC	masculine (gender)	PL	plural
ms	manuscript	PLAC	prefix for separable determiner for place
MYTH	mythological tense/aspect	PLS	plant suffix
N	nasal resonant; noun	POSS	possessive
n. d.	no(t) date(d)	PRES	present tense/aspect
NAA	National Anthropological Archives, Smithsonian Institution, Washington	PRFV	perfective
NB, nb	transcription notebook (used by Jacobs)	PRFX	prefix
NCONJ	nominal conjugational particle	PRO	pronoun
NEG	negative	prob.	probably
NITER	non-iterative, non-durative	PROG	progressive, Type 3 reduplication
		PRON	pronominal
		PROX	proximate
		PRSN	person
		PRTCL	particle (adverbial)
		PSSV	possessive
		PUNCT	punctual (= non-durative)
		PURP	purposive, beneficial

R	resonant (nasal, liquid, glide)	TEMP	temporal mode
R _H	heavy resonant (nasal, liquid)	TENS	tense/aspect
R _L	light resonant (liquid, glide)	th	thither, thence (translocative)
√RED, rRoot	reduplicated root	TRANS	transitive (/active)
√R, RRoot	reanalyzed root	transl.	translation
REC(IP)	reciprocal	TT	<i>Takelma Texts</i> (Sapir 1909)
REDUP	reduplication	Tw(al).	Twalatin (NK)
REFL	reflexive		
REL	relative mode (= ATTR)	V	vowel; verb
REPET	repetitive, frequentative, or ITER aspect	Ū	accented vowel
rhet.	rhetorical	V _B	verb(al)
RPAST	recent past tense/aspect	V _{ROOT}	root vowel
		Ū _{ROOT}	accented root vowel
S.	Santiam (John Hudson's dialect)		
SAP	speech act participant (1st or 2nd p.)	VER	veridical evidential particle
s.f.	slip files	VEXT	verbal extender
SG	singular	viz.	videlicet, 'namely'
SK	Southern Kalapuya	V _{PREFIX}	verb prefix complex (on noun phrase)
sp.	special, a certain kind of	vs.	versus
s.t.	something (as object)	V _{ST}	verb stem
stV	stem vowel		
SUBJ	subjunctive (attributive future) mode	wh	whither (LOC, query)
SW	southwest	WH	William Hartless, as recorded by Frachtenberg (Mary's River, CK)
s.w.	somewhere		

**Central Kalapuya Phonology:
The segmental phonology of John Hudson's Santiam**

The breath [= 'spirit'] blows where it wills;
you hear its **sound**, but know neither whence
it comes nor whither it goes.

—*John* (3:8)¹

τὸ πνεῦμα ὅπου θέλει πνέει,
καὶ τὴν φωνὴν αὐτοῦ ἀκούεις,
ἀλλ' οὐκ οἶδας πόθεν ἔρχεται καὶ ποῦ ὑπάγει' ...
—Κατὰ Ἰωάννην

What kind of thing is this—what is being
written of a people whose language is dead?!

p^há? 'an-húy háš 'a²-ník^hee u-yéma-φατ^h
'a-méñma ðini-mi-hí? 'u-ðúul-u-þi-þi!
—Eustace Howard, August 1928.²

Introduction

In this preliminary chapter, the goals of the thesis are stated. An illustration of the set of segments for Central Kalapuya (CK), both as phonemes and as allophones, as they are understood thus far, is given. Subsequent chapters are previewed.

0.1 Thesis goals

There are two goals with regard to this thesis. The first is to update the study the segmental inventory of the language (CK), arguing for certain segmental representations or series rather than others. The second is to provide textual examples of CK, now that it is becoming more available to phonetic, phonological and morphological inquiry. This study will follow a purely descriptive linguistic format.

0.1.1 Central Kalapuyan segmental inventory

One thesis has already been written on Kalapuyan phonology: Yvonne Hajda (1976) suggests a system of three vowels, long and short; four diphthongs; five resonants; five fricatives; two laryngeal series (phonation types of plain vs. glottalized, aspiration alternating with **h**) with four distinct places of articulation plus affricates and labiodorsals, for the Mary's River dialect of CK. Yet the only major author of papers on Kalapuya,

¹ Emphasis added. Parallels lie in considering the general symbolic nature of sound, *which communicates*, or the apparent peculiar *incoherence* of certain CK glottal stops, unless distinct manners (i.e., processed on a *higher order*) of subsegmental clustering are applied.

² Eustace Howard (nb85:137) was raging possibly due to frustration that not even in (language) death could the old traditions be kept, e.g. referring to Jacobs' continual request for stories in the summertime.

Howard Berman, in both historical works (Berman 1988, 1990) and in his unpublished paper on the verbal prefix of CK (John Hudson's dialect of Santiam), posits (without argumentation) *five* vowels, long and short; *three* diphthongs; and among the occlusives *three* laryngeal series.³ This thesis finds *three* vowels, of *three* types of length (long, variably long or short, and short), *three* diphthongs, and *three* laryngeal series. The five resonants are doubled in that they may all occur glottalized in any position: *y̠*, *w̠*, *l̠*, *n̠*, *m̠*. There is some evidence that *ʔs* and *ʔ* (in syllable-final position only) may be interpreted as single segments *s̠* and *ʔ̠* (similar to the interpretation of word-final occlusive preglottalization).⁴ And *x* is found, as Hajda implies in noting its rarity, to be only a borrowed or peripheral phone in CK.

0.1.2 Central Kalapuya as a linguistic entity

The second goal is concerned with making Central Kalapuya more accessible to scholars. Phrases of authentic⁵ CK (particularly from the corpus of John Hudson) longer than just words are provided, as in Chapter Five. Examples from the notebooks are chosen on the bases of (1) being within a 'normal' range for CK spelling, and (2) being of variational interest. The notion of *Central Kalapuya* itself is approached through a study of the name and of the tentative classification of the known CK dialects. It is hoped that interest will be raised in the study of Kalapuya, prompting more study, especially with regard to its structure. At present, only one short paper on the grammar of any Kalapuya language has been anywhere published,⁶ and only one serious manuscript on such a topic has been successfully attempted.⁷

Certain aspects of the CK segments will be discussed in detail. Of these, 'glottalization' will be the most involved. A few processes acting incidentally upon the segmental phonology will be discussed briefly, though in depth treatment will generally have to wait. The allophonic distribution of the three vowels, sometimes even more

³ This is also the set of segments used in Rude 1986.

⁴ Information concerning word-final preglottalization will be a recurring theme in this thesis. The discussion begins in Chapter 3 (with the pre- and post-glottalization of the resonants), is developed in Chapters 4 (preglottalized fricatives) and 5 (simultaneous- and pre-glottalized occlusives). Laryngeal segments are discussed in Chapter 6.

⁵ Phonologically correct.

⁶ Rude 1986.

⁷ Howard Berman (*undatedb*), "Santiam Verbal Prefixes". Berman (1988, 1990) has published two good historical papers on Kalapuya.

tricky than glottalization, is also discussed. Prosodic features with regard to maximal syllable structure is touched upon briefly, especially with regard to the labiodorsals.

0.2 The phonological segments of Central Kalapuya

0.2.1 CK phonemic inventory

A major concern of this thesis is to develop an effective way of writing Central Kalapuyan segments. To this end, I have developed the following set of phonemic representations, which I use to write the language underlyingly.

The table in (1–3) illustrates the major (phonemic) segments of the CK language.

(1)

Accent

High pitch, left-most syllable nucleus on nominal and verbal roots⁸

(2)

Vowels

i		u		i		u		ii		uu		uy	
	a			a				aa				ay	aw

(3)

Consonants

	Labial		Coronal		Dorsal		Laryngeal
Resonants	w				y		
	ẉ				ỵ		
	m		n	l			
Fricatives	ṃ		ṇ	ḷ			ʔ
	φ		s	ʃ			h
			ṣ	ʃ̣			
Occlusives	p̣	ṭ	ʈ̣		ḳ	ḳʷ	
	b	d	tʰ		g	gʷ	
	pʰ	tʰ			kʰ	kʰʷ	

Table 1: The underlying segments of CK

⁸ Because the strong CK high-pitched accent is always predictable as being on the left-most syllabic nucleus of the root, it is not generally marked; the morpheme boundary preceding the root, whether to a verbal or nominal prefix, adequately does that. (Note that an excrescent schwa, often heard between initial C₁[^o]C₂ of a maximal C₁C₂VRC₃ root, is never stressed.)

Notes on Table One: The accent is always predictable (e.g., by the right end of a preceding nominal or verbal prefix-marking hyphen), and thus is unmarked except phonetically. Vowels are generally written as they sound, either long or short. They are discussed in Chapter Two. The resonants, plain and glottalized, are discussed in Chapter Three. The fricatives, plain and potentially glottalized, are discussed in Chapter Four. The three distinctive phonation types among the occlusives are glottalized, lenis plain, and aspirated. (Occlusives refer to stops plus affricates, especially of a given phonation type.) They have six places of articulation, though the affricates are reduced to two distinctive types and the laryngeal stop to one. They are discussed in Chapter Five.

0.2.2 The major allophones of CK

The concept of *major allophone* is useful, heuristically and practically. It refers to the notion that allophones of less than a certain range of *ad hoc* variation or phonetic space will be ignored for the purposes of the work at hand. In other words, the use of symbols that are phonemes or sound representations that are phonologically distinct in certain languages in another language lacking in such distinctions may be called the use of 'major allophones' for that language. An analogy would be that of a phonetic seive, which catches only particular sounds of certain common variation and some minimal phonetic space. This avoids commenting on each of myriads of handwritten examples and hypothesizing the intent of the writer in each case. They are also heuristically useful as one unravels the language. By writing the consonants phonemically (except for major positional variations in the word) but continuing to write the vowels as the major vowel allophones (given below), for example, many of the consonantal environments influencing the vowel qualities have been recognized. (No theoretical value, beyond its *ad hoc* descriptive use, is posited for this term.)

The major vowel allophones of Central Kalapuya are the following:

(4) CK major vowel allophones

i		u		ii		uu
ε	ə	ɔ		εε		∞
á	ɑ					aa
		ay		aw		
				oy/uy		

Table 2: Major CK vowel allophones

0.3 Chapter summary of the thesis

The following paragraphs give brief synopses of the chapters of this thesis. There are seven including the conclusion.

Chapter One: Kalapuyan background

Very little information is available to scholars on either the Kalapuya language or on its speakers. Accordingly, this chapter will discuss the name *Kalapuya*, the location of Kalapuyan speakers at Contact and their linguistic milieu. The Kalapuya linguistic family, the dialects of this family and of the central language, Central Kalapuya (CK), and likely dialectal relationships will be discussed. Past analyses of Kalapuyan that have been attempted, whether overtly or covertly bearing on CK phonology, are also discussed. (Some relevant discussion of the history of the Central Kalapuyan people, their names, and sources for Kalapuyan languages is to be found in five appendices.) Finally, the system of methodology I have used with regard to Jacobs forms must be taken into account. For readers not interested in anthropological aspects of the language and its speakers, a mere quick glance at the table of comparative analysis in §1.5.11 and a skim through §1.6, the methodology, is suggested before moving into Chapter Two.

Chapter Two: CK Vowels

The purpose of this chapter is to show what is known at present of the surface and underlying vowels in Central Kalapuya. The set of underlying vowels is best thought of as a proportional set of three systematic vowel phonemes, //a, i, u//, distinct respectively to one another with regard to height and backness. Vowels in CK verbal and nominal roots exemplify three types of underlying vowel length: short, variable, long. An introduction to the analyses of the major vowel allophones by each of the three underlying vowels is attempted. Two types of epenthetic vowels are mentioned for CK, one of which, *i*, has a consistent harmony. Dialectal variation, particularly with regard to variable raising of /a/, is a concern.

Chapter Three: CK resonants

Chapter Three looks at the resonants of CK, both plain and glottalized resonants, five of each. These resonants—**n**, **n̥**; **m**, **m̥**; **l**, **l̥**; **w**, **w̥**; **y**, **y̥**—are seen to contrast root-initially and -finally. They form three natural groups, nasals, liquids, and glides on the basis of increasing sonority. Plain resonants (except **n**) are commonly found as second members of stem-initial clusters. Three others—**l** (**l̥**), **m** (**m̥**), **n** (**n̥**)—take part as first members of *bound clusters*¹⁰ which form codas with occlusives, sharing one laryngeal node, word-finally. A number of other features, including resonant glottalization, root shape, probable gemination in the language at an earlier period which has left debris in terms of medial pre-glottalization of occlusives and variable-length vowels, and five levels of lexical phonology, are discussed as well.

Chapter Four: CK fricatives

This chapter discusses the fricatives in CK. They are four, plus two probable glottalized forms (which only occur preconsonantly in root-final position) **ɸ**; **s**, **s̥**; **t**, **t̥**; **h**, plus the borrowed or peripheral phoneme¹¹ **x**. The argument is made for **s̥** and **t̥** as at least incipient glottalized fricatives. This follows upon the argument for preglottalization of word-final glottalized occlusives, sometimes referred to as ‘the theory of final glottalization’. Preglottalization (in word-final coda position) is seen as the distributional complement of glottalization concurrent with the release of the occlusive (which only occurs, in general, before a pitch-accented vowel on an occlusive). A distinction between occurrences of glottal stop as a resonant member of a coda cluster and preglottalized root-(/word-)final obstruents is claimed.

¹⁰ A ‘bound cluster’ is a cluster in which segments, e.g. N + Oc (nasal + occlusive), share features, such as (pre)glottalization (?), equally among themselves. Resonants mediate glottalization: thus in a bound cluster of nasal plus glottalized occlusive serving as coda, the glottal stop appears preconsonantly and, moreover, regressively before the resonant (which is before the occlusive), as the examples in (6).

(6)	(a)	//mant̥//	-[m̥n̥t̥ ~ m̥n̥d̥]	try (to see, find out)
	(b)	//k̥at̥//	-[k̥at̥ ~ k̥at̥d̥]	hang

(In such cases, it is usually not possible to say whether the glottalization is coming from the stop or the resonant; statistically it cannot always be on the resonant. For purposes of regularity, I mark such indefinite glottalization on the occlusive.)

¹¹ A ‘peripheral phoneme’ (from Munske 1984) is one that is used peripherally to the way segments from the normal inventory are used, i.e., nonphonemically. An example is the sound **t̥** or **ʔ** in Nez Perce, where it is used only in rare words of onomatopoeic sense, such as **ʔép** ‘sound of an object falling into water’ or **ʔéw** ‘sound of deer walking in mud’ (Aoki 1994:421), where in the sister language Sahaptin, it is a common and even ordinary segment, e.g. **ʔáax̣** ‘all’, **ʔawí** ‘co-wife’ (NW; see Rigsby and Beavert 1975).

Chapter Five: CK occlusives

CK has three laryngeal series among its occlusives (stops + affricates).¹² These phonation types are *plain*, *glottalized* and *aspirate*. Of the concurrently glottalized occlusives, the non-ejective effect of glottalization makes it noticeably weaker than that of neighboring languages, particularly to the north. Such weakly but immediately glottalized occlusives occur only root-initially or on a reduplicated portion of the root suffixed to it. Preglottalized occlusives occur in a coda where the glottalized occlusive is both root- and word-final. The two types of glottalization, concurrently-released glottalization of a root-initial and the glottalization of a glottal stop released preconsonantly where the associated obstruent is word-final, are in complementary distribution. Final preglottalized consonants do not surface if a vowel is suffixed to them, but rather behave as plain occlusives. Plain occlusives may optionally voice slightly when both preceded by a nasal and followed by a vowel. Both glottalized and plain occlusives become aspirates before other obstruents and *n*. Plain occlusives also tend to aspirate or vary randomly with aspirated occlusives in word-final position, this pattern of neutralization occasionally extending into preglottalization as well.

Chapter Six: The consonants from front to back

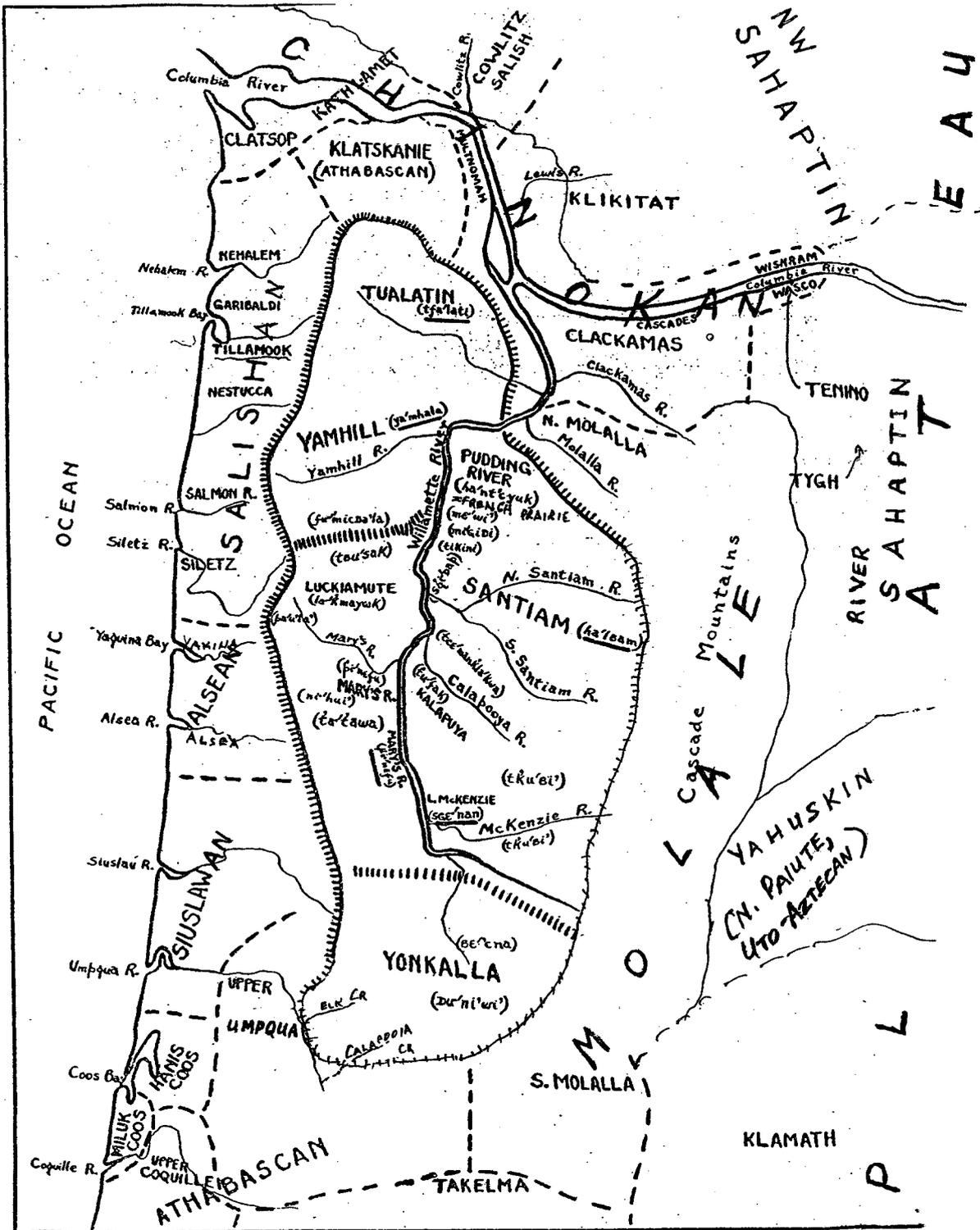
Approaching the segments from their four major places of articulation, (bi)labial, coronal, dorsal, and laryngeal, highlights aspects of CK segments. The bilabials prove to be surprisingly robust, both with regard to types of segments and cluster patterning, particularly for the Northwest. The dorsals, on the other hand, are stops only. Labiodorsals are fully justified. The largest and most complicated group is the coronals, with nearly half of the consonantal segments. The laryngeals are least understood, perhaps functioning both as resonants and as stops. The area most in need of study is the prosody, which we find active everywhere in CK.

Chapter Seven: Conclusion

In this chapter a conclusion and review is given. Suggestions for future studies are made.

¹² The word 'occlusive' is used in order to address a set of stopped consonants, including stops and affricates, without having to repeat 'stops and affricate(s)' each time. Affricates, while stopped, have an extra continuative gesture which makes them often distinct from 'stops'.

Map: "The Kalapuya Communities"



THE KALAPUYA COMMUNITIES

The heavy boundary line supplies an approximate boundary for the area within which Kalapuya languages were spoken. The three major language divisions within the Kalapuya groups are roughly delimited by vertical broken lines. Kalapuya renderings of place or band names are given in phonetic transcription, in parentheses, and those band dialects which are represented by texts are underlined>. The areal locations of the language groups which more or less immediately surround the Kalapuya area are also approximately indicated; dashes

Map of "The Kalapuya Communities"

This map was drawn by M. Jacobs (1945:154) in the 1930s. (The last line, originally reading "dashes separate these other groups from one another.", is cut off on the xeroxed copy in McPherson Library.) I have made the following changes to it:

- (1) The names of several groups have been added.
- (2) Kalapuyan borders have been slightly altered. The primary motivation for this is to align them with the most likely location of autochthonous groups at Contact as revealed by early accounts of fur traders and others.
 - (i) As is known from the Treaties of 1951 (see Mackey 1974:125–143), there was also a Santiam band of Molale. It must be understood that the Molale bands occupied the area to the east of the Kalapuya along the entire flank of the Cascades, doubtless at some points occupying both sides. (They had been in the process of moving westward across the mountains before Contact.) At the same time, these mountain areas were used by many peoples—by Sahaptian gatherers, the Molale, and by Kalapuyan peoples as well.
 - (ii) The Yonkalla probably extended down Elk Creek to its mouth on the Umpqua River, and perhaps nearly to the mouth of Calapooya Creek. The peaceful, retiring peoples met by Northwesters (Ross [1855]1956:132–133) "on the banks of the Umpqua" in 1818, called "Snakes", were surely Yonkalla. Jesse Applegate (1907:1) recounts their presence "inhabiting the country between the Kallapuya range and the Kallapuya creek, where the town of Oakland is now" when they settled in the upper Elk Creek area from 1846. (Dates are in Applegate 1914.)

Chapter One

Central Kalapuya—the region and the language

Very little information is generally available on either the speakers of Kalapuya or on their language. Accordingly, this chapter will discuss the name *Kalapuya*, the location of Kalapuyan speakers at the time of IndoEuropean Contact, their linguistic milieu, the Kalapuya linguistic family, dialects of this family and of Central Kalapuyan (CK) in particular, and analyses of Kalapuya that have been attempted that bear on CK phonology. (Some discussion of the history of the Central Kalapuyan people, their band names, and sources for Kalapuyan languages is to be found in the Appendices.)

1.1 The Kalapuya family of languages: relatives and neighbors

The name 'Kalapuya' is probably a combination Clackamas Chinookan–Kalapuyan term meaning 'men of the prairies', from Chin. *kala* 'man, men' + Kalapuyan *ḥúy-wa* or *ḥúy-wá* 'prairie, forest glen'. The two forms are associated through Chinookan rules of nominal possession. The more common form with initial glottalization would be a diminutive, (cf. Nez Perce *kálapóoya*, 'California Indians' [Aoki 1994:264]), pejorative in Clackamas and other Upriver Chinookan dialects: 'Little men of the prairies'. (See Appendix I for more details.)

At IndoEuropean Contact, when Astoria was founded in 1811, there were on the order of 9000 speakers of Northern and Central Kalapuya (hereafter, NK, CK), perhaps including Southern Kalapuya (SK) as well.¹ By 1856–57, when the survivors of NK and CK were herded out of the valley to the Grand Ronde reservation, only a few hundred remained. The individual Kalapuyan languages were probably not generally spoken to children after around 1880, when a Chinook Jargon creole, the *lingua franca* of the Grand Ronde reservation at the time, took their place as a first language for a generation or two (Zenk 1984). The last known speaker of CK (indeed, of any Kalapuyan dialect), John B. Hudson (JH), died in 1954 (Boyd 1999b:134). See Appendix II for more historical (and prehistorical) background.

Northern, Central, and Southern Kalapuya are the three languages which make up the relatively shallow Kalapuyan language family, probably with a time depth on the

¹ See especially Boyd 1999a, 1999b; Parker 1838; Ruby and Brown 1976.

order of Romance. Kalapuya is one of some eleven or twelve known genetic units of which some 24 individual autochthonous languages were spoken at Contact in the area of the current state of Oregon.

The Kalapuyan family has been ascribed to a hypothetical superstock known as "Penutian", without evidence.² While this is not the place to discuss likely or possible interrelationships among languages termed 'Penutian', it may be noted that at the end of the first century of Penutian studies, only Utian (Costanoan plus Miwokan), among Penutian's many putative subbranches, has been confirmed.³ With regard to the nearly equally putative "Takelman" family which supposedly included Kalapuyan and the dialects of Takelma(n), accepted in principle since Frachtenberg 1918, a similar problem appears to have been resolved in part. In an important talk before the SSILA convocation at the Linguistic Society of America, Tarpent and Kendall (1998)⁴ pointed out serious problems with this purported genetic relationship, accepted by Sapir, Swadesh, and many others. Much of it has been based on improper segmentation of forms (especially from Swadesh) on the one hand and loanwords on the other. This should come as no surprise. Despite great similarities in phonology and some verb and noun roots in common as well as a few morphological items, the two small families (Kalapuya and Takelma) are very different grammatically. This is all suggestive of a period of intense, sustained contact rather than genetic affiliation. Berman (1988) himself, who knows Kalapuya well and is a strong advocate of Penutian, found only 55 "[clearly] correct" cognates with Takelma out of a combination of Frachtenberg's original 55 together with Swadesh's (1965) 97. Together with another 6 "possible" forms from Swadesh, 40 of Berman's own and perhaps a dozen more of Frachtenberg's sets, that makes a total of around 113 "likely cognates".⁵ This, it occurs to me, is a very small number to come out of Berman's large slip files, placing a genetic relationship with Takelma(n) in strong doubt. At this time, a wider genetic affiliation of the Kalapuyan languages has not been determined. Suffice it to say that, in its manner of marking grammatical relations on the verb, in its verb suffixes and pronominal forms, Kalapuya,

² Sapir 1921a, 1921c, 1929. Also (hedgingly) Jacobs *ca.* 1930, Swadesh 1956, and others.

³ Catherine Callaghan has done impressive work toward (Proto-)Yok-Utian (i.e., Yokuts plus Utian), which would connect three out of original five California language families understood by Dixon and Kroeber (1913, 1919) to comprise the center of the great stock. However, as Callaghan (2000, 2001) has repeatedly noted, there are significant problems with Yok-Utian, and the "genetic relationship has not yet been substantiated" (2001:341).

⁴ Reviewed in Mithun 1999:433.

⁵ Berman unaccountably ignores all 69 suggested cognates of the only other relevant study, Shipley 1969; they may well have been counted in the other lists.

it seems to me, behaves more like Salishan than it does Plateau,⁶ Takelma or Chinookan. At the same time, one may see several different layers of borrowing in CK. However, genetic affiliation with languages currently classified as Penutian or Hokan cannot be ruled out. Further historical reconstruction in this area would greatly benefit from a thorough study of loan patterning in the area.

Areally, the Kalapuyan languages lie at the northern edge of the southern division of the Pacific Northwest linguistic area—a complex *Sprachbund* with nearly 120 languages in over two dozen genetic units from Prince William Sound (at or above 60° N) south to San Francisco Bay (at or below 38° N).⁷ Kalapuya's closest neighbors were the Molale [Plateau] to the east (with Tenino-Wayampam-Tayxláma groups of River Sahaptin [Sahaptian, Plateau] behind them across the Cascades); the Umpqua [SW Oregon, Athabascan] to the south (with the Takelma beyond them, followed by the Shasta); the Yahuskin (Northern Paiute [Western Numic, Uto-Aztecan]) and Klamath [Plateau] to the southeast; the Multnomah and Clackamas Upper Chinookans (lower Kikšt) and the Clatskanie [Athabascan] to the north (with the Cowlitz and Upper Chehalis groups of Tsamosan [Coast, Salishan] just beyond across the Columbia River, and the Klickitat group of Northwest Sahaptin to the northeast); and a series of three different peoples north-to-south down the coast: Tillamook (Nehalem-Nestucca-Salmon River-Siletz [Coast, Salishan]); Alsea and Yaquina [Alsean or Yakonan]; and Siuslaw-Lower Umpqua [Siuslawan] (with Hanis [Coosan] just southwest across the Umpqua River). Immediate neighbors of the Kalapuyans, then, spoke languages of six distinct families, with four more families close nearby. Band exogamy encouraged group contacts: most people were at least bilingual. Everyone traded. Interior peoples tended to raid more seaward peoples. The lower *Kikšk* claimed suzerainty over the Willamette Valley, as did the Cayuse.⁸

⁶ The Plateau family or stock consists of Sahaptian, Klamath-Modoc, Molale, and—perhaps—Cayuse, though extant materials on this last language are apparently insufficient to decide. The relationship of at least the first three is accepted by the specialists who work on them.

⁷ If Chumashan, Salinan and Yokotsan are included in this grouping, to about 34° N. See Lewis 2002 for an overview of the *Sprachbund* complex I call the Northwest Linguistic Area.

⁸ A senior Cayuse in the valley told an Iroquois hunter for the Astorians that the Whites should not ascend this river to hunt as they frightened the game so much with their guns that bow and arrow could no longer be used (Coues 1897 [1965]:818). The Clackamas attempted to extract a tax from Astorians-Northwesters ascending to hunt (Ross [1855] 1956: 72–7). Further, Ross ([1849] 1966: 236), puts Key-ass-no as the principal Kalapuyan chief. This prince, who is first known at Kalama in 1811 as *Keasseno* (Franchère 1854:110; Parker [1938] 1967:251–2; Cazenove, Ruby and Brown [1976] 1988:154; Casino), later lived in lower Multnomah and controlled the Columbia from the upper Estuary to well past Fort Vancouver.

1.2 Geographic location

The homeland of the Kalapuyas at Contact was the Willamette Valley and a portion (one or two tributaries) of the northern right bank of the lower middle Umqua River valley. This north-south area forms the southern portion of the Willamette-Puget Trough, which extends from the Calapooya Divide down the Willamette and Columbia Valleys, up through the lower Cowlitz and upper Chehalis valleys and down through Puget Sound into the Strait of Georgia.⁹ The area enjoys similar mild climate and habitat. That it has functioned as a corridor for southern-moving groups is shown by the placement of the two tiny, closely related Northern Athabascan groups, the Kwalhioqua in southwest Washington on the Willapa River and Bay (between the Lower Chehalis and Lower Chinookans) and the Clatskanie in far northwest Oregon on the upper Nehalem River (extending north to a use site on the Columbia River at the mouth of the Clatskanine River), northwest of the Tualatin. They appear as frozen in a north-south journey, between the Dene of British Columbia and the two adjacent groups of Pacific Coast Athabascan—southwest Oregon and northwest California. At Contact, the Valley was seen as a lush hunter's paradise, inviting to outsiders. "The Wallamitte quarter has always been considered by the whites as the garden of the Columbia, particularly in an agricultural point of view, and certain animals of the chase [*sic...*]" (Ross [1849] 1966:234).¹⁰ (See the map, based on Jacobs, on page 9.)

This Kalapuya homeland extended maximally from the Yonkalla domain in Calapooya Creek,¹¹ tributary of the Umqua River, at about 43° 20' N in the south to the northern extremity of Tualatin domain west of the Tualatin Mountains about 45° 45' N along the Willamette Trough. Its western reaches were in the Oregon Coast Range at 123° 45' W, extending eastward across the Valley into the Cascades to about 122° 15' W. Central Kalapuya country extended in the Valley from the junction of the Middle and Coast forks of the Willamette (just south of present-day Eugene) at about 44° N north down almost to the mouth of the Pudding River on the west-to-east jog of the Willamette (east of present-day Wilsonville) at 45° 48' N.

⁹ This is the direction of stress and tear of the northward moving Coast Range, as seen in the 50-mile northward bend of the Columbia and other rivers near the coast.

¹⁰ "Our guide informed us that ascending this river about a day's journey, there was a considerable fall, beyond which the country abounded in deer, elk, bear, beaver and otter." Franchère [1819] 1854:111. Parker (1838 [1967]:258, from his 1835-7 trip, called this country "uncommonly good."

¹¹ See, for example, Jesse Applegate 1907:(1).

1.3 Differentiation by band grouping.

There are three branches of the Kalapuyan linguistic family: Southern (SK), Central (CK) and Northern (NK).¹² Each branch represents one language. The differences among them are probably on the order of or slightly shallower than that of the Romance languages.

1.3.1 Northern Kalapuya.

NK was divided into two major tribes: the Twalatin (**ʔa-ʔfálati**; CK **ʔan-ʔfáladya** [EH nb.84:10], **-twálaté** [JH nb.33]) and the Yamhill (**ʔa-yámhala**, also CK [J45:70]; **-yámhələ** [JH nb.33]). The Twalatin made their homes in the valley and tributaries of the Twalatin River basin beginning a short distance from its mouth on the Willamette just above

¹² It may be of interest when the tripartite view of Kalapuya was first clearly understood by scholars. Scouler (1841) noted distinctions between “Kalapooiah” (actually a variety of Yamhill, NK) and “Yamkalia”, SK. The 2-page Yamhill ms (NAA #475-b) probably by Gibbs (1851) “from Thomas and Antoine, Cheifs” claims that “The Luka-mai-yooks and Twallattys speak the same [as Yamhill]. The Santiam band of Calapooyas a rather different dialect.” Gatschet (1877g) studied NK and took vocabulary lists of CK, but does not seem to have noticed their distinctiveness by the time of his broad article on “Indian languages”. Frachtenberg (1913–1914) was the first to study all three branches. He would have uncovered their relationship when he took down in English, 10 Dec. 1913, notes on seven major dialects from William Hartless at Chemawa (Frachtenberg 1914c). Below the names of the first two dialects, he wrote, “The Yamhill and Wapato Lake [= Twalatin] dialects from one unit.” And below the fifth dialect, Yonkalla, he wrote, “This dialect formed a distinct unit, different from any of the others.” The other dialects, Lakmayut, Marysville (both listed *before* Yonkalla, indicating left bank); Ahántsayuk and Santiam (right bank, N to S), are all Central Kalapuya. (I have not seen Frachtenberg further on this.) Yet even in Jacobs *ca.* 1930 we see the family approached as *one language*, even though Jacobs clearly knows the distinctions. (He was following the method of his Sahaptin grammar, Jacobs 1931, where he had treated the three lower Sahaptian dialect clusters as one despite the fact that they are almost mutually unintelligible.) Jacobs (*ca.* 1930[:7]) says this:

Speaking of themselves they say that they form three dialect groups, one of which does not understand the other readily, tho it be possible to learn to understand and express oneself in the adjacent dialect within some weeks[.] The three Kalapuyan groups claimed by the native must also be recognized by the linguist: they are the Twalatin and Yamhills to the north (which I shall summarily term “lower Kalapuya”), the Santiams, Hantcyuks, Kalapuyas, Pudding River, Marys River, Lakmyuts and other band located centrally along the Willamette (I shall call them “central Kalapuya”), and the Yonkalla groups to the south (a convenient term for them will be “upper Kalapuya”). Yonkallas can neither understand nor speak central Kalapuya, the latter neither understand nor speak Twalatin and Yamhill; but each knows that the others are kin and that the world outside speaks entirely differently.

That the three dialect clusters of Kalapuya were, in general, mutually unintelligible, appears a virtual certainty. Nevertheless, John Hudson declares on the Swadesh-Melton (Swadesh 1953, 1954) tape that “the Yonkallat—that was the funniest part—the Yonkallat ... could understand the Kalapuya, but the Kalapuya couldn’t understand the Yonkallat.” By “Kalapuya” Hudson means any of the CK dialects. At the same time, he speaks of “Yamhill” and “Twalatin” languages on a par with “Mulale” and “Clackamas”—i.e., languages that he did not speak. I follow Berman (1990) in using Northern, Central, and Southern Kalapuya as language names.

Willamette Falls. The North Yamhill River also was considered Twalatin. The largest cluster of winter villages was around Wapato Lake (Twalatin *mam-pto* between Hill and Ayers Creeks near present-day Gaston).¹³

The South Yamhill River, from its mouth to its source in the western Coast Range was home to the Yamhill People. Also part of *ts^hon-yámhala* (Yamhill country, J1945:70.6) was at least part of Rickreall Creek and the north fork of the Luckiamute (or Little Luckiamute) River. Yamhill influenced the (north)western CK dialects.

1.3.2 Central Kalapuya.

CK was divided into numerous bands. Ross ([1855] 1956:77), for example, says “sixteen in number”; Parker ([1838] 1967:258) says “seventeen different tribes”. Aside from a few most important bands, the actual number of important secondary bands is unknown. The four most important bands or tribes (marked RB or LB for right or left bank of the Willamette, north to south), following the statement given by William Hartless (in Frachtenberg 1913; see Makey 1974:34–35) are given in Table 2 below. Hartless gave each a triple division—*riverside*, *middle*, and *mountainside*.¹⁴

(1) Tribes of Central Kalapuya

- RB Pudding River or French Prairie Indians, the *'a-hántsi^hayúk* < -hántsi-²yók, < hántsi-
'back away [from the river]' + -yúk/yúk^h 'PASSIVE' (F.1914b:2; EH), on
southwest-northeast flowing creeks west of Pudding River, especially
upper Mill Creek, Senecal Creek and Champoek Creek. *'an-hándsuyúk*
(G1877:105). (I write *Hantsayúk* in English.)
- LB Luckiamute, *'a-lák^hmayók* (nb.46:84,150) 'belonging at edge of timberland'
(F.1914b:2) < [ʼa-]lágowa-ma-²yók; lágowa 'edge of timber' on the Luckiamute
River; *ts^ha-lákmiut* (G1877:69). (I write *Lakmayúk* in English.)
- RB Halpam *'a-hálpa^m*, (-hálpa^m [F.MR]) 'the upriver (people)'; south of *hántsi^hayúk*,
including the drainages of the Santiam River (and at least the affiliation of
CK bands to the south). Also G. (Also called *Santiam*.)
- LB Mary's River (MR), *'an-píináφu²* (EH nb.78.8). South of *lák^hma²yók*; on Marys River,
lower Muddy Creek, present-day Corvallis. *'an-^híneφu* (G1877:69). WH's tribe.

Table 4. The four major subgroupings or tribes of Central Kalapuya

¹³ See Zenk 1990, 1994 for more information.

¹⁴ In this and the following lists, I have used my own reconstitutions as far as possible; some uncertain segments are left unresolved. p-d. = present day. With the two NK dialects and Yonkalla, Hartless/Frachtenberg considered the Kalapuya family to have seven dialects *in toto*.

In addition to these traditional groups, there were a number of secondary bands of CK. These in each case may or may not relate to one of the larger groups; some of the names are villages. This is a little confusing, since from the information available (e.g., Jacobs and John Hudson) the Kalapuya do not appear to have differentiated among types of bands, tribes, clans, or villages. (For a listing of some of the more well-known secondary CK bands, please see Appendix III.) One of these is called *sáŋdyám*, supposedly after the eponymous ancestral chief, San-de-am (Minto [1900] 1968:49), also the name of an important right-bank tributary of the Willamette (possibly from **tʰn-ɬiyam*, root unknown). Both John Hudson and Eustace Howard claimed to be Santiam, but their idiolects are so distinct as to rule out the same dialect. Hudson found Santiam to be the same as the CK tribal term *Hálpam*; Howard implies that the two may be somehow distinct. The Halpam included the east (right) bank of the Willamette probably from Battle and Beaver Creek south of p-d. Salem at least up to Albany. William Hartless¹⁵ gave only the dialect “Santiam”, “on both sides of Santiam River”, whose forks make up the river valley system by that name in the center of this area.

1.3.3 Southern Kalapuya = Yonkalla (*yánkʰaldʰ*).

The organization of the southern branch is not known. It is assumed there were at least two major dialects, based both on Frachtenberg’s and Jacobs’ Yonkalla informants’ differences and on two major winter village centers. (We have no definite record for the area of Calapooya Creek, present-day Oakland.)

tʰan-ɬéʰsna (JH nb.46:102); *ɬéʰsna-yuʰ* ‘a falls and salmon place’ (EH nb.82:28); *an-ɬístnä* (G1877): village in the area of the northern SK winter village center, probably the Row River below Dorena Lake (east of present-day Cottage Grove).

(*tʰa*-)*yánkʰaldʰ* < *yánkʰ* ‘high’ + *el(a)ʰ* (= *iild*) ‘house’ (F.s.f.); i.e., ‘mountain home’ (cf. Mt. Yoncalla near present-day Drain). Southern winter village center; upper Elk Creek, especially Yoncalla Creek.

ɬúuniʰwiʰ village in this complex where JH’s mother is from.

Table 5. Principal areas or villages of Southern Kalapuya

¹⁵ Frachtenberg 1914c.

1.4 Kalapuyan dialectal distinctions

This section discusses the genetic whole of the Kalapuyan languages from the point of view of (1) the differentiation into three separate languages, and (2) the major or known dialects within the central language, Central Kalapuya.

1.4.1 Overall view of Kalapuya: *Stammbaum*

The three branches or languages of Kalapuyan can probably be represented as in (2) or Table 4.¹⁶ The connections north to south may be seen clearly except in SK, where they are virtually impenetrable.

(2) The Kalapuya language family

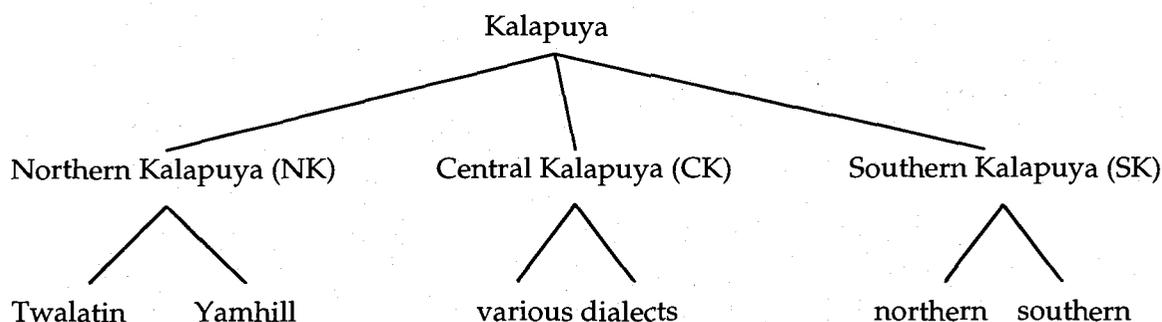


Table 6. The principal branches of Kalapuya

1.4.2 Central Kalapuyan dialects: a tentative classification

There are considerable differences among CK dialects. I assume that such differences were generally tribal, band or clan related. Judging from John Hudson's ability to make sense of Eustace Howard's texts (despite his more limited vocabulary and different grammatical forms), I conclude that differences among CK dialects did not seriously affect intelligibility.

Of the two main northern dialects of CK, Hantsayuk, as seen in the vocabulary list of Gatschet (1877), is closer to the 'Santiam' of either Eustace Howard or John Hudson, than is Lakmayuk, the most distinct and northern-like of the CK dialects. Lakmayuk must have been affected through contact with Yamhill and/or other dialects

¹⁶ For a discussion of the origin of the three branches of Kalapuya, please see note 11, page 14.

of NK that border it. This can be seen in the shorter numerals, occasional fronting and raising of /a/ to /ye/, the /ɔ/ long vowel instead of /aw/, and in other ways. It is possible that Yamhill was extending a linguistic (and cultural) dominance southward; Yamhill was probably spoken on the northern fork of the Luckiamute River,¹⁷ which is south of Rickreall Creek.

One of the more curious dialectal distinctions is that between the two 'Santiam' informants of Jacobs.¹⁸ The language of Eustace Howard shows a number of features that differ from that of John Hudson and that put Howard closer to a mid-point between Hudson and the NK border. (Hantsayuk, Hudson's ideolect, and the Mary's River speech of William Hartless I consider 'core' CK.) Item (3) shows variations from the two dialects of 'Santiam' plus the NK dialect of Twalatin of K'inai and his son Louis Kenoyer.¹⁹

(3) Hudson and Howard

English	John Hudson (JH)	Eustace Howard (EH)	Twalatin (LK)
(a) he	g ^w awk̚ <kwáw'k, kwáw.k>	kawk ^h <káw̄k, kwáw̄k>	g ^ɔ ɔk ^h <Gó·k> ²⁰
(b) they	g ^w inik̚ <kwíní'k>	ginik ^h <kíník, kwíník>	g ^ɔ innuk ^h <Gín·uk>
(c) face, eyes	-k ^h íliik ^h <kwíle·k, kwíli·k kwíli·k>	-k ^h íleek ^h <kwíle·k, kwíli·k, kwále·k>	-k ^h állak ^h <kwál·ak>
(d) food	-k ^w áanāp̄in <kwá·nāf̄in>	-k ^w áynāp̄u <kwá·nāf̄u>	-k ^w éināf̄u <kwé·nāf̄u>
(e) eat	-k ^w áanāp̄u ^(?) <kwá·nāp̄u ^(?) > ²¹	-k ^w áynāp̄u <kwá·nāp̄u ^(?) >	-k ^w éināf̄- <kwé·nāf̄->

¹⁷ In their Treaty of 1951, the *lák'may'ok* claimed all land north of the south fork itself (Makey 1974:112).

¹⁸ Howard Berman (e.g., undatedb) was the first to notice that the two 'Santiam' speakers were not.

¹⁹ Twalatin (*'a-t'fálati*), the most northerly of the two Northern Kalapuya (NK) dialects, was recorded by Gatschet in 1877 from K'inai and others, revised by Frachtenberg with Kenoyer in 1914 and by Jacobs with Kenoyer in 1936. These words, modified to my system, are from Berman's slip files (Berman undatedb).

²⁰ According to Boas *et al.* 1916, the system of sound writing which Jacobs followed (the vowels of which were based upon the analysis of Henry Sweet), ω is a low, back, narrow, rounded vowel, while ε is a mid, central, wide, rounded vowel. Jacobs wrote ω more often later in his Kalapuyan career, especially while working with Louis Kenoyer on NK (1936). With the CK dialects, written largely 1928–30, Jacobs wrote ε more often. When editing Jacobs 1945, around 1936–7, he changed all ε to ω . There seem to be two allophones (of //u//) involved: a higher one involving scatter from <u> to <ɔ> (the latter occasionally <ɔ>, <ɔ>) and a lower one, generally <ɔ>, sometimes <ɔ> or <ɔ>.

²¹ The raised parentheses, a non-Jacobs feature, are an attempt to show a marking, here V-final word-final glottalization, which occurs in part or half of the form-types.

Illustrative of the NK—(’*a-lák’mayók*.)—Howard—CK dimension, three features from (3) will be discussed briefly.

(A) Glottalized articulation versus labialized articulation. Notice that in JH’s speech the third-person singular independent pronoun *he* (3a) always begins with labialization, *g̥a-*. EH does this only in 3 out of 31 exemplars²²; otherwise Howard uses a glottalized onset, *k̚a-*. The lack of labialization in the singular pronominal EH forms is paralleled in the plural, (3b), where only 4 out of 14 exemplars have the secondary articulation in the onset and 10 do not. EH shares this lack of labialization with Twalatin.

(B) The root vowel of JH’s pronunciation of the words for ‘food’ and ‘eat’ is a long *aa*; EH has diphthongization, *ay*—more similar to the *ey* diphthong recorded for Twalatin. This also shows the greater fronting and raising of the Twalatin vowels.

(C) This general raising of vowels, especially *a > á > ε > i*, is seen throughout the family; the phenomenon is not well understood. Sometimes NK, especially in the long vowels, appears to have risen, sometimes CK in the short vowels. Nevertheless, in each case, the idiolect of EH shows itself to be somewhere in the middle. For example, one exemplar of EH’s ‘faces’ has the Twalatin *//a//* vowel instead of CK *//i//*. On the other hand, long *//aa//* in CK is often a diphthongized long *[ei]* (probably *//ii//*) in Twalatin.

Eustace Howard’s forms are transitional between NK or Lakmayuk and CK.

There exists, moreover, in the EH dialect, a peculiar aorist-like tense used only in myths, termed the mythological past, formed with *ḃ-* instead of the usual aorist *g̥-*. This tense is absent in the ’*an-ḃiindḃu*’ (Mary’s River) dialect of William Hartless as well as in the Santiam of John Hudson. Grace Wheeler, recorded by Frachtenberg in 1914 (said to be ‘Lower McKenzie’ in Jacobs 1945), however, used it in her stories. (EH uses *ḃ-* in four out of five modes, but not with the locative *ḃu-*.) Tenses with *ḃ-* occur in both dialects of NK, marking special myth-time aorists in all modes.²³ The use of such an important grammatical feature, throughout most of the modes, suggests three things:

²² The exemplars are from the Berman slip files. For independent pronouns, exemplars are the same as formtypes. Please see §1.6.1, 1.6.3 below.

²³ I am not familiar with Yonkalla (SK) to comment on its prefixal system. A cursory look at Twalatin suggests that the prefixed modes in transcribed from Louis Kenoyer (LK) by Jacobs (1936–7) do not agree with those given in Gatschet’s materials of Kenoyer’s father, Kenai, and others. The verbal prefix in these languages is still a uncertain area that warrants much work.

- (i) one of the Santiam informants—perhaps EH—was not in fact Santiam;
- (ii) it is possible both EH and Grace Wheeler spoke similar dialects, if not the same; and
- (iii) this dialect (of EH and GW) was originally of a more northerly provenance.²⁴

It is tempting to attribute Howard's idiolect to influence from another (sub)dialect, in particular that of his maternal grandfather, *hənmənápu*, said to have been spoken in the upper Palmer Creek area, west of the Willamette crossing at Wheatland (opposite the old Mission site). This is adjacent to the Yamhill area and would plausibly explain the northern influence. If correct, it would mean that Eustace may have fixed his CK before his father's early death. At this time, we cannot be certain of the geographic location of the Eustace Howard–Grace Wheeler dialect, nor of the location of dialects of speakers of other old wordlists. Their comparison, however, allows us to have a first, tentative look into the mutual relationships of the dialects of CK.

The listing of a few words, such as those in (4), for Northern and Central Kalapuyan dialects, as known, helps to pinpoint the relational organization of CK dialects. In the following Table 5 we move a little further. (Laryngealization features, aspiration and glottalization, are marked on Jacobs's materials and occasionally on Frachtenberg's.)

²⁴ Although Jacobs ultimately places *sgánan*, 'gray fox', clan and personal name of Grace Wheeler (GW), on the lower McKenzie River, elsewhere (his slip files) he suggests she may be from a group between Corvallis and Salem. Frachtenberg insists she is a "Kalapuya", apparently as informed by GW herself. (See F. 1913–14a:3:n.p., in Hayda 1976:6.) But if this term is used in the most common sense of the day, i.e., as 'Central Kalapuyan', it tells us nothing. At this time, the possibility must be left open as to whether EH was influenced by his maternal grandfather's dialect, the *hənmənápu*, which name itself would seem to have a MYTH prefix. Frachtenberg notes that GW's glottals were more intense than Hartless's Mary's River glottals, which probably also suggests a more northern origin. He states that GW occasionally used *pk-* (instead of *p-* /*ḃ-*) for her story pasts. In the single Yamhill myth in Jacobs 1945(: 199–203), however, the *ḃgu-* <BGU> mythological prefix occurs where Twalatin uses the aorist *gu-* <gu>. Gatschet's Twalatin regularly uses *p'gu-* to form usitives; there appears to be no mythological aorist.

(4) Comparison of Twalatin with 6 CK idiolects

English	Twal. ²⁵	Lak. ²⁶	Hants. ²⁵	GW ²⁷	EH	JH	WH ²⁸
(a) one	-wáʔan	tána	táuna	táuna ²⁹	-tʰáunʰa	tʰáunʰa	táunʰa
(b) two	-géem	gém	gíimi	gʷéemi ^(ʔ)	-gʷéemi ^(ʔ)	gʷéemi ^(ʔ)	gʷéemi
(c) five	húwan	wán	wán	wán	wán	wán	wán
(d) he	gʷókʰ	kók	kʷáwk	káwk	káwkʰ	gʷáwʰkʰ	gʷáwʰkʰ
(e) they	ginnukʰ	kinnik	kʷinnik	—	ginikʰ	gʷiniʰkʰ ^(h)	gʷiniik
(f) fire; house	-mii; -may	-máy	-má	-máa	-máa	-máa	-máy; -máa
(g) baby, child	-wápi ³⁰	-wápya	wápya	-wápya	-wápya ³¹	-wápya ³⁴	-wápya
(h) eat	-kʷéinafu	—	—	-kʷáynəbʷə ^(ʔ)	-kʷáynəbʷə ^(ʔ)	-kʷáanəbʷə ^(ʔ)	-kʷáanəbʷə ^(ʔ)
(i) wood	-wád(d)ikʰ	-wátik	wátak	-wáɖak	-wáɖakʰ	-wá ^(ʔ) ɖaʰkʰ	-wáɖak
(j) spirit ally	-yúłmi	yúłmei	-yúłma	—	-yúłma	-yúłma	-yúłma
(k) face, eyes	-kʷállakʰ	-kʷállik	kʷállik	kʷíleek	-kʰíleekʰ	-kʰíleekʰ ³²	-kʷíleek

Table 7. Central Kalapuyan dialectal examples next to Twalatin

An examination of Table 5 clearly shows several trends among CK dialects. First of all, Lakmayuk illustrates the long back vowel in ‘he’, the high final vowels in ‘ally’ and ‘wood’, and geminate resonants—all Northern characteristics. It is obviously closer to NK (neighboring Yamhill) and should be separated from the others. Second, the idiolects of Eustace Howard and Grace Wheeler are seen to pattern together, including the curious initial glottalization of the third-person singular pronoun. This dialect appears to have gone in a slightly different direction from the remaining CK dialects. Ahantchuyuk is written with geminate resonants as is Lakmayuk, but it has labialvelar initials for the third-person pronouns, which separates it from both Lakmayuk and the

²⁵ I have marked Jacobs’ plain form as aspirated for Twalatin, though this is somewhat hypothetical. In general, finals have an aspirated offglide. Only Jacobs wrote three phonation types.

²⁶ Slightly modified symbols from the lists of the “Lúkamiute” (*ʔa-lákʰmáɣək*) and “Ahántchuyuk” (*ʔa-hántʰáɣuk*) dialects recorded by Gatschet (1877). Gatschet did not record Kalapuyan glottalization.

²⁷ Grace Wheeler’s words are from Jacobs 1945: 351–369, modified to my system.

²⁸ The Mary’s River dialect (*ʔan-píinaʷə*) was recorded by Frachtenberg in 1913–14 from William Hartless. These words are from Jacobs 1945: 205–350 (except *gʷáwʰkʰ*, Frachtenberg 1913–14b:II), modified to my transcriptional system,

²⁹ *táune* before vowels, or *táuna* in general.

³⁰ The Yamhill (*ʔa-yámhala*) form from Louisa Selky to Frachtenberg, 1914, is *-wápii* (J1945:200.1).

³¹ Alternates with the unglottalized form of the initial, *-wápya* or *-wápyá*.

³² Alternates with *-kʰíliikʰ*, as in (3c) above.

EH-GW pair, and links it to Santiam and Mary's River. These last three, then, are quite similar, forming an east-southeast-southwest crescent. (Note that Mary's River has the diphthong **-ay** instead of Santiam **-aa** for **-maa**, 'fire, house', a reflex that we also see in Lakmayuk in the northwest.) Santiam has undergone a reaction to geminates, real or positional (possibly in opposition to Twalatin). Santiam and Mary's River have also increasingly refined their use of glottalized consonants, especially finally.

While there are many features that we cannot look at here, we are finally in a position to suggest a preliminary hypothesis with regard to the relationship of the Central Kalapuyan dialects. This is given in (5). It should be noted that there is a back, horseshoe-like pattern in the CK territory. Mary's River touches (through a mediating band) the territory of Lakmayuk to the north and in subtle ways approximates the vowels of that dialect. On the east side, it touches Halpam (Santiam) across the Willamette River; while Halpam touches Hantsayuk to the north, which in turn touches what may be the homeland of Eustace Howard's family back across the river to the west, which touches Lakmayuk laying still further west.

(5) Central Kalapuyan dialects (tentatively)

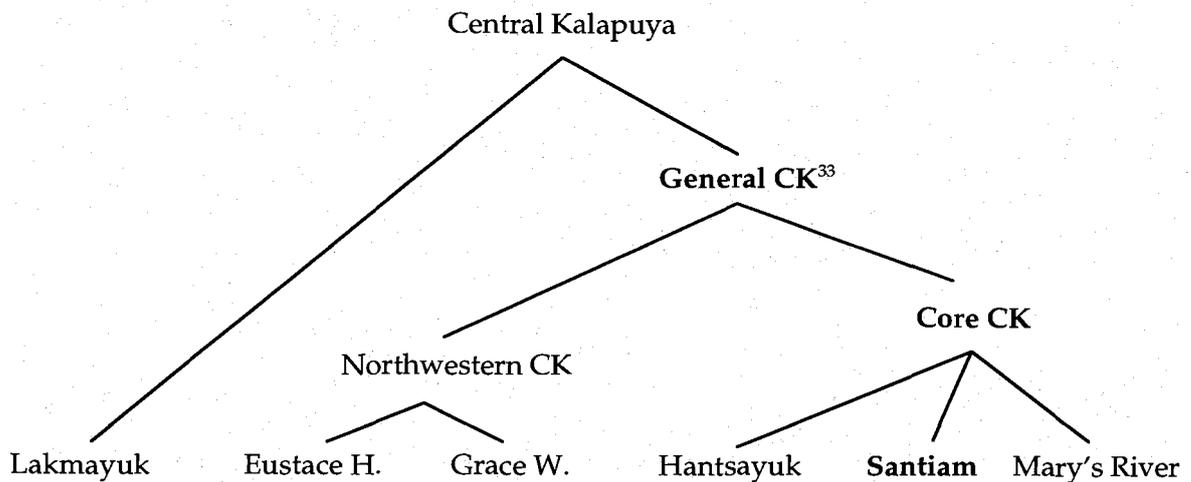


Table 8. The Central Kalapuyan dialects (tentatively)

(For a short discussion of the relationship between Mary's River and JH's Santiam, close but with some interestingly distinct properties between them, please turn to Appendix IV.)

³³ Belonging to this group as well is the Kalapuyan language of the Barnhardt list, NAA 218.

Central Kalapuya proper trends off the right side of the figure in Table 8. This thesis is primarily concerned with what I have tentatively termed *General CK*, especially the Santiam of John Hudson.

1.5 Previous research in Kalapuyan linguistics

Many people have heard Kalapuya dialects. Settlers, such as Jesse Applegate (1914:68) noted “Kalapooya” to be “remarkably soft and musical”. Gatschet (1877g:167) said that “The laws of euphony are numerous in this language, whose utterance is soft and harmonious; thus it forms a remarkable contrast with all the surrounding languages, the sounds of which are uttered with considerable pectoral exertion.” Jacobs (ca. 1930[:13–4]), surely thinking of CK, expands on this theme: “I think Kalapuya is one of the most beautiful languages I have heard in my linguistic experience; I may exaggerate; my impressions of northwest Sahaptin, Molale, Chinook and Coast Salish may seem unlovely by contrast; [...] but there can be no doubt that compared with the languages to the east and north Kalapuya is consonantly soft and invariably charming in tone and rhythm.”

1.5.1 Collections of Kalapuyan data

The major recorders of data of Kalapuyan languages are Albert Samuel Gatschet in 1877 (Twalatin and some CK), Leo Joachim Frachtenberg from 1913 to 1914 (all three branches), and Melville Jacobs from 1928 through 1936. Gatschet wrote occlusives of only one phonation type, Frachtenberg of two types, but only Jacobs wrote all three. The main source for this study are the John B. Hudson elicitations from Jacobs of 1928 through 1936, largely to be found in Jacobs’ field notebooks #33–36. A number of ethnographic texts from John Hudson were recorded as Jacobs reviewed the Eustace Howard materials with Jacobs. The Eustace Howard materials, which are used as a secondary source and which also hold these John Hudson ethnographic texts, constitute 17 of Jacobs’ field notebooks, #46–47, 76–90. Some of the forms from Frachtenberg’s elicitations of William Hartless, Mary’s River speaker, are also introduced—primarily from his slipfiles or the three volumes elicitation notebooks called “Grammatical Notes”. Primarily because of some inconsistency in the recording of phonation types among the occlusives and laryngeals, the Frachtenberg texts appear somewhat less valuable than the Jacobs texts. Unfortunately, there are too many errors in Jacobs 1945 (his published *Kalapuya Texts*, containing the John Hudson CK materials together with almost all of

Frachtenberg's Mary's River CK stories and Gatschet's Twalatin NK stories, as well) for these materials to be used for phonological purposes. (See §1.5.10.) For a more detailed discussion of the various collections of Kalapuyan data, please see Appendix V.

1.5.2 Early phonological analyses.

It is difficult to see phonological systemization in the early recordings of Kalapuyan materials. The earliest accounts run a gamut of spelling styles from more unsystematic to less unsystematic uses of common English. Hajda (1976:6) notes that Gatschet (1877g:148) extols the employment of a one-letter-for-one-sound principle in promoting a 'scientific' alphabet. However, in application, he himself was not so strict, employing *thl* for writing [ʔ], for example. On the 1877 Powell form (NAA MS473) with 21 pages partly or fully filled in with both Lákmayuk and Ahántchuyuk dialect forms (out of some 111 pages), Gatschet (1977d) writes the following vowels: *a, ʌ, u, e* (infrequently), *o* (rarely). Sadly, of the three phonation types, Gatschet writes but one. He occasionally records simple glottal stops as hyphens between vowels.

1.5.3 Leo J. Frachtenberg

Frachtenberg's (F) knowledge of Kalapuya was good. Jacobs (*ca.* 1930[:2]) praises his card files as having "most of the important elements of grammatical structures, with their dialectic varieties ...; Dr Frachtenberg must be accorded full credit for having come close to completion of a comparative grammar of the stock". F. used a variety of a five-vowel system in his CK writings, using a horizontal line (macron) over the vowels for length. Nonetheless, Hajda (1976) was sore tasked to align what was suggested by the linguist and what he actually wrote with his symbols. Confusion of glottalization—often written with aspiration (or, Hajda says, *as* aspiration), sometimes writing nothing for it—appears to be one of the reasons which led Hajda to follow Frachtenberg in confusing glottalization with aspiration, ultimately denying the existence of an aspirated obstruent series. (To recognize the lenis plain series in Frachtenberg's transcriptions, Jacobs thought he had to "read in intermediates into all of F's notes"—i.e., replace his plain series (which is how Jacobs wrote his aspirated series) with intermediates. Another time he found the frequency of Frachtenberg's use of palatals, particularly <ɰ>, "show[s] that here he has spotted the true ɰ sound" (Jacobs *undated*:Box 40).) As Hajda sums up (1976:47),

Frachtenberg was not concerned with whether ma and ma' ("thou") were "the same" or not, but with whether those were accurate recordings of what Hartless said.

While the concept of *phonology* was not well understood in his time, it is apparent that Frachtenberg had the best understanding of Kalapuyan grammar than any linguist before or since (with the exclusion of correct Berman's analysis of the verb stem. Part of this, of course, lies with the fact that CK was still spoken as a language in 1913–4, in several dialects (though not, apparently, Lukmayuk or Ahantsayuk). F. managed to note the nasal variation VN ~ VR₁ ~ VV/R₁, that is, a vocalic nucleus consisting of two morae and ending in a nasal, liquid or glide allows the change of its second member, the resonant (R), in its assimilation to the immediately following resonant. But since geminates are not tolerated in CK, by far the most common surface realization is that the resonant drops and the preceding vowel lengthens. F., though, seems to imply from his note that the nasal is intrusive, epenthetic, as it is in other languages of the area.

Frachtenberg's interpretation of a final, post-vocalic glottal stop as non-continuative (i.e., *the opposite* of various forms with -n- among the pronominal suffixes or of some open verbal syllables closed by <'> or [h] indicating CONTINUITY of the action involved) or punctual is interesting. The following statement and examples are from his slip files.

- (6) "The continuative of verbs in -i', -ni' is formed by replacing the stop by an aspiration, hence -in , -i', -i' [.] -ni', -ni [.]" (Frachtenberg *undated*, Box 45.)
- (7) (a) ta k'a'nī' take him across
 (b) wa' ta k'a'nī' don't take him across
 NEG IMP take-TRANSV (-k^han-(n)i ~ -k^han-(n)i' JH, EH³⁴, TRANS, non-negative)
 (c) ta wī't' open it!
 (d) wa' ta wī'ti' don't open it!
 NEG IMP open-TRANSV (-wi'ḡ (JH) ~ -wii't^h (EH), TRANS, non-negative)

Frachtenberg is saying that the -i transitivity suffix (which sometimes has an unexplained ' following a final vowel, in Jacobs' materials), must be used in continuative form in negative commands. This is -i' after consonants or -ni(') with the addition of the continuative -n (before consonants or after vowels), as opposed to the positive (non-continuative or punctual) form, which (he says) is -i' ~ -∅. Although continuative (and

³⁴ The sole imperative with this verb root in Jacobs is EH's with the neutral stem vowel, -k^han-a.

durative³⁵) are very common stem qualities in CK, negative command forms are not available for these verbs in Jacobs' material and it is therefore difficult to assess Frachtenberg's conclusion. Nonetheless, Frachtenberg is clearly making an important grammatical distinction based upon phonetically important morphological changes. That Hajda (1976), as we recall, did not find such work systematic is momentarily disheartening but it need not be confusing. Frachtenberg would not be the last linguist to define distinctions in one place only to ignore them in another.

1.5.4 Melville Jacobs

Jacobs insisted upon three phonation types of occlusives: 'intermediate', 'aspirate surd', and 'glottalized'. *Intermediate* is the term used by Boas *et al.* 1916 to indicate a plain, lenis type of occlusive with \emptyset voice-onset time, no aspiration or any other strong feature. *Aspirate surd* would mean voiceless aspirate. *Glottalized* meant, for Kalapuya, *weakly* glottalized, not ejective. Jacobs clung to the system of symbols used by Boas, Pliny E. Goddard, E. Sapir and A. L. Kroeber (the American Anthropological Association Committee, Boas *et al.* 1916), long after it had been supplanted by later recommendations, particularly those of G. Herzog, S. S. Newman, E. Sapir, M. Haas Swadesh, M. Swadesh, and C. F. Voegelin in 1934.

Boas *et al.* 1916 speaks of a set of "surd-sonant intermediate" consonants, to be written in small caps. These "intermediate consonants" which appear to be of two types "here include *voiceless consonants pronounced with stress ordinarily characteristic of sonant consonants, also surd consonants that are sonant at the moment of release*" (Boas *et al.* 1916:11; emphasis added). The first appears to include a notion of incipient tone, such as in languages of South and Southeast Asia with four register boxes, for example.³⁶ The second appears to suggest lenis occlusives that, perhaps depending upon dialect, may or may not be voiced, as in dialects of French. Jacobs had written such intermediate

³⁵ It is not always easy to distinguish these. I have at times called the durative *-d* and its variations *absolutive* because of the unaccusative nature of this aspect, though a durative paradigm running through the verb classes appears basic. All bound pronominal forms have *continuative* variants in *-n-*. It seems unlikely that that they will turn out to be common allomorphs, since both can occur in a given word (e.g., common *-dmi*). The first suffix is associated with verbs, the second with accusative or dative particles. If indeed, as the Frachtenberg material suggests, the final *-ʔ* can be related to non-continuity, a large block of unknown material, perhaps the last of right-apostrophe confusion, is cleared in the stem.

³⁶ Some students of Tibetan phonetics, for example, call this lenis, low-tone inducing phonation type "devoiced" (Watters 2002:5f). See Chapter 5 below for more discussion.

consonants occasionally medially or finally in Northern Sahaptin where aspiration or glottalization was neutralized. In Central Kalapuya, however, he found a series of occlusives without aspiration, glottalization, or, for any practical matter, voicing. It may be useful to quote him (*ca.* 1930[:32]) at length, noting how he understood this concept:

The intermediates ... form a true series; Frachtenberg ordinarily confused them with surds; he indicated \underline{k} (written as \underline{k}) often enough to make it clear that in his dialects true intermediates were present. In lower Kalapuya [NK] Frachtenberg occasionally employed sonants; we infer that in those dialects sonancy commences somewhat earlier in the articulation of intermediates than in the central [CK] and upper [SK] bands; whether sonants or intermediates as such be found in lower Kalapuya is not very important; the voiced consonants of the adjacent Chinookan dialects have earlier sonancy and hence are described more conveniently as sonant than intermediate; the adjacent Molale and northwest Sahaptin have intermediates not sonants; I infer that Chinookan contact gave extra sonancy to lower Kalapuya intermediates which, if they be sonant or intermediate, are cognates of the true intermediates of the other dialects. They may be acoustically intermediates from the point of view of the sonants of other languages like Chinook. We may say that Kalapuya has a true intermediate series, which in the lower dialects leans toward sonancy.

Jacobs is clearly speaking in a way today described as *phonetically*.

There are some 45 different consonant symbols and 19 different vowel symbols in Jacobs 1945; in the notebooks the variation, were all forms to be considered, would be considerably greater. To give one example: in feeling out the quality of [i ɪ] variation appropriate (i.e., fine distinctions of an allophone here written as /i/, whose phoneme //i// also includes /e/),³⁷ Jacobs would make slight changes in the writing of these vowels, the straighter the mark apparently the higher (and perhaps tenser?), on an analogical scale, the vowel, as (8):

(8) i i i i

Such variations as those in (8) were written in the first Kalapuya notebook; thereafter they were simplified into two forms as in [i ɪ] (before simplifying further). There is no question that Jacobs was a master at taking phonetic dictation; he was one of the very best. We are very thankful to have so much information. The task now is how to interpret it correctly.

³⁷ Double slash marks (e.g., //a//) are used for phonemic distinctions and single slash marks (/a/) for allophonic distinctions, unless of a very fine nature—in which case brackets ([a]) are used. See the later methodology section in this chapter for discussion.

1.5.5 Leigh Lisker

A year after its publication, Jacobs 1945 was reviewed by Leigh Lisker (1946) of the University of Pennsylvania, the only review of *Kalapuya Texts* that I have seen. Lisker mentions various problems associated with the presentation of the textual material, specifically their overly precise phonetic rendering, their lack of morphological segmentation, the randomly variant spellings in their forms, and the confusion of phonemic with morphophonemic levels (when did Jacobs have either?). He questions the need for the labialized series and “possibly the glottalized stop”. But his criticism of Jacobs’ lack of regularization is apt:

Theoretically there need be no objection to such a [phonetic] presentation, provided only that it does not exclude the possibility of making a more exact statement. This depends primarily upon our ability to say that some elements (morphemes) are the same, for which purpose we should like material so arranged that the meaning of the individual morphemes is easily determined. But the identification, and even the isolation, of the individual morphemes is bound to be a long and rather laborious task for anyone relying on Jacobs’ material.

Lisker suggested a set a phonemes, with no reasons given, for the Jacobs materials. Listed in efforts of completeness, it gives hints about what a first untutored look at this material might suggest.

(9) Lisker’s suggested segment list; {} = initial, medial only, () = medial, final only

		Consonants						
		p	t		(k)	q		
[Occlusives:]		b	d		g	g		
		{p’	t’		k’}	(q’)		
[Fricatives:]		(f)	s	ʃ	ʒ	(x	x)	{h}
[Voiced Continuants:]		w		l	y			
[Nasals:]		m	n					
		Vowels			Diphthongs			
		i	u	[length]	∅ [“no vowel clusters”]			
		(e	o)					
		a						

1.5.6 Morris Swadesh

For his 1965 paper comparing Kalapuya and Takelman, Morris Swadesh followed lists he made from the Penutian Survey and of some hastily gathered forms (including Mary's River) from a brief trip to the Jacobs' "holdings" in Seattle. Berman 1990:27–8 notes some of the errors Swadesh made in his data. For our purposes it is sufficient to note that his one analytic suggestion, an analysis of /f/ as a /hw/ *cluster*, was unfortunate and veils the load that *f*, or //φ// (or /^hw/), as a single segment carries among verb suffixes (as Takeuchi [1969:vi], having tried followed Swadesh's suggestion, ruefully found). Perhaps the most common alternation Swadesh (mis)perceived is the general result of a clustering of that rounded fricative with a preceding aspirated obstruent where the aspiration from two sources appears to double: $K^h + \varphi \rightarrow Kh^w$.

1.5.7 William Shipley

William Shipley (1969, 1970) got the Kalapuyan data for his two historical papers from 200-word lists on three dialects (Tualatin, Central, and Yonkalla) supplied to him by Morris Swadesh. The 1970 paper was an attempt at the reconstruction of this little language family. Shipley did the best he could with the materials presented him. He (1970:98) found that "Glottalization is sporadic. It is presumed to have diffused and is, therefore, left out of account." Thus, at one blow, a tremendous amount of lexical distinction was left out of his forms and analysis. From among a total of 127 cognate sets, involving all three languages, Shipley found "A small but consistent group of aspirates in S[antiam forms which] point to a PK aspirate series, of rare occurrence." In all, he found a total of eleven Santiam forms (and one from Tualatin) which alone illustrate a series of aspirate occlusives. These agree with just seven forms in the Jacobs data, for various reasons. A cursory look through Shipley's forms reveals, however, another eleven forms listed in Jacobs as having aspirate obstruents, but plain in Shipley's. Tables showing vowel/diphthong variations among the dialects are well-presented. Shipley's Proto-Kalapuyan has plain and aspirate series but, unfortunately, no glottalized series of occlusives. Since he has already ruled out glottalization for Kalapuya, he lacks one series, making two occlusives series in Kalapuya to three in Takelma when these small families are compared. In his later (but earlier published) paper, "Proto-Takelman" (1969), Shipley makes this statement concerning glottalization.

The various Kalapuyan languages have glottalized stops. Their occurrence, however, is entirely unsystematic and, therefore, unreconstructable. This is also true of the Takelma glottalization—indeed it is true for all Penutian

languages so far as I know. It seems that glottalization is a diffused, non-systematic feature in Penutian. [Shipley 1969:227–8]

Melville Jacobs was not happy with this statement. In a one-page rejoinder (Jacobs 1970), probably the last from him in print, he suggested the data be consulted again, mentioning his own extensive “holdings” in Kalapuyan materials. He found Shipley’s statement on the “unsystematic and unreconstructable” nature of glottalized stops in Kalapuyan to be “premature”.

I suspect, also, that a deduction that glottalization is a diffused, nonsystematic feature in Penutian is an expression of insufficient research. I would urge that systematic work be put in on this conclusion about glottalizations slipping and sliding around chaotically over a considerable region and popping and crackling unpredictably here and there.

Shipley makes another interesting statement with regard to the Kalapuyan data:

An extensive Kalapuyan lexicon *could* be made from the published texts of Melville Jacobs. So far, no one has stepped forward to undertake so formidable a task. [Shipley 1969:226]

The following table represents Shipley’s (1969:227, 1970: 100) Proto-Kalapuyan phonemes:

(10) Shipley’s Proto-Kalapuyan segment list

Consonants						
p		t	c	k	k ^w	ʔ
ph		th	ch	kh	k ^w h	
m		n				
	f	s	ɬ			h
			l			
w			y			
Vowels						
	i	i'		u	u'	
			a	a'		

1.5.8 Takeuchi Lone

At the beginning of 1970 Jacobs received a xxxviii+81-page manuscript from Lone Takeuchi of Tokyo. This person (whom I assume to be male) may have prepared his work under the direction of Terence Kaufman at Berkeley. Takeuchi 1969 is surely

the most noteworthy study of Central Kalapuyan between Jacobs' time (1928–37) and Berman *undated*, closely approaching the study that Shipley was imagining above. Takeuchi had a prepublication copy of Shipley 1970 and copies of Swadesh's glottochronological lists. The paper includes 7 pages on phonology (iii–ix), 25 pages on morphology (including a good deal of work toward the solution of the verbal prefix complex, together with lists and examples of aspectual and objective suffixes, x–xxxiv), 2 pages on his transcription (xxxvi–xxxviii), and a comparative glossary of Jacobs' Santiam and the Frachtenberg-Jacobs Mary's River material running to 972 items (pp. 1–80). It has apparently long circulated privately among those studying Kalapuya. I will discuss his phonological discoveries.

Takeuchi goes over the same words from Shipley 1970, which I alluded to above, looking for aspiration in medial position and finding it, except in clusters with affricates (c). He is the first, as far as I know, to state clearly that "The distinction between aspirated and unaspirated becomes neutralized in final position", for which he writes everywhere "an aspirated C". As for glottalization, however, he follows Shipley in regarding it as non-phonemic, for which he gives two reasons: (1) frequent variation with the unaspirated (plain) series, and (2) the fact that "consonant plus glottal stop becomes glottalized consonant" (as in (11b) below). I reject the first reason as follows: Frachtenberg had some difficulty in sorting out plain (released word-finally) from aspiration from glottalization (also released with aspiration word-finally). Beyond this, I attribute the variations to dialect borrowing or possibly transitive/intransitive distinctions probably borrowed from Takelma (not, as Berman (e.g., 1990:30) has done, to consonantal symbolism, the evidence for which simply does not seem to be there). What is happening in the example of Takeuchi's second reason is the regressive spreading of glottalization from a glottal initial or a glottalized resonant to a preceding plain stop, as in (11a) or (b).

$$(11) \quad (a) \quad K + ?V \rightarrow \acute{K}V \qquad (b) \quad K + ?R \rightarrow \acute{K}R$$

The glottalization feature appears to belong to the stop, but is actually carried by both. This is a common enough situation. What is remarkable is that linguists have continued to look at those little apostrophes of Jacobs as random glottal stops, rather than as parts or fragments of unit phonemes, including the plain (or aspirated in release) consonants which follow the catches. In his vocabulary, Takeuchi indicated initial glottalization only.

Takeuchi accepts labiovelars (as have Jacobs and Shipley), though noting (p. vi) “that the sequence kwu does not occur in S[antiam]K[alapuya].” His major reason for labiovelars, quite correctly, is to avoid a third initial consonant. Takeuchi follows Swadesh 1965 in writing *hw* for <f>. He regrets it, though, noting “that regularity and rules in these forms are only obtained by regarding the hw-sequence as one unit f.” He finds a maximal double-syllabic patterning of CCVVCCCVVCC.

Perhaps his greatest discovery is that the variation among front and among back vowels, respectively, demonstrates the lack of distinctiveness in what sound like very different vowels.

In the great majority of cases (as can be easily found out from the vocabulary) either M[ary's]R[iver] or SK has a variant i, a, u where the other may have e, o.

He notes the MR *a* ~ S *e* distinction (which is largely spurious; see the discussion under Berman), and goes considerably farther:

As a very impressionistic summary of the vowel distribution and alternations in unstressed syllables and espec. affixes, it could be said: espec. in prefixes there is a distinction between high and low vowel, i.e., alternations are u/i, and a/e. Mainly in the suffixes, however, the distinction seems to be front/back or rounded/ unrounded, i.e., alternations are a/i/e and u/o The stressed vowels remain stable also in terms of quantity short and long, where there may be unpredictable variations in unstressed vowels.

I found this especially interesting, having uncovered the same general understanding independently at the time of reading.

He lists five “P-rules”, which he is among the first to observe. These are (with my comments in brackets) listed in (12).

- | | | | |
|------|-----|--|---|
| (12) | (a) | geminate simplification | [C ₁ C ₁ → C ₁ . Yes.] |
| | (b) | nasal assimilation | [Relies on a feature ANTERIOR. Highly questionable.] |
| | (c) | affricate simplification before “dental” | [Yes.] |
| | (d) | labiovelar reduction to velar before #
(and k/g opposition neutralized) | [Yes;
and yes.] |
| | (e) | liquid reduction to w before velar | [Rounding may regressively be the assimilatory trigger, though a following liquid apparently triggers regressive <i>dissimilation</i> of positional geminates.] |

There is no doubt that Takeuchi's work represented a huge step forward for Kalapuyan studies. Takeuchi's phonemes and notes are represented in (13) just as he put them on his page iii. (His ə and possibly Chin. ɑ are epenthetic; cf. my ɪ and /ə/.)

(13)

		Consonants					
Aspirated stops:	p	t	c	k	(kw)	ʔ	
Unaspirated stops:	b	d		g	(gw)		
Fricatives:	f	s			h		
Nasals:	m	n					
Laterals:		l/ɬ					
Glides:	w	yʒ			(ʒTakeuchi actually uses j.)		

		Vowels		
High:	i		u	Length: long/short
Low:	a			

Alternations:		ə is a variant of i. [Yes.]
[sic]		ɑ in words borrowed from Chinook. [?]

It is difficult to look at this material and not be impressed at the tremendous amount of work involved. Unfortunately, insightful as it has been, Takeuchi 1969 was based upon the published texts. No phonological approach can do without direct use of the source material.

1.5.9 Yvonne Hajda

Yvonne Hajda (1976) wrote "Mary's River Kalapuyan: a descriptive phonology" of that Central Kalapuyan dialect as her (unpublished) MA thesis in Anthropology at Portland State University. Her bibliography does not mention Takeuchi; she was presumably unaware of his manuscript. Through analysis of the six texts making up the first two of Frachtenberg's thirteen notebooks of William Hartless' dictations of *P'inequ* myths, what she "attempted to do here is to present as complete an analysis as possible of the 'taxonomic' phonemic system of the Mary's River dialect" (p. 11). This was done by counting occurrences of individual forms and positing model forms where plausible. Her discussion and analysis occupy about half of the 64-page thesis. While no phonological rules or constraints are made explicit as such, she offers insights into the makeup of the phonology.

She found that “glottalized obstruents ... are in complementary distribution with sequences of glottal stop plus obstruent (such as final ʔp).” (p. 27) Unfortunately, she does not follow this important insight throughout; instead, she worries about counting ʔ as an unnatural third member of a cluster: “[ʔ] may not be a segmental phoneme (though I am interpreting it as one)” (p. 26). Jacobs (*ca.* 1930) had noted that glottalization could be used as morphemic juncture, as a stylistic element (he thought, before a final consonant), or as an independent phoneme. She notes (p. 28) that ʔO_c as final glottalization appears to pattern differently, depending upon whether the occlusive is t or ts on the one hand (which generally appear to vary finally with ʔt or ʔts) or ʔk or ʔp (which do not). Hajda found the situation worse for aspiration, where initial $[\text{h}]$ varies with final $[\text{ʔ}]$, and full glottal stops are marked for aspiration.

... Frachtenberg sometimes writes aspiration after both glottalized and unglottalized stops, so aspiration cannot be used to sort out the two stop series [deduced], in Mary’s River, at least. They may be glottalized-unglottalized, fortis-lenis, or clusters vs. single stops, but not aspirated-unaspirated. [p. 30]

Some of this confusion seems to have no basis. Hajda found a complementary distribution of glottalized consonants, but still thought all three series were neutralized finally. It did not seem to occur that finally consonants could be both preglottalized and released with aspiration (as F clearly marks, though not consistently). Nor that final glottal stop itself could be released with aspiration, like other stops.

She declares that “Intermediates generally do not occur preceding stress; they tend to vary with unglottalized stops wherever they occur.” Jacobs’ “treatment of the Mary’s River material, however, shows greater patterning than is visible in his own Santiam, for some reasoning.” This statement is unjustified. While intermediates are more common in Jacobs’ Santiam, a count in the first Mary’s River tale in Jacobs 1945 reveals 171 occurrences of an intermediate as onset of a stressed syllable in the Frachtenberg material of 194 lines. This is almost one per line, hardly a basis for such a temerarious complementary distribution. In the end she declares, like Shipley, “There seems to be evidence for two phonemic obstruent series” (p. 30). Hers, however, are glottalized and plain rather than his and Takeuchi’s aspirated and plain.

Many of her judgements, such as labiovelars as unit phonemes (p. 26, as Takeuchi had found, the labialization dropped in final position), are made on the basis of segment clustering. Thus three segments seems one too many for Central Kalapuyan stem-initial and word-final clusters—as Takeuchi had also found, though he accepted up to three (word-)medially. (The random glottal stop is the gate crusher.) Hajda gives a table of what she calls “initial clusters” on page 35. Since Frachtenberg wrote the unaccented and very proclitic verbal prefixes as separate words, and the nominal determiner *a(n)-* (*/ʔn/*) is easy to segment, we may assume that this means ‘stem’ or ‘root initial’. She notes that *ḳ ḳʷ y w l m n* “occur only as second members.” That is, glottalized or labialized consonants occur only before vowel; resonants may appear in that slot too. Hajda notes a few consonants that do not cluster and erroneously includes /l/ in this group. ([x] is more problematical; she states that Frachtenberg found six examples of it. I believe I hear it clustering in second position in a couple of places on the Swadesh tape, probably */ḳ/*.) She is quite right, however, to note that /h ʔ/ do not notably cluster at all, making the apparently spurious presence of the glottal in triple-member final clusters seem stranger still. She eschewed medial (presumably root-morpheme final) clusters, finding them troublesome, but gives two examples (including */swánkswaku/* ‘crawled’). She finds (exclusive of the glottal catch) only /m n l/ patterning with final /p t c k/ in final clusters, which is correct. That she does not dwell in depth on clustering with regard to the syllable per se is not surprising; before *Syllables and Segments* few phonologists looked there for insight.

Hajda’s conclusions about the vowels, like those of Takeuchi, are useful. She notes that *i* ‘go’ and *yi* ‘return’ are not the same; that [i], [e], and [ɛ] all vary with each other, as do [u] and [o]. With regard to the diphthongs:

They could be written with /w/ and /y/ as second elements, but this would obscure the fact that the vowel clusters with [ɥ] and [j] in second position are distributed much like single vowels, while those with [ɥ] and [j] preceding other vowels are like other consonant plus vowel sequences. For instance, those diphthongs which are followed by /ʔ/ (the second element is never preceded by /ʔ/) in final position seem to behave like single vowels followed by glottal stop in that the stop is often retained when suffixes are added. [p. 41]

Hajda recognizes two diphthongs with long first vowels, which do not occur in Santiam. She also notes that schwa is not phonemic, occurring (1) as a short, unstressed variant of /a, i, u/, (2) as epenthetic vowel, where occur both [ə] (general) and [i] (a

possible allophone of /i/), and (3) as a glide into a nasal vowel, as written by Frachtenberg. The following represent her final set of phonemes (p. 50):

(14) Hajda's list of CK (Mary's River) segments

		Consonants					
		Labial	Coronal		Dorsal		
		Laryngeal					
Obstruents		p̣	ṭ	ç	ḳ	ḳ ^w	ʔ
		p	t	c	k	k ^w	
Fricatives		f	ʃ	s	x		h
Voiced Continuants		w	l	y			
Nasals		m	n				
		Vowels		Diphthongs			
	i	i'	u	u'	ai	ui	
	a	a'			au	a'u	

1.5.10 Howard Berman

Probably no one today has done more with Kalapuya than Howard Berman. Berman 1990 [1988] states that he worked on the Jacobs material for "three years, as time has permitted". According to University of Washington librarian, Gary Lundell (p. c.), Berman's longrange goal was a reconstruction of Proto-Takelman. With only 47 new cognates to show for all that work (no matter how carefully done), it must have been very frustrating to perceive oneself at once so near and so far away. Fortunately, Berman has left us with some other gifts of the fastidious care with which he has done his linguistic work, as well as the insights gleaned. First of all, his box of file slips of Jacobs manuscript material (Berman: undateda), all variant forms noted with their page in the published work, is a real pleasure to use. Secondly, in the course of his studies, Berman (undatedb) reconstructed the Santiam verbal prefix system. This slightly inflected affix bundle, prefixed to the verb root, containing tense/aspect-person, mode, plurality, directionals, and a couple of special adverbs is virtually half of the grammar of the language. Finally, he has left us with a reconstruction of Proto-Kalapuyan (Berman 1990). This reconstruction is far superior to Shipley 1970, chiefly because of the care Berman has taken to go to the source materials. As he pointed out in Berman undatedb:3-4, 1990:33, there were a good number of changes made between the dictation

of most of the notebooks and Jacobs 1945. The most confusing of these is what (perhaps 96% of the time) is an allophone of //a//, usually written by Jacobs as <á> in the notebooks but as <ε> in Jacobs 1945, i.e. as a member of //i//. This and similar unfortunate attempts at regularization make it incumbent upon the scholar of Kalapuyan segments to base his study upon the original notebooks.

Without discussion (except for chiding Swadesh with inappropriate reanalysis of oo to uu, 1990:28), Berman undatedb:2 and 1990:33 detail the "sound system" of CK. He assumes three obstruent series (which I agree with) and five vowels (which I do not), plus length. Mere reconstruction of a given segment (say o or e) does not mean that it was phonemically distinct in either the mother language or the daughter language; a conditioning environment may drift down into daughter dialects unchanged. He finds Central Kalapuyan by far the more conservative language, with only diphthongal shifts from Proto-Kalapuyan *iu to ui in Central and usually to *ai to Santiam a(·). He (undatedb:2) correctly analyzes *f^w* and *h^w* as allophones of "f" (my //φ//). His segments (plain are *aspirated*; voiced are *lenis plain* or *intermediate*) are as in (15):

(15) Berman's CK segments

		Consonants					
		Labial	Coronal		Dorsal		Laryngeal
Obstruents	Glottal	p'	t'	c'	k'	k'w	ʔ
	Aspir	p	t	c	k	kw	
	Plain	b	d		g	gw	
Fricatives		f	s	ʃ	x		h
Nasals		m	n				
Liquid				l			
Glides		w		y			

Vowels				Diphthongs	
i	i'	u	u'	ai	au
e	e'	o	o'		ui
a	a'				

Berman undatedb:2-7 mentions a number of phonological processes, directly or indirectly, in Santiam. Unfortunately, the conditioning factors are not adequately given ("sometimes", "occasionally", "usually", "probably", or "optionally" are inevitably

listed). ((e–q) below are enumerated 1–10 on pages 4–7.) I summarize them informally here in (16) from the examples given; the names stated by Berman are sometimes confusing. (The bracketed notes following the entry of each rule are mine. I apologize for their brevity; many of these items go well beyond what is possible here.)

(16) Berman's phonological notes (and mine)

- (a) The merger of *f* and *w* after aspirate consonants.
[This refers to the nature of //ϕ// and its allophones.]
- (b) $C + ? \rightarrow C'$. [Discussed in Takeuchi and Hajda.]
- (c) $C\# \rightarrow ?C\#$. [Discussed in Hajda.]
- (d) $a \rightarrow a'$ / {'apical stops', *y*, *h*, 'occasionally elsewhere'} —.
[Appears to be normally subphonemic lengthening; exceptions go beyond this thesis.]
- (e) $CVCVCVC\#\acute{V} \dots \rightarrow CVCV\cdot CVC\#\acute{V} \dots$
[An interesting prosodic feature, whereby feet may be marked every other syllable (away from the stress in the leftmost root syllable) by weight. To be investigated in another format.]
- (f) $CV\#\acute{C}\acute{V} \rightarrow CV\#\acute{C}\acute{V}$. [Perhaps ~ instead of →; uncertain.]
- (g) $\check{v} \rightarrow \text{ə}$. [Also noted by Takeuchi and Hajda. This is the epenthetic V that I write *i* and find affected by (i) and (m); $i \rightarrow i$, u . /ə/ is a separate epenthetic vowel.]
- (h) $din\check{v} \rightarrow \{d^2n\check{v}, ^2n\check{v}, n\check{v}\}$. [Morphologically complex; not discussed here.]
- (i) $i \rightarrow u$ / — *w*. [Along with (m), illustrative of Santiam front-back harmony: rounding before *w*, labiodorsals, or back vowels if the regressive target is epenthetic.]
- (j) $V_1\text{-}hV_2 \rightarrow V_2\text{-}hV_2$. [What I call "vowel attraction". It works not only across *h* but across any *C* to targets in the verb prefix, especially where two triggers (at least one regressive) are involved. It appears to be distinct from the more restricted harmony of items (i) and (m).]
- (k) (i) [SONOR]-V → [SONOR]-?V.
(ii) [SONOR]-R → [SONOR]-?R.
[This is not 'glottal stop insertion' but recognition that (1) every root must begin with a consonant (if underlying ?), and (2) glottalized resonants exist.]
- (l) (i) {*n*, *m*} → [NASAL, αPLACE] / —[obstruent, αPLACE].
(ii) {*n*, *m*} → [NASAL, βPLACE] / —[obstruent₁, αPLACE] [obstruent₂, βPLACE].
[In a potentially interesting example, B. notes that nasals occasionally assimilate to the more distant member of a cluster (the one closer to the vowel).]

- (m) $u \rightarrow i / \text{---} [(\text{NASAL}) \{\text{CORON, DORS}\}]$.
 [Attraction of the vowel to coronal is maintained even if the coronal (nasal) assimilates to dorsal.]
- (n) $m \rightarrow \emptyset / \text{---} \{w, f\}$. [Nasals drop before (other) resonants and fricatives. (Cf. (p).)]
- (o) $u \rightarrow u' / \text{---} ([\text{NASAL}]) w$. [Compensatory lengthening of vowel where a nasal (or other resonant) drops before a second resonant, as in (p).]
- (p) $n \rightarrow \emptyset / \text{---} \{l, w, y\}$.
- (q) $C_1C_1 \rightarrow C_1$. [As B. states, 'geminate simplification'. (In the case of occlusives, a glottal stop may be left as a sign of debuccalization; $VRR \rightarrow VVR \sim V(\cdot)R(\cdot)$, as in (n-p).]
- Note: the S-M tape suggests this pattern VVN occasionally among the nasals, otherwise the extra weight appears to float optionally back and forth between V and R, but $\mu\mu\mu$; less length (V· instead of VV, say) perhaps is heard with l.]
- (q) $c \rightarrow s / \{d, n \text{ (optionally)}\}$.
 [Also Takeuchi. Bound clusters are preferred in CK, but only *two* non-laryngeal segmental *gestures* are tolerated: the [t] onset of t^{h} is elided.]

Berman's work is top-rank. He has uncovered many facets of Kalapuya phonology and diachrony that will keep those of us interested in this family busy for a long time.

1.5.11 Comparative table

It is useful, perhaps, for the reader to see the various stands on important aspects of the segmental phonology of Santiam Kalapuya. Below is a table that sums up the major points of this section. (The materials of Gatschet and Frachtenberg are not well-enough known by this writer to be able to finish their rows.)

(17)

Segmental trait: Study:	Obstruent series	Number of vowels	No. of diphthongs	∃ back dorsals	∃ back coronals	Labio-dorsals	<i>f</i>	<i>ʀ</i>
Gatschet 1877	1	5: <i>a, i, u, + e, & o</i>	?					
Frachtenberg (1913–14)	2: plain, glottalized	6: <i>i, e, ä, u, o, a</i>	[see Hajda]					
Jacobs (ca. 1930)	3: glottalized, intermediate, aspirated	many (but also 3: <i>a, i, u</i>)	3: <i>ai; au; ui, oi</i>	no	no	yes	yes	no‡
Lisker 1946	3 (glottal.?)	5: <i>a, i, u (e, o)</i>	∅	yes	yes	no	yes	no
Shipley 1970 (PK)	2: plain, aspirated	3: <i>i, u, a</i>	-	no	no	yes	yes	no
Takeuchi 1969	2: aspirated, unaspirated	3: <i>i, u, a</i>	-	no	no	yes ◊	no/yes	no
Hajda 1976 (MarysRiver)	2: glottalized, plain	3: <i>i, u, a</i>	4: <i>ai, ui, au, au</i>	no	no	yes ◊	yes	no
Berman 1990	3: glottalized, intermediate, aspirated	5: <i>i, e, a, u, o</i>	3: <i>ai, ui, au</i>	no	no	yes	yes	no
Lewis 2003	3: glottalized, lenis plain, aspirated	3: //a, i, u// (+/ε, ɔ, á, ə/ & i)	3: <i>uy, ay, aw</i> (analysis of V ₁ V ₂ as VR; *im, *iw disallowed)	no	no	yes	yes	yes

◊Writes aspiration for DURATIVE ‡Discusses them phonetically ◊Dependent upon prosody

Table 9. Comparative analyses of Central Kalapuya

In Appendix VI, another table is given for equivalences of the symbols used in Jacobs' notebooks, Jacobs 1945, Takeuchi, Hajda, and Berman based on the phonemes claimed in this thesis.

1.6 Methodology

This section treats certain issues of spelling of CK forms and how I have attempted to resolve them. The first section discusses Jacobs' background and motivation in writing CK as he did. The second deals with how one of Jacobs' (possibly many) spellings for a given morpheme or segment may be judiciously chosen instead of another.

It might be useful to look at the differences between this study and Hajda's in terms of methodology. Perhaps the primary difference is that I claim to have control of the corpus of one speaker of CK, John Hudson, and use a large number of both phonetically accurate and reconstituted forms to discuss aspects of the language including, particularly, its segments. This material is based on over four notebooks of John Hudson's dictations (and scatterings through 17 more), which originally I accessed largely through Berman's slip files, though important forms and running text have all been checked in the notebooks. (Translations are originally John Hudson's, collated onto slip files by Berman. For almost all of the running text—i.e., a conjugated verb or better—I have either revised the translation or supplied my own.) I attempt to present evidence, or at least traceable data, for all segments in their various phonological forms, at least to the extent that I comment upon them or an allophonic process that affects them. I try to present evidence for a coherent phonological patterning of the segments. I use the data from a back-up speaker, Eustace Howard (here I am even more dependent on the file slips of Berman), to check material through the 17 notebooks that record his CK dialect—for example, on preglottalized final fricatives. Hajda worked with two notebooks (the first six myth texts) out of the 12 notebooks of myth texts that Frachtenberg elicited from William Hartless, plus three grammatical notebooks. She presents only a few forms in evidence of her conclusions, relying generally on frequencies of entire morphemes rather than of segments (and their features) as I do.³⁸ Probably one the greatest differences is that my work comes after Berman's while hers was before. Berman's (undatedb) paper on the Santiam verbal prefix enabled me read CK. It was not until the basic morphology of the verbal prefix was worked out (which Berman did) that it was possible to recognize the involved phonological activity, first in the verbal prefix system, and then elsewhere. Hajda, nevertheless, was basically correct in her discussion of CK vowels.

³⁸ Hajda does not have a methodology section as such. She has "assumed that his (Frachtenberg's) symbols represent phonetic realities" (Hajda 1976:11). She begins working through a set of common morphemes, such as *lau*², ('now'), *nak* (/ʔnək/ in S, 'speak'), mentioning the numbers of the respective occurrences of complete morphemes in order to choose by frequency. "In some cases, one finds two or three variants occurring equally often in the manuscripts. These I have taken to be phonemic or phonetic variation on the part of the informant (as the others may also be, of course) rather than recorder error" (Hajda 1976:12). Where she finds Frachtenberg allowing "free variation", she immediately assumes that members are "to be treated as members of one phoneme." Finally, she does not give many arguments for her selection of segments.

1.6.1 Jacobs' background and phonetic decisions concerning Kalapuya

Melville Jacobs completed the doctoral requirements at Columbia University in anthropology under Franz Boas in December 1927, writing up the efforts of the two previous summers' fieldwork on Northwest Sahaptin as his *Sketch of Northern Sahaptin*.³⁹ Jacobs had accepted an appointment at Seattle, whereby he taught half-time and did fieldwork half-time from 1928 through 1936 (Thompson 1978). This meshed with urgent requests from Boas to investigate other rapidly vanishing languages of the Northwest. The first of these was Central Kalapuya, on which he began working with John Hudson on 30 January 1928. Having taken down vocabulary and phrases for five days, he began recording myth texts on February 5th. Jacobs' phenomenal ability to recognize the sounds of a language well enough to take excellent dictations after only a couple of days' practice can hardly be overemphasized. Little if any phonological analysis was involved at the time of recording. Having filled nearly four notebooks with Santiam materials, Jacobs moved on to work with Eustace Howard (1929–30), a more fluent though less diffident speaker, returning to Hudson for translation and other elicitation on rare occasions through 1936. Some eighteen largely unanalyzed notebooks with Howard's materials are in the Jacobs Collection.

Meanwhile, great changes were underway in American linguistics. An earlier student of Boas, Edward Sapir, became increasingly interested in the probability that "a psychological mechanism" unconscious to the language speaker mediated sounds not merely phonetic but of "a restricted 'inner' or 'ideal' system" (Sapir 1921:55).

The conception of the ideal phonetic system, the phonetic pattern, of a language is not as well understood by linguistic students as it should be. In this respect the unschooled recorder of language, provided he has a good ear and a genuine instinct for language, is often at a great advantage as compared with the minute phonetician, who is apt to be swamped by his mass of observations.

[Sapir 1921:56, n. 16]

In 1925, Sapir's renowned paper on the phonemic principle, "Sound patterns of language", appeared in the first issue of the journal *Language*. He spoke of "the

³⁹ Jacobs 1931. Though based primarily on the Northwest dialects of *x'álx'aypam* (Klickitat) and *táytnapam* (Upper Cowlitz), Jacobs also did some recording of Northeast Sahaptin as well. It is easier to cut through to the grammar in Sahaptin, with its rich consonantal inventory and lack of phonological variation (*cf.* River *wáncamkša* 'tiring out', or *xásunknikša* 'going around on horseback' [Millstein 1990], which show not even nasal assimilation to a following occlusive at morpheme juncture), than in languages with fewer consonants and more complex patterns of surface variations, like Nez Perce or the Kalapuyan dialects.

psychological 'spacing' of the phonemes ... in the phonetic pattern" common to two speakers with regard to segmental qualities free of individual variation sharing a "one-to-one correspondence" (p. 36). Allophonic variation "common to all normal speakers" "is dependent upon the ... 'point of the pattern'". Although phonetically variant according to the environment of the phone in question among neighboring segments, it "is felt by the speakers to be the 'same' sound"—e.g., a (short) vowel before a voiceless coda or a (long) vowel before a voiced coda (p. 37).

These quotes from Sapir are meant to show, by way of contrast, a course of study that Jacobs chose not to pursue. He would rely in the *phonetic* qualities of the sounds themselves for comparison. Corollaries that developed were the concepts that certain *sounds* in Northwest languages were areally related (true) and that the study of these sounds *qua* sounds was important (more questionable). He related phonetic purity to the phonetic manual of his time, Boas et al. 1916.⁴⁰ Naturally beginning by writing several kinds of vowels, as we saw in §1.5.4 above, he reduced his inventory as he got to know the language better. But at a certain point—perhaps after 1930—he stopped worrying about the environmental differences of a smaller inventory. By Jacobs 1945 (redacted by 1937), he was still using some 64 different segmental symbols.⁴¹ The systematic changes that he did make to his field notes on publication turned out largely to be untoward. Numerous marks of glottalization in the notebooks were left out, and a rough attempt at systematicity with regard to long vowels is not necessarily felicitous. Probably the worst problem occurs with regard to the vowel written generally in the notebooks as *â*, as Berman (*undatedb*, 1990:33–34, n.11) has noted. In Northern Kalapuyan dialects, //a// provides the reflex for CK //i// in certain lexical items; this may have confused Jacobs. But in Central, /â /is certainly a variation of //a// in the vast majority of cases. In a few instances, as Frachtenberg often found it in Mary's River, it appears to function as *ä* (as F. wrote it), essentially a very low variety of /*ε*/, allophone of //i//. By replacing all forms of *â* with *ε* (the standard lower allophone of //i//⁴²) in Jacobs 1945, Jacobs threw away an important distinction and confused the two vowels.

⁴⁰ "Phonetic transcription of Indian languages", Report of Committee of American Anthropological Association, Smithsonian Miscellaneous Collections, 66 (6), Washington.

⁴¹ By contrast, the revised set of underlying segments used in this thesis includes 44: 12 vocalic and 32 consonantal segments. Of course the number of segments is really unimportant; those of who study Kalapuya wish he would have just printed his excellent notebooks as they were.

⁴² Note that Berman, in all his Kalapuyan writings, uses a 5 vowel system with *i* and *e* distinct.

For such reasons, it is essential for scholars of Kalapuyan phonology to work directly from the original materials or quality photocopies thereof. At the same time, it is hoped that this thesis will help illustrate ways that Jacobs 1945 can be interpreted for those who wish to study the language structurally.

1.6.2 Methodological considerations and examples of reconstitution using formtypes

This section discusses the notions of *major allophone*, of the true or 'absolute quality' of a segment of an extinct language, and of my term *formtype*. The goal is to be able to correct common types of spelling errors in CK and thus make possible the *reconstitution* of the language. This is done primarily through comparing forms by using sets of exemplars (formtypes) to *reconstitute* morphemes as we see in example (18) below.

In §0.3.3 above, the notion of 'major allophone' was introduced. This designation represents an intermediate order, between *phoneme* as we currently think of it in phonology and the generally distinctive squiggles Jacobs used to distinguish different heights and perhaps tenseness of high front or back vowels (for instance).⁴³ A major allophone represents distinctive patterning which can be predicted, by and large, of the phoneme it maps onto, through the environments in which it is found.

Another concept that should be mentioned here is that of the 'absolute quality' of the segment, especially of the vowel segment. This is an epistemological notion, one that suggests there was at one time a best way to characterize, say, a CK vowel segment with regard to quality and length. In other words, I assume that where Jacobs may write a dozen or more different spellings for a single word or stem, there is one that is more or less correct given the grammatical situation (though not necessarily any of those suggested by Jacobs). Of course we recognize this in the present, but approaching the past one fights the analogy of a reconstituted linguistic construct, which is veridical, with

⁴³ It should be noted, perhaps, that a 'major allophone' not equivalent to a phoneme in the sense of 'old fashioned phonemics' of structural linguistics, however. This is because there is no qualification of a 'major allophone' that says that the mapping onto its phoneme, algebraically $/\alpha/ \rightarrow //\alpha//$, of whatever complexity, may or may not be homomorphic. For example, CK /ɔ/ is most likely entirely and simply explained in //u/. However, /u/ is not so accounted for, because /u/ may be of the epenthetic vowel *i* (also realizable as /i/ or //i//) as well as of the more straightforward /u/ that is part of //u// with /ɔ/. /ɔ/ is a major allophone because it can presumably generally be predicted and it carries a certain amount of weight or frequency in a certain quadrant of a vowel scatter chart. This cannot be said of the [i] ~ [ɪ] or [u] ~ [ʊ] distinctions Jacobs tried to write early in his Kalapuya career.

a given remembered theory which may not be veridical. This problem may be unique to the study of dead languages. For there is no way of going into the field and checking.

Not all kinds of symbols vary to the same confusing degree among these materials. Two types of problems most commonly dealt with, for example, are those involved with *phonation types*, the possible interchange of, say, $g \sim k \sim k^h$ or a feature mediated among those series, or *vowel qualities*, where seven short and five long surface vowels may occur of various origination. Also raised are questions like how to represent [x] or more commonly [χ], which probably do not exist in CK as phonemes, or what [ʰw] really is. One of the more frequent chores is counting the number of length marks (dots) on a particular vowel on exemplars of a morpheme, in similar or identical conditions, to note whether that vowel is long or short. The fact that Jacobs was very accurate (i.e., was very highly consistent) in marking vowel length in certain items, especially multisyllabic noun and verb stems, and far less accurate (i.e., very inconsistent) in marking others, such as certain pronominal, demonstrative or adverbial particles, suggests, together with the indifferent nature of the accent on such latter words, that there are strong reasons for separating these types of words as classes. One of the trickiest problems concerns the occurrences of glottal stops of different types. How can it be, for example, that Jacobs occasionally heard them following vocalic finals on verbs or nouns but often did not? Certainly these types of problems have not been worked through this, though the discovery of Frachtenberg's suggestion and examples of glottalization on such verbs marking PUNCTUALITY (as opposed to DURATION OR CONTINUITY) is a positive advancement.⁴⁴

As a moderate example of the type of problem implied in the last paragraph, I give the stem (here just a root) of the verb "come from, start from" from the corpus of John Hudson (originally approached through the slip files of Howard Berman). Recall that each exemplar may have several examples—other exemplars of the stem plus different verb prefixes, for example. (These are not given in the effort of simplicity, since they have no phonological effect on the stem.) The numerals following the

⁴⁴ A thorough checking of all examples of final preconsonantal glottalization to see if such aspectual differences may be behind the phonological variation observed has not been done at the time of writing. So far, there is no evidence to support such an assumption: such glottalization appears to be entirely lexical rather than aspectual with the exception of the type of examples mentioned in §1.5.3. Nevertheless, it is quite possible that such aspectual glottalization *cross-categorizes* such forms. (Note that word-final durative //ḍ//, //ḍḍ//, or //ḍnd// morphemes [CONT is generally //n//] generally realize the final ḍ as [ʰ], at least in Mary's River and Santiam, making an additional final //ʔ// marking punctuality unclear at best.) Small capitals indicate categories.

exemplar give the number of *formtypes* (or exemplars illustrating *types of exemplars* that have a positive bearing on a feature, segment or morph one is uncovering; here, identical stem exemplars) for /--yámᵑ/ , or /--yámᵑ/ as major allophones. (No number indicates an occurrence of 1.) Note that items in (18b) do not count as formtypes because they do not show the presence of the glottalization of the final occlusive. This is because of a restraint on the occurrence of glottalization which is simultaneous-with-release in CK: it only occurs syllable initially (or in reduplication of initial patterns) on the root and not before a stem vowel (except following Type 2 or Type 1 reduplication). (Although the glottalization could be underlyingly on the nasal, it is assumed to be on the occlusive primarily for reasons of distribution—there would be too many glottalized nasals. From the circumstance of the final coda, it makes no difference: in a bound cluster the laryngeal feature of glottalization is held by the nasal (**m**) and the following occlusive (**p**) equally.) Jacobs notebook symbols are given below mine for the eight spellings from JH in (18a) and the four spellings in (18b).⁴⁵

- (18) (a) /--yámᵑ/ /--yámᵑ/ $[\text{yá}^2\text{mᵑ} \sim \text{yá}^2\text{mp}^h]$ ⁴⁶ ‘come from’
 (i) -yámᵑ^h 2 (ii) -yámᵑ (iii) $\text{-}^2\text{yámᵑ}^h$ (iv) $\text{-yá}^2\text{mp}^h$ 2 (v) $\text{-yá}^2\text{mᵑ}$ (vi) $\text{-yá}^2\text{mᵑ}$ 2
 (vii) $\text{-yám}^2\text{p}^h$ (viii) $\text{-yám}^2\text{ᵑ}$ 3 /13 total
 (iJ) yámᵑ 2 (iiJ) yámᵑ^p (iiiJ) yámᵑ (ivJ) $\text{yá}^2\text{mᵑ}$ 2 (vJ) $\text{yá}^2\text{mᵑ}$ (viJ) $\text{yá}^2\text{mᵑ}$ 2
 (viiJ) $\text{yám}^2\text{p}$ (viiiJ) $\text{yám}^2\text{ᵑ}$ 3 /13 total
- (b) /--yámᵑ-i/ /--yámᵑ-i/ $[\text{yámᵑi}]$ {come.from}+{TRANS} ‘obtain from’
 (i) -yámᵑ-i 2 (ii) -yámᵑ-ii 2 (iii) -yámᵑ-i 5 (iv) $\text{-yám}^2\text{ᵑ-i}$ 2 /11 total
 (iJ) yámᵑi 2 (iiJ) yámᵑi^p 2 (iiiJ) yámᵑi 5 (ivJ) $\text{yám}^2\text{ᵑi}$ 2 /11 total

The first thing we note is that there is apparently more kinds of activity going on root/word-finally than before a stem vowel: /--yámᵑ/ has twice the number of spellings as /--yámᵑ-i/ , even though the latter is longer while the number of citations (formtypes) is about the same (85% of the first). Working through (18a), we see that (v) and (vi) are identical, except that *the accent is missing* in (v). Likewise, we may assume that (i) and

⁴⁵ Actually there are more spellings, if one takes into account the differences of Jacobs vowel <ɪ> which varies uncertainly with <ɪ> and so forth. (See (8) above, this chapter, and discussion.)

⁴⁶ I have chosen this manner of notational presentation, first underlying phonemes in double right slant marks ($\text{/}\alpha\text{/}$), followed by the lexeme expressed in major allophones ($\text{/}\beta\text{/}$), followed in turn by phonetic realization in square brackets ($[\gamma]$), often again followed by Jacobs’ original forms (in angle brackets, <δ>). One or more may be missing or the order may be reversed.

(iii) are the same as equivalent forms with \acute{a} (instead of α —*the dot is missing over the a*), though such forms are not found. In order to go further, we must do some proportions. We notice that 3 formtypes have α , while 10 have \acute{a} : \acute{a} (77%) seems to be the better choice, though some (slight?) variation may be involved. We notice that 6 have the aspirate release, p^h , Jacobs $\langle p \rangle$, while 7 have the lenis plain release, b . Here, we cannot just say this latter, b , with 54%, is the better choice. When the proportions approach 50%, we must assume that something else is going on, namely—in this case—*free variation of the aspirate release of p (p^h)*, which means that somewhere around half the time there will be no release at all (b , the lenis plain form).⁴⁷ Now we have, so far, $-y\acute{a}mb \sim -y\acute{a}mp^h$. What is missing? Glottalization! 10 out of the 13 forms have glottalization, somewhere in the morpheme. They are: initially, 1; before the bound cluster mb (which functions as the coda of this root syllable⁴⁸), 5; before the occlusive b/p^h , the last member of the bound cluster, 4 formtypes. Thus: $-^2y\acute{a}mp^h/p^h$ 1, $-y\acute{a}^2mb/p^h$ 5, $-y\acute{a}m^2b/p^h$ 4. With regard to the first example, (18a_{iii}), we may assume that Jacobs heard glottalization, but—not knowing exactly where—stuck an apostrophe in at the beginning of the root syllable. What is increasingly clear is that this glottalization is part of this final cluster, $-^2mb/p^h$. Its timing is preconsantal and it is bound equally to both segments.

What about (18b)? We see essentially the same factors, but without the scatter of the release ($b \sim p^h$) because there is no release. And, as I hope to show eventually, because there is no release, because a stem vowel follows the coda of the root syllable making the stem bisyllabic (breaking the ‘bound cluster’ apart into coda and onset), there is no glottalization.⁴⁹ In two out of eleven examples, a long final vowel was heard. (This is probably due to a late rule which slightly lengthens final vowels.) There is a 4 to 7 split here with regard to the vowel, $yamb\grave{i}$ / $y\acute{a}mb\grave{i}$. I argue in Chapter 2 that the vowel fronts because of the y initial. We are left with the lack of glottalization except in 2 out of

⁴⁷ As a rule of thumb, I tend to consider 85–100% of the formtypes of a given form (virtually) certain; 65–85% probably; 35–65% probably wrong (in that the relevant factor has almost certainly not been featured yet), 15–35% probably not, and 0–15% as certainly not so.

⁴⁸ I use the term ‘root syllable’ merely to indicate a peculiar CK root shape, that is syllable-like. It may have one or more stem suffixes, as in (18b). This is overwhelmingly the general pattern for verb roots in CK; noun roots are similar, but more often have perhaps extended-root-level suffixes or are otherwise bisyllabic or even longer. By itself, the CK root is generally of one syllable, maximally $(C_1)C_2V(R)(C_3)$, where C_2 , any consonant, optionally with one preceding obstruent (O_b) as C_1 , is onset to V , any vowel, with R either the second mora of this vowel or diphthong (bound to V), or as a heavy resonant (L, N). In the first case, C_3 may be any consonant; in the second, it may be only an occlusive, O_c , bound to the preceding R .

⁴⁹ It could be said that CK simultaneous-with-release glottalization is ‘licensed’ only initially on the first onset of the root, a pattern complicated only slightly by reduplication.

the 11 formtypes (18biv): **yám̐bi** 9 / **yám̐ʔi** 2. I have no good explanation for this. If I am correct, and **//yam̐//** is the underlying form of the root, it may be that *some* glottalization leaks out in performance error of **//-yam̐-i//**. In other words, part of the mind knows that this root terminates in a glottalized consonant, so—perhaps in hesitation—it is occasionally pronounced even though the rules of the language ordinarily block it because it is consonant non-initial to the root.

Let us try looking at another moderate example in (19).

- (19) (a) **//-yi.k̐//** (?), /-yik^h ~ -yik̐/, [yík^h ~ yíʔk^h] ‘bite’
 (i) -yík^h 4 [-yík^h, *-yík^h 3]⁵⁰ (ii) *-yíʔ (iii) -yíʔk^h (iv) -yíʔq^h 3 /9 total
 (iJ) yíʔk̐ 4 (iiJ) yíʔ (iiiJ) yíʔk̐ (ivJ) yíʔq̐ 3 /9 total
- (b) **//-yí.k̐-ni//** (?), /-yíik^h-ni/, [yí:k̐ni] {bite}+{OBJ.COUNT} ‘bite it’
//-yí.k̐-i-q̐// (?), /-yíik^h-i-q̐/, [yí:q̐i] {bite}+{DUR} ‘when [= ‘at/during the time that’,
 TEMPORAL mode] [she] bit [= ‘was biting’ with AORIST DURATIVE]’
 (i) -yíik^h-ni 3 (ii) -yíi-q̐ /4 total
 (iJ) yíʔk̐ni 3 (iiJ) yíʔq̐ /4 total

We notice, first of all with (19a), that all forms have a final velar except (ii). In (ii) the form appears before the demonstrative form **gus** ‘that’. The following dorsal occlusive makes a positional geminate pair in CK (despite any differences in phonation, final and initial). Since geminate segments are disallowed in the language, the first dorsal (i.e., on -yík^h) is converted by debuccalization⁵¹ into a glottal stop, ʔ. Since we can get no sense out of a question whether dorsal this would have been **k^h** or **ʔk^h** or something else, we see that we must throw away this example; it cannot be used as a formtype. Items (iii) and (iv) collapse to what I write as **-yíʔk^h** (wherever on the dorsum it is pronounced). We are thus left to consider the following: **-yík^h 4 ~ -yíʔk^h 4**.

⁵⁰ The asterisk, fairly rare in Berman’s slip files, indicates something is wrong: judging from its use elsewhere with forms with symbols identical to those used in Jacobs 1945, I assume it indicates that Berman has not seen these particular items. Those in (19ai) and (aii) are from a short ethnographic fragment, #79, on page 2 of notebook #80, which I haven’t copied. Any of the forms in (19ai) *may* actually be <yík^h>, or they may be <yíʔk^h>, or something else. (Note: the symbols written in (19a) are mine; those written in (19b) are from Jacobs’ notebooks, often through Berman’s files.)

⁵¹ Debuccalization means that a segment is reduced to a laryngeal feature, in this case the final dorsal of -yík^h becomes merely ʔ. Debuccalization in CK is discussed in Chapter 3 (§3.8.2).

There are there are two things wrong with this example. (1) If we take this variation seriously, we cannot agree to granting glottalized status (i.e., **k̚**) to an example that only shows glottalization 50% of the time. Something is wrong or something else is going on. This indicates that the example should be put aside for the time being. (2) The asterisk on examples from ethnographic fragment #79 (Jacobs 1945:76) indicates that this three of the four formtypes indicating final **k̚** have not been checked in the original notebook. In other words, there could be more formtypes with **k̚**.⁵² There is always, too, the question of whether in jotting down the data Jacobs always heard the glottals.

The result of (19) is that we cannot use it to determine final glottalization. A third example may be useful. This one in (20) is not of a normal verbal or nominal root, but rather of the class of adverbial/demonstratives.

- (20) //g̥u// /g̥ù ~ g̥ùu/ [g̥u ~ g̥u: ~ g̥ú ~ g̥ú:] (a) 'that'; (b) 'there, yonder, over there'
 [Berman's glosses]
 (Derivations involve //g̥u-s// 'that, the, there, then' and //g̥u-s-i// '(right) there, thus'.)
- (a) ku
- (b) ku ku ku· g̥ú· kú· kú· kú· kó·
- (c) məkú· (//mi-g̥u// /mi-g̥u/ {NCONJ}+{that} 'that which is over there')

Firstly, Berman started two slip files, thinking no doubt that the short form **gu** in (a) was probably different than the long forms in (b) such as **guu**. My best guess at this point is that there probably isn't any difference, that (a) and (b) are the same form with very slightly different meanings as we approach the usages closely. If so, that means we have, collapsing the equivalent vowels, the following:

- (20) (d) (i) **gu** 3, (ii) **guu** 5, (iii) **guuu**, (iv) **mi-guu** /10 total

The third form in (20d) is no doubt pragmatically long. There is some data that suggest that final particles in polysyllabic words are lengthened. If so, then we cannot count (iv), since we would not know why it is long. The formtypes for length, then, are **gu** 3 ~ **guu** 6 /total 9. Referring again, however, to the marking of stress on the various examples: we see an unusual variety (not unusual for demonstrative roots). We are left to surmise that this is probably due to a variety of grammatical and pragmatic factors,

⁵² See above, note 41. The only two forms in the Eustace Howard s.f. are consistent with the glottalization interpretation: **-yík̚** and **-yík̚-q-u**. (Of course, only the first is a formtype.)

which result in certain kinds of stress placement. Stress, of course, tends to lengthen vowels; only one long vowel is not marked with stress. (In general, nominal and verbal roots are always marked clearly and sharply for stress; such variation would not be found there.) This idea, together with the derivative forms written //ḡu-s// and //ḡu-s-i//, suggests that it may be that there is no distinction in length among the demonstratives. (I mark adverbials and demonstratives with grave accents to indicate the variability of their surface stresses.)

This is the kind of procedure which must be done with every root morpheme (the prefixes, suffixes, and members of the demonstrative/adverbial class have other problems) in order to ascertain its correct spelling. Basically, a weighting system of proportions is used. Exemplar forms, such as those (if one is studying the root/stem) with other verbal prefixes or with other stem suffixal complexes, make up the formtypes, that must be referred to. While it is known that the prefixes do not affect the stem phonologically, in other cases (such as stem suffixal variation) each formtype or set of formtypes must be checked to make sure that there is no untoward effect, i.e. that no feature or segment is blocked or shunted toward an unexpected variation. A suffix vowel opening up a new syllable, for example, will have regressive influence on the root; such examples therefore cannot be used, as in (18b). Nor can post-root vowels that may be affected by still later stem vowels be used in attempts to show underlying vowel purity, for example. Again, the reasoning here is based upon the idea that the formtypes of a set of exemplars is, very roughly, equivalent to the entire set of forms throughout a given CK corpus. There are no doubt some problems here, many of which will be cleared up when a larger corpus is available.

While working at the Jacobs Collection, in fact, I was very fortunate to have been granted access to Howard Berman's very near exhaustive set of file slips for John Hudson and his surely completely exhaustive set for Eustace Howard. Berman had recorded all independent (or clitic) particles, adverbs and word stems in each of the speech of the two Kalapuyans from Jacobs' 4 notebooks of Hudson dictations and 17 notebooks of Howard (and Hudson). His 3" x 5" slip files (filling two boxes with the slips of two CK speakers and one NK speaker recorded by Jacobs) are the most accurate

of this kind of recording that I have ever seen, beyond all expectations.⁵³ Without the use of these extremely accurate lists, this project would have taken far longer than it did.

One backup used to check the reconstituted lists such as those discussed here is the list of some 530 words (and phrases) recorded on tape by Morris Swadesh and Robert Melton from John Hudson on 5 July 1953 (Swadesh 1953, 1954).⁵⁴ This excellent tape adds much depth to CK studies and will be used effectively in future acoustic studies.

1.6.3 Writing CK

This thesis attempts to provide both a phonemic representation to CK sounds and words, and a more readable one (closer to the sound of the language). The phonemic representation is placed between double right slash marks, //—//, where not otherwise noted. However, it was once suggested to me⁵⁵ that one could not take stories or other dictation down in a system of purely *phonemic representation*. The sense was that too much phonological information would be lost. Who, that is not a speaker, would be able to make all the connections rapidly enough? Likewise, in languages where vowels are epenthetic and other processes obscure the surface sound forms, it is useful to have a system of writing that is closer to the surface. Here I employ what I call writing in *major allophones*, between single slant marks, /—/. Normally, at least initially, only the major vowel allophones and the stem-initial/medial/final variants of the consonants are used. Where a closer representation is needed, Jacobs' or other manuscript forms are written in angle brackets, <α> (though the scripted font for J., where used, obviates this), or an attempt at a phonetic rendering impressionistically from the Swadesh-Melton tape, or

⁵³ Incredibly, I found no definite fault with regard either to his notation (though, at least for JH, he fails to record Jacobs' initial [i ~ ɪ] and [u ~ ʊ] variations) or to his page referencing in Jacobs 1945. (Generally one, though often two and sometimes three examples are noted against the exemplar by their page numbers in *Texts*.) Berman, however, missed (at least, in the slips available in the library) vocabulary citations from Hudson during his first session with Jacobs in the morning of 30 Jan. 1928 (notebook 33: 50–6), as well as much of the paradigmatic material in the early notebooks, viz. 33 and 34, including interesting verb forms. (None of this material is in Jacobs 1945. Berman clearly was concentrating on the continuous texts that Hudson related to Jacobs.) Berman also made a set of slip files from the Twalatin speech of Louis Kenoyer that Jacobs recorded.

⁵⁴ Berman (1988:3) remarks, "Whatever one may say about his historic work, Swadesh performed an invaluable service to linguists by recording so many languages on the verge of extinction. I only wish he had had the time and resources to do a Hokan vocabulary study too." Considering the accelerating rate of language death today, how much more of a wake-up call this is now!

⁵⁵ Mary Haas, p. c., Berkeley, 1967. I think she said "morphophonemics" and corrected herself to "systematic phonemics".

maximally from Jacobs' transcription, may be made with square brackets, [a]. (Where this writer was not able to consult an actual notebook form at the time of writing, the page and line numbers for the citation are omitted. In such cases, an analogical representation of the Jacobs' script is interpolated based on the representations in the slip files of Berman (undateda).)

Similarly, in order to avoid any possible prejudicial ambiguity (expected of those whose first languages have only two laryngeal series), it has seemed to me best to represent such a 3-system with three sets of characters, rather than associating character sets with that of a 2-system language, such as English or Sahaptin. In this thesis I represent all occlusive characters with built-in diacritics; the lenis-plain series uses a distinct character type consisting of a normal roman voiced character together with the diacritic of a tiny underlying circle (◌) underneath, consistent with voicelessness. Such a system avoids any confusion of the 'intermediate' or lenis-plain type with any 'voiced' or other 'voiceless' variety. It also allows for an unmarked 'archiphoneme' where laryngeal distinction is not made.

1.7 Conclusion

In this chapter, we have looked at the Kalapuyan tribes, at their location at IndoEuropean Contact and their linguistic milieu, at the Kalapuya linguistic family, and at the known, well-attested dialects of this family and of Central Kalapuyan (CK) in particular. A provisional *Stammbaum* of Central Kalapuya dialects has been attempted. Analyses of Kalapuya that have been attempted with regard to CK phonology, especially with regard to the efforts of Takeuchi, Hajda, and Berman, have been reviewed. Finally, the system of methodology used with regard to Jacobs forms has been discussed, including reconstitution by segments using formtypes.

Chapter Two
Introduction to CK Vowels

2.1 Introduction to the vowels

This chapter discusses what is known at present of the surface and underlying vowels in Central Kalapuya. The set of underlying vowels is perhaps best thought of as a proportional set of three systematic vowel phonemes, //a, i, u//. Three observed varieties of vowel length—short, variable, long—are shown. Jacobs' own writing of CK vowels is reviewed before giving an introductory analysis to the major vowel allophones of each of these three underlying vowels. (Dialectal variation, particularly with regard to the variable raising of /a/, is a concern.) Finally, two types of epenthetic vowels are discussed for CK, ə and i, the second of which may be either /i/ or /u/, depending upon a consistent rounding/backness harmony. Unbracketed data should be considered phonetic.

The vowels in their three lengths (all stressed nuclei of verbal or nominal roots) may be represented phonemically as in (1).

(1) **CK underlying vowels**

	//V//		//V•//		//VV//	
(a) i		u	(b) i•	u•	(c) ii	uu
	a		a•		aa	

(1b) is realized as either short or long, depending upon whether the root vowel is in a monosyllabic or polysyllabic stem. There are also three diphthongs, essentially //V₁V₂//, as we see in (2). Like the long vowels, they represent two morae of prosodic weight.

(2) **CK diphthongs, //V₁V₂//**

	uy	
ay		aw

These three vowels bear fully functional loads. I give three examples. Suffixed to a verbal root, they may indicate relational features of *transitivity* or activity in -i, *intransitivity* or stativeness in -u, and neutrality (though generally either unaccusative or unergative) or vocalic prefixation to a more involved stem suffix in -a, as we see in (3). An example of each is seen in (3).

- (3) (a) //i// /-laam-i/ bring, take inside
 (b) //u// /-laam-o/ come, go inside
 (c) //a// /-laam-a²yok^h/ be brought inside

They may take part in the inflexional stem suffix which is a result of the blending of categories of case, verb class (according to *Aktionsarten*) and durative/nondurative choices, declarative/negative sentence type, and the three persons. A simple example of this shown in (4).¹

- (4) (a) //a// /-diid-á²d/ give me
 (b) //u// /-diid-ub/ give you
 (c) //i// /-diid-i²d/ give him

In a similar way, only qualities of CK vowels are reproduced by reduplication. Let us look at examples from Type 3 (see Appendix VII).²

- (5) (a) //a// /-ts^hwald-á²-o/ -ts^hwált-at-o '(be) bawling'
 (b) //i// /-g^hélt^h-its^h-o/(?) -g^hélt^h-its^h-o(o) 'bright'
 (c) //u// /-p^hooφ-uφ/ -p^hooφ-uφ '(be) blowing'

The three diphthongs, //uy, ay, aw//, which may be written either as vowel clusters, *ai, au, ui*, or as vowel plus glide, *ay, aw, uy* (as I write them here), since their doubly-moraic (μμ) natures may pattern either as individual long segments (true diphthongs) or as Vowel + Resonant clusters.³ Although there are suffixal particles (and other forms) that begin with the consonantal equivalents, i.e., *-ya, -wa*, the opposite vocalic forms, such as **ia, *ua*, are not found. Nor are combinations like **i-w* or **i-m*, especially across morpheme borders, allowed among the sonorants. (This appears to be strictly followed only in Santiam.) Labiality (rounding) would back the coronal (i > u).

¹ It is likely that the vowels in (4b) and (4c) actually represent an epenthetic vowel, *i*.

² The third column in (6) gives F.'s forms from his grammatical notes. The second column are reconstitutions, questionable because F. marked only two phonation types consistently in CK; two out of three corrected with reference to EH and JH's forms.

³ Variations, such as (ɔi or) ɔy as major vowel allophones are also to be noted, consistent with the methodology in this thesis (though when Jacobs has written *o*, I should follow suit, not knowing if it represents /u/ or /ɔ/ (assuming there is this difference among major allophones).

Except for a real possibility in shifted α / $\acute{\alpha}$ (ϵ) vowels, nowhere does one find any minimal pairs occurring among these allophones except to the extent that they represent the three underlying vowels, // α , i , u //.⁴

These forms are virtually the same as those used by Melville Jacobs in his notebooks, except more regularized. Most of the materials discussed in this thesis, including vowels in this chapter, are based upon an analysis of the vowels of John Hudson (JH, or supplemented by those of Eustace Howard, EH, speaking a slightly different dialect), as transcribed by Melville Jacobs. We will now look at the forms Jacobs actually wrote. The examples given in (8) are symbols used in his notebooks. They changed slightly through the course of his CK elicitation career, as we notice from (8a) to (b).

(8) Jacobs' CK vowels, short only represented here except for diphthongs.⁵
(Parentheses indicate symbol rarity.)

(a)	\imath	ι	\mathfrak{z}		\mathfrak{u}	\mathfrak{v}	\mathfrak{u}		$\mathfrak{a}\mathfrak{v}$		$\mathfrak{a}\mathfrak{u}$
Feb. 1928	ϵ		α		\mathfrak{o}	$(\mathfrak{ö})$	$(\mathfrak{ô})$				$\mathfrak{u}\mathfrak{i}$
	$(\acute{\alpha})$	$\acute{\alpha}$			$\mathfrak{ɔ}$						
			\mathfrak{a}								
(b)	\imath	ι				\mathfrak{u}	\mathfrak{u}		$\mathfrak{a}\mathfrak{v}$		$\mathfrak{a}\mathfrak{u}$
19(30–)36	ϵ		α		\mathfrak{w}						$\mathfrak{u}\mathfrak{i}$
			\mathfrak{a}								

In (8a), we see the vowels used by Jacobs in recording the first Santiam myth text he wrote down, six days after he had first heard the language of Santiam. Note the many attempts to carve up high vowel space, particularly at the beginning (February 1928). That these fine distinctions which I write as / i / were important to Jacobs is shown by occasional corrections he made in his notebooks, overwriting \mathfrak{z} with \imath , or \imath with \mathfrak{z} . Jacobs also wrote certain vowels far less in the latter part of his career, such as short ϵ (instead of $\mathfrak{æ}$), while $\acute{\alpha}$ disappears.⁶

⁴ The writing of these allophones is dependent upon estimations of frequency ratios of exemplars or formtypes, recorded by Berman (undateda) from Jacobs transcriptions. For a discussion of form-types and methodology, please see the discussion in §1.6.2.

⁵ Jacobs' long vowels are the same as those written in (8b), less α but plus lengthened $\mathfrak{ɔ}$.

⁶ An example of Jacobs' writing where he clearly intended a difference among the high vowels is seen in notebook 34:35 when he was in his second week of work with JH. Note the forms below:

That he was centering his vowel space for the sound of //i// somewhere lower than English //i//, is clear from his notes. Thus in *Texts* (1945:15), he writes (despite the fact that nowhere in *Texts* does a printed vowel *ɪ* occur) his note 37:

ɪ, i. Probably historically related to *ε, e*. The sound is acoustically between English *ɪ, i* on the one hand and English *e* on the other, but closer to *ɪ, i*. The entire Oregon-Washington area has this intermediate sound, which I always write as *i*.

These were followed by attempts to look with an equally fine scope at back vowel space. In parallel, we should note his note 39 (likewise noting that *ʊ*, written in the notebooks, nowhere occurs in *Texts*):

ʊ, u. Perhaps the entire Oregon-Washington area has this sound, which I write *u*; it is acoustically a sound between *ʊ, u* on the one hand and *o* on the other, but closer to *ʊ, u*. An occasional variant may be *ω*.

The goal of this fine transcription was aimed at setting absolute phonetic values for the vowel ranges he encountered, it seems, rather than teasing out allophones. These vowel ranges were then to be compared with the absolute ranges of other languages in the Northwest Linguistic Area. (The notion of *phonological* or *allophonic* comparison appears not to have been followed.) The attempts at such fine transcription lessened toward the end of his Kalapuya career (item (8b) above, late summer 1930 through 1936). Still, Jacobs continued to write extra vowels where he presumably knew well that phonologically there was only one. All of these vowels, except *α* [ə], may be long. (Words with long *āā*, however, are very few; notice that *ā* drops out altogether in (8b) during the 1930s when Jacobs was only incidentally transcribing with JH as they reviewed EH's dictations.) Jacobs noted that long *ii* and *uu* were higher, "brighter, more metallic than short" *i* or *u*. The low back vowel *ω* was introduced later in his Kalapuya career as a lower, closer back vowel (a variation of *ɔ*), which Jacobs eventually preferred and wrote instead of *ɔ* (or *o*) everywhere. He later changed all such mid-to-low back vowels to *ω* when editing his material for *Texts*.

-
- | | | |
|------|-------------------|--------------------------|
| (i) | <i>kwəm'ítip</i> | <i>he jumped over it</i> |
| (ii) | <i>kwəni'ítip</i> | <i>they " " "</i> |

The second form of /*g̊əm(-ni)-ʔiɸ*/, RPAST-IND(-PL.3)-jump, shows inclusion of the plural morpheme *-ni* in the major argument. Cf. nb33:125.22, <-*é.ti:p* jump>. Note how Jacobs' writing shows clearly the difference in the vowel following the incipient glottal stop on the root. The second i-vowel (epenthetic, before the final *-ɸ*) is both higher and shorter.

In looking at Frachtenberg's transcription of Mary's River *ä* (~ε~ι), Jacobs may have assumed it to be equivalent to Santiam *ä*, going by sound rather than by analysis of sets of words. Eventually he merged this CK *ä* with ε. This was unwise, as has been pointed out by Berman (undatedb, 1990). An important distinction was lost, since better than 90% of the instances of *ä* in John Hudson's Santiam represent variations of //a//, not //i//.

In item (9), a comparison is made between the vowels as written by Jacobs, either in his notebooks or in *Texts*, with the major vowel allophones and phonemes used in this thesis. (Note that Berman (undated, 1990) assumes vowel allophones ε and ɔ are also phonemes, e and o, respectively.)

(9) Comparative vowel table (parentheses indicate rarity)

Jacobs		Lewis	
Notebooks (1928–30)	<i>Texts</i> (1945 [1937])	'major V allophones'	V phonemes
<i>a</i>	<i>a</i>	a	a
α ə	<i>a</i>	ə	a (or ∅)
<i>ä</i>	ε	ä	a (rarely i)
ε (ü)	ε	ε	i
ι ι ι ι (e)	i	i	i
u u u	u	u	u
o	ω u	ɔ u o ⁷	u
ɔ ω	ω	ɔ	u
ι ι ι u u u ə	i u (ə)	i, /i u/	∅ (or i)

Table 10. Jacobs' vowels compared to those used in this thesis

2.3 Three underlying types of vowel length

Vowel length is distinctive in CK. Underlyingly, there are three kinds of length: short, variable, and long. However, on the surface only two types appear: short and long, one or two morae.⁸ Variable vowels (possibly only in verbal and nominal roots)

⁷ An effort is made to fit Jacobs' o into higher or lower ranges of back vowel, /i, u/. However, often an example may be too ambiguous in this regard to do so; then I also write it as /o/.

⁸ This is a descriptive account of Central Kalapuyan. An account of the CK syllable is beyond the scope of this thesis. Nevertheless, important data about the language would not be adequately

vary according to their position in a word: short in monosyllabic stems or long in polysyllabic stems. We will observe the contrast between short and long, and then at the three-way contrast.

The examples (i) and (ii) of item (10) contrast short and long vowels. The (i) examples all contain short vowels; the (ii) examples have long. They are written phonemically. (Examples are of John Hudson, unless stated differently. Only rarish occurrences are referenced.)

- | | | | | | | |
|------|-----|------|---------------|---|-----|---------------------------------|
| (10) | (a) | (i) | -ḡap̚ [ḡa²p̚] | coal(s) (N) | | |
| | | (ii) | (A) -ḡaap̚ | stand (V) | (B) | -ḡaap̚-aí standing ⁹ |
| | (b) | (i) | -ḡa | rib (N) | | |
| | | (ii) | -ḡaa | do, make, be the cause of (V) | | |
| | (c) | (i) | -ḡip̚ | deep (V) | | |
| | | (ii) | -ḡiip̚ | raw camas (N; but cf. EH, -ḡip̚ 'fresh, early camas') | | |
| | (d) | (i) | -huli | want, wish (V) | | |
| | | (ii) | -huuli(?) | take off (a pack) (V) | | |
| | (e) | (i) | -hu-ḡu² | become, <i>happen</i> to | | |
| | | (ii) | -huu-ḡu² | be(come) <i>dark</i> (V; cf. -huu-yu-ḡuu
[probably -[huu-ḡu²]-ḡu²], 'become dark') | | |

conveyed without a notion of the timing units applicable to the nucleus of a CK root syllable-like structure (i.e., the stressed nucleus). While the root of most verbs and many nouns can be maximally represented as C₁C₂VRC₃, where the R represents either a resonant or V₂, a more exact view would recognize three types of rhyme-like structures, as we see in (I) and (II):

(I) (O_b) C₁ V(G) (C₂)

(II) (O_b) C₁ V (R_HO_c)

While only consonantal onset and single vowel are required in a verbal/nominal root, the onset-like structure may have an (other) obstruent (O_b) preceding the consonant initial, C₁. (An excrescent schwa, colored by the consonants, is often heard between them.) The rhyme-like structure in (I) allows any type of consonant, C₂, to optionally follow a short or long vowel. The combination V(G) is intended to show that not only is the second mora (or sonorant timing measure) of the nuclear structure optional, it may represent either the lengthening of the first vowel (V₁V₁) or a diphthong (V₁V₂). The rhyme structure could even be a vowel (or diphthong) plus a resonant, V₁(V)R (or other C₂). In (II), however, the coda-like structure is distinct. Whereas in (I) the two morae work together as one unit, in (II) they do not. Here a heavy resonant (R_H: l, n, m, ɫ, ḡ, ḡh) binds with a final occlusive (O_c). In each case, a surface glottal (?) appears only *outside* of the structure, either as VG² or as ²R_HO_c, to which the resonant is bound.

⁹ Compare also: -ḡaap̚-na(-ḡ) 'pay up'

There is one obvious and rare exception to the rule of long and short: the following adverbial appears to have three morae of length (one very long high vowel on the S-M tape). To obviate such an underlying possibility, I write it with a glide:¹⁰

(11) t^hyiip^h.gam long ago

Notice also that the examples in (10a) with long vowels in its root –**ɗaap^h** do not change, whether it bears a suffix or not. I repeat this example and add another.

- | | | | | | | |
|------|-----|------|------------------------|---|--|--------------------------|
| (10) | (a) | (ii) | (A) | –ɗaap ^h | | stand |
| | | | (B) | –ɗaap ^h -at | | standing ¹¹ |
| (12) | (a) | (i) | –ɸiit | [ɸiit ² ɗ ~ ɸi ² ɗ] | | pull out, take out |
| | | (ii) | –ɸiitɗ-ɸat | [ɸiitɗɸat ² ɗ] | | let's pull out, take out |
| | (b) | (i) | –ɸuup ^h | | | twist |
| | | (ii) | –ɸuup ^h -ad | | | twisting |

Whereas the items in (10a) and (12) were always long in the root, those in (13) show vowels that are always short. Whether there is a suffix or not makes no difference.

- | | | | | | | |
|------|-----|----------|-----------------------|------------------------------------|--|--|
| (13) | (a) | (i) | –g ^w ad | [[g ^w áʔ]/–##ɗ] | | break (off) |
| | | (ii) | –g ^w ad-u | [g ^w ádɔɔ] | | be broken (off) |
| | (b) | (i) | –git ^s | [gɛ ² ts ^h] | | do, make, put on, build [many examples] |
| | | (ii) | –git ^s -ni | [gɛ ² ʒni] | | make it (t ^s decomposes to ʒs before n) |
| | (c) | (i) | –kub | | | cut (up) |
| | | (ii) (A) | –kup ^h -ni | | | cut it (up) |
| | | (B) | –kup ^h -na | | | (be) cut off |

On the other hand, in item (14) we observe a different pattern, one indicative of variable vowels. The examples in (i) again are short and those in (ii) are long; this time, however, they are of the same root. (A kind of natural trochee develops on the bisyllabic stems.)

¹⁰ This is one of the very rare times J. writes <ɯ>, i.e., two vowels instead of one plus length, <ɯ>.

¹¹ Compare also: –ɗaap^h-na(-ɗ) 'pay up'. (Only for rarish examples are references detailed.)

(14)	(a)	(i)	-ʔi		go
		(ii)	(A) -ʔii-ɖiɖ		going
			(B) -ʔii-ɸiɖ		going together
	(b)	(i)	-ɖiɖ	([ɖi ² ɖ] ~ [ɖii ² ɖ])	give
		(ii)	(A) -ɖiiɖ-áɖ	[ɖiiɖá ² ɖ]	giving
			(B) -ɖiiɖ-iɸ	[ɖiiɖuɸ]	give you
	(c)	(i)	-ɸeɬs	[ɸé ² tʰ]	stab
		(ii)	-ɸeɬs ^h -ik ^h	[ɸéɬs ^h ik ^h /ɸéɬs ^h ig]	(stab+?)
	(d)	(i)	-huɬs	[hó ² tʰ]	panther
		(ii)	-huuɬs-is	[húuɬsɪs]	Panther

For these reasons, three lengths of vowel must be understood for the language. I write them phonemically as in (15):

(15)	//V//	always short
	//V·//	variable—short if monosyllabic (root only), long if bisyllabic (suffixed)
	//VV//	always long

Hence, we have the nine underlying vowels as presented in (1). In the materials in this thesis, however, they are generally written in surface form (i.e., since they always carry one or two morae, they are simply long or short according to the stem environment).

2.4 The three vowel qualities of CK

There are three underlying vowels in CK, //a, i, u//, not counting length. In terms of quality, they center about [a], [e] and [o], respectively. a is dominant and triggers regressive backness vowel harmony on the nuclei of neighboring (left-lying) epenthetic vowels. It is by far the most common single vowel.¹² i is the second most common short vowel (but most common long, particularly as /eɛ/). It is closely aligned with coronality, especially of neighboring consonants. u is the least frequent of the vowel phonemes. It is aligned with both labiality (rounding) and backness. The epenthetic vowel, i, apparently /i/ (arguably //i// underlyingly), becomes i before coronal consonants or u either before a labial resonant or continuant (w, m, ɸ) or labiovelar, or before a triggering

¹² Hajda (1976:41) notes Shipley's (1970:98) suggestion "that it represents the falling together of some earlier vowels".

a (regressively across an obstruent, generally), as a result of *harmony*. There is a tendency for front vowels to raise around coronals. *a* is subject to fronting (with a quality of raising) and weakening. The large number of /*æ*/ vowels suggests that there may have been a historical shift, as a result of which certain //*aa*// raised, though this is far from clear.¹³ Raising of the glottis (sphinctering) tends to effect mid-vowel qualities. A back vowel next to a velar tends to make both further back. Final vowels tend to lengthen. Any stressed vowel lengths somewhat. And all vowels, except epenthetic *i*, may be stressed.

The finding of only three distinct vowels validates the insights of Takeuchi, Shipley and Hajda, who have posited as many for CK. We will now look at the vowels and their allophones, one by one. Both long and short will be referred to through the short underlying vowels.

2.4.1 The allophones of the vowels //*a*// and //*aa*//

The first vowel in Kalapuya is *a* and its long form is *aa*. They are the most sonorous vowels. Long *aa* in this synchronic study is virtually without variation. Short *a* has two, *á* and *ə*.

2.4.1.1 The allophones of //*a*//: /*a*/

/*a*/ is by far the most common allophone not only of //*a*//, but of all vowels. We can see the relative number of occurrences of it as compared with the other vowels in (16).

(16) /*a*/ >> /*i*/ >> /*u*/

Generally centered in pronunciation about [a], it is the most sonorant CK segment because it is the most open vowel: it is low and back and unrounded. Generally unrounded, it may occur rounded. It communicates its backness regressively to a preceding epenthetic *i* harmoniously. Examples of /*a*/ are seen in (17).¹⁴

¹³ That there has been raising in Kalapuya is clear. Where we have CK *-maa*, 'fire, house' (originally, {hearth}?) from JH, Twal. has two forms: *-mii* 'house' and *-may* 'fire'. Normally CK *ay* = Twal. *ey*: CK *maytsi* 'morning', Twal. *meydz*; but *-way* 'go to bed' and *-²way* 'child(ren)' in both dialects. CK 'food' and 'eat' have the root *-k¹aan-*; Twal. *-k¹eyn-*. Yet some verbs with *aa* remain the same: CK, Twal. *-yaaq-* 'stand, dance; knock down'. Some forms suggest reverse raising, as in 'face, eye(s)': CK *-k¹ileek¹*, Twal. *-k¹állak¹*. (Twal. examples from Berman s. f.: LK. B. (1990) points out possible problems with Louis Kenoyer's Twal., having a CK mother.)

¹⁴ In the following examples, the data varies from being written in major allophones to phonetic. Although stress placement is entirely predictable (on the left-most syllabic nucleus of the root of

- (17) (a) κυήκωάφα gunk^hάφα //gn-kwafa// his-pack (35:15)
- (b) α(())ωά:qtsa(())†, α(())ωά:qtsá(())† //ʔan-waak^h-ts^hat^h//
DET-female-COLL 'women, woman'
- (c) ωά' lau' τι' τάτáha'nafa [wá^hlau^h ts^hi^h dá^hdáha^hnafa] (35:125)
//wa^h-law^h ts^hi^h ḡa-ḡaha-^h-nafa//
'(but) you could not kill me' (< not-now I USIT-kill-PUNCT-DUR.me)

2.4.1.2 The allophones of //a//: /á/

/á/ may represent (at least) two different but very similar sounds: (I) a fronted and slightly raised variety due to advancement of the tongue root under stress following initial *h* and (II) another variety raised through palatalization of *y* or *l*, often weakening in unstressed environments. A rough estimate of the center of its phonetic space is given by IPA [ɘ] for Santiam. The alternations between *a* and *á* are suggest complex raising and appear to be historically mixed with the alternations between *e* and *i*. But *á* is rarely an allophone of //i//. (This may be compounded by the fact that Jacobs was probably not really careful in recording this vowel; as noted above, he stopped writing it in the 1930's.) *á* is generally only a short vowel; very rarely did Jacobs wrote it long.

The major environments of *á* occurrence are after *h* or after *y* and around *l*. The first is consistent with *advanced tongue root*, which often corresponds with a lenis, generally quite low pitched modal sound, often with breathiness. The plain occlusives provide a similar environment, especially where unstressed. (*á* is frequently found, for example, in the verbal prefix after ḡ-: -ḡá-, contrastive mode.) Item (18) gives examples of stressed *á* after *h*.

- (18) (a) [EH:] há^h [JH: há^h/ha^h] (over) here, this way
(b) [JH:] há^s [EH: *id.*] this, these here
(c) há^{si} [EH: hášii] here
(d) -há^{mi}? win
(e) -há^{myá}- take out
(f) -há^{phi}-ḡiḡ gather firewood

each noun or verb; secondary stress is on the left-most syllabic nucleus of pronominal/adverbials), it is inserted here out of convenience to the reader. The cursive font below is made in attempted replication of Jacobs' handwriting and reflects forms out of his notebooks in the Jacobs Collection (University Libraries, University of Washington, Seattle) upon which this thesis is based. The numbers at the right edges of a textual line, however, refer to page and line of Jacobs 1945 (*Kalapuya Texts*) where the example may be corroborated.

There are only two counterexamples, as in (19). It will be noted that there is apparently no fronting/raising in (19a) (JH), but the EH forms show variation between *a* and *i*—clearly an unusual form. It is not clear why *-hasa* is not fronted.

(19) Apparent counterexamples

- | | | | |
|-----|-------|--------------------------------|-----------------------------|
| (a) | -hǎʔ | [EH: -hǎʔ/-hiʔ; cf. Twal. -ha] | voice, language, word, talk |
| (b) | -hása | | pubic region |

A second primary environment of *ǎ* involves tongue raising following *y* or *l*, consistent with *palatalization*. Several of the following examples show *ǎ* followed by a coronal; that the preceding *y* is the paramount factor, however, is seen in (17f), where both JH variants (of JH) contains *ǎ*.

(20) *ǎ* following *y*:

- | | | | |
|-----|-----------------------|---|----------------------|
| (a) | -ʔyǎlg- | [EH: -yǎlg-a/-yǎlkʰ(-na) 'be straight/id.'] | straighten |
| (b) | yǎlkʰama | | Joe Hudson |
| (c) | -yǎlʔs-wa | | slip |
| (d) | -(ʔ)yǎlʔwa | [EH: <i>id.</i>] | dance |
| (e) | -yǎs(-) | [EH: -yas] | be sharp; ache, hurt |
| (f) | -yǎʔmpʰ ~ yǎmʔbʰ/(-u) | [EH: -yampʰ] | come from/get from |

Note however that EH consistently employs *ǎ* after *y* only before *l*—as in (20a, d) but not (20e, f). The usage of JH is more generally affected by *y* than that of EH. Other examples where *ǎ* occurs before *l* are in (21).

(21) *ǎ* before *l*:

- | | | | |
|-----|-------------|----|--------------------------|
| (a) | -bǎla(ʔ) | 23 | be big, strong, large |
| (b) | -bǎla-ʔyuu | 4 | make big; get big |
| (c) | -pʰǎʔlakwan | 1 | a little beyond, further |

After *l*, however, raising/fronting is somewhat less consistent than after *y* (or *h*). It generally occurs on short vowels that are followed by a nasal or a coronal plosive. That there is an implicit weakening, as well, is seen in the salvaged, stressed vowels of the French/CJ loanwords in (22c, d). Of course, where two liquids occur in succession, as in (22a–b), the intervening low vowel is a prime candidate for such raising.

(22) *á* following *l*:

- | | | |
|-----|--|-----------------------------------|
| (a) | -lálak ² ya, -lálak ² ya | be(come) angry |
| (b) | -(^ʔ)lálá ² wa | call (out) (to); holler |
| (c) | -lám ^{ts} in | medicine (F: <i>la médecine</i>) |
| (d) | -láp ⁱ ip | pipe (F: <i>la pipe</i>) |
| (e) | -(^ʔ)lá ^ɔ ɔgwa- | take care of; be careful |
| (f) | - ^ʔ lá ^{ts} wa(-) | steal |

Short, unstressed environments following *y* or *l* occur in the following examples. (It is not clear the extent to which the lack of stress in (23) or (24) contributes to a weakening of *á*.)

(23) *á* after *y*, *l* in unstressed environments:

- | | | |
|-----|---|--|
| (a) | -qápyá | meat, flesh |
| (b) | -qáyá ^ʔ la ² q ^h | crabapple(s) (tree) |
| (c) | (i) -g ^w ín-hi ² -yá(-ba) | gambl(ing) [lit: 'getting-things thing'] |
| | (ii) -yá | (GERUND) |
| (d) | -yá [EH: ya > yi] ¹⁵ | Q (enclitic) |
| (e) | yé ^l á | only |
| (f) | -yé ^l á ² ɔ | sting |

In (24), we see *á* may appearing in other lenis environments, following a coronal nasal (24a–b), or plain coronal consonant (24c–f), preceding or following a coronal affricate (24g), preceding a coronal sibilant (24h). (This latter, however, may have *á* analogously through parallels with the similar adverb *hás*, as we saw in (18a–c).

(24) *á* in unstressed, lenis coronal environments

- | | | |
|-----|---|---|
| (a) | -k ^w áaná ^ɔ pin | food, meal |
| (b) | -k ^w áaná ^ɔ b ^ɔ u ² | eat |
| (c) | -qáw ^ɔ ɔ-á | singing |
| (d) | ɔá- | (USIT mode, verb-prefix) |
| (e) | -ɔán- | (DIR.from.a.place, thither), verb-prefix) |
| (f) | -ɔáɔ | (DURATIVE) |
| (g) | -á- (as in -á-ts ^h ant ^h , PL; -ts ^h án,) | (stem V) |
| (h) | p ^h áš, p ^h ás | thus, so |

¹⁵ EH form types: *ya* (1), *yá* (2), *yá* [*á* overwrites s.t.] (1), *ye* (1), *yi* [*i* overwritten by JH's *a*] (2), *yi*² (1).

a lenis plain. The single nature of this form-type adds to its doubtful existence and suggests that it is underlyingly short.

(27) -yeenáá-ḅa //yii-na-ba//, /yee-ná-ba/ story, account

This item occurs in the same lenis coronal environment seen in the examples (23) and (24) in §2.4.1.2 above, along with the added possibility of vowel attraction as in (25).

Another occurrence of **áá** surfaces between two back lenis plain dorsals as in the phonetic material of (24a). (This is likely a borrowing from Athabascan.) (24b) is fronted for JH but not for EH.

(28) After dorsals:

(a)	-ḡááḡa	grandmother
(b) (i)	-ḡánḡi	grandma
[cf. EH (ii)]	-ḡánḡi ²	sister's child, nephew, niece]

The other two such long **áá** examples I have found appear to be completely in free variation with **aa**. They are listed in (29c) and (d).

The **a/á** variations produce a number of apparent minimal pairs in (25). I regard these as spurious; each pair has a problem. In (25a_{ii}), **a** alternates with **i**. (25b) shows words that likely have two divergent meanings—for male and female chores, perhaps originally something like 'get, gather food'. Though I cannot account for (25c_{ii}), it occurs in only one form-type and has a root likely related to that in (25c_i). This is true also for (29d).¹⁷

(29) Apparent minimal pairs between **á/a**:

(a) (i)	[EH] há ²	[JH: há ² /ha ²]	(over) here, this way
(ii)	-ha ²	[EH: -ha ² /-hi ²]	voice, language, word, talk
(b) (i)	-ḡáha-y	[EH: <i>id.</i>]	kill
(ii)	-ḡáha-y-	[EH: -ḡáhay]	dig roots

¹⁷ Note LK's Twal.: -yá²D, /-yaaḡ/, 'stand, dance', -yá²Dat, /-yaaḡ-at^h/, 'knock down'. The association of 'knock down' with this most common CK (or Tral.) expression is common to both branches. But the Twal. suffix gives a durative sense (if I read it correctly), which suggests that too much dancing and one falls down and/or knocks others so. The meanings of (29c_i) and (ii) may be similarly related.

- | | | |
|---------|---|--------------------------------|
| (c) (i) | -yáa-na | visit |
| (ii) | -yáán-a-ḅ-/yáán-i-ḅ- | warm (oneself) (up) |
| (d) (i) | - ² yáaḍ-u/-á-ts ^h εε [EH: <i>id.</i>] | (approach to) stand,/and dance |
| (ii) | - ² yááḍ-a-ḍ - ² yáaḍ-a-ḍ | knock down, senseless |

áá appears a very doubtful allophone. I do not think it exists.

2.4.1.4 Central vowel schwa /ə/

I have written schwa in different ways. It could be understood (a) as a predictable epenthetic vowel or (b) as a weakened **a**. A special weakened form occurs in the unstressed form of the determiner ²an- for separable nouns, while other cases of /ə/ are found in stressed root nuclei. At the time of writing, I favor hypothesis (b), for two reasons. First, the frequency of velars as the coda-like structure (C₃) of the root following the ə suggests weakening of the vowel, or a shift to its mid-range, before **K#**. In fact, this is found with all vowels. Note three major occurrences of schwa as stressed root vowel occur before //g// in (30a) below, and in (30b) one before /²mp^h/. (The frequencies are about equal for ə and a in (30aii) and (iii); only (ai) and (b) are sure things.) Elsewhere, final **k^h** tends to obliterate the difference between [i] and [ε] where they occur before it.

(30) Stressed schwa between a heavy resonant, **R_H**, and **C** in roots:

(a) Where C is an occlusive, O_c (**RəO_b**):

- | | | | |
|-------|--|---|--|
| (i) | - ² nók ^h , - ² nəgə ^h ḍ | -ḥag(-at ^h) | say, sound [cf. Tak. <i>na(g)</i> - 'say, do'] |
| (ii) | -ləgat ^h , -lək ^h wit ^h | -lag-at ^h /-φit ^h | play |
| (iii) | - ² ləgwə | -ləgwa | hand(s), arm(s), limb(s) |

(b) Where C is a resonant, **R_H** (**RəRO_b**):

- | | | |
|---------------------|-------|-------------|
| -lə ² mp | -lamḅ | whip, spank |
|---------------------|-------|-------------|

The second reason is comparative. A check on LK's Twalatin forms shows that only the full grade **a** is observed there. (Now it may be that by the time (1936) of recording, Jacobs was no longer interested in distinguishing fine phonetics details. But I think it more likely that Jacobs began to realize that, at least for Twalatin, it was all /a/.) The determiner of (31), ²an-, has its own form in Twalatin, yet there is no suggestion that

a weakened form was ever part of its history; the frequencies are reversed in favor of /a/. Thus this form of the determiner in CK appears to be a local development. This is consistent with weakening. The examples in (31) show three different forms of assimilation of the nasal of 'an- to the following consonant, initial to the noun root. (The left-hand column is phonetic, reflecting Jacobs; the central column is phonemic.)

(31) Unstressed schwa regularly in unpossessed DET (**O_həR**)

(a)	əmpɪini	ʔan-piini	girl(s)
(b)	əndʒiɪʔ	ʔan-ɟiiʔ	raw camas
(c)	ən ^{tʰ} φá ^ʔ φi	ʔan-tʰφá ^ʔ φi	anus worms, hemorrhoids
(d)	ənʔáuts ^{kʰ} laq ^h	ʔan-ʔáwts ^{kʰ} lak ^h	garter snake
(e)	əŋɟúla	ʔan-gula	arrowhead
(f)	ən ^ʔ óihɪ	ʔan-ʔuyhi	a man
(g)	ənhéelubə	ʔan-hiilbə	disease
(h)	əʂni	ʔan-sni	coyote, Coyote
(i)	əmíis	ʔan-miis	cooked camas
(j)	ə ^ʔ nóit ^h á	ʔan- ^h uyt ^h á	brown bear
(k)	əlámʔsin	ʔan-lamʔsin	medicine (CJ < <i>la médecine</i>)
(l)	ə ^ʔ wá ^ʔ ɟə ^ʔ k	ʔan- ^h wáɟak ^h	stick(s), tree(s) ¹⁸
(m)	əyéɛɟi	ʔan-yiidi	story

In the first column of (31), we see a phonetic version of Jacobs' JH transcription. In the second column, essentially a phonemic one (plus some waffling about how to treat the initial glottal stop, proposed on general syllabic conditions, and other oddities).¹⁹ In (31a–e), we see the assimilation of the nasal in the DET to the following occlusive. In (f–g) we see maintenance of the coronal nasal before the laryngeals. In (h), we see elision of the nasal before the only non-laryngeal fricative with nouns to show the pattern. In (i–m), we see elision of the nasal before resonants.

All of these cases show ə as the unstressed vowel of the separable noun determiner regularly. This is a strong argument for epenthesis, and cannot be ruled out. ə-epenthesis would be predicted to occur between a syllabic-initial ʔ and a resonant, **O_həR**,

¹⁸ This unusual example has preconsonantal glottalization on each C. Since glottalization is medially not generally found in CK, and since ^hw and ^hk are usual for CK stems in these positions, a double-triggered phonation assimilation to the central consonant is hypothesized.

¹⁹ For a discussion on the various forms of the glottal stop used in this thesis, see §6.4.

as in (31); between a resonant and an occlusive, **RəO**, as in (30a); and between resonants, **RəR**, as in (30b). **OiR** and **OiO₁** (where **O₁** is a suffix) occur due to **i**-epenthesis (although some archaic **OiO₁** may have become **OəO₁**). The occurrence of **ə**-epenthesis, for stressed vowel nuclei at least, is, however, doubtful, as I have tried to suggest above. And there is another reason for **ə**-epenthesis to be problematic: Why do some **?R** become **?əR** and others become **?iR**? Under the **ə**-epenthesis (as opposed to **a**-weakening) hypothesis, I would have no answer for this. For a treatment of the epenthetic vowel **i**, see §2.6.

2.4.1.5 Summary of //a// and //aa//

//a// is most common and dominant. While most occurrences of this vowel are as /a/, it has two weakened, centered (before K), or fronted and raised varieties: /á/, which is fronted and raised, and /ə/, which is weakened or centered. It has been suggested that advanced tongue root produces /á/ in stressed vowels following root-initial **h**- and that palatalization produces /á/ in stressed and unstressed vowels following **y**- and around **-l**. //aa//, less frequent than //a//, does not vary in CK. Many long vowels that were //aa// in an earlier stage of various Kalapuyan dialects *may* have undergone raising and become //ii//—/εε/ and possibly also /ii/. This does not affect the synchronic distinctness of //aa// and //ii// in CK. I have analyzed /ə/ as may be seen as a reduced form of **a**, most likely not epenthetic, although that hypothesis is appealing. It is more likely seen to be the result of weakening in unstressed or resonant environments in CK.

2.4.2 The vowels //i// and //ii//

The vowels //i// and //ii// are considered here as the second vowels of the language. //ii// is more common than //i//. They appear to be connected with coronality.

2.4.2.1 An introduction to the major allophones of //i// and //ii//

//i(i)// has the following major vowel allophones:

- (a) /i(i)/, generally [i(i)], but also between [i(i)] and [ɪ(ɪ)]. These vowels are more common before coronal environments and also when stressed and fortis following initial laryngealized sphinctering when long.
- (b) /ε(ε)/, generally [ε(ε)], but between [ɛ(ɛ)] and [ε(ε)], and sometimes extending lower. In Mary's River, for example, /ε/ includes Frachtenberg's *ä*, probably [æ]. This is more common in lenis positions where not raised (though it occurs in coda glottalization).

The following discussion will compare both types (a) and (b) above, first as long vowels and then as short vowels, in various environments. Jacobs tends to write //i/ as /i/ while I hear it as [ʔe]. Frachtenberg wrote *e* more often as well. From such reasons, it is deduced that the basic forms of //i(i)// tend to center about [e(e)].²⁰ It must be emphasized, perhaps, that there are *no minimal pairs* observed between /e/ and /i/ or between /ɛ/ and /ii/.²¹ They are all interpretable as //i/ or //ii/ or //i/. It is clear that much more work needs to be done sorting out the nature of these allophones. The information given here is introductory.

2.4.2.2 Comparison of long /ɛ/ and /ii/

In the following examples, I give examples of the long form, /ɛ/ vs. /ii/. The long form *ɛ* is very common (more so than the short form *e*), and may top the scale with regard to relative frequency among the long vowel allophones. Overall, //ii// is most common, as we see in (32). (Compare (16) in §2.4.1.1.)

(32) //ii// >> //aa// >> //uu//

Generally, /ɛ/ is more frequent following aspiration (**h**-) and lenis (resonant, plain occlusive) initials. /ii/ is more common after glottal stop (ʔ-) and glottalized occlusive initials (**K**-).

//ii// generally appears as *ɛ* after **h**-, especially before lenis forms such as resonants or plain occlusives, as in (33).

(33) General preference for *ɛ* after **h**- (or breathiness):

- | | | |
|----------------------|------------|------------------------------|
| (a) -héekʔ; -héegwa- | /-hɛɛgʷ-a/ | go along, pass by, on; leave |
| (b) -héedá(á,ʔ)-φaʔ | | moccasins, shoes |
| (c) -héedubə | | bed |
| (d) -héel-án-tsʰ- | | tell about, relate |
| (e) -héelip | | get sick |

²⁰ Thanks to Susan Blake for this insight, expressed at the Grammatical Structures in Indigenous Languages of the North/West, Victoria (February 2003).

²¹ While no minimal pairs have been found, the following alternation is on p. 30 of Nb. 84 (EH?):

kwésisv	smoke (real heavy) (from a good fire)	[Presumably /-kwés-is-u/]
kúsisv	seeping wisps of smoke from a small fire	[Presumably /-kúys-is-u/]

This may suggest a diminutive system based on how the semivowel binds with the initial, which will vary the target of the pitch accent. It also shows that not all **kw**- are **kʷ**.

The forms of $\epsilon\epsilon$ in (33b–e), we note, occur before coronals. Since coronals would tend to raise, however, we conclude that the major environmental circumstance for $\epsilon\epsilon$ is the initial consonant, not what follows. **h-** is common before $\epsilon\epsilon$ but rare before stressed **ii** in JH and EH. We see **h-** before **ii** in (34), where (34a) and (b) are very likely the same root ending in $-ts^h$ ($ts^h \rightarrow s/-n$). This occlusive is coronal and fortis. In example (34c), there appears to be a link between the higher vowel and labial obstruents.

(34)	(a)	$-hiits^h$	[EH: <i>id.</i>]	fall
	(b)	$-hii\delta-nay(-)$		sneeze
	(c)	$-hiip^h$		pick up

(**h-** is often a good environment for revealing a segment's secret self. For example, one checks before the laryngeals to find the true quality of nasals that could be either **n-** or **m-**.)

Notice also the large number of $\epsilon\epsilon$ roots following **y** (especially before a resonant), as in (35). (Diachronically, some, such as (35a–c), may suggest an earlier period of raising of $\parallel\alpha\alpha\parallel$ to $\parallel\epsilon\epsilon\parallel$ or $\parallel ii\parallel$.)

(35)	General preference for $\epsilon\epsilon$ after y- or \acute{y} - ²²		
	(a)	(i) $-y\acute{e}eh-\acute{a}$	come (hither)
		(ii) $-y\acute{e}eh-i-ni$	take away (from)
	(b)	(i) $(-)y\acute{e}e-n\acute{a}\acute{a}-\acute{b}a$	story, myth, news, account
		(ii) $-y\acute{e}e-\acute{d}i$	<i>id.</i>
	(c)	$-y\acute{e}es-na\phi-$	fight (one another)
	(d)	(i) (CK-JH-J) ${}^?y\acute{e}e-$	[PREFIX].KIN.3
		(ii) (SK-F) $y\acute{ii}-, y\acute{e}e$	<i>id.</i>
	(e)	$-{}^?y\acute{e}e$	burn ²³
	(f)	(i) $-y\acute{e}el-\acute{a}-\acute{d}$	sting
		(ii) $-({}^?)y\acute{e}el-i({}^?)$	light (s.t. afire)
	(g)	$-{}^?y\acute{e}em-i({}^?)$	burn (s.t.)
	(h)	(i) $-({}^?)y\acute{e}em-a-\acute{d}/-a-\acute{b}-a$	mark, tatoo, paint, write
		(ii) $-({}^?)y\acute{e}em-a-ts^h\acute{a}/ts^h\acute{a}$	be painted, be marked

²² EH, however, has more forms in $\parallel ii\parallel$, following **y-**, almost as many as he does in $\parallel\epsilon\epsilon\parallel$.

²³ One of two JH formtypes shows the initial glottal on this form. But JH directed J. to write it into two out of two of EH's forms for *burn* (INTR), ${}^?y\acute{e}e-\phi an$. This root is likely related to (e) and (f).

(37) General preference for $\epsilon\epsilon$ after w -

- | | | |
|-----|---|---|
| (a) | -wεεq ^h i [?] | dead person, people |
| (b) | -wéey-án(d)-t ^h φan | listening-[DURATIVE] - to.me.[DURATIVE] |
| (c) | -wíit ^h ɔɔ < -wíit-t ^h ɔɔ | open (up) (INTR) |

(38) General preference for $\epsilon\epsilon$ after l -

- | | | |
|-----|--|--------------------|
| (a) | -léets ^h át ^h want | lie down curled up |
| (b) | -léep ^h da | clitoris |
| (c) | léε-φan | still; supposing |
| (d) | -líiφa/-líiφε | log |

We notice again a greater frequency for $\epsilon\epsilon$ after the resonant m in (39). The one apparent contradiction to this, (39h), occurs before a coronal sibilant—again, not lenis.

(39) Preference for ϵ after m :

- | | | | |
|-----|--|-------------------|--|
| (a) | méen-φan | [EH: <i>id.</i>] | very (much) |
| (b) | méeni | [EH: méena] | first |
| (c) | -méesa | | oak |
| (d) | -mεεφu [?] | [EH: <i>id.</i>] | mountain(s) |
| (e) | mεεwi [?] | | a bottomland camas digging site, Chemawa |
| (f) | - [?] mεek ^h -a(n) | | count |
| (g) | (-)-mεεgu [?] | [EH: -miigu] | (be) summertime |
| (h) | -miis | | cooked camas |

In (40), we see a reverse of what we have seen following the resonants—that is a preference for ii , after labial obstruents. This should not necessarily be said of (40a), though, which may raise its vowel as a result of glottalization simultaneous-with-release. (40b) is the exception that does not change (perhaps affected by vowel attraction). The loan in (40c) appears to follow (40d-j) which may well be the result of raising after the labial consonant and/or before coronals or palatals.

(40) Preference for /ii/ after labial obstruents

- | | | | |
|-----|------|-------------------------------------|---------------------------------------|
| (a) | (i) | -p̣ii | put (away, down), place (in) |
| | (ii) | -p̣ii-(na-)yéεdi (EH: -p̣iya-yéεdi) | tell stories [with incorpor. N] |
| (b) | | -ḅεεḥa- | get, be cooked; be ripe |
| (c) | | -ḅíiḅa(ʔ) (EH: -ḅíiḅa) | paper, letter (English <i>paper</i>) |
| (d) | | -ḅiini | girl |

(e)	-b̥iila	back
(f)	-b̥iilik ^h	log bridge
(g)	-biili-ni	look out, watch it
(h)	-p ^h iitp ^h -	skin, peel (V)
(i)	-p ^h iits ^h ba	peel (V)
(j)	-φiit ² d	pull out, take out

After dorsal consonants, there is a preference for *æ* in stressed syllables. It must be noted that it does not seem to matter whether there is glottalization, as in (41a–c), or not, as in (41c–d), on the initial.

(41) Preference for /*æ*/ after dorsal obstruents

(a)	-k̥léek ^h (-wa)-	be fastened, stuck, sewn together
(b)	-k̥wée-ni ^(?)	take (with), carry (along), bring, have
	[cf. Tak. -k̥wene-hi	'hold in one's hand' (Sapir 1909)]
(c)	-k̥éεφu	grandchild, grandfather
(d)	-g̥éεw-u	assemble
(e)	g̥éεφu, g̥εemi	two
(f) (i)	-q̥iig̥-a-ts ^h uφ / q̥iig̥-a-ts ^h i	(l)/(l) hang (TRANS)/hang oneself
(f) (ii)	-q̥éεq̥-q̥ini-yii	(l) he choked him

The only counterexample is in the phonetic pair in (41f.i), a single example each, which show a raised vowel between back velars.²⁴ Yet the same environment in (41f.ii) does not show the raised vowel.

Before final *k^h* in unstressed (final) syllables there is clearly free variation, as in (42). The [*æ*] (or [*ɛ*]) series in the first column varies freely with the [*i*] series in the second. (In short vowels citations, at least, it may be that this vowel was originally epenthetic (*i*) before a final *g/k^h* suffix. In this weakened environment, it is not clearly distinct among [*ɛ*] ~ [*i*].²⁵) All things considered, final unstressed vowels tend to lengthen slightly, especially where there are three syllables in the stem.

²⁴ The root final is not clear here; the *g* in the first example may be the final, which elides before a reduplicated //k// onset in the second example of (f.i) and releases aspiration before *q̥* in (f.ii).

²⁵ The long *æ* vowel here, however, is likely to represent the sum of the epenthetic vowel plus a lost mora of the preceding resonant, *l*, which, in dialects to the north and south, is geminate—i.e., compensatory lengthening. Compare (42a) above, -k̥^hléek^h (JH), with Twal. -k̥^hállak^h (LK) with intervocalic gemination in the root. The neutralization from V epenthesis now scans two X-slots.

(42) Partial neutralization (weakening) and lengthening of //i// before K##

(a)	-k ^h wileek ^h		-k ^h wiliik ^h	eye(s); face
(b)	-ts ^h ám̐ɛek ^h	[EH: -ɸek ^h]	-ts ^h ám̐iik ^h	patrician, chief
(c)	-máwilek ^h		-máwiliik ^h	ash (tree)
(e)	-t ^h k ^h ʷílileek ^h	[EH: -t ^h g ^h ʷílileek, -t ^h g ^h ʷíliliik]		blackberries
(f)	- ² wáyne(ɛ)k ^h , - ² wá ² ye(ɛ)k ^h	[EH: -wá ² yeek ^h]		give birth, have children

Other unstressed positions allow the emergence of [ɛɛ], under free variation of quality and length, especially in (pronominal/adverbial) particles, as in (43).

(43) Partial neutralization (weakening) of //i(i)// before ## in particles

(a)	(-)nikeɛ			what(ever)
(b)	ɔɛɛ(ʔ)			how, why, what [hedge with IMPER]
(c)	ʔɛɛ/ɔɛɛ	ʔii/ɔii		but, however [polite hedge with IMPER]
(d)	yɛɛ(ʔ)	yii(ʔ)		someone, anyone, whoever, who

Summary of long front vowels. We have seen that /ɛɛ/ and /ii/ may have two sources: an old /ɛɛ/ and a raised /aa/. Synchronically, /ɛɛ/ and /ii/ on one hand and /aa/ on the other are totally separate phonemes in CK, despite a certain parallelism that still seems to occur among the short vowels (/a/ to /á/) and the current raising of /ɛɛ/ to /ii/ before coronals. Nevertheless, the majority of cases show a preference for [ɛɛ] or /ɛɛ/ as the underlying long form of the front (high) vowel. This is shown most clearly following resonants and h-. Other examples, such as those in (35d-h), suggest that some /ɛɛ/ are the result of the effect of glottalization, particularly root-initially. The only environments that seem to promote raising of the vowels to [ii] or /ii/ are following labial obstruents or perhaps backed velar glottalization, as well as before strong coronals such as fricatives and affricates.

2.4.2.3 Comparison of /ɛ/ and /i/

In this section, we will look at the comparison of short /ɛ/ and /i/. The examples, however, are much fewer. And, except for some glottalized forms, they are almost lacking for short /ɛ/.

That /ɛ/ was at some time in the past synchronically the more basic form is very likely. Common words, such as -ʔi (as written by Jacobs; //ʔi-//), 'go', which on the Swadesh-Melton tape sounds to me like [ʔɛ] or even [ʔe]; I would tend to ascribe to /ɛ/.

Frachtenberg also wrote this vowel more often. And, as noted, many occurrences of the high vowels are before coronals. While this is the general picture, numerous actual details need more study than can be offered here. However, in the CK recorded by Jacobs, only /i/ is written with sufficient frequency to be considered a regular vowel.

The list in (44) shows /i/ after resonants.

(44) Short /i/ following resonants

(a)	(i)	-wíʔl-i(ʔ)	take back
	(ii)	-(ʔ)wíl(ʔ)wil-	(be/make) round
(b)		wínhá	some (of it, them)
(c)		-yísɓál	needle, thorn(s)
(d)		-yiʔk (//yi.k//)	bite
(e)		-límwa	make a thud
(f)		-liʔ	laugh
(g)		-ʔslíʔ	anus, ass [rude]
(h)		-níš- (//nitsʰ//)	tell, say
(i)		-šní	coyote, Coyote
(j)		-mílmis	yew
(k)		-miʔlq (//milk//)	swallow
(m)		-ʔmiʔš (//ʔmish//)	sapsucker

Of interest is a pair that appears to reverse the coronal-raising solution. (45a, b) below represent two possibly cognate words for similar things: 'people' in the sense of *one's folks* and 'people' in the sense of *human beings* (i.e., other Indians). Here, the lower vowel occurs in the form that has a coronal nasal; the other, before a labial nasal, is raised. (Both nasals are glottalized.)

(45)	(a)	-(ʔ)miʔm	people, relative(s), person
	(b)	-(ʔ)meʔnma [EH: <i>id.</i>]	People, Indians

While the /i/ in (45a) may be expected, the /e/ in (45b) is unexpected. Because of the adjacency of two different types of nasals in this unusual root (disallowed at surface boundaries) as well as its meaning, it may be assumed to be a conservative form and to have maintained its /e/ vowel quality where most of the single //i// vowels have raised.

In (46) we see that /i/ follows most obstruents.

(46) Short /i/ following obstruents

(a)	-b́íφ		anus, buttocks ²⁶
(b)	-pʰíʔíkʰ	//pʰíík//	roll
(c)	-φpíʔíʔ	//φpíí//	periwinkle
(d)	-díʔ		teeth, mouth
(e)	-tʰí		have, be s.w. (LOC/POSS)
(f)	tʰíʔ	//tʰíʔ//	I
(g)	-tʰíʔpʰ / tʰíʔb-	//tʰíʔpʰ//	break (off)
(h)	-ǵísga-atsʰaφ	(1) ²⁷ (&EH)	drive me
(i)	(EH) -kʰíʔ	(1)	tear, pull apart
(j)	-ǵín(-hi)		get, hold (onto) (s.t.)
(k)	-tʰkʰwí		limb
(l)	-skʰíltʰwani	//skʰíltʰ-wa-ni//	untie s.t.
(m)	pʰsinʔ	//pʰsií//	three
(n)	-šíʔwa		child(ren)

The patterning short /ε/ is very different. In fact, except for after w-, short /ε/ occurs seldom or not at all following resonants, as is seen in (47).

(47) Short /ε/ following resonant initials

(a)	-wéʔna	(EH, ~ -wéεʔna) ²⁸	dream, sleep [N] (cf. -wáaʔya, <i>id.</i>)
(b)	-ʔwéʔna	(1)	rubbing [N]
(c)	-wéʔ		skin [V]
(d)	yèlá		only

²⁶ With the exception of this offcolor word, interestingly we see no short /i/ vowels (or /ε/ either) following the lenis plain initial, b- in the speech of JH. Those that do follow labial occlusives follow only onsets from the small aspirated (pʰ-) class. Both aspirate and glottalized onsets (pʰ-, p̰-) precede y written as a glide before a. (These facts are not so in EH. It is uncertain whether this discrepancy is merely due to the relative size differences of their lexicons, or some other reason.)

²⁷ These small numbers after a form indicate the number of formtypes (exemplars) from Berman's slip files. In the cases of (46h) and (i), there was only one exemplar of each type.

²⁸ Half of the eight formtypes for this in EH are long. This is typical of J. who wrote few short /ε/ late in his CK transcription career.

After obstruents, we see a similar lacuna. Except for a few items with velar initials, the short /ɛ/ examples are poor.

(48) Short /ɛ/ following obstruent initials

	(a)	-gɛʔts(-ni)	make, do (s.t.)
	(b)	-pʰgɛ(ɛ)ʔ (/bʰgiʔ//; EH -pʰgɛʔ)	water ²⁹
EH	(c)	-kʰɛlɔ-ɪd-	smoke—continuously (Type 3 REDUP)
	(d)	-ɸɛʔtsʰ	stab ³⁰

Note, however, that all of these examples, with the exception of the likely raised adverbial in (47d), contain glottalization either in their root final or, for (48c) only, in the initial. It is probably unlikely that this glottalization has a prosodic effect on /ɛɛ/ vowels, causing them to shorten to fit into a certain syllabic slot (one too many segments perhaps). More likely is that Jacobs simply perceived many //iʔ// as /ɛʔ/.

There is also a small group of /ɛ/ ~ /i/ lax vowel alternations. These two particles and indefinite pronoun belong to the third lexical class of adverbials/demonstratives and show the same free variation as we saw above in (43) for /ɛɛ/ ~ /ii/.

(49)	(a)	-mɔde	-mədi	(ADVERB)
	(b)	-ne	-ni	3.OBJ.NONITERATIVE
	(c)	yɛ(ɛ)(ʔ)	yɪ(i)(ʔ)	anyone, s.o., who(ever)

Summary of short vowel comparison. I have said that //ii// >> //i//, at least in terms of quantity of exemplars. While the number of exemplars of /ii/ is much greater than /i/ (/ii/ > /i/), one can still consider long and short forms of the vowel [i]. However, the difference /ɛɛ/ >>> /ɛ/ is too out of balance to make such a comparison effective for the vowel [ɛ]. It should be understood that /ɛ/ is just an allophone of //i// in the environment of glottal stricture, virtually not occurring elsewhere.

²⁹ While it appears that this example is short for J, I note a similar example, -tʰkɛɛ (JH) but -tʰkɛ(ɛ)(ʔ) (EH), 'rattlesnake'.

³⁰ Compare EH, -ɸɛtsʰuʔ 'Clackamas'.

2.4.2.4 Summary of the vowels //i// and //ii//: /ɛ/, /i/, /œ/, /ii/

In the summary for /œ/ and /ii/, it was mentioned that there were two types of these vowels, and that although there has been and perhaps continues to be a tendency for raising, especially before coronal consonants, other factors suggest other differences. There are no minimal pairs between these two vowels. /œ/ appears to occur more often after initially glottalized onsets and as the default vowel following **h**- and the resonants. /ii/ tends to appear more frequently before coronals, especially affricates and fricatives. There is some free variation, especially in weakened environments like before final **K** and in particles, for both long and short vowels. Among the short vowels, there are not enough occurrences of **ɛ** to mark it as vowel in its own right; it appears only following glottalization on the initial or before glottalization on the coda.

The fact that there is no distinct /ɛ/ vowel raises the question of what further organization can be made in the distinctions between the allophones. It makes the proposition of finding enough complementary distribution to completely collapse the **ɛ/i** vowel distinctions more viable, despite the large amount of free variation, /œ/ ~ /ii/.

2.4.3 The vowels //u// and //uu//

There are two major allophones each of //u// or //uu//:

- (a) /u(u): generally [u(u)], but also between [u(u)] and [ʊ(ʊ)]. These are more common around labials.
- (b) /ɔ(ɔ)/, generally [o(o)], but between [ɔ(ɔ)] and [ɔ(ɔ)]. These are more common around back vowels or finally.

I write these vowels normally as /u/ or /uu/ and /ɔ/ or /ɔɔ/, indicating two allophones for type of vowel. Sometimes I cannot decide when a (rare) form is written only in **o**, so I write it as /o/, as in example (50a) below. When it is the central option of a of a less rare choice of three (as in (50), below), it is also difficult to know which way to write; in this case the formtypes do not help. So, here too I may write /o/.

- | | | | | | | |
|----------|--|---------------------------------------|--|--------------------------------------|--|-----------------|
| (50) (a) | | -b̥ɔmæq ^h (2) | | | | neck, throat |
| (b) | -b̥ú ^h ts ^h (4) | -b̥ɔ ^h ts ^h (5) | -b̥ɔ ^h ts ^h (4) | /b̥o ^h ts ^h / | //b̥u ^h ts ^h // | mouth |
| (c) | -p ^h úunuk ^h - (2) | p ^h ɔonuk ^h (3) | -p ^h óonuk ^h (1) | /p ^h oonuk ^h / | //p ^h uunuk ^h // | a few, a little |

Others, like (51a–b), show the INTR verbal stem suffix (/u/) in the form of the two allophones /-u(u)/ in the middle of the stem, and as /-ɔɔ/ stem finally.

- (51) (a) -mínuφit^h /min-u-φit^h/ -mín-ɔɔ /-ɔɔ/ //min-u// come out, go out
 (b) -wíits^hits^hu /wiits^h-its^h-u/³¹ -wíits^h-ɔɔ /-ɔɔ/ //wi-ts^h-u// open up (INTR)

Likewise, the neighboring consonants may make an effect toward raising or lowering. Notice in (52) the attraction of the high vowel to the plain labial occlusive:

- (52) (a) -yáan-a-ts^hφɔɔ //ts^h-φ-u// visit me 105.21
 (b) -yáan-á-ts^hφubu //ts^h-b-u// visit you 121.9–10

The curious plethora of spellings by Jacobs mounts at the end of words, where vowels regularly are slightly lengthened, as in (53); note (a) and (h). (a–b) are given with the inchoative suffix. (I have given secondary accent for pronominals/adverbials.)³²

- (53) (a) -hú(u)-²yu(u) -hó(o)-²yu(u) -hó(ɔ)-²yu(u) -hó(ω)-²yu(ʔ) do like that; happen to
 (b) -húu-^(ʔ)yu -hóo-²yu be dark, night
 (c) -bú²ts^h -bó²ts^h -bó²ts^h mouth
 (d) -t^hq^hó² -t^hq^hó² -t^hq^hó² tail
 (e) -nóɔna -nóɔna nose
 (f) -hú(u)p^hna -hó(o)p^hna heart, breast
 (g) -ʔlú²q^h -ʔló²q^h pileated woodpecker
 (h) t^hàaφɔɔ²/t^hàaφɔɔ t^hàaφω(ʔ) one at a time
 (i) k̂ò(ɔ)nφan k̂ò(ω)nφan just, only
 (j)³³ -²yu²q^h -²yo²q^h -²yo²q^h -²yó²q^h PASSIVE
 (k)³⁴ -²yu² -yo(ɔ) -²yóω INCHOATIVE

Despite this sometimes confusing myriad of forms, we see that except for a very few, such as the TRANS/INTRANS verb in (53a) (all forms in each) and the two suffixes in (j–k),

³¹ I reserve the right to use epenthetic vowels with this allophonic writing, as well as surface ones. Normally a final -u INTR becomes long, if not low as in the second example. Here, it could be a special non-lengthened stem V as in (c) or after some Type 1 and Type 3 reduplicants, in -u; or i.

³² Although I created a font to write Jacobs' handwritten forms, I have avoided adding that extra, introductory layer where possible; it often adds still more translation and confusion.

³³ All forms occur on, for example, -q̂áhai- 'kill'.

³⁴ The first and fourth forms occur on -^(ʔ)yóω-φat^h- '(be) old'. The third form is written on the verb -²óq^h-/-²óq̂- 'get warm'.

most readily divide themselves into a *higher and a lower back vowel*. Thus I can write, using major allophones, /-**huu**-/ 'be dark, night', /-**hu(u)phna**/ 'heart', /-**lu²q^h**/ 'woodpecker', on one hand and /-**q^hɔ²**/ 'tail', /-**noɔna**/ 'nose', /**tu^haaɸo(ɔ)^(r)**/ 'one at a time', and /**ko(ɔ)n-ɸan**/ on the other. (53c) might bring a momentary hesitation: if there were no form in **u**, I would write it in **ɔ**; if there were only the central form, I would like to write it in **o**; but since there is a form in **u**, I write /-**bu²ts^h**/, 'mouth'.

We will now look briefly at the long back vowels. Forms with upper back vowels around velars are regularly backed.

(53)	(d)	- q^hɔ²	tail
	(j)	- yɔ²q^h	PASSIVE ³⁵
(54)	(a)	- loŋga	feather
	(b)	- ɔɔdɔ-a	arise, get up

A number of forms have **-l**, appears to attach the vowel back and downwards. (This suggests a rounded quality in the **l**; cf. the **l** ~ **w** alternation in §3.

(55)	(a)	- dɔɔlɔba	feather(s)
	(b)	- hɔɔla	descend, come down
	(c)	- tsɔlts	poke at

Other forms, as in (56), have near final labials. This, however, tends to contradict the example in (52b) where the stem suffix **-ɸ** appears to keep the vowel high and more rounded.

(56)	(a)	(-) dɔɔɸi	month, moon
	(b)	- tsɔn²wa	tree stump

In still other cases, it is not clear why they are low as in (57), except that they were underlyingly already quite low.

(57)	(a)	- nɔɔha	willow
	(b)	- tsɔ²d	(be) blind
	(c) (i)	- hɔɔd-u	see
	(ii)	- hɔɔd-n	see s.t.

³⁵ Despite having been written many ways by J., it is generally **-yɔk**.

We are forced to conclude that, like the front vowels / $\epsilon\epsilon$ /, a low form may be closer to the default value for this vowel. Labials tend to cause the vowels to raise.

The number of long back low vowels is greater than the number of short. (This parallels the situation with regard to / $\epsilon\epsilon$ / and / ϵ / we saw in §2.4.2 above.) Glottalization following the vowel is often across the board, above in (53–d, g, j), as well as (55c), (56b), (57b). Many follow initial aspiration, as in (53a, b), (55b), (57c). **h-** appears to move the /u/ vowels lower to [o]. It is not possible currently to give a full analysis of the differences between the higher and lower forms, as for long and short / ϵ / . Nonetheless, we can see the differences between the first two listed in (531–b), reprinted here as (58).

- (58) (a) –hú(u)-²yu(u) –hó(o)-²yu(u) –hó(ɔ)-²yu(u) –hó(ω)-²yu(ʔ) /-hɔ-²y/ do like that; happen to
 (b) –húu-(ʔ)yu –hóo-²yu /-huu-²y/ be dark, night

Among the higher vowels, normal /u(u)/ [u(u)], variation appears at least as common as among the lower, as in (59).

- (59) (a) –húuk^h-ni –hóok^h-ni eat
 (b) –kúuni –kóoni brother
 (c) –gúut^hgum-u –góodgum-a/-u be early morning, sunrise
 (d) –múuk^hi –móok^hi venison, meat

 (f) –kúp^h-na –kóp^h-na be cut off, be short
 (g) –²uk- –²ók- heat (TRANS)
 (h) –^hbubu –^hbóbu small screech owl

We note that the lower form in [o(ɔ)] often appears more common or basic.

We have seen that the vowel, //u(u)// has two allophones, /u(u)/ and /ɔ(ɔ)/. Despite their far fewer numbers, they are written (systematically) with a greater variability with regard to quality than /i(i)/ and / ϵ (ϵ)/. The long form, here /ɔɔ/, is more common than than the short, /ɔ/. The laryngeals appear to help maintain the lower vowels. However, these preliminary notes are certainly not yet the final word.

2.4.4 Conclusion of three vowel qualities

We have seen that there are three basic vowel qualities in CK, //a, i, u//. //a// has the major allophones of /a, á, ə/; //i// has the major allophones of /i, ε/;³⁶ and //u// has the major allophones of /u, ɔ/. Where long vowels occur, in all cases except /aa/ far more common than their short equivalents, the single long major allophone of //aa// is /aa/, those of //ii// are /ii/ and /εε/, and those of //uu// are /uu/ and /ɔɔ/. These groups are not equally proportional, and a close study will shed interesting light on the internal history of CK phonology and its segments

2.5 Three diphthongs in CK

There are three diphthongs in CK, *ay*, *aw*, *uy*. (They appear to exist only stressed,³⁷ as *áy*, *áw*, *úy*, or as *dy*, *dw*, *dy*, the latter I assume for non-conjugated pronominal/adverbials, the third lexical class.) In stressed format, They occur as the nuclei of verbal and nominal roots. They are basically equivalent to three distinct long vowels, only V_1V_2 instead of V_1V_1 . They could equally be written *ai*, *au*, and *ui*, except that at times they behave as they were VG, the parallel of VR. That is, the second segments of the diphthongs may be glottalized.³⁸

There is little variation in their pronunciation, except that *uy* varies with *oy* just as *u* with *o*. They change differentially through the dialects as units, not as separate vowels. They bear an important distinction from ordinary VR clusters in that where the glottalization of a stem-medial (or stem-initial) resonant occurs inevitably before the resonant, as $V^{\text{r}}R$, in the case of diphthongs the glottalization appears as VG^{r} . The clear and apparent reason for this is in order to preserve the integrity of the diphthong. (Stem- or word-final resonant glottalization is generally of a R^{r} pattern. Examples are given in the next chapter.)

³⁶ While it has been noted that /ε/ is hardly a major allophone in the sense that it appears only to be merely a synchronic reflex of /i/ under glottalization (the exact range of /ɔ/, though undetermined, may be similar), I will continue to use this terminology as a heuristic device toward uncovering the allophones of CK. This is an introductory study and not the final word on the matter.

³⁷ An example from B.'s s. f., *-mántħwritai*, is surely only an alternate formtype for *-máñd-t^h-pida*, '(you) wrestle together'.

³⁸ It could be argued that the V in VR is different than V_1 in V_1V_2 with regard to diphthongs, but this is being too recondite for the current project. Whether or not a set of distinct, glottalized diphthongs should be set up, *áy*, *áw*, *úy*, is a serious possibility that the data suggest on the basis of patterning alone. Probably dialectal studies will aid in making a final determination.

2.6 An epenthetic vowel in CK

There is some evidence for two kinds of epenthetic vowels in CK. One appears as schwa in either stressed or unstressed positions. This, however, is more likely to be a reduced vowel. (It has already been reviewed in §2.4.1.4.) The second, which I write *i*, appears either as /i/ or as /u/, depending upon the consonant or vocalic nucleus that follows it. It arises in the environments O_b-R_H , R_H-O_b , or occasionally $O_{b1}-O_{b2}$ environments (where O_{b2} represents a root suffix, probably of derivational origin).

Example (60) exemplifies a few occurrences of this epenthetic vowel, *i*, which appears in environments O_iR_H , R_HiO , and O_iO which are always unstressed.

(60) Epenthetic *i* (unstressed environment)

OR _H	(a)	<i>αμπάστῶν, ἀμπακτῶν</i>	[?] ən-pásɰin	[?] an-pasɰn	whiteman
OR _H	(b)	<i>κυμβάκ'μπ</i>	ɰ-im-lámɰ	ɰ-m-lámɰ	whipped
OR _H ,R _H O	(c)	<i>τὺμῆέλιπ</i>	ts ^h -im-héelip	ts ^h -m-hiilɰ ³⁹	I'm sick
R _H O	(d)	<i>ἀνῆέλιπα</i>	[?] an-héelip-a	[?] an-hiilɰ-a	sickness
O ₁ O ₂ (x2)	(e)	<i>κίτι'ίτυρα'τ</i>	ɰ-i-ɰi- [?] iɰɰ-a ^ɰ	ɰ-ɰii- [?] iɰɰ-aɰ	when he was leaping

i is subject to an interesting back/round/dorsal to front/unround/coronal harmony, with both consonantal and long-distance vocalic regressive triggers.

2.7 Conclusion of vowels

We have reviewed the basic allophones of the vowels. From //a// and //aa//, the allophone /a/ was seen to be the most general, the long allophone /aa/ second. Two weakened forms of //a//, /á/ and /ə/, have been discussed.

From //ii// and //i// we have reviewed /εε/, /ii/, /ε/, and /i/. Of these, /εε/ is by far the most common form, with /ii/ common perhaps due to raising before coronals and

³⁹ The *m*- (INDICATIVE), which I generally write as *-m*-, represents the mode in many present and aorist verb prefixes; it is represented as *-am-* in other tenses. (The phoneme also appears as the third person possessive in *ɰm-*.) An epenthetic *i* always appears before it (when following a consonant or default initial [?]), being then realized in one of the following three ways:

(61) [?]m → $\begin{cases} \text{um} & / \text{---[LABIAL]} \\ \text{im} & / \text{---[CORONAL]} \\ \text{ij} & / \text{---[DORSAL]} \end{cases}$ (' is a hypothesized syllable-initial glottal stop.)

differentiation from / $\epsilon\epsilon$ / in the presence of labial obstruents. For the short vowels, the reverse is true, with /i/ maintaining a modest but distinct presence throughout all environments, with the probable exception near glottalization, where / ϵ / is found. Historically, all vowel segments appear subject to raising. This has apparently affected some former */ $\alpha\alpha$ /* that have become // $\epsilon\epsilon$ //. However, CK currently observes strict distinctness of segment between // $\alpha\alpha$ // and // $\epsilon\epsilon$ //. The lower vowels often tend to appear following laryngeals, that is, following **h**- and (or before) glottalization.

From // \mathbf{uu} // and //**u**// we have reviewed / $\mathbf{u}\mathbf{u}$ /, / \mathbf{u} /, / \mathbf{u} /, and /**u**/ briefly. These vowels are fewer than / $\epsilon\epsilon$ /, / \mathbf{ii} /, / ϵ /, and /i/. They are written more variously by Jacobs. Final vowels near velars tend to be lower. How the several allophones have raised to [u(u)] (and to [ɪ(ɪ)]) is only partially understood at this time.

The three diphthongs, **ay**, **aw**, **uy**, probably always stressed (as occurring only in a root nucleus) have been discussed very briefly. More will be said about them in Chapter 2.

One true epenthetic vowel, **i**, has been discussed. Which allophone, /i/ and /u/, it bears depends upon which consonant or vowel follows it. If the following consonant is coronal, it will stay as /i/. But if labial resonants or labiovelars follow, or if, beyond a neutral consonant (occlusive), a back vowel (**a** or **u**) occurs, they (or it) will trigger an assimilation (long-distance in the case of the following vowel) to /u/.

There is another, more general vowel assimilation in the language I call *vowel attraction*. An account of this would take us too far afield for this thesis.

Much more work needs to be done to elucidate the patterning of CK vowels, both synchronically and historically. This is only an introductory review.

Chapter 3

Resonants

3.1 Introduction to the resonants

The ten CK resonants, five plain and five glottalized, are as in (1)

(1) The resonants

w	y	l	m	n	
w̥	y̥	l̥	m̥	n̥	ʔ

Sets of the resonants in CK include glides (**G**, actually semivowels in this language: w, w̥, y, y̥), liquids (**L**: l, l̥), and nasals (**N**: m, m̥, n, n̥). A special class is made up of the liquids and nasals, which I call 'heavy' resonants (**R_H**). Recognition of glottalization comes from the moderate to small glottal catch occurring immediately before, after, or sometimes during every glottalized resonant. The glottal stop will be discussed in Chapter 6.

The resonants, at least after the stem vowels and DURATIVE -d̥, are the most likely segments to form meaning-bearing units on the verbal stem suffixes (followed by the fricatives and the affricate). They also form part of the prefixal system (e.g., nominal DETERMINER in **an-** (or t^h**an-**), verbal INDICATIVE mode in **-m-**, cislocative positional in **-man-**.)

In this chapter, we will review examples of these ten resonants in a variety of environments. I discuss the nature of resonant glottalization, as seen by Jacobs (phonetically) and myself (phonemically). (This begins a discussion thread on CK glottalization that will continue throughout this thesis.) Brief discussions of CK resonant sonority, root structures and clustering with occlusives follow. Consonantal gemination in Kalapuya, an important topic in the history of the family, will be broached in dealing with the constraint against gemination found in CK. This problem in turn touches upon the assimilation of nasals, with regard to place or total manner, to following consonants. Before occlusives, nasals assimilate to the place of the following segment. Before fricatives and other resonants, they disappear in different ways.

3.2 Examples of the resonants

The examples proceed from the more sonorant glides (i.e., **w** and **y**) to less sonorant nasals (i.e., **n** and **m**). Each resonant is shown in stem-initial and stem- or word-final positions, and occasionally stem-medial positions. Plain and glottalized examples are given, allowing contrast.

With regard to the glottalized resonants, a free-standing **ʔ** occurring *after a resonant* at the end of a stem is indistinguishable from **w̥**, **y̥**, **l̥**, **m̥**, or **n̥** in such positions, where the glottalization of the segment normally is expressed *after* the supralaryngeal part of the resonant syllable-finally (thus, **psinʔ** or **psin̥** 'three'). Syllable-initially, on the other hand,—whether stem-initially or -medially—such a possible glottal segment, as part of a potential cluster, occurring *before the resonant* would be indistinguishable from a glottalized resonant (thus, **həʔlum** or **h̥ləum** 'out(side)').¹ A general lack of interior **ʔ** (except on certain compounds, where **-ʔR-** occurs at the break), however, suggests that, without morphological evidence to the contrary, the simpler form, **R̥**, is generally correct, rather than **Rʔ** as final cluster, or **ʔR** as root initial cluster. (Note that the distinctions are lexical in nature; only verb-finally does the aspectual category PUNCTUAL, **-ʔ**, potentially play a part. Moreover, combinations of **VʔV** or **V₁ʔV₂**, which might be expected to arise by some kind of grammatical infix, do not normally occur in CK where the expression of either one long vowel or two short vowels is interrupted by a glottal catch.²) Such double-gestural parts of the glottalized resonants, i.e. the off- or on-glide glottalization and the articulatory locus of supralaryngeal features, are generally pronounced ambisyllabically where possible, ending a preceding syllable and beginning a following syllable. In this case, phonetic **-ʔ.R-** represents both coda and syllable onset when flanked by vowels, yet is in reality but one segment. (There is evidence for ambisyllabicity

¹ This discussion is predicated on the assumption that some kind of prefix comes before the initial glottalized resonant, otherwise the glottalization presumably is not heard. Jacobs generally wrote an apostrophe for a glottal stop between prefix and root. The example given, presumably **/həʔlum/** based on a comparison with the demonstrative particle **/həʔ/** 'here, there, this way' (cf. *ha'ma'ita.rint* J28.9/nb85:60.13 **/haʔ—mayts̥-dnd̥/** '(the way of dawning,) eastwards', where the particle is still a clitic), shows a contrary example to the general pattern I suggest here. I don't think there is any difference for CK. If two glottal gestures they would merge into one.

² The few **VʔV** examples that can be found include **/-niʔi/** 'pestle' (EH), **/-ʔyáʔay/** 'steelhead', place names like **/kʔʔs/** 'people of the central/south coast, Siletz' and probably **/tʔa-wóʔogotʔ/** for the lower Mohawk Valley (Gatschet 1877d:69). **VCV** examples include **/támá/** 'Klamath', **/táqadətʔ/** 'Klickitat', and few odd words like **/hùpun/** 'behind', **/-máyuus/** 'hat', **/-sáawal/** 'tarweed seed'. But see the discussion in §3.4.4. NK may have such forms regularly.

among non-glottalized segments as well. While there is no room for a full treatment of this topic here, see the brief discussion below in §3.4.)

3.2.1 The glides or semivowels

There are four glides in CK, **w** and **w̥** and **y** and **y̥**, which correspond to the vowels **u** and **i** in maintaining qualities of backness/rounding or coronality, respectively. Because of their close role as second members of diphthongs in CK (as I write them), they may also be called *semivowels*. All of them may occur in any position, though in initial position preglottalization cannot normally be heard without some kind of a prefix to the stem. Stem-initially and stem- or word-finally, the glottalized semivowels follow the same patterns, ²**R** and **Rʔ**, as the other resonants.³ Diphthongs are not known stem-initially (i.e., following epenthetic initial [ʔ]), though they are following **h**. A glottalized glide in medial position will normally carry its glottalization after the supralaryngeal portion of glide, leaving the integrity of the diphthong unaffected. CV stem suffixes, on the other hand, will carry the glottalization initially, leaving a preceding (stem) vowel without coda.⁴ No attempt has been made here to distinguish between syllables that are potentially CV₁V₂ (although also CVG by my analysis) and those that may be better considered CVC in that they are CVR̥. Resonants in onset and final clusters are discussed in §3.4 below.

In many of the following examples, Jacobs' own script⁵ indicates the form, followed by a major allophonic version, followed by a phonemicized version. (I may add, unsystematically, predictable stress or the epenthetic vowel **i** (otherwise /i, u/) to the first.)

³ CK generally does not allow the glottal stop to separate vowel+glide in cases I can recognize (CVGʔ, *CVʔG). It is hard to test this, however, against normal syllabification of the resonants, where glottals normally appear outside the resonants, e.g. //wáy-wá// (or //wáy-wa//) [ʔwáyʔwaʔ] 'woman'.

⁴ Compare (EH) /gúyʔ/ 'grinding bowl' with /káʔ.ya.tʰa/ ~ /gú.yá.tʰa/ [sic, but for my syllabification marks], probably //gúy-a-tʰa// 'what has been ground' for an apparent exception. Resyllabification forces part of the preceding segment (here the **y** gesture) to appear before the onset-less stem vowel, if there is no consonantal suffix as initial.

⁵ A font to display Jacobs' notebook writing, which is based largely upon Boas et al. 1916, has been developed. Small caps represent intermediates, ordinary stops are aspirates; **c** and **tc** (or **tc̥**; = [ʃ], [tʰ]) are the prepalatal or backed form of dental **s** and **ts** (or **ts̥**). In Boas et al. 1916, **a** is central, whereas **ɑ** is back; Jacobs probably intended them further forward. Both are low, open and unrounded vowels. **o** (mid) and **u** (low) are closed, rounded vowels, whereas **e** (front, unrounded) and **ɔ** (back rounded) are open mid vowels. **α** (or **α̥**) is central, equivalent to schwa. For a comparison with phonemes used in this thesis, see Table 14.

3.2.1.1 //w// and //w̥//

(2) Root-initial w

- (a) //waak^h-// {woman}
- (i)⁶ *ti'* *ητᾶωά·qε* //ts^hiʔ 0-m-dan-waak^hiʔ// //waak^h-iʔ// spouse
 /ts^hiʔ (ʔ-)m-dan-waak^hiʔ/
 I PRES.3-IND-POSS.1-spouse I have a husband 105.4/nb35:13.19
- (ii) *κυσ* *κανιηωά·qtsáʔT* //waak^h-ts^hat̪// {woman-PL} women, woman
 //gus-g-am-ni-hi-waak^h-ts^hat̪//
 that—AOR-ATTR-PL.3-NCONJ.VER—women those who were women- 97.3/nb34:135.15–6
- (b) *háś* *τιντυ·ωάιτᾶρ* //waydab̥// 'camp overnight' (V) < //way-// 'sleep' + //d̥(a)b̥//
 /háś/ //ts^h-m-du-waydab̥//
 here PRES.1/2-IND-PL.1-camp.overnight Let's came here overnight. 90.15/nb34:25.11
- (c)⁷ *τυτυωέ'na* //wiŋa// dream (N)
 /du-di-wé²na/ //du-dn-wiŋa// in his dream(s)
 LOC-POSS.3-dream 67.10/nb35:65.13, 17
- (d)⁸ *τυβῆωύ·* //wuʔ// go get (V)
 /dup^h-wúʔ/ //du-p-wuʔ// [you people,] go and get ...!
 IMP.2-PL.2-go.get 63.9/nb36:165.19

(3) Stem-final and -medial w as second members of diphthongs

- (a) (i) /-gáw-i/ //gaw-// send off, throw
 (ii) /-gáw-a/ //gaw-// go examine, look
- (c) /-gáwɔ̄-à/ (< //gawɔ̄// sing + //a// NOMIN) singing
- (d) *τᾶτι·βῆαύς* /d̥ad̥ii-βῆaws/ //da-dii-βῆaws// 'when it would be wintertime'
 USIT-TEMP-winter 19.15/nb34:127.12

⁶ The morphological analysis here of PRES.3 as 0 takes into account the facts that (1) the epenthetic vowel *i* ([i ~ u]) that precedes the modal //m-// (IND) requires a surface C-, here ʔ (as in ʔ-m or C-R) to manifest; (2) some variation of /ʔ/ is always written before vowels when preceded by another vowel (or often a resonant), becoming /ʔ/ (strong) stem initially; (3) ʔ <'>, however, is never written by Jacobs before /u(u)-/ in PRES.3.ATTR- (where the tense and mode cannot be split), except where a vowel precedes (as in (30a) below).

⁷ Cf. /-waa/ 'dream' (N), /-wa(a)ʔya/ 'dream' (N), /-way/ 'sleep' (V).

⁸ (a) This particular example missed the normal final glottal stop in J's notebook. (b) I am not sure of the underlying laryngeal status (aspirated or plain) of certain prefix-final consonants, viz. -p- 'PLURAL.2' and -t- 'DIRECTIONAL'. At least the second of these must be plain.

(4) w glide in root onset clusters: *tw-*, *tʰw-*, *tʰsw-*

- (a) *ɾaniʔwaʔɾiniʔ* /d̪ani-tʰwaʔd̪iniʔ/ //d̪a-ni-tʰwaʔ-d̪-ni-ʔ// they would stick it in
USIT-3.PL-pierce-DUR-OBJ.SG-PUNCT 30.2/nb46:76.19
- (b) *tʰwiʔak* /-tʰwiitʰak/ //tʰwiitʰak// blue racer
- (c) *ɾam tʰswaʔɾɪɾ* /d̪am-tʰsaʔd̪id̪/ //d̪a-m-tʰswaʔ-d̪d̪// 'he would gut...'
USIT-IND-gut-CONT.ITER nb46:17.21 (EH)

(5) Root-initial *w̥*

- (a)⁹ *-waʔak* (5), *-waʔɾɔʔk* (3), *-waʔtɔʔk* (2), *-waʔɾɔʔk* (1), *-waʔaʔk* (1),
-waʔɾɔʔk (1), *-waʔɾɔʔk* (1), *-waʔɾɔʔk* (1)
/-ʔwaʔd̪aʔkʰ/ //waʔd̪ak// wooden stick, pole, tree
- (b) (i)¹⁰ *-waʔ* (5), *-waʔ* (3), *-waʔ* (1) /-w̥aʔʔ/ //w̥aʔ// child, children
- (ii) *waʔiʔwaʔ(-)* (6), *-waʔiʔwaʔ* (3), *(-)waʔiʔwaʔ(-)* (3), *(-)waʔiʔwaʔ* (2)
/-w̥aʔʔwaʔ/ //w̥aʔʔ-waʔ/ (or //w̥aʔʔ-w̥aʔ//) woman [cf. -waakʰ-, above]
- (iii) *waʔineʔk* (3), *waʔineʔk* (1) //w̥aʔnikʰ// give birth, have a child
- (c) *-wiʔ-* (2), *-weʔ-* (1) /-w̥iiʔ/ //w̥iʔ// (or //w̥i(i)ʔ//) rub

(6) *w̥* finally and medially

- (a) *laʔfan* /l̪aʔʔfan/ //l̪aʔʔfan// < //l̪aʔ + -ʔfan// just then
now-ADV
- (b) *ɾu ɾaʔ* 'in the canoe' /-ɾaʔʔ/ //ɾaʔʔ// canoe
- (c) *ʔyʊʔwal, yʊʔwal* /-(ʔ)yʊʔw̥al/ go hunting < /-(ʔ)yʊʔwaʔ/ (//yʊʔw̥-aʔ/?) pursue

⁹ (a) On certain items Jacobs' various spellings have been given to allow the reader to see how common the patterns are. The small numbers after the lexical items refer to formtypes (see the methodology, §1.6.2). (b) Stem-internal marking of glottalization on obstruents is somewhat difficult in CK, since both *K̥* (simultaneous-with to post-release glottalization) and *ʔK* (pre-consonantal) occlusives occur. While they do not contrast, marking them is awkward.

¹⁰ While there is no way to tell in such an example if the form is really underlyingly *-w̥aʔʔ* or *-w̥aʔ*, the latter seems more consistent with CK roots, though VRC structures are readily allowed. (I leave the pitch accent unmarked on these examples in order not to have to replicate J.'s variations.)

3.2.1.2 //y// and //ỵ//

(7) y initially

- (a) $\text{tʰu}^{\text{h}} \text{tʰu} \text{man} \text{tʰciyá}^{\text{h}} \text{m}^{\text{p}}$ /tʰuh tʰimantsʰi-yám̐/ 'Where are you coming from?'
 //tʰuh tʰ-m-man-tʰ-yám̐//
 'where?' PRES.1/2-IND-DIR.LOC.h-DIR.LOC.wh-come.from 90.10/nb34:23.17
- (b) /-yíi/ return
- (c) /-yísɓál/ needle, thorn(s)
- (d) /-yúu/ sit (in), ride (in), go (in)
- (e)¹¹ $\text{-yú}^{\text{h}} \text{hú}^{\text{h}} \text{yú}^{\text{h}}$ (&c, 8), $\text{-yú}^{\text{h}} \text{húyú}^{\text{h}}$ (&c, 6)
 /-yúuhu-yúu/ //yuuhu-yú// ((get to) be (an)) old (person)

(8) y finally

- (a) 'mái /-²may/ //m̐ay// white fir
- (b) 'muí, 'moí /-²muy/ //m̐uy// put (s.t.) in
- (c) (EH) mútu /-múɗuy/ //muɗuy// salal berry nb84:82

(9) y glide in root onset clusters: **py-**, **p̣y-**, **ṭy-**, **ṭy-**, **ɗy-**, **my-**

- (a) $\text{táti}^{\text{h}} \text{p̣yáus}$ /ḍəɗii-p̣yáws/ //ɗə-ɗii-p̣yaws// when it would be wintertime
 USIT-TEMP-winter 19:15/nb34:127.12
- (b) $\text{p̣sín}^{\text{h}} \text{fú}^{\text{h}} \text{'ám}^{\text{h}} \text{p̣yáñ}^{\text{h}}$ //p̣^hsiñ-ɸu an-p̣^hyañ// three days
 /p̣^hsinɸu ²am-p̣^hyañ/ three-CNT DET-day 19:1-2/nb34:125.23
- (c) $\text{nau}^{\text{h}} \text{ántyɛ}^{\text{h}} \text{ṭ}$ //naw—an-ṭ^hyi(i)ṭ// yellowjacket
 /naw—²an-ṭ^hyii/ COM—DET-yellowjacket 51:2/nb36:119.5
- (d)¹² (JH?) $\text{ṭciyúwít}^{\text{h}} \text{ám}^{\text{h}} \text{yáñ}^{\text{h}}$ /ṭ^hyuwit^h an-myañ^h/ south
 /ṭ^hyuwit^h amyañ^h/ nb84:98.21
- (e)¹³ (EH) $\text{tyi}^{\text{h}} \text{k}$ /ɗỵiik^h/ //ɗyik^h// however (?)

¹¹ A small &c indicates 'plus other forms, too many to list'.

¹² Or $\text{ṭci}^{\text{h}} \text{wít}^{\text{h}} \text{ám}^{\text{h}} \text{yáñ}^{\text{h}}$.

¹³ The examples of items in **ṭy-**, **ɗy-** like (8d, e) are very very few. Occurring mainly in EH, eleven formtypes of 'however' as /ɗyik^h/, as above; three formtypes as /ɗiik^h/ (which may be underlying).

- (f) (JH) *tsámɣanʁk* /tsʰám(i)yankʰ/ 'on top, above; sky, heavens' 18.13/nb34:125.17
 (EH) *tsámɣanʁk* /tsʰámɣanʁkʰ/ *id.* nb46:55.21 (Also, JH as [tsʰámɣanʁkʰ] on S-M tape)
 < //tsʰanʁ/- 'place of' + //myankʰ// 'height, sky'

(10) *y* initially

- (a) -'yánɾ- [ʔyándʁ] /-yandʁ-/ //yandʁ-// purchase
 (b) -'yác (4), -'yás (4); -'yác'yv' (1), -'yác'yv' (1)
 /-yás(-yuu)/ //yas(-yuu)// hurt, ache (TRANS, INTRANS)
 (c) -'yé (1/2), -'yéfan (2/2); /-yéε-(φan)/ //yii-// burn (INTR)
 -'yému(?) (4/6) /-yéεm-i(?) / //yium-i// burn (TRANS)
 (d) -'yú (2/9), -'yú (1/9), -'yó (1/9), -'yú (5/9)
 /-yúʔ/ //yúʔ// blood

(11) *y* finally and medially

- (a) 'wái' [ʔwáiʔ] //wáy// kid(s), child(ren)
 (b) (EH) kúi' /-gúyʔ/ //guy// < -gu- 'grind' stone (grinding) bowl
 (c) 'yu, 'yó /-ʔyu(u)ʔ/ //yuu// INCHOATIVE (intransitivizer on V)
 (i) tsíʔtɕu'yu /-tsʰíʔtsʰíʔu-ʔyuu/ (cf. tsíʔʔu /tsʰíʔ-u/ s.t. breaks (INTR)) 141.10/nb36:15.13
 //tsʰíʔ+tsʰíʔ-u-yuu// "all broke down"
 (ii) Pú'yú /-púu-ʔyuu/ //pu(u)-yuu// 56.7/nb34:113.7 be(come) full
 (iii) hú'yú /-húu-yuu/ //huu-yuu// 56.7/nb34:113.5 be(come) night, dark
 (iv) qásqa'yó /-kʰáskʰa-yóʔ/ //kʰáskʰa-yuu// 56.2/nb36:185.9 be(come) bad

Note the following MINIMAL PAIRS from some of these examples above:

- (2b) [wái] //way// sleep
 (5bi/11a) [ʔwáiʔ] //wáy// child(ren), offspring
 (7b) [yii] //yii// return
 (10c) [yéε] //yii-// burn (INTR)

There are additionally a number of other MINIMAL OR NEAR-MINIMAL PAIRS (often depending on underlying vowel length, which may be uncertain), such as the following:

- (11d) [wáa] //waa// dream (N or V)
 (11bi) [ʔwa] -//w̥a// NOMIN suffix

3.2.2 The liquids

There are only two liquids, **l** and **l̥**, which may occur in all positions. **l** clusters with occlusives both root initially and root finally. (For clustering, see §3.4 below.)

(12) Root-initial **l**

- (a) -λάμ- (25) /-laam-i(-ʔ)/-u/ //la-m// {enter/take inside, -TRANS/-INTR}
 (i)¹⁴ κίτιτ'νιλάμι /g̥idiid.ni-lámi/ //g̥-ɖii-ɖ-ni-la-m-i// 'when they took (it) in'
AOR-TEMP-DIR.thither-PL.3-enter-TRANS 109.12
 (ii) κινλάμο· //g̥-m-ɖ-la-m-u// 'went inside'
AOR-IND-DIR.th-enter-INTR 108.20
- (b) -λίφα, -λίφα [liiɸa] //liiɸa// log
 (c) αλόησα, αλόησα, -λόησα [əlɔŋɕa] //an-lungə// feather

(13) Final (and medial) **l**

- (a) -γίσαλ (3) /-yisɸal/ //yisɸal// needle; thorn(s)
 (b) -τίτιλ (6), -τίτιλ' (1) /tʰiitsʰil/ //tʰiitsʰil// oak, bow
 (c) τάντ'ούλιμ' /-tʰul-i-ni-ʔ/ //tʰul-// poke

(14) **l** glide in root onset clusters: **pl-**, **pʰl-**, **tsl-**, **kl-**, (gl- [ʔ?]) **kʰl-**

- (a) πυπλα'ντι /ɸu-plántsʰ/ //ɸu-plantʰs// nits
117:1/nb36:91.9 POSS.2-nit(s)
 (b) κίτιμιπλόκνι /g̥idini-pʰlɔkʰni/ //g̥-ɖii-ni-pʰlakʰ-ni// 'when (they) ploughed
69.17/nb35:93.17 AOR-TEMP-PL.3-split-OBJ.3 [lit.: 'split open'] ...'

¹⁴ -ɖʰni- is short for -ɖi-ni-, apparently representing the elision of an epenthetic vowel (**i**, or [i] here) following the translocative directional **ɖ**. It represents another distinct occasion where Jacobs wrote ' to indicate a glottal gesture for some reason.

- (c) $\tau\upsilon\tau\iota\eta\tau\acute{\iota}\sigma\lambda\acute{\iota}'$ / $\text{d}\text{u}\text{d}\text{i}\eta\text{n}-\text{t}\acute{\sigma}\lambda\acute{\iota}'$ / // $\text{d}\text{u}-\text{d}\eta\text{n}-\text{t}\acute{\sigma}\lambda\acute{\iota}'$?/ 'in his rectum'
100.17/nb34:157.13 LOC-POSS.3-anus.[vulgar]
- (d) $\tau\acute{\alpha}\tau\iota\grave{\alpha}\lambda\acute{\iota}'\rho\alpha\tau$ / $\text{d}\acute{\alpha}\text{d}\text{i}\eta\text{i}-\text{k}\text{l}\text{i}\eta\text{i}\text{b}\acute{\alpha}\text{d}$ / // $\text{d}\acute{\alpha}-\text{d}\eta\text{i}\text{i}-\text{k}\text{l}\text{i}\eta\text{i}\text{b}-\acute{\alpha}\text{d}$ / 'when it wrapped around'
80.2/nb36:105.3 USIT-TEMP-wrap.around-DUR
- (e)¹⁵ $\kappa\iota\eta\tau\alpha\lambda\acute{\alpha}'\text{s}\acute{\alpha}'\gamma\upsilon$ [$\text{g}\eta\eta\text{t}^{\text{h}}-\text{ç}\lambda\acute{\alpha}-\text{y}\text{s}\acute{\alpha}'\gamma\upsilon$] // $\text{g}-\text{m}-\text{ç}-\text{g}\text{l}\text{a}\text{y}\text{s}-\acute{\alpha}-\gamma\upsilon$ // 'it gave off a smell'
105.2/nb35:15.11 AOR-IND-DIR.th-smell-STV-INCH
- (f) $\tau\acute{\alpha}\text{m}\acute{\alpha}\kappa\omega\lambda\acute{\iota}\sigma\kappa\omega\lambda\text{i}\sigma\upsilon$ / $\text{d}\acute{\alpha}\text{m}\acute{\alpha}-\text{k}^{\text{w}}\text{l}\text{i}\sigma\text{k}^{\text{w}}\text{l}\text{i}\sigma\upsilon$ / // $\text{d}\acute{\alpha}-\text{m}-\text{m}\acute{\alpha}-\text{k}^{\text{w}}\text{l}\text{i}\text{s}+\text{k}^{\text{w}}\text{l}\text{i}\text{s}-\text{u}$ // '(it) would keep
48.7/nb47:12.11 USIT-IND-DIR.h-squirt.AUG-INTR on squirting'

(15) Root-initial $\acute{\iota}$

- (a) $\tau\acute{\iota}'\lambda\acute{\alpha}$, $\tau\upsilon'\lambda\acute{\alpha}$; $\rho\upsilon'\lambda\acute{\alpha}$ // $\acute{\iota}\lambda\alpha$ // his, your feces
- (b) $-\lambda\acute{\alpha}\kappa\omega\alpha$, $-\lambda\acute{\alpha}\kappa\omega\alpha$, $-\lambda\acute{\alpha}\kappa\omega\alpha$, $-\lambda\acute{\alpha}\kappa\omega\alpha$ (&c, 12); $-\lambda\acute{\alpha}\kappa\omega\alpha$, (&c, 5)
/ $-\acute{\iota}\lambda\text{g}\omega\alpha$, $-\acute{\iota}\lambda\text{g}^{\text{w}}\alpha$ / // $\acute{\iota}\lambda\text{g}\omega\alpha \sim \acute{\iota}\lambda\text{g}^{\text{w}}\alpha$ // hand, arm
- (c) $\lambda\acute{\alpha}\upsilon'fan$ / $\lambda\omega^{\text{v}}\text{fan}$ / // $\acute{\iota}\lambda\omega^{\text{v}}-\text{fan}$ // just then
- (d) $(\alpha)\lambda\upsilon'q$, $(\alpha)\lambda\acute{\omicron}'q$ (7); $(\alpha)\lambda\upsilon'q$ (2) / $\text{ə}-\acute{\iota}\upsilon^{\text{v}}q$ / // $\acute{\iota}\lambda\text{u}\text{k}$ // pileated woodpecker

(16) Final $\acute{\iota}$

- (a) $-\acute{\tau}\acute{\alpha}'\lambda\alpha$ (2) / $-\text{t}\acute{\sigma}\acute{\alpha}'\text{I}-(-\text{t}\acute{\sigma})$, $-\alpha(\text{d})$ / // $\text{t}\acute{\sigma}\acute{\alpha}\text{I}$ // rattle
- (b) $-\tau\acute{\alpha}\kappa\iota\lambda'$ (3), $-\tau\acute{\alpha}\kappa\iota\lambda'$ (2), $-\tau\acute{\alpha}\kappa\iota\lambda$ (2), $-\tau\acute{\alpha}\kappa\iota\lambda$ (1), $-\tau\acute{\alpha}\kappa\epsilon\lambda'$ (1) /9
// $\text{d}\acute{\alpha}\text{g}\acute{\iota}$ // bark (of a tree)
- (c) $-\omega\text{i}'\lambda\text{i}(-)$ (&c, 17) // $\text{w}\text{i}\text{l}-\text{i}$ // take back, bring back

Notice the following NEAR MINIMAL PAIRS:

- (12d) [$\acute{\iota}\lambda\alpha\lambda\alpha$] // $\lambda\alpha\lambda\alpha$ // poison-power
- (15a) [$\acute{\iota}\lambda\acute{\alpha}$] // $\acute{\iota}\lambda\alpha$ // feces
- (12e) [$\acute{\iota}\lambda\text{g}\acute{\alpha}\text{t}^{\text{h}}$, $\acute{\iota}\lambda\text{k}^{\text{h}}\text{w}\text{i}\text{t}^{\text{h}}$, ...] // $\lambda\text{g}\acute{\alpha}$ // play (V)
- (15b) [$\acute{\iota}\lambda\text{ç}\omega\alpha$, $\acute{\iota}\lambda\text{g}\omega\alpha$, ...] // $\acute{\iota}\lambda\text{g}\omega\alpha$ // (or // $\acute{\iota}\lambda\text{g}^{\text{w}}\alpha$ //) hand, arm

¹⁵ There is serious doubt whether the form $\text{g}\acute{\iota}$ - really exists. The root $-\text{g}\text{l}\text{a}\text{y}\text{s}-$, 'smell', has an alternate, $-\text{k}\text{l}\text{a}\text{y}\text{s}-$; each is attested by two formtypes each with senses of 'smell' or 'stink'. Only the latter is recorded in EH (2 probable formtypes). While there may be an alternation here ($\text{g} \sim \text{k}$, perhaps modelled after Chinookan or Takelma), it is at least as likely that this is one of the times when Jacobs simply missed a glottal. Cf. Twal. (LK) [$\acute{\alpha}\lambda\text{a}\text{i}\text{s}$], 'stink'. $-\text{g}\text{l}\text{a}\text{y}\text{s}-$ is surely mistaken for $-\text{k}\text{l}\text{a}\text{y}\text{s}-$.

3.2.3 The nasals

The nasals are the most consonantal of the resonants. Jacobs' recording of glottalization on a reduplicated onset cluster (in a Type 1 reduplicant with a suffixed glottalized coronal occlusive before a nasal (**m**) offglide) is spotty. It seems likely that this could be because of the decreasing sonority in the offglide of such clusters and an increasing difficulty to mediate such glottalization in clusters without the stressed root vowel to follow. (See example (19c) below.)

3.2.3.1 //m// and //m̥//

(17) root-initial **m**:

(a)		//may-ts ^h //	{time of sunrise}	
(i)	τυμάιτιτιντ	//ḡu-mayts ^h -ḡnd̥// LOC-sunrise-ADVL	toward the sunrise, east	126.15
(ii)	τυμάιτιυ'	//ḡu-mayts ^h -ʔ// LOC-sunrise	tomorrow (//may// 'sunrise' + //ts// 'INC/REFL' + //ʔ// 'PERF'(?))	19.8
(b)	υμάυ(-)	/u-mau(ʔ)/	//maw//	white
(c)	(-)μέφυ(ʔ)	/-mεεφyʔ/	//miiφyʔ//	mountain
(d)	-μίνω/-μίνο-	/-min-ɔɔ ~ -min-u-/	//min-u//	come, go out
(e)	-μόκι(ʔ)/-μούκι' (13); -'μόκι/-'μούκι' (2)	/-mook ^h i(ʔ) ~ -muuk ^h iʔ/	//muuk ^h iʔ//	deer, meat

(18) Final or medial **m**

(a)	τιίβκαμ	[t ^h iibgam]	//t ^h yiiβgām//	long ago (ADVL)	17.1
(b) ¹⁶	αάυυμ	/ə-sayum/	//an-saym//	grizzly	21.10
(c) ¹⁷	υλίμωα	/ʔu-limwa/	//lim-wa//	make a thud	105.10/nb35:15.15
(d)	λάυ'μτε	/law ^h mḡe/	//law ^h -mḡi//	then (ADVL)	

¹⁶ The epenthetic vowel **i**, here **u**, assimilates to the following labial **m**. This CK word, like several others (especially animal names), is the same in Chinook (Shoalwater).

¹⁷ This verb appears to be based on an onomatopoeic interjection, <ʔim> or **lim** (JH), meaning 'a big thud', sufficiently rare probably because of its [im] surface combination and residual geminate. EH: -lima.

(19) **m** as off-glide in root-initial clusters: **ím-**, **t^hm-**, **ṭsm-**, **ṭ^hm-**, **sm-**

- (a) *pú·nukmantmú'k* /p^huunuk^h man-ímuk/ //p^huunuk^h Ø-m-man-ímuk// 24.19/nb46:196.3
'(its) neck here is (a little) soft' neck PRES.3-IND-DIR.LOC.h-soft
- (b) *ántmú'wak* /ən-t^hmuwək/ //ən-t^hmuwək// chinook salmon 19.19/nb34:127.20
- (c)¹⁸ *kumṭs móq̣ ṭsmínfá'í'á'wáTα'K* /gum-ṭsməq̣ṭsmínφəy ʔəʔwáʔdəʔg/ 132.7/nb35:87.9
'(she) hit me and hit me with a stick' //g̣-m-ṭsmak^h+ṭsm-nφay ʔan-wáq̣ak//
AOR-IND-hit.AUG-OBJ.DUR.1 DET-stick
- (d) *ən ṭsmí'τ* /ən-ṭsmi'ɖ/ //ən-ṭsmi'ṭ// maple 18.12/nb34:125.9
- (e) *kin smú'twa* /g̣in-smú'twa/ //g̣-m-smuɖwə/ (or //smú'twa//) 100.3/nb34:153.9
AOR-IND-slip.free

The root **may** of /**may**-ṭ^hi/ 'sunrise, morning, tomorrow' in (17a) forms a MINIMAL PAIR with the root **m̄ay**, 'white fir', in (20b).

(20) Root-initial **m̄**:

- (a) (i) -'m̄aṭat (2), -'m̄á'ṭat (1) //m̄aḍ-a-ḍ// (be) thin, flat
(ii) -'m̄aṭatcat (1) //m̄aḍ-a-ḍ-ṭ^haḍ// (be) thin, flat (+PL.COLL) 47.8
- (b) -'mai (3) //m̄ay// white fir
- (c) -'mé'ka(n) (3), -'mé'kan (1) //m̄iik^h-a-n//, count (s.t.)
- (d) (i) -'m̄uí/ 'm̄ói (20), -m̄uí (1) //m̄uy// put (in)
(ii) -'m̄óiṭci/ 'm̄úiṭci (·) (8) //m̄uy-ṭ^hi// enter, go in

(21) Final **m̄**

- (a) *τán'éfam'* /ɖán-ʔéεφam[?]/ //ɖan-ii-φam̄// my father
POSS.1-KIN.PREFIX-father
- (b) *τán'énum'* /ɖán-ʔéεnum[?]/ //ɖan-ii-num̄// my mother
POSS.1-KIN.PREFIX-mother
- (c) *kinf'ló'm* (1) /g̣inṭ-lúm̄/ //g̣-m-ḍ-lum̄// choked (INTR)
AOR-IND-DIR.th-choke

¹⁸ This example in (19c) is the one occurrence out of four formtypes where J wrote glottalization on the reduplicant; it is missing from the other three. Although I assume that the reduplicated onset was indeed glottalized, as we see consistently in simpler examples, it is possible that this was not the case. See Appendix 7 for further discussion of reduplication. (See also note 27, p. 105.)

- (d) -mím' (18), -mí'm (16), -mí'm' (4), -mí'm' (1), -mí.m' (1), -mí.m (1), -mím (1)/42
 αmí'm /ə-mí'm/ //an-mí'm// the people, relatives

(21d) is one of the most striking examples of a glottalized resonant in final position. Out of 42 relevant form-types noted by Berman, 41 show evidence of glottalization as marked by Jacobs marked.¹⁹ In five exemplars or form-types, he noted glottalization both before and after the m. On one formtype, he marked it *before and during* the m.

3.2.3.2 The alveolar nasal resonants, //n// and //n̥//

(22) Root initial n

- (a) náu, náu', nau' /nàw²/, /naw²—/ //naw̥// and (ADVL); COMITATIVE (PRCL)
- (b) ne /ni—/ //ni// as if, sort of, somewhat (PRCL)
- (c) (i) τυτινινώ'na //ḍu-ḍ-ni-nuuna// through their noses
 OBL-DIR.th-PL.3-nose 35.6
- (ii) τινός'na /ḍin-nɔɔna/ //ḍn-nuuna// its nose
 POSS.3-nose
- (d) ανύωα //an-nuwa// country, place, land
 DET-country

(23) Final and medial n

- (a) αcqánan(3), αskánan(2), αsqánan(2), αckánan(1)/8
 /-sgánan/ //sganan// gray fox 139,140
- (b) τάνικωίν [ḍánig̥'in] //ḍ-am-ni-g̥'in// 'they took ...' 17.1/nb46:104.3
 USIT-IND-PL.3-get get (hold of), seize
- (c) τσμπόνι'αντά //ts̥-m-bun-i an-ḍa// 'I make it into rock'
 /ts̥um-buni ʔan-ḍa/ PRES.1/2-IND-change-TRANS DET-rock 91.6/nb34:45.19
- (d) /-ḍind/ ~ /-ḍint̥/ //ḍnd ~ ḍnt̥// 'ADVL (suffix): way, direction; time, frequency; manner'
- (i) τά'φο'τιντ 18.11/nb34:125.3, τά'φο'τιντ 23.5/nb45:56.17
 /t̥aafoɔ-ḍind/ //t̥aafo-ḍnd// 'once in a while'
 < t̥aa-fo 'once' (< t̥aw̥na 'one' + -fo) + -ḍnd 'ADVL'

¹⁹ I count pause, shown by the syllabic-like dot here in the fifth example or by a hyphen, as a kind of glottalization, since it is often marked in places where Jacobs otherwise writes an apostrophe.

- (ii) //mayts^h-d̥nd// 'eastward' < m̄ayts^hi 'sunrise' + -d̥ind 'ADVL'
 (A) *μάιτετιντ* 28.9/nb85:60.13 (B) *τυ μάιτετιντ* 126.15/nb35:121.5
 m̄ayts^hi-d̥ind /d̥u-mayts^hi d̥ind/ < //d̥u-// 'OBL' + //mayts^h-d̥nd//

(24) **n** in initial onset clusters with **s**

- (i) *αcνί* 135.1/34:101.3 (ii) *αcνί* 135.1/34:101.1 [ə-ʃnɪ] //an-sni// Coyote, coyote
 DET-coyote

This onset, **sn-**, is a very common initial sequence. (**sm-** is almost as common; while **sl-** occurs only with onomatopoeic expressions—at least as written by Jacobs.)

(25) Root initial **ñ**

- (a) *κumantci'ná·* //g-man-ts^h-ñaa// (would not) do anything (to ...)
 /gumants^hi-ñaa/ SUBJ-DIR.back.and.forth-do 65.14/nb36:183.1
 (b) *τάντυ'νίctυmpoi* //ts^h-am-du-ñis-d̥-n-ɸuy// which we tell you
 PRES.1/2-ATTR-PL.1-tell-DUR-OBJ.DUR-OBJ.you 60.10/nb36:113.3
 (c) *α'νοίτá* //an-ñuyt^ha// brown bear 115, 116

(26) Final and medial **ñ**

- (a) *wá'n'* (2), (-)wá'n (2), (-)wán' (2), 'wá'n (1), 'wán' (1)/8
 /wan^ʔ/ //wañ// five
 (b) *-pʰyán'* (3), *-pʰyá'n* (1)
 /əm-p^hyan^ʔ/ //ən-p^hyañ// sun, day

In (26a), all eight form-types for 'five' mark glottalization on the final resonant, **ñ**. Two form-types mark it twice—before and after the nasal. Two out of eight also mark glottalization initially on the **w**, which probably does not carry the glottalization independently. In (26b), all four form-types for 'day, sun' carry the glottalization of the **ñ**.

(27) Medial **ñ**

- (a) (-)táuv'na(-) (9), (-)táuvna (2) /t^haw^ʔna/ //t^hawñaa// one
 (b) (-)wá'na (2) /wa^ʔna/ //wañaa// another
 (c) -sú'na(-) (5) /-su^ʔna/ //su-ñaa// fix (< good-make)
 (d) *amé'nma* /a-me^ʔnma/ //an-miñma// (the) people

23. 1. This phoneme occurs in a variant *L* of briefer sonantization. In *gumbe''lq*, 'it was strong,' a non-phonemic closure often precedes *-lq*, and the final consonant, *q*, is an incompleated stop, that is, the release is delayed though audible. And consonant *l* is of brief sonancy.²¹

In fact, Jacobs writes both **ñ** and **ṁ** in the 1945 texts, although inconsistently and along with a lot of other things (i.e., apostrophes for multiple reasons). Rather than 'a non-phonemic closure', Jacobs discussion in (28–9) is particularly illustrative of the glottal-nasal binding which, for [ə'noitá] //an-ñuitá//, [gwəɖuts'iyá'mpʰ] //g'a-ɖu-tsʰ-yampʰ//, and the examples in (20–21) and (25–27) above, is indeed distinctive. Glottalization is also seen to bind phonemically to the liquid in (15–16) above and to the glides in (5–6) and (10–11) above.

Care has been taken to provide non-nasal (or non-resonant) environments as points of comparison. For example, Jacobs occasionally writes an apostrophe before a nasal or other resonant which glottal effect, /ʔ/, is apparently identical to that of glottalized resonants but which actually is the result of a process of total assimilation and debuccalization of the first of two proximate geminates (see the discussion in §3.5 below).²² One must therefore be especially careful to note whether or not a lexical item, if a noun, is preceded by a DETERMINER, **ts'an-** for a place or **an-** for a separable thing. In the examples below, neither DET nor INDICATIVE (**-m-**, nor other confusing factor) is included, showing that the **ʔm** (/ṁ/) of /-²máɖatʰ/ in (30) occurs in a simple way:

- | | | | | |
|----------|-----------------|-------------------------|-----------------|-----------------|
| (30) (a) | né' 'u'má'tat | //né u-matʰatʰ// | sort of thin | |
| | | like PRES.3.ATTRIB-thin | | 67.4/nb36:175.1 |
| (b) | wá' KITá'má'tat | //waʔ g-ɖa-matʰatʰ// | It was not flat | |
| | | not AOR-CONTR-thin | | 39.2 |

An even better check is across the *nominal* prefixal boundary where the link is tighter and easier to use than that across the more variable verbal prefixal boundary. For example, a segment suspected of glottalization can be checked in root-initial position

²¹ The form J. gives is *Kumr'a'lq* [gumɖá'ɬq], but //g-m-ɖalkʰ// (60.14/36:113.16). This example is one of only 2, out of 15 formtypes of /-ɖalkʰ/, that show a glottal stop; J. writes no glottalization for the other 13. A better choice would have been [q'áɬʰ ~ q'áɬʰ], /-k'altʰ/, or //k'altʰ//, 'hang [TRANS, INTR]'.

²² All nasals, for example, will assimilate in place to that of the following consonant (though this is weaker across the verb prefixal boundary than across the nominal prefixal boundary; e.g. *Kumr'a'lq*, [gumɖá'ɬq] /gum-ɖá'ɬkʰ/). If the second segment is a resonant, this assimilation tends to be total. The two types of glottalization, however, can to a considerable extent be distinguished by the fact that the glottalization of glottalized resonants is generally very regular, while that of debuccalized nasals before resonants is sporadic.

following the third-person plural for possessive (or verb subject) in //ni//. If the segment on the right is normally glottalized, the apostrophe will be there whether the noun (or verb) is singular or plural, as we see below in (31).

(31)²³ Singular (ɔ̃n) and plural (ɔ̃n-ni) references to -wáy 'child'

(a)	Tu'wáí'	[ɔ̃u ² wáí ²]	/ɔ̃i ^(ʔ) - ² wáy ² /	//ɔ̃n-wáy//	his children
			POSS.3-child(ren)		23.9/nb46:58.5
(b)	Tini'wáí'	[ɔ̃ini ² wáí ²]	/ɔ̃ini ² - ² wáy ² /	//ɔ̃n-ni-wáy//	their children
			POSS.3-PL.3-child(ren)		137.5/nb34:131.3

It can be seen that the initial glide on ²wáí² is glottalized, because it appears before the third person plural suffix //ni// in (31b). Without such a neutral segment to the right, it would not ordinarily be possible to distinguish glottalized-resonant glottalization from possible glottalization of the n-reduction in (31a), however rare. Likewise, I have tried to suggest final environments that are known to be unglottalized for observing the adjunction of the inchoative suffix -yú and other suffixes.

Summation of arguments for glottalized resonants

The following arguments may be brought to bear for the existence of glottalized resonants in CK.

(1) Only certain lexical items are were marked with glottalization next to resonants. This marking is sometimes on one side of a resonant, sometimes on the other. Particularly interesting, I find, are certain examples of nasals and the liquid where Jacobs marked glottalization next to or on the same segment twice. The sets of examples in §3.2 show contrasts of **R** and **Ṙ**; one may be reasonably certain that glottalization occurs with regard to a given segment, though it may be missing in a particular formtype or may be present due to the effect of a neighboring segment in another.

(2) The glottalized resonants pattern together as a group by themselves and also in opposition both to the plain resonants and to the glottalized obstruents.

²³ I do not have a reason why Jacobs sometimes wrote Tu'wáí' (55.17/nb36:183.15, bis) or Tini'wáí' (55.18/nb36:185.1, 23.8/nb46:58.3) without a final glottal. Perhaps final glottals in CK without emphasis are harder to hear than those on glottalized resonants.

(3) Glottalized resonants provide a framework for systematization of the prosodic structure with regard to syllable canon. If they were not posited, for example, there would be too many consonants in the initial or final of the root.²⁴

(4) The existence of several minimal pairs points out the distinctions between plain and glottalized resonants clearly.

Glottalized resonant onsets may be heard on the S-M tape, and have been described phonetically by Jacobs. Their occurrence and patterning is straightforward and may be compared to languages spoken today.²⁵ They do not show the confusing variation, for example, found in the final coronal preglottalized occlusives (that we look at in Chapter 5). Thus there is no question that glottalized resonants are part of the consonantal inventory of Santiam.

3.4 An introduction to sonority and clustering in CK

3.4.1 Sonority, root, clustering and assimilation: overview

This section will provide an introduction to general patterns of root and consonant clustering. Basically, there are two ways that consonants come together:

- (I) being within a root (or affix), or
- (II) through concatenation of morphemes, at the edge of a root (or affix).

In the root of a noun or verb in CK there is rarely if ever any evidence of phonological processes.²⁶ Noun and verb roots have the most varied sets of segments. On the other hand, the types of segments found in the affixes is constrained. In the verbal prefix—an affix bundle consisting of tense/person, mode, plurality, directional, and a very small set of adverbs, (only the first two of these five are obligatory)—for example, only plain occlusives (counting the affricate **tsʰ**, thought to vary indistinctly with plain [**ʧ**]) plus

²⁴ See the examples of final, glottalized 'bound clusters' in (39) below in §3.4.3, where, e.g., [**yóʰmpʰ**], 'come from', is analyzed as /**yóʰmpʰ**/ (immediately, though as //**yampʰ**// ultimately. See also the discussion concerning labiovelars in Chapter 6). CK may have a maximum of two consonants in a coda, as noted in (32) below, in this case **RO_b**.

²⁵ For a discussion of phonetic realizations of glottalized resonants, see Esling, Fraser, and Harris 2002. For a discussion of phonological aspects of these events, see Howe and Pulleyblank 2001.

²⁶ There is some evidence for assimilation of **i** (i?) in roots. Cf. MR /**ʔénumʔ**/, general CK /**ʔénumʔ**/, 'mother'. (See Appendix 4 for MR forms as distinct from Halpam/Santiam.) Such rounding/coronal assimilation of vowels is observed to an even greater extent in the dialect of EH: JH [-**síʔwa**], EH [-**súʔwa**] 'child(ren)'. This type of alternation is not synchronic.

resonants are found. This is still greater than the number of segments found in the plain nominal prefix. In the verbal stem, active suffixes likewise show remarkably few segmental types—the resonants plus \emptyset , ts^h , d ($\sim t^h$), h , ʔ . Rather, it is *between the morphemes* in the verbal prefix, those of the noun prefix (and the noun stem), the stem suffixes (and the verb root), *and* between the verb prefix and the verb stem, that most segmental interaction and phonological processes occur.

It is likely, following the sonority hierarchy observed crosslinguistically, that certain phonetic properties in CK follow from the arrangement of resonants as glides, liquids and nasals, in forming two ordered sets, $\{w, y, l, m, n\}$ and $\{\dot{w}, \dot{y}, \dot{l}, \dot{m}, \dot{n}\}$.²⁷ One outcome of an increasing sense of *consonantal* to the right of these spectra might be a decreasing closeness between the root initial and its offglide, $-O_bR-$, e.g. in terms of laryngeal features. If no special laryngeal binding (as I call the attachment of the laryngeal feature to both cluster members simultaneously), there is no withholding of the general aspirate release between consonants before a glide—rather than before a nasal, say—when both are members of a root onset cluster. It is questionable, however, whether much more can be assumed; it is doubtful whether any good distinctions can be drawn from Jacobs' apparent weakness in ability to hear glottalization of initial occlusives before less sonorant resonants, for example.²⁸ The rest of this section looks at some clustering patterns, the root shape, and resonant assimilation across morpheme juncture.

3.4.2 A note on root shapes

Semivowels or postvocalic glides appear to a certain degree interchangeable with the vowels.²⁹ Part of the reason for this is that the resonants, in general, appear to bear timing units (or morae) equally as vowels, and often are nearly equally sonorous. Let us assume now a maximal five X-slot morphemic base for (many if not) most CK roots, as in

²⁷ Evidence for the relative sonority of w or y for CK speakers is not clear at this time. I assume two sets, one plain and one glottalized, likely differing in sonority (among other features).

²⁸ Jacobs may be presumed to have had a decreasing ability to perceive glottalization on an occlusive preceding a nasal glide, viz. the m offglide following the C_3 of a reduplicated base, as mentioned at the beginning of §3.2.3. This is apparently the case of Type 1 reduplicants where a complex onset is suffixed to the root. Jacobs heard glottalization only in one of four occasions where a nasal offglide follows the glottalized onset, as in $/-ts^h m-i-/$ for $/-ts^h m-i-/$. See item (19c) above. (Such glottalization is regularly repeated in Type 1 reduplication; see Appendix VII.) This fact may also be related to the lack of high stress on the second syllable. For a discussion of such environmental effects on glottalization, see Chapter 5.

²⁹ As noted above, I do not clearly distinguish between $CV\dot{R}$ as CVC and as $CV_1V_2?$ (or $CV\dot{G}$).

(32a), where C represents some consonant and R here some sonorous segment. From the general expression in (32a) are distinguished (32bi) and (ii) which illustrate the possible rhyme-like constructions, with a constant root initial ((O_b)C₁).³⁰

$$(32) \text{ (a)}^{31} \quad C_1 C_2 V R C_3$$

$$\text{ (b) (i) } \quad (O_b) C_1 \left\{ \begin{array}{l} V(\widehat{G})(C_2) \\ V(R_H \widehat{O}_c) \end{array} \right.$$

$$\text{ (ii) } \quad$$

The O_bC onset is common; among nouns both may be obstruents.³² In verbs, the first consonant is either a fricative (sibilant) or, if occlusive, the second must be a resonant. (32bi) points to both a limit on the number and type of resonant positions in the rhyme-like portion of the root and the link between vocalic segments in the nucleus. These include both VV and V₁V₂ (or VG) nuclei. Both segment types, V and R, count as sonorant timing slots or morae in CK. In the first case, (32bi), R functions as the second member of a vocalic cluster or (better) diphthong, (V₂ = G = i(ʔ), u(ʔ)). In the second case, (32bii), R (now R_H = l, n, though potentially also m, ɺ, ṃ, ṇ) functions as the onglide to an occlusive in a bound cluster.

Examples of an R final following a long vowel ($\widehat{V}G C_2$, where C₂ = R) in a root are common. In actual usage, however, stem vowels tend to keep this final root resonant extrasyllabic from the long vowels. It is my conjecture that a short vowel nucleus will induce ambisyllabicity with regard to such a resonant final; there is no space to discuss this here. However, such ambisyllabicity is avoided in the case of variable vowels, when these become long upon addition of a vowel suffix. The resonant then becomes the onset of a second stem syllable, as in (33). (In general, these verbs are never without suffixes.)

(33) Long vowel plus resonant final

	<u>Observed forms</u>	<u>Probable root (+stem vowel suffix)</u>	<u>Gloss</u>
(a) (i)	[-lɔ̃.mi]	//lɔ̃-m//+//i//	bring/take inside
(ii)	[-lɔ̃.mɔ̃]	//lɔ̃-m//+//u//	go/come inside

³⁰ C = any consonant (including R); R = any sonorous segment, V or R; G = any glide; O_b = any obstruent; O_c = any occlusive.

³¹ The rare root form CVVFO_b also occurs, but never monosyllabically. (See (36.1c) below.)

³² The first occlusive of a pair may syllabify heterosyllabically to the rest of the morpheme, as is seen impressionistically below in (35a, b, f) across a nominal boundary.

(b) (i)	[-g̥éɛ.wa]	//gi.w//+//a//	gather up (s.t.)
	(ii)	[-g̥éɛ.wu]	gather, assemble (INTR)
(c)	[-g̥éɛ.mi]	//gi.m// (+i?)	two
(d) (i)	[-d̥úu.li]	//du.l//+//i//	kill
	(ii)	[-d̥úu.lu]	die
(e)(EH) (i)	[-t̥wíi.li]	//twi.l//+//i//	finish (TRAN)
	(ii)	[-t̥wíi.la]	end (INTR)

We shall note this set of examples again in the discussion of degemination in §3.5.2.³³

These examples appear to limit the sonority maximum to a surface moraic limit of two morae (VV, VR).³⁴

3.4.3 A brief discussion of clustering (obstruent-obstruent and obstruent-resonant)

There are four possible areas for consonant clustering in and around the CK root. These are as in (34).

(34) Cluster locations in the CK root—

- (I) before the root,
- (II) in the root initial,
- (III) in the root final,
- (IV) after the root.

Only (II) and (III) involve proper CK root clusters. (I) and (IV) may involve ambisyllabic structures resulting from concatenation across an affixal boundary. Examples of (34i), across the nominal prefix boundary, heard impressionistically from the Swadesh-Melton tape, are in (35).³⁵ We shall now look at preroot clustering according to (34i) and initial root clustering (34II) with regard to obstruent clusters and to consonant-resonant clusters, before dealing with root-final resonant-obstruent clusters (34III).

³³ It is interesting how this group includes so many of those roots that take the //i// transitive/active and //u// intransitive/stative stem vowel suffixes. Also occurring is a set of *short* vowel roots, such as //min-u// 'come/go out'.

³⁴ There is evidence that the language can count up to three morae, as we have seen in ts'yiiḡgam [ts'iiḡgam] 'long ago'. One could say that CK appears to be sensitive to three morae phonetically, but resolves this to two morae phonemically. See §3.5 below.

³⁵ The numbers refer to my numeration of Swadesh's English terms, fired at JH in rapid succession. For most of them he was still able to supply a CK rendering, at 85 years of age.

The affrication that occurs normally between obstruents surfaces in slightly different ways. The voiceless, excrescent vowels shown in the phonetic portion of (35a–c, f), heard impressionistically, constitute an important part of it.³⁶

(35) Pre-initial nasal-obstruent clusters across the nominal prefix–root boundary

(a)	[ʔæmp ^v .g ^w áʔ]	/ə̃m-p ^h g ^w áʔ/	//ən-p ^h g ^w áʔ//	thunder	S-M#200
(b)	[ʔɸmp ^ʔ .g ^w éʔ]	/ə̃m-p ^h g ^w éʔ/	//ən-p ^h g ^w iʔ//	water, creek	S-M#188, 197
(c)	[ʔɸn.t ^h .g ^w éʔ]	/ə̃n-t ^h g ^w iʔ/	//ən-t ^h g ^w iʔ//	limb	S-M#261
(d)	[ʔɸŋ ^k x.dáʔ]	/ə̃n-k ^h dáʔ/	//ən-k ^h dáʔ//	smoke, fog	S-M#203, 229
(e)	[ʔæs.gúup ^h] ³⁷	/ə̃-sgúup ^h /	//ən-sguub//	ashes, dust	S-M#228, 238
(f)	[ʔæmp ^h .kʔ]	/ə̃m-p ^h lʔ/	//ən-p ^h luʔ//	dirt, ground	S-M#231, 235, 246

Where a fricative (35e) or affricated occlusive (35d) occurs as first cluster member, no further affrication is necessary. The aspirated velar in (35d) affricates before another obstruent; this is a common feature among peripheral segments (**p^h**, **k^h**). Notice that while **-mP-** clusters well, **-n.T-** with the alveolar occlusive does not. Nor does **-p.l-** stick tightly together, as in (35f). In fact, sonority here does not appear to seriously increase the chances for clustering. With the exception of **m+p**, tautosyllabic clusters between nasals (probably resonants in general) and occlusives across *the nominal prefixal boundary* are not generally viable.

Between the verb prefix and stem lies *the verbal prefixal boundary*, a gulf greater than across the nominal prefixal boundary. Normal nasal assimilation to the following occlusive is not always observed. The presence of some special kind of voiceless impediment or aspiration between prefix and root to block any clustering is consistent. Only a strong root onset glottal stop can, regressively, coalesce with an occlusive at the end of the verbal prefix, as in (36a) below. Jacobs often records heavy aspiration between such consonants and a root onset glide, or voicelessness of the second party if a liquid (a progressive effect of the aspiration). (Translations, as is usual with any running text in this thesis, generally are mine as altered, unless in double quotation marks.)

³⁶ The quality of the excrescent vowels is apparently determined by neighboring or preceding consonants (rather than by the rounding/coronal harmony affecting the epenthetic vowel *i* regressively by following segments).

³⁷ Another transcription, apparently alternating freely, would be [ʔæs.gúup].

(36) Aspiration and voicelessness across the boundary between verbal prefix and root

- (a) τᾶτί τᾶτῆωύ /dát-i dát^h-wúu²/ //da-ḍ-ʔi- da-ḍ-wu-ʔ// 'Go and get him!'
IMP-DIR.th-go IMP-DIR.th-get 110.9/nb35:47.3
- (b) τυφῆωύ /dup^h-wúu/ //d-ub^h-wu-ʔ// 'Get [s.o.]'
IMP-PL.2-get 63.9/nb36:165.19
- (c) Κινηύ /gint^h-yii/ //g-m-ḍ-yii// 'went back'
AOR-IND-DIR.th-return 107.14/nb35:29.11
- (d)³⁸ κίτιτᾶμο /giḍiiḍ-láamɔ/ //g-ḍii-ḍ-laam-u// '(she) went in'
AOR-TEMP-DIR.th-enter-INTR 117.13/nb36:93.21
- (e) τᾶντᾶμ /dánt^h-mám/ //ḍ-am-ḍ-mam// '[when] (she) would eat up...'
USIT-IND-DIR.th-eat.up 117.16/nb36:95.7

The examples chosen in (36a–c) show this aspiration particularly strongly. The claim I wish to make here is that it is the environment of *the prefix-root boundary itself* that facilitates the aspiration on the occlusives on the left or the voicelessness of the liquids on the right. Such an understanding obviates the positing of a rule changing the value of final prefixal segments—such as Berman (undatedb:36–7) does, whereby ^h (which as DIRECTIONAL.th or translocative appears just before the verbal prefix boundary unless plural) becomes ḍ(i), its value before PLURAL.3- morpheme -ni.

Clusters of (34IV), those after the root, not very significant, will not be discussed in detail. Where a stem vowel suffixes to a final occlusive, the final occlusive generally is seen to be a simple lenis plain consonant (rather than aspirate or preglottalized in final position) plus vowel, .CV (as in (33) above). If it suffixes to a bound cluster, there is a split of the two consonants to become ambisyllabic, -V₁R.CV₂- (examples in (39) below). This pattern is parallel to -ʔ.R- that was discussed at the beginning of §3.2. In the case of a fossilized suffix in a reanalyzed root, a single obstruent will provide a coda (C₃) if otherwise lacking, as in (37a).

- (37) (a) //gawḍ// sing < //gaw// 'throw (out)' + //ḍ// 'DURATIVE'
(b) [gɔḍ.gə] //gudḍ-a// arise, get up < //gudḍ// + //gə// (?)
(c) /ʔiis.ḍu/ //iisḍ-u// (be) little

³⁸ Devoicing, although infrequent (and apparently confined to the laterals), is not confined lexically only to the prefix-verb stem interface. It also occurs in pronominal/adverbials: /ḍislaw/ 'soon', from //ḍis-law// 'soon-now' (heard on the S-M tape, #170).

(d) /ʔidib/ //idb// jump (cf. /ʔidubɑʔd/ //idp-a-d// leaping, 114.12)

In (37b), a -g suffix is apparently part of the reanalyzed root.³⁹ However, the neutral stem vowel makes a .CV sequence. In (37c), the same occurs with a different stem vowel (here, the stative -u), in an unusual, possibly reanalyzed CVVFO_b root, whose final consonants are not observed to cluster tautosyllabically. In several post-root coda examples, however, as with -b in (37d), a possibly suffixed obstruent give rises to an epenthetic vowel (i) between itself and a preceding obstruent. Tautosyllabic clustering in the position of (34IV) is impossible in CK.

The *root initial clusters* of (34II) will be discussed briefly. I have listed an example of each type of occlusive-resonant clusters, as far as is known, in §3.2. The following set of examples repeats their roots, illustrating the root-initial clusters. (I presume in a cluster that *glottalization on an occlusive is of the occlusive and not from an adjacent segment*, such as a (glottalized) resonant—though I can think of no a priori reason why that should be so.)

(38) Root-initial occlusive clustering with resonant on-glides⁴⁰

(a)	w:	t̥w-, t̥w-, t̥sw-; K ^w	Examples:	from (3) above
(i)		//t̥wat//		stick in (TRANS)
(ii)		//t̥wii ^h ak//		blue racer
(iii)		//t̥swat//		gut (TRANS)
(b)	y:	p̥y-, p̥y-, t̥y-, d̥y-, t̥y-		from (8) above
(i)		//p̥yaws//		wintertime
(ii)		//p̥yaŋ//		sun, day
(iii)		//t̥yii ^h //		yellowjacket
(iv) ⁴¹	(EH)	//d̥yik ^h //		however (?)
(v)		//t̥yuiw ^h //		south

³⁹ Other interpretations are possible, such as a Type 1 reduplication fossilization or a triconsonantal root. The last appears least likely for CK.

⁴⁰ Omitted from this list is the extensive role of Type 1 and Type 2 reduplications, such as /-t̥smák^h+t̥sm-/ (mentioned in an earlier note) 'hit and hit', /-sk̥^hil^h+sk̥^h-/ 'untie, loosen', or /-swang^h+sw-/ 'crawl', have in producing consonant clusters. These unusual clusters occur within the reduplicated root, an extension of the root itself, and are subject to special rules of segment occurrence (e.g., that glottalized initials can occur in such clusters). See Appendix 7 for details.

⁴¹ J. wrote 11 formtypes with a glide, 3 without (but with ii). 7 have the d̥ initial, 4 t̥, 2 t̥^h. The only other root with such an initial is the one formtype in EH for /d̥yuiw^h?, of uncertain meaning.

(c)	l:	ɸl-, pʰl-, t̚l-, k̚l-, (ɣl-,) k̚ʰl-	from (14) above
	(i)	//p̚lant̚s//	nits
	(ii)	//pʰləkʰ//	split open [TRANS]
	(iii)	//t̚liʔ/	rectum, ass (vulgar)
	(iv)	//k̚liib//	wrap around
	(v) ⁴²	//ɣlays ~ k̚lays//	smell, stink (?)
	(vi)	//k̚ʰlis//	squirt
(d)	m:	t̚m-, t̚m-, t̚sm-, t̚m-	from (19) above
	(i)	//t̚muk//	neck
	(ii)	//t̚muwak//	chinook salmon
	(iii)	//t̚smakʰ//	hit
	(iv)	//t̚sʰmit̚//	maple

It appears strange that clusters with the lenis plain occlusives are so very rare, here attested only by **ɸy-** (two possible roots) and by **ɣl-** in one very doubtful root. (Compare English *d'you*,⁴³ *grease*, *glacier*.) Noting their occlusives' more mixed laryngeal varieties and the likely possibility that only glottalized and aspirated obstruents cluster regularly with resonants initially, I refrain from calling such root-initial clustering 'bound' in the sense of root-final clustering. It is more likely that, as Berman (1990) has it for PK, such preresonant plain or aspirated segments are "neutralized" before resonants, just as all laryngeal series of occlusives (including glottalized) are neutralized before other obstruents. Apparently eliminating lenis plain from initial clustering with resonants not only makes the clustering pattern more systematic, but it paves the way for recognizing all neutralized segments as probably underlyingly lenis plain. In this way, initial clustering is somewhat different from final clustering, where (I maintain) lenis plain regularly alternates freely with aspirates, while the glottalized appear as preglottalized—a neutralization pattern seen initially only before resonants.

At the right end of the root are a different series of clusters, the *root-final* clusters. These are better known and form an important group, (34III), the last group of clusters we will look at. I refer to them as **bound clusters**. The examples in (39–40) show them as *sonorant + occlusive* pairs at the right end of the coda-like structure in the root in stem-/

⁴² EH has only the glottalized variation in two formtypes. JH has two glottalized and two plain.

⁴³ Perhaps only for those English speakers who have **dy** initially, as in *Do you go there often?*

word-final position. Such pairs consist of a nasal or liquid and an occlusive (with the exception of the affricate). If either of the clustering consonants is glottalized, which in final position always means *preglottalized*, the glottalization is shared and passed regressively through the resonant to sit in front of the pair.

(39) Four examples of roots with glottalized bound clusters

- (a) $-má'nt$ (6), $-má'nt$ (4), $-mánt-a-$ (2)
 $/-mánt^h \sim mánt(-a)/$ $//mánt^h//$ try (to see, find out)
- (b) $-yám'p$ (5), $-yám'p$ (4), $-yám'p$ (4), $-yám'p$ (9), $-yám'p$ (2)
 $/-yám'p^h \sim yám'p \sim yám'p(-i)/$ $//yám'p^h//$ come from, get from
- (c) $-qá'lt$ (2), $-qá'lt$ (2), $-ká'lt$ (1), $-qá'lt$ (2)
 $/-ká'lt^h \sim ká'lt/$ $//k^h'alt^h//$ hang
- (d) $-mí'lg$ (3), $-mí'lg$ (1), $-mí'lg$ (1) $/-mí'lk^h/$ $//mí'lk^h//$ swallow, inhale

The roots in the examples of (39) all show a tautosyllabic coda, $-^2R_H\widehat{O}_c$. The timing of the glottal gesture is just before the resonant; aspiration generally follows the occlusive. Its preglottalization reflects other final preglottalizations, such as that of a fricative, where \widehat{F} is 2F , or an occlusive where \widehat{K} is 2K . (A resonant \widehat{R} generally has the gestural order 2R when it occurs stem-initially and -medially; stem-finally, however, it generally has the shape R^2 .) It is impossible to tell whether it is the resonant or the occlusive that is glottalized. However, just as it was assumed in the case of an initial cluster that it is the initial (prevocalic) obstruent that is glottalized, so we may assume here that it is the final occlusive that underlyingly bears the glottalization. There is some weak confirmatory evidence for this analysis in Jacobs' alternating placement of the glottal stop, i.e., before resonant or before final.⁴⁴ However, glottalization is not required. The root in (40), $/-qá'lk^h/$, with coda $-R_H\widehat{O}_c$, is an example of a non-glottalized bound cluster.

⁴⁴ Why no \widehat{N} surfaces when $/-ma[n]g-$ ($//mánt^h/-$) bears a suffix, as in $/-ma[n]g-ad/$, or in $/-yám'p^h \sim -yám'p-i/$ 'come from/get from', or the lack of $[l]$ in suffixed forms of $/-ká'lt^h \sim -ká'[l]dal/$ or $/-mí'lk^h \sim -mí'[l]k^hni$ leads one to conclude that either that the final stop is glottalized underlyingly (and not the preceding resonant, which would show glottalization in any case) or something else is occurring.

- (40) $-\tau\acute{a}lk$ (6), $-\tau\acute{a}lq$ (3), $-\tau\acute{a}lq$ (3), $-\tau\acute{a}'lk$ (2) / $-\dot{d}alk^h$ / // $\dot{d}alk^h$ // (be) strong, brave
- | | |
|---|--|
| <p>(i) $w\acute{a}' mact\acute{a}r\acute{a}lk$
 [w\acute{a}² m\acute{a}² \acute{s}-\dot{d}\acute{a}-\dot{d}\acute{a}lk^h]
 //w\acute{a}² mah ts^h-\dot{d}\acute{a}-\dot{d}\acute{a}lk^h//
 not you.SG PRES1/2-CONTR-strong
 'you are not strong' 22.17/nb46:54.9</p> | <p>(ii) $st\acute{o}' t\acute{c}int\acute{u}r\acute{a}lq$ (st\acute{o}' 4/7)
 [s\dot{d}\dot{d}\acute{o} t\acute{s}^h\acute{i}ndu-\dot{d}\acute{a}lq^h]
 //ts^h\dot{d}u ts^h-m-\dot{d}u-\dot{d}\acute{a}lk^h//
 we PRES1/2-IND-PL.1-strong
 'we are strong' 116.3/nb36:85.23</p> |
|---|--|

In this section, CK sonority, root shapes, and occlusive-resonant clustering have been briefly discussed. The common root in CK has a maximal structure of $C_1C_2VRC_3$, where R represents any sonorous segment, vowel or resonant, realizing a nucleus of maximally two timing places or morae. Clustering across the initial juncture of a noun root has been seen to be possible with final nasals of the nominal prefix. The results are impressionistically ambisyllabic, but they may include the capture of an extrasyllabic labial occlusive from a complex noun root onset, which becomes a coda final of the preceding syllable. Across the verbal prefixal boundary all clustering is on opposing syllabic sides, except for a root-initial epenthetic glottal stop which coalesces with a prefix-final occlusive. Initial clustering within the root occurs between generally glottalized or aspirate occlusives and *w*, *y*, *l*, or *m* as offglides, forming initial onsets. Final clustering occurs between a nasal or liquid and an occlusive final at the end of a root which is also word-final. Both sets of root clustering tend to involve glottalized or aspirate occlusives only. However, root-final (bound) clusters are more well-defined, both in terms of the class of segment that is accepted and of the nature of the sharing of laryngeal features between segments.

3.5 The problem of geminates and resonant assimilation in CK.

Geminate or long consonants have been found in NK. They appear to have distinct reflexes in CK which entail important phonological variations.

3.5.1 Positional geminate constraint in CK

In his slip files, Berman notes as one of his exemplars (my formtypes) where the final consonant in a word—often an occlusive—is elided in favor of an apostrophe. The understanding from these cases is that where there is the possibility of positional geminates, CK reduces the first via debuccalization (reduction of the segment to a mere laryngeal representation, a glottal stop). (Jacobs' examples are given in (41) in major allophonic notation with epenthesis and accents shown. My translations.)

(41) Positional geminate debuccalization

- (a) τῖνι τὰ τῖ τὴ Τυμά /ḡini-ḡáats^h-i[?] ḡu-máa/ who lived in the houses
 //ḡ-ii-ni-ḡa-ts^h-ḡ ḡu-maa//
 USIT-ATTR-PL.3-live-DUR LOC-house 41.6/nb35:95.21
- (b) ὕτᾱ Πατᾱτκωῖν /u-ḡáaḡ-a[?] ḡá-ḡ-ḡⁱⁿ/ who's standing there—get [him]!
 //u-ḡaaḡ-a-ḡ ḡa-ḡ-ḡⁱⁿ//
 PRES.3.IND-stand-STV-DUR IMP-DIR.thither-get 123.3/nb35:185.7
- (c)⁴⁵ κῠμτᾱ' Qιτᾱ' ἰῖsna /ḡim-t^há[?] ḡiḡá-ḡilis-na/ he cried, but still he wriggled
 //ḡ-m-t^hag ḡ-ḡa-ilis-na//
 AOR-IND-cry AOR-CONTR-shake-OBJ.DUR 100.3/nb34:153.7
- (d) νᾱντῠρ· αῖḡ /nᾱnḡuḡ-ḡáyp^h/ you will roast (s.t.)
 //nᾱ-m-ḡu-ḡ-ḡayḡ//
 FUT2-IND-PL.1/2-2-roast 116.11/nb36:89.3⁴⁶

From the examples in (41a–c), the occlusive segments appear to be subject to a geminate exclusion: two examples of the same segment cannot be presented next to each other. Examples to the contrary, like (41d) where the ḡ is actually labelled as long, are extremely rare in JH. (It is likely that only manner and position are sufficient categories which must be matched in order to trigger the constraint in CK. While the given examples are all lenis plain, it probably makes no difference if one of them is of a distinct laryngeal type.) Geminate-like clusters of any kind are generally avoided. While it may be assumed that the positional-geminate reduction is equally effective upon both segments, the pattern of this reduction is [?]G, with the glottalization prior to the main gesture of the segment itself. This is, of course, the general pattern of both *obstruent* glottalization in non-initial positions and of *resonant* glottalization in non-final positions.

In (42) below, we see what must be the same reduction of geminates through debuccalization of the first (leftmost) pair member—here, of two adjacent resonants—that was seen among occlusives in (41).⁴⁷ Whereas the occlusives were rather consistent in their notation, however, the resonants are not at all consistent, and in fact more frequently the debuccalization is not marked.

⁴⁵ This is an example of CONTRASTIVE mode without the negative subordinator wā?

⁴⁶ This example was noted in Berman *undated*:6.

⁴⁷ I have noted the contexts where a segment may be checked for underlying glottalization in §3.3.

(42) Examples of debuccalized resonants, written part of the time

(a)	κἰτᾶ'ωᾶ'ḡἰ (4/10)	/ḡἰḡá²-wáak'í/	//ḡἰ-ḡam-waak'í// SUBJ-POSS.1-spouse	(if she) were my wife 107.11/nb35:27.23
(b)	α'γῦ'ḡḡ (1/8)	/ə²-yúuhu/	//an-yuuhu// DET-old.man	old man 102.21/nb34:171.5
(c)	α'λά'ḡḡ (2/5)	/a²-láḡḡ/	//an-labḡḡ// DET-pipe	pipe
(d)	τᾶ'νώ'ḡḡ (1/3)	/tsʰa²-nḡḡḡ/	//tsʰan-nuuhḡḡ// DET.place-willow	willow ⁴⁸ nb46:150.1
(e)	Κωα'μῦ' (1/4)	/ḡʷə²-múu/	//ḡʷa-m-muu// RPAST-IND-black	it was black 69.15/nb35:93.11

As we see from the formtype notation on these examples (following the Jacobs script), debuccalization of nasals is occasional before labial and lateral approximates, but rarer before nasals and *y*. (Glottalization on /ʳy/ is sometimes difficult to understand, where different patterns may be underlying.⁴⁹)

The important point here is that R_1R_2 combinations generally reduce to R_2 , whether or not the debuccalization is marked, as in $ʳR_2$. This parallels the occlusives. We can say in general that C_1C_2 , where both *Cs* have the same manner and articulatory position, will reduce generally to $ʳC_2$ among occlusives and to $(ʳ)C_2$ or C_2 among resonants. We will see in the subsection after next that sonorant variations also involve timing slots among the resonants, lacking with the occlusives. This kind of assimilation is very common. But to help understand what is underlying it, we will now look at geminates in the family at large.

3.5.2 Geminates in Northern Kalapuya compared with CK

While CK has a strong constraint against positional geminates—and, we may assume, against geminates in general—it is interesting to look for a moment at forms in

⁴⁸ The Willow clan (or band) name, of a CK group near Eugene.

⁴⁹ An alternative analysis would say that /ʳ/ arises between stem resonant and prefix resonant just as it does between stem vowel and prefix vowel. While this is quite possible, it is heir to the same problems of infrequency and lack of regularity that the geminate-resonant reduction hypothesis has. The appeal to geminate reduction (through resonant assimilation) is more consistent, while Jacobs marking of /ʳ/ between resonants at morpheme juncture is spotty.

a NK dialect, Twalatin, where intervocalic consonantal gemination as an active process. (The following examples, from Louis Kenoyer, Jacobs' Twalatin informant, are from Berman's slip files, in my major allophonic notation. As with the vowels, two consonants are written where Jacobs has the consonant plus length.)

(43) Twalatin intervocalic geminate segments

	<u>NK (LK)</u> ⁵⁰	<u>CK (EH, IH)</u>	<u>CK root</u> ⁵¹	<u>Gloss</u>
(a)	-k ^{hw} állak ^h	-k ^{hw} íleek ^h	//k ^{hw} íli.k ^h //	face(s), eye(s)
(b)	-lámm-u/-i	-láam-u/-i	//la.m//	go, come in/take, bring in
(c)	-gέww-u/-i	-gέεw-u/-i	//gi.w//	assemble, gather: INTR/TRANS
(d)	gεffu	gέεφu	//gi.m-φu//	two (of s.t.), twice
(e)	´-mmi, ´-mméy, ´-mmay	-máa	//maa//	house
(f)	´-yyi	-yíi	//yii//	return

Not all segments are subject to gemination. Besides resonants and lenis plain consonants, only the Twalatin fricatives /f/ and /s/ appear generally to geminate. Gemination arises where the potentially geminate consonantal segment is single, unglottalized and between real vowels, as we see by failure of gemination in (44).

(44) Failure in Twalatin consonantal gemination

	<u>No gemination</u>	<u>(Gemination)</u>	<u>Reason why not</u>
(a)	/a-mέεφ/ oak tree	/a-mέφφu/ mountain(s)	monosyllabic root
(b)	/gudít ^h -yi/ go back	/gudmé-yyi/ go back	neighboring consonant
(c)	/-t ^h wéel-t ^h / end, corner	/-t ^h wéll-i, -u/ finish (TR/INTR)	neighboring consonant
(d)	/-yú ^h wan/ say, speak	/-gέwwu/ assemble (INTR)	glottal gesture
(e)	/-gúudip ^h / sweathouse	(//guudp ^h //)	neighboring vowel epenthetic

⁵⁰ I write Twalatin geminates twice, as I do with CK vowels. (Jacobs writes them with a length mark, as <ḷ>. I am uncertain of Twalatin voicing of lenis plain consonants, beyond following nasals and probably intervocalically. Stress is more complex in Twalatin; monosyllabic short roots take stress on the penultimate (where, if having variable vowels, roots may be long anyway).

⁵¹ Several CK roots are written with variable vowels. These generally reflect short vowels in Twalatin, but the geminate reduction in CK reflexes.

The general rule appears to be the following: Gemination of a simple resonant or obstruent between full vowels occurs directly following nuclear stress, or to such a segment following a back vowel (**u, a**) and directly preceding nuclear stress. It also occurs sporadically to such segments elsewhere. However, exceptions abound.⁵²

From Jacobs *ca.* 1930[:45], it would seem that Yonkalla (SK) also has geminates. Referring to his Yonkalla data, Jacobs claims that ambisyllabicity (my term) has progressed to the point where some consonants are represented as geminate: “the extra weight is split between the adjoining syllables”. However, a cursory scan of notebook 45 does not support geminates for SK.⁵³ Note, for example, (45):

(45) Intervocalic resonants among the dialects

(a)	SK (LBA)	ɪsməhú·laɪ	(‘I’m coming down’)	/-huulay/
(b)	CK (JH)	ɸuma-hɔ́·la	(‘he came down’)	/-hɔɔla/
(c)	CK (EH)	ɸi-hú·lafkaɸni	(‘take down’)	/-huula-/
(d)	NK (LK)	ɸuma-huɸ·aɪ	(‘They came down’)	/-hullay/

The Yonkalla root and the Twalatin root are identical except that the latter shows evidence for geminates and the former has a long root vowel instead, like CK.

Gemination may have been common to Proto-Kalapuya (PK).⁵⁴ If this is correct, degemination in CK is no doubt related to the break up Common Kalapuya and provides a relative date for important changes in CK phonology from the time of its loss. Such changes include the patterning of vowel length in roots. Let us compare, for example, the timing sequences of Twalatin and CK forms of ‘face(s), eye(s)’ in (46). The form is a bisyllabic noun root, unusual in CK, with six timing (X-) slots for five segments; Jacobs’ -*kwáɸ·ak*, /-k^wáɸlak^h/.

⁵² On special difficulties with the Twalatin materials, note Berman 1990:40.

⁵³ The data in nb45 are from Mrs. Laura Blackerty Albertson, recorded by Jacobs in Siletz, fall 1928. In Jacobs *ca.* 1930[:45], the data given from Yonkalla imply geminates.

(a)	ɸa m a t	/kámmaɸ/	chicken
(b)	ɸwɔ ɸ a	/k ^w áɸɸa/	little round hailstones
(c)	ɸa m á s a u k	/kə m á s s a u k/	the woman’s dress

⁵⁴ There is no evidence, however, of geminates in Louisa Selky’s Yamhill story recorded by F. (Jacobs 1945:199–203). Still, G. (1877) records long nasals and liquid in Lakmayuk and Hantsayuk.

(46) Comparison of Twalatin C-timing with CK V-timing in 'face, eye'

Twalatin:	/k ^h	ɑ	l	l	ɑ	k ^h /
Twal. timing tier	X	X	X	X	X	X
	↘	↘	↘	↗	↗	↗
Underlying segments	// k ^h	V ₁	l	V ₂	k ^h	//
	↗	↗	↗	↘	↘	↘
CK timing tier	X	X	X	X	X	X
CK:	/k ^h	i	l	ε	ε	k ^h /

As NK and CK split, the number of the timing slots and the quality of the segments did not not change;⁵⁵ they were merely rearranged somewhat—due presumably (as we shall see) to the loss of gemination in CK. The extra timing slot Twalatin uses for doubling its intervocalic consonants becomes in CK part of the second root vowel, which becomes long. Yet in the ambisyllabic manner CK treats its many of its consonants, it behaves as if it were still geminate.

It is very likely that at least some of the medial glottal stops in JH's variety of CK arose in such variations. While many NK:CK forms are problematic, observe those in (47).

(47) Twalatin plain occlusive geminates with CK cognate reflexes (major allophones)

	<u>Twalatin, Pre-CK</u>	<u>CK (EH)</u>	<u>CK (JH)</u>	<u>gloss</u>
(a)	- ³ yúggun	- ² yúk ^h u(n)	- ³ yú ² k ^h u(n)	know, learn (s.t.)
(b)	- ³ wáddik	- ² wáḍək ^h	- ³ wá ² ḍə ² k ^h	piece of wood
(c)	-GG-	-Ḡ-	-Ḡ- /V-V]√	medial O _c O _c bisyllabic reflexes

⁵⁵ While the example is typical, differences between the Twalatin and CK vowels here are not accounted for. They parallel a small group of words with similar ɑ/i variations of Twal./CK such as /-má-?ɑ-/ ~ /-má-?i-/ 'come', /-m(m)i/ ~ /-m(m)ay/ ~ /-máɑ/ 'fire, house'. (There is also a still smaller set of examples in reverse of this.) The Lakmayuk form, <k^hálik>, is probably the most archaic. The final consonant in (46) may have been a suffix, -ḡ, in Pre-PK times.

The example in (47a) is aspirated intervocally in CK and presumably voiced (Jacobs' -GG-) in Twalatin, though they are probably cognate.⁵⁶ Both examples have glottalized resonants initially, showing that such resonants date to Proto-Kalapuyan times. The glottalized and non-glottalized forms in JH and EH respectively are regular in the two examples.⁵⁷ It may be that the presence of another glottal is necessary for the medial glottalization to surface in JH; cf. (47d) below. The INTR stem vowel -u in (47a) has apparently coalesced with the root; cf Twal. /-yuk^hni/ 'teach s.t.'. Where Twalatin (and Pre-CK) has a geminate lenis plain occlusive in the medial position of a bisyllabic root, EH has simply dropped the gemination. The dialect of JH, however, has debuccalized the first member of the geminate pair, exactly as it does with regard to positional geminates.⁵⁸ This process requires a bisyllabic stem, perhaps whereby the entire environment, e.g. NK -V₁O_bO_bV₂-, is part of the root. Compare two monosyllabic roots:

(47)	Twalatin, Pre-CK	CK (EH)	CK (JH)	gloss
(d)	-lág-g-ut ^h	-lág-g-ud	-lág-g-u ^h d	play (DURATIVE)
(e) (i)	-yaad	-y ^h aa ^h d-u	-y ^h aa ^h d-u ~ yaad-u	stand (to dance)
(ii)	-yadd-at ^h	-	-y ^h aa ^h d-ad ~ yaad-ad	knock down (DUR/ITER)

Where the Proto-Kalapuyan root was monosyllabic, mere length obtains in the CK root syllable, as we see in (47e).⁵⁹ As in (44a, c), where gemination was blocked yielding long

⁵⁶ There are also examples of Twal. geminated segments underlyingly aspirated (*ɔt^háá* 'four(th)') and glottalized (*ɔt^hám^hɔ* 'want to'). Gemination clearly refers only to timing. Why there should be the laryngeal difference between Twal. and CK in (47a) is not clear. It may point to a difference in the realization of internal aspiration in the two languages. Berman (1990:32; I transliterate to my system) notes only 2 examples of reconstructed PK *k^h, as compared with 31 examples of "neutralized" *k^h (or *k, as I might write), 27 of *g^h and 9 of *k̄. One of these two *k^h, B.'s *wéek^hi? 'dead person', is medial. However, as B. points out, EH has /-wíigi(?) ~ -wéegi(?)/ (cf. JH /-wéek^hi?/). The other is *k^hwauni or *k^hau-ni 'name s.t.', apparently a labialvelar and not *k^h. It is possible that the aspirated series, which appears to be recently added, was not entirely distinct in the velar position when PK broke up. A remnant of this undifferentiated state is seen modern CK in the distributed coronal segment t^h, which is not distinct from [t̚].

⁵⁷ Glottalization (-^hg-) occurs better than 67% or 39 out of 58 formtypes of JH's (47a), for example, always intervocally. In EH, it occurs once on 205 generally intervocalic formtypes. On the first segment of (47b), it is marked 93% or 14 out of 15 formtypes for JH. On the other hand, only little better than 50% of (47ei)'s 28 formtypes from JH are glottalized. Such differences may turn out to represent the difference between the glottal gesture as part of a resonant or separately.

⁵⁸ We may assume that, with regard to -^hwá^hdá^hk^h, whose first glottal is Proto-Kalapuyan while the second from geminate reduction, the double-triggering two glottals would likely spread a third to the final -k^h. (Double triggering appears to be common in CK.)

⁵⁹ The lack of a long vowel in CK for (47d) is probably due to an epenthetic origin of the vowel.

vowels in the initial syllable instead, so in (47e) there is a lengthening of the vowel in Twalatin, which is also seen in the CK dialects.⁶⁰

For CVC roots with resonant finals, the Twalatin root becomes CVRR- where a stem vowel follows; the corresponding CK roots undergo vowel-lengthening to get CVVR plus stem vowel, as is seen in (48).

(48) First (root) syllable variation between Twal. long resonants and CK long vowels

	<u>Twalatin</u>	<u>CK (JH, EH)</u>	<u>Gloss</u>
(a)	lam.m-i, -u, -a	laa.m-i, -u, -a	<i>take in; enter, be taken in</i>
(b)	CVR.R-V _{stem}	CVV.R-V _{stem}	

The example in (48a) is a token for the entire set of such examples given back in (33) of §3.4.2. Syllabification occurs after the same number of sonorant timing slots in both Twalatin and CK. Where gemination is observed in Twalatin, the first syllable is long in CK. Where gemination is blocked, length is observed in the first syllable of both languages. We now have an explanation for many of the occurrences of the VV ~ V alternation among the variable vowels (V·) of §2.3. Present-day CK variable vowel alternations, perhaps generally, are a reflex of consonantal gemination or nongemination at an earlier stage in the language, a variation that depended upon syllabic factors.⁶¹

Why the second syllable in k^hil eek^h lengthened (rather than the first) may have to do with a sonority process that in CK ranks consonants on the left and vowels on the right. Thus ?R has the more consonantal portion on the left side of the pivot and the more sonorous portion of the glottalized resonant to the right. Compare Twal. /-múyus/, CK /-múyuus/ 'hat'.

Gemination is clearly important in the history of Kalapuya and its reflexes in the modern dialects. It is influenced by syllabification, stress, and root and stem shapes, in turn continually affecting vowel and consonantal length. While not yet fully understood,

⁶⁰ While still more complicated residual effects may be tied up in daughter dialects' glottalization of a final root coda, the constraint on gemination in CK is unlikely to explain either final preglottalization in general or on the DURATIVE morpheme in particular as in (47d) of JH's CK.

⁶¹ This partial solution, however, does not clear up all the problems. Where there are forms that are geminate in Twalatin, *di di d'up*, *gud d'at*, *gud id'up*, *gud id'up*, and (usually) variable in CK *-ti t'at* (~ *-ti(·) t'at* ~ *-ti t'at*), *-ti t'up*, *-ti t'at* 'give (X to Y)', there are others that are variable in Twalatin, *'-dap*, *-d'at*, and long in CK *-ta'p*, *-ta'pa't* 'stand (up)', yet unaccounted for.

the feature provides considerable insight into CK vowel, resonant, and medial glottal variations.

3.5.3 Assimilatory processes and lexical phonology in CK

CK has an elaborate system of lexical phonology. By this I mean that it is involved phonologically at the concatenation points of several morphological–lexical levels, on each of which, from small to large, specific types of phonological objects are operated upon by different processes. These operations occur through the effects that the neighboring segments and segmental gestures of these objects have on one another. The changes induced are generally assimilatory (though they may be static or dissimulative) and (except for IA)⁶² operate across morphemic boundaries appropriate to each given sphere.

Following a general lexical phonological approach (e.g., along the lines of papers in Hargus and Kaisse 1993, as discussed by Kaisse and Hargus, Hargus, and particularly Odden 1993), I list five distinct morphological levels for CK. To the right I give the objects of a specific level. Under each, I list the types of processes that occur with regard to each level and give a bracketed environment with activity pointers. Vowel assimilation is the only process that runs through all of the spheres; I repeat it below where it is most remarkable.

(49) Five levels of phonological influence in CK

Morphological-lexical level

Objects

(I) The root (and reanalyzed root) ⇒ Segments and their gestures.

Processes:

(A) Vowel assimilation (studied dialectally)

(B) Final obstruent preglottalization (lexically marked)

(C) Root reanalysis (through suffixation)

(a) $\overset{(\downarrow)}{\surd} [\dots]$

(b) $\sqrt{R} [[\dots] \surd []]$

⁶² The changes to (IA) are diachronic and isoglossic or geographical rather than synchronic.

- (II) The reduplicated root. ⇒ The root and portions of the root such as the onset and rhyme-like VC structures.

Processes: (A) Templatic processes of at least three types of reduplication.

$$(a) \quad \sqrt{\text{RED}} \left[\left[\dots \right] \sqrt{\text{RED}} \left[\right] \right]$$

- (III) The affixal level: ⇒ Morphemes in the verb prefix, in the noun prefix, the nominal stem, and in the stem suffix (interior and exterior).
- (a) the verb prefix bundle, prefix, the nominal stem, and in the stem suffix (interior and exterior).
- (b) the noun prefixes and stem, stem suffix (interior and exterior).
- (c) stem suffixes.

Processes: (A) Resonant assimilation and geminate reduction⁶³
 (B) Nasal assimilation to (obstruent) place
 (C) Vowel epenthesis
 (D) Vowel assimilation processes: harmony and attraction

$$(a)^{64} \quad \sqrt{\left[\left[\right]_{\text{TENS.PERS}} \left[\right]_{\text{MODE}} \left[\right]_{\text{DIR}} \left[\right]_{\text{PL}} \left[\right]_{\text{ADV}} \right] \text{VPREFIX}} \quad \text{VST} \left[\sqrt{\text{(RED)}} \left[\dots \right] \dots \right]$$

$$(b)^{65} \quad \sqrt{\left[\left[\right]_{\text{TENS.PERS}} \left[\right]_{\text{MODE}} \left[\right]_{\text{PL}} \left[\left[\right]_{\text{NCONJ}} \left[\right]_{\text{VER}} \right]_{\text{NMCONJ}} \left[\right]_{\text{NOMCONJ}} \left[\right]_{\text{DT}} \text{NST} \left[\dots \right] \right]}$$

$$(c)^{66} \quad \text{VST} \left[\sqrt{\text{(RED)}} \left[\dots \right] \alpha \left[\right] \beta \left[\right] \gamma \left[\right] \dots n \left[\right] \right]$$

⁶³ Resonant assimilation, by which I mean total assimilation of a certain type of resonant—nasals—before other resonants, is infrequent in the suffixes, but there are apparent examples, such as *pu'ya* /-*pu'ya*/, 'making', from //*bun*// 'make' + //*ya*// 'NOMIN'. If this is not correct, then two separate spheres, the first consisting of the verb prefix and noun prefix and stem, the second of the stem suffixes, will have to be considered.

⁶⁴ Parentheses mark the bracketed category and the edge phonology as optional.

⁶⁵ The main nominal phrase properly consists of $\text{N} \left[\left[\right]_{\text{DT}} \text{NST} \left[\dots \right] \right]$. In (IIIb), I have included the verbal prefix as used for nouns, which effectively changes the lexical category, in order to elucidate a greater number of points of affixal phonology. This VPREFIX either attaches to the POSS DT or to the plain noun stem. Noun phrases or relative clauses of a possessed entity or thing normally follow a DET N phrase and are part of it; those attributive to the noun normally precede it.

$$\left(\left[\right]_{\text{NOMCONJ}} \right) \left[\right]_{\text{DT}} = \left[\begin{array}{l} \left[\right]_{\text{LOC/OBL}} \\ \left(\left[\dots \right]_{\text{NOMCONJ}} \right) \quad \left[\left[\right]_{\text{PSSV}} \left[\right]_{\text{PL.3}} \right]_{\text{POSS}} \\ \left[\left[\right]_{\text{PLAC}} \left[\right]_{\text{DETR}} \right]_{\text{DET}} \end{array} \right]_{\text{NPREFIX}}$$

While LOC/OBL is also one of the five modes of VPREFIX (or NOMCONJ), I have placed it separately here as well. Without a further determiner, it has both a prepositional and an OBL case quality.

⁶⁶ The suffixation patterns of the stem have not yet been completely worked out. Consonantal suffixes are often dependent upon a stem vowel before (or with *tʰ*, after as well). The pattern here is suggestive only.

- (IV) The **verb**. ⇒ Elements of both sides of the verbal prefixal boundary: affix bundle and lexemic stem.

- Processes:
- (A) Dissimilative or static processes of aspiration (/devoicing).
 - (B) Coalescence of stem-onset glottal stop with the final occlusive in the verb prefix.
 - (C) (Limited) nasal assimilation to place

$$(a) \quad V[[\dots]_{V_{\text{PREFIX}}} \downarrow V_{\text{ST}}[V_{\text{(RED)}}[\dots] \dots]]$$

- (V) **Discourse**. ⇒ Clitics, words⁶⁷ and phrases.

- Processes: (A) Geminate reduction.

$$(a)^{68} \quad [\dots]_{\text{ADVL}} \downarrow [\dots]_{\text{PRON}} \downarrow V[[\dots]_{V_{\text{PREFIX}}} \downarrow V_{\text{ST}}[V_{\text{(RED)}}[\dots] \dots]] \downarrow N[[]_{\text{DT}} N_V[\dots]]$$

Derivational processes of (I) are not central to the kind of phonology we are concerned with here.⁶⁹ However, we should take note of the following two examples, apparently reanalyzed roots. The nasals occur at syllabic break. Nevertheless, surface nasals do not sit next to each other in CK. Only in the root, with its sense of immutability, could such a situation exist.

(50) -mɛ́'nma (6), -'mɛ́'nma (2) /-mɛ́'nma/ //miɨ́ma// people, Indians

(51) τάνι'λάμνα //ḁa-m-ni-lamna// they would distribute ...
USIT-IND-PL.3-distribute

The coalescence of similar nasal segments is discussed at some length below.

Processes in (II) are discussed in Appendix 7. This thesis is centrally concerned with (III–V).

⁶⁷ In CK, any word that could take a verb prefix, which is practically every word including pronominal/adverbials, is also a clause.

⁶⁸ The typical pattern here, with initial adverb, demonstrative, verb and noun, is suggestive only.

⁶⁹ Please see note 24, p. 203, for examples of vowel assimilation in the root; see also Appendix 4. Coda obstruent preglottalization, (C), entails lexically marking an element in the root coda for final root preglottalization. See Chapter 5, especially §5.5.4.

(IV), the phonology of the verbal prefix boundary, has been exemplified very briefly in (36) above in §3.4.3. This juncture is unique in the language, being neither a normal word morpheme juncture, nor like that between a noun and its nominal prefix. It is largely discontinuous: little passes it save for an epenthetic glottal stop which may coalesce with an occlusive to the left and aspiration to the right, both of which are dissimulative in nature.⁷⁰ The juncture creates a special lexical opposition of Aux to Verb, which is indifferent to a simple assimilatory process like nasal assimilation.

(V), the phonology of clitics and words, has already been mentioned with regard to positional geminate reduction in (41). It is likely to be porous to vowel assimilation (vowel attraction), as is (IV).

There remains (III), the affixal sphere, whose processes I repeat here.

- (A) Resonant assimilation and geminate reduction,
- (B) Nasal assimilation to (obstruent) place,
- (C) Vowel epenthesis,
- (D) Vowel assimilation processes: harmony and attraction.

(C) and (D) of this set have been discussed briefly (except for vowel attraction, which would take us too far afield) in Chapter 2. That leaves (A) and (B), which the remainder of this subsection will be concerned with.

Both (A) and (B) are essentially processes of nasals. We will look first at (B), nasal assimilation to place, the simpler of the two. (I repeat material from Chapter 2.) The best place to view nasal assimilation is the juncture between the separable noun determiner //ən// (with surface realizations of [ən ~ ɛn ~ ɐn ~ ɐ]), each automatically preceded by a glottal stop /ʔ/ when a vowel precedes), and the nominal stems. In (52), we see that DET illustrates the four types of nasal assimilation, according to the four major articulatory positions in CK—labial, coronal, dorsal and laryngeal. Examples in the first column show a wide phonetic notation; in the second an underlying one.

⁷⁰ From forms such as [gin.(tʰ)kɑ.mɔ] 'he went in', Berman would write /gi-n-tʰ-lɔ-m-o/; how else to explain an aspiration great enough to produce voicelessness in the following resonant? But the plural would be /gi-n-di-ni-lɔ-m-o/ 'they went in'. The plain form of the directional appears to me more basic, i.e. /gi-n-ɖi-ni-lɔ-m-u/, /gi-n-ɖ-lɔ-m-u/, leaving this special juncture itself as aspirating environment.

(52) Nasal variations before four articulatory positions

(a)	ἄνπιῖνι	//an-piini//	girl(s)
(b)	ἄνδιῖπῶ	//an-diiḗp//	raw camas
(c)	ἄντῶφάφι	//an-tḗfa ² fi//	anus worms, hemorrhoids
(d)	ἄντῶαυτῶκῶλακῶ	//an-tḗawtsḗkḗlakḗ//	garter snake
(e)	ἄνγούλα	//an-gula//	arrowhead
(f)	ἄνύῖη	//an-uyhi//	a man
(g)	ἄνῆεῦλα	//an-hiilba//	disease

Before labial occlusives the nasal becomes labial, before coronal coronal, and before dorsal dorsal; before laryngeals the nasal reverts to its default state, here as coronal. The default labial nasal, which is the phonological realization of the INDICATIVE mode morpheme, **-m-**, is similarly realized in the same forms of assimilation, except, of course, its default. We see IND in (53) at the verb prefix boundary.

(53) Variation on the allophonic realizations of INDICATIVE **-m-**, by position

(a)	καμῶλα	/gam-ʔala ² /	//ga-m-ala ² // FUT.3-IND-die	he will die 67.13/nb35:67.1
(b)	κὺμῶκ	/gum-ho ² k ^h /	//g-m-huuk ^h // AOR-IND-eat	(he) ate (it) 98.18/nb34:145.15
(c)	ναμῶνῆ	/nam-punhi/	//na-m-punhi// FUT.2-IND-make	you will [not] make ... 43.15
(d)	τὰντάῃαι	/dan-ḡahay/	//da-m-ḡahay// USIT-IND-kill	kills 23.6/46:56.19
(e)	τῆγκὰμῶγαι	/tsḗn-gam ² yad/	//tsḗ-m-gam ² a-ḡ// PRES1/2-IND-help-DUR	I help 138.7/nb35:73.7

However, although assimilation must be the preferred form, non-assimilation seems to be nearly as frequent at the verbal prefixal boundary:

(54) Non-assimilation of INDICATIVE **-m-**

(a)	τὰντάῃαι	/ḡam-ḡahay/	//ḡa-m-ḡahay// FUT.1-IND-kill	I will kill ... 115.13/nb35:163.19
(b)	κὺμῶαι	/gum-ḡawi/	//g-m-ḡaw-i// AOR-IND-put-TRANS	(he) put down... 105.9/nb35:15.11

(c) (EH)	<i>omyás</i>	/um-yás/	//θ-m-yas//	it hurts, aches
			pres.3-ind-sharp	

The assimilation of nasals before either fricatives or resonants, however, generally entails total elision of the nasal.⁷¹ The two manners appear to involve quite distinct processes. The fricatives are themselves very aspirate and turbulent. This suggests a certain incompatibility of manner between them and a preceding resonant, leading to simple elision when the nasal attempts to assimilate as triggered by the fricative. We see in (55b), though, that the reverse (fricative before resonant) is tolerated in CK.

(55) Nasals disappear before fricatives in nominal phrases

(a)	[əppíʔ]	//an-ppiʔ//	gopher	
(b)	[əšní]	//an-sni//	coyote, Coyote	
(c)	[ḡinlúk ^h ḡuφna]	//ḡn-luk ^h -ḡ-u-φna//	his hole	(EH, nb47:57)

The two regular fricatives in CK, //φ// and //s//, both show total elision of the nasal. The third form,⁷² the only noun with initial //t// in JH or EH, a possessed quality formed from a verb (as the segmentable stem suggests). The fact that there is no elision of the nasal in (55c) is curious; it is not clear if it has more to do with //t// or the following verbal noun. (There is no example at all in /x/, in either JH or EH, with a preceding nasal to compare.)

Before resonants, we see a superficially similar pattern of total elision of the nasal.

(56) Elision of nasals before resonants

(a)	əmiis	//an-miis//	cooked camas	
(b)	ə ^h nóit ^h á	//an- ^h nuyt ^h a//	brown bear	
(c)	əlámʃin	//an-lamʃin//	medicine (CJ < <i>la médecine</i>)	
(d)	ə ^h wa ^h ḡə ^h k	//an- ^h wa ^h ḡak// (or // ^h wa ^h ḡag//)	stick(s), tree(s)	
(e)	əyéḡi	//an-yiḡi//	story	
(f)	κινθόικωι 140.6/nb36:11.11	[ḡmi-hóyʃ-wii] //ḡi-m-ni-huys-wii// SUBJ-PL.3-smell-EMPH	[they feared that] they might smell...indeed	

⁷¹ There are a few rare counterexamples.

⁷² I have not seen the original of this form.

The process of elision among the nasals, however, is quite different from that among the fricatives. I give a general pattern for reduction of nasals as in (57), where R_1 is a *nasal*, and R_2 is a following resonant of any kind.

(57) Resonant reduction across an affixal boundary

$$-VR_1\#R_2- \rightarrow -VR_2-$$

Standard examples showing $N_1N_2 > N_2$, or $m-n > n$ from (56f) above or $n-\acute{m} > \acute{m}$ from (58bii) below, illustrate morphemes in the verbal prefix or in the nominal word, respectively. In the general pattern, two resonants⁷³ merge across a morpheme boundary #; the first completely disappears into the second. The hypothesis I present here suggests that this occurs in two stages: (1) the first segment, R_1 , gives up its own position and manner (e.g., nasal vs. oral approximant) in favor of those of the second, R_2 , while both sonorant segments keep their own timing periods (morae); (2) the copy of R_2 (old R_1) falls prey to the CK constraint against geminates and disappears, either by debuccalization, leaving a glottal stop (ʔ), or, more commonly, by simple erasure, without a trace.

As evidence for step one, I present the following data. (58a) is from William Hartless, as recorded by Frachtenberg. (58bi, ci) are impressions from the S-M tape.

(58) Assimilation without reduction (\approx resonant gemination)

(a)	(WH)	taw wā qíʔ	/ḍaw-waakiʔ/	//ḍan-waakiʔ//	my wife	F. slip files, J. Coll., Box 43
(b)	(JH) (i)	[ʔæmʔmai]	/əm-ʔmay/	//an-ḿay//	white fir (tree)	JH, SM#256
	(ii)	α' m á ı	/ə-ʔmay/	//an-ḿay//		40.10/nb35:103.7
(c) ⁷⁴	(JH) (i)	[ʔəlloʔkʰ]	/əl-loʔkʰ/	//an-luʔk//	cherry (tree)	JH, SM#257
	(EH) (ii)	α' nu' ʔ k	/aʔ-nuʔkʰ/	//an-nuʔk//	(choke)cherry	nb46:51.2, 4

In the first example, F. writes a /w/ in the Mary's River dialect where normally in Santiam one would expect an elided /n/ from the first person possessive //ḍan//-, 'my'. The mora or X-slot occupied by /n/ is maintained, but the material is equivalent to (or

⁷³ Because this pattern occasionally involves resonants other than nasals as R_1 , I use the more general term "resonants" rather than "nasal and resonant".

⁷⁴ For JH, the normal word for chokecherry was αηγáγá'la'q [əŋɣáγá'la'qʰ], //an-gayaʔak//, perhaps related to [əŋɣáγá'na], //an-gayaʔa// (+/kʰ/), berries. In both this term and his 'cherry tree', we see a variation n ~ l, suggesting possible Northwest influence diminutive influence.

drawn from) the following resonant, first segment of CK //wɑkiʔ//, 'wife'. (58bi) and (ci) give examples of this in JH's Santiam as heard impressionistically but distinctly on the Swadesh-Melton tape: the mora of /n/, now from DET //ɑn//-, is maintained, but as a copy of the following resonant. The maintainance of this sonorant mora (now filled regressively from the following resonant), however, is optional and less frequent than its elision along with the rest of the segment.

The second stage, of course, is the elision of the original R_1 segment entirely, with the occasional, optional substitution of a glottal stop (debuccalization). This is the result of the CK constraint against geminates which, I suggest, did not exist in Common Kalapuya. This constraint is not observed with the same force in all CK dialects. As is noted in Appendix 4, Mary's River generally does not elide nasals across the verb prefix juncture. Observe, for example, (59), where JH "corrected" William Hartless's Mary's River, where such R_1R_2 occur at the verbal prefix juncture:

(59)⁷⁵ WH's Mary's River R_1R_2 , at V_{PREFIX} juncture, compared with JH's Santiam.

<u>MR</u>	<u>S</u>	<u>CK</u>	J45:205.6, .7
(a) (i) ‡umwa'usu'	(ii) ‡u-wa'usu'	(iii) //∅-m-wɑws-u//	"No one was there."
		3.PRES-IND-not.there-INTR	
(b) (i) ‡Gumwa."	(ii) ‡Gu-wa."	(iii) //g-m-wɑʔ//	AOR-IND-not "There was none."

As Jacobs remarks (1945:205, n. 89), "um- before w is extremely rare in Santiam, at best; it is the usual form in Mary's River."

Unlike before fricatives then, the resonants (at least where R_1 is a nasal) evince the following two-step reduction:

(57) Resonant reduction across an affixal boundary

(i)	$-VR_1\#R_2-$	\rightarrow	$-VR_2R_2-$	total resonant assimilation
(ii)	$-VR_2R_2-$	\rightarrow	$-VR_2-$ (or $-V'R_2-$)	geminate reduction

We have seen in this subsection that CK has an elaborate system of levels in lexical phonology. Both their independent nature and importance can be seen by the largely distinct processes carried out in each of them. Two of these are (A) assimilation

⁷⁵ ‡ indicates that the forms are taken directly from Jacobs 1945.

of nasals to the place of following segments—occlusive, fricative, or resonant, and (B) total assimilation and elision which occurs when the nasal is followed by a resonant. While the intermediate stage of this last type of assimilation is largely hypothetical, some small evidence of their reality comes from odd examples indicative of the factors in question. Examples of gemination in Tualatin, from Mary's River and from the S-M tape suggest a rich system of prosodic weight, with two units on the surface and one more underlyingly for a total of three in counting.

3.6 Summation of resonants

In this chapter we have studied the occurrences of CK resonants, both plain and glottalized, initially and finally. They form three natural groups, nasals, liquids, and glides on the basis of increasing sonority. The glottalized resonants, discussed phonetically by Jacobs, are clearly underlying in most cases. Four resonants—*y*, *w*, *l*, *m*—are commonly found as second members in initial clusters, while three others—*l* (*l̥*), *m* (*m̥*), *n* (*n̥*) (*R_H*)—take part as first members in such clusters finally. In both cases their partners are, generally, glottalized or aspirated occlusives (not lenis plain). However, such aspirated occlusives are likely neutralized lenis plain underlyingly. *R_H* participates in a bound cluster whereby it shares laryngeal features with the following occlusive. (Initial clusters may do this to a more limited extent as well.) On the generalized root, $C_1 C_2 V R C_3$, clustering over the left edge with C_1 is possible with extrasyllabic labials but is relatively rare even across the nominal prefix boundary. Such clustering across the verbal prefix boundary is impossible, while that involving C_3 over the right edge is non-existent except for reduplication. The verbal prefix boundary is a unique juncture in the language, which opposes the auxiliary-like verb prefix and the verb stem. Gemination, apparently once part of the phonology of Common Kalapuya, has retreated in CK, leaving variable vowels instead of consonants that became long intervocally as we still see in Twalatin (NK). Gemination has also left a tendency for ambisyllabicity. Nasal assimilation to place is general in CK for both *n* and *m*. Before fricatives and resonants, nasals are elided. Such elision before resonants, however, has been shown to be a part of total nasal/resonant assimilation, evinced by unusual examples where the mora of the first (nasal) resonant is maintained, its melodic material being a copy of the second. This copied resonant then elides as part of geminate reduction in CK, occasionally leaving a [?] as geminate reduction regularly leaves among lenis plain occlusives. CK is shown to have an involved system of lexical phonology with some five separate levels, whereby different phonological processes occur on each level.

Chapter Four

Fricatives

4.1 Canonical fricatives in CK

This chapter discusses the fricatives in CK. They are as follows in (1):

(1) CK fricatives

ϕ	s	ʔ	(x)	h
	ʂ	ʃ		

There is evidence for two series, plain and glottalized. The glottalized fricatives occur only syllable-finally, pre-glottalized (like other obstruents in this position). **x** is a rare segment in CK, in JH a borrowed or peripheral phoneme, sometimes an allophone of //kʰ//. **h** is discussed with ʔ in Chapter 6.

The fricatives in CK are found in all three major lexical categories (noun roots, verb roots and pronominal/adverbials). Except for the laryngeal //h// (and probably //ʔ//), however, they are not found in the affixal system. There is similarity between certain aspirated occlusives and certain fricatives: several occurrences of [x] and [χ] are underlyingly //kʰ//, and ϕ shares the characteristic of aspiration with both //pʰ// and //w//.

4.2 Examples of the fricatives

Examples are given in root-initial, root-final and stem-medial positions. The unusual segments ʂ and ʃ are preglottalized fricatives occurring only in stem final or medial position. (For a general account of CK glottalization including fricatives, see Chapter 5.)

4.2.1 ϕ

The following examples in (2) illustrate root-initial ϕ in CK with different root vowels.

(2) Root-initial ϕ

- (a) *tuɾɪnɪfá* //ɬu-ɬn-ni-ϕaʔ// down to their feet
OBL-POSS.3-PL.3-foot

- (b) (i) $\tau\acute{\alpha}\tau\iota\nu\iota\phi\iota\tau$ /- $\phi i i^{2h}$ / // $\dot{d}\alpha\text{-}\dot{d}i i\text{-}n i\text{-}\phi i t$ // when they would take out ...
USIT-TEMP-PL.3-take.out 35.12/nb47
- (ii)¹ $\tau\acute{\alpha}m\phi\iota\tau\iota\nu\iota$ // $\dot{d}\alpha\text{-}m\text{-}\phi i t\text{-}\dot{d}\text{-}n i$ // (he) would extract it with...
USIT-IND-take.out-DUR-OBJ.3.NITER 63.4/nb36:163.21
- (c)² $\tau\acute{\alpha}n\iota m\acute{\alpha}\phi\upsilon\acute{\alpha}\tau$ // $\dot{d}\alpha\text{-}m\text{-}n i\text{-}m\alpha\text{-}\phi\upsilon\text{?}g\text{-}\alpha\text{-}\dot{d}$ // (~// t //) (they) would close ...
USIT-IND-PL.3-DIR.hither-close-STV-DUR 40.14/nb35:103.21
- (d) $\kappa\iota\tau\acute{\alpha}\phi\upsilon\iota\nu\iota$ // $g\text{-}\dot{d}\alpha\text{-}\phi\upsilon\text{-}n i\text{-}\text{?}$ // but he has put on
AOR-CONTR-put.on-OBJ-PERF 48.14/nb46:184.5

The examples in (3) show root- and stem- (i.e., word-)final ϕ :

(3) Word-final ϕ

- (a) $\alpha m\acute{\upsilon}\phi$ // $\alpha n\text{-}m\upsilon\phi$ // grouse 34.11/nb34:175:1
- (b) $\tau\iota\nu\iota\acute{\alpha}\upsilon\phi$ // $\dot{d}n\text{-}\acute{\alpha}\upsilon\phi$ // his spit 105.2/nb35:13.9
- (c) (i) $\phi\iota\phi$ (< EH: $\kappa\upsilon\sigma\text{?}\rho\upsilon\phi\iota\phi$ // $g\upsilon s\text{-}\dot{b}\upsilon\text{-}\dot{b}\iota\phi$ // 'your ass [marked; vulgar]' nb47:67.3)
(ii) $\beta\iota\phi$ (< EH: $\kappa\acute{\upsilon}\sigma\text{?}\rho\upsilon\phi\iota\phi$ // $g\upsilon s\text{-}\dot{b}\upsilon\text{-}\dot{b}\iota\phi$ // '(id.)) nb80:25.21)
- (d)³ (i) $\kappa\omega\omega\nu\iota m\acute{\alpha}\kappa\iota\acute{s}\kappa\alpha\text{-}\acute{\tau}\epsilon\alpha\text{-}\phi$ // $g^w\alpha\text{-}m\text{-}n i\text{-}m\alpha\text{-}g\iota s(+g\text{-}\alpha\text{-}\acute{\alpha}t s^h\text{-}\alpha\text{?}\phi$ // 74.3/nb34:117.5
they drove me back RECP-IND-PL.3-DIR.h-drive(-AUG)-STV-AUT-OBJ.1
- (ii) $\tau\acute{\alpha}n\iota\text{'}\nu\iota\text{'}\acute{\tau}\epsilon\alpha\text{'}\phi\tau\acute{\alpha}\upsilon\text{'}$ // $\dot{d}\alpha\text{-}m\text{-}n i\text{-}t s^h\text{-}\alpha\text{?}\phi$ // // $\dot{d}\alpha\text{-}y i i$ // ibid.
they told me to go back (home) USIT-IND-PL.3-tell-AUT-OBJ.1 IMP-go.back
- (iii) $\kappa\omega\alpha m\alpha\text{'}\tau\acute{s}\iota\text{'}\delta\kappa\omega\alpha\text{'}\phi$ // $g^w\alpha\text{-}m\text{-}m\alpha\text{-}\acute{\tau}\iota\text{?}\text{?}\text{?}\text{-}\alpha\text{?}\phi$ //
(he) scratched me RECP-IND-DIR.h-scratch-me nb86:22.1

Word-final ϕ is relatively unusual. The examples in (3b) and (c) are the only ones known following the vowels α and i , respectively. I have no answer to the question of

¹ The ² here is the result of positional coronal stop gemination, $-t + \dot{d}$.

² There is no apparent reason here for glottalization word-medially, except for the unusual expression of ?k .

³ The non-durative first person pronominal object forms, $-(t s^h)\alpha\phi$, are opposed to the durative/iterative first person object pronominals, $-(t s^h)\phi\alpha n$. $-t s^h$ takes part in the object paradigm as a prefix to the object suffix itself. Because it appears to have similar roles to those of the particle labeled *autonomous* by Thompson and Thompson (1992:101–2) for the N $\acute{\epsilon}$ $\text{?k}\acute{\epsilon}p m x$ (Thompson) language or that recognized by Davis (1997:66–8) as the *autonomous (intransitive)* of S $\acute{\iota}\acute{\alpha}\tau\iota m\acute{\epsilon}t s$ (Lillooet), I borrow the term *autonomous* suffix for CK $-t s^h(\alpha, i, u)$.

why φ in (3a) is preglottalized (presumably $-a\eta\varphi^4$). It may be allophonic with regard to final $-\varphi$ (the environment following a), but doubtful. I have repeated it twice in order to show the consistency.

The following examples show root-final but stem-medial φ in (4) and mid-stem φ in (5).

(4) Root-final but stem-medial φ

- | | | | | |
|-----|-----------------------------|--|-------------------------|------------------|
| (a) | <i>κύστατι·τσίφτςυ' yw·</i> | //kus—da-dii-tsi φ (+) τ s-u-yu// | when it twitches | |
| | | that—USIT-TEMP-twitch(+AUG)-STV-INCH | | 77.8/nb46:162.5 |
| (b) | <i>τcomháφιτιντ</i> | //ts ^h -m-ha φ -i-dnd// | I'm gathering ... | |
| | | PRES.1/2-IND-gather-STV-DUR | | 104.6/nb35:7.23 |
| (c) | <i>τάντάντςύφα'τ</i> | //da-m-dan-tsuu φ -a-d// (~// τ -t// (?)) | he would suck there | |
| | | USIT-IND-DIR.LOC-suck-STV-DUR | | 63.4/nb36:163.21 |
| (d) | <i>τάνιμου'φιν</i> | //da-m-ni-muu φ -(i)n// | they would roast (s.t.) | |
| | | USIT-IND-PL.3-STV-OBJ.3 | | 27.16/nb85:56.17 |

(5) Reanalyzed-root-medial φ^5

- | | | | | |
|-----|----------------------------------|--------------------------------------|----------------|-------------------|
| (a) | <i>ανά'φύ'</i> | //an-naa φ u?// | DET elderberry | 90.6/nb34:23.5 |
| (b) | <i>τιν'έ'φam</i> | //dn-ii φ am// | her father | 105.11/nb35:15.17 |
| (c) | <i>μου'ίφι</i> [múí φ e] | //muy φ i// | brother-in-law | Nb83; SM#533 |
| (d) | <i>τυ'τά'κ'φιν</i> | //du-tak ^h φ in// | work (N) | 54.9/nb46:34.23 |
| (e) | <i>μά'τ'φan</i> | //ma φ an// | all (PRON) | ibid. |

There are a few consonants that cluster with // φ //. Most important are those where the cluster is part of the root. In (6) we see $t\varphi$ -:

⁴ This is a conjecture, based on the fact that as the only preglottalized example, it accords with the facts and does not require a segment φ based on a single affixal morpheme. (I dislike adding glottal stops here and there, preferring to seek a pattern—but there sometimes there appears no choice.)

⁵ 'Reanalyzed' and 'reanalysis' here refer to the process by which presumed stem suffixes are subconsciously reworked by a new generation of speakers as part of the root itself. This is not strictly true, however, with some of the examples in (5) which clearly have suffixes.

(6) Common **tʰɸ**-clustering

- (a)⁶ *om'ye fyɛfu' dantfa'* //θ-m-yiɸ+yiɸ-u dān-tʰɸa?// my ass is itching nb47:174.15
PRES.3-IND-itch+INT-INTR my-ass
- (b)⁷ *ɾɪntfá'fi* //d̪n-tʰɸa?ɸi(i)// his anus-worms 100.10/nb34:155.7-9

The glottal stop before **ɸ** in (6b) does not represent a preglottalized labial fricative **ɸ̥**, but rather the last segment of the main morpheme root before a suffix, **-ɸi**. Examples in (7) below exemplifies the curious clusters **ɸɸ**- or **ɸɸ̥**-:

(7) Common **ɸɸ**-clustering

- (a) *αfɸi'* /əɸɸi?/ //an-ɸɸi(?)// the gopher 114.16/nb35:159.11
- (b) *αfɸi'ɪ* /əɸɸi'ɪ/ //an-ɸɸi(?)ɪ// DET periwinkle 130.15/nb35:77.11

The common reversed form, **-ɸɸ**-, appears to involve an epenthetic **ɸ**. (Cf. the Tw. form in (8b.ii).)

(8) Probably⁸ epenthetic **ɸ** before **ɸ**:

- (a) *táu'náɸfan* //tʰawhá-ɸɸan// alone 121.2/nb35:173.23
- (b) (i) *ɾá kʷá·náɸfu* //d̪a-kʷaanɸɸu(?)// Eat!
IMP-eat 121.1/nb35:173.19
- (ii) (LK) *kʷéɪnafu* /kʷéɪnafu/ eat nb122

An interesting allophonic variation of **ɸ** (and misleading to previous researchers—cf. Takeuchi's struggle in writing **ɸ** as **hw**, following Swadesh, §1.5.8) is the great aspiration it produces when positionally clustered with a heterosyllabic occlusive.

- (9)⁹ *nanɾɸmántchurɪta* //na-m-dub-mand-ts^h-ɸɪd̪aa// you will wrestle together
(J45: †nandubma'ntch'ida) FUT.2-IND-PL.2-try-AUT.INTR-RECIP 116.9/nb36:87.23

(This is similar to the case with initial **w**, which initially has an allophone **hw**, realized following a plain occlusive precedes, the verbal prefix juncture doubling the aspiration:

⁶ Presumably pronounced [d̪an(ɸ).tʰaʔ], where [á] represents a sound halfway between [æ] and [ɐ]. I myself do not hear the bilabial quality [ɸ] of Jacobs <f> in most situations on the S-M tape; I rely on Jacobs's statements for this interpretation. Following /tʰ/, one might expect [f].

⁷ But cf. EH /-ɸaʔɸi/ 'anus worm'.

⁸ Since the double segment may represent a reanalysis of **ɸ**, I do not simplify it phonemically.

⁹ Jacobs writes **h** generally when there is twice the normal aspiration of an aspirated obstruent.

- (10) $\kappa\iota\eta\theta\omega\acute{\upsilon}q$ $\text{//g-m-d-wu\acute{k}\text{//}$ (she) got to (where)
AOR-IND-DIR.th-get.there 116.14/nb36:89.9

In this subsection, we have seen ϕ in three positions, surrounded by three vowels and consonants. It has been noted that one form of the objective morpheme 'me', $-\alpha^2\phi$, apparently occurs with a glottal just before the ϕ , generally (but not always) word-finally. ϕ is a quite aspirated, a feature it shares with some forms of initial w and with p^h .

4.2.2 s, ś

The following examples in (11) illustrate root-initial s in CK. They are very common.

- (11) Root-initial s
- (a) $\alpha\sigma\acute{\alpha}\omega\alpha\lambda$ $\text{//an-saawal\text{//}$ DET-tarweed tarweed seeds
- (b) (i) $\tau\iota\varsigma\acute{\iota}\tau\alpha\alpha\alpha$ $\text{//\acute{d}n-siidgag\text{//}$ (~- $\text{//k^h\acute{a}k^h\text{//}$) his clothes, property 74.12/nb34:107.17
- (ii) (EH) $\kappa\upsilon\varsigma\tau\iota\varsigma\acute{\iota}\tau\acute{\alpha}\alpha\kappa$ $\text{//gus-\acute{d}n-siit^h\acute{k}^h\text{//}$ her clothes nb46:71.1
- (c) $\upsilon\mu\varsigma\acute{\upsilon}$ $\text{//\emptyset-m-su\text{//}$ it's okay, that's good
PRES.3-IND-(be) good 18.8-9/nb34:123.20

The example in (12) is illustrative of similar s + heavy resonant (l , m , n) clusters (analyzed as obstruent + resonant offglide in §3.2) from Chapter 4.

- (12) $\alpha\kappa\eta\acute{\iota}$ $\text{//an-sni\text{//}$ a coyote, Coyote

The examples in (13) show s as first initial in a series of onset clusters:

- (13) s in onset clusters: $s\acute{b}$, $s\acute{d}$, $s\acute{g}$, $s\acute{g}^r$, $s\acute{k}$, $s\acute{k}^r$
- (a) (EH) $\rho\iota\mu\iota\varsigma\rho\acute{\omega}\acute{\iota}\lambda\acute{\omega}\nu\acute{\alpha}\eta\alpha$ $\text{//\acute{b}-ni-s\acute{b}uul+ul-\acute{w}\acute{a}-na\text{//}$
(\exists no transl., but "flying round way up in the air" MYTH-PL.3-fly.around+PROG-CAUS-ARG.3.ITER
was given by J./EH for $s\rho\acute{\omega}\acute{\iota}\lambda\acute{\omega}\nu\acute{\alpha}\eta\alpha$, nb77:141.16) nb78:21.7
- (b) $\sigma\tau\acute{\omega}$ $/s\acute{d}\acute{\omega}\acute{\omega}/$ $\text{//t^h\acute{d}u\text{//}$ we
- (c)¹⁰ $\alpha\sigma\kappa\acute{\upsilon}\acute{\rho}$ $/\acute{\alpha}-s\acute{g}\acute{\upsilon}u\acute{p}^h/$ $\text{//an-s\acute{g}uup\text{//}$ ashes

¹⁰ In cases where $p^h \sim \acute{b}$ unpredictably, writing $\text{//p\text{//}$ is tantamount to creating an archiphoneme. It is meant to cover a range of neutralized word-final sounds, $[p^h \sim \acute{b} \sim \acute{b}^r \sim \acute{p}^h]$, while indicate loss of laryngealization. In a sense, final $\text{//p\text{//}} \sim \text{//p^h\text{//}} \sim \text{//\acute{b}\text{//}} \sim \text{//\acute{b}^r\text{//}} \sim \text{//\acute{p}\text{//}}$ in final word-position. All four forms are found, though they are surely not phonemic. How best to represent them is under consideration. $\text{//p^h\text{//}}$ in final position indicates $[p^h \sim \acute{b}]$. It is common and is likely a variety of $\text{//p\text{//}}$,

- (d) (EH) $\rho\upsilon\mu\varsigma\ \kappa\alpha\iota\ \acute{\iota}\mu\sigma\kappa\alpha\iota\mu\omicron\ \gamma\upsilon$ //b-m-sg^mim+sg^mim-u- γ u// (it) went flickering up
 MYTH-IND-go.flicker+INT-INTR-INCH nb85:61.13
- (e) $a'sk\acute{\alpha}'\theta$ /a²-ská²l^h/ //an-skalt// (special) blanket 28.7/nb85:60.9
- (f)¹¹ (JH<EH) $\beta\omicron\tau\iota\sigma\kappa\acute{\omega}\iota\theta\omega\alpha\iota$ //b-dii-sk^milt-wa-ni// when he untied
 MYTH-TEMP-untie-CAUS-OBJ.3.NITER nb46:174.21

The following examples provide root- and word-final evidence for **s** and **ś**. Those in (14) show final **s**.

(14) Root- and word-final **s**

- (a) $\tau\iota\tau\upsilon\ \eta\acute{\alpha}'\gamma\acute{\alpha}\varsigma$ //ḍi—ḍu-han— γ as// so (wherever their bodies)
 HEDGE—LOC-DIR.LOC—ache hurt in some place 30.9/nb46:78.21
- (b) $\tau\acute{\iota}\varsigma$ /ḍi(i)s/ //ḍis// soon, shortly 34.10/nb34:125.3
- (c) $\tau\iota\upsilon\mu\omicron\ \gamma\upsilon\varsigma$ //ḍn-ni-muyuus// their hats
 POSS.3-PL.3-hat 29.9, .11, .12/nb47:106.5, .11, .15
- (d) $\tau\upsilon\beta\acute{\gamma}\acute{\alpha}\upsilon\varsigma$ //ḍu- β yaws// for the winter,
 OBL-winter in the wintertime 19.19/nb34:127.20
- (e) $\kappa\upsilon\varsigma\ \acute{\alpha}\acute{\gamma}\omega\acute{\alpha}\varsigma\acute{\gamma}\omega\alpha\varsigma$ //gus—an-k^wask^was// “the crane”
 DEM.DEF.PROX—DET-great.blue.heron 118.14–5/nb36:99.15

The examples in (15) show little glottal stops before the fricative **s**, -**ś**. These are preglottalized sibilants, which only occur when at once syllable-final and word-final.

which includes glottalized variations. //b̥// (better, /b̥/) is consistently [b̥] in final position. It can presumably be dispensed with by labeling final segments “suffixed” where (part of) a suffix. //b̥// I am suggesting in this thesis is an incipient phoneme, [p̥] (or [ʔ_{0c}]). Beyond this, there is reason to believe that all final **p̥** ~ **b̥** are underlyingly **b̥**, left over from a time when **p̥** ~ **b̥** was sub-phonemic.
¹¹ In “correcting” the texts of Eustace Howard, Jacobs often made phonetic changes as suggested by John Hudson. On the other hand, on such occasions Hudson would often give a word, apparently borrowing Howard’s MYTHOLOGICAL tense with distant past (=AORIST) in initial **b̥**-, instead of which he normally used **g̥**-, the aorist. This was first pointed out by Berman (undated :24).

(15) Word-final ʔs or ʂ ¹²(a)¹³ //tʰiʂ// sapsucker(i.A) ʔi^{c} -*now* τῖν *and* κόνι *his* ʔi^{s} //now—*dn*-kuni—tʰiʂ//
—sapsucker 121:2/nb35:175.1 and—his—brother—sapsucker(i.B) ʔi^{c} τ_{COM}μι_{hi}τῖ_c 99.7/nb34:149.5 //tʰ-m-mi-hi-*di*ʂ// (i.C) ʔmi^{c} nb76:62.16
I am Sapsucker. PRES.1/2-IND-NCONJ-VER—sapsucker //tʰmiʂ//
sapsucker(ii) an^{c} (EH, plus 4 other f.t.) //an-tʰiʂ// sapsucker nb47:41.9(b) amps^{s} vagina *and* *nav* amps^{s} //now—an-pʰsiʂ//
and—DET—vagina 133.7/nb34:33.1(c)¹⁴ (i) *kom* ho^{c} //g-m-huyʂ// (he) smelled (s.t.)
AOR-IND-smell 89.8/nb34:19.1(ii.A) (EH) *kin* tho^{s} //g-m-d-huyʂ// smelled (TRANS)
AOR-IND-DIR.th-smell nb47:171.5(ii.B) (EH) *Pom* hu^{c} //b-m-huyʂ// (he) smelled
MYTH-IND-smell nb85:99.3

In (15a), all three forms of the root from JH end in ʔs , as does EH's regular //tʰiʂ//. (15c) likewise occurs in both EH and JH, the only verb among the three exemplar roots. All three of these roots end in ʔs , or //ʂ//. Non-final forms lack the glottalization, as in examples (16.i–iii) of //huyʂ//, which compare with (15c.i, 15c.iiB):

(16) Stem-medial *huyʂ*(i) *kom* ho^{c} ni //g-m-huyʂ-ni// he smelled (s.t.) ...
AOR-IND-smell-OBJ.3.NITER 89.8/nb34:19.5(ii) (EH) *niku* cp *hu* c ni //ni-gus-huyʂ-ni// that (was) what he was smelling
EMPH/COMPL—that—smell-OBJ.3.NITER nb85:99.15(iii) *kin* ho^{c} *wi* //g-m-ni-huyʂ-wi// (they) smelled...indeed
AOR-IND-PL.3-smell-EMPH 140.6/nb36:11.11¹² All of these ʔ could be represented by RF (i.e., ʔF), since they follow a short vowel.¹³ A JH variation, still with final ʂ , is ʔmi^{c} or //tʰmis// (nb76) instead of //tʰis// 'sapsucker'. While the root initial of JH formtypes alternate ʔ -3, ʔ -2, ʔ -1, EH's are consistent: ʔ -5.¹⁴ (1) Jacobs seems to have used a small circle for posterior sounds, instead of a dot. (2) While the preglottalized fricative occurs *only finally* and not before a suffix (like -ni 'it'), in that environment it occurs 3 for 3.

/-huys-ni/ appears without glottalization when followed by any suffix—here the exterior suffix -ni or the adverbial clitic -wi. As we will see in Chapter 5, this is the same behavior as that of final preglottalized occlusives. Two out of three of these roots, also recorded by Jacobs from EH, are from both speakers. In each case, the numerous actual recordings of the lexemes (many more than the number of formtypes) show the forms consistently with (pre)glottalized final -ʔs or -ʂ where word-final, but its absence in nine formtypes before the suffixes -ni, -wi, and -oɟ in the JH material, or before seven formtypes before the suffixes, -ni, -iɟ, and -iɟi in the EH material.

These occurrences of preglottalization in (15) are not allophonic variations of final s following i, nor do they generally coöccur. To emphasize this, I illustrate with further examples of this segmental pair in (17).

(17) Word-final -is

(a) τίς (&c) //d̥is// soon, shortly, in a little while e.g., 18.10/nb34:125.3

(Note: NEAR MINIMAL PAIR with -//tiʂ// sapsucker (from (15a) above))

(b) αμίς //an-miis// cooked camas
(τίς kamsú 'αμίς soon the camas will be good ibid., 18, 19)

(c) kum í tɛ ɪ s //g-m-mitsʰis// "ran off" 97.15/nb34:139.5
AOR-IND-RUN

Final ʔs always occurs on the three morphemes listed in (15), while it never occurs on the four listed in (17)—only s. Any attempt to derive ʔs must be able to explain this fact.

The following examples in (18) show stem-medial s.

(18) Stem-medial s

(a-b) Κόνfan kum tɛ́ s i s o ' y u : / wá' n i k e : κ i τ á Q λ á s i s u
(it) just was sizzling; it didn't at all smell. 108.21/nb35:37.15-7

(a) (i)¹⁵ κ i τ á Q λ á s i s u //g-ɟa-glays+is-u// [didn't] smell
AOR-CONTR-smell+PROG-INTR 108.21/nb35:37.17

(ii) m a ' t s u ŋ k̄ λ á s i s u //mah tsʰ-m-klays+is-u// "Oh—you stink!"
you PRES.1/2-IND-smell+INT-INTR nb47:80.19

¹⁵ In the notebook, Q overwrites a previous ʔ. This is one of two rare formtypes for a root //glays//. If correct, this would suggest two allomorphs for JH, //glays// ~ //k̄lays// 'smell, stink (INTR)'.

- (b) *κυματίζεισ'yu* //g-m-tʰis+is-u-yu// sizzled
AOR-IND-sizzle+PROG-INTR-INCH 108.21/nb35:37.15
- (c)¹⁶ *τὰτινὶβὰ'σα'λατ* //ḁa-ḁii-ni-ḁaasal-a-ḁ//
USIT-TEMP-PL.3-smoke-STV-DUR 35:6-7/nb47:32.17
- (d)¹⁷ *ἄηκᾶσα* //an-kʰaskʰa// bad (quality of s.t., s.o.)
- (e) *ἰλιστῖνα* //ilis-ḁ-na// move around, about
move.about-DUR-ARG.3.ITER 78.9/nb36:125.11

Notice that the vowel /u/ occurs very rarely before the coronal //s//; one exception is the common lexeme *gus* 'that, those, (the thing) there (PRON)' (< *gù* '(over) there (ADVL)' + s).

A possible preglottalized *ḁ* occurs medially in one root:

- (19) (EH) Stem-medial /ʔs/ or /ʔs/: //buʔs//
- (a) (i) *καμιτ'ρῶς τὰμπι·μα*, /gɑ-m-mi-tʰ-ḁʔʔs ḁam-ḁiima/ Prob. [ḁʔʔs] (or [ḁʔʔs])
if my life were longer FUT-IND-NCONJ-DIR.th-long my-life nb79:47.15
- (ii) *ὕμῶς* /ḁ-m-ḁʔʔs/ be long(er)
PRES.3-IND-long(er) nb88
- (b) (i) *τεὺμῶς·να* /tʰ-m-ḁʔʔs-na/ I have been making it long
PRES1/2-IND-long-ARG.3.DUR nb85:51.5
- (ii) *τὺμῶς·σὺν ἄμῃ·ν'* /ḁu-m-ḁʔʔs-ni əm-pyáñ/ "a long long day of it"
LOC-IND-long-ARG.3 DET-day nb82:91.5

The set in (19) is anomalous in that it behaves quite differently than what we have just observed with regard to the examples in (15–6), whereby preglottalization on the s of //huyḁ// disappeared following a suffix, e.g. -ni. Here the glottalization on //buʔs// is retained, whether there is a suffix or not. Two different systems are apparently involved. The first has reconstituted reflexes in a series of preglottalized word-final obstruents, including *ḁ* and *ḁ*, as illustrated above for *ḁ* in (15). The second pattern is seen in glottalization that tends to appear in the stem medially, or when another speaker, such as EH, places the glottalization further out toward the nucleus of the syllable, so that *VʔV* results, instead of the expected *Vʔ* as from JH. In (19a.i), where JH consistently has syllables of the type

¹⁶ The glottal stop before l <'ḁ> in //ḁaasal// is unexplainable (except perhaps as a floating feature arising between the initial *ḁ* and a (possibly) glottalized final /ʔʰ ~ tʰ ~ ḁ/).

¹⁷ There is no class of adjectives in CK. //kʰaskʰa// may be a noun or a verb, with the appropriate prefixes, depending upon whether a quality or a behavior is stressed.

$C_1V?C_2$, EH has syllables of a varying pattern, $C_1V?VC_2 \sim C_1V?C_2$. This suggests that, in certain contexts at least, $//\text{ʔ}//$ behaves as a resonant, providing an onglide to the main coda segment (i.e., a ʔs cluster).¹⁸

In this subsection we have examined occurrences of the sibilant s in root-initial, root-final, and stem-medial environments. The vowel u generally does not precede s . A preglottalized sibilant ʔs (or $//\text{ʔs}//$) is found in root-final positions where also word-final. Depending upon whether it appears also stem-medially (or whether the nucleus-glottal stop has a $V^?V$ variation in EH), it should be written as ʔ to show its distinctness. If it only occurs finally before s or ʔ , I assign it tentative status as the initial laryngeal feature of a word-final glottalized consonant. Otherwise, it should be accounted for as one of the other forms of glottalization that we have already seen.

4.2.3 $\text{ʔ}, \text{ʔ}$

The following examples in (20) illustrate root-initial ʔ in CK:

(20) Root-initial ʔ

- | | | | | | |
|-----|---------------------------------|------------|--|--------------------------------|-------------------------|
| (a) | <i>kumʔáʔ</i> | /gum-ʔáʔ/ | //g-m-ʔap// | put on, wore | |
| | | | AOR-IND-put.on | | 119.14/nb35:167.9 |
| (b) | <i>ʔani ʔúʔ</i> | /ʔani-ʔúʔ/ | //ʔa-m-ni-ʔuk// | they would dig holes | |
| | | | USIT-IND-PL.3-dig.hole | | 32.4,5/nb35:107.16, .18 |
| (c) | <i>kanima ʔú kwa ʔini ʔóʔna</i> | | //ga-m-ni-ma-ʔuk ^{hw} -a ʔn-ni-huʔna// | they will come to life (again) | 125.16/nb35:199.13 |
| | | | FUT-IND-PL.3-DIR.h-wake.up-STV PSSV.3-PL.3-heart | | |

The voiceless lateral ʔ is common, though less so than the other true fricatives (φ, s). It does not, for example, generally occur root-initially before $//i//$ in JH or EH.¹⁹

The examples in (21) and (22) show evidence for word-final ʔ and preglottalized ʔ , respectively.

¹⁸ A CK (root) syllable may be closed maximally by an RC coda. See §3.4.2 on root shapes.

¹⁹ There are two exceptions in JH. One is the name *ʔáʔ*, the *Molale* Steven Savage (81.3/nb36:189.8). The second is an aberrant formtype in JH with ʔ : *ʔan ʔíʔ* '(he) was laughing' (114.13/nb35:157.21); since the verb root everywhere else is *ʔíʔ* in both JH and EH (and even J1945 has *ʔli'ʔ*), the true form is surely this latter, i.e., *ʔan ʔíʔ* /ʔan-ʔíʔ/.

(21)²⁰ Root- and word-final ʔ

- | | | | | |
|-----|-------------------|---|------------------------|------------------------|
| (a) | αντσά·ʔ, αντσάʔ | //an-t̥sa(a)ʔ// | mole | nb36:122.5, 33:52.10 |
| (c) | Τάντqwaʔ | //ḡa-m-ḡ-kʰaʔ//
USIT-IND-DIR.th-burn | it would burn down | 36.9/nb36:179.21 |
| (d) | αγκωίʔ | //an-gʷiʔ// | mussel shell(s) | 32.16/nb35:149.11 |
| (e) | κύctini káinu·ʔ | //gus—ḡn-ni-kaynu(u)ʔ// | their tobacco [marked] | 35.1, .3/nb47:32.3, .7 |

(22) Root- and (generally) word-final ʔ

- | | | | | | |
|-------------------|--|----------------|---------------------------------------|---------------------------------------|---------------------------|
| (a) (i) | αντwaʔ (2) | /an-twaʔ/ | //an-twaʔ// | red fir tree | 39.7/nb76:124.11 |
| (ii) (EH) | αντwaʔ (1), twaʔ (2), αντwaʔ (1/4) | | //an-twaʔ// (~//twaʔ//) | red fir | nb47:161, 169, 171; 83:13 |
| (b) ²¹ | τσηkwaʔ (1) | /ḡun-kʰaʔ/ | //ḡn-kʰaʔ// | her urine | 48.7/nb47:12.11 |
| | (cf. the NEAR MINIMAL PAIR with -qwaʔ //kʰaʔ// 'burn', in (21b) above) | | | | |
| (c) (i) | κωmliʔ (1) | /gum-liʔ/ | //g-m-liʔ//
AOR-IND-laugh | (he) laughed | 133.10/nb34:33.9 |
| (ii) (EH) | κωmliʔ (-liʔ (4/4 finally)) | | //g-m-liʔ// | (he) laughed | nb46:43.11 |
| (d) (i) | τάνu weʔ (2) | /ḡani-wiʔ/ | //ḡa-m-ni-wiʔ//
USIT-IND-PL.3-skin | they would skin it | 62.5/nb36:143.19 |
| (ii) (EH) | βtawiʔimti (1) | /ḡ-di-wiʔ—mḡi/ | -//wiʔ// | when (s.o.) indeed butchered, skinned | nb90 |
| | MYTH-TEMP-skin—ADVL.EMPH | | | | |

In these data, we see examples of ʔ or ʔ in root-final position, generally word-final as well. The fact that similar-looking morphemes—(21a/22a), (21b/22b), (21c/22d)—differ in the presence of preglottalization is a strong argument for importance of such preglottalized obstruents as single segments root-finally. (The argumentation behind this will be developed further in the next chapter.) Data in EH at least partially confirm three of the four above, (22b) not occurring in his corpus. Jacobs recorded -twaʔ (22a.ii) in the EH materials only one out of four times; a throw-away except for the evidence from JH (22a.i). On the other hand, all four formtypes in (22c.ii) show preglottalized ʔ in the EH material. While individual forms often show peculiarities, the overall pattern strongly

²⁰ Length is continually a problem in many examples. (21a, c, d), for example, all have both long and short forms in J.'s recording. In general, where such variations are about the same in number, I tend to take the short form; otherwise, the later form.

²¹ In this formtype, the only one from Jacobs for this lexeme, J. inserted parentheses around ʔ.

suggests distinct forms in [ʔ], which I interpret as //ʔ//, despite its presence only in word-final position. On the other hand, (24d) shows an alternation $V^?V \sim V^?V$ in EH, which suggests a ʔ cluster in the example, as we saw a parallel example with ʔs.

The examples in (23) illustrate the potential for stem-medial ʔ.

(23) Stem-medial ʔ

- | | | | |
|-------------------|------------------------|--|--------------------------------|
| (a) | <i>um pa'ʔam</i> | //ʔ-m-pʰaʔam// | (he) is dead-drunk |
| | | PRES.3-IND-dead.drunk | nb46:46.top |
| (b) | <i>ʔani pi'ʔpat</i> | //ʔa-m-ni-pʰiit(+pʰ-a-ʔ// | they would peel [the ash bark] |
| | | USIT-IND-PL.3-peel(+AUG)-STV-DUR | 26.2/nb47:4.13 |
| (c) | <i>ʔani tce'ʔtɕini</i> | //ʔa-m-ni-tʰiit(+tʰ-i-ni// | they would scrape it |
| | | USIT-IND-PL.3-scrape/plane(+AUG)-STV.TRANS-OBJ.3 | 30.16/nb46:60.7 |
| (d) ²² | <i>ʔani hiʔʔwini</i> | /ʔani-hiʔʔwi-nii/ //ʔa-ni-hiʔ-wa-ni// | they mixed (s.t.) |
| | | USIT-PL.3-mix-CAUS-OBJ.3 | 20.7/nb34:128.23 |
| (e) | <i>ʔu kwi'ʔwa</i> | /ʔu-kʰiʔwa/ //ʔu-kʰiʔwa// | at the cemetery |
| | | LOC-cemetery | 75.9, .10/nb34:109.23, 111.3 |

(23c–d) show ʔ root-final before the common singular-action object suffix *-ni*. I assume in (23d, e) that the glottalization is on the suffix *-wa*.

Let us briefly review the types of glottalization that we have seen in this section. Observe the following set of roots in (24) (in major allophones), where the (i) examples show the segments in question stem-finally, and those in (ii) show them stem-medially.

²² *-wa* or *-wa* is a suffix subject to vowel attraction. Cf. [gʌŋ-ʔaiʔwawani] //gʌ-m-kay-wa-wa-ni// FUT-IND-be.crooked-CAUS-OBJ.3 '(s.o.) will have twisted (s.t.); [gʌŋ-ʔaiʔwa] //gʌ-m-kay-wa-u// FUT-IND-be.crooked-CAUS-INTR 'it will get crooked' and [ʔi-ʔaiʔwawɔ] //ʔi-kay-wa-u// USIT.REL-be.crooked-CAUS-INTR 'it will have been twisted' (75.17–76.4/nb36:83).

(24) Comparison of glottal stop expression in CK and Twalatin (NK)

	JH	EH	CK	Twalatin (LK)	Gloss
(a) (i)	—	-bɔʔɔs ~ bɔʔs	//bʊʔs//	—	be long
(ii)	-bɔʔsna	-bɔʔsna	//bʊʔs-na//	—	make long
(b) (i)	-wɛʔ	-wɪʔi	//wiʔ//	—	skin, butcher
(ii)	—	(-wɪʔi—mɔi)		[-wúʃʃuf]	(id.)
(c) (i)	[(-)hóʔʔʰ]	(-)húʔʔʰ (3), -húʔʔʰ (1)	//hu·ʔʔʰ, huʔʔʰ//	hám-hus	panther
(ii) ²³	huʔʔʰsis	(-)huʔʔʰsis	//hu·ʔʔʰ+is, huʔʔʰ+is//	—	Panther
(d) (i)	[-hóiʔʃ]	-húiʔʃ	//huyʃ//	-húis	smell
(ii)	[-hóisɔ]	-húisatʰ	//huyʃ-a-ɔ//	-húisiʰ	discharge at, fart
(e)	-tʰwáʔ	-tʰwá(a)ʔ (3), -tʰwáʔ (1)	//tʰwaʔ//	(-)hán-tʰwaʔ	red fir
(f) ²⁴	-ʔnókʰ, -ʔnógʌʔ	-ʔnókʰ, -ʔnógʌʔʰ	//nóg(-a-ɔ)//	-ʔnág((g)-itʰ) (ʔ18/64)	say, speak

This set of examples illustrates some of the variation in glottalization as reflected in the CK dialects of JH and EH, their reconstituted language, and LK's Twalatin. In (24a) (and (b)), we see the consistency of the glottal stop, whether absolutely word-final or word-medial. In (24c), we see a final glottalization occurring preglottalized but medially simultaneously glottalized when a reduplicated (Type 3) suffix is added, at least in JH. It is possible that this kind of occurrence is unique to reduplicated suffixation. In (24d) and (e), we see the typical forms of final obstruent preglottalization, which is found only in CK and only word-finally. In (24d), we see that initial (simultaneous) occlusive glottalization generally has a reflex in Twalatin. In (24f), we see a glottalized nasal having a reflex in Twalatin. Thus there are several different patterns occurring at the same time in CK. For a general discussion of preglottalized and glottalized segments, see Chapter 5.

²³ The diminutive suffix is an unusual variation of Type 3 reduplication, progressive. *hu·ʔʔʰ*, //hu·ʔʔʰ-is//, has an unusual stem-medial simultaneous glottalization, which is found preglottalized in the non-dimutivized form, //hu·ʔʔʰ//, as in *ɔnhoʔʔʰ* /ɔn-hoʔʔʰ/ (103.4/nb35:3.1).

²⁴ While evidence of root-initial glottalization in Twal. occurs (through Jacobs' apostrophe or Gatschet's hypens) on only 28% of the expected formtypes, I count it anyway. Not only does Jacobs mention the extreme difficulty of perceiving faint Tw. glottalization, but Kenoyer had been the sole speaker of NK since "the period of the World War (1918)" (J45:155) by 1936 when J. interviewed him and was surely rusty in this last year before his death (J45:179).

In this section we have discussed the occurrences in Santiam of the three plain fricatives, ϕ , s , and ʃ , as well as the glottalized forms ʃ^h [ʃ^h] and ʃ^l [ʃ^l]. They have been observed root-initially, -finally, and stem-medially. The preglottalized fricatives are found only when at once root- and word-finally. They contrast with clusters, ʃs and ʃʃ , which are found finally or stem-medially. The two plain fricatives, ϕ and s , have the widest distribution. This may suggest that ʃ is, relatively speaking, a more recently adopted phoneme. It is likely that the development of preglottalized fricatives in final position among the coronals is also a recent development, in line with the adoption of preglottalized occlusives in final position. This development is not found in NK. A discussion of the occlusive members of the obstruents, together with a discussion on the interpretation of the different glottalized segments in CK, will be given in Chapter 5.

4.3 The case of /x/

The last fricative that I discuss in this chapter is the rare segment, x . The segment is somewhat doubtful, particularly in regard of the fact that in two major dialects attested for CK, JH and EH, there is a lack of common vocabulary which share this segment. We will first look at examples in JH, then in EH, and then comparatively.

Jacobs usually writes this as a back dorsal, ɣ , though the two forms co-occur and are presumably allophonic to one another. Let us look at examples of roots which carry this segment in the JH materials. There are only three which have x or ɣ initially, as in (25):

(25) Initial x in JH

- | | | | |
|---------|----------------------|---|---|
| (a) | uxa'ya | /u-xay+ay/
PRES.3.ATTRIB.3-drunk-PROG | "he is half-shot, drunk"
nb46:46.top |
| (b) | tanixayiyu | /da-m-ni-xay-i-yuu/
USIT-IND-PL.3-dizzy-INCH | "they got dizzy"
35.6/nb47:32.15 |
| (c) (i) | xaxaxaxx | [noise of a snake going along on the ground'] | 112.14/nb35:57.5 |
| (ii) | pox pox pox | /pox pox pox/ [sound of sapsucker's chopping] | 99.6/nb34:149.1 |

Notice that the first two (25a-b) show the same root morpheme, -xay ($[\text{xay}]$), 'become dizzy' (+PROG, 'drunk'). This is likely a root common to several languages; Aoki (1994:919) lists xáyp as a Nez Perce root meaning "to show off, act up, act silly". In (25c) we see the segment used onomatopoeically, initially and repetitively (c.i) and finally (c.ii), to

express distinct tokens for different animals—a typical kind of usage for a peripheral phoneme.²⁵

In root-final position, we note the following pair of roots in **ts^hix-d** and **ts^hiix-d**, which probably involve fossilized durative morphs (DUR₁). JH appears to turn velar aspirates before **d** into fricatives when following the front vowel //i// (and also //u//).

(26) Final **x** before **d** (in JH)

	JH		EH		CK
(a) (i)	tcixTat nb86:18.11 /ts ^h ix-d-a-d/ color-DUR ₁ -STV-DUR ₂	(ii)	tcik ^h Tat ts ^h ik ^h -d-a-d color-DUR ₁ -STV-DUR ₂		nb86:19.11 //ts ^h ik ^h -d-a-d// be colored green
(b) (i)	tcixTata ^h ana nb85:126.4 /ts ^h ix-d-a-ts ^h aana/ color-DUR-STV-REFL	(ii)	tcik ^h Tata ^h ana /ts ^h ik ^h -d-a-ts ^h aana/ color-DUR-STV-REFL		nb85:127.3 //ts ^h ik ^h -d-a-ts ^h aana// paint oneself green
(c) (i)	/i-x-d/		/i-k ^h -d/		//i-k ^h -d//

The JH words are from the left-hand pages of notebooks (84–86) filled with EH's dictations, which Jacobs went over with JH. Notice that Howard has **k^h** (or **k^h**) before the **d**, while Hudson prefers **x**. This is not unusual; the language has a clear parallel between aspirated occlusives and their fricative counterparts. The offglide ^h containing fricativized homorganic material from the supralaryngeal portion of the segment, like ^h following a back **k**, historically increases its load so that [k^h ~ k^hx (~ x)]. The affrication in JH following a palatalizing //i// before a coronal stop is strong; such affrication can be heard on the Swadesh-Melton tape in initial position. Note further the likely spelling of two more lexemes of uncertain origin, with the root 'dark' (27a) and 'jab' (27b), with **x** following the vowels //i// and //u//, respectively.

²⁵ A peripheral phoneme is one that typically carries a sound of a neighboring language, giving thereby a sign of something foreign as well as a particular semantic coloring in the use of the sound itself prior to its being taken into the language as a regular phoneme. An example is the [ʃ] used initially in English consonant clusters. I use the term following Munske 1984:233.

Another example, here medially, of a clear Sahaptian loan in JH is /^hʃo[χ]u^hna/ 'a cold' (ən'c'χu'na 37.10/nb36:177.13), probably //uxu-^hna// 'cough-INC'; cf. NP ^hoxo^hoxa 'a cold, cough (ABS)', ^hoxo^hoxa-tsa 'I cough' (<American reflex for coughing?), a reduplication also found in EH.

(27) Two further root-final **x** in JH

- (a) (JH/EH?) $\text{um}^{\text{t}}\text{si}^{\text{t}}\text{x}^{\text{t}}\text{u}$ / um-tsiixd-u / // $\emptyset\text{-m-tsiik}^{\text{h}}\text{-d-u}$ // it's awfully dark
PRES.3-IND-dark-DUR-INTR nb84:28.6
- (b) (JH) $\text{tom}^{\text{t}}\text{is}^{\text{t}}\text{ox}^{\text{t}}\text{tin}^{\text{t}}$ / $\text{dumi-tisoxdini}^{\text{t}}$ / // $\text{dumi-tisuk}^{\text{h}}\text{-d-ni}^{\text{t}(-?)}$ // to jab him ...
INF-stab.at-DUR-OBJ(-PFT) 22.12/nb46:50.19

This process has occurred more widely in Twalatin which has a clearer **x** than any CK dialect, as we see in (28).

(28)²⁶ Selected **x** in Twalatin vs. CK (roots only in Jacobs' script)

	JH		EH		Twalatin (LK)	Gloss
(a) (i)	$\text{t}^{\text{a}}\text{q}$ // $\text{t}^{\text{a}}\text{k}^{\text{h}}$ //		$\text{t}^{\text{a}}\text{k}$ // $\text{t}^{\text{a}}(\text{h})\text{k}^{\text{h}}$ //	—		cry
(ii)	$\text{t}^{\text{a}}\text{q}^{\text{t}}\text{t}$ // $\text{t}^{\text{a}}\text{k}^{\text{h}}\text{-d}$ //		$\text{t}^{\text{a}}\text{x}^{\text{t}}\text{t}$ // $\text{t}^{\text{a}}(\text{h})\text{k}^{\text{h}}\text{-d}$ //		$\text{t}^{\text{a}}\text{x}^{\text{t}}\text{d}^{\text{t}}$	cry-DUR
(b) (i)	—		—		$\text{t}^{\text{a}}\text{x}^{\text{t}}$	tie
(ii)	$\text{t}^{\text{a}}\text{q}^{\text{t}}\text{at}$ // $\text{tak}^{\text{h}}\text{-d}$ //		$\text{t}^{\text{a}}\text{k}^{\text{h}}\text{t}^{\text{a}}\text{cyat}$ // $\text{tak}^{\text{h}}\text{-isya-d}$ //		$\text{t}^{\text{a}}\text{x}^{\text{t}}\text{at}$	tie-DUR
(c)	$\text{ts}^{\text{a}}\text{k}^{\text{h}}\text{p}^{\text{h}}\text{lu}$ // $\text{ts}^{\text{a}}\text{ak}^{\text{h}}\text{aplu}^{\text{h}}$ //		$\text{ts}^{\text{a}}\text{x}^{\text{t}}\text{p}^{\text{h}}\text{lu}$ // $\text{ts}^{\text{a}}\text{axaplu}^{\text{h}}$ //		—	strawberry

Although the situation is still more complicated than these data show, it should be apparent that there is no unanimity with regard to when velar aspirates affricate to the point of being perceived as velar fricatives. EH is somewhat more tied to the //**x**// than JH. Note, for example, the intervocalic **x** of 'strawberry' in (28c). There are seven roots in EH with initial **x**; of these, only one can be at all related to JH: xoiwa 'fool, confuse'—cf. JH $\text{x}^{\text{a}}\text{t}$ 'dizzy', and here the vowel is different. Only one of them is written with a back **x**. One of them is written with a fronting mark, as in (29), with a note by Jacobs that "The **x**'s above are to be corrected, and made **x**'".

- (29) $\text{P}^{\text{h}}\text{int}^{\text{h}}\text{x}^{\text{h}}\text{ilil}^{\text{h}}\text{wana}$. $\sqrt{[\text{c}^{\text{h}}\text{ilil}]}$ // xil-il // (?) nb82:115.4
"he drew it slowly out of his mouth"

It seems that, for EH at least, each lexical item must mark any **k**^h that becomes a fricative before **d** (or otherwise) separately. This is the classic flux that one finds during a linguistic change.

²⁶ The construction of this set is based on the most commonly occurring forms from each speaker.

x was clearly at least an incipient phoneme in the dialect of EH. Even though it fits with the pattern of the language, I do not find sufficient evidence to state that it was in the dialect of JH. At any rate, the incipient phonemicization appears to have been progressing along separate lines in the two CK dialects. For these reasons, I do not consider //x// to have been a real phoneme in the language of JH at the time of Contact.

4.4 Summary

In this section the fricatives **ɸ**, **s**, and **ʃ** have been noted in root-initial, stem-final, and stem-medial environments. They have been compared with the preglottalized coronal segments /ʔs/ or //s̥// and /ʔʃ/ or //ʃ̥// which only occur word-finally at the end of a root. We have noted two examples, however, where the final glottalization is maintained stem medially, i.e., before a suffix. This appears to be a separate phenomenon, requiring the positing of a glottal stop for clusters such as ʔF, which may be distinct from F̥. The patterning of the glottal stop as laryngeal onglide in such cases is that of a resonant. Likewise, the occurrence word-finally of /ʔɸ/ is difficult to explain another way. /ʔs/ and /ʔʃ/ might be similarly explained as ʔF. However, I do not think that this is the way the language patterns. Nor would it account for the vanishing of final glottalization upon the addition of a suffix. An extended discussion of preglottalized final obstruents together with the types of glottalization in CK is in Chapter 5.

The segment **x**, written generally with **x̣** in JH or with **x** or even **x̣** in EH, does not appear to be a real phoneme in the language of JH. Hudson wrote **ḳ** as **x̣** before **ɔ̄** following //i// (and //u//), but **ḳ** following **a**. Two initial uses of **x̣** by him are likely borrowings of a common areal term for 'foolish' or 'dizzy'. //x// is likely to have been incipient in CK at Contact. However, that its spread among the dialects was different is seen by the distinct behavior of the segment in the dialects of JH and EH.

Chapter Five

The occlusives of CK

5.1 Chapter overview

This chapter describes the way the occlusives¹ pattern in CK. Because they pattern in different ways depending upon their position in a root or word, they will be described in each distinct position, beginning root-initially. Only in root-initial position are all three laryngeal types of occlusives, lenis plain, glottalized, and aspirate, clearly distinct at the greatest number of points of articulation. They are as in (1).

(1) The occlusives, root-initially.

Glottalized:	p̥	t̥	ʈ	k̥	k̥ʷ
Plain:	b	d	tʰ	g	gʷ
Aspirate:	pʰ	tʰ		kʰ	kʰʷ

The affricate is often unaspirated stem-medially.²

Word-finally only two laryngeal series are regularly distinguished, as the plain and aspirate series generally merge in final position, becoming aspirate but laryngeally neutralized. EH shows this in general as in (2). (Labiodorsals generally drop their labial feature, becoming simple dorsals word-finally.)

(2) The occlusives, root- (and word-)finally (EH)

Glottalized:	p̥ʰ	t̥ʰ	ʈʰ	k̥ʰ
Aspirate/neutralized:	pʰ	tʰ	tʰ	kʰ

In a few lexical items, however, Jacobs' recording of JH distinguishes part of a third set of unaspirated plain segments. These include several items ending in labial /b/ and a couple in coronal /d/ stops (perhaps all from segments suffixed as part of reanalyzed roots), as in (3).

¹ The word 'occlusive' is used in order to refer to a set of segments, including stops and affricates, which may be distinct from 'stops' which have no extra continuative gesture.

² Jacobs writes Twalatin with three different affricates, dj/dz- (probably [dʒ/dʒ] except between sonants and possibly initially), t̥ʰ/t̥ʰ-, t̥ʰ/t̥ʰ-. Correspondences with CK reflexes, however, are very irregular.

- (3) The occlusives, root- and word-finally (JH)

$\text{p}^{(h)}$	$\text{t}^{(h)}$	ts^h	$\text{k}^{(h)}$
b	(d)	t^h	$\text{k}^{(h)}$
$\text{p}^{(h)}$	$\text{t}^{(h)}$		

Final glottalization occurs as glottal constriction before the supralaryngeal portion of the segment. Word-final aspirated release of occlusives is general in the case of EH, but in JH it is freely varying with a lack of aspiration (i.e., plain).

Stem-medially before a vowel, the following series are regularly found:

- (4) The occlusives, stem-medially before a vowel

Plain:	b	d	(dz)	g	g^w
Aspirate:	p^h	t^h	ts^h	k^h	k^{hw}

Before resonants, the following sets of occlusives occur:

- (5) Occlusives that occur before resonants (except n), generally

Glottalized:	p^{h}	t^{h}	ts^{h}	k^{h}	k^{hw}
Aspirate:	p^h	t^h	ts^h	k^h	k^{hw}

These have been discussed in Chapter 3 (§3.4.3) as onsets to the root.

Before obstruents, only one consistently aspirated series generally occurs.

- (6) The occlusives, before other obstruents, generally

Aspirate:	p^h	t^h	k^h
-----------	--------------	--------------	--------------

(The affricate ts^h is found only before the resonants **w, y, l, m**.) In the actual texts, however, JH allows extrasyllabic b , d , and occasionally g to precede other, especially plain, occlusives in certain lexical items. The following must therefore be distinguished:

- (7) The occlusives, before other occlusives, JH

b	d		$(\text{g}^{(h)})$
p^h	t^h	ts^h	k^h

Such a distribution is common in reduplicated onsets and in certain reanalyzed roots and stems of JH.

A kind of *voicing*, often partial, optionally occurs where a plain occlusive follows a nasal and precedes a vowel. This might occur, for example, initially in nominal roots following the nasal final of the determiner.³

While simultaneously glottalized segments are extremely rare except stem-initially (or through reduplication), such segments are occasionally found elsewhere as products of the coalescence of a plain segment and a following gesture of glottal stricturing. There are two possibilities: (1) a prefix-final plain occlusive coalesces with a following initial epenthetic glottal stop across the intervening verbal-prefix boundary, or (2) a stem-medial plain occlusive coalesces with the following glottal gesture or stricture of a preglottalized resonant (or possibly with a following independent glottal stop). Thus the following occlusive simultaneously glottalized segments are found:

(10) Root-final or -medial occlusives with a coalescing simultaneous glottal

Glottalized: p̣ ṭ tṣ ḳ

(The underlined segments in (10) indicate the possibility of coalescence across the verbal prefix boundary.)

³ The following sets in (8) and (9) are largely hypothetical, based on listening to the Swadesh-Melton tape. Only a few plain forms, viz. **b**, **d**, in the verbal prefix and stem suffixes have actually been heard.

(8) The occlusives, optionally, following a nasal and before a vowel (root-initially)

Glottalized:	<u>p̣</u>	<u>ṭ</u>	<u>tṣ</u>	<u>ḳ</u>	<u>ḳʷ</u>
(Partially) voiced:	b	d	(ɖ/ɗ) ³	g	gʷ
Aspirate:	p ^h	t ^h	ts ^h	k ^h	k ^{hʷ}

The simultaneously glottalized series generally occurs only root-initially. Otherwise, the distribution in (9) obtains.

(9) The occlusives following a nasal and before a vowel (stem-medially)

(Partially) voiced:	b	d	(ɖ/ɗ)	g	gʷ
Aspirate:	p ^h	t ^h	ts ^h	k ^h	k ^{hʷ}

Only in (1) above do we see the basic, underlying forms of the occlusives. One may infer that plain occlusives underlie most of the aspirated forms (except as in (1)), such as we see in (2–6) (although in (6–7) they could be glottalized as well). (The partial unveiling of underlying plain forms in JH, has at the same time the contrary effect of recognizing an incipient third laryngeal series finally and an incipient second series before obstruents.) In (3), the glottalized forms may pertain to initially, simultaneously glottalized segments or to finally glottalized ones. In (10), plain forms underlie the glottalized ones. The remainder of this chapter will discuss these variations.

Among the goals of this chapter is an account of all obstruents in Jacobs's recordings of JH and EH together with an attempt at a coherent theory of all glottalization marks encountered. Three subsequent sections will show the occlusives root-initially, word-finally, and stem-medially. The types of glottalization in CK are outlined in §5.5, together with a theory of final glottalization.

5.2 Comparisons of initial CK occlusive phonation types: Root-onset

Because there has been some question about the validity of the three laryngeal series or phonation types of CK, particularly from Hajda 1976, it is useful to compare examples of the three laryngeal types at length. The following sets of data will also provide an opportunity to view some CK words as used by JH in various types of phrasing. This section begins with an overview of the phonetic nature of three laryngeal types.

5.2.1 Qualities of CK laryngeal series: plain, glottalized and aspirate

The plain (or lenis plain) series of occlusives, which Jacobs called "intermediates" after the term used in Boas *et al.* 1916, is without overt laryngeal feature, i.e., without aspiration, glottalization or voicing. Voice-onset time (VOT) is assumed to be close to zero. Voicing [$\text{p} \sim \text{b}$] may occur (to some degree) where the occlusive follows a nasal and comes before a vowel, especially if the vowel is the accented root vowel. Aspiration occurs if the segment appears before another consonant or word-finally. (While EH follows this regularly, JH has several examples of unaspirated plain occlusives finally, particularly ending in $-\text{p}$ and less so in $-\text{d}$. Further, final aspiration in JH is often marked inconsistently as if it were freely varying with plain, while in EH it is marked regularly.) Glottalization occurs if the segment is followed by an epenthetic glottal stop across a

verbal prefix boundary or by the glottal portion of a glottalized resonant or perhaps by an independent glottal stop. In order for the plain occlusives to be pronounced in the normal lenis fashion, both thyroarytenoid and cricothyroid muscles (which form the most important agonist-antagonist pair in the larynx) must be relaxed.⁴

Glottalized occlusives with simultaneous release in general occur only as the immediate onset to an accented vowel in a (left-most) root syllable. As the cricothyroid muscle in the larynx tends to raise the vowel, the (thyro-)vocalis portion of the thyroarytenoid muscle counteracts this force with a stiffening of the body of the vocal folds, allowing their cover to become “slack and ready to vibrate” (Fujimura 1977:284). This may result in a simple glottal stop, “where the ventricular folds momentarily arrest the vibration of the vocal folds” (Esling 2002[:12]), defining a sharper resultant voice (Fujimura). Or it may occur more or less simultaneous with the production of occlusives. Korean “forced stops”, similar to CK glottalized occlusives, for example, have “distinctly tight closure of the glottis somewhat prior to the articulatory release in both initial and intervocalic positions.”⁵ According to Jacobs (ca. 1930[:33]), “Glottal and lingual release [of Kalapuyan glottalized occlusives] seem perfectly coterminous.” I call this *simultaneous glottalization*. This is opposed to the preglottalized or postglottalized glottal constriction which occurs before or after a glottalized resonant or before a finally glottalized obstruent (effectively, a glottal stop as a gesture associated with the supralaryngeal portion of the segment).

Such simultaneous glottalization also occurs in the onset of reduplicated roots (Type 2) and of reduplicated onsets (Type 1) before a stem vowel. Also identically marked are segmental coalescences where an epenthetic glottal stop following a verbal prefix boundary has coalesced with a preceding prefix-final plain occlusive, or where the glottal gesture of a following glottalized resonant (or independent glottal stop) has coalesced with any preceding plain consonant. It is important to note that simultaneous glottalization in CK is *weak glottalization*—never exploded or even truly ejective as are the glottalized occlusives of so many languages surrounding the Kalapuya family.⁶ Such

⁴ This insight was confirmed impressionistically by John Esling, p.c., May 2003. For the settings of the thyroarytenoid and cricothyroid muscles, see (among others) Fujimura 1977, Halle and Stevens 1971 for feature application, and, more recently, Titze 1994 and Kingston in-press. See also §5.5.2.

⁵ Fujimura 1977:286, discussing Kagaya 1974.

⁶ Weak glottalization has been noted impressionistically by many authors since Swanton’s (1911:210) note on idiolectally differing styles of ejectives among Haida speakers. A ‘glottalized consonant’ is defined by Boas et al. (1916:14) as “a voiceless consonant pronounced with

glottalization apparently disappears in favor of aspiration before another consonant or reappears as preglottalized stricture before word-final occlusives.

Jacobs notes that the inevitable pitch accent on the left-most vowel of the root raises some three notes (*a* to *d*, 5 notes on a 12-note scale) above the normal (ca. 1930[:46]). This rise may assist in the production of glottalized segments directly before it.

Aspirate occlusives are those with a positive voice-onset time. The aspiration forms a brief offglide to the occlusive, as is the case with the fricatives.

The relative frequency of these three initial phonation types is as follows in (11).

(11) Relative frequency of CK phonation types.

$$\text{Ḡ} > \text{Ḳ} > \text{K}^h$$

Plain occlusives are more frequent overall than glottalized, and glottalized are more frequent than aspirated. Root-initially, these differences are somewhat muted.

Occlusives in initial position

The consonantal oppositions in (12–24), including minimal pairs,⁷ provide evidence for three sets of opposition among CK occlusives in initial position: *aspirate* vs. *plain* (A), *simultaneously glottalized* vs. *plain* (B), and *simultaneously glottalized* vs. *aspirate* (C). <ḡ>, the plain aspirate, is not written by Jacobs in general for CK. There is also something of a recognizable paucity of glottalized and particularly of aspirated occlusives in some contexts—primarily among the labials and plain dorsals. Nevertheless, examples of these segment types have been found before each of the three underlying vowels that I propose for CK. Root-onset is the primary environment for consonants.⁸ This means that only initially are the three phonation types of simultaneous glottalization, plain, and

simultaneous closure of the glottis, and whose release also is simultaneous with that of the flotal closure”, giving as examples Southern Paiute and Delaware. Those genuine “so-called ‘fortis’” consonants (ejectives) are released “with glottal release subsequent to that of the oral release. ... It is recommended that the orthography already in use (namely, *pʰ*, and correspondingly for other consonants) should be used to indicate the more weakly articulated glottalized consonant of this type.” Weak and strong glottalization are comparatively discussed in Fallon 1998:380–397.

⁷ Many of what I am here calling ‘minimal pair’s are so only phonologically; that is, their grammatical differences would often disallow any exchange of morphemes in the given slots.

⁸ This includes pronominal-adverbials, although I otherwise distinguish them (e.g., accentually).

aspirate observed in the same environment. This section shows that CK (except for the two-way contrastive coronal affricates) has a full set of contrastive occlusives, laryngeally triply contrastive at labial, dorsal and labiodorsal, and coronal positions. The glosses have generally been updated except where quotation marks are used. The order is from peripheral (labial, dorsal) to coronal (stop, affricate) or from less frequent to more frequent. The five lines of each example indicate (i) Jacobs' original transcription as he wrote it in his notebooks; (ii) my (possibly corrected) transliterated, phonetic version⁹ of (i); (iii) a phonemicization of (ii); (iv) a morpheme-by-morpheme interpretation of (iii); and (v) a rendering of (iii). (I have updated the translations in most cases when they are not enclosed in quotation marks.)

5.2.2 Aspirate and plain occlusive pairs, root-initially

Examples (12–15) illustrate distinctions among *aspirate* and *plain* pairs of segments. (The fifth set is missing in this comparison, since plain-aspirate contrast is not observed in Jacobs recording of CK affricates. Aspirates in general are relatively infrequent in CK.) Examples are provided for each contrast before each of the three underlying CK vowels (*/a/*, */i/*, and */u/*, as indicated in (a), (b), and (c)¹⁰). The roots with initially contrasting segments appear in bold face. The examples in (11) illustrate **labial** contrasts.

	Aspirate (K ^h)		Plain (Ḡ)	
(12)	p^h-/b-			
(a)	... <i>kwáuk</i> <i>kumihipa'lakya</i> .		<i>kumpá'la'tiyu'łma</i>	69.9/nb47:24.7
	<i>/ḡ^wáuk^h gumihip^háalák^hya/</i> . ¹¹		<i>/ḡum-bála² ḡiyúłma/</i>	
(i)	<i>//ḡ^wawḡ ḡ-m-mi-hi-p^háalák^hya//</i>	(ii)	<i>//ḡ-m-bála(-²) ḡn-yuúłma//</i>	
	he AOR-IND-NCONJ-VER-shaman		AOR-IND-big(-TEMP) his-spirit.power	
	..., he really was a shaman :	...	his spirit-power was great .	

⁹ Where single-slant lines are used, the segments fit into my notion of 'major allophones'.

¹⁰ The labiodorsals do not occur before */u/*.

¹¹ Grave accents (marked as acute by Jacobs) are used in this thesis for pronominals and adverbials, which generally lack the consistency of the accents on nouns and verbs.

- (b) $\kappa\iota\eta\mu\alpha\ \beta\acute{\iota}\lambda\lambda\beta\kappa\upsilon$ 104.12/nb35:9.19 $\kappa\upsilon\sigma\tau\upsilon\cdot\pi\acute{\iota}\cdot\lambda\acute{\iota}\kappa$. 52.12/nb46:20.5
 /gɪnɪma-p^hɪlk^hp^hk^hu/ gʊʂ—ɖuub^hɪlik^h
 (i) //g-m-ni-ma-p^hɪlk^h+p^h{il}k^h-u//¹² (ii) //gʊʂ—ɖu-b^hiilik^h//
 AOR-IND-3.PL-DIR.h—roll.along+INT-INTR that—OBL-log.bridge
 (they) rolled along after (him). from(/at) the log foot-bridge
- (c) $u\mu\beta\acute{o}\cdot n\upsilon\kappa$ $u\mu\beta\acute{u}\eta\acute{\kappa}\acute{\alpha}$ $\kappa\upsilon\sigma\tau\acute{\epsilon}\cdot\ 'y\acute{\epsilon}\cdot\ 'u\beta\acute{u}\mu\alpha\tau\iota\eta\tau$ ¹³
 um-p^hò-nuk^h /um-b^húnhá/ gʊʂ t̪eɛ² y̪eɛ² ʔubúmaq^hɖɪnd^h
 (i) //θ-m-p^huunuk^h// (ii) //θ-m-b^hun-ha// (iii) //gʊʂ—ɖii-yii(?)—u-b^humak^h-ɖnd^h//
 PRES.3-IND—a.few/little PRES.3-IND—make-OBJ₄ that—HEDGE-S.O.—PRES.ATTR.3-[fem]sex-DUR.ADVL
 (it) is just a little (s.t.) made (it so) (and) as for those who had been having sex
 97.10/nb34:137.13 78.13/nb36:125.21 80.5/nb36:105.9

The examples in (13) illustrate contrasts between *aspirate* and *plain dorsals*.

(Examples as given before //i// are difficult to find.)

(13) **k^h/g-**

(a) (NEAR) MINIMAL PAIR:

- $\kappa\iota\eta\tau\iota\eta\ \kappa\acute{\alpha}\eta\alpha\ \tau\acute{\alpha}\eta\alpha\upsilon$ 106.5/nb35:19.23 $\omega\eta\eta\acute{\kappa}\acute{\alpha}\ \kappa\iota\eta\tau\iota\eta\ \kappa\acute{\alpha}\eta\alpha\upsilon$ 113.10/nb35:61.19
 gɪndini-k^hána t̪á^hhau wɪnhá—há²—gɪndini-ɖán
 (i) //g-m-ɖ-ni-k^han-a t̪áhaw// (ii) //winha—há²—g-m-ɖ-ni-ɖan//
 AOR-IND-DIR.th-PL.3—cross.over-STV across some—this.way—AOR-IND-DIR.th-PL.3—go.by
 they crossed over some of them went by this way;

¹² The nucleus of the second syllable, clearly a Type 2 reduplicant, is missing segments in two formtypes. Cf. EH -p^hɪlk^h-₁₂ ~ -p^hɪlk^h-₄ ~ -p^hɪlk^hɖug^h-₇ '(INT) ROLL'. A root -p^hɪlk ~ -p^hɪlk^h may be assumed; the second syllable of INT (Type 2 reduplication) is often weak.

¹³ In JH, forms of the indefinite pronominal particles, generally $\kappa\acute{\epsilon}\epsilon$ — (proclitic) or —t̪eɛ (enclitic), 'what; why, how, HEDGE (with imperatives)', or —y̪eɛ(?) 'who, whoever', are written many ways. Seven out of eleven form-types for JH's //y̪ii(?)// have a final glottal, for example.

- (b) *an-k'iit'an*¹⁴ 69.4/nb47:22.11 *Κωωνι μακι's Ka'tca'f* 74.3/nb34:117.5
/ank^hiit^han/
gwənimə-gisgəats^haʔ¹⁵
- (i) //an-k'iit'an// (ii) //g^wa-m-ni-mə-gi-sgə-a-ts^h-aʔə//
DET-horse RECP-IND-PL.3-DIR.h-go(?)-CAUSE-STV-AUT-OBJ.1
a horse They **drove** me back.
- (c) MINIMAL PAIR:
Κυς' αηγολλα Κωαυ'Κωωm'τ'ωα'νι *να'μιτπο'τς αηγολλα* 126.16/nb35:121.9-11
gʷs—ʔəŋq^hola gʷau²—gʷəm-tʷáʔni namid-βóʔts^h əŋq^hola
gʷs an-k^hula g^wawk^h g^wa-m-tʷaʔ-ni// (ii) na-m-mi-d-βuuʔs an-gula
that DET-coffin.bug him RECP-IND-strike-OBJ.3 FUT.2-IND-TEMP-DIR.th-fill DET-arrowhead/flint
that coffin bug hit him 79.8/nb36:105.23 you will fill yourself (with) flint

The examples in (14) illustrate contrasts between the *aspirate* and *plain labiodorsal* stops. (Note that labiodorsals, or clusters of **K** and **w** gestures, do not appear before //u//.)

(14) **k^h**-/g^w-

- (a) *γι'κιντινικωα'τ*¹⁶ 53.5/nb46:42.7 *Κιτιτ'Qωά'τι 'λαQωα* 100.10-11/nb34:155.11
yí—gindini-k^hát^h ((4) ~ -k^háʔ^h (8)) gidíid-gwáʔ di'láqwa
(i) //yiiʔ—g-m-dn-ni-k^hát// (~ //k^hwát//) (ii) //g-dii-d-g^wad dn-lag^wa//
who—AOR-IND-POSS.3-PL.3-name AOR-TEMP-thither—**break.off** POSS.3-hand
what their names were when (he) broke off his hand
- (b) *τυηκω'λε·κ* 44.6/nb36:127.19 *Κω'νι'κ* 57.12/nb36:137.11
ɖuŋk^hwileek^h gʷiniʔk^h
(i) //ɖn-k^hiliik^h// (~ //k^hwiliik^h//) (ii) **g^winik**
poss.3-face/eye(s) IND.PRO.3.PL
(on) his face **they**

¹⁴ Occasionally Jacobs does not mark dorsal nasal assimilation, as here. It is not clear whether he always heard it and tired of marking it or whether something else is indicated—perhaps nasalisation of the vowel without full consonantal expression.

/-k^hiit'an/ is probably a loan from Chinookan; cf. the alternate [-k^hiú-t'an], nearly identical with the Kikst (River Chinookan) form i-kiútan (all dialects; cf. Clackamas i-kiwtan (Jacobs 1958-9:503)) and to Shoalwater (Seaside Chinookan) -kēutan (Boas 1911:598). Because the *iu cluster is disallowed in CK, there has been an accommodation in the CK forms, either in the vowel itself or in the placement of the accent and change of first vowel to offset glide: //k^hyú-t'an/. Twal. /k^hiwdin/ follows the Chinookan directly, maintaining the V cluster iu. CJ has kúitan (Thomas 1970:78).

¹⁵ These are the only two examples of words from JH with /i/ following a non-glottalized dorsal; other plain dorsals are followed by /ɛ/, while aspirates do not obtain before this vowel (except for EH /aŋ-k^hilmalata/ or /aŋ-k^hilp^hgalata/, 'stirrer, spoon').

¹⁶ Cf. Tak. k^hwedei 'name' (my system, TT247). The formtype in (14a.i) is chosen for resemblance to (ii), despite missing ?.

The examples in (15) illustrate contrasts between *aspirated* and *plain* coronal stops.

(15) **tʰ-/d-**

- (a) ὄοο , τὰ Πα' Κωνντι Τα' ηαι 94.7/nb34:79.11 ΚΟΜΤΑ' Ρα' Τ 95.19/nb34:91.5
 ὄοο /tʰápaʔ gʷandi-dáhai/ /gum-dá-ḅaʔd/
 (i) //uuu tʰápaʔ—gʷa-m-di-daha-i// (ii) //g-m-daaḅ-a-tʰ// (~//d//)
 oh four—RECP-IND-PL.1-kill-TRANS AOR-IND-stand-STV-DUR
 Oh! we killed four (he) was standing (there)
- (b) κύς τὰ μαντί 19.1/nb34:125.21 τὰ μακα ἴττω τυτινι τι' 18.4/nb85:48.7
 gùš ḁaman-tʰi¹⁷ ḁama-kʰáltʰi-u ḁuḁini-ḁiʔ
 (i) //gus—ḁa-m-man-tʰi// (ii) //ḁa-m-ma-kʰáltʰi-u ḁu-ḁn-ni-ḁiʔ//
 DEM—USIT-IND-LOC.h-be/lie USIT-IND-DIR.h-hang-AUT-INTR OBL-POSS.3-PL.3-tooth
 they would be in there (it) would get hung up in its teeth
- (c) MINIMAL PAIR:
 ἡὰς στὸ τυτυτόϛ 113.4-5/nb35:59.23 οὐτὸ'κ ἀμπκε' 43.5,.6/nb34:121.5,.7
 ḁàs sḁóḁ ḁinḁu-tʰóʔ uḁúʔg əmbḅéʔ
 (i) //has—tʰḁu—ḁ-m-ḁi-tʰuk// (ii) //u-ḁuk an-ḅgiʔ//¹⁸
 there—we—FUT.1-IND-PL.1-make.fire pres.3.ATTR-(be)cold DET-water
 we will make a fire there cold water

¹⁷ //gus//, DEM ('that'), generally takes (secondary) stress when pronominal and proclitic to a verb, as an argument, but not when appositive (or attributive) and proclitic to a noun (cf. (13c.i) above). Although such differentiation of allomorphs occurs, I have treated the item as a unit, nevertheless marking it consistently on the phonetic line as /gùs/ (and /hàʔ/, 'this').

¹⁸ I write -ḅ- as the first obstruent of the double-occlusive onset for 'water', though phonotactics suggest -pʰ-. The nasal of the DET prefix should not bind to ḅ (recorded in 10 formtypes to 7 for pʰ), as it does, were the segment underlyingly pʰ. All outer initial-cluster occlusives are likely plain.

5.2.3 Glottalized and plain occlusive pairs

The examples in (16–19) illustrate contrasts among the occlusives with regard to *glottalized* and *plain* pairs. Those in (16) show **labial** distinctions.

Glottalized (K̥)	Plain (G)
(16) p̥-/p-	
(a) MINIMAL PAIR:	
<p><i>kam yá'c'yu' pu pá'u'</i> 17.17/nb86:12.5¹⁹ <i>gam-yás'yu' ɸupá'u'</i> (/ <i>gint^h-p^hlɔq^hi ɸumpá'u</i> (111.3)) (i) // <i>g̥a-m-yas-ýu</i>(^ʔ) <i>ɸu-p̥aw</i>// FUT-IND-pain-INCH POSS.2-stomach you will/may get pains in your belly</p>	<p><i>Kúc 'a 'me''nma ɸiniɸa 'u'</i> 38.12/nb47:100.1 <i>guš -^ʔa^ʔmé^ʔnma ɸiniɸá'u'</i> (ii) // <i>g̥us-an-miⁿma ɸn-ni-p̥aw</i>//²⁰ that-DET-people POSS.3-PL.3-canoe the Kalapuyan canoe</p>
(b) MINIMAL PAIR:	
<p><i>kuɸtani pí'ni</i> 31.14-5/nb35:105.23²¹ <i>gùš ɸániɸiini</i> (i) // <i>g̥us-ɸa-m-ni-p̥ii-ni</i>// that-USIT-IND-PL.3-put-OBJ.3 they put that ...</p>	<p><i>Kuc 'ampí'ni</i> 46.5-10/nb35:111-113 <i>guš ^ʔəmbí'ni</i> (ii) // <i>g̥us-an-ɸiini</i>// that-DET-girl the girl</p>
(c) <i>ɸó'q ɸó'q</i> 99.3/nb34:147.15 <i>ɸó'q^h ɸó'q^h</i>	
<p>(i.A) // <i>p̥úk-ɸúk</i>// chop-chop!</p>	<p>Chop! chop!</p>
<p><i>əmpú^ʔyu</i> 110.5/nb35:45.11, <i>əmpó^ʔyu</i> 111.5/nb35:49.11 <i>əmpú^ʔyu(u)</i> (i.B) // <i>an-p̥ú^ʔyu</i>// DET-small.chicken.hawk Small Chickenhawk</p>	<p><i>lau' um hó' knitəmpúq</i> 89.15/nb34:21.3 <i>làu^ʔ um-hó-k^hni ɸambúq^h</i> (ii) // <i>la^w 0-m-huuk^h-ni ɸan-ɸuk^h</i>// now PRES.3-IND-eat-OBJ.3 POSS.1-nape.of.the.neck now he's eating my neck</p>

¹⁹ All 10 formtypes from EH show the final glottal, despite the fact that only half the 4 from JH do.

²⁰ Note that final glottalized resonants **w̥** and **n̥** here, as in many places, could be written also **wʔ** and **nʔ**. There is, however, no motivation for an extra segment.

²¹ While one of 3 formtypes in JH are finally glottalized, none of EH's 13 are glottalized.

The examples in (17) illustrate contrasts between *glottalized* and *plain dorsal* stops.

(17) **ḳ-/g̣-**

61.14/nb36:142.3–5

(a)²² *κωίνι'Κτάνι'άουτ τὸν'ῦν' 60.14–5/nb36:113.18*
g̣wini²g̣ ḍani-áaυḍ du-huú²yuu²

κωίνι'Κ τάνι κάυνι τινι'άουτᾶ
g̣wini²g̣ ḍani-g̣áuni ḍini-áaυḍá

(i) //g̣^hiniḳ ḍá-m-ni-**ḳaw-ḍ** du-huú²//
 they USIT-IND-PL.3-**sing-DUR** OBL-dark
 they would sing in the nighttime

(ii) //g̣^hiniḳ ḍá-m-ni-**g̣awn-i** ḍn-ni-ḳaυḍ-a//
 they USIT-IND-PL.3-**sing-TRANS** POSS.3-PL.3-sing-N
 they would sing their songs

(b) MINIMAL PAIR:

32.8/nb35:109.3–5

τῶ' νᾶ.καμανῶάν κυτ τᾶν κέ'φῶ 131.7/nb35:81.5
ṭ^hu² n̄²g̣amanῶán g̣us ḍanḳé'efu

γί'κῶν κέ'φῶ ᾠά'τᾶντ
/yiiḳ^hun g̣é'efu wáats^haḍinḍ/

(i) //ṭ^hu²-nak^h-g̣-am-man-g̣an g̣us-ḍan-**ḳé'efu**//
 where?—I.wonder—AOR-ATTR-LOC.h-go that—POSS.1-**grandson**²³
 Where, I wonder, did that grandson of mine go?

(ii) //yiiḳ^hun **g̣é-efu** waats^hat^h-ḍnḍ//
 perhaps **two-CNT** hole(s)-in.the.way.of
 maybe two holes

(c) NEAR MINIMAL PAIR:

καμ'ῶ'p̣^hna πυῶp̣^hna 56.14/nb34:115.7
g̣am-ῶ'p̣^hna buhó'p̣^hna

τάνι κῶ'p̣^hna nb85:72.21
/ḍani-g̣úup^hna/²⁴

(i) //g̣a-m-**ḳup^h-na** bu-hup^hna//
 FUT.3-IND-**cut.off**-OBJ.3.DUR POSS.2-heart
 (that) will cut short your life.

(ii) //ḍa-m-ni-**g̣uup^h-na**//
 USIT-IND-PL.3-**make.fun.of**-OBJ.3.DUR
 made fun of s.o. (repeatedly)

(d) *κῶ'isisu nb84:30.9 (EH: πυῶκῶ'isisu nb84:31.7)*
(-)ḳúisisu²⁵

αῆγῶ'ῶ'walada nb86
αῆγῶ'ῶ'walada²⁶

(i) //ḳuys+is-u// (EH: //ḡ-m-//, MYTH-IND-)
smoke+INT-INTR
 wispy smoking (EH: 'it was smoking')

(ii) //an-**g̣uý-wa-lada**//
 DET-**grind**-CAUS/NOM-tool
 mortar

²² **ḳaw-ḍ** is probably etymologically -**ḳaw-ḍ** 'throw (out) continuously' (-**ḍ** 'DUR'), and -**g̣awn-i** 'sing (one's own song)' from -**g̣aw-ni** 'throw out to s.o.'.

The pair -**ḳaw-** and -**g̣aw-** may be influenced by Takelma aorist/non-aorist distinctions, perhaps originally reflecting a CK punctual/durative distinction.

²³ Although JH glossed this as 'grandchild', this is a reciprocal relationship, 'grandmother'- 'grandson', and so also 'relatives'; the original meaning may have been 'daughter's son'.

²⁴ JH reflecting on EH's -**g̣ulp^h-na** (or -**g̣uup^h-ni**, nb85:59, 65).

²⁵ Cf. *κῶ'esisu*, (/ḳ^his-is-u/) '(fire) heavily smoking', an alternative with labiovelar instead of velar+u, possibly illustrative of consonantal symbolism, /ḳúy ~ ḳ^h/, DIM-AUG.

²⁶ (16c, d) are surely inspired by EH, where Jacobs went over EH's dictations with JH. EH has -**g̣ui²(ya)lada** 'mortar' (nb86, 87), as well as -**κῶ'ῶ'** 'grind' (nb82, 86, 89) and -**κῶ'ῶ'** 'mortar, stone bowl' (nb86, 88).

The examples in (18) illustrate contrasts between *glottalized* and *plain labiodorsal* stops.

(18) **ḳ-/g̣-**

(a) MINIMAL PAIR:

há' τάντιν ι κωά 33.7/nb35:151.11
há'ḡándinikwá

- (i) //háʔ—ḡa-m-ḡ-ni—**ḳa**//
this.dir—USIT-IND-DIR.th-PL.3—**take**
they would take (them) here (& there)

támpí' wá'la tuτυηḡwá
ḡám-pii wála ḡuḡuη-ḡwá 52.6–7/nb36:155.9–11

- (ii) //ḡa-m-pii wála ḡu-ḡn-**g̣a**//
USIT-IND-put beneath OBL-POSS.3-**head/hair**
(he) put (them) under his head

(b) MINIMAL PAIR:

ḷ_ ἄγκωίν κωμ'ί 130.14/nb35:77.7–9
l(áw'mḡè) ḡḡkwin ḡum-ḡí ²⁷

- (i) //ḷaw-mde an-**ḳin** ḡ-m-i//
then DET-COON AOR-IND-GO
so **Coon** went

κωη κωίν τι'γάντα 45.6/nb36:131.5
uḡḡwín ḡi-ḡándá

- (ii) //ḡ-m-**g̣in** ḡii-ḡánd-a//
PRES.3-IND-take USIT.REL-buy-STV
(they) **take** what (he) would pay in purchase

The examples in (19) illustrate contrasts between *glottalized* and *plain coronal* stops.

(19) **ṭ-/ḡ-**

(a) NEAR MINIMAL PAIR:

wá' τιντά'άπα'τ. 118.21/nb36:101.5
wá' ḡindá-táḡa'ḡ

- (i) //waʔ—ḡ-m.ḡa—**ṭaḡ-a-ṭ**// ²⁸
NEG—FUT.1-(IND)\CONTR-step.on-STV-DUR
I will not (be) **step(ping)** [on your knee.]

'wá' ye τιντά'άπα'τ 81.12/nb34:173.3–5
wá' yèe ḡándá-ḡáḡa'ḡ

- (ii) //waʔ—yii(?)—ḡ-a(m).ḡa—**ḡaḡ-a-ṭ**//
no—someone—USIT-(IND)\CONTR-stand-STV-DUR
No one would be **standing**.

(b) κωσ'άντι'c κινι'νίct'ni 122.10/nb35:181.17
ḡùš' ḡánti'š ḡini-ḡníšḡ'ni ²⁹

- (i) //ḡus—an-**ṭis** ḡ-m-ni-nis-ḡ-ni//
that DET-**sapsucker** AOR-IND-PL.3-say-DUR-OBJ.3

that Sapsucker said (to them), ...

αcνί κιντḡό.ḡ_ νιτιντί' 95.18–9/nb34:91.1–3
ḡšní ḡint^h-ḳó(?)p^hni ḡindí'

- (ii) //an-sni ḡ-m-ḡ-kup^h-ni ḡn-**ḡi?**//
DET-coyote AOR-IND-DIR.th-cut.off-OBJ.3
POSS.3-**tooth/mouth**

Coyote cut (it) (with) his teeth.

²⁷ Jacobs regularly wrote only l— as abbreviation for láu'mḡé (with variations in stress).

²⁸ Cf. the homonymic root 'chop' (not appearing in JH with a simple root: -ṭaḡ-al(-aḡ) 'chop-PLS (-DUR)') with its augmentative (Type 1) reduplicant: -ṭaḡ+ṭ-a-aḡ₁ 'chop+Aug-STV(-STV)-DUR'.

²⁹ The red-breasted sapsucker is *Sphyrapicus ruber*. (The DET is often dropped informally on names.)

The examples in (21) illustrate the contrasts between *glottalized* and *aspirated* plain dorsal stops.

(21) **ḳ-/kʰ-**

- (a) τὰ λὰ Τκωανά τὰ κάρπυα' . τάυνα ' αμί' m, | τὰ κάρπα' νι κuc ' αμπί' νι
 ḡá-ʔlááḡʷanáá ḡáñkáɾɸyáʔ tʰáuná ' əmí'm, | τὰ κάρπα' νι guš ' əmbíini
 ḡá-ʔlááḡʷanáá ḡáñkáɾɸyáʔ tʰáuná—an-miɾɿ ḡá-m-kʰáɾɸáʔ-ni guš—an-ɸiini//
 IMP-look.after-PURP-OBJ.3.DUR POSS.1-body one—DET-kinsman USIT-IND-pack-OBJ.3 that—DET-girl
 'Take care of my body!' 100.13/nb34:155.21 one person would carry the girl 46.6/nb35:111.23–113.1
- (b) κύc τὰν τερή ḡί' ḡά τcι 32.2/nb35:107.5 τὰ μyυ' ḡκωατcι anκί' t'an 69.4/nb47:22.11
 guš ḡáñḡəḡ-ḡíiḡátsʰi ḡám-yúupʰḡwáḡi anκí'itʰan³³
 (i) //kus—ḡá-m-dan-kii+k-a-tsʰ-i// (ii) //ḡá-m-yuupʰ-ḡʷá-ḡi an-kíitʰan//
 that—USIT-IND-LOC.th-choke+AUG-STV-AUT-ACT USIT-IND-ride-PURP-OBL.OBJ.3 DET-horse
 (it) would choke itself on that (he) would ride on a horse
- (c) ó· mḡkón fan_hás winhá kumaḡw'ws
 ðoo mḡkónɸan háš 34.12/nb34:175.5–7 winhá ḡuma-ḡʰʷʷs 53.8/nb46:42.15–7
 (i) //uuu 0-m-mi-kun-ɸan—has// (ii) //winha—ḡ-m-mi-kʰuʷus//
 Oh PRES.3-IND-NCONJ-just.nothing-ADV—this some—AOR-IND-NCONJ-Coos/SW OR Athap.
 Oh! This is a mere nothing. (he) was part Siletz³⁴

³³ See above, the second part of note 12, p. 154.

³⁴ /kʰʷʷs/ refers to Miluk, Takelma and groups to the south, especially Southwest Oregon Athapascan, who went to the Siletz camp—as opposed to the northern Oregon Coast tribes, Hanis north through Nehalem (Tillamook), collectively called /ʔáwtʰa/ or 'Seashore people'.

The examples in item (22) illustrate contrasts between *glottalized* and *aspirated* labiodorsal stops.

(22) **kʷ-/kʷʰ-**

(a) MINIMAL PAIR:

κωάμ'κ ωαντ'κωάτ
/gʷəu²-gʷənʰ-kʷa²d/ 96.6/nb34:93.5

- (i) //gʷawk—gʷa-m-d-**kʷa-t**// (~//**-d**//)
he—RECF-IND-DIR.th—**take-DUR**³⁵
he has taken (it)

ωά' στα' γυ'κον καντυγκωά'τ
wá² sða² ʔyúkʰun gənduŋ-kʰwá²t 53.14/nb46:44.13

- (ii) //waʔ—tsʰ-də-ʔukʰu-n gə-m-dn-**kʷa-t**//
not—PRES.1/2-CONTR-know-OBJ₂ FUT-IND-POSS.3-**name**
I don't know what his name is

(b) MINIMAL PAIR:

κυckaη κωέ'νι' τιν κyú'tan
gùš gəŋ-gwéeni² dɪn-kʰyútan 75.14–15/nb36:147.7

- (i) //gus—gə-m-**kʷii(-)ni(-) dɪn-kʰyutʰan**//³⁶
that—FUT.3-IND-take.along(-OBJ.3(-PFTV)) POSS.3-horse
(he) will **take** his horse

uyú'ħuyú' əŋqawí'
uyúhuyuu əŋqawí' 101.15/nb34:163.1

- (ii) //u-yuhu-ʔu an-**kʷii**//
PRES.3.ATTR-old-INCH DET-digging.stick
an old **digging stick**

The examples in (23) illustrate contrasts between *glottalized* and *aspirated* coronal stops.

(23) **t-/tʰ-**

(a) MINIMAL PAIR:

l — κύc τάνι'fá·k'τitsani
l— gùš dani-táakʰditsʰani
(i) //láv-mde gus də-m-ni-**táaq-d-tsʰa-ni**//
then that USIT-IND-PL.3-tie-DUR-AUT-OBJ.3
40.9/nb35:103.5

then they **tied** them together

τιν'ά'ωι τ'αμτά'q'τ'ιτ τ'άτ'ι κο'τ'κ'ωμá
dɪnʰáwi dəm-tʰáaqʰdɪd dádi-góodguma
(ii) //dɪnʰaawi də-m-**tʰaaq-d-d** də-dii-guudgum-a//
always USIT-IND-cry-DUR USIT-TEMP-
75.3–4/nb34:108.12–14 be.early.morning-STV

(She) would always **be crying**
(when it was) early in the morning.

³⁵ This analysis is suspect due to the fact that it is the only example out of 40 formtypes for $\sqrt{k^a}$ with any suffix and because **-d** appears at first inappropriate for the sense of the verb. However, this is a point in the story where the old man (Crane) is thinking of Coyote as *having* his spear point (i.e., keeping it from him); thus the use of **DUR** here in an English *perfect* (= imperfective) sense should be acceptable. Furthermore, EH allows 16 suffixes out of 48 formtypes, 4 with **-dad** [**daʰ**] (unchecked, but probably equivalent to JH's **-d** with this verb). Alternatives are /-**kʷaa**/ 'pack [N]', /-**kʷaaiikʰ**/ 'partner [N]' (both JH & EH).

³⁶ Cf. also /-**gʷin-hi**(ʔ)/ 'get, hold, grab it', EH /-**gʷin-hi**/; Tak. **gʷen-hi** (non-past), **kʷen-hi** (aorist) (Sapir 1912:177; TT213: 'hold in one's hand'; **-hi** acts as applicative). For //**kʰyutʰan**//, see n.12, p. 154.

- (b) PROBABLE MINIMAL PAIR: 21.15/nb46:48.15 46.2/nb35:111.13
- κύςτι· υῤῗε'νι'α'ωα'τακ κωάυκ κύς'αν'όιηι υτίτιν'ά'να'
- gùš-dii³⁷ uk'éeni ʔaʔwáðak^h gʷàwk^h³⁸ gùš ʔənʔóihī u-tʰi ðinʔá-naʔ
- (i) //gùš-dii(i)-u-kʰi(-)ni-an-wáʔak-gʷawk// (ii) //gùš-an-uyhi u-tʰi-ðn-aana(ʔ)//
- that—HEDGE—PRES.3.ATTR—carry—DET—wood—he that—DET—man PRES.3.ATTR—**have**—POSS.3—daughter
- but the one who carried the pole—he the man who had a daughter
- (c) NEAR MINIMAL PAIR:³⁹
- κύςτα=τι·νι'ύκι' τάτι·νι'τύ'q tá'miyank
- gùš ðáðiiiniúgi² 31.2/nb46:60.13 ðáðiiini-tʰúʔk^h tʰámjyank^h 17.14/nb34:125.17
- (ii) //gùš-ðá-ðii-ni-tug-i(-ʔ)// (ii) //ðá-ðii-ni-tuk-ni tʰan-myank^h//
- that—USIT—TEMP—PL.3—**finish**—TRANS(—PRFV) USIT—TEMP—PL.3—**make.a.fire**—OBJ.3 PL.DET—zenith
- “when they got through [scraping]” when they built a fire on top

The examples in (24) illustrate contrasts between *glottalized* and *aspirated coronal affricates*. (Because of the doubtful reality of a phoneme //tʰ//, including the allophones [tʰ, tʰ̥] and so forth—some of which might be heard on the Swadesh-Melton tape—no attempt has been made to note any possible oppositions tʰ-/tʰ̥- or tʰ-/tʰ̥̥.)

(24) tʰ-/tʰ̥̥-

- (a) MINIMAL PAIR:
- Dani't'ca'kni κύς'α'λό'q κιντ'άκτ'νι'τιν'τό'λαπα κús'αν'τό'ν'ωα
- ðani'tʰáʔk^hni nb76:120.8 gùš ʔaʔlóʔq^h gin-tʰáʔgʷd²ni ðindóʔólápa gùš'antó'ón'wa
- (i) //ðá-m-ni-tʰak-ni// (ii) //gùš-an-luk g-m-tʰak^h-ð-ni-ðn-ðuulapa gùš-an-tuunwa//
- USIT—IND—PL.3—**grind**—OBJ.3 THAT—DET—woodpecker⁴⁰ AOR—IND—**wedge.into**—DUR—OBJ.3—
- “they are mashing, pounding, 122.4/nb35:179.17–19 POSS.3—feather that—DET—tree.stump
- grinding (tarweeds)” the Woodpecker stuck his feathers into a stump

³⁷ The form in *Texts* is <te'>. It is curious that J. made such bizarre corrections as the glottalization and the vowel in the examples of this particle on the page of *Texts*.

³⁸ The common surface form of this noun is əʔwáʔtʰáʔk^h. On such words in CK, it is tempting to suppose a floating feature of glottalization, triggered by the glottalization of the first two root consonants, as in //an-wáʔak//, the middle segment glottalized from de-gemination in CK (see §3.5.2).

³⁹ While unsuffixed //tuk// in (ii) occurs in JH, neither form occurs unsuffixed in EH, so one cannot be sure if they are always minimal pairs or not. EH, however, has a much better set //tuk : tuk̥//: τιν'ύκι / τ'ά'να' τ'ο'φ'ο'υ'α //ðn-tugi tʰawna ðuφu'ya// 'his finishing one garment' (nb76:73.7), τιν'ύκι'α'να' //ðn-tugi-[ʔ]an-maa// 'his fire construction' (nb84:23.21), showing it in nominal context.

⁴⁰ Pileated woodpecker, *Dryocopus pileatus*.

(b) MINIMAL PAIR:

umáu' né' an tsí' wí . 47.9/nb47:110.3	κús tci' κιηκαβτῶν 22.16/nb46:54.3
umáu' nêe anísí' wii	gùs tsí' gíngáp'dən
(i) //u-maw nii—an-tsí?—wii//	(ii) //gus tsí? g-m-gab-d-n//
PRES.3.ATTR—white like—DET— bone —EMPH	that I AOR-IND—hear-DUR-OBJ.3
[it was] white, [just] like bone	"I heard it ..."

(c) NEAR MINIMAL PAIR: ⁴¹

kumtsúqa' t 97.3/nb34:135.13	αcni kum'úmha'ni αntú'q kini 'lá tshwa' t
gumtsúga'd	əsní gum-ʔúmhá'ni əntʂu'q' gini-ʔlats'wa'd
(i) //g-m-tsug-a-t//	(ii) //an-sni g-m-umhaʔ-ni an-tsuk g-m-ni-lad-ts-wa-d// (~-t//)
AOR-IND— plug -STV-DUR ⁴²	DET-COYOTE AOR-IND—send-OBJ DET— mouse AOR-IND-PL.3-take.care.of-
(he) plugged it	Coyote sent mice to steal ... 90.16/nb34:25.13–15 AUT-VEXT -DUR

5.2.5 Initial occlusives in reduplicants

There are three major types of reduplication in CK.⁴³ Two of them reduplicate the initial root onset of a verb, whether a single segment or complex, either alone (Type 1) or as part of the entire root syllable⁴⁴ (Type 2), suffixing it to the root. The reduplicated verb root initials and full syllables serve largely pragmatic functions, emphasizing transitive situations in Type 1 (*augmentative*), or an intransitive situation in Type 2 (*intensive*). Because the stress (marked by pitch accent) stays with the base, the three laryngeal types of occlusives repeat themselves without the presence of the stressed root vowel; in the case of Type 1 reduplication, which we will look at below, without the root vowel at all. This reduplicative environment is especially noteworthy in that it is one of the only one or two types of occurrences of non-root-initial simultaneous glottalization.

Reduplication in CK is somewhat skewed toward the marked types of laryngeal features. Of 26 examples of roots illustrative of known true Type 1 reduplication in Appendix 7, there are 13 *glottalized* occlusive initials, 6 *aspirated* occlusive initials, 3 *plain*

⁴¹ This pair shows similar conditions as in (21c) above, only the (ii) form unsuffixed; see note 37.

⁴² The combination of stem vowel **a** and DUR **ɔ** (~ **t**), while usually indicative of a continuous or repetitive aspect for certain verb classes, is not completely clear. Duration in CK may center on an object (-n-) as well as on the verb. In some verbs, an object is often implied; the continuity of verbal action serves to reify an object's presence and -**ad** may take on the sense of an object marker.

⁴³ For more information, see Appendix 7.

⁴⁴ I use the term 'root syllable' in certain contexts where the root appears consistently as a syllable, like roots in many East Asian languages. In CK Types 1 and 2 reduplication, for example, only forms with a 'root syllable', as far as is known, serve as bases for reduplication.

occlusive initials, and 4 *non-occlusive* initials. Among the 21 examples for Type 1 reduplicants without known simple forms (partners), the figures for these types are 4: 7: 7: 3. Among all (with or without partners) 16 examples of verbal Type 2 reduplicants, they are 3: 5: 3: 5. In other words, glottalization is particularly marked in Type 1 reduplication, as we see in (25b) below, although aspiration is marked as well, especially considering the general occurrence of CK segments as shown in (25a).

(25) Estimated relative frequency of segments

(a) Generally: $G > \dot{K} > K^h$

(b) In Type 1 reduplication: $\dot{K} > K^h > G$

Such a result might lead one to hypothesize that Type 1 reduplication was originally associated with glottalization, probably before CK came to have three laryngeal series. While this is very possible, there are several cases in the reduplication of initially glottalized segments where the glottalization is often lost (or at least is unheard by Jacobs) on the reduplicant. Below I give examples of Type 1 reduplication for each of the three laryngeal types:

(26) Plain Type 1 reduplication

(a) τὰμ κυ'ἰβκυ'υ· τιν'ά'ωι.

[dám-gúlp^hgubuu]

//dā-m-gulp^h+g-u-bu//

USIT-IND-**tip.over**+AUG-INTR-NOMIN always

[the canoe] was always [easily] tipped over

38.10/nb47:98.21

(b) ἰαυ'μτε κίτι' qwa't qwa'tιη kápya'

[law^hmde gidii-g^hád^hg^ha^h dinkápya^h']

//law^h-mde g-dii-g^had^h+g^h-a(-d) dn-kápya^h//

now AOR-TEMP-**break.off**+AUG-STV(-DUR) his-body

then as he was breaking off parts of his body

100.9/nb34:155.5

(27) Aspirated Type 1 reduplication

(a) κús τάνι βύτπα'τ

[gùs dáni-p^húdp^had]

//gus—dā-m-ni-p^hud^h+p^h-a-d//

that—USIT-IND-PL.3-**boil**+AUG-STV-DUR

they would boil that

37.3/nb36:175.18

(b) *κἰνἰ πῶλ᾽αῖβῶλα.τ*[gini-p^hlɔq^hp^hla²d]//g-ni-p^hlak^h+p^hl-a-(^h)d//

they split it [the pitchwood] up

AOR-PL.3-split.lengthwise+AUG-STV-DUR

112.21/nb35:59.5

(28) Glottalized Type 1 reduplication

(a) *κἰτἰ·νἰ κ'ο'ρκατ κυς'αμο'κἰ'*/gidii-ni-k[ɔ]b²gɔd gʊs-əm[ʊ]k^hi²///g-dii-ni-kub^h+k-a-d gʊs-an-muuk^hi²//

'...when they had cut up that meat...'

AOR-TEMP-3.PL-cut+AUG-STV-DUR that-DET-meat

105.15/nb35:17.9-11

(b-c) *τᾶνἰ τ᾽ᾰκτἰ νἰ·τἰ' τᾶτἰμα ῥοίῖῖῖῖῖ· με' νfan*

they would chew it up;

[dāni-t^hɔk^ht^hiniid^hi² dādima-ῥoíῖῖῖῖ· ménφan]

when it was well mashed,

//da-m-ni-t^hak^h+t^hi-ni-d^hi² 45

da-dii-ma-puy+p-yu mén-φan//

36.3-4/nb36:179.3

USIT-IND-PL.3-mash+AUG-TRANS-OBJ.3—tooth

USIT-TEMP-DIR.h-pulverize+AUG-INCH best-ADV

(d) *κῠῠῠ ῖς μᾶα ῖςμἰνφάι'ᾰ'ωάτᾰ'κ*

[1/4]

/gum-t^hsmáqt^hsmínφáy²ʔáwá²dá²g/(i) //g-m-t^hmak^h+t^hsm-i-nφay an-wá²tak//

'(she) hit me and hit me with a stick'

AOR-IND-hit+AUG-TRANS-DUR.OBJ.1 DET-stick

132.7/nb35:87.9

(ii) *κἰτἰ·ῖς μᾶα ῖςμἰνἰ ᾰ'ωά'τᾰ'κ*

[3/4]

[gidii-t^hsmáqt^ht^hmini² ʔáwá²dá²g]//g-dii-t^hmaq^h+t^hsm-i-ni an-wá²tak//

as (she) hit him again and again

AOR-TEMP-hit-.AUG-TRANS-OBJ.3 DET-stick

131.1[-132.10]/nb35:79.7[-87.15]

While simultaneous glottalization is the primary type of phonation found in such examples of Type 1 reduplication,⁴⁶ it is peculiar that there are apparently so many examples of missed glottalization in this environment. Probably the main reason for this may be put to the great difficulty in recognizing the weak Kalapuyan glottalization, both simultaneous and strictured, by its transcribers. While advances have been made and Jacobs may have been the best recorder, J. himself makes it clear that he missed forms. It

⁴⁵ This is an example of "noun stripping" in CK: *dini-* (< *dn-ni-* 'POSS.3-PL.3') is missing before *-d^hi²*, inalienable 'tooth' (lexicalizing as 'chew'). It is a rarer phenomenon than Rude (1986) suggests. (The *an-* 'DET' prefix on alienable nouns regularly drops optionally on names and obligatorily following oblique *du-*, though POSS does not. Cf. *τἰ·τἰνἰ'ῖ'ωάτ* //*du-dn-ni-t^hi²wat*// 'in their bucket' vs. *τἰ'ῖ'ωάτ* //*du-t^hi²wat*// 'in the bucket' (17.4-5/nb46:104.11-3).) Rude's statements on CK word order and verb agreement are generally correct, despite his missing the sense of the durative *-d* (*-d^hi-ni*, here often marked 'DUR-OBJ.3', may be 'OBJ.3.II-OBJ.3.I'). I benefited from his discussion of the oblique.

⁴⁶ Aspiration is the primary phonation type of root onsets undergoing known Type 2 reduplication.

is particularly difficult to know whether a 'should-be-glottalized' reduplicant is not glottalized because the recorder failed to hear it or because of some other, possibly functional reason. For these reasons, I have put together the following table to analyze major examples of verbs exhibiting spotty recording. The results suggest that there is no great difference between these obvious recording errors and other spelling errors found in the Jacobs materials. In (29) below, the numbers following the reduplicated forms indicate the number of formtypes that share the form as written, over the number of possible forms.

(29) Examples of glottalized onsets in Type 1 reduplicants variously recorded

(a)	puy	(JH)	puy+p̣ 1/1 (EH: p̣uy+p̣ ^h 6/6, -#)	'grind finely'
(b)	ʔap̣	(JH)	ʔap̣ ^h +ʔ 1/1 (EH: ʔap̣ ^h +ḍ 7/8, -a)	'chop, chip, peck, pick, tap'
(c)	ʔsak ^h	(JH)	ʔsak ^h +ʔṣ 6, ʔsak ^h +ʔṣ ^h 1/7	'grind, mash, crush (L)'
(d)	kuḅ /-V, kup ^h /-C	(EH)	kuḅ+ḳ 6, kuḅ+g̣ 7, guḅ+g̣ 2/15	
		(JH)	kuḅ+ḳ 2, kup ^h +g̣ 2/4	'cut up; cut to pieces'
(e)	klug		klug+ḳl 0/2 (EH: klu+ḳl, JH: glu ² gl (crossed out))	'whip, club'
(f)	ʔsmak ^h	(JH)	ʔsmak ^h +ʔsṃ 1, ʔsmak ^h +ʔsṃ ^h 3/4	'hit; keep hitting'
(h)	ṣḳ ^w il	(EH)	ṣḳ ^w il ^h +ṣḳ ^w 2, ṣḳ ^w il+ṣḳ ^w 4/6	'untie, free'
(h)	ḳ ^w lis	(JH)	ḳ ^w lis+ḳ ^w lis 1/1	'squirt (OOC)' (Type 2)

We see that on the whole, Jacobs has done a remarkable job in maintaining regularity in the hearing of these weakly glottalized segments. In (29a) and (b), Jacobs noted the glottalized reduplicants in JH, but generally not in EH. In (29a), the reason is clearly that, in final position (only in EH), the forms lacked (simultaneous) glottalization, as they generally always do.⁴⁷ In (29b), the -ḍ form in EH is unglottalized 7 out of 8 times; this may represent a reanalysis of reduplicant -ʔ as durative -ḍ in EH. Jacobs missed the glottalization on 1 out of 7 formtypes in (29c). (29d) shows the breakdown between the two sets of recordings for 'cut' and the greater variety in EH, no doubt representative of greater problems in hearing his dictations at least initially, as stated (nb46:2). In (29e), the debuccalization of the initial (degeminating) velar resulted in a single EH form missing one segment, but in confusion regarding the single JH form recorded. In (29f), Jacobs missed the glottalization on the reduplicant 3 out of 4 times in

⁴⁷ Movement of vowels in Kalapuyan dialects in and around the consonantal segments of lexical items is common. Thus the stem vowel is lacking in EH in (29a). Compare the reflexes of CK /ə-sní/ 'coyote' and /ən-ḍḳ²/ (JH) 'elk' with respective Twal. /éisin/ and /únṭḳ²/.

JH, getting it only on the third attempt, all in the same short story of Pheasant and her grandson Coon. There can be little doubt that the maximal complication of resonant offglide (O_1+O_2R) played an important role in this auditory problem of O_2 's glottalization. In (29h), the segmental complication of $RO_1+O_2O_3$, where O_3 carries two supralaryngeal features, similarly blocked the audition of a preceding segment, again the second segment of the cluster. Here, however, it was the coda consonant t^h , while the glottalization on O_2 was heard without fault. Finally, I noted a potential problem (O_1+O_2R again) with a Type 2 reduplication, which Jacobs heard just fine. The result of this somewhat tedious survey is to suggest that such errors of glottalization are no more unusual than spelling errors anywhere else in the corpuses of JH and EH. There is, as a consequence, no reason to speculate that the lack of a raised pitch of the stressed root vowel before the reduplicated glottalized onset is somehow responsible for any of these errors. Nor, to address the larger question, can anything further be read into the general problem of the restriction of simultaneous glottalization to onsets of such stressed root vowels at this time.

5.2.6 Summary

In this section, we have reviewed the occlusives root-initially. A description of their three phonation types was presented. The occlusives were then viewed with regard to binary contrasts of aspirated and plain, (simultaneously) glottalized and plain, and glottalized and aspirated, before each of the (three) CK vowels where applicable. Reduplicants, the only other place where simultaneous glottalization generally occurs, were also reviewed with regard to the frequency of their phonation types and with regard to the error types Jacobs made in recording simultaneous glottalization on the reduplicants. Such errors were determined to be well within his normal error range.

5.3 Comparisons of final CK occlusive phonation types: Word-finally

5.3.1 Introduction to final occlusives

The patterning of final occlusives in CK is potentially controversial. The approach taken here will be to review forms which give the pattern of JH's final occlusives as suggested above in (3) of §5.1:

- (b) —//wátʰ//
- (i) τῖνι καύφιν'ωατ̰ . [End of story] 18.5/nb85:48.9
 //ḍii-ni-gawφ-n—wátʰ// when they fished (for s.t.)—it is said.
 [ʰwátʰ]
- (ii) τὰτί'γάτ̰'ωατ̰ τῖντί'να 36.1/nb36:177.19
 //ḍa-ḍii-yas—wátʰ ḍn-t̰ina// when it hurt—they would say—in the knee
 [ʰwaḍ]
- (iii) βὰς'ωατ̰ κῖνι'να'ḥav 33.17/nb35:153.19
 //pas—wátʰ ḡ-ni-n̄ahay// so—they say—they used to do
 [ʰwaʰḍ]

In (32b), the enclitic //wá[ʰḍ ~ ḍ ~ t̰]// might well be written with a final underlying plain occlusive ([ḍ]). This would fit the data best in terms of similarity of sound in JH. And it would make some sense in that most of the phonetically similar alternating forms should be written this way, as forms of the intermediate series, underlying //Ḡ//. (Notice that the final glottal in (32b.iii) is [ʰḍ], not [ʰt̰] as with many true preglottalized occlusives.) However, in this thesis such alternating forms have generally been written with the released form, //Kʰ//, which agrees with the majority of surface forms of EH. We will see that this manner of marking also allows the aspirated forms to represent those final segments whose laryngealization has been neutralized, maintaining the alternate forms according to stray influences of following segments.

Marking forms by the number of formtypes for each variety can be helpful to see consistency among common forms. With regard to peripheral occlusives, for example, compare the regularity of dorsal forms in (33) with the dorsal and labials of (34).

(33) Final dorsals with regular aspirated release

- (a) -'úlik (3/3) //ulikʰ// acorn(s)
- (b) -'áusak (6/8); -'k (1/8) //tawsakʰ// — arrow
- (c) -Tállq -k (14/16); -Tá'llq (2/16) //ḍalkʰ// (be) strong, brave

(34) Final dorsal and labials with inconsistent aspirated release

- (a) (i) -hók/hók /-húukʰ/ eat (-kʰ₁₃ ~ -ḡ₇ /20)
- (ii) -hókni/hókni /-húukʰ-ni/ eat (s.t.) (-kʰ₁₆ ~ -ḡ₁₁ /27)

- | | | | | | |
|-----|------|-----------------|-------------------------|------------------|---|
| (b) | (i) | -ḡóp/ḡóp | /-kúp ^(b) / | cut (up) | (-p ^h 5 ~ -b ^h 5 /10) |
| | (ii) | -ḡópɪ/ḡópɪ | /-kób-i, u/ | cut (TRANS/INTR) | (-p ^h - 0 ~ -b ^h - 2 /2) |
| (c) | (i) | -ṭá'p/ṭá'p/ṭá'p | /-ḡáap ^(b) / | stand (up) | (-p ^h 3 ~ -p ^h 3 ~ -b ^h 4 /10) |
| | (ii) | -ṭá'pa'ṭ | /-ḡáap-a'ḡ/ | be standing | (-p ^h - 0 ~ -b ^h - 16 /16) |

Differences of final occlusives between examples in the set (33) which always or nearly always marks a regular off-glide and set (34) which does so only half of the time may ultimately prove to be scalar and unimportant. If /k^(b)/ and /p^(b)/ are written as //g// and //b//, however, there could be a problem with forms in that for JH, at least in regard to the reanalyzed level of the root, where /b/ and /ḡ/ are, rarely, written plain. At the root level itself, as here, such differences are not important because finally they neutralize. /k/ and /p/ are completely neutralized, while /k^h/ and /p^h/ represent [g ~ k^(b) ~ k^h] and [b ~ p^(b) ~ p^h] (though surely these two neutralized sets fall together). I write fully neutralized segments as //k// and //p//.

The last example is of the least common final occlusive, the affricate **ts^h**, which in word-final position can only be thought of as having an aspirate release. In fact, there is in the corpus of JH apparently only one form with a simple, unglottalized final coda:

(35) Lone example of simple final affricate

ṭá'p'hi'ṭ láu'mte ...

42.17/nb34:118.22

ḡa-ḡii-hiits^h, láw-mdi ...

when it fell off, then ...

[hiits^h]

Berman lists 28 formtypes for this lexical item, roughly: *hi'ṭ* 17, *hi'ṭ* 11, *hi'ṭ* 1.⁵¹ Its form is clear and very different from several others, such as [bó^hts^h] (ʔ 13/13) 'mouth', [ḡé^hts^h(-), ḡé^hts^h, ḡé^hṣ-] (ʔ 30/32) 'make', or [ḡa^hts^h, ḡa^hts^h] (ʔ 24/24) 'find' with a very consistent pattern of preglottalization. In most of these, the different nature of the recording of the glottal stricture here suggests strongly that it is a different mechanism. There are as well several other examples of root-final or stem-medial **ts^h** (generally AUT), but always with a suffixed vowel. I do not have an answer to the question of why the language dislikes to make //ts^h// final.

⁵¹ Note the one glottalized formtype, a glottal stop apparently takes the place of a second mora of vowel length.

5.3.3 Word-final plain occlusives

It is a curious fact that there appear to be, in the corpus of John Hudson, a number of lexical items that are consistently written by Jacobs with plain finals. In (36), we see examples of such lexical items. They appear to be roots suffixed with a derivational *-b/*.

(36) Final plain occlusives: labials

(a) (i)	-’ίτιP	/-ʔidib/	//id-b//		‘jump’
	(ii)	-’ίτυρα’τ	/-ʔidubα²d/	//id-b-α²//	(~//α²//) ‘jumping’
(b) (i)	-ḥélib	/-héelib/	//hiil-b//		‘get sick’
	(ii)(A)	-ḥéλυρα’τ	/-héelubα²d/	//hiil-b-α²//	” ‘be sick’
	(B)	-ḥéλυρα	/-héelubα/	//hiil-b-α//	‘sickness’
(c) (i)	-κότιP	/-kódib/	//kuud-b//		‘sweat’
	(ii)(A)	-κότυρα’τ	/-kódubα²d/	//kuud-b-α²//	” ‘sweating’
	(B)	-κότυρα	/-kódubα/	//kuud-b-α//	‘sweating; sweathouse’

There are also a few coronal examples where a final *-d/*, doubtless originally a durative marker that became part of a reanalyzed root, maintains its plain quality in final position.

(37) Final plain occlusives: dorsals

(a) (i)	-qáut (4), -qáut (14), -qáut (3), -qáut (1)/(22)	/-káwd ~ káwt/	//kaw-d//	sing
	(ii)(A)	/-káwd-α/		singing (N)
	(B)	/-káwd-id/		singing (DUR)
	(C)	/-káwd-αdi/		sing (V, OBL)
	(D)	/-káw-i/		throw, sing (V, ACT)
(b) (i)	-Púwāt (8), -Púwāt (1)/(9)	/-búwád/	//buw-αd//	throw a spear at, spear
	(ii)(A)	/-búwád-i/		spear (ACT)
	(B)	/-búwá-φin/		fish spear
	(C)	/-búwá-ʔládá/		fish spear

The example of *sing* is almost certainly etymologically derived from *-kaw* ‘throw out’, occasionally still used as a verb for sing, plus the durative morpheme *-d*. It seems that in JH there is a tendency for some plain suffixes to retain their plain-ness in any environment. This is definitely unlike the corpus of EH, where all such examples exhibit aspirate finals. That plain occlusives remain unreleased in final position in a consistent manner suggests that, in the dialect of JH at least, there was a selecting and

separate accommodation of these items, at least on the level of the reanalyzed root. This would represent the first step becoming distinct in this position.

5.3.4 Word-final preglottalized occlusives

Word-final glottalization is glottal constriction (as opposed to simultaneous glottalization), with some degree of raising and sphinctering of the larynx (i.e., a glottal stop) which occurs immediately prior to the final forms, just as we saw with root-final glottalized fricatives in Chapter 4 and with stem-medial glottalized resonants in Chapter 3. Control of the preglottalization feature appears to be associated with the root—its final segment(s) as a coda. There are three rough patterns which must be distinguished: (A) consistent preglottalization of final occlusives indicative of a final distinction between aspirated (actually neutralized) and glottalized final occlusives; (B) occasional preglottalization of final occlusives, a variant of the aspirated (~ plain) forms which represent neutralization; and (C) preglottalization caused by the occurrence of a glottal stop or gesture immediately prior to the final consonant.⁵² This last pattern is the most consistent and will be seen even when the root has been suffixed, while (A) and (B) disappear upon suffixation.

In items (38–42), final preglottalized occlusives, pattern (A) above, are compared with their reflexes before vowels or other sonorants. Again, the order is peripheral to coronal. In each set, the exemplars in (i) illustrate occurrences of preglottalization of the particular occlusive in root- (and word-)final position. The exemplars in (ii) illustrate occurrences of suffixation to the root which hide the glottalization. (The glottalized form is considered primary rather than the plain form because of its extra set of forms.) The last example in each set shows an analagous form from another root which has no final preglottalization. Item (38) illustrates final labial preglottalized occlusives.

(38) Preglottalized final labial stops

(a) //bʉpʉ// 'cover over'

(i) TĀTĪ·NĪPŪ⁴P TĪNĪTĪ'·P

19.2-3/nb34:124.12

//ḍa-ḍii-ni-bʉpʉ ḍn-ni-ḍiiḥ//

when they covered their raw camas...

USIT-TEMP-PL.3-cover POSS.3-PL.3-raw.camás

⁵² At the same time, this last pattern must be distinguished from the preglottalization of suffixes, such as the causatives -ni or -wa, which may join to finals otherwise showing pattern (A) or (B).

- (ii) (A) Τάτιν ι Ρύρα'τ 40.11/nb35:103.11
 //ḡa-ḡii-ni-ḡub-a-t̥// (~ -//ḡ//)
 USIT-TEMP-PL.3-cover-stV-DUR
 when they were covering (it)
- (B) Τάντι=νι Ρύρ=νι 18.14/nb34:125:15
 //ḡa-m-ḡ-ni-ḡub-ni//⁵³
 USIT-IND-DIR.th-PL.3-cover-OBJ.3
 they would cover it ...
- (b) (Not preglottalized:) //k̥up̥// 'cut'
 Τῆ ḡόρ τυḡωά 75.1/nb34:109.5
 //ḡa-m-k̥up̥⁵⁴ ḡn-ḡ^a//
 USIT-IND-cut POSS.3-hair
 (she) would cut her hair
- The examples in (37) illustrate final preglottalized dorsals.
- (39) Final dorsal preglottalized stops
- (a) //wu.k̥// 'arrive, bring back'
- (i) Κιτινιωύ'ḡ αcνί 95.1/nb34:83.21
 //ḡ-m-ḡ-ni-wu.k̥ an-sni//
 AOR-IND-DIR.th-arrive DET-Coyote
 "they arrived back[.] Coyote"...
- (ii) (A) Κύc τᾱτι·νι'wu·κιτ τυ·τινιμά' 25.12/nb47:2.3
 //ḡus-ḡa-ḡii-ni-wu.ḡ-i-ḡ ḡu-ḡn-ni-ma// as they brought them back to their homes
 DEM.DIST—USIT-TEMP-PL.3-arrive-TRANS-DUR OBL-POSS.3-PL.3-house
- (B) Κυc 'αμο'κ̥ι υwu'qi 105.13/nb35:15.23-17.1
 //ḡus-an-muuk̥^hi u-wu.ḡ-i//
 that—DET-meat PRES.3.REL-arrive-TRANS
 that meat which he has brought

⁵³ It is not known why Ρύρ'νι is written on two occasions (39.13/nb35:99.9, 40.11/nb35:103.11). (The glottal stops are not repeated in J1945. Notice also that one was written on this form and then crossed out.) One possibility is the use here of the -ni causative instead of the -ni objective.

⁵⁴ This is in fact a neutralized form; //p̥/ here as the aspirated form is used to represent final neutralization, since /ḡ ~ p̥/ finally in this word, despite the fact that Jacobs writes <P> or ḡ. Better would be to write the form as //k̥up̥//, using the simple form <p> without any marking as an archiphoneme. However, much of what is written here is heuristic in nature; I am never far from a surface form. I ask the reader's indulgence in accepting such a dual-use form.

(b) //l̥uk̥// ‘pileated woodpecker’ (*Dryocopus pileatus*)⁵⁵

(i) α' λ' ό' q̣ κωι ήι κ' yu· 119.6/nb35:165.11
 //an-l̥uk̥ g̥'nik̥h—yu// the woodpeckers also
 DET-woodpecker—they—also

(ii) α' λ' ό' q̣ u lau'mTE ×4,99.1-4/nb34:147.5-19
 //an-l̥ugu. l̥aw-m̥di...// [(Oh) My bother!] Woodpecker! then ...

(c) (Not preglottalized:) //t̥mu-k̥// ‘be soft’

pu'nokman't̥mu'k̥ l̥ 24.18/nb46:196.3
 //pu-nuk̥h Ø-m-man-t̥mu-k̥// (where it) is a little soft there. then ...
 a.little PRES.3-IND-DIR.LOC.h-soft

Glottal stricturing is conveyed at the end of vowel preceding the syllabic close marking the end of the root. This position, at the end of the pitch-accented root vowel is thought to be maximally salient, second only to root onset. Since simultaneous glottalization is not “licensed” anywhere but in the root-onset, another form—the glottal catch of a raising and constricting larynx—has therefore taken hold at the end of the word and may be said to be “licensed” by its root coda.

The examples in (40) illustrate finally preglottalized coronal stops. Again, examples in (i) show the final glottalization of a coda segment in a root, while the suffixed examples in (ii) show a plain variant, usually before a sonorant.

(40) Preglottalized final dorsal stops

(a) //wut̥// ‘pull s.t.’

(i) κιπρωύτ̥ h̥ánti' 93.1/nb34:71.5f
 //g̥-d̥ii-wut̥ hants̥i'// when he pulled it to the side
 AOR-TEMP-pull (to).that.side

(ii) κuc' αντό' fαq̣ κιντωύτι 109.12/nb35:41.13
 //gus—an-t̥uɔq̣ak̥h g̥-m-d̥-wuɔ-i// that Mudfish pulled it in
 that—Mudfish AOR-IND-DIR.th-pull-TRANS

⁵⁵ The difference between **luk̥** and **lugu** is that the latter form represents 4 examples from Coyote's song. In the Coyote cycle, Coyote, caught inside a tree the mantra for his closing of which he has forgotten, begins to sing his power-song, calling out to his ally, τ̥άη κό'νε α' λ' ό' q̣u ‘my brother Lugu’. The sense is archaic and vocative or diminutive. (Bisyllabification has an apparently endearing effect in this language: cf. //t̥mu-k̥// ‘be soft’ : //t̥muwək̥// ‘Chinook salmon’.)

- (b) //diiṯ// ‘give s.t.’
- (i) *Tāni tī’ t kus’ amí’ m* 37.4/nb36:175.20
 //ḡa-ni-diiṯ gus—an-mim// they would give (it to) that person.
 USIT-PL.3—give that—DET-person
- (ii) (A) *táw’ ná tɪn tɪ’ tɑ kwɑm tɪ’ tɑ’ t* . 92.12f/nb34:67.17
 //tʰawná ḡn-tʰiṯḡa ḡa-m-dii[ḡ]-at// (~ -//aḡ//) One-legged gave (it to) me.
 one POSS.3-leg REC.PAST-IND-give-OBJ.1
- (B) *tɑn tɑn tɪ’ tɔp* 132.1/nb35:85.13
 //tʰ-am-ḡan-ḡii[ḡ]-uḡ// “I’ll give them to you”
 PRES.1/2-REL-DIR.LOC.th-give-OBJ.2
- (c) (Not preglottalized:) //tʰi’watʰ// ‘bucket’
- ... *tɪn tʰi’wat* 17.1/nb46:104.3
 //ḡn-ni-tʰi’watʰ// ... their bucket. then ...

The examples in (41) illustrate final preglottalized coronal affricates.

(41) Preglottalized coronal affricate

- (a) //ḡuutʰ// ‘fill’
- (i) *hác ’ anú’ wa kum Pó’ tɔ am p k é’* 111.11/nb35:51.3
 //has an-nuwa ḡ-m-ḡuutʰ am-pʰgi?// this country filled with water...
 AOR-IND-fill DET-water
- (ii) *kam rni mayi’ fɪ’ t kam Pó’ tɔ=ɪ amí’ m’ hác ’ anú’ wa* . 137.10/nb34:131.15f
 //ḡa-mi(i)-ni-ma-yii ḡa-m-ḡuutʰ-i// if they should come back,
 FUT.3-TEMP-PL.3-DIR.h-return FUT.3-IND-fill-TRANS people would fill this country⁵⁶
- (b) //ḡa-tʰ// ‘find’
- (i) *láu’ tɪ’ s tɑn tɪ’ tɑ’ t yɪ’ kɔn* ⁵⁷ 54.15/nb46:36.17
 //ḡ-m-ḡu-ḡa-tʰ// (~ //ḡaʔtʰ//?) maybe we will soon find (him)
 now-soon FUT.1-IND-PL.1-find perhaps
- (ii) *kú’ c tɪn tɔ tɑ’ tɪ t* . 38.8/nb35:137.11
 //ḡus—ḡ-m-ḡu-ḡa-tʰ-ḡ // “there we shall remain”
 that[.place]—FUT.1-IND-PL.1-find/be-DUR

⁵⁶ Jacobs has (from JH): “... , this land would become full of people.” If /tʰ/ is AUT, the latter is better.

⁵⁷ EH also has /-ḡaʔtʰ/ for ‘find’. /-ḡaʔtʰ/ in JH is extremely regular, /ʔ/ occurring 13/13; in /ḡuutʰ/, only 2/4 ft. The Twal. forms, *ɔáfɔɪu* and *ɔáfɔɪut* may suggest CK ? < PK \emptyset , with pre-CK *ḡaʔ-tʰ*. The glottal stop is replaced by length in (39b.ii); medial gemination was apparently blocked by the fricative, which then later dropped leaving only length. It’s not clear which glottal form is here.

- (c) (Not preglottalized:) //hiitsʰ// ‘fall (off)’

τάτι^hίτε λού'ντε ...

42:17/nb34:118.22

//ḡa-ḡii-hiitsʰ, law-mḡi //...

when it fell off, then ...

USIT-TEMP-fall.off then

The examples in (42) illustrate final bound clusters (nasal or liquid + occlusive) whereby the glottal catch has regressively appeared before the nasal and is thought to be simultaneously attached to both segments in the cluster.⁵⁸ (For discussion, see §3.4.3.) Again, the (i) examples show the feature.

(42) Final preglottalized occlusives in bound clusters

- (a) //yamḡ//

(i) τού' tɔumantɔyá'mḡ //tsʰuh tsʰ-m-man-tsʰi-yamḡ// 90:10
where? PRES.1/2-IND-DIR.LOC.h-DIR.wh-come.from
Where are you coming (here) from?

(ii) κίτυ^hάγḡμḡ //ḡ-ḡu-han-yamḡ-i// 115:3
AOR-LOC-DIR.LOC.h-come.from-TRANS
from where he had gotten...

- (b) //mantʰ//

(i) τσμα'ntʰ //tsʰ-m-mantʰ// 70:11
PRES-IND-try I'll try [= test] ...

(ii) (A) κινιμά^hντι //ḡ-m-ni-mantʰ-i// 66:17/nb36:173.11
AOR-IND-PL.3-try-TRANS they tried

(B) κυμά^hντατ //ḡ-m-mantʰ-a-ḡ// 140:9
AOR-IND-try-STV-DUR he observed ...

(C) κυμά'ντι' //ḡ-m-ni-ma[ʔ]ntʰ-i// nb85:56.23
AOR-IND-PL.3-try-TRANS he tried

Item (42b.iiC), however, illustrates a rare surface example of the feature, the occlusive constricted medially—that is, with the presence of a vowel suffix.⁵⁹

⁵⁸ I assume that the glottal is on the final occlusive if there is no evidence to the contrary. As previously noted, it cannot be on the nasal: (A) the glottal is sometimes written immediately before the final occlusive, and (B) there would be too many glottalized nasals in such positions.

⁵⁹ This is a one-word comment (noted as JBH by J.), on the page opposite EH's story which Jacobs was going over with JH. JH repeats EH's very bizarre double accent, though with the glottal

The data in item (43) show that the suffix *-ni*, a stem third-person object suffix noting non-durative behavior with applicative functions, behaves like any other suffix in blocking any final glottalization, just as those beginning with vowels. The nasal initial of the suffix, however, does not lead to a plain occlusive substitute for final preglottalization. Rather, it brings into action the CK rule of aspiration before consonants in any general clustering situation.

(43) Final preglottalized occlusives with *-ni* objective suffixation

(a)	(i)	κιντῖπλότ'q	/g-m-ḡ-p ^h lak'/ AOR-IND-DIR.thither-split	he stripped off ...	141:13
	(ii)	κῖτινῖπλότ'κνῖ	/g-ḡii-ni-p ^h lak ^h -ni/ AOR-TEMP-PL.3-split-SG.ACT.OBJ	when they plowed it ...	69:17
(b)	(i)	τιντυτό'q	/ḡ-m-ḡi-t ^h uk'/ FUT.1-IND-PL.1-make.fire	(we) will build a fire	113:5
	(ii)	τάτινῖτιτό'κνῖ	/ḡa-ḡii-ni-t ^h uk ^h -ni/ USIT-TEMP-PL.3-make.fire-SG.ACT.OBJ	when they built a fire	17:14
(c)	(i)	κῖτάτμι'λq	/g-ḡa-ḡ-milk ^h / ⁶⁰ AOR-CONTR-DIR.thither-swallow	(she) did(n't) swallow	132:3
	(ii)	τάνῖμι'λκνῖ	/ḡa-m-ni-milk ^h -ni/ USIT-IND-PL.3-swallow-SG.ACT.OBJ	they would swallow it ...	35:7

Nasals, though sonorant, generally act as other stops with regard to clustering even in their role as offglide to onset clusters. (In Chapter 3, it was seen that generally only aspirate and glottalized were allowed as first member occlusives in such clusters.) In (44) below, we see that finally-glottalized occlusives fail to keep their glottalization even before *y* as in the suffix *-ya*:

(44)	(i)	τυμῖκḡωί'τ	ḡu=mi-k ^h ɸit ^h ⁶¹ INF-drink	to drink	90:10
	(ii)	τυνḡκḡωί'τḡ	ḡn-k ^h ɸit ^h -yá POSS.3-drink-NOM	his drinking	115:3

It is noted, then, that, in general, finally-glottalized occlusives do not share the trait of initial simultaneously glottalized occlusives with regard to a position of left-hand

stricture normally not evidenced with such a suffixed vowel at all! This is a performance error, but possibly useful for purposes of illustration here.

⁶⁰ This is one of several examples suggesting the DIRECTIONAL.thither; Berman's (undatedb): -t^h-, is actually -ḡ-, with no need for metathesis.

⁶¹ Alternative spellings for this morpheme would be /-ḡwit/ or /-kɸit/.

5.3.5 Word-final irregularities

There are two types of residual problems with regard to the positing of final preglottalized occlusives to be taken up here. The first is a chronic problem of uncertain outcome, while the second shows how an apparent problem may not be so at all.

The first concerns a tendency for certain frequent morphemes terminating in what was surely originally underlyingly a plain $-/d/$ to undergo preglottalization word-finally, apparently in a pattern of neutralized free variation. Most remarkable of these morphemes is the set associated with the different forms of the durative morpheme, which vary across verb classes, generally by their *Aktionsarten*, and which may be of the forms $-/d/$, $-/d̥d/$, $-/d̥nd/$. There is also some variation dialectally and probably by speaker. Jacobs and Frachtenberg recorded the allomorphs $-/t/$, $-/d̥t/$, $-/d̥nt/$ ⁶² as well as the lenis form just listed. Frachtenberg tended to write these glottalized versions more regularly for Mary's River than Jacobs did for Santiam. They are considerably less frequent in EH. There is also an alternate form for the fossilized or archaic noun collective, $-/tsat/$ or $-/tsat̥/$, that suggests an archaic but similarly varying $-/tsad̥/$. Certain lexical examples, as in (38b.i) above, $-/t̥i'ʔ/$ 'give' (presumably) $-/d̥iit̥/$, also show this alternation in the common $-/d̥iit̥/$. This might suggest that the stability of glottalized word-final contrast is weak, especially in the coronals. On the other hand, if the segments checked for preglottalization are appropriate only to the root, then neutralized segments in these suffixes make no difference. Such a strict lexical interpretation would obviate the impression that the durative has been alloyed with a morpheme $/ʔ/$ which is essentially the opposite its opposite. (See the discussion of equivalently neutralized $/p/$ below.)

Forms that appear at first to be great problems often turn out not to be so at all. The verb $-/ʔuk̥/$ 'be hot' is extremely unusual in apparently manifesting simultaneous glottalization on the final occlusive on several occasions. A closer look at its occurrences in four of JH's ethnographic dictations appears to show something else.⁶³ Reviewing the forms with final glottalization shows the following:

⁶² Throughout this thesis, I have allowed these forms as allomorphs of the finally neutralized plain forms. The main reason for this is their commonness.

⁶³ The result shown here is tentative, based upon a fuller understanding of onset glottalization of word-initial particles which begin with vowels.

- (A) Glottalization appears before two suffixes with initial glottalization, the inchoative **-ýu** and the causative **-ñi** as in (46a) below.

(46) **-uk^h** 'be hot'

- (a) Glottalization coalesces finally from following initially glottalized resonants

(i) τὰτι·μα'ὐ'κῆγυ· 17.4/nb46:104.11
 //ḡa-ḡii-ma-uk^h-ýu// when (they) had gotten hot
 USIT-TEMP-DIR.h-be.hot-INCH

(ii) τὰνι'ὐ'κῆνι'λουί'αντα' 17.3/nb46:104.9
 //ḡa-m-ni-uk^h-ñi luý--an-ḡa//⁶⁴ they heated lots of rocks
 USIT-IND-PL.3-be.hot-CAUS lots.of--DET-stone

- (B) Glottalization appears initially before the determiner of a noun which forms a compound-like union with its attributive, 'hot':

- (46)(b) Glottalization coalesces finally from following initial prevocalic glottal epenthesis

(i) κὺς'ὐ'ὐ'κῆαντα' 17.6/nb46:104.15
 //ḡus--[ʔ]u-[ʔ]uk^h--[ʔ]an-ḡa// those hot rocks
 that--PRES.3.ATTR-be.hot--DET-stone

(ii) τὰνι'ῖω'ḡ τὸ'ὐ'κῆαμ'ḡ=ὐ'· 20.12/nb46:108.15
 //ḡa-m-ni-ῖsuuk^h ḡu-[ʔ]uk^h--[ʔ]an-ḡlu?//
 USIT-IND-PL.3-roast LOC-be.hot--DET-earth

(iii) τὰνι'ῖὐ'κῆαν τὸ'ὐ'κῆ_αskú'ḡ 27.15/nb85:56.15
 //ḡa-m-ni-ῖsuuk^h-n ḡu-[ʔ]uk^h--[ʔ]an-sḡuup^h//
 USIT-IND-PL.3-roast-OBJ.3 LOC-be.hot--DET-ashes

In the second and third of these constructions, the [ʔ]u- present attributive prefix has been exchanged for the ḡu- locative prefix and **-uk^h** behaves like the first part of a compound.

- (47) Prevocalic epenthetic glottalization (stricturing) before vocalic onset

κὺς'αντα' 17.7/nb46:104.21
 //ḡus--[ʔ]an-ḡa// the rock
 that DET-stone

⁶⁴ Some lexical items, like **luý**, show glottalization on the initial resonant about 25% of the relevant recorded formtypes. Because of the regularity, and perhaps inevitable influence from the finally glottalized resonant (attested 70% of the time; B.s.f.), I mark initial glottalization on such items.

In (47) we see that initial glottalization before the determiner occurs also following certain consonantal finals. Why glottalization appears consistently before some **an-** DET and not before others is not well understood. While stricturing does often appear before onset vowels following consonants closing previous syllables, as well as mandatorily between vowels of separate words, it would be disingenuous at this time to suggest that (46b) is a final analysis of /u^hk/.

5.3.6 Summary of word-final occlusives

There are five major types of word-final allophones in the final segments discussed above.⁶⁵ Listing them (without any theoretical implication whatsoever, beyond the uniqueness of the phonological domain), with <p> as general symbol, for K:

(48) Major allophone types of final occlusives

- (i) /p/ : [p^h ~ ɸ ~ ʔɸ ~ ʔp^h]
- (ii) /p^h/ : [p^h ~ ɸ]⁶⁶
- (iii) /ɸ/ : [ɸ]
- (iv) /p̥/ : [ʔp^h ~ ʔɸ]
- (v) /ʔp/ : [ʔp^h]

The type of laryngealization shown in (i) is that of total neutralization. The laryngeal feature has been cut from the segment. This a frequent pattern. A problem lies in determining if there is any distinction with (ii), which manifests only aspirate release varying with no release. The pattern in (ii) is perhaps most common. It is very likely that (ii) is a variation of (i). /ɸ/ is a special form seen only on segments such as ɸ or ɸ which, like l, suffix derivationally to the root. Thus (iii) can be accounted for by somehow marking the derived segments. This could be done nicely in the framework of lexical phonology—the reanalyzed root—which I have suggested for CK in §3.5.3. So it may be understood that while (i) and (ii) may be best thought of as a neutralized //p//, on a

⁶⁵ There are, unfortunately, doubtless many places in this thesis where they are not so marked.

⁶⁶ It might be thought that a separate group of naturally aspirating final offglides, i.e. /p^h/, should be made for the great number of forms having such finals. A close look, however, shows that where formtypes show sufficient variety, /p^h/ is part of (ii).

slightly different level, such suffixes as /b/ may be represented superficially as //b//. (Most if not all of (i) and (ii), as well as (iii), are doubtless //b// on some other, “deeper” level.)⁶⁷

While the case of variation in (i) entails final preglottalization by hazard, through lack of a distinctive laryngeal setting, the cases of (iv) and (v) entail final preglottalization by intent. It is part of the argument in this thesis that at the time of Contact, preglottalization was distinctively incipient word-finally in CK. This is the sense of (iv), where the general form is ^ʔK. This could be [^ʔp̚], a clearer form, or [^ʔb̚]—both representing what I write finally as //b̚//.

/ʔp̚/, relatively stable medially (as was seen in §3.5.2 in JH at least), may be transitional word-finally. I have little evidence for it at present word-finally.

In this section we have looked at several types of final occlusives, including those with aspirate offglide, final preglottalization, final unreleased plain. These are found to reduce to two or three varieties: final neutralization, final plain (as a special case in reanalyzed roots), final preglottalization (assumed here to be incipiently distinct), and immediately pre-final debuccalized consonants as glottal stops. This last form is probably not stable and varies between independent status as a glottal stop and final preglottalization.

5.4 Stem-medial occlusive phonation types

5.4.1 Introductory

Word medially between vowels lenis plain and aspirates occur regularly. Glottalized occlusives are relatively rare and must be treated separately as exceptional. I repeat their distribution given in (4), which is repeated below.

⁶⁷ This must be true, if only historically. The aspirated series is surely relatively recent in the history of Kalapuya. The first aspirate allophones were neutralized plain forms before other consonants and word-finally, just as such forms are aspirate now. A number of loans with consistent aspiration would impart the rest. The presence of an aspirate series does not make aspirate allophones underlyingly aspirate.

(4) Medial occlusives (before a vowel)

Plain:	b̥	d̥	(ɟ̥)	g	gʷ
Aspirate:	pʰ	tʰ	tʰ	kʰ	kʷʰ

The plain series is by far the most common type of occlusive to appear before vowels. Glottalized occlusives are generally found only as the onset to an accented root vowel, in its reduplicant, preglottalized in a word-final coda or where coalescence has occurred between an occlusive and a following glottal gesture. Medially we see them in this last form of coalescence, plus in a few rare preglottalized examples. In this section, I will follow the same, reversed order of §5.3 in presenting first the aspirates, then the plain examples, followed by a longer section which deals with the surfacing of different forms of glottalized occlusives medially.

5.4.2 Aspirate occlusives medially

Plain and aspirate forms demonstrate stable characteristics medially. The examples in (49) show bilabial medial aspirates. They are relatively few.

(49) Medial aspirates: bilabial stops

- (a) κινι κá'pa'ni 89.4/nb34:17.13
 //g-ni-kʰapʰaʔ-ni// (EH -kʰaʔa-) they *carried* (them) (= pack s.t. on one's back)
- (b) τυηά'pya' 44.13/nb36.15
 //ɟn-kapʰyaʔ// his *body* (also: *meat, flesh*)

The examples in (50) show dorsal medial aspirates.

(50) Medial aspirates: dorsal stops

- (a) αντάκιελ' τυμά· 90.8/nb34:23.11
 //an-ɟakʰiɛl' ɟu-maʔ// burning *bark*
 DET-bark OBL-fire
- (b-c) ωά' τάτυυ'κυν níκε·⁶⁸ 41.6/nb35:95.21f
 //waʔ ɟa-ɟa-ni-yukʰu-n nikʰii// would not *know anything*
 not USIT-CONTR-PL.3-know-OBJ.3 whatever
- (d) //laakʰaʔ-u(ʔ)// far away (ADV)

⁶⁸ CONTR ɟa → ɟi by *vowel attraction* through regressive assimilation from ni in the verb prefix.

The examples in (51) show coronal medial aspirates among stops.

(51) Medial aspirates: coronal stops

- | | | |
|-----|-----------------------------|--|
| (a) | 'α'noítá
//an-ńuytʰa// | 115.14/nb36:85
brown bear, Brown Bear |
| (b) | maʰi
//mah(-tʰii)// | 50.6/nb36:78.13
you (plural) |
| (c) | αmptóto'q
//an-pʰutʰuk// | 111.11/nb35:51.5
"oak puffball [or gall]" |

The examples in (52) show coronal medial aspirates among fricatives.⁶⁹

(52) Medial aspirates: coronal affricates

- | | | |
|-----|--|---|
| (a) | 'αη ka'watsá't
//an-gaawatsʰai// | 45.12/nb36:131.23
property, <i>valuables</i> |
| (b) | intɛmítɛstɪnt láu'
//θ-m-ɔ-mitsʰis-ɔndɔ́ láw//
PRES.3-IND-DIR.th-RUN-DUR now | 101.20/nb34:167.17
'...(he)'s <i>running</i> (there) now!' |
| (c) | Tumáitɛv'
//ɔu-maytsʰu(?)//
OBL-tomorrow(.morning) | 119.8/nb35:165.15
on <i>the next day</i> (ADV) |

5.4.3 Plain occlusives medially

Now, compare those examples with the following examples of stem-medial plain forms in three positions of articulation (53–55). We have seen plain forms regularly initially and irregularly finally. They are quite regular, in fact the most common form medially.

(53) Medial plain forms: labials

- | | | |
|-----|---------------------------------------|---------|
| (a) | -héeɫupa't
//héeɫuɔ-a-i// (~//ɔ//) | be sick |
| (b) | -háɫɪntáú
//háɫɪ-n-tsʰaw// | be poor |

⁶⁹ The lexical items given here are further segmentable, though their integral use obviates this.

- (c) *ἠαῖπᾰμ*
//həɪpam// upriver; Halpam, Santiam
- (54) Medial plain forms: dorsals
- (a) *-τῶαγαλῦ* /-tʰəgəlu/
//tʰəgəl-u// (be) dried
- (b) *-ἴσκατ*
//i-sg-a-ɟ// creep, sneak up on
- (c) *-ᾠτᾠα* /-gəɟga/
//gud+g-a// arise, get up
- (55) Medial plain forms: coronals
- (a) *-ἠῶτῦματι* /həɟu-məɟi/
//huud-u—mɟi// saw then
- (b) *-τίτῦρ*
//ɟiɪd-uɐ// gave (it, one) to you
- (c) *-κότῦρα*
//guudɐ-a// sweathouse; sweating

There is no affricate here because only in a voiced environment (such as we see below in 5.4.5) can there be any distinction with aspirate.

5.4.4 Glottalized occlusives medially

There is no distinct construction for medial glottalization. Yet one finds a variety of examples of different kinds of glottalization, often of only a few each, showing that glottalization is not forbidden medially. The varying types, from simultaneous glottalization of Types 1 and 2 reduplication, simultaneous glottalization from coalescences, preglottalized occlusives from historical degemination, preglottalized root-final occlusives from Type 2 reduplication (especially onomatopoeic), preglottalized resonants, and the rare independent glottal stop (especially in a penultimate segmental slot in the root), call for special care in their writing.

Simultaneous glottalization from reduplication has been discussed among the root-initials in §5.2.5. In (56a–c), we see examples of medial glottalization from glottalized resonants. Medial glottalized resonants are very common.

(56) Examples of glottalized resonants medially

- (a) *aŋgú'ya* //an-guy-ýa// mortar nb86
DET-grind-NOM
- (b) *κúçκιντινικwá'fa'la.ta'*⁷⁰ 37.12/nb46:114.3
//gus-g-m-dn-ni-{k'ap-a-laat'a?}// ("it was their packing-thing"
DEM.DIST—AOR-IND—POSS.3-PL.3-{pack-STV-tool} {thing [or 'tool'] used for 'packing'}
- (c) (i) *βινιμαβι'lk'yu*⁷¹ nb47:132.13
//b-m-ni-ma-p'ilk-ýu// "they rolled [the hoop]"
MYTH-IND-PL.3-DIR.h-roll-INCH
- (ii) *δανιμαπι'lk* nb86
//da-m-ni-ma-p'ilk// "roll along"
USIT-IND-PL.3-DIR.h-roll

Inchoative //ýu// (like the passive //ýuk//) is an 'outside' stem suffix. It does not effect a change on the stem causing final occlusive preglottalization to disappear as do 'inside' stem suffixes. In (56c.i), we see such final preglottalization together with the glottal gesture of the suffix. (Compare (c.ii) without the suffix.) This is not unusual and can even be heard on the tape.⁷² In (57a) and (b), we see examples of such coalescences before the common causative suffix, //wá//.

(57) Glottal coalescences before -wá

- (a) *βτισκwí'lt'wani*⁷³ nb46:174.22
//b-dii-sk'ilt-wa-ni// "when he untied" (EH)
MYTH-TEMP-untie-CAUS-OBJ.3
- (b) *κúçláu' incnípwá* nb47:30.5
//gus-la-w-θ-m-snip-wá// "dead to the world" (EH)
that.one—now—PRES.3-IND-knocked.out(?)—CAUS

⁷⁰ In fossilized expressions (at least), the *l* of *-laat'a?* is apparently replaced by *l*.

⁷¹ JH, reviewing EH's language at J.'s request, is here apparently borrowing his mythological past—here, by EH, *βινιμαβι'lk'yu* (nb47:133.13).

⁷² [*tsé'yu*] //tsi?—ýu// 'me, too', S-M184. Here //—ýu// represents the clitic 'also'. (I have not been able to determine the phonetic distinction between the inchoative suffix and this enclitic, if one exists.)

⁷³ JH is correcting EH's dictation here, suggesting the non-durative *-ni*. EH has *βτισκwí'lt'wani*. Other examples of EH also show coalescent glottalization in //sk'ilt-wá//.

The fact that we do not know if (57b) is finally glottalized or not, for example, is not generally relevant, since coalescent glottalization, as we have seen in (56c.i), does not generally regress beyond the occlusive.⁷⁴ Likewise, preglottalization does not progress to become simultaneous. They appear to be separate systems—one (simultaneous glottalization) dealing with occlusives of the onset, while the other (final preglottalization) deals with occlusives of the rhyme.

In (58), we see three examples of coalescences of glottalized resonant and medial occlusives, surfacing as simultaneously glottalized [p̚].

(58) Assumed coalescences of glottalized resonant and medial /p/ (or //b//)

- | | | |
|-----|--|-----------------------------------|
| (a) | κυc'α'wáβ̣=ya
//gus—an-wápya// ⁷⁵
that—DET-(little.)child | 42.15/nb34:119.17
“that child” |
| (b) | ts'a'laṃp̣ya' ⁷⁶
//ts'aalaṃp̣ya?// | nb47:96.12
“hollow tree trunk” |
| (c) | -tsa'ḳuβ̣ḷu' τoṃp̣ya'̣ḷ
//ts'aaḳ ^h up̣lu?̣ ḡn-p̣ya// | nb47:71.25
strawberry vine |

The fact that all three examples are of /p/ (presumably, underlying //b//) in (58) leaves open the possibility that labial occlusives may in fact occur as simultaneously glottalized occlusives medially. (I have not done an exhaustive search of exemplars here.) However, with the exceptions of the two forms in (64) below (and the footnoted EH form), to my knowledge, *simultaneously glottalized occlusives are not found directly before any late stem vowels*. Coincidentally, it was noted that only [p̚] and [t̚] are found as coalescences at the verbal prefix junction. This is clearly a result of the fact that only the plain obstruents //b// and //g// can occur at the end of the verbal prefix. Ultimately, we must conclude that, generally speaking, with the exception of a very few independent glottal stops as penultimate segments, *there is no non-root-/word-final example of /ʔ/ (or /ʔ/) stem-medially that cannot be construed to be part of Ṛ*.

⁷⁴ There are some exceptions to this, such as -ỵu INCH.

⁷⁵ While the glottalization on the /p/ is regular, that on the initial resonant β̣w/ is written 6/14 f.t. times for JH and 9/22 f.t. times for EH (a difference of only 2%).

⁷⁶ This example (as B. notes in his s.f.) is crossed out by J. Perhaps JH did not feel comfortable with it. EH's original is τu ts'a'ulaṃp̣ya', 'in (the) ...'.

Examples of unusually consistent finally preglottalized occlusives may mean that there is a glottal stop //ʔ// just before the final consonant. However, the examples in (59) show how the tendencies for any final glottalization are greater in JH than in EH. It may be that //ʔO_b// alternates with, becomes, or degenerates to //ʔ_b//. In (59a), the JH form for 'mouth' appears to require a full penultimate glottal stop; in (59b) it may require occlusive final glottalization. In each case, EH is one notch less glottalized than JH. However, here, as with other general patternings, the form in EH helps shed light on the real underlying form for (59a)—which must be //bʊtsʰ//. (The Twalatin form in (59a.ii) without //ʔ// suggests that the underlying form suggested for EH may be better for CK.)

(59) Final glottal stop as penultimate segment

- (a)(i) $\tau\upsilon\tau\iota\nu\iota\phi\acute{o}\tau\varsigma$ 36:3/4//nb36:179.1/5
 /du-ɖn-ni-bʊʔtsʰ/ (ʔ13/13) (EH: //bʊtsʰ//, ʔ2/8) in their mouths/out of their mouths
 OBL-POSS-PL.3-mouth
 //bʊʔtsʰ// ~ //bʊtsʰ// mouth
- (ii) (Twal., LK) $\delta\acute{\alpha}\mu\beta\upsilon\tau\epsilon$ //ɖan-bʊtsʰ// my mouth
- (b) $μα\acute{\tau}\tau\alpha\nu \acute{\eta}\alpha\varsigma \alpha\nu\acute{\omega}\nu\alpha \kappa\upsilon\mu\phi\acute{o}\tau\epsilon \alpha\mu\phi\kappa\acute{\epsilon}$ ⁷⁷ (ʔ2/4) (EH: //bʊtsʰ//, ʔ0/4)
 //mɑɖɸan has an-nuwa ɖ-m-bʊuʔtsʰ an-bɣiʔ// 111.10-11/nb35:51.3
 "all this land was filled with water"

There are only a few incidents where Jacobs chose to write a weakened vowel after a glottal stop. Almost all occur in the first week he elicited CK material from John Hudson in Notebooks #33 and 34. (See items (62) and (61), respectfully, below.) He also put them after the glottal stop before τ and a few other consonants. These schwas were obviously meant to be distinct from α , Jacobs regular way of writing ə ; we may assume that he wished to indicate excrescent vowels with no moraic quantity. Of special note is (60), /- $\text{g}\epsilon^{\text{ʔ}}\text{ts}^{\text{ʰ}}$ /, 'make, do', which Jacobs wrote with a schwa through the end of Notebook 33 (his first week with JH). During dictation of his first story, however, on p. 23 of Notebook 34, he crossed out the schwa, and it never appears again. In the B. slip files, not one out of 30 formtypes has a schwa. Nevertheless, the repeated forms showing $\text{ʔts}^{\text{ʰ}}$ +suffix tells us that a penultimate glottal stop is surely involved, as in (60.iii). (Note the morphophonemic change $\text{ts}^{\text{ʰ}} \rightarrow \text{s} / -\text{n}$ (or any obstruent).)

⁷⁷ /mɑɖɸan/ 'all' probably has rhetorical lengthening.

Other examples of a schwa before a glottal stop or glottalized consonant are more rare. In (62), I include two from a list Jacobs made the first morning he worked with John Hudson (30 January 1928). In both examples, the words are written twice, both without and with the schwa. Although for the analysis given here (where $\text{?} \in \mathbf{R}$, the set of all resonants) it makes no difference, I doubt that these excrescent vowels before glottal gesture are significant.

(62) Mistaken examples for penultimate glottal stop

(a)	$\alpha^t wa' \text{?}$	$/\text{?}n\text{-}iwa\text{?}/$	$//an\text{-}iwa\text{?}//$	$(\sim //iwa\text{?}//\text{?})$	nb33:52.16-17
	or $\alpha^t wa' \text{?}$		red fir		
(b)	$\alpha m \text{?} la$	$/\text{?}m\text{-}mu\text{?}la/$	$//an\text{-}mu\text{?}la//$	$(\sim //mu\text{?}la//\text{?})$	nb33:53.5
	$\alpha m \text{?} \text{?} la$		crow		nb33:55.21

As far as is known to this writer, these are all of the occurrences of $V\text{?}C$ in JH's CK. Other possible examples of $V\text{?}V$ in CK (like EH $-ni\text{?}$, 'pestle') are rare; even VCV is rare as well⁸¹—despite such forms frequently occurring in neighboring Sahaptin ($V\text{?}V[V]$) or Takelma (VCV). Only in very few cases in CK, especially where a full glottal stop (often a presumed debuccalized consonant) occurs as penultimate segment, plus rare examples as in (64), is a glottal stop before a final occlusive in any way not part of an allophone of that occlusive.⁸²

One of the more interesting variations occurs in (63) with a suffix $-[i\text{?}]$, or more probably $-[i\text{?}i]$, that is likely an old pan-Northwest diminutive suffix. (Compare the NP referential familial suffix $-i\text{?}$ (Aoki 1994); $-i\text{?}$ diminutive in Karok, Yurok, and (along with $-i\text{?}$) in Wiyot (Haas 1970); $-i\text{?}$, $-i\text{?}$, $-i\text{?}$ diminutives in Nootka (Sapir 1915a).) The easiest way to analyze this is to assume that the initial glottal is also on the Panther suffix.

⁸¹ $V\text{?}V$ includes place names like $k^u\text{?}us$ 'people of the central/south coast, Siletz' and probably $/ts^a\text{-}w\text{?}ogot^{\text{?}}/$ for the lower Mohawk Valley (Gatschet 1877d:69); also VCV for $i\text{?}mat$ 'Klamath', $i\text{?}gadot^{\text{?}}$ 'Klickitat', and few odd words like $h\text{?}pun$ 'behind', $-m\text{?}yuus$ 'hat', $-s\text{?}awal$ 'tarweed seed'. This pattern does not really exist in CK, though it does in Twalatin. Thus a glottalized vowel pattern for final glottalization does not work for CK. (Compare the examples for Coast Tsimshian in §5.5.4.)

⁸² Nor have I seen any evidence of an infixing glottal stop like that which functions in numerous Salishan languages as an inchoative. It is not known if the punctual $-^{\text{?}}$ suffix, suggested by F. to suffix to ends of verbs, occurs in CK anywhere but the very end of a word, perhaps always following a vowel. (This would make a huge and important project.)

(63) Panther diminutive

- | | | | | | |
|-----|------------------------|---------------------------------------|---------------|---------|----------------|
| (a) | ən h ^o ʔ ts | [ənh ^o ʔ ts ^h] | //an-hu-ʔs// | panther | 103.4/nb35:3.1 |
| (b) | h ^u -ʔic | [h ^u ʔis] | //hu-ʔs-ʔis// | Panther | nb82 |

The diminutive suffix brings the two kinds of medial glottalization next to each other. Of course the coalescing glottal of the suffix, becoming simultaneous on the affricate, wins out. The preglottalization drops before the suffix, as is the regular suffixal pattern.

Even apparent exceptions in JH to the types of derivations we have been doing may have solutions. Notable are two forms in (64). In (64a), glottalization cannot be attributed to the botanical suffix *-//1//* suffix, known to be plain. Nor can an analysis via a glottal from a penultimate debuccalized consonant, i.e., *-ʔs^h-*, work, since this would not lead to simultaneous glottalization. I attempt to explain this by assuming a form derived from an underlying verb *//ʔsa-//* 'weave' not otherwise found. In (64b), I assume a Type 2 reduplication (probably common among nouns for living things).

(64) Irregular medial glottalization

- | | | | | |
|---------|--|-------------------------|--|---------------------|
| (a) | ʔm u ^ʔ ʔs ^h a l | /-muʔs ^h al/ | rope | 31.15/nb35:107.1 |
| | //an-mi-ʔsa-l// (cf. <i>-ʔsa-b-u</i> 'soft bag', <i>-ʔsa-b-ik^h</i> (EH) 'braids' weave-NOM-) ⁸³
DET-NCONJ-weave(?)-PL | | | |
| (b) (i) | ən t ^ʔ a ^ʔ t ^ʔ a l | 101.1/nb34:159.21 | (ii) ən t ^ʔ a ^ʔ t ^ʔ a l | (EH, nb47:75.17) |
| | //an-ʔsa+ʔsa-l// | rosebush | | thornbush, rosebush |

The forms in (64) are likely produced by changing derivational morphology. That they are found demonstrates that medial glottalization is not prohibited in CK. It also shows that there are no normal structures to generate it. These examples constitute the few cases of medial simultaneous glottalization known not before resonants. If glottal stops enter the system of final preglottalization via debuccalization of different kinds (e.g., of penultimate obstruents), they are unlikely to be stable. Just as there is apparently no phonological difference between the string *ʔR* and the phoneme *Ṛ* (or final *Rʔ*) in CK generally, it is questionable the extent to which there is a true distinction between *ʔK* and *Ḳ* or between *ʔF* and *Ḟ*. There are a few glottal stops that occur

⁸³ The nominal conjugating particle, at the right end of verbal prefix, generally *-mi-*, acts as a kind of modal attributive here, in the sense of English *being, used as*. Note one f.t. (only in EH) of *m^ʔausa* "hard arrow wood, used for arrowheads", vis-a-vis (EH) */-t^ʔawsak^h ~ -t^ʔawsa^ʔ ~ -t^ʔawsa/* 'arrow'.

penultimate to final obstruents and therefore I represent them as distinct. An example, such as in (59a), may suggest that there is some (free) variation here with preglottalized finals. One thing that can be said is that both final and simultaneous glottalization holds very well on the affricates.

5.4.5 Voicing in CK

Partial to full voicing ([**ɸ** ~ **ɸ̥** ~ **b**]) of occlusives is optional in CK when an occlusive follows a nasal and comes before a vowel. Only two possibly voiced obstruents have been heard, **d** and **b**, in verbal prefixal and suffix environments. On the Swadesh-Melton tape, most of occurrences in the nasal—vowel environment merely give a more distinctly plain or lenis sound to the occlusive. Occasionally, voicing is heard. In (65) below, we hear the second attempt of John Hudson, now 85 years of age, impressionistically:

(65) Partial voicing of occlusive

"I will tell you."

S-M62

[tʰɛ' dʰm.niʃ.dʰm.b̥ ɔ̃]

//tʰɪʔ dɑ-m-niʃ-d-n-b̥uy//

I FUT-IND-tell-DUR-OBJ.3-OBJ.2

(66) Full voicing of occlusive

"He went back there."

S-M103

[gun.tʰɛ—gun.tʰɪ.gu—gu.gn.dan.tʰɪ—gu.gn.dan.tʰɪ]

//g-m-d-[ʔ]i ... g-m-d-[ʰ]i—gu ... gu—g-m-dan-d-[ʰ]i ... gu—g-m-dan-d-[ʰ]i//

AOR-IND-DIR.th-go...AOR-IND-DIR.th-go—(over.)there...(over.)there—AOR-IND-DIR.LOC.th-DIR.th-go...

...(over.)there—AOR-IND-DIR.LOC.th-DIR.th-go

It is clear from his voice during the hour recording that going over the CK words with Swadesh and Melton was a bit of an emotional rollercoaster for John Hudson. The item in (66) he began quickly, interrupting himself twice; the last time was a repetition of the third. His intonation went up on the first start, allowing the coalescent glottalized particle and onset to be heard easily. On the fourth, he was coming down hard; only the slightest stricture could be heard but the voicing is clear.

Devoicing of liquids following a fricative or affricate is clearer than voicing. Two examples are given in (67) from the Swadesh-Mellon tape.

(67) Full devoicing of resonant (liquid)

- | | | | |
|-----|------------------|---------------------------|--------|
| (a) | “soon” | | S-M170 |
| | [dʃ̥.s̥.t̥u] | //dis-l̥w// ⁸⁴ | |
| | | soon-now | |
| | | | |
| (b) | “buttocks, butt” | | S-M328 |
| | [dʊn(d).s̥ʰt̥ʰ] | //dn-t̥li?// | |
| | | his-asshole/anus | |

(I cannot tell if the glottalization I hear as aspiration initially on the second syllable is important for this devoicing or not.) Voicing and devoicing take their major cues or triggering from the consonant preceding the one voiced or devoiced. This is progressive assimilation to voice. (Other CK processes, such as glottal coalescence or nasal and fricative assimilation to place, are triggered by segments following—anticipatory or regressive assimilation.)

5.4.6 Summary of medial occlusives

We have seen that plain and aspirate medial occlusives occur regularly in medial position in extended roots and before suffixes. The occlusives in these two laryngeal series behave similarly to each other and generally in the same manner as they did initially. They are distinct with regard to final occlusives, however, in the sense that in final position, plain and aspirate types tend to neutralize (to aspirate). (Plain finals occur only for a small subgroup of lexical items.)

With regard to glottalization, however, the picture is very different. Whereas initially simultaneous glottalization naturally occurs at root onset, medially such glottalization is confined to reduplication or coalescence. Because these are derived processes, I have not included a glottalized series in the medial occlusives summary in (4) of §5.4.1. However, *two different types of glottalization are occurring at the same time: simultaneous glottalization* on initial occlusives occurs in root onsets, and medially in the reduplication of onsets and roots and in coalescences with the glottal gestures of following glottalized resonants; and *preglottalization* occurs on occlusives medially from historical degemination, as we saw in Chapter 3 (§3.5.2). In (68) below I repeat part of (47) from Chapter 3. Note the speech of John Hudson.

⁸⁴ It may be that the glottal gestures, particularly initially, do not apply with this compound ADVL.

(68) Twalatin plain occlusive geminates with CK cognate reflexes (major allophones)

	(i) <u>Twalatin, Pre-CK</u>	(ii) <u>CK (EH)</u>	(iii) <u>CK (IH)</u>	<u>gloss</u>
(a)	- ^ʔ yúggun	- ^ʔ yúk ^h u(n)	- ^ʔ yú ^ʔ k ^h u(n)	know, learn (s.t.)
(b)	- ^ʔ wáddik	- ^ʔ wáḍək ^h	- ^ʔ wá ^ʔ ḍə ^ʔ k ^h ⁸⁵	piece of wood

Preglottalization also occurs on final obstruents. However, when roots containing such final obstruents are suffixed, the glottalization disappears. Apparent exceptions to this are assumed to give evidence for the glottal stop as penultimate segment in an **RO_b** root-final cluster.

We may represent preglottalization by ʔC ; this is the general form of medially glottalized resonants as well as of all finally glottalized obstruents. Whereas Ḳ , the simultaneously glottalized occlusive, occurs at the onset of the root, ʔC is the system of the end of the root, where this is also the end of the word with preglottalization or glottal stop-obstruent clusters, or in a suffixed stem involving glottalized resonants or glottal stop-obstruent clusters. Where both systems occur fortuitously, namely stem medially, it becomes difficult to represent them at a certain level in a way that also shows their surface form and their origin: //Ḳ// in this sense is meaningless stem-medially, though perfectly meaningful either root-initially or root-finally. To use a metaphor, the root onset or simultaneous pattern and the root coda (continuing the analogy of the root as a syllable) or preglottalized pattern are fighting it out in the middle.

While spontaneous glottalization has more energy, preglottalization has much reserve. Three examples illustrate glottal gesture regression in CK, which parallels the preglottalization system, though only one of the examples produces preglottalization while two produce pseudo-simultaneous glottalization or coalescence. (a) Glottal coalescences happen because the glottal gesture has moved back from before the locus of a glottalized resonant, for example, onto a preceding occlusive. (b) Similarly, the glottal gesture from a preglottalized occlusive in a bound cluster moves forward to just in front of the resonant partner in the cluster, yielding cluster preglottalization.⁸⁶ (c) Another

⁸⁵ This example, probably //wáḍək// , illustrates the effect of glottalization spreading, where one and especially where two features of glottalization already exist in a lexical item. Cf. $[\text{g}^{\text{e}}\text{m}^{\text{e}}\text{w}^{\text{e}}]$ 'eight', probably $\text{//gimi}^{\text{ʔ}}\text{-wi//}$, #26 on the S-M tape.

⁸⁶ It should be noted that while types (a) and (c) here have been demonstrated in the examples, only the result of (b) has been shown, while its actual process is inferred or hypothesized.

similar pattern moves the strong epenthetic glottalization acting as a root onset forward across the verbal prefix boundary to coalesce with a prefix-final occlusive. While example (b) is clearly a preglottalization pattern, (c) is basically a spontaneous glottalization or onset pattern, while (a), the medial pattern, shares of both. The next section looks at parts of this battle in closer detail.

5.5 Glottalization in CK

5.5.1 Introductory to this section

One of the aspects of CK segmental phonology addressed by this thesis is that of the forms of glottalization as recorded for the language. There are two main types: (1) the weak simultaneous glottalization which is found on root-initial occlusives (and their reduplicants) as well as cases of coalescence (an occlusive plus a following gesture of glottalization or stricture, e.g. from a following preglottalized resonant)—both represented by apostrophes over occlusives in Jacobs notebooks; and (2) the glottalization of a brief sphinctering of the outer vocal folds or perhaps a mere constriction—short glottal-stop type—whether before a resonant in medial position, an obstruent in (root/word-)final position, or a degeminate occlusive medially; or following a resonant in final position; or as an independent glottal stop of epenthetic (as root or particle onset) or historical origin (penultimate or final segment of the root). These are all represented by apostrophes in Jacobs notebooks.⁸⁷ This section will expand on the typology of laryngeal types developed in §5.2.1 including thoughts by Jacobs, carefully list the varieties of CK glottalization by segment types, and discuss possibilities of a theory of finally preglottalized obstruents in CK. It is felt that preglottalized obstruents, a possibly contentious type of segment in this thesis, require special handling.

5.5.2 Review of the laryngeal types of CK segments

The segments of Central Kalapuya have two phonation types among resonants and fricatives, plain and glottalized, and three among occlusives, including aspiration as well. This subsection reviews the summary of §5.2.1, including thoughts of Jacobs concerning CK phonation types and the insights of the system of writing he used, Boas et al. 1916. Aspiration being relatively straightforward as a phonation type, we will be

⁸⁷ They are also apostrophes in Jacobs 1945, to the extent that they have not been excised.

dealing here with the implications of CK plain and glottalized occlusives. Also discussed is the motivation for the CK font used in this thesis.⁸⁸

It often escapes the individual of European or North American background that languages with three or more laryngeal series (or phonation types) are qualitatively distinct phonologically from those with only two. That is, the phonological space carved up by segments laryngeally in three (or more) ways is quite different from that which is two-way distinctive. This thesis uses symbols for each laryngeal type whereby each has its own identifying diacritic. For example, the lenis-plain series uses a distinct character type consisting of a normal roman voiced character together with the diacritic of a tiny underlying circle (◌̣). I do not regard any of the three types as in some way underlying or unmarked.⁸⁹ The phonological space of each type is at once unique and wholly dependent upon the other(s) in helping to categorize the ways in which it is distinct from the others. (This allows for a form such as /p/ to act as a neutralized form without any of the laryngeal qualities of **p̣**, **p̚**, or **p̤**.)

Jacobs referred to the plain stops in CK as “intermediates”. This term was used in the pamphlet of a committee of the American Anthropological Association formed in 1912 to draw up a phonetic system for transcribing American Indian languages.⁹⁰ The committee was chaired by Boas but dominated by Sapir. The system presented in its “Report”, issued by the Smithsonian in 1916, was followed by Jacobs throughout his professional career, well after it had been to some degree supplanted, for example, by

⁸⁸ An earlier version of this thesis developed featural distinctions for the sounds of CK. Thus the weak simultaneous glottalization of syllable onsets is STIFF and in complementary distribution with the CONSTRICTED glottalization of CK final and medial preglottalized obstruents and glottalized resonants. STIFF/CONSTRICTED occlusives are opposed to the SLACK nature of lenis plain occlusives and to aspirated or SPREAD occlusives in initial positions and medial positions. See Howe and Pulleyblank 2001 for a discussion of the complementary distribution of pre- and post-glottalized segments of Northwest languages.

⁸⁹ This, of course, flies in face of my diachronic observations, which are of another line of inquiry altogether. Here I am speaking strictly synchronically and psychologically.

The set of symbols used by Western linguistics is distinctly prejudiced in having only two kinds of basic symbols, which represent the phonation types voiceless and voiced. It is no accident that both in explaining their notation and in discussing “the phonemic principle”, the IPA handbook uses as examples the languages English and French to contrast, where aspiration, for example, does not matter (IPA 1999:18f, 27f). “The IPA aims not only to provide symbols which can unambiguously represent phonemic inventories, but also to be able to represent details of phonetic realization” (IPA 1999:28). In this last aim, of course, I have no quibble, but in the former, there is a half-truth. The simple 4-way system of Hindi occlusives, for example, cannot be represented without diacritic marks as they elegantly are in native *devanāgarī* systems.

⁹⁰ Boas et al. 1916. For background, see Bright 1989/90:(V:1):149f, Darnell 1998:195f.

Herzog et al. 1934. Surely the strongest reason for this was that no new or better symbols emerged which Jacobs could use to represent Northwest plain consonants. Although intermediates are not discussed in Herzog et al. 1934, by that time the use of small capitals (e.g., **B, D, G**) for “intermediates” was waning. Sapir, for example, in his 1912 grammar of Takelma, used **b, d, g** in this way, simply labelling them “voiceless media” (Sapir 1912:31). But Jacobs was obsessed by phonetic correctness. And this third phonation type appeared to have its truest representation in CK.

We may say that Kalapuya has a true intermediate series, which in the lower dialects tends toward sonancy. (Jacobs ca. 1930[:32])

Boas et al. 1916 were clear in their intent to mark a distinct phonation type.

In many Indian languages sounds occur that to the English ear appear now a surd and now a sonant. These stops are called intermediates, and should be consistently represented by definitive symbols. Small capitals of the sonant symbols are recommended for these. The ordinary *b, d, g*, may be used when only intermediate surds and not sonants occur. [...] Unaspirated surds are usually difficult to distinguish from intermediates. (Boas et al. 1916:4)

This lack of difference between “unaspirated surds” and intermediates eventually led to these latter being ignored. But in a 3-way phonation system, they are of great importance.

In the case of stops and spirants, where distinct characters are used for corresponding voiced and voiceless forms, the small capital is to be used to indicate a surd-sonant intermediate (intermediate consonants here include voiceless consonants pronounced with stress ordinarily characteristic of sonant consonants, also surd consonants that are sonant at the moment of release). Thus, **G** indicates the intermediate between sonant *g* and surd *k*; [...]. (Boas et al. 1916:10)

The two types of intermediates given in the parenthetical clause are suggestive of two different systems. The first, “voiceless consonants pronounced with stress ordinarily characteristic of sonant consonants”, suggests the lenis characteristics of low tone-inducing consonants in 3- or 4-way systems common in East Asia, such as onsets to Burmese syllables carrying tone 1 or the lenis plosives in Korean⁹¹. The second, “surd consonants that are sonant at the moment of release”, suggests a 2-way system in a language like French and English with late voicing—close to 0 voice-onset time (VOT). 3-system CK with its fortis-lenis-unaspirated contrasts is more similar to the first

⁹¹ Hyun Bok Lee, in writing Korean (in narrow transcription) for the *IPA Handbook*, actually uses the same **ɸ**-system as is used here (IPA 1999:123).

situation. Intermediates were found to be one of “Four main types of articulation ... recognized for the stopped and affricative consonants of each position; the sonant, the surd, the intermediate ..., and the aspirated surd ...” (Boas et al. 1916:11). Jacobs used voiceless small capitals for most of his Kalapuya career; later, in the 1930s, he switched to voiced forms for CK plain.

Frachtenberg (who recorded 12 notebooks with William Hartless’ Mary’s River dialect dictations, 1913–1914) unfortunately did not generally distinguish between aspirated and plain consonants in his transcriptions. Jacobs notes that on occasion, however, Frachtenberg sometimes writes C· for Ç as an indication of palatalized consonants—a notation which Jacobs recognized as simply intermediate.

Hajda (1976:29–30) suggests that “Intermediates generally do not occur preceding stress; they tend to vary with unglottalized stops whenever they occur.” While it is true that intermediates are by far the most common type in unstressed environments (they are virtually the only laryngeal type of occlusive in the verbal prefix, for example), this statement is quite incorrect—as we saw above in examples (12–19).

To summarize plain occlusives, it should be clear that a 3-way laryngeal system is very different from a 2-way system. Jacobs continued to write small capitals for “intermediates” not only because the system of Boas et al. 1916 used it but because he, as a student of the phonetics of numerous Northwest languages, clearly felt the need for a third form to represent lenis plain occlusives or plosives. Finally, it is the view of this writer, gleaned from teaching different languages to different cultures over nearly three decades, that although lenis plain plosives may technically be written with symbols like [p], they will be better understood by Western readers with symbols like [b] which do not bring along the Western baggage of subconscious aspiration with it.

The kind of glottalized occlusives found in CK are also unusual. These simultaneously glottalized segments are but *weakly* glottalized. They

often seem merely extra sharp and crisp intermediates; they do receive a weak and usually almost inaudible crackle; they are emphatically never “fortis” or exploded. So mild is their utterance that the unwary auditor—all of us have been very often quite unwary—may confuse them with intermediates.

(Jacobs ca. 1930[:33])

In the Northwest Linguistic Area, weak or lenis glottalization is observed in the north in Tsimshianic (see, e.g., Tarpent 1987:35f for Nishga). It is found in the southern area in Shasta (Silver 1966:30) and Wintu (except for q ; Pitkin 1984:27–28) and probably in other California languages.

Simultaneous glottalization (e.g., $[\text{p}^h]$) and word-final preglottalization (e.g., $[\text{p}^w]$) are in complementary distribution. In the first case, a weak glottalization is simultaneous or coterminous with lingual expression and release; in the second, a short glottal stop occurs just prior to the final (usually released) obstruent. A plain occlusive will coalesce with an immediately following glottal stop or gesture, even across the verbal prefix boundary, producing simultaneous glottalization.⁹² Both types of glottalization tend to involve some sphinctering, including raising and constriction of the larynx.⁹³ Both involve manipulation of the muscles of the larynx, in particular interdependent cricothyroid and thyroarytenoid muscles, in producing glottalization.

Preglottalization of occlusives in syllable-final position of roots is observed in the neighboring languages of Takelma (Sapir 1912:36), the Southwest Oregon Athapaskan dialect of Tututni (Golla 1976:219f⁹⁴), as well as to a certain extent in Tsimshianic (see Dunn 1979:4 for Coast Tsimshian, Wickstrom 1974:64f for Gitksan). Section 5.5.4 will take up the problem of final preglottalization of obstruents for CK.

5.5.3 Types of glottalization in CK

The types of glottalization in CK divide into two groups: simultaneous (or coterminous with lingual release) and non-simultaneous. The simultaneous include regular glottalized occlusives at root onset and occlusives coalesced with a following glottal gesture; non-simultaneous include final post-glottalized resonants plus a number of preglottalized types, including glottalized resonants, preglottalized obstruents, reduced geminates (debuccalization of the first member), epenthetic glottal stops as syllabic onset to a vowel-initial root, and independent glottal stops (rare). The following list attempts to be exhaustive.

⁹² See §5.4.4 above for examples. For a discussion of complementary distribution in glottalized consonants, see Howe and Pulleyblank 2001.

⁹³ I am thankful to John Esling and Jimmy Harris for discussion on these matters. On sphinctering, see Esling 2002.

⁹⁴ Golla calls these “consonant clusters”, $\text{ʔ}+\{\text{d}, \text{g}, \text{g}^w, \text{s}, \text{s}^r, \text{t}\}$, occurring medially and finally. Such clusters with resonants ($\text{n}, \text{m}, \text{l}$) are **Rʔ** medially and finally.

- (69) Types of glottalization in CK
- (a) Simultaneous glottalization ($\dot{\mathbf{K}}$)
 - (i) Regular or true, in onset to root
 - (A) Root onset (simple or in $\dot{\mathbf{K}}\mathbf{R}$ cluster), before accented root vowel ($\acute{\mathbf{V}}_{\text{ROOT}}$)
 - (B) Type 2 reduplication of (a.iA): without accent, \mathbf{V}_{ROOT}
 - (C) Type 1 reduplication of (a.iA): with stem vowel instead of nuclear, no accent
 - (ii) Pseudo-simultaneous, in coalescence ($\mathbf{K}^?$)
 - (A) Verb-prefix-final occlusive plus root-onset epenthetic glottal stop, $\acute{\mathbf{V}}_{\text{ROOT}}$
 - (B) Stem-medial occlusive plus glottal gesture from following (pre)glottalized resonant (no \mathbf{V}_{ROOT})
 - (b) Post-glottalization of final glottalized resonants ($\mathbf{R}^?$)
(syllable-final for glides; otherwise, generally word-final)
 - (c) Preglottalization ($^?\mathbf{C}$)
 - (i) Preglottalization of glottalized resonants ($^?\mathbf{R}$)
 - (A) Stem-medially
 - (B) Root-initially (usually inaudible except following some prefix)
 - (ii) Preglottalization of root/word-final obstruents ($^?\mathbf{O}_b$)
 - (A) Fricatives ($^?\mathbf{F}$, $\acute{\mathbf{F}}$)
 - (B) Occlusives ($^?\mathbf{O}_c$, $\dot{\mathbf{K}}$)
 - (iii) Debuccalization
 - (A) First member of geminate pair ($^?\mathbf{C}$)
 - (t) Intervocalic geminates (historically; in Pre-Common CK)
 - (tt) Pseudo-geminates (word-finally)
 - (B) Fricatives in fricative-occlusive clusters root-finally (historically) ($^?$)
 - (C) Epenthetic vowel *i*, e.g., where elided in the morpheme cluster $\mathbf{d-ni}$.⁹⁵
 - (d) Glottal stop as segment ($^?$)
 - (i) True glottal stop (resonant, generally only word-finally or penultimate segment)
 - (ii) Epenthetic glottal stop
 - (A) Syllable onset of vowel-initial root
 - (B) Intervocalically, between word or clitic
 - (C) Onset of vowel-initial prefixes (irregular $^?$)
 - (e) Verb-final occurrence of PUNCTUAL (glottal-stop morpheme, $^?$)

Table 11: Summary of glottalization types in CK

⁹⁵ This could be in the suffixes, *DUR-OBJ.3*, or at the end of the *V* prefix as *DIR-PL.3*.

5.5.4 Final glottalization of obstruents in CK

Table 12 just above gives a summary of the types of glottalization in CK. In general, there are only four types on this chart that are dubious: (i) the nature and occurrence of the epenthetic glottal onset of vowel-initial prefixes (69d.iiC), (ii) the use, occurrence, and semantics of the non-durative final PUNCT morpheme (mentioned briefly in Frachtenberg's grammatical notes) (69e), (iii) the origin and nature of final and penultimate glottal stops as individual segments (69d.i), and (iv) preglottalization of root/word-final obstruents (^ʔO_b) (69c.ii). One of the main goals in this thesis has been to work out the patterns of glottalization, of Jacobs' many manuscript apostrophes, for CK. Upon finding a lexical distinction between items, nouns and verbs, that had obstruent preglottalization root- (and at the same time word-) finally, it was natural to assume a phonemic distinction. This distinction has been carried on throughout the continuing research on CK phonology and morphology and the writing of this thesis. In general, I feel a good start has been made in accounting for all of Jacobs' apostrophes. However, final obstruent glottalization is not as straightforward as other points made on Table 12 (with the possible exception of the other three listed above). The goal of this section is to shed more light on what might otherwise seem a tendentious decision—that is, the acceptance of final obstruent preglottalization as phonemic.

In discussing this problem, I will present two alternate hypotheses. *Hypothesis I* may be called 'the theory of final obstruent glottalization'. *Hypothesis II* may be called 'the theory of final pragmatic (obstruent) glottalization'. The goal is to distinguish between these two theories and to attempt a *synthesis* between them. Hypothesis I, *thesis*, claims that final glottalization is a full system of glottalization (or non-glottalization) which is phonemic in nature. Hypothesis II, *antithesis*, claims that preglottalization of final obstruents is a combination of penultimate glottal stops and language pragmatics. While I do claim to come to a synthesis, this does not, of course, mean that the ensuing discussion is the final word on the topic. It is a step toward further elucidation.

Hypothesis I, *the theory of final obstruent glottalization*, has the following positive points:

- (1) Major class lexical items (nouns, verbs) end in obstruents (fricatives or occlusives) which are either preglottalized or not.

(2) CK allows maximally two consonants (a resonant and an occlusive, say) in a root-final coda. If the glottal gesture which occurs before the resonant in a bound cluster is taken as a separate segment, that would make three coda segments and would not agree with the established syllable canon (Takeuchi 1969, Hajda 1976). Therefore, the glottal gesture must be part of one of these coda consonants, or more likely held by the cluster in common. Similarly, in syllables where there is a long vowel ($\mu\mu$), a preglottalization gesture interpreted as a separate segment would not fit the common root canon of five segments or timing slots—for example, where the onset consisted of a two-segment cluster.

(3) There is a certain consistency in the occurrence of preglottalized obstruents. For example, the following properties can be observed:

(a) Finally preglottalized obstruents drop their glottalization and generally become or behave as unglottalized (plain) obstruents upon stem suffixation. On the other hand, exterior stem suffixes like //y^hu// INCH and //y^huk// PASS do not appear to have this effect.⁹⁶

(b) On the somewhat rare instance where stem suffixation does not entail loss of preglottalization, it may be assumed that the final consists of a cluster, $ʔO_b$. Occasionally, motivation for such glottal stops are found in other dialects.

(c) Preglottalized fricatives, which have near-minimal pairs with unglottalized fricatives, are the members of a unique set, though their glottalization is found only finally. They behave similarly with respect to preglottalized occlusives.

(d) The patterning of preglottalized obstruents finally and medially is the same as that of glottalized resonants medially and initially. This is part of a wider system of ambisyllabicity in the language family. A double consonant, $-C_1C_2-$, where one syllable may end on C_1 and another begin with C_2 , often cannot be distinguished from a single segment functioning with two gestures. It is likely that at an earlier stage in the development of CK, medial consonants that were long intervocalically (as in contemporary Twalatin) later underwent degemination and became preglottalized consonants medially in the dialect of JH, for example. This is the general system of preglottalization or root final (coda) glottalization.

(4) Final preglottalized obstruents appear to represent an opposing system to initial simultaneously glottalized obstruents. Since both systems use segments from the same

⁹⁶ These suffixes, however, do appear at least occasionally to spread glottalization regressively, so one cannot be sure of this.

segmental inventory, it is likely that a given segment of final preglottalization, i.e. /ʔO_b/, and an equivalent segment of initial simultaneous glottalization, i.e. /Ŏ_b/ (= ǀ; only affecting occlusives), are common allophones, *mūāātīs mūāandīs*.

(5) Preglottalized occlusives show near minimal pairs with non-preglottalized.

Hypothesis II, *the theory of pragmatically (pre)glottalized final occlusives* points out the following:

(1) While there are obstruents that appear either preglottalized or not preglottalized finally, there are also obstruents that, from the formtype counts in B.s.f., appear to be sometimes preglottalized and sometimes not.

(2) No minimal pairs have been found either among the "glottalized" fricatives or among the occlusives.

(3) While final preglottalization is shown by Frachtenberg for Mary's River,⁹⁷ Eustace Howard does not show the same for his dialect. Nor is it found in Twalatin. While EH and JH have nearly identical proportions of consistency with regard to glottalization on glottalized resonants as heard by Jacobs, they vary widely with regard to those on preglottalized occlusives. What has been regarded as final preglottalization is clearly a nonphonemic final stricturing in certain CK dialects.

(4) There appear to be two sorts of final patterns with regard to final neutralization: /pʰ/, which represents [b̥] (except for a lexically distinct few) and [pʰ], freely varying, on one hand, and /p/, which represents [pʰ ~ b̥ ~ ʔb̥ ~ ʔpʰ], on the other. This is simply not possible. The solution is to merge these two sets, since they represent one group of phones. Since the generally neutralized pattern contains such phones as [ʔb̥ ~ ʔpʰ], which are equivalent to preglottalization among occlusives, there is no way that they can be distinct at the phonological level.

(5) There is apparently a serious problem with the durative allomorphs and other suffixes and lexical items that end in coronals.

(a) These items show final neutralization as /t/. In particular, they demonstrate the preglottalized [ʔd̥ ~ ʔt̥] phones much more frequently than would be expected.

(b) Where such allophones occur on the durative morphemes, the alternation between the allomorphs, /-d̥; -d̥d̥, -d̥d̥d̥; -d̥ind̥/ and /-ʔt̥^(b); -d̥iʔt̥^(b), -d̥d̥iʔt̥^(b); -d̥inʔt̥^(b)/, must

⁹⁷ This dialect of WH is not known as well as the dialects of JH and EH.

represent neutralization. It cannot be PUNCT, which would contradict the sense of DUR. If neutralization occurs to morphemes whose glottalization or lack of glottalization is so apparently important, precisely reflecting the semantic area controlled by the allomorphs, there cannot be distinctive preglottalization at all.

(6) Jacobs states definitively that preglottalization is “stylistic” in nature.

Most of the five or six points on each side of this argument have been brought forward during the last three chapters. We turn now to one point not mentioned so far. This is Jacobs’s notion of “stylistic”. Of the various sounds of glottal constriction or light sphinctering the constitutes the glottal gestures I have been discussing, Jacobs (ca. 1930[:15]) says:

Kalapuya is often phonetically “tricky”; especially so are the obscure glottal catches; I do not doubt that such catches and even other articulated sounds were occasionally lost by me when recording dictation.

Some seven years later, discussing the phonetics of Jacobs 1945, here concerning dorsal stops (where he found preglottalization to be most prevalent), he writes:

I also write this stop with a glottal catch just preceding it: ‘k, ‘q. In short or light syllables (-VC, -CVC) this and some other final consonants (stop or affricate) are often incompletely articulated: the release is slightly delayed. And there is a concomitant and very brief glottal closure, non-phonemic, which also closes the syllable. I have heard much the same sort of syllable mechanism in Aleutian and western Alaskan Eskimo dialects. I often record these syllables -V’C, or -CV’C, where the ’ represents the non-phonemic and barely audible glottal stricturing which is coterminous with the final -C. [Jacobs 1945:13]

Again, in regard to preglottalization, he has this to say.

Another seemingly secondary, fortuitous and virtually inaudible glottal arrest is found before C₁ in syllables or words of CVC₁ ([or] CVV₁C₁) type, where C₁ is stop[ped] or affricative; the hitch is infrequently or never heard if C₁ be alveolar or prepalatal, and most often heard when C₁ is palatal; Angelo and Freeland noted their failure to hear it in Twalatin. Frachtenberg recorded it occasionally in his dialects. I am encouraged to claim *reality for this impressively elusive phenomenon by the constant verification of my own notations that I observe in Frachtenberg’s notes. The catch is undoubtedly stylistic, not grammatically functional*; nevertheless the “feel” of it is so marked as to give a unique character, beat, sparkle to connected utterance; this, perhaps more than any other one trait, produces the acoustic individuality of the language.

[Jacobs ca. 1930[:40]; italics added.]

Jacobs recognized the importance of phonetic accuracy. In my attempting to account for the sounds of the segments of CK, the problem of this “non-phonemic and barely audible glottal stricturing” and/or “very brief glottal closure” arose early. I noticed that lexical items that ended with the root appeared generally either to have this final preconsonantal feature or not, though some were ambiguous. For the purposes of this thesis, final preglottalization of obstruents has been analyzed as phonemic, i.e., as if Hypothesis I were correct; this may be incorrect. Indeed, in an interesting paper entitled “The phonology of final glottal stops” by Larry Hyman (1988) discusses the pragmatic functions that develop around final glottalization. He cites examples of the lexically distinctive final glottal stop in Bamileke-Feʔfeʔ, the “demarcative” function of pre-pausal (final) glottal stops in Tokyo Japanese and Hausa and of their pragmatic expressive uses in Parisian French and British English⁹⁸. In his own study of Dagbani (Gur, Northern Ghana), he calls attention to a demarcative function of a final glottal stop after short final vowels in non-nominal lexical items, or in a final word within negative scope—both subject to several conditioning factors (phonetic, grammatical, pragmatic and possibly phonological). The natures of both declarative and negative final glottal stops in Dagbani, however, are essentially expressive or pragmatic. Hyman points out a historical process of conditioning has led to what he calls “the PHONOLOGIZATION of an intrinsic variation in the speech signal” (Hyman 1988:124). The variation is pause. He concludes that in the case of Dagbani, while the conditioning of glottal stop occurrence involves a variety of linguistic elements, the result is entirely predictable. Therefore, no glottal stop is underlying and a postlexical rule, albeit complicated, will suffice to enter the demarcative glottal stop.

A simple example of final glottalization possibly like that in CK is its occurrence in certain examples of English words, as in (70) below, which shows unreleased and released varieties of the final alveolar stop, both occurring immediately following a small glottal stop.

(70) *hat* [hæʔd ~ hæʔtʰ]

Hypothesis II argues that this is the situation in CK.

⁹⁸ “Henton and Bladon’s (1988) study of creak as a ‘sociophonetic’ marker in British English” (Hyman 1988:115).

(beyond having the feature *CONSTRICTED GLOTTIS*), it is clear that some kind of creak must affect each laryngealized mora of the six laryngealized vowel phonemes (3 long, 3 short). CK, on the other hand, relates its glottal striction to specific neighboring consonants.

Perhaps the closest type of glottal stop to that in CK root finals, certainly in a European language, is the Danish *stød*. Without going into detail concerning its complex conditioning factors, no longer complete in predicting the sound, it will be noted that the *stød* normally occurs only in stressed syllables.

(73) Examples of Danish *stød*

		<u>Pronunciation</u>	<u>Writing</u>	<u>Gloss</u>	<u>Reference</u>
(a)	(i)	[fu: ^h l]	Fugl	'oiseau'	
	(ii)	[ful ^h]	fuld	'plein'	Martinet [1944] 1949
(b)	(i)	[mi: ^h l]	Mil	'mille [la mesure]'	
	(ii)	[mil ^h]	mild	'doux'	Martinet [1944] 1949
(c)	(i)	[ve: ^h ð]	ved	'knows'	
	(ii)	[veð]	ved	'by, at'	Bredsdorff 1958:16
(d)	(i)	[mø: ^h lær]	Møller	'Møller [the name, e.g. 'Miller']'	
	(ii)	[mø: ^h lær]	møller	'miller'	Bredsdorff 1958:16
(e)	(i)	[man ^h]	mand	'man'	
	(ii)	[man]	man	'mane'	Haugen 1976:205

It is generally a constriction, not a complete glottal stop,¹⁰⁰ thus necessitating a voiced environment, especially following a long vowel or diphthong or vowel plus resonant, often where a voiced consonant has elided. Haugen (1976:284) notes that the *stød* corresponds "roughly" to Accent I of Old Scandinavian, replacing "it as a distinctive feature in [contrasting] pairs that would have merged where the musical difference disappeared" (p. 205). Rischel (1970) points out, coincidentally, its relationship with two consecutive historically voiced consonants, which he writes /D/+ /D/ and which have produced words ending in the final variations [-^ht] ~ [-^hdə] (where /D/ is either a voiced stop or voiced fricative). Haugen (1976:265) also mentions the glottalization of voiceless geminate stops in West Jutland as a separate development of glottalization, perhaps more

¹⁰⁰ Bredsdorff 1958:15 and Haugen 1976:284 agree on this. Martinet [1944] 1949:43 reads slightly differently: "Il s'agit d'une sorte de crispation des cordes vocales qui peut aboutir à leur complète fermeture."

complete in constriction, “e.g. in dreʔge drinks (from O[ld]Da[nish] drikkær)”. Thus in a number of ways, including elision of penultimate segments (73a.i), glottalization of geminate stops (73d.i), and the simplification of medial (73d) and final (73a, b.ii, e.i) consonant clusters, Danish post nuclear glottalization has parallels with that of Central Kalapuya. The *stød* still produces distinctive minimal pairs in important Danish dialects today (e.g., (73d–e) above). We cannot be sure this was ever the case in CK.

What can we make of these contrasting hypotheses? Is there not some way in which the arguments of both can be combined in a general overview of the CK glottalization?

I suggest that final preglottalization expanded from the kind of original use as in (71), using root-final occurrences of marked glottalization, at first pragmatically, like a second accent. Once the earlier form of the language had undergone degemination, root-final and stem-medial consonant cluster simplification led automatically to a relative plethora of little glottal stops which were then regularized. Post-nuclear salience in the root may have helped keep the accent on the root vowel; in unsuffixed roots in Twalatin, for example, the accent has regressed into the prefix system.¹⁰¹ At the time of Contact, there appears to have been a reanalysis in progress, whereby CK dialects, especially those farther from Twalatin in the north, were tending toward the development of final preglottalization in varying degrees. In John Hudson’s dialect by this time, this kind of glottalization must have become underlying at least to the degree of presenting a coherent pattern of distinctive lexical variation and phonological alternation in the final consonant or consonant cluster of the root, even though it did not yet show minimal distinctive alternation lexically. Then, too, the possibility always exists that even at that point it possessed a pragmatic character, some sense of which Jacobs could feel but not comprehend since he had never sought comparative examples. If so, the perlocutionary intent of such an illocutionary structure will probably always elude us.¹⁰²

The notions of ‘simultaneous glottalization’ and ‘preglottalization’ work best if we think of the root as a kind of syllable,¹⁰³ with ‘simultaneous glottalization’ occurring in

¹⁰¹ This follows a penultimate stress pattern of Columbia River languages.

¹⁰² For the pragmatics of relevant speech acts, see Searle 1969, especially chapters 2 and 3, as well as Austin [1962] 1975.

¹⁰³ Of course this is not quite true. There are numerous roots which are bisyllabic, such as those in (68), through the addition of reanalyzed suffixes. These are, however, a minority. Moreover, only monosyllabic roots are known to undergo Types 1 and 2 reduplication. We must conclude

the onset and ‘preglottalization’ occurring in the closing coda. They enjoy complementary distribution, since they represent glottalization of the onset and glottalization of the coda, respectively. In fact, each type occurs in a specific area—the onset root-initially and the onset to the ‘coda’ just following the root vowel root-finally—which is maximally salient (open to perceptual cues). If we accept this, then many of the problems of the unusual final laryngeal states of a number of lexical items involving suffixes, such as the durative morphemes //ḡ, ḡḡ, ḡḡḡ//, fall away. This is because *these final variations are not part of the root and therefore have absolutely no bearing on final ‘preglottalization’ which is a root-coda phenomenon*. In other words, a CK speaker ‘knows’ that certain morphemes involve ‘preglottalization’ because they are in the coda of a root syllable. Other examples of preglottalization, including stylistic or dialectal variations for example in the durative suffixal allomorphs //t̪, ḡt̪, ḡḡt̪//, for example, are simply ignored or filtered in the phonological domain. This is an approach that should work very well through lexical phonology. A better understanding of preglottalization should emerge with an in-depth study of the CK root.

While I have accepted, tentatively and without close study, Frachtenberg’s suggestions in his grammatical notes with regard to a ‘punctual’ (PUNCT) or perfective (PRFV) -[ʔ] suffix, and have marked it on achievement verbs where I see it, it is very doubtful that this will offer much in the way of solution here. First of all, most of the lexical items on the list of those with final preglottalization are nouns. Secondly, Frachtenberg’s examples usually show it suffixed to a vowel, generally part of a suffix, as in (74):

- (74) Example of Frachtenberg’s perfective suffix, called “punctual” F. GNII[:52.11]
 (WH:) *ma'ti tūp tūlä^ε* //maht̪ii ḡub-ḡul-i(-ʔ)// (PRFV in parentheses)
 “Ye kill them!” YOU.PL IMP.2.PL-kill-TRANS(-PRFV)

The little raised epsilon ^ε used to mark the glottal stop is always right at the end of the phrase, often on the active/transitive -i stem vowel. Only some of the verbs are sufficiently achievement- or accomplishment-oriented to undergo such a process. Indeed, it would be lovely if one morphological fact could answer this problem. Alas, we must look elsewhere.

that the prototypical CK root is monosyllabic. My model is the root-syllable of certain Tibeto-Berman languages, which often have an outer occlusive prefixed to the immediate onset.

Here I will mention two other points in support this theory of final glottalization. (1) Frachtenberg, as Jacobs noted above, in his transcriptions of William Hartless's Mary River (Pineøu) also recorded this final glottalization, often noting it more consistently than Jacobs on the duratives. (2) Such final preconsonantal glottalization is attested in neighboring languages to the south of the Kalapayan family, namely in phonologically close Takelma (Sapir 1912:33–6) and in the Tututni dialect (Golla 1976:219–20) of Southwest Oregon Athabaskan, at Contact south of Kalapuya but on three sides of Takelma (north, west, and south). Borim Lee (1991:82–85) analyzes this final glottalization in Takelma with a clever left-movement rule, "Laryngeal Flop", transferring a previously post-consonantal glottalization to the preceding vowel, leaving SPREAD GLOTTIS finally:

Sapir (S[apir 1912]:36) describes that "[A] final fortis becomes the corresponding aspirated surd (-ts! becoming -[ʰs]), but with a preceding catch by way of compensation for the loss of the fortis character of the consonant." We implement Sapir's analysis by assuming that the [CG] from the syllable-final consonant delinks and is relinked to the preceding nuclear timing slot. [Lee 1991:82]¹⁰⁴

Takelma and neighboring Athabaskan dialects lie to the south of Kalapuya country. Since CK appears to have differentiated itself from NK in the process of degemination, it is quite likely that southern social contact aided in the process of developing final glottalization, more active in Takelma than CK.

That two different systems of glottalization came to be in use in CK seems certain. Lexical distinction was driven by the simultaneous weak glottalization of the root onset. At the same time, a pragmatically-driven final variation in the salient pre-coda position of unsuffixed roots took advantage of debuccalized consonants and other root-final changes to produce a preglottalization that became lexically related. This does not mean that it is fully phonemic; it is an incipient part of a would-be future phonological system, brought about by "the PHONOLOGIZATION of an intrinsic variation in the speech signal", as Hyman puts it. But whereas Dagbani's final glottalization was predictable, in CK it is not. Thus, despite its inadequacies, CK preglottalization must be marked on the lexical items affected.

¹⁰⁴ The brackets inside Lee's quotation marks are mine and revert to Sapir's original usage.

This is similar to an analysis suggested independently in Lewis (2000) for finally glottalized segments in CK, called "Laryngeal Delinking" for word-final glottalization, as opposed to "Laryngeal Delinking and Loss" for plain occlusives neutralized and aspirated in word-final position—similar again to Lee's analysis for final release in Takelma.

5.6 Chapter conclusion

This chapter has discussed the surface and underlying values of CK occlusives of three laryngeal series (or phonation types) at three articulatory positions including affricates and labiodorsals where found. The occlusives are illustrated initially before each of the three CK vowels, as well as finally and medially. It is found that these three laryngeal types are unambiguously contrasting only initially, i.e. generally in the onsets of noun and verb roots, where they are found to be weakly simultaneously glottalized, plain or aspirate. Finally, i.e. in the last coda of the root (which, in the majority of cases, is the only coda of the root) where this is also the final coda of the word, there are two contrasting series, preglottalized and aspirate (or neutralized). Medially, i.e. root-medially (if possible) or root- or suffix-finally at the joining of a(nother) suffix, there are two series of occlusives, plain and aspirate. Simultaneously glottalized occlusives arise medially as the result of coalescence with a following glottal gesture. Simultaneous glottalization of root onsets and final preglottalization in codas are in complementary distribution, just as medial and initial preglottalized resonants are in complementary distribution with final post-glottalized resonants.

Preglottalized occlusives lose their glottalization upon suffixation of the root, with the notable exceptions of exterior suffixes. In the unusual situation where glottalization occurs with suffixation, a glottal stop must be assumed. The weakly simultaneously glottalized occlusives are different from the final preglottalized occlusives which are phonetically plain occlusives (released as aspirate) with a short glottal stop before them. These two types of glottalization represent glottalization activity in the onset of the root and in the (final) coda of the root, respectively. Beyond the root, although preglottalization exists on suffixes, it has no lexical value there, being merely pragmatic (of some unknown intent) and is ignored by speakers.

Historically, preglottalization may have arisen in the onomatopoeic preglottalization of animal and other peripheral sounds. Growth of lexical distinction between preglottalized and nonpreglottalized roots may have been influenced by Takelma, which has a more developed system of preglottalization. The onset of a period of degemination in the history of the language, as CK appears to have pulled south from NK, was surely important in the development of final obstruent preglottalization.

Chapter Six

The consonants from front to back

This chapter discusses some of the idiosyncrasies of CK consonants with regard to place of articulation, *labial, coronal, dorsal* and *laryngeal*. The positional variation of coronal fricatives and affricates on one hand and the plain and labialized dorsals on the other is briefly discussed. Motivation for labiodorsals is given through a review of root shapes. Finally, the laryngeal segments *h* and *ʔ* are discussed.

6.1 The labials

The Kalapuyan languages, together with easterly neighbor Molale, are somewhat unusual in the Northwest in having a fully-developed labial series.¹ We see the labials in (1).

(1) The labials

Occlusives	Fricative	Resonants	
b̥		m	w
pʰ	ɸ		
p̥		m̥	w̥

Jacobs considers *ɸ* to be “truly bilabial, not labio-dental” (ca.1930[:35],² 1945:14). It is more common than *ɬ*. The bilabial occlusives, *b̥*, *p̥*, *pʰ*, are all respectfully common,

¹ Perhaps a better way to reflect on this is to recognize Kalapuyan as one of the northernmost language families of the *southern* Pacific Northwest language area. Molala has the following set of labials (parentetical *pʰ* marks the inclusion of an extra laryngeal series in Berman 1996).

b̥		m	w
(pʰ)	ɸ		
p̥			

[Rigsby 1965:159]

Glottalized resonants may be found upon looking. Such series do occur in northern California: Karuk (Bright 1957:7) has {*p*, *f*, *β*, *m*} in a language with but one laryngeal series among its stops (cf. {*p*, *b*, *β*, *m*, *w*} in Yurok [Teeter 1964:13f], with two series). Seashore Chinook (Boas 1911:565), with two stop series, however, had only three labials: {*p̥*, *p*, *b̥* ~ *m* ~ *w*}. (My symbols.)

² “In the bilabials, continuant *f* is especially interesting: it is truly bilabial, not labio-dental; the stricture contact is so mild and the lips so rounded, that the sound has been recorded frequently as *fw* and *hw*. I hear the identic[al] sound in Molale Sahaptin; I do not know of its occurrence elsewhere in the region; the fact that Molale and Kalapuya employ the sound while other languages of Oregon do not, argues for a considerable period of Molale-Kalapuya contact and friendship.”

and match well the plain dorsals (**g, k, kʰ**). **m** and **m̥** both occur frequently. The lack of **ɸ** is not very surprising; the only apparently glottalized fricatives are coronal.

The resonant **w** with its initial allophone ^h**w** (at times confused with **ɸ**) appears as a candidate for aspirated or voiceless resonant. Both initial /**w**/ and /^h**w**/ show a great amount of aspiration, especially after occlusives. For example, in /ə^h**w**ə^htə^h**k**/ 'wood, stick', the initial glottalized **w** sounds like [^h**w**] on the S-M tape. Perhaps this is normal; /^h**w**/ is the most common allophone of true (i.e., non-epenthetic) //ʔ//.

6.2 The coronals

There is no question but that coronals have a unique and powerful place in the segmental inventory of CK. Coronal patterning is broad and balanced. The only (pre)glottalized fricatives found are coronal (**ʃ, ʃ̥**), in parallel with the plain coronal fricatives (**s, ʃ**).

Coronals make up the center group of the CK segmental inventory, with about half (15 of 31) of the consonantal segments posited as underlying in this thesis.

(2) The coronals

	Resonants			Fricatives		Occlusives	
Plain	y	l	n			tʰ [tʰ ~ tʰʰ]	ɖ
Voiceless				ʃ̥	s [s ~ ʃ̥]		tʰ
Glottalized	ý	l̥	n̥	ʃ̥	ʃ̥ [ʃ̥ ~ ʃ̥ʰ]	t̥ [t̥ ~ t̥ʰ]	t̥

The affricate **tʰ** has been placed as intermediate between the aspirated series and the plain series. Intervocally, it may have a [**ɖ**/**ɖ̥**] allophone. It occurs in the verb-prefix bundle, as the first-/second-person verb agreement particle for present tense, where it is the only non-plain occlusive. **tʰ**, together with **ɸ**, **ɸ̥** and **ɖ**, are the only obstruents among the stem suffixes (otherwise all resonants).

A certain amount of variation is found in the coronals, both in terms of idiolectally alternate release and in terms of geographical dialectal variation.³ The DURATIVE, for example—which comes in three varieties depending upon verb class,

³ As has been noted, Frachtenberg writes the glottalized forms regularly for the left-bank Mary's River dialect of CK.

generally subclasses of *Aktionsarten*, as $-\text{[d̥, d̥d̥, d̥nd̥]}$ (or $-\text{[t, dt, dnt]}$)—alternately surfaces as $[\text{d̥} \sim \text{t̥} \sim \text{t̥}^*]$, $[\text{d̥id̥} \sim \text{dit̥} \sim \text{dit̥}^*]$, and $[\text{d̥ind̥} \sim \text{d̥int̥} \sim \text{d̥int̥}^*]$, respectively. Which forms are used may be pragmatically and dialectally controlled. Similarly, the collective $-\text{[p̥d̥]}$, commonly used as the durative plural, is alternately $[\text{p̥id̥} \sim \text{pit̥} \sim \text{pit̥}^*]$. The archaic noun collective suffix, presumably $-\text{[t̥ʰot̥]}$, shows similar variation, $\text{t̥ʰót̥} \sim \text{t̥ʰót̥}^*$, in word-final position. This variation—or neutralization, which is apparently is—occurs also with a few prominent verbs ending in /t/ as well.

There are at least four slightly different points of articulation among the coronals. We may assume that the stops, t̥ , d̥ , and t̥^* , are alveolar.⁴ However, it is not clear that this is so for the nasals, n , n̥ . One may speculate that they and especially the fricatives and affricates were articulated to some extent with the back portions of the tongue blade, which would make them not apical but *laminal*. This would account for Jacobs' hearing them backed in the vicinity of the alveo-palatal position, thus: $[\text{s̥}, \text{t̥s̥}^*]$, which may have alternated with a more apical form, as in the following examples.⁵ (The fourth group, which also has great variation in position, are the liquids and their homorganic fricatives.)

With regard to vowels, there is a slight preference for written $[\text{s}]$, Jacob's $\langle \text{s} \rangle$, before the modal vowel [a] and for $[\text{s̥}]$, Jacob's $\langle \text{c} \rangle$,⁶ before high vowel [i] , except for (3d).

(3) $[\text{s}] / [\text{s̥}]$ variation before vowels

(a)	$\alpha\text{sá}\cdot\text{wal}$ (s 3/3)	/əsáwal/ //an-saawal//	tarweed seed
(b)	$\alpha\text{cáyum}$ (c 7, s 5/12)	[əšáyum, əsáyum] //an-sayum//	grizzly, Grizzly

⁴ This is confirmed by Jacobs (ca. 1930:36): "T (D of the Phonetic Transcription) receives alveolar not dental articulation. The t̥ series of the Oregon-Washington region is inevitably alveolar...."

⁵ For a brief treatment of the phonetics of coronals, see Keating 1991.

On coronals being more prone to neutralization than other segments, see Paradis and Prunet 1991.

⁶ Jacobs wrote c for $[\text{s̥}]$ and s for $[\text{s}]$ in keeping with the Americanist tradition of his day. This was also the recommended usage of Boas et al. 1916. The chart of affricates from Boas et al. 1916:6 lists:

	Sonant	Surd	Glottalized
Bilabial	bv	pf	pf'
Interdental	dθ*	tθ	tθ'
Dental	dz	ts	ts'
Prepalatal	dj	tc	tc'
Palatal	gɣ	kx	kx'
Velar	gɣ	qx or kx	qx' or kx'

* dθ is made with an open or cursive θ.

(c)	$\alpha ci'wa'$ (c 5, s 1/6)	[əʃi'wa] //an-si'wa//	(little) children, child
(d)	$\alpha si'TQaQ, \alpha si'Tqaq$	/əsiidgag/ //an-siidgag//	property, clothes
(e)	umsu' (c 6, s 35/41)	/um-su'/ //ʔ-m-su(?)//	it's good

The clear exception in (3d) is anomalous; the position of the continuant appears to be influenced more by the second part of the root than by the immediately following vowel. The allophone [s] also appears generally before //u//, as in (3e), and most consonants (**O_b**), though [ʃ] is more common before //n//:

(4) [s] / [ʃ] variation before consonants

(b)	$\alpha skú'p$ (c 1, s 4/5)	/əsgupʰ/ //an-sgup//	ashes
(c)	-sk'wilt(-) (JH 1; EH c 2, s 42)	/-sk'ilt/ //sk'ilt//	untie
(d)	stó' (c 2, s 5/7)	/sdòɔ/ //tsʰdu//	we, us
(e)	kinsmut'wa (1)	/gin-smut'wa/ //g-m-smut-wa//	slipped free of
(f)	$\alpha cni'$ (c 11, s 5/16)	[əʃni] //an-sni//	coyote, Coyote
(g) (EH)	-cni'nap- (4)	-[ʃniinapʰ]- -//sninap//-	bow down, give up
(h) (EH)	-cnap'tin- (6)	-[ʃnapʰdini]- -//snapʰ-d-ni//	fit (into)

The lateral series, **l, l̥, t, t̥**, varies a great deal in position. Usually it is still further back. Both the voiced forms of this group, **l, l̥**, and the palatal resonants, **y, y̥**, tend to palatalize //a// to **ä** when following or preceding the **a**. Likewise, they raise //i//, normally [e], to its higher allophone, [i~i]. **l** was occasionally heard as a labial glide (//w//, as in the second part of the diphthong **au**) word-finally, as in -pá'saŋ ~ pá'sau 'smoke [V]'.

We have seen that the coronals are the most important set of segments in CK. While glottalized allomorphs of final coronal suffixes suggest that neutralization may be more common in this articulatory position, no other positional area has such a frequency of suffixed segments (largely t). Laminal-apical variation was suggested a possible factor in the alveopalatal-alveolar variation in sibilants and affricates recorded by Jacobs.

6.3 The dorsals

The dorsals occupy a relatively modest position in CK, certainly as compared to those of languages neighboring on all sides with great dorsal patterning. Velar/uvular distinctions, where they occur, are allophonic or in free variation. There is no true dorsal fricative nor any dorsal resonant (except m or n by assimilation). The labiodorsals are somewhat ambiguous, clearly posited for adherence to the syllable canon rather than for phonetic reasons. (5) shows both the dorsal occlusives with their front-back variations.

(5) The dorsals

Occlusives:	plain	labialized
	g̱ [g̱ ~ ɣ̱]	g̱ ^w [g̱ ^w ~ ɣ̱ ^w]
	k ^h [k ^h ~ q ^h]	k ^{hw} [k ^{hw} ~ q ^{hw}]
	ḵ [ḵ ~ q̱]	ḵ ^w [ḵ ^w ~ q̱ ^w]

We shall look at dorsals first with regard to their front-back variations. Then we will look at the need to posit labiodorsals for CK.

6.3.1 Dorsal backing

Of the two CK speakers Jacobs took dictations from, only JH has front-back dorsal variation in Jacobs' writings. *All dorsals in EH are written with the front variety only.* Occasionally, before back vowels, apparently when J. was going over EH's dictations with JH, the latter would prefer a backed version, such as the three listed (in the second column) below in (6).

(6) Changes to EH's dictations, inferred to have been motivated by JH

	EH	JH correction	underlying form	gloss
(a)	aṉkáł	aṉgáł	//an-gáł//	penis
(b)	umká·ska	umqá·sqa	//Ø-m-k ^h ask ^h (-)a//	it's baaad [rhet.]
(c)	taṉṯkáut	taṉṯqáut	//ða-m-ð-kawt//	(s.o.) would sing out

This lack of positional variation in EH is all the more remarkable if the northern hypothesis of EH's dialectal origin is correct. This may have been the way of an interdialectal group, possibly less syllabic in orientation than JH's CK. At any rate, Jacobs, who came to EH eleven months after he began working with JH, continued to write occasional uvular forms in JH's ethnographic materials even as he avoided writing them in EH's material.

With regard to the dorsals in JH's speech, it is not easy to see how they vary systematically (rather than as free variants). One trend that should be noticed at least briefly is based on prosody: closed syllables in the root tend to back; open syllables tend to front the dorsal. There are, however, lots of exceptions, particularly with long high front vowels. Backing in closed syllables works better with back vowels.

(7) Variation in JH's dorsals: backing in closed syllables with back vowels

(a)	-qán (18), -qán (2); -kán (1), -gán (1)	//gán//	go along, pass by
(b)	-qáɫ'ɾ(-) (2), -qá'ɫ (1), -qáɫɾ- (1); -ká'ɫ (1), -káɫɾ- (1)-	//kʰalɫ//	hang (TRANS/INTR)
(c)	-qásqa, &c (11); -káska, &c (6)	//kʰaskʰa//	(be) bad
(d)	-qái'(wa)wɔ· (2)	//kay(wa)-u//	get crooked
(e)	-qóp(-), -qóp(-) (18); -qúp- (1); -kúp- (3), -kóp- (1)	//kupʰ//	cut (up)
(f)	-qóɾqa (10), -qóɾqa (1), -qó·ɾqa (1)	/gɔɾgɑ/	arise, get up
(g)	-síɾqaq (5), -síɾqaaq (4)	//siidgag//	property, clothes
(h)	-qé·qɾɪnyɪ· (1)	//kii·k-ɬi-ni-yu// (?)	choke him (TRANS)

(8) Exceptions: I. fronting in long, closed syllables

(a)	kɔwá·k (2), kɔwá·k (2), kɔwá·k (2), kɔwá·k (1), &c.	//gʷawk//	he, she, it	
(b)	-skúp (2), -ckúp (1), -skúp (2)	//sguupʰ//	ashes	
(c)	-kɔwí·ɬ (3), -kɔwí·ɬ (2)	//gʷiiɬ//	mussel shell(s)	
(d) (i)	-klee·kɾat	-kleekʰ-ɬ-a-tʰ	//kliig-ɬ-a-ɬ//, //kliig//	be fastened,
(ii)	-klee·kɔwɾɪnyɪ·	-kleeg-wa-ɬi-ni	//kliig-wa-ɬ-ni//	sew together

The corollary of backing in closed syllables is fronting in open syllables. The examples tend to be words with long vowels.

(9) Variation in JH's dorsals: fronting in open syllables (or ones closed with a glide)

(a)	-kítan (2), -kítan (1); -kyútán (2)	//k ^h iit ^h an// ~ //k ^h yuut ^h an//	horse
(b) (i)	-κότιυ (1),	/g̥uud̥ib̥/,	//g̥uud̥-b̥//
(ii)	-κότυρα(')τ (2)	/g̥uud̥ub̥at̥/	sweat
(iii)	(-)κότυρα (7)	/g̥uud̥ub̥-a/	sweathouse
(a)	-káinuš (2)	//k ^h aynuš//	tobacco
(b) (i)	-kána, -kána, -kána, &c. (13)	/k ^h an-a/ //k ^h an//	go across
(ii)	-kán- &c. (10)	/k ^h an-i/	take across
(c)	(-)kóni &c. (20), -kúní (2)	//k ^h uuni//	brother

Long syllables in the root sometimes back, even if they are open. In these examples, the vowels are front or frontish.

(10) Exceptions: II. occasional backing in long, open syllables

(a) (i)	-q̥líPAT (2)	-k̥liib̥-aḡ	//k̥liib̥-//	wrap, twist around
(ii)	-q̥líPU (1)	-k̥liib̥-u		<i>id.</i>
(b) (i)	-q̥íq̥atc̥i (1)	-k̥iik̥-a-ts ^h i	//k̥iik̥-//	choke himself
(ii)	-q̥íkat̥suf (1)	-k̥iik̥-a-ts ^h uḡ		hang you (TRANS)
(c)	-sqánan (4), -sqánan (1); -skánan (2), -ckánan (1)		-//sgánan//	gray fox

The back dorsal forms before high front vowels were found very strange by at least one committee member.⁷ However, perhaps there is a correlation between the glottalization

⁷ It was even suggested that perhaps Jacobs meant uvular by **k** and velar by **q**. After all, Sapir (1915b) wrote a monograph on Comox reduplication this way (see the chart in Sapir 1915b:6, with its labels of "GUTTERAL" for **k**, **k!**, **x**, and "VELAR" for **q**, **q!**, **x**). However, this writer was unable to find a similar anomaly in the grammars of the period, certainly nothing from around Jacobs' time. Nor does Jacobs use such a reversed system anywhere in his writings, that I am aware of. Boas's Chinook (1911) and Tlingit (1917), and Jacobs' own *A Sketch of Northern Sahaptin Grammar* (1931) all make a distinction between "palatal" (or "mid-palatal" in Jacobs' case), written with **k**, and "velar" (or "back palatal, velar" in Jacobs' case), written with **q**. (Sapir 1912, however, shows no occlusive distinction for Takelma by place, like CK; the dorsals are labelled "Guttural", not "Palatal", and written with **k'**, **g**, and **k!**.) Jacobs followed, more or less consistently, Boas *et al.* 1916 with regard to symbols throughout his professional life. On page 5 of this pamphlet,

that we see in (10b) at least and the vowel. The constellation of features surrounding glottalization including sphinctering and retracted tongue root (RTR) is associated with the raising of the larynx as well as creaky voice or laryngealization.⁸ A raised larynx would tend to maintain a high vowel, other things being equal. This is because such a raising shortens the acoustic tube of the supralaryngeal cavity and heightens its resonant frequencies.⁹

The reversed pattern of (8d) appears as a contradiction to the pattern in (10a). This may be fixed if the front vowels are interpreted as working in exactly the reverse fashion (i.e., backing in open syllables, not backing in closed) to the back vowels. Free variation must be given wide leeway here. Eventual acoustic studies should help considerably.

We have seen that Jacobs marked a distinction in the position of articulation of the dorsals of only one of his two CK informants, namely John Hudson. While there is no clear way of interpreting such a distinction (short of free variation), I have suggested that a complex of syllable closure, vowel length, and vowel height may be involved.

6.3.2 The labiodorsals

The labiodorsals parallel the dorsals. No distinctive labio-dorsal sound is generated, as far as is known. Jacobs always wrote them as two segments in his notebooks, though he changed many to integral units in Jacobs 1945. Their distinctiveness is nonetheless noted in other ways, as we shall see.

The question of whether or not there are labiodorsals in a language is not as simple as it might appear. For example, in Nez Perce Aoki (1970) found no surface

"Phonetic transcription of Indian languages", the symbols *k*, *k'*, *k'* are listed among those "Palatal" for "Surd", "Surd aspirated", and "Glottalized" respectfully, and *q* or *k*, *q'* or *k'*, *q'* or *k'* among those for "Velar". Bright (1989, 1991), in his "Phonetic key to publications of Edward Sapir", says nothing about a reversal of position, giving only the *ks* as "voiceless front-velar stop" and *q* as "voiceless uvular (back-velar) stop", despite the fact that this "Phonetic key" also occurs in a volume (Golla (ed.) 1991) that reprints Sapir 1915b.

⁸ See recent phonetic studies, such as Esling 2002, which recognizes, for example, "in the tense series [of Yi rhymes...] systematic larynx raising, tongue retraction, and aryepiglottic narrowing of the laryngeal sphincter". It is not known if some of the off-glide of word-final CK glottal stop [ʔ], for example, is aryepiglottic ([ʔʰ]).

⁹ Before the strong initial epenthetic glottal stop, however, the vowel regularly lowers, e.g. F. (GN I:55) (WH) *tc:um ē 'tupat* /tsʰum-ʔidubəq/ //tsʰ-m-ɪdʰ-əq// 'I am jumping'.

labiodorsals in the Upper dialect of Nez Perce which he describes, though he reconstructs two “morphophonemes” (k^w , q^w) from alternations in the morphology. The Lower dialect (1970:6-7) appears to have two surface labiodorsals (k^w , k^w) from the slight data extant. Many Sahaptin dialects—downriver cousins of Lower (i.e., downriver) Nez Perce in contact with Chinookan and Salishan neighbors—have, on the other hand, six labiodorsals (k^w , q^w , k^w , q^w , x^w , χ^w).

The problem in Kalapuya is not variational in this regard, but conceptual and prosodic. CK has on the whole a tightly structured root morpheme which, at least among most verbs, when without suffixes generally occupies a single syllable. A prosodic hierarchy is followed, both in terms of the grading of segments from the nucleus of the syllable outward and in the types of segment that may appear as affixes. In the rhyme, for example, from the nucleus outward: vowel (a, i, u); resonant (semivowel, liquid, nasal); fricative (peripheral, coronal), affricate, stop (plain, aspirate, glottalized). While the scaling of the last group is speculative, it is clear that CK has been refining the simplicity of its roots.¹⁰

Takeuchi (1969:v, vi, viii) posited “a labio-velar series” based on “regularity in the canonical forms ... only obtained by regarding kw/gw as one unit. Otherwise it would be necessary to set up three initial consonants, of which C₃ will always be w/k_.” He also noted “the fact that the sequence kwu does not occur in S[antiam]K.” Hajda (1976:26) says much the same thing, in greater detail:

/k^w/ appears to be a unit phoneme, not a cluster. Initially and medially, it occurs with the same freedom of occurrence as /k/ before vowels, except that it does not occur before o or u. Unlike /k/, it does not appear as the first member in initial consonant clusters, but it does occur following initial /p/, /t/, /c/, and /s/. Since clusters seem to be limited to two consonants, /k^w/ is best considered a unit. One advantage to considering it as such is that it can be used to even out the distribution of [k] and [q] to some extent, since ku can then be interpreted as the phonetic result of /k^w/ occurring before /u/, while the conjunction of /k/ plus /u/ results in go.¹¹

There is one known exception to Hajda’s statement on clustering in the Jacobs materials:

¹⁰ This can be seen, for example, in the elision of fricatives before stops: CK - $d\acute{o}t\acute{s}it^h$, Tw. - $d\acute{o}q\acute{z}ut^h$ ‘live there’.

¹¹ The possible value of this last remark for studies of the back vowels has not been examined.

- (11) τάμακωλίσκωλίσυ ḡa-m-ma-ḳʷlis+ḳʷlis-u [she] squirts (out)
 USIT-IND-DIR.hither-squirts+INT-INTR 48.7

In this case, the labiodoral $ḳʷ$ occurs before l is used in the C_1 position.

Takeuchi and Hajda are very correct with regard to canonical reasons for labiodorsals. Yet, overall, the facts surrounding them are still vague enough that we may endeavor to see how they pattern in a little more detail. There are actually at least three major arguments for labiodorsals:

- (12) Reasons for labiovelars
- (I) *separate patterning strategy as segments,*
 - (II) *patterning strategy within the CK prosodic structure or syllable canon, and*
 - (III) *variations in consonant clustering and inter-consonantal aspiration.*

We will first look briefly at the possibilities for avoiding labiovelars before returning to (12). If one looks at a set of data like (13), labiodorsals do not seem necessary.

- (13) Examples of obstruent-glide clusters in CK

(a)	τᾱτῖ·ḡyáus	/-ḡyáus/		be winter(time)
(b)	αntḡé·ṭ	/ənṭʰyíit/		yellowjacket
(c)	κωáú·k	/ḡwáúʰk/		he, she
(d)	κῖνῖκῶé·ní	/-ḳʷíini/		take, hold
(e)	τυηκḡḡwíṭyá	/-ḳʰwíṭʰya/	//ḳʰwíṭʰ-ya//	drinking
(f)	αntκωῖ	/ənṭʰḡwí/		arm, limb
(g)	αmpκωᾱ́	/əmp̣ʰḡwáʰ/		thunder
(h)	υmyíʰwá·ỵo·	/-yíitwáʰyu/	//yíit-wá-ỵu//	blow (wind)
(i)	τᾱτῖʰwá·ní	/-ṭwáʰni/	//ṭwáʰ-ni//	hit, strike
(j)	αwíḡ	/swíḡʰ/		small bird

In these data, where O is any obstruent, we see $Oy-$ in (13a-b), $Ow-$ in the rest, except for (13f,g) which have O_1O_2w- . At first glance, they (Kw) appear to pattern like consonant and glide of any similar cluster. Jacobs never noted any particular labiodorsal pronunciation that would appear to license labiodorsals.

Let us examine the segmentation of two verbs in (14) below—in particular, to isolate the verbalizing suffix $-wa$. It works well enough with $-malḳʰ$.

(14) Possible analysis and segmentation of **-wa**(a) **malk^h-** 'come out'(i) /-malk^h-di-(^h)/ come.out-DAT-PUNCT take, pull s.t. out; come out(ii) /-malk^h-wa/ defecate-VBL defecate(b) **heek^h(w)-** 'go along'(i) /-heek^h/ go along, pass by(ii) /-heeg^g-wa-d/ go.on-VBL-DUR₁ pass (*in a race*), leave 133.9, 12; 140.13(iii) /-heeg^g-wa-t^huφ/ go.on-VBL-OBJ₂ leave you 104.3, 9(iii) /-heeg^g-wa-t^ha²φ/ go.on-VBL-OBJ₁ (he) left me 81.9

However, looking closer at (14b), an additional semantic import or intent possibly conveyed by **-wa** is unnecessary. The suffixes for **-heek^h** are simply analyzed wrong. A stem vowel, **a**, is needed before the suffixes. They should be as in (15).

(15) (i) /-heek^h/-# go along, pass by(ii) /-heeg^g-a-d/ go.on-STV-DUR₁ pass (*in a race*), leave 133.9, 12; 140.13(iii) /-heeg^g-a-t^huφ/ go.on-STV-OBJ₂ leave you 104.3, 9(iii) /-heeg^g-a-t^ha²φ/ go.on-STV-OBJ₁ (he) left me 81.9

Takeuchi pointed this out in 1969 with the example in (16):¹²

(16) //heeg^g// /t^hi² t^hu-m-heek^h mch g^gə-du-t^hi-yəmp^h/
 I PRES.1/2-IND-going.on you RECP-LOC-ADV.where-come.from
 I'm moving on to where you have come from. 90.18

(17) shows the word-final apocope of the labial characteristic:

(17) **K^w → K /-#**

To rephrase Hajda, this simplification occurs before other obstruents in clusters as well.

¹² Here I use my own fonts from the original notebook instead of Jacobs 1945 used by Takeuchi. There are other examples where segmentation is still moot, e.g. **-tuuk^h-wa** or **-tuuk^h-a**? The aspiration of the final tells us it's *probably* not **g^g**-, but we really have no information regarding the aspirates (**-t^hú-k^wwa**, 'awake, come to').

Jacobs wrote final labialdorsals as such in his Twalatin notebooks from Louis Kenoyer. Dialectal comparison should help resolve a number of problems dealing with the underlying features in CK.

As given above in (12), there are three arguments for labiovelars: (i) segmental distinctiveness, (ii) segmental patterning vis-a-vis the syllable canon, and (iii) variations in consonant clustering and inter-consonantal aspiration. In (15–16) above, we saw the an example of the unique behavior of labiodorsals finally in CK. Now we look to their patterning. Another reason for admitting labiodorsals is simply in order to reduce the number of dorsals vis-a-vis the numbers of other segments. Let us, however, look at the canon of root shapes.

As suggested in §3.4.2, the following accounts for the root shape for common verb roots, maximally extended as a tautomorphemic base in (20).

(18) $C_1C_2VRC_3$

The only requisite part of this is V; if V is alone, an epenthetic glottal stop appears before it. All other segments, working from the inside out, are optional and increasingly infrequent. But let us chart a selection of tautomorphemic roots,¹³ from the simplest to the most complex, as in (19).

¹³ By 'tautomorphemic' root, I mean the type most common, simple root in CK, shed of any archaic, reanalyzed suffixes, that behaves as if it were itself a syllable.

(19) Tautomorphemic root base (verbs).

	Example:	Weight:	(μ_0)	μ_1	μ_2		
(a)	//i·//	go		V		14	
(b)	//uk//	heat		V		C 15	
(c)	//tʰi//	have, be there		C	V		
(d)	//tʰap//	chop		C ₁	V	C ₂	
(e)	//yuu//	sit		C	V	V	
(f)	//huy//	be so		C	V	R	
(g)	//ɕaap//	stand		C ₁	V	V	C ₂ 16
(h)	//huyʂ//	smell (TRANS)		C ₁	V	R	C ₂ 17
(i)	//kʷa//	take		C _{1w}	V		
(j)	//gʷat//	break off		C _{1w}	V		C ₂
(k)	//kʷii//	root digger) ^{18:a}		C _{1w}	V	V	
(l)	//kʷaw-ni//	call, name (s.o.)		C _{1w}	V	R	
(m)	//gʷiil-yu//	again) ^b		C _{1w}	V	V	C ₂
(n)	//gʷawk//	he, she, it) ^c		C _{1w}	V	R	C ₂
(o)	//kla//	pitchwood) ^a	C ₁	R	V		
(p)	//twaʔ//	hit	C ₁	R	V		C ₂
(q)	//pyuuh//	Ignore me!) ^d	C ₁	R	V	V	C ₂
(r)	//ʂmulk//	stick into	C ₁	R ₁	V	R ₂	C ₂
(s)	//kʷlis+kʷlis-u//	squirt	C _{1w}	R	V		C ₃
(t)	//tka//	rip through	C ₁	C ₂	V		
(u)	//kɕaʔ//	smoke	C ₁	C ₂	V		C ₃
(v)	//kɕaa//	(have) ears) ^a	C ₁	C ₂	V	V	
(w)	//tguup//	skunk) ^a	C ₁	C ₂	V	V	C ₃
(x)	//tɕʷi//	limb) ^a	C ₁	C _{2w}	V		
(y)	//pɕʷaʔ//	thunder) ^a	C ₁	C _{2w}	V		C ₃
(z)	//skʷilt//	untie	C ₁	C _{2w}	V	R	C ₃

Table 12. CK tautomorphemic base

¹⁴ In V(C) roots, onset C = epenthetic ?.¹⁵ In onset or coda C in general, C = {O_b, R}.¹⁶ Rhyme rule: VVC₂ is disallowed where C₂ = tautosyllabic R.¹⁷ Rhyme rule: VRC₂ is disallowed where R = R_H (N, L) and C₂ = F, or where C₂ = R.¹⁸ a = noun, b = adverb, c = pronoun/demonstrative, d = interjection (?).

Collapsing the terms in (19a–o), we note the maximal base morpheme as (20).

(20) The maximal CK root

$(C_1)CV(R_2)(C_2)$

Item (20) is the same as (18).¹⁹ Note the parallels between (19c–h) and (19i–n). In each case, the labialized segments act as individual segments despite the extra gesture. All other initial onsets, which are written as CR- are really C.R-, and in a sense involve two syllables with an excrescent vowel between them (often phonologically realized as aspiration), as heard on the S-M tape, though there is no vowel *weight*. (19s) repeats (19p) and (19x–y) repeat (19t–u). (19z) is the only example of a maximal syllable with C_1C_2 and R, that is, $C_1C_2VRC_3$, or (18/20).

If we collate the initial cluster patterns that we find and label them by the first obstruent, as in (21), we see that, among the stop series, S-, P-, T-, C-, and K-, only certain patterns occur about the initial cluster C_1C_2 -. (Capitals here indicate families of all three laryngeal series by place. C- represents the two affricates. s- is sometimes part of //tʰ-// or C. Vowels following semivowels are given parenthetically.) The glide w is the only third member of clusters beginning with s-, p-, and t- first members.

(21) Chart of C_1C_2 - or onset clusters, by prefix (first member of cluster)

S-	P-	T-	C-	K-
s g, k	b ɣ	d K	tʰ, t͡s	m ɣ T
s kʷ(i)	pʰ ɣw(a, i)	tʰ Kw(a, i)	t͡s	l K w(a, i)
s d	pʰ tʰ	tʰ b, p	t͡s	w(a) K l
s n	pʰ tʰ	tʰ, t͡	m tʰ	y(u)
s m	pʰ s	tʰ, t͡	w(a, i)	
s l	pʰ, p̥	l tʰ	y(i)	
s w(i)	pʰ, p̥	y(a, i, u)		

¹⁹ Note also the following constraint on resonants in the coda: a coda may appear as resonant only where the vowel is short, as in (i).

(i) *CVVR]₀

Although roots of the form CVVR exist, e.g., //laam/ 'go/take in', they never occur in CK without a stem vowel, -i or -u, which causes the final resonant to become extrasyllabic as the stem-vowel onset. This confirms the relationship between V_2 and R_2 and the tautosyllabic proscription of more than two morae.

Combining second and third members in such situations, we see **Kw** or **Kʷ**. Admitting **Kʷ** as a unit phoneme, then, perfectly solves the problem of the extra cluster member. We also see that its distribution is limited: as remarked by both Takeuchi and Hajda, it does not occur before the vowel **u**.²⁰ By not using labiodorsals, we would miss the relationship shown clearly in (19) and (21).

The last argument for labiodorsals, variations in consonant clustering and inter-consonantal aspiration, was noted in Chapter 3. In general, clustering only occurs where aspiration (or glottalization and aspiration, in the case of tautosyllabic initial clusters) intercedes between the cluster members. The labiodorsal cluster **gʷ** is the only exception to this. Of course, it is not really a cluster but a unit, and should be written **gʷ**.

It is clear, then, for several reasons that labiodorsals are required for Santiam. CK is not alone in having positional labiodorsals: they are reported for Takelma (Sapir 1912) and Shasta (Silver 1966).

6.4 The laryngeals.

There are two laryngeals in CK. They are two of the most difficult segments to understand.

(22) ʔ [ʔ, ʔʰ, ʔʷ, ʔʰʷ] **h**

The glottal stop behaves sometimes as a stop and sometimes as a resonant. Ultimately, it should be placed with the resonants. The rough breath is a fricative. They are almost in complementary distribution, for initial glottal stop is always epenthetic, while **-h** is very rare in word-final position. Both the epenthetic glottal stop and **h** are neutral with regard to the important distinction of PERIPHERAL VERSUS CORONAL and therefore can usually be used as a test for the default values of preceding nasals (such as the determiners **tsʰan-**, **an-**; the possessive prefixes **dan-**, **dn-**; or the indicative mode **-m**).

²⁰ There are a number of other features that are interesting in (24). In particular, we see a hierarchy of 'prefixes' or cluster first members by the number of second members they allow. Just the opposite of languages to the north, the front consonants are stronger:

(i) Hierarchy of cluster prefixes
P- > T- > C- > K-

h, like the other fricatives (except for the putative **ʃ** and **ʒ**) occurs initially, word-medially (as syllabic onset) and (rarely) finally. Syllable-initially, **h** is easy to recognize and occurs frequently in all word classes, including directional adverbs of the verb prefix and object suffixes of at least one verb class. The following examples in (23) illustrate **h** root-initially in CK:

(23) (a)	τινιμέ ^α ἡ	//d̥-ii-ni-m- hɑʔ // ²¹	[that] which was their voices	
		USIT-ATTRIB-PL.3-NOM.CONJ-voice		41.5
(b)	ἡ ^α σι	// has -i//	here, this way	
(c)	κὺμῆ ^α ίτυρτι	//g̥-m- hay -d̥uβ-d̥i	he forgot	98.19
		AOR-IND- forget -PURP-OBL.OBJ		
(d)	τὺμῆ ^ε λυρα ^τ	//tʰ-m- hiilp -a-t̥//	I am sick	
		PRES.1/2-IND-sick-STV-DUR		108.5
(e)	κιτᾶ ^θ ῆ ^ι ·ῖ ^ρ	//g̥-d̥ɑ-d̥- hiip //	(it could not) lift up	22.13
		AOR-CONTR-DIR.th-lift		
(f)	καμῆ ^ω ·τυτ ^υ φ	//g̥-am- huuɔ -a-tʰuφ//	(he) 'might see you'	126.11
		FUT.3-IND-see-you.OBJ		
(g)	κιτῆ ^ο ι	//g̥-d̥ii- huy -ʔ//	when he had picked [the crabapples]	131.17
		AOR-TEMP-pick-PRFV		

The examples in (24) illustrate stem-medial, suffix initial **h** (for a special class of verbs ending in **-n**):

(24) (a)	κὺμ ^ρ ύνῆ ^α	//g̥-m-ḅun- hɑ // ...	(he) was making ...	
		AOR-IND-make-OBJ.DUR		102.17
(b)	νι ^ρ υνῆ ^ι	//θ̥-m-ni-ḅun- hi -ʔ//	(they) have made	43.17
		PRES.3-IND-PL.3-make-OBJ-PRFV		

Final **h** is something of a mystery. It is known to occur on a few very common words.

²¹ For some reason, this lexical item uniquely requires DET and POSS forms in **-m** before it: τὺμῆ^α, ḅn-**hɑʔ**, 'POSS.3-language'.

(25) Word-final **h** (underlying representation)

- (a) (i) *mah* you (SG) (ii) *maʔ* [*maʔʰ*] what? (iii) *-maa* fire; house
 (b) *mahtʰii* you (PL)
 (c) *tʰuh* (some)where(?)
 (d) *pʰyuuuh* "Ignore that I'm here!"

The words in the first column of (25) are all the words known with some assurance to end in **h** in JH's language. It is interesting that none of them is a noun or verb, the two major lexical categories in CK. Frachtenberg in his notes implies a continuous-non-continuous dichotomy in verb endings where final vowels terminate in aspiration (marked by open quote mark, presumably **-h**, 'non-punctual') or glottalization (marked by close quote mark, **ʔ**, 'punctual'), respectively. I have tried to adopt the second as a perfective verb aspect. Cases of the former are much less clear in Jacobs' writing.²²

//*mah*// is also heard on the S-M tape. Of the others, //*pʰyuuuh*//, (25d), is a rare Coyote interjection. (25c), //*tʰuh*//, 'where', is written by Jacobs in 14 B. formtypes; of these, 6 have unambiguous aspiration. Hajda (1976:23) cites 5 occurrences of *ya*, 'did', for Mary's River. I do not recognize this form. She (p. 32) points out that, graphemically, "[h] and [ʔ] are in complementary distribution, since the latter is syllable-final and the former syllable-initial." Speculating on Frachtenberg's equating of the two laryngeals, she imagines [h] being used as a morpheme boundary marker word-medially, on a parallel with glottalization (ʔ) between morphemes, because it does not cluster. But I have not found anything like that going on, at least in Jacobs' materials. (Aspiration among C₁ consonants is shared in clusters with aspirated or fricative C₂ consonants. One finds as well aspiration from occasional h-initial verb suffixes like the example she gives, MR *púnhä*.) I have no way of accounting for the paucity of final **-h**. One may speculate that spreading as a released offglide in word-final obstruents has become the default pattern, and consequently final **-h** is not high in distinctive value. It may indeed have recently been in complementary distribution with ʔ.

²² These features have not been studied at length. Frachtenberg does not give examples of such aspects applying to final consonants on similar verbs.

? initially is not always so easy to recognize in the texts because it may be indistinguishable from several other kinds of ?, as listed on Table 12 in Chapter 5. Jacobs first suggested that

A true glottal halt or stop appears, non-consonantal in meaning, but serving as delimitant of syllables and words. Jacobs ca. 1930[:40]

There appear to be three types of initial glottal stop, all of which are epenthetic. One serves to mark morpheme boundaries between vowels. A second, such as appears following certain consonants and before the vocalic nucleus of particles and the determiner, is more problematical. Both of these are light and apparently distinct in manner from that which is found as the onset to a verbal root. (26) below, a repetition of (47a) in §5.3.5, shows this kind of glottal stop before a the determiner:

- (26) Prevocalic epenthetic glottalization (stricturing) before vocalic onset

κύς' αντα' //g _u s—[ʔ]an-ḡa// that DET-stone	the rock	17.7/nb46:104.21
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(27) below, a repetition of (46b.i), shows glottalization before the **u**- prefix and also before the major lexical item, **-uk**, 'heat'.

- (27) Glottalization coalesces finally from following initial prevocalic glottal epenthesis

κύς' u' ὕκ' αντα' //g _u s—[ʔ]u—[ʔ]uk ^h —[ʔ]an-ḡa// that—PRES.3.ATTR-be.hot—DET-stone	those hot rocks	17.6/nb46:104.15
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Every researcher since Jacobs has followed him in accepting some variety of this notion of a morpheme structure (constraint) glottal separating vowels and even resonants at morpheme juncture. Exactly what are the values of the various possibilities of glottal stop, whether they are all the same, is not well understood. In the onsets to the verbs shown in (28), the epenthetic glottal stop is markedly stronger than before particles, from the tape and as seen in effects on the vowel:

- | | | | |
|------------------|----------|--|-----------|
| (28) (a) /ma-ʔi/ | Come in! | (b) /ḡan-ʔéεφam/ | my father |
| (c) /ʔan-ʔoyhi/ | man | (d) /ʔan-ʔamp ^h ḡaʔ/ | Umpqua |
| | | (</ʔan—{ʔan-p ^h ḡaʔ}/ 'the Thunder (River [ʔ]) (people)') | |

In (30) below, I leave the finally aspirated (a.i) for comparison. (Equivalent words for (b–d.i) do not exist. Expressions are in underlying representation. Phonetics are from the S-M tape.)

(30) Final glottal stop compared with vowel length and aspiration

	(i)	(ii)		(iii)	
(a)	mah you (sg)	maʔ [maʔ ^h]	what?	-maa	fire, house
(b)		waʔ [wáʔ ^h]	no	-waa	dream(s)
(c)		p ^h aʔ [p ^h áʔ ^h]	thus, so	—paa—	well, then [<i>w. IMP</i>]
(d)		-yúʔ [ʔyúʔ ^h]	blood	-yuu	have sex

The important thing to notice in (30) is how, where the endings are clearly heard in a not overly fast delivery, as on the S-M tape, how final lexical glottal stop clearly releases final aspiration in exactly the same manner as the occlusives. Note also the lexical variation which shows how //ʔ// contrasts with length; many times in individual lexical items it appears to alternate with it as well.

Finally, it is necessary to come to an understanding of exactly what kind of a segment ʔ is. The manner of the glottal stop in CK, as I propose to show, is ambiguous, finally patterning like the occlusives, medially patterning like a resonant. (I will not discuss initial glottal stop here, which is inserted by 'post-lexical' rule, after all other phonology on a given level.) Finally, however, we note three positions for the glottal stop:

(31) Patterning of the underlying glottal stop

- (i) word-final position (neutralized occlusive-like breathy offglide)
- (ii) next-to-the-last or penultimate position (resonant-like, rhyme-medially)
- (iii) root-medially (occlusive- or resonant-like, but very rare)

We have seen examples of the first (31.i) in (30) above. Examples of the second are in previous chapters: moving (19b) and (22d.ii) from §4.2 and (59a.i), (60.iii) and (61.ii–iii) from §5.4.4, we see in (32) below the extra consonant in the root:

(32) Examples of penultimate segment of the root as ? (rhyme-medial ?)

- (a) (i) $\tau\upsilon\mu\pi\omicron\acute{s}na$ /t^h-m-b^hs-na/ I have been making it long
PRES1/2-IND-long-ARG.3.DUR nb85:51.5
- (ii) $\tau\upsilon\mu\pi\omicron\acute{s}ni$ /d^u-m-b^hs-ni/ make long
LOC-IND-long-ARG.3 nb82
- (b) (EH) $\beta\tau\iota\omega\acute{i}\lambda\mu\tau\iota$ (1) /b-di-wi^hi-m^hdi/ -//wi^h// when (s.o.) indeed butchered, skinned
MYTH-TEMP-skin-ADVL.EMPH nb90
- (c) $\tau\upsilon\tau\iota\mu\iota\phi\acute{o}\tau\varsigma$ 36:3/4//nb36:179.1/5
/d^u-dⁿ-ni-bu^hts/ (²13/13) (EH: //bu^hts//,²2/8) in their mouths/
OBL-POSS-PL.3-mouth out of their mouths
//bu^hts// ~ //bu^hts// 'mouth'
- (d) $\tau\acute{\alpha}\nu\iota\kappa\epsilon\acute{\prime}c\eta\iota$ a=mⁱl^hmis 30.15/nb46:60.3
//d^a-m-ni-gi^hts-ni an-milmis//²⁴ they made (them from) yew
USIT-IND-PL.3-make-OBJ.3 DET-yew
- (e) (i) $\kappa\omega\acute{\alpha}\nu\kappa\omega\alpha\mu\phi\acute{\epsilon}\acute{\alpha}\tau$ nb33:82.22
//g^wawk g^w-am-phi^hts// "he struck him, stabbed him"
- (ii) $\tau\acute{\iota}\kappa\omega\alpha\mu\phi\acute{\epsilon}\acute{\alpha}\tau\upsilon\phi$ /t^hi^h g^wə^h-φé^hts^huφ/ nb33:82.16
//t^hi^h g^wə-m-phi^hts^h-(t^h)uφ// I "butchered" you
I RECP-IND-stab-you.OBJ

One should notice the extra consonant in the root which, without the excrescent vowel (e.g., from (32e)), appears as an onset to the final obstruent coda. With suffixation, a final obstruent preglottalization is not allowed. Therefore, an independent glottal stop is inferred. However, before the final coda of the tautomorphemic root, a second obstruent is not allowed. We have already noted that the maximal expression for such a root, from (18) or (20), is $C_1C_2VRC_3$. By the CK tautomorphemic canon, the only segment type that could fit here is a *resonant*. This makes some sense also, when we note how final length in Jacobs' writing often appears to vary with a glottal stop, either because of an added PUNCT (or PRFV) or because Jacobs just heard such a variation. There can be no more than two morae of length in a CK syllable.

An example of (31.iii), root-medial glottal stop, is contained in the following example (33), with rare root-medial glottal stop.

²⁴ Although I have consistently marked verb stem -ni as indicating a third-person object throughout this thesis, it has become clear to me (as Rude 1986 wanted to say) that this suffix is a kind of applicative, raising obliques (here 'yew') to subject (absolutive/agentive) status.

(33) Root-medial glottal stop

κυϑ'αnyα'ar Presumed pronunciation: [ʔən-yáʔaj] 17.16/nb86:12.1
 //gus—an-yaʔay//
 DEM.DIST—DET-steelhead/(EH)silverside 'steelhead [marked category]'

Probably an alternate spelling for //yaʔay// is /yaʔʔay/ or /yaʔʔay/, the medial consonant corresponding to [ʔ] or preglottalized ʔ, in the same manner as other degeminated consonants. Any CK consonant would behave in such a fashion.

We have looked again and reviewed the nature of the two laryngeal segments which pattern as two kinds of consonants marked by glottalization and aspiration, one resonant-like (though occlusive-like finally) and one fricative-like. They are almost in complimentary distribution. The possibility of a floating feature may help answer the question of how initial or final glottalization can affect intermediate segments, or vice-versa. (Frachtenberg's morphemic glottalization marking aspectoidal perfective on certain achievement verbs is very similar in practice.) And we have seen how the glottal stop patterns medially with the resonants, and finally with the occlusives.

6.5 Conclusion

A concentrated look at the four places of general articulation in Central Kalapuya, bilabial, coronal, dorsal, and laryngeal, sheds insights on the CK segments that might be missed in another approach. From §6.3, we note that the bilabial C₁ has the greatest cluster patterning of any of the segments. This gives emphasis to the unusual nature of the fully developed labial set in CK. The dorsals, on the other hand, include only stops. Labiodorsals are clearly justified by reasons of segmental uniqueness, segmental patterning, onset cluster patterning and aspiration. Yet the dorsal set appears skeletal next to the others. The largest group is of course the coronals, with nearly half of the segments and several subpatterns. They are most complex and the only group to include possible glottalized fricatives. The laryngeals are the least understood. Because they are found nearly everywhere in the gestures of glottalization and aspiration, it is difficult to appreciate them as segments. Many mysteries are likely to become more clearly understood once a thorough study is undertaken of CK prosody. In this melodious language, it apparently affects everything.

Chapter 7

Conclusion of thesis and suggestions for future studies

The goals of this thesis, outlined in the Introduction, were: (1) to present phonological (and morphological) aspects of the segments of Central Kalapuya, following the analysis I have adopted, and (2) to illustrate these segments with data from Jacobs' notebook transcriptions from John Hudson (primarily) and Eustace Howard (secondarily), his two CK informants.

In Chapter One, background material was presented on the three Kalapuan languages at Contact, including their speakers and areal milieu. The Kalapuyan language family and its dialects were discussed and a tree-structure of Central Kalapuyan (CK) dialects was presented. Past analyses of Kalapuyan that bear on CK phonology were covered by linguist. (Some discussion of the history of the Central Kalapuyan people, their names, and sources for Kalapuyan languages is to be found in the six Appendices.) Finally, the system of methodology used with regard to Jacobs forms was discussed with examples.

An overview of the surface and underlying vowels in Central Kalapuya was presented in Chapter Two. The set of underlying vowels has three members, //a, i, u//. These have seven short allophones (a, á, ə; e, i; u, ɔ) and five long allophones (aa; ee, ii; uu, ɔɔ). A third category of vowel length, variable, is short in monosyllables and long where the root is suffixed. Three diphthongs were discussed, ay, aw, uy, the second member represented as a glide. One epenthetic vowel was mentioned, i, which has a consistent harmony in Hálpam (Santiam). (ə, and perhaps many examples of general a, may have been similarly epenthetic in the past.) Dialectal variation, particularly with regard to variable raising of /a/, is a concern.

Chapter Three reviewed the resonants of CK, both plain and glottalized resonants, five of each. These resonants—w, w̥; y, y̥; l, l̥; n, n̥; m, m̥—are seen to contrast initially and finally. They form three natural groups, glides, liquids, and nasals, on the basis of decreasing sonority. All of them may (assumably, unglottalized) may provide an offglide to a root-initial occlusive; three of them—l, n, m (or R_H)—are commonly found as second members in root-final bound clusters where they provide onglide to final root codas. Again, it is assumed that the glottalization is from an underlyingly

glottalized occlusive, though both segments share the laryngeal features. Based on current medial gemination in Twalatin, a Northern Kalapuya dialect, and apparent ʔO_b remnants in CK, that an earlier stage of the language, Pre-CK, also had geminates. Degemination, which may be ascribed to social causes, left much of the variable vowel system and occasional medially preglottalized occlusives in CK, particularly in John Hudson's Santiam. The chapter suggested, speculatively, a maximal root $C_1C_2VRC_3$ as the prototypical CK root. It also suggested a series of some five lexical levels addressing different parts of CK derivational and inflectional morphology with regard to types of phonological processes. These include the root, the reduplicated root, the affixal system (where most assimilation occurs), the verb (with its unique verbal-prefix/verb-stem boundary), and discourse. Positional gemination and nasal assimilation to obstruents and to other resonants were discussed in this context.

The fricatives in CK were discussed in Chapter Four. They are only four plus ʃ and ʒ . x (not counted) is thought to be a borrowed sound or peripheral phoneme. The final, preglottalized fricatives ʃ and ʒ are discussed. ʔ was introduced as an independent segment which shows its glottalization even when the root has been suffixed, whereas preglottalized final root obstruents after root suffixation generally do not.

Chapter Five discussed the occlusives of CK. They are of three laryngeal series: plain; glottalized, either simultaneously (weakly) in the root onset, or through preglottalization in a (final) root coda; and aspirate. Simultaneous glottalization is also present in Type 1 and Type 2 reduplicants. Medially, it occurs only as fortuitous coalescence where a following glottal gesture (perhaps from a glottalized resonant) attaches to the preceding occlusive. Medial preglottalization of occlusives, presumably from degemination, also occurs, though rarely. While preglottalization of obstruents is root-final, initial and medial glottalized resonants also show preglottalization. Three laryngeally distinct types of occlusives are found root-initially, two finally (plain generally missing, having regularly neutralized through aspirate release) and two stem-medially (where glottalization is generally fortuitous, not underlying). The major patterns are discussed further below. The question of the validity of preglottalization as an underlying feature was discussed at length. Perhaps the major contending facts for preglottalization are that (1) segments with final preglottalization must be underlyingly marked, and (2) initial root-onset simultaneous glottalization and root-final preglottalization of obstruents appear as equal and opposite patterns in complementary distribution. Those against are (1) the fact that apparently no definite

minimal pairs have been discovered in final position, and (2) style or pragmatic marking is extremely common at the end of an utterance. It was suggested that CK was developing such a phonemic contrast at the time of Contact.

The four places of general articulation in Central Kalapuya, bilabial, coronal, dorsal, and laryngeal were covered in Chapter Six. The bilabials were seen to be surprisingly robust, both with regard to types of segments and cluster patterning, especially for the Northwest. The dorsal series, on the other hand, manifests only stops. A set of labiodorsals is fully justified on the bases of patterning and canonical root types. The largest and most complicated group is the coronals, with nearly half of the segments. The laryngeals are the least understood, probably functioning both as resonants and as stops. The area most in need of study is the prosody, which we find at work everywhere in CK.

I present here again the segments of CK.

- (1) The high-pitch-accented CK root (generally syllabic, from Appendix VII)

$(C_1)C_2\acute{V}(R)(C_3)$ Maximal reduplicative root

- (2) (a) The vowels of CK (b) The vowel quantities of CK

i	u	V	V.	VV
	a	μ	μ/μμ	μμ

- (3) The consonant phonemes of CK

	w			y	
Resonants	ẉ			ỵ	
	m		n	l	
	ṃ		ṇ	ḷ	?
Fricatives	φ		s	ʃ	h
			ʂ	ʃ̣	
Occlusives	p̣	ṭ	ṭʂ	ḳ	ḳʷ
	ḅ	ḍ	ṭʂ̣	g̣	g̣ʷ
	pʰ	tʰ	tʰʂ	kʰ	kʰʷ

The three types of occlusives, plain, glottalised, aspirate, are found only root-initially. Root medially before vowels we find only two, plain and aspirate, to be underlying, as in (4).

(4) Medial occlusives before a vowel

Plain:	b	d	t ^h	g	g ^w
Aspirate:	p ^h	t ^h		k ^h	k ^{hw}

Before consonants, however, the patterning is different. Total neutralization generally prevails, as we see in the forms of Eustace Howard. The occasional plain forms, which represent generally underlying plain forms surfacing in the careful speech of John Hudson both finally (with regard to certain apparently reanalyzed suffixes) and in clusters before other occlusives (in certain lexical items), can be ignored for two reasons: (1) they are taken care of at particular lexical level, and (2) they are not found in the speech of EH. This resolved, the general occlusive pattern found before the stronger consonants (obstruents plus *n*) is as in (5) (the affricate becoming *s*).

(5) Pre-consonantal occlusives before *n* or obstruents

Neutralized:	p ^h	t ^h	k ^h
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There is another set of occlusives, however, that occur before the resonants *w, y, l, m*, as in (6) (only one of the labiodorsals appearing, before *l*).

(6) Occlusives before (lighter) resonants, initially in clusters

Glottalized:	p̰	t̰	t̰s	k̰	k̰ ^w
Aspirate:	p ^h	t ^h	t ^h s	k ^h	(k ^{hw})

The two series in (6) are similar to those which appear root-finally word finally.

(7) Occlusives word-finally

Glottalized:	ʔp ^h	ʔt ^h	ʔt ^h s	ʔk ^h
Neutralized/aspirate:	p ^h	t ^h	t ^h s	k ^h

Thus the preglottalized series do form part of a coherent pattern in CK, despite that, from cross-linguistic evidence, one might expect for (7) a pattern closer to that for (5).

Finally, I would like to present the patterns of three types of glottalized segments, glides, heavy resonants and occlusives, in three positions—initially, medially, and finally.

(8) Position of glottalization in three types of segments

	Glides (//w̥, y̥//)	Heavy resonants (//l̥, m̥, n̥//)	Occlusives (//p̥, t̥, ts̥, k̥, k̥ʷ//)
Root-initially:	Preglottalization (ʔw, ʔy)	Preglottalization (ʔl, ʔm, ʔn)	Simultaneous glottalization (p̥, t̥, ts̥, k̥, k̥ʷ)
Stem-medially:	Preglottalization morpheme-initially; Postglottalization morpheme-finally	Preglottalization	(a) Coalescence (b) Preglottalization
Root-/word- finally:	Postglottalization (wʔ, yʔ)	Postglottalization (or preglottalization) (lʔ ~ ʔl, mʔ ~ ʔm, nʔ ~ ʔn)	Preglottalization (p̥, t̥, ts̥, k̥)

Table 13. Timing of glottalization among three types of glottalized segments

A close examination of this chart shows interesting patterns of discrete variation.

This thesis has shown that Takeuchi and Hajda were correct in suggesting three vowels for CK. On the other hand, Berman was correct in three laryngeal series and three diphthongs. This thesis has also added, I hope, to the knowledge of CK resonants and processes.

There is yet much to study in Central Kalapuya. It is hoped that this thesis will generate interest in the Kalapuyan languages and in other southern Pacific Northwest languages in general. To that end, I would like to suggest some of the most important things that to be done in Kalapuyan studies. Perhaps most important is a dictionary of Central Kalapuya to be created from the Jacobs texts from both the dictations of John Hudson and Eustace Howard. To these should be added all words from the dictations of William Hartless and Grace Wheeler as taken by Frachtenberg. Then the additional

material from the early wordlists may be added. Each form should be carefully reconstituted phonologically and its origins noted.

In the prosodic and grammatical studies of Central Kalapuya there is, of course, a great deal to do. The Swadesh-Melton tape should be thoroughly studied acoustically. The CK root should be completely analyzed. Relevant GR-marking pronominal and other stem suffixes must be noted throughout the various corpora and the appropriate syntactical studies undertaken. And there are Twalatin and Yonkalla to be studied.

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Appendix I

Kalapuya

1 The name *Kálapúya*¹ is still spoken in the Columbian area; at Toppenish (WA) I have heard even *kálapúya* spoken in northern Sahaptin, probably in derision. Michael Silverstein gives two Chinookan designations² for it in *Kikšk*, the most upriver of the three Chinookan languages,³ as in (1).

- (1) (a) *itkálapúyawaykš* (so called by lower *Kikšt*—the Clackamas people, below Willamette Falls[—in CK: $\alpha(n)-f\varepsilon\cdot tu'$])
(b) *itgalapúwiyukš* (so called by upper *Kikšk*[—Wasco-Wishram?])

The combination of the (plural) classifying prefix *it-* and plural animate suffix *-(y)(u)kš* is used to mark human plurals in *Kikšk*. Zenk (1990:552, referring to Silverstein) states that “the stem *-galapúwi-* or *-kálapúywa-* is apparently not originally Chinookan and is of unknown origin.” However, if the glottalized form is taken into account (as a derisive or diminutive form), an etymology may appear. An origin in the Estuary Chinookan forms *k-i-Lá-* or *k-a-Lá-* (also *k-á-La-*; Boas’ *L* = [t ~ tʰ]), ‘people of’,⁴ is probably untenable because of the voiceless lateral. However, a possessive compound based on the Upriver terms for ‘man’ (2a) or ‘men’ (2b) looks entirely possible. (The prefixes *i-* and *it-* are essentially possessive determiners, SG.MASC and PL.MASC; much of the time, it is not so easy to sort out their semantics.)

- (2) (a) *i-kála* ‘man’ (b) *it-kál-ukš* ‘men’⁵

The basic format for both nominal compounding and possession is a pair of ordered noun phrases (NP), where the first modifies the second, e.g. ${}_1\text{NP}_{\text{ATTR}} {}_2\text{NP}$,

¹ Frachtenberg (slip files) gives *K!alabūya*.

² Personal communication from M. Silverstein to Henry Zenk, 1975, and to editors of the *Handbook of North American Indians*, 7, 1974. (See Zenk 1990:552.)

³ **Seaside:** Clatsop, Shoalwater/Chinook; **Estuary:** Wakiacum-Kathlamet, Qašiamišti (Cowlitz mouth), perhaps Kalama; **Upriver (Kikšt):** Multnomah, Clackamas, Cascades, Hood River, the Dalles (Wasco/Wishram). (Traditionally, there were only two names, Lower and Upper Chinookan; the second and third languages were ascribed to Upper. It is now generally accepted, I think, that there were three, despite Boas’ (1911:563) early statement that “The language was spoken in two principal dialects, Upper Chinook and Lower Chinook.”

⁴ For example, *k-a-Lá-mat*, ‘the Kathlamet’; *k-i-Lá-xaniak* ‘people of a village’ (Hymes 1955:127–8).

⁵ E.g., Fouler and French 1982:19, from Dyk 1933. In at least some current Wasco speakers, the accent on the plural form has moved it to the ultimate syllable of the word.

The word refers to the extensive glades of oak-savanna grassland (Boyd 1999) in the Willamette Valley and tributaries which the Kalapuyas (unlike the Chinookans, for example) kept free of vegetation by annual or semiannual burns.⁷ The compound then would appear as (7a) in Chinookan or as (7b, 7c) in Kalapuyan.

- (7) (a) *it-kalá-ḥuy²wa-yukš 'men of the prairies' (or) 'men of the (forest) glades'
 (b) *²an-kalá-ḥuy²wa 'a man of the praires, men of the prairies'
 (c) *ts^ban-kalá-ḥuy²wa 'the country of the prairie men'

This stem of (5b) or (c) can be seen in Lewis and Clark's *Cal-lar-po-e-wah* or *Cal-lah-po-é-wah* (Thwaites 1904-5:4:241,255), the *-e-* presumably designating the glottal.⁸

The most dubious feature of (7) is the misplaced accent, as compared to the forms in (1). Why has the accent moved back in (1)? In modern Wasco, *-yúkš* appears to pull the accent back, putting ultimate or penultimate stress on the form (or its preceding syllable) because of this final animate pluralizer. However, my best guess is that the answer probably lies in the variation of the codes being used. Here we see the stress on the first syllable of the *foreign* term (for Chinookans, that is): a speaker rattles along until (s)he comes upon the *ḥuy²wa*—the Kalapuyan stress is a high pitch and strong—hitting it in a codeswitching simulation to exaggerate the use of the foreign term. (For a Kalapuyan, the first part could be understood as merely an extension of the initial verbal or nominal prefixation. It could be natural to keep the stress back.) Perhaps due to the very complicated nature of Chinookan morphology, stress rules were clearly secondary to the study of the meaning of the building of the Chinookan phrases. The stress has been, unfortunately, very much ignored.

In Kalapuya, once the stress was clarified, the exact reflex of (7a) would depend upon how the Kalapuyan speakers interpreted the Clackamas *-k-* initial. Normally, an English or Sahaptin *k-* would probably have been interpreted as an aspirated stop, *k^h*; note the word for 'horse', also masculine in Chinookan:

"I'm not sure". *-pu-* may represent an underlying verb root meaning 'fill', *-i* 'TRANS/ACTIVE'; *-wa* (or *-²wa*) is apparently an inceptive verbalizer or causative in CK.

⁷ On the botanical makeup of and indigenous burning in the Willamette Valley, see Boyd 1999.

⁸ Cf. also Alexander Henry's *Calipuyowes* (Coues 1897: 2: 814, 860, 879), Ross's *Col-lap-poh-yea-ass* (1849:235-6) or *Call-law-poh-yea-as* (1855:108 [1956:77]), and Stuart's *Cathlapoo-yays* (1935:33).

	Chinook ⁹	Wasco	Twalatin	C. Kalapuya
(6)	-k'éutan	i-kíutan	-k ^h íudin, -k ^h iudən, -k ^h iutan	-k ^h iitan, -k ^h yútan (JH, EH)

John Hudson and Eustace Howard have vocalic variants for this word, differing in what is apparently a more stable reflex (ii) for the nucleus of this assimilated CK word, plus a more recent loan pattern in nuclear *ju*. However, all forms of the root begin with *k^h*. If, however, the more common Clackamas form was the diminutive *it-kálá-*ɸuy²wa-yukš*, 'little men of the prairies [derisively]', a loan into any branch of Kalapuyan would have normally kept the glottalization. This would account for the glottalized/unglottalized variation of the initial. Jacobs (nb.78:8) records at least once Eustace Howard using *Kálap^húya*; this form is also attested for William Hartless (Frachtenberg undated, or as F.s[lip].f[iles])¹⁰ with lengthening of the stressed vowel. Glottalization is not used with this term by John Hudson to my knowledge, who apparently said *K^haláp^húya* as in English. The origin of the aspiration on the *p^h*, a recent development, is not clear. But it should be accountable from the English influence, possibly through a natural Clackamas alternation with a voiceless aspirated reflex as may have been originally used in *Kikšk*, as we see in (1).

Following this line of reasoning, the most likely terms, then, for tribal name as constructed and borrowed would have been as in (7a-b):

- (7) (a) *//ʔn-kalabúy²wa// [ʔaŋkálabúy²wa] 'little men of the forest glades/prairies'
 (b) *//ʔn-k^halabúy²wa// [ʔaŋk^hálabúy²wa] 'men of the forest glades/prairies'

Later the *w* dropped out as the distributive effect¹¹ of *-wa* was lost. The *ɸ* changed to *p^h*, either under the influence of White usage or in making the Kalapuyan fashion of laryngeal types available to early Upper Chinookans. The Kalapuyan people were noted for their general honesty and friendliness to groups that passed through their country. They probably would have ignored the pejorative nature of the glottalized form and taken any appellation in their stride.

⁹ Boas 1911:598. The Twalatin and CK forms are from Jacobs.

¹⁰ Box 45 in the Jacobs Collection at the University of Washington Libraries.

¹¹ Similarities between certain particles in *Kikšt* and Kalapuya is remarkable.

An item found among Frachtenberg's slip files¹² appears to clinch the general direction, at least, of this hypothesis. Frachtenberg writes:

According to Gatschet[,] *kalapu'ywa*, *kalapwa'yukš* were names applied to *Tfalatī* by the *Afečš* because they lived on prairies.

These *Afečš* (CK 'a(n)-~~qéčzu~~) are the Clackamas (CH gi(t)k-*qimāš*)¹³, while the *Tfalatī* (Twalatin) are the more northern of the two known Northern Kalapuya (NK) tribes who were neighbors of the Clackamas and Multnomah to the west. We can therefore tentatively assume that *kalapúya* / *kalapúya* is a mixed word, composed of a Chinookan possessive-compound prefix and a Kalapuyan root, borrowed back into NK and CK from Chinookan as *-k'alapúywa* or *-kalapúywa*, with or without pejorative glottalization. The difference is here assumed to vary with the Clackamas use of the diminutive and Kalapuyan acceptance of the name in either form.

While the Kalapuya have themselves used this name in intercourse with many outsiders including Whites, the original name for themselves was certainly different, and may have been tribe-specific. It may be relevant that two Plateau peoples refer to them as *múk'ay*, as in the name for them Molale *mú(u)k'aya* (J.nb. 45) or in Klamath *mokey* (Barker 1963:239).¹⁴ In Nez Perce, the name *kalapóoya* was used for Klamath of California Indians—indicative of their cultural alignment.¹⁵ For more information on Kalapuyan names, see Hodge 1907–1910, Swanton 1952, and Zenk 1990.

2 The senses of *Kalapuya* today.

The English term *Kalapúya* has at least three significations. First, it pertains to the linguistic family of three branches, Northern (NK), Central, and Southern (SK), each recognized as a separate language, and to their speakers, culturally or linguistically as a unit. (The Treaty of 1851, for example, referred to all NK and CK groups as bands "of

¹² Frachtenberg's Kalapuyan slip files were given to Jacobs by Boas in 1930 after the death of their author. See them under Frachtenberg *undated*.

¹³ Silverstein 1990:544. F. (s.f.) has NK *a-qimmaš*. It is not clear how wide a designation the Tualatin (or Clackamas) terms imply. One assumes that *Afečš*, for example, refers to a larger group (of Clackamas) than only the Clawiwalla of Willamette Falls (*wulámt* [Hale [1846]1968:217]). It is likely that *a-qimmaš* is simply the Chinookan word for Clackamas borrowed into NK with either the addition of the NK determiner 'a- or the maintenance of such a prefix from Chinookan (or both).

¹⁴ Both of these was listed in Rigsby 1965:241; the former in Zenk 1990:552.

¹⁵ Aoki 1994:264. "There is a folk etymological tradition to consider this the source for the name *California*."

the Callapooya Tribe of Indians".)¹⁶ Second, it has referred more specifically to the Central branch, as opposed to the two NK tribes, Twalatin and Yamhill, or the SK people, the Yonkalla. From Contact to the death of the language family around 1954, this appears to have been the chief use of the term. Finally, to a few Whites, perhaps thinking of the valley with the name *Calapooia River*, it seems to have come to refer particularly to the southernmost Central group, especially on the right bank of the Willamette, upper Hálham: that is, ts'an-t'kubi'. This is the country of the Calapooia River Valley running through p-d. Brownsville, inclusive of CK groups as far south as the border with SK.¹⁷ (Even Jacobs puts *KALAPUYA*, clearly as a subgroup designation, in the area of and just below the Calapooia River valley on his map 1945:154.) This third sense is surely the least correct of the three. Both John Hudson (J. nb.46:150) and Eustace Howard (J. nb.78:8) indicated the second sense as the most correct.

In this thesis, I use the term alone primarily to refer to the linguistic family and the cultural patterns of all Kalapuyan peoples in general, while still reserving some cultural differences (and of course linguistic differences) for CK. I use the term *Kalapúyan* adjectivally with regard to the people or language, and nominally with regard to the people themselves.

¹⁶ The term *Calipoa* as was used by Governor Joseph Lane in a report of 1849 to refer to the people in the second sense. See Mackey 1974:84–125.

¹⁷ The map in Berreman 1937 (reprinted in Cheatham 1988:9) shows "Calapuya" for ts'an-t'kubi' and the northern Yonkalla area, ts'an-t'kú'sna, together.

Appendix II

A brief history and way of life of the Central Kalapuyan people

1 Kalapuyan prehistory

With the final flooding of episodic Lake Willamette, around 13,000 BP,¹ and its retreat, the moist period still favorable to megafauna and their hunters continued to warm. It is probable that from around 12,000 BP² until megafaunal die-off about 10,800, proboscidians were hunted in what later became CK territory, judging from incomplete tool records. Points from three different cultural complexes of early megafaunal hunters have been found. A large, 14cm Sandia point, a Cody point ("Eden Valley type of Yuma" with converging sides of the tang, Cresswell 1947:177)³ and a few Clovis points⁴ have all been found in this area, in some cases with probable megafaunal association.

As the weather grew drier, certainly from the time of the proboscidian die-off, the valley cultures underwent considerable change.⁵ By 7800 BP,⁶ we find a well-settled

¹ The filling of Lake Willamette (along with two lakes on the mid-Columbia), as far south as p-d. Fern Ridge Reservoir, was caused by periodic gigantic flooding of episodic Lake Missoula, the last of which occurred around this time. Large boulders from the northern Rockies, once buried in Canadian icebergs, still mark deep edges of the episodic lake, such as the Bellevue erratic in Erratic Rock State Park in *ts'an-yamhala*. (The flood point was the undercutting of a southern finger of the Cordilleran Ice Sheet occupying p-d. Lake Pend Oreille, where Clark Fork enters. See Hammatt 1976 [not available] or Mullineaux *et al.* 1978 for dating. A recent review is in Waitt 1995 and a popular account of the Missoula spill is in Alt 2001. For Oregon geology, see Baldwin 1976.)

² The estimated (C¹⁴) date for the Manis Mastodon site near Sequim (northeast corner of the Olympic Peninsula), WA (Gustafson *et al.* 1979). Compare this with a 13,200 BP C¹⁴ date at Fort Rock Cave, central Oregon on the edge of the Great Basin, versus the large "exquisitely crafted" fluted points of the East Wenatchee (WA) site of 11,200 BP (Bonnichsen and Turnmire 1999:11-2).

³ These first two points were found in the prairie between the Calapooia River and Muddy Creek (well-known locations for kitchenmidden/low burial mounds), on the James Templeton ranch³ in *ts'an-t'kúbi*² country (by a local teacher and paleontology student in 1895 not far from vertebra, a tooth, and part of a tusk of one or more mammoth (Cresswell 1947). (See Worthington 1957 for a discussion of Cody points in the context of early North American projectile points.)

⁴ One of these (abraded by stream action) was found along the Mohawk River (*ts'a-wó'ogot'*?), northeast of present-day Springfield (Alleley 1975).

⁵ Chronology for the Willamette Valley may be tied in with that of Cressman *et al.* 1960 (who suggest that post-Missoula human occupation at the Five Mile Rapids site, WS-4/35WS8, began again around 10,000 BP, with early riverine adaptation including salmon fishing) and the onset of Leonhardy and Rice's (1970) "Windust" Phase at 10,000 BP on the lower Snake River. "Cascade" points (Butler 1961; unavailable to me) date from perhaps 8000 BP, the beginning of Leonhardy and Rice's Cascade Phase; they were probably used for atlatl dart points and knives. For a recent general review of paleoindian arrowpoint types, see Stanford 1999; for a review closer to CK country, see Bryan and Tuohy 1999.

group living in the southern or upper end of the Willamette Valley (p-d. Fern Ridge Reservoir on Long Tom River, *ts'á-lámale*⁷ country), relying on camas, *'ə-miis* (cooked *Camassia quamash*),⁸ as a staple—much like Kalapuyan people at Contact (except that their elk were “considerably larger than the modern elk”⁹). The lanceolate “Cascade” point, assumed for atlatl dart points and knives, is found in the Valley and outlying areas¹⁰ from about this time. Valley weather continued to warm, entering into a period said to be warmer than today, the Hypsithermal, centering around 6000 to 5500 BP, plus or minus 2000–2500 years.¹¹ This period saw an oak maximum; many in the Valley used acorns (*'ən-ʔúlik*¹²; *Quercus garryana*, *méεφα*) as their staple,¹² a crop of secondary importance in the Willamette Valley at the time of Contact, but of primary importance to cultures further south in warmer climates.¹³ During this same period, side-notched points become common, especially from 4000 BP. Then, after around 2000 BP, atlatl darts gradually gave way in numbers to smaller arrowheads (*'ən-láwsək*).¹⁴

2 Some details of their way of life

Central Kalapuyans were considered masters of camas production, and pressed cooked camas into cakes called *dúnk^hayk^h*, lit. ‘his leaf’ (EH), the size of a two-inch hotcake.¹⁵ A secondary staple and women’s speciality were the seeds of the tarweed (*'ə-sáwal*, *Madia* sp., esp. *M. elegans*), gathered by the women in baskets after an early fall

⁶ That is, around 7765 ±90 BP, according to the best date Cheatham and coworkers found in Hannavan Creek (east edge of Fern Ridge Lake, west of Eugene); Cheatham 1988:106.

⁷ CK forms given in this appendix are in the writing style of *major allophone*, e.g. /*ts'á-lámale*/. The accent, which is predictable from the form, is given for additional assistance to the reader. Forms are from John Hudson (JH), unless otherwise noted (EH = Eustace Howard). For geographical names (such as *ts'á-lámale*), see §1.3 and Appendix 3.

⁸ According to JH, the uncooked, fresh camas is *'ən-đii^h* (cf. Takelma *đip^h* [Sapir 1909:243]). For EH, both cooked and raw camas are called *'ə-miis*; *'ən-đii^h* is a specially early variety.

⁹ Leonhardy and Rice (1970:5–6), noting Gustafson 1969 for Marmes Rockshelter.

¹⁰ Newman (1966:26), who supervised the excavation of Cascadia Cave, put its initial occupation “at 6000 B. C. and [...] associated with the Cascade point [...] which continues throughout the time of occupation. [...] Side notched points are placed at 4000 B. C. or slightly later.”

¹¹ The Hypsithermal period, said to be warmer than current period, is placed by Heusser (1960:184), mainly through palynological studies, “to between ca 8500 and 3000 B. P. in southern British Columbia, Washington, and Oregon.”

¹² Charred acorns were found, for example, associated with a hearth on Luckiamute River which dates from about 5300 BP (Reckendorf and Parsons 1966).

¹³ Acorns were roasted, husked, sun-dried, leached in water for 24 hours, then boiled—JH.

¹⁴ EH: *'ən-láwsə?*

¹⁵ From EH, J.nb83:137. “These people preserve their commass much better than any others; they make it up in cakes of about 10 pounds’ weight, three inches thick, in which state it keeps fresh and moist.” —Alexander Henry, Champoege, 23 January 1814, in Coues 1897[1965]:2:814–815.

burn-off and carefully ground in a beautiful, large grinding bowl or mortar (^ʔəŋ-^gúy^ʔ-^(ya)la^ʔda [EH])¹⁶ with a stone pestle (-ní^ʔi, EH) as a breakfast food. At least two varieties of *Lomatium* or biscuitroot, probably ^ʔən-^thúytsuk^ʔ,¹⁷ longer than camas, and (ə-)lú^ʔ (EH), smaller, were gathered from Champoek, ^tʰan-hánt^ʰiyúk.¹⁸ Herbs were dug with digging-sticks (^ʔəŋ-k^ʰii) with handles of antler, into which hardwood pieces were fitted.

Many delicious berries (^ʔəŋ-^gá^ʔyana/^gáya^ʔna) formed a third staple. The native blackberry (^ʔən-^th^ʰililek^ʔ, *Rubus ursinus*)¹⁹ was the most important, ripe in early July; they were dried for winter. Wild strawberries (^tʰáxup^ʔlu^ʔ)²⁰ were ripe in June. Raspberries (^ʔé^ʔu^ʔfi) were ripe in late June or early July. Serviceberries (^mé^ʔə^ʔip^ʔ), harvested in late July or August, were dried. Small huckleberries (^ʔa-máw) were taken near Salem (^tʰa-mí^ʔgí^ʔdi), while a large, mountain variety (^ʔən-^ʔiwam) were traded for from the Molale (^ʔEH, nb.83:139).²¹ Wild cherries were ^ʔə-l^ʔq^ʔ (S-M). Salalberries (^mú^ʔduy [EH]) were ripe often August through October. Elderberries (^ʔə-ná^ʔə^ʔu^ʔ [JH]), ripening in October, were boiled (^ʔEH, nb83.139). Raw sunflower (^ʔən-^ʔá^ʔl) stalks were eaten in April (EH, nb82:72). Hazel (*Corylus cornuta*) supplied both a delicious nut (^ʔam-^pʰ^ʔʔ), often mashed with camas or tarweed, stored for winter, and, in its tough shoots, rope (^ʔə-mú^ʔtsá^ʔl) fiber.

There were white- and black tailed deer (^ʔə-mook^ʔi^ʔ/^muuk^ʔi^ʔ); venison was such a staple that it also meant in general *meat*. Deer were gathered in huge, county-wide tribal sweeps, especially at the time of the fall burn-off, the meat dried for the winter. Elk (^ʔən-^th^ʰá^ʔq^ʔ)²² were taken in pits. While Kalapuyans love salmon (^ʔən-^th^ʰmúwək^ʔ, 'fish, Chinook salmon')²³, at Contact, they were mostly trading with Chinookans for the fish at or below Willamette Falls. Few salmon were able to make the 20-foot leap up the falls (and then only during the spring floods); it is likely that the Willamette ceased being a heavy salmon-bearing river during Hypsithermal times. Eels (^ʔən-^ʔaw) were taken by hand at night with a torch in the falls of many tributaries. They were roasted on spits.

¹⁶ Literally, 'grind-tool', from ^guy^ʔ 'grind'—'mortar': ^guy^ʔ, ^guy^ʔla^ʔda, ^guy^ʔyalá^ʔda, ^guy^ʔwalá^ʔda; JH: ^guy^ʔya

¹⁷ EH: ^ʔən-^th^ʰúytsuk^ʔ or ^ʔən-^púytsuk^ʔ

¹⁸ *Lomatium* was probably a tertiary food for CK, unlike the Plateau peoples where it is first rank.

¹⁹ EH: ^ʔən-^th^ʰililek^ʔ

²⁰ EH. JH (J. overwriting an earlier EH form): ^tʰáak^ʔup^ʔlu^ʔ

²¹ ^ʔEH indicates *the preceding five examples are (only) from EH*, at the notebook citation given.

²² EH: ^ʔən-^th^ʰá^ʔ

²³ EH: ^ʔən-^th^ʰmúwi^ʔ

Small animals were taken with dead-fall traps. Gray squirrels (^ʼə-múwət) were roasted on coals or hot ashes. Their skins were kept for blankets, though the robe of a small rodent called the mountain beaver was highly prized. Grouse (^ʼə-múφ) and a kind of pheasant (^ʼən-t^hmú^h) were the most favored birds, followed by duck (nák^hnak^h) and geese (^hk^hʒdak^h). Mud turtles (dúgal^h) were eaten (3EH, nb84.3). Grasshoppers (^ʼən-t^hgó^hyək^h)²⁴ were gathered after a burn. A species of caterpillar, ^ʼən-t^há^hyit^h, infesting young ash trees (^ʼə-máwlek^h/máwiliik^h) every few years, would gather in holes that were dug at the base of trees and, boiled, eaten as a delicacy. Grizzly bears (^ʼə-sáyum)²⁵ were hunted at their dens by a daring man holding a hardened sharpened pole and a flanking team for skill and bravery; they were not eaten. Nor were frogs (^ʼən-t^hk^hák^há^h), lizards or snakes (EH). Garter snake (^ʼən-t^hsáwts^hk^hlak^h)²⁶ was important mythically as the carrier of fire; blue-racer (^ʼən-t^hwiit^hak^h) brought luck in gambling. Rattlesnake was ^ʼən-t^hk^he(ε).

During the summer (méεgu^h), when the people camped closer to the rivers on the flood plain, they went naked except for a women's pubic covering. In winter (pyáws), they wore furs, leggings and moccasins on the snow. They sometimes tattooed spots on their faces, hands and arms—as much testing themselves against the pain as for the decoration. Faces were painted (t^héek^h-d-ats^hi) red ([^ʼu-]ts^hi^hlil-u) and white (^ʼu-máw[-ts^hát^h]) for decoration; black ([^ʼu-]múu[-ts^hát^h]) added for war (WH). During the summer the people slept out, a grass or brush house being erected occasionally over a fir boughs, presumably in bad weather. (Both 'house' and 'fire(place)' are ^ʼə-maa.) Little is known of winter house construction; the best description is probably that by WH. It shows by rough sketch a single pair of upright forked logs: cross pieces between the forks were tied on with a kind of grass, making walls. The floor was not dug out, but sanded, with the hearth in the center. A two-foot high dirt berm about the structure supported the siding; the roof was bark. The door, which usually faced the river, was a rush mat (sáy).²⁷

The people enjoyed a number of different stick (hand or bone) games (-g^hi^hhi-yá) with betting, plus a beaver-tooth dice game. They also shot arrows at a hoop (^ʼən-g^háyhi) for skill. They played skinny (tá^hg^hoi[-dáy], a kind of intertribal lacrosse) with two different

²⁴ EH: -t^hgúuyak^h

²⁵ EH: ~ ^ʼə-sáyim (recorded once)

²⁶ J. is clearly wrong on 'copperhead'; F. gives 'garter snake'; 'red racer' is also possible.

²⁷ The sense is that of a sketch (5c) in Suttles (1990a:7) titled, "Central Oregon Coast", but with a flatter roof.

types of skinny sticks (EH). Games of physical strength included footraces, wrestling, and tug-of-war. They bet on everything.

At the dance for a girl's first menses, she danced five days, wearing a mask of yellowhammer ('*an-tsiik*') feathers. Deer-hoofs rattles were mounted on sticks.²⁸ Marriage involved asymmetrical trading, considered as a bride price. Band exogamy was practiced, resulting in common bilingualism. At marriage, the bride was carried in by a family member and not let down until the pile of gift goods was sufficiently high. The couple made their home with the bridegroom's family, then visited the bride's family. The sister of one's wife was also given and could not be refused (WH). At childbirth, the husband helped his wife by holding her from behind. After the birth, she lay by a pit of heated rocks and was not allowed cold water for five days (*wán-phi 'əm-pyán'*). The husband sweated (*-gúduḅ-od*) and abstained from hunting for five days, as, it was said, the game could smell the blood ('*ə-yú'*) on him. The child ('*ə-wápya*') was tied to the mother's back without a cradle board (EH); Central Kalapuyans did not practice head-flattening.

According to William Hartless, "Each tribe" had "three chiefs": two were go-betweens and one was the real ('affluent man' and, by implication, powerful) headman, '*ən-tʰámpekʰ*'. Only WH remarks that the people took slaves (*ḍu-wá'gá'*), who could marry free women. Crimes, including both adultery and murder, were generally settled in a property exchange, in lieu of far more serious penalties. An apparent exception to this involved the often dark world of the shaman or doctor, '*əm-pʰálakʰya*', whose powerful allies might convince him to commit atrocities. The killing of shamans, in retribution for murder (real or imagined), was an accepted practice. Some shamans were transvestites; some had powers of clairvoyance or precognition through dreams (*ḍu-ḍu-wáa*). Youths took part in the spirit quest, bathing (*-tʰáŋqʰtʰe-ḅa*) and fasting for five days, to gain an ally, *ḍr-yúutma* or spirit power, be it dead person ('*ə-wéeqi'*), rattlesnake ('*ən-tʰkʰé*), thunder ('*əm-pʰgʰá'*), pileated woodpecker ('*ə-lú'kʰ*), eagle ('*ʼən-]tsiinu*), grizzly, wolf ('*amú'liŋd*), skunk ('*ən-tʰgúupʰ*), deer, fatal-poison ('*ə-láala*), or other power. Any important endeavor, such as hunting or gambling (i.e., playing the 'hand game' or the 'stick game'), necessitated five days' abstinence from sexual intercourse and preparation through cleansing (sweating and bathing), to be successful. Winter dances, led by

²⁸ See Driver and Riesenberq 1950. These traits are found throughout North and South America and suggest a long time in the Western Hemisphere.

shamans (with staves, *ḡini-súk^hna*) lasted five nights of singing (*ḡun-káwḡ-a*) and dancing (*-yáa-ts^he ḡi-yál^hwa* 'standing at one's dance'), the last night until dawn, with give-aways to attendees.

The underutilized comparative study of Collins (1951) has shown that Kalapuyans have more in common with Plateau and Californian groups than with immediately northwest groups or (still less) with Oregon coastal groups. There is no room here to discuss the naturalness of the application of Kroeber's (1936, 1939) system of organic cultural categories in the lower Northwest. It is clear to me, however, that the understanding of the cultural patterns and milieu of the Kalapuyan people is in need of review.

3 Kalapuyan history since Contact

While White men were known as traders in great ships from at least the 1790s along the coasts, the Central Kalapuyans did not generally come into contact with the West until 1812 CE. In April and May, a party of 7 or 8 Astorians, headed by Donald McKenzie of Montreal and William Mathews of New York, are said to have ascended to the source of the Willamette—presumably as far as the three-way junction of the McKenzie River (named for the leader), the Middle Willamette, and the Coast Willamette in the environs of present-day (p-d.) Eugene. Thomas McKay of Canada took a second party up during the summer. On the 23rd of November, J. C. Halsey and William Wallace of New York left with 14 others to establish a hunting and trading post up the river just around or just passed Champoeg in Ahantsayuk country, returning the following May with much game and furs. This post, which provided dried venison to the 'factory' under William Henry, continued to be used after John Jacob Astor's Pacific Fur Company was sold out to the Northwest Company late in 1813.²⁹ Another, Wallace House, was later set up in 1814 on higher ground three miles north of the Chemeketa (*ts^hon-migiḡi*, p-d. Salem) mill. 32 men plus "two huts of freemen and Nepisangues" were living at the first location as of 23 January 1814 when Alexander Henry visited it.³⁰ By 1817–18, 60 men under Alexander McLeod had passed over the divide to Elk Creek

²⁹ See Franchère [1820] 1854, and Henry in Coues [1897] 1965, vol. II.

³⁰ Coues [1897] 1965: II.813–815. Franchère's account in Huntington's translation of 1854 (p. 163) does not appear to match the note in Ruby and Brown 1976:283. Ruby and Brown's distance of "150 miles up the Willamette" for the post seems too far—though McKenzie may have reached that distance (Ross [1846] 1966:235 says he "penetrated some hundred miles") and small groups probably routinely reached the trifurcation of the river.

into the Umqua watershed. Not content with a rich harvest of furs, their Iroquois hunters, apparently pressing upon the local women—from the Indians' retiring behavior, certainly Yonkalla—grew angry and fired on them when they tried to run away, killing 14 outright "but the number that fell in the flight was not ascertained".³¹

In 1821, the Northwest Company merged with Hudson's Bay; four years later factory headquarters was moved up the Columbia into Fort Vancouver on the right bank. Jason Lee's Methodist Mission was established north of ts'un-migiḍi on the right bank of the Willamette in 1834.

Native Americans suffered from repeated waves of European and Asian diseases. Bouts of smallpox, reaching the area overland around 1782–3 and again about fifteen years later, greatly reduced their populations. Veneral diseases, probably brought by trading ships, took great tolls among the lower Chinookans and much affected the fur traders. But the greatest tragedy by far was wrought by the "cold sick", possibly from the Missouri and Ohio river valleys, more likely by ship from Asia.³² Within five years or so from the fall of 1829 when it hit around Fort Vancouver, this disease, evidently a kind of malaria, had killed some 90% of valley Kalapuyans. Fighting it by sweating and bathing brought on shock and death. Parker's ([1838] 1967:258) figures of "seventeen different tribes, under their respective chiefs, and number about 8780 persons, who speak the same language" were surely pre-disaster statistics from the Hudson's Bay Company.³³ Lang (1885:487) mentions Rev. Perkins' estimate that by 1840 there were only 600 remaining. Parker himself, regarding his visit there in November 1835, refers to Rev. Jason Lee's "mission among the Calapooah Indians of whom there are but a few remaining" (p. 164). Soon the function of such mission schools would be transferred largely if not almost exclusively to White children.

Chief Factor John McLoughlin at Vancouver originally was strongly against White settlement in Oregon. To allow such a colony to grow was clearly counter to the monopolistic practices of the Hudson's Bay Company; all employees had to return to their points of origin. He wanted to get rid of the "freemen", the independent trappers,

³¹ Ross [1855, 1924] 1956: 132–3f.

³² See Boyd 1985, 1990, 1999; Ruby and Brown 1976; Boag 1988.

³³ Boyd (1999:99, 131) lists sources of similar Hudson's Bay Company estimates. Based on the spread of European diseases during the last quarter of the 18th century, he estimates a pre-White Kalapuyan population of around 15,000.

mostly American, who freelanced for the Company while residing in the Willamette Valley. Étienne Lucier from Montreal, for example, had joined the overland Astoria trek, acquired an Indian wife by 1814, and had built a place on the east bank above Champoeg to call home until 1828 when McLoughlin ordered him back to Canada. Lucier missed his party, did another tour (now into California with McLeod) and returned to ask McLoughlin again about a farm. Joseph Gervais from Maskinonge similarly had come to Astoria overland, eventually became a freeman and staked out a farm on French Prairie around 1827 or '28, as did Louis Labonté, Jr., three years later. They were married to sisters, daughters of the important Clatsop chief, Coboway.³⁴ McLoughlin was now faced by several men, all Hudson Bay Company retirees of French Canadian extraction with first-nations' wives, with the same intent. He decided to make an exception for this particular group, good Company examples among the Americans, and from 1829 lent them what they needed. Parker ([1838] 1967:163) mentions "about twenty families" of French Canadians living there in November 1835. Havard (1880:317) notes that Lt. Charles Wilkes found 700–800 Canadians in Oregon by 1838, with 300 "half-breed offspring" at French Prairie and nearby. These people all predated the trickle that turned into a flood of U. S. immigrants during the 1840s, from 140 or less in 1842 to as many as 5000 in 1847.³⁵

In May 1843, 52 Americans overturned a negative French-Canadian vote of 50 to form a provisional government at Champoeg. A year later, Executive and Legislative Committees were elected. Male settlers began filing claims of one square mile, 640 acres apiece, all over the Willamette Valley, in hopes of a U.S.-sponsored homestead act. The 49° parallel boundary was agreed with Britain on 15 June 1846. A bill in the U.S. Senate strongly backed by Senator Thomas Benton of Missouri (following Dr. Lewis Linn before him) finally passed and the Oregon Territory was established 14 August 1848. The territorial government took over from the provisional seven months later, with Joseph Lane appointed governor. Rumours of gold-discovery in California arrived with ever-greater influxes of land-hungry settlers, often from the cholera-and typhoid-infected valleys of the east. Finally, the Donation Land Law was passed in the U.S.

The Donation Land Law, more popularly known as the Donation Land Claim Act (DLCA) provided land for males who (1) were white or half-white American Indian, (2) were at least eighteen years of age by 1 December 1850, (3) were either residents of the territory or about to become such by 1

³⁴ See Hussey 1967, Chapter 4.

³⁵ Ruby and Brown 1972:94, n.20.

December 1850, (4) had cultivated their claims and lived on them for four years, and (5) were either United States citizens or about to become such by 1 December 1851. If a settler met these qualifications, he was allowed 320 acres (a half section) if single, and 640 acres (a full section) if married. The additional 320 acres was to be held in the wife's name. [Boag 1988:215]

Notice that a full-blood Indian could not make a claim, even if (s)he agreed to follow the American rules. The Kalapuya Indians, those several hundred that were left, despite the loss of their camas pastures to the hogs, their tarweed fields to fences, their deer to the more powerful weapons of the settlers, still held, technically at least, title over the land.

Lane offered them nothing, but in 1849 appealed to the Federal government for the extinguishment of their title through a buying out of the land. An act of Congress on 5 June 1850 reorganized the Indian services in Oregon. Anson Dart became Indian Agent; he appointed a Board of Commissioners to negotiate with the Indians for their title, anticipating their entire relocation to Eastern Oregon. The new federal, Whig-appointed governor, John Gaines, had showed unusual humanity in his letter of 2 December 1850 pleading for the Kalapuyans to be apprenticed to trades (in the valley) instead. Dart appointed him (no longer governor), Alonzo Skinner, and Beverly Allen as Treaty Commissioners (Mackey 1974:88ff.). On 11 April 1851 in Champoeg, the Board began negotiation with the Kalapuyan and (Northern/Central) Molale tribes. Alquema (Joseph Hudson) quickly became their major spokesperson (though following Ti.a.chan, Louis, as "principal Cheif" in protocol). Alquema said that the Indians would refuse a reserve beyond the Cascade Range. Eventually, individual treaties were worked out in turn with "the Santiam Band of the the Kallapooya Tribe of Indians" (16 April), "the Tuality, Band of Kallapooya Tribe[...]" (19 April), "the Yamhill Band [...]" (2 May), the Luckamiute Band [...]" (2 May), the "Moolal-le" Tribe (6 May), and the "Santiam Moolale" band (7 May 1851). For each tribe or band, a tiny reserve was guaranteed on the mountainside edges of their native areas plus the promise of sizable cash payments in return for their titles.

Not only Bancroft (1886) but some White Oregonians were very unhappy with Gaines' treaty-making, done with pomp and great expense. Moreover, Congress had reversed itself and "abolished all special Indian Commissions and transferred to the Superintendent of Indian Affairs [...] the power to make treaties" on 27 February 1851; the news came late (Mackey 1974:129). Nonetheless, the treaties were negotiated and signed in good faith; they might reasonably have been accepted. According to Beckham

(1990:181), Lane and Samuel Thurston, "territorial delegates to Congress, were instrumental in blocking Senate action". The treaties were ignored. All that happened was that the Indians became more desperate and the settlers more determined to have them all out of the valley.

Four years later, on 4 January 1855, the bands of the Willamette Valley and Joel Palmer, Indian Agent, signed a treaty without local reserves. Removal to Grand Ronde began in January 1856. Palmer's proclamation of 13 October 1855 called for their "forthwith" collection onto "temporary reservations" under the direction of "their local Agents". "The names of all adult males, and boys over 12 years of age shall be enrolled, and the roll called daily." Only serious White sponsorship could avoid removal and concentration. Eustace Howard (NB 83:136) recounted to Jacobs his mother's telling of the people's suffering when they were force-marched to a gathering point at Dayton and then on into the Coast Range in midwinter where little had been prepared for them.

John Hudson would have been four years old in 1872, and Eustace four in about 1876;³⁶ theirs was evidently the last generation that learned to speak Kalapuyan dialects. After 1880, it is doubtful if parents of young children received CK replies to their commands and queries. Zenk (1984) recounts something of the life at Grand Ronde, especially the emergence of a creolized Chinook Jargon as the *koine* adopted by Grand Ronde children for a generation or two until English replaced it as *lingua franca*.

³⁶ The possibility that John Hudson was nearly or partially a semi-speaker must be considered. Not only does he apparently avoid certain grammatical features in EH or in WH, but he uses apparently periphrastic constructions frequently, especially for words he does not know or cannot recall. I give three examples. Both are from the S-M tape, unfortunately when his abilities were weakest. (This contrasts with EH, who evinces no such problem. (?) not heard.)

- | | | | |
|-------|---------------|-----------------------------------|--|
| (I) | cave | /wáats'út' 'əm-p'ɪs(?)/ | lit., 'hole (which is) in the ground' |
| (II) | drown | /gum-ʔálaʔ du-p'géeʔ/ | lit., 'he died in the water, he died by water' |
| (III) | green, unripe | /wáʔ 'mǝá-hécha(?), 'um-g'áaʔək'/ | lit., 'not cooked; unripe, raw' |

In (III), after giving the periphrasis, he recalls the word 'raw', the only example of it from him.

My final thought, however, is that he was *not* a semi-speaker, but a product of a mixed environment at a special time, producing in him a unique idiolect.

Appendix III

Additional bands of Central Kalapuya

The following list contains many of the more important bands or villages for which some spelling and location can be reconstituted. Especially important ones are marked with an asterisk. Their order is roughly north to south; (left/right bank is indicated by LB, RB).¹

- | | | |
|-----|--------------------------------|--|
| LB | ḡunmánaḡu ² | (EH nb.78:92); ḡənmanáḡu (EH nb.78:8). On (upper) Palmer Creek (near p-d. Hopewell); country of the paternal grandfather of EH. |
| RB | ṡ'an-tḡḡóḡhak | an excellent lomatium-digging place, belonging to 'a-hántṡa'yuk; latter-day Champoek, first capital of Oregon, on Champoek Creek. ³ |
| RB | ṡ'an-míḡiḡi | Village at p-d. Salem, famous for its excellent camas ground. |
| RB | ṡ'an-méewi ⁷ | an open low camas-digging place; esp. such a site near <i>ṡ'an-míḡiḡi</i> (JH), e.g. (across from) p-d. Independence (G.Ah:69, ⁴ <i>ṡ'am-míwí</i>), or (to the north), Chemawa (<i>ṡ'a-mí'wä</i> , WH [F. undated:44]). |
| LB* | ṡ'intṡ'al | On Rickreall Creek: p-d. Dallas (G.Ah:69). Probably either NK, e.g. a Yamhill subdialect, or a CK dialect like <i>lák'ma'yok</i> , influenced by Yamhill. |
| LB | tḡúsak^h | Ash Creek area (p-d. Independence; near <i>lák'ma'yok</i>) (JH 46: 84, 150). |
| RB | skíḡap^h | Present-day Orville (opposite <i>tḡúsak^h</i> , JH nb.46:84). |

¹ Extensive lists (including CK) are in both volumes of Hodge 1907–10, the Oregon section of Swanton 1952, and throughout the Kalapuyan materials of Gatschet, Frachtenberg and Jacobs. (See esp. Gatschet's CK lexical lists, BAE MS #473.) See also Zenk 1990:552–3. For a list of bands associated with river basins, see Toefel 1985:28. The list here is meant only to be suggestive only; an exhaustive list would be several times this length.

A list of nine "names of the different tribes" of the "Col-lap-poh-yea-ass" is given by Ross [1849]1966:236, for villages or bands in ascending up the Multnomah/Willamette: "Wa-come-app, Naw-moo-it, Chilly-Chandize, Shook-any, Coupé, She-hees, Long-tongue-buff, La-malle, and Peeyou tribes". The first two are in Chinookan territory and the last is likely Yonkallat. The other six are CK groups. (See chapter 2 in Hajda 1984 for discussion of the lower Chinookan area.) Only one of them, the sixth, unambiguously matches a name here. The seventh name is evidently the origin of the English *Long Tom* River, apparently the lower part of 'a-lámalee: *lámḡḡumbḡiḡ* or /lámḡḡ-ḡin-ḡiḡ/, apparently 'Whip-his-ass', probably a common clan name. (Ross [1855]1956:7, however, gives the number of "all the Wallamitte tribes" called "Call-law-poh-yea-as" as 16.)

² The forms in the left-hand column are reconstituted in the system of 'major allophones' (+i), i.e. /ḡunmánaḡu/, rather than //ḡ-n-mána-ḡu// or something like that (I do not know the meaning of this).

³ Champoek, later important in the history of Oregon, to the CK was known for its special camas: Champoek < *ṡ'an-tḡḡóḡhak*, 'place of early camas' (EH nb.89.121); cf. -ḡoitsuk^h (EM: 'moss') ~ -tḡuitsuk^h, 'a tubular-shaped camas' (probably *Lomatium*). "Champoek is a place where 'ən-tḡuitsuk^h used to be gotten in quantities" (JH nb.84.38). (-poeg ~ -pooitch 'a kind of camas', Hussey 1967:19.)

⁴ Gatschet/Powell 1877 (Lúkamiute and Ahántchuyuk elicitation); spellings to accord with mine.

LB	'an-lá(a)ḡawa	Far southern extension of 'a-lák'mayók, through ts'an-ḡuiša (ts'an-ḡáḡawa, G:69); or northern extension of píiniḡu (Jacobs' s. f., Box 36).
RB**	sánḡyám	On the Santiam River, especially at pd. Jefferson or at the forks; (subsection of or equal to) hálḡam. EH, on the other hand, stated that hálḡam was close to p-d. Albany and north of it (cf. 'an-k'ólók'wa), implying a distinction with sánḡyám. ⁵ Status claimed of both JH and EH, despite dialectal differences. (EH nb.78:8)
RB	'an-k'ólók'wa	band or clan, p-d. Albany and eastward; part of 'a-hálḡam. ḡlógwa (F.1914b; J1945:154 (map): ts'ém-an-k'ólók'wa.)
RB*	ts'an-t'kúbi(i)ʔ	On Calapooia Creek (especially p-d. Brownsville), probably Muddy Creek; south of (and traditionally part of) 'a-hálḡam (ts'ánt'kúbi? JH nb.46:102); -t'ḡóbä, (F); ts'an-t'ḡubi (G:69). ⁶
RB*	ts'an-ts'iqin	McKenzie River (WH. F.1914b:5); p-d. Eugene (-ts'iqin, G:69).
RB	ts'an-ḡl'ixḡ-ə-míḡa	McKenzie River; p-d. Springfield (G.Ah:69).
RB	ts'a-wš'əḡot'	Mohawk Valley (northeast of p-d. Springfield; ?) (G:69 <tsa uó-oKot>).
LB*	'a-méεḡu	Muddy Creek (LB), lower Long Tom (probably a section of southern 'an-píiniḡu?; especially pd. Monroe), extending to 'a-lámale. (F.s.f.). Note: -méεḡu' means 'mountain', i.e., 'hills, upland'.
LB*	'a-lámale *	(ts'a-lámalee) Upper Long Tom Creek, Coyote Creek (F.s.f.).

Table 14. A number of the more important (secondary) bands of Central Kalapuya.

A number of the smaller secondary groups appear to be clans (not "bands", as J. would say, following JH's "tribes"). The names of these clans were generally associated with women and passed through the female line, but the chief residence was with the male spouse's male kin. Thus although the women may have held some matriarchally-determined descent (with mandatory visit or visits to the family of the wife), the clans were virilocal. Two examples with translatable names include:

RB	'a-nócha	band or clan ('willow'), near pd. Eugene (JH nb.46:150).
	'ə(n)-sgánan	band or clan ('gray fox')

⁵ The river and band, it is implied, is named after a hálḡam chief who was met near present-day Jefferson by contingents of A. R. McLoud's party to the Umpqua (Yonkalla) country returning northwards in 1818. This Sánḡyám was the grandfather of Joseph Hudson (or Hutchins; Yálk'ama [JH nb.86:38]), who facilitated and signed the treaties (1851, 1855). Joseph Hudson was the maternal grandfather of EH and a great-uncle of JH. (See Minto 1900; where the grandfather chief is called San-de-am and Joe Hudson Pa-pe-a-as.)

⁶ Despite general agreement for a center at p-d. Brownsville, Jacobs quotes JH saying ts'an-t'kúbi(i)ʔ was "along the MacKenzie R. near Eugene—say between the Mackenzie [River] to Eugene". The same area was also given for 'a-nócha.

Appendix IV

Mary's River and Santiam dialects.

It is suggested in this thesis that the dialects of 'a-hánts¹á'yuk¹ and 'an-*ḫ*ináφu² are closest to 'a-hálpam (Santiam [S]) and may be taken to form what I call here 'core CK'. Nevertheless, even the variations between *P*ináφu² (or Mary's River [MR], dictated by William Hartless [WH] and recorded by F.), and the *Hálpam* or Santiam (S) of John Hudson (as recorded by J.), can be problematical and cast doubt on the simplistic model of Table 8, §1.4.2. Since several of the items contrasted here between Santiam and Mary's River are important, it is worthwhile going over them briefly.

1 There is a far greater tolerance for ignoring the regressive rounding/backing of epenthetic vowels in MR. Tautosyllabic *im*, generally forbidden in both John Hudson's Santiam and Eustace Howard's idiolect (also 'Santiam'?) as we see in (1b), occurs (though infrequently) in MR, as in (1a) (and occasionally in other dialects):²

(1) (a) ünim' (FIII.48), 'éenim' (J45:297.20) (b) 'éenum' 'mother'

Nor is rounding before bilabials (or as here, regressive assimilation to a back vowel) automatically observed in MR as it is in Santiam. Item (2) displays the reflexes for /-híilip̥-/ 'be sick'. (Here, -a² is DURATIVE -a-d.)

(2) W. Hartless (MR) J. Hudson (S) E. Howard
 (a) héełipa² (FII.68) (b) héełip̥; héełupa²d (c) héełip̥; héełpa², héełupa²d

2 There is a greater tolerance for -R₁R₂- clustering (R = resonant) in MR, where in Santiam R₁ must assimilate to R₂, often then to be replaced by [?]. (This is one of several areas where Jacobs had John Hudson—addressing a dialect quite different from his own—'correct' the dictations of Hartless, and then put a Santiam form after.³ See Jacobs 1945 [abbreviated J45]: 204–5ff. ‡ indicates that the example is not from Jacobs' notebooks or other hand notes but rather directly from the published forms in his problematical *Texts*.)

¹ Forms without other markings should be interpreted as written in the 'major allophone' system.

² There are a few exceptions to the **im*, **i-w* rule even in the dictations of JH.

³ Unfortunately, I have not seen most of Frachtenberg's original MR notebooks. One must be careful here, for very often the 'Santiam' forms which follow the MR do not agree with JH's regular dictation forms, Hudson apparently settling for an intermediate form.

- (3) MR S CK J45:205.6, .7
 (a) (i) *umwa'usu' (ii) *u-wa'usu' (iii) //θ-m-waws-u// "No one was there."
 3.PRES-IND-not.there-INTR
 (b) (i) *Gumwa'' (ii) *Gu-wa'' (iii) //g-m-wa?// AOR-IND-not "There was none."

As Jacobs remarks (205, n. 89), "um- before w is extremely rare in Santiam, at best; it is the usual form in Mary's River."

3 Assimilation of a nasal to the following occlusive (stop or affricate) is much less marked in MR than in Santiam. Then too, as Jacobs (204; 205, n. 85) points out, Frachtenberg did not write *ŋ* before dorsals. We are left to wonder if MR really did not assimilate nasals to this position (as Santiam does), or if (as I find more likely) Frachtenberg found it so regular a process that he just did not bother to note it.

- (4) MR S CK
 (a) (i) *DunG^wi' nhi'yaBa (ii) *DuŋG^wi' nhi'yaBa (iii) //ɗn-g^win.hi.ɣa-ba// J45:207.2
 (b) (i) *DumG^wi' nhi'yaBa (ii) *id.* (iii) *id.* J45:207.3
 "his gambling [pieces]" his-gamble-NOM

4A The vowel //i// appears to have slightly lower allophones, at least in the lower range, than in the Central CK dialects. Frachtenberg sometimes writes it as <ä>, presumably [æ]. (No doubt this gave Jacobs another reason to attribute Santiam ä, presumably IPA [ɐ], which he thought related, to the phone ɛ, but which in Santiam more generally represents a member of the //a// phoneme.) These examples are from the first of three volumes of Frachtenberg's grammatical notes.

- (5) Mary's River (WH>F) Santiam (JH>J)
 (a) (i) tsä' (FL.52) (ii) ts^hi' 'I'
 (b) (i) tsä' (FL.19) (ii) ts^hi' 'bone(s)'
 (c) (i) tä' (FL.16) (ii) di' 'tooth, teeth'
 (d) (i) *asne' (J45:205.1) (ii) *asni' [ʔə-šni] 'Coyote'
 (e) (i) 'ä, 'ɛ (ii) 'i 'go'
 (f) (i) pK-ä' (FL.48) (ii) -p^hk^wɛ' 'water, stream'
 (g) (i) mäni 'in front' (FL.48) (ii) méeni 'first, beforehand'

Notice that the MR reflexes show somewhat more regularity in allophonic variation than do the Santiam in that the low allophone occurs more often before ʔ. ((e) méeni may well

derive from *-ma* 'CISLOCATIVE' + *ni* '(derivational suffix)', i.e. rather than *ni*). This may indicate a possible left-bank dialectal continuity from NK through 'a-lák'mayók, which is adjacent to MR through intermediate (sub)dialects like ts'an-tátawa. Unless there has been a general vowel raising at some point, the examples point to a centering of vowel height around dorsals and glottals.

4B Occasionally, the pattern (with this left-bank group) is just the opposite. In the case of (6), the vowel is high in MR (a) and lowered in Santiam (b).⁴

- | | | | | | | | | |
|-----|-----|-----|----------|--------------|------|-----------|-----------|--------------------|
| (6) | (a) | (i) | ɲni-pa'' | (J45:209.10) | (ii) | ɲne-pa'' | nɛ(-)pʰá² | 'like-those' |
| | (b) | (i) | ɲqu'nfan | (J45:209.18) | (ii) | ɲq̄ω'nfan | k̄ɔn-ɸan | 'just, merely-ADV' |

4C A second group of comparisons centers around the vowel //a//, steady in certain examples in MR but in Santiam exhibiting apparent fronting, often following aspiration. Notice that this coronal activity is exactly opposite to the foregoing peripheral activity. Jacobs wrote these Santiam vowels as *á* in his notebooks but as *e* in *Texts* (which latter vowel he used to show his 'corrections'). (Citations are from Jacobs 1945.)

- | (7) | Mary's River (WH>F) | Santiam (JH>J) |
|-----|---|--|
| (a) | (i) ɲpa's (213.14) | (ii) pʰás 'thus, the way' |
| (b) | (i) ɲpa'si (207.10) | (ii) pʰási 'the same way' |
| (c) | (i) ɲha's (219.14) | (ii) há's 'this' |
| (d) | (i) ɲha'si (208.12) | (ii) há'si 'here' |
| (e) | (i) ɲDu·Da'nu'wa (208.11) | (ii) ɖùu-ɖáá²-núwa 'from-my-place'; ɖán '1.SG.POSS' |
| (f) | (i) ɲDa(·)yu· (207.19, 208.13) | (ii) ɲDe-yu· ɖá-yúu 'IMP-sit' "Sit down." |
| (g) | (i) ɲGiDa-niyu· (209.4) | (ii) ɣi-ɖá-ni-yúu 'AOR-USIT-3.PL-sit' "They would sit down" |
| (h) | (i) ɲGiDa-nimala'la'wai (209.12) | (ii) ɲGiDe-nimale'le'wai ɣi-ɖá-ni-ma-lááwa
"(when) they have called out to you" AOR-USIT-3.PL-DIR.hither-call.out |
| (i) | (i) ɲwa'' DeDahe·k (207.18) | (ii) ɲwa'' nanDe-he·k wa² nam-dá-héekʰ
"You won't go on." ⁵ not 2.FUT.IND-CONTR-go.on |
| (j) | (i) ɲu' tcumwu'k-ya? 'u-tsi-m-wú'kʰ-ya | 3.sg.pres.rel-1/2.sg.pres-ind-arrive-Q (MR) |
| | (ii) ɲu' tcu-wu'k-ye? 'u-tsi-m-wú'kʰ-yá | 'Is it that you have come?' [literally]
"Oh—have you come?" |

⁴ In Santiam, however, less-frequent variations occur in *ni*(·).

⁵ The translation for this actual sentence was omitted in Jacobs 1945:207.

The particle **-ḍá-** (**-ḍa-** in MR) can function as IMPERATIVE (14f), USITATIVE tense (14g, h), and also CONTRASTIVE mode (14i) as well. Numerous words also have such dialectal alternations.

5 There are numerous alternations for grammatical particles as well. To cover them all would take us too far afield. We may note three in passing.

5A The second person future particle in MR is generally expressed in **ḍa-** rather than **nam-**.⁶ (Compare **ḍm-**, first person, and **gam-**, third in Santiam. The future is the only tense to have separate forms for all 3 persons.)

- (8) (i) *ʒwa·'' DeDahe·k* (207.18) (ii) *ʒwa·'' nanDe·he·k* *wáʔ nam-dá-heekʰ*
 "You will not go on." not 2.FUT.IND-CONTR-go.on

5B The infinitival particle in JH's Santiam is the complementizer **ḍumi-**, INF, used where the embedded clause has the same subject as the matrix clause (presumably a compound of **ḍu-** 'OBLIQUE' + **mi-** (or **mi-**) 'NOMINAL CONJUGATOR'). In Mary's River, however, WH uses just **ḍi-**. (In Eustace Howard, both **ḍumi-** and **ḍi-** occur.)

- (9) (a) (i) *tcum hō·lī tī wāi* (F.II.55-MR) *tsi-m-hóoli ḍi-wáy.* "I want to sleep."
 (b) (i) *tsum hūli tumi wáí* (J.nb33.105-S) *tsi-m-húli ḍumi-wáy.*
 PRES.1/2-IND-want to sleep

5C The particle generally used for nominal conjugation in Santiam is **mi-**, sometimes enhanced (or infrequently substituted for) by **-hi-**. However, Mary's River uses **ni-**.

- (10) (a) (i) *ʒwi·nas-wi giniwa·pya Gint'i',* (J45:223.3-4-MR) *wíings-wi gi-ni-wápya gi-m-d-ʔi*
 indeed-HEDGE AOR-NOM.CONJ-child AOR-IND-IND-go
 (ii) *ʒwi·nas-wi ganihiwa·pya Gint'i',* (Corrected)⁷ *ga-ni-hi- REL-NOM.CONJ-hi-*
 "Anyway, [the one who was] the child went."
 (b) (i) *ʒgu·c-Jack pi·cimin gwa·uk gumihpa·lakya* (J45:69.9-S)
gus Jack pišimin g'áw'g gi-m-mi-hi-p'áalak'ya ...
 'that Jack Pishimin' he AOR-IND-NOM.CONJ-VER-shaman '—he was a real shaman.'
 (ii) *ʒgumi·ya·nkalat an·u·hi.* 'He was a Yoncalla man.' (J45:69.11-S)
gi-m-mi-ʔánk'ala'tʰ an·úyhi AOR-IND-NOM.CONJ-Yoncalla DET-man

⁶ The particle **ḍa-** is also used for the imperative (2.SG).

⁷ It is not clear why John Hudson thought that the Mary's River sentence needed the benefit of enhancement by **-hi-**, which seems to add emphasis of a veridical nature.

Appendix V

Collections of Kalapuyan data

Lists and collectors

The following materials have been listed:

1 Lists of 92 words each of fair accuracy for

- (A) "Kalapooiah. Spoken on the Wallamat Plains"—apparently Yamhill; and for
(B) "Yamkallie. Spoken near the Sources of the River Wallamat"—Yonkalla.

They were apparently taken by Dr. **William F. Tolmie**, "Surgeon to the Hudson's Bay Company, who has resided for eight years on the N.W. coast" and given with others by him to Dr. **John Scouler** for publication (1840:217, 237–41). The first is a subdialect of Yamhalla, perhaps a southern Yamhalla (from the Rickreall Creek or Little Luckiamute River areas). The second is a dialect of Yonkalla.

2 **Samual Parker** was with the Methodist American Board of Commissioners for Foreign Missions on an exploring mission to Oregon. His account includes a list of 119 CK lexical items ([1838]1967:333–6) taken down during the winter 1835–36. The accuracy of the forms is sometimes very good. Parker alone, among pre-Boasian linguists who recorded Kalapuya, tries to write glottalization. He does so for syllable-initial prevocalic glottalization regularly, and medial glottalization occasionally, with a left-quote mark.¹

3 **Horatio Hale** (1846:564–566, 570–629; lists *ca.* 1841–42), appointed as "linguist and ethnologist, upon his graduation [from Harvard] at the age of twenty, to the United States Exploring Expedition, commanded by Charles Wilkes, which circumnavigated the globe during the years 1837 to 1842",² among much other material, supplied two pages of paradigms of a CK dialect and some 217 lexical forms (out of 180 × 2). In his Synopsis (p. 569), he identifies two dialects, which he distinguishes as "q. Kalapuya" (i.e., CK) and, *directly underneath*, "r. Tuhwalati (Follaties)" (Twalatin) for the language given as "S. Kalapuya" (the majuscule letters refers to language, minuscule to dialect). These

¹ E.g. ke'mewe (Parker 1838:335) giime'wi' (J.ca.1930:165) 'eight'
On the Swadesh-Melton tape, laryngealization is clearly heard before both resonants, the glottal floating forward through all sonorant segments.

² Apparently anonymous biographical entry, Hale [1846]1968:iii.

were "obtained from two natives of the tribe, one of whom was a youth educated by the missionaries at the Wallammet station". However, in the body of the comparative list, the two forms, NK and CK, are placed *alongside* one another, separated by a comma when both given, but with no label. When only one form is present, it can only be properly understood with regard to its origin where other material exists. It is usually not possible to tell definitely whether a given form is NK or CK from the list. The accuracy of the forms seems good, except for glottalization which is generally left out, as often is aspiration.

4 **George Gibbs** (1850, 1851, 1877) made short lists of Twalatin and CK forms for comparative purposes (which I have not yet seen).

5 **W. H. Barnhardt** (1859, NAA MS218) made a list of "Calapooia" 173 items together with lists for Umpqua and Takelma, working from Hale's 180-word list. These were forwarded to Gibbs, who was working for the Bureau of American Ethnology. Barnhardt's list shows no glottalization, but has careful syllabification and often correct aspiration between two consonants (or a voiceless excrescent vowel) marked with a right quote mark. *r* indicates V length. The "Calapooia" list is good CK, despite Gibbs notes.³ It is of a General CK dialect (note under Table 8).

6 The Swiss linguist and foremost technician among Powell's researchers, **Albert Samuel Gatschet**, recorded portions of one of Powell's (1877) hundred-page forms with both Lukiamute and Pudding River (Ahantsayuk) vocabularies (Gatschet 1877d, NAA MS473), as well as Yamhill and Tualatin materials (Gatschet 1877a-c, 1877e-f) in 1877. He was able to record story material at a time when traditional tales, including creation myths, were still being told. Despite missing "glottalization and some other distinctions," Hajda finds that "his work is nevertheless quite usable." Jacobs' (1945:155) high standards found the Gatschet texts to be at best "of most inferior linguistic quality, honeycombed with phonetic, grammatical, and translational errors and gaucheries". He (1945:146) notes that Gatschet often employed sonant obstruents where Jacobs believed there should be an intermediate series (thus providing Jacobs with indirect proof for

³ The sixth and last page of Barnhardt's list contains two notes, apparently by George Gibbs (the first is crossed out but is signed "G. G."). They claim that the list has "many errors.... I suspect that it was obtained from some other than a Kalapuya Indian. ¶Seems to be a medley of various coast & interior languages, and as it represents no spoken language, cannot be relied on." The list shows some lexical peculiarities, especially with the vowels, but the language is good CK. Gibbs' remarks are surprising, as he had worked with Kalapuya.

such a series in Northern Kalapuyan). His hyphen generally represents some kind of continuity or length before a glide (**w**) or **u**.⁴

7 **Leo J. Frachtenberg**, a student of Franz Boas, worked at the Siletz Agency and at Chemawa (Indian school at Salem) on Kalapuya materials from 1913–1914. He recorded vocabulary, grammatical notes, and a short text from Louise Selkeah (Frachtenberg 1913-14a, 1914a). Working with Louis Kenoyer, he re-elicited Gatschet's Tualatin materials by correcting them in red ink directly onto the pages of Gatschet's original manuscript (Frachtenberg 1915a). (It remained for Jacobs to again redo these manuscripts of Gatschet's for publication.) In Southern Kalapuya, he collected vocabulary and grammatical notes from Mrs. Robert Allen and Mrs. Tom Jackson (Lucy) at Grand Ronde (Frachtenberg 1914b). His major Kalapuyan work was on a Central dialect, Mary's River (or Mary'sville, *P'ineφu*), just across the Willamette from Santiam (*Hálpam*), perhaps contiguous on the right bank. His informant, William Hartless, a man of great intelligence, must have made his work easy for him. At the Siletz Agency, Frachtenberg (1913–14b) recorded 12 notebooks of texts and translations (both myths and ethnology), 3 of notes to the texts, and 3 more of grammatical notes. At Chemawa (Indian school near Salem), he recorded another notebook of short texts from Grace Wheeler (*Sgé'nan*).⁵

Kalapuya was not the first American language Frachtenberg had worked with; he had already published grammars of Hanis Coos and Siuslaw and stories. He had heard Northwest sounds already during a period of "five or six years of linguistic field researches [which] exhibited seriously defective phonetic workmanship." Jacobs (1945: 204) felt that Frachtenberg's Mary's River transcriptions were the best he ever made,

⁴ I have only examined Gatschet's two partial CK manuscripts.

⁵ It is not completely clear which Central dialect she spoke. Frachtenberg called her a "Kalapuya", presumably as in the third use of that name, to describe those Central bands on the right bank between the Santiam and present-day Eugene. Jacobs calls hers the "Lower MacKenzie River dialect", but this has been rendered by researchers in Indian alternately as *Ské'nan*, *Tk'úpi*, *Chíqin* or other. Jacobs' (1945) rendering of her name, *sgé'nan*, is very likely the same as */sgānan/* (EH *sgānan*), 'gray fox', and presumably refers to a clan. (John Hudson told Jacobs that women's names—not men's—were the names of *tribes* or *bands*; probably he meant *clans*, within those tribes or bands.) The dialect elicited from her by Frachtenberg makes use of the historical past, similar to the aorist but beginning with *p(i)-* instead of *k(i)-*, as is also represented in the dialect of Eustace Howard but is absent from the "Santiam" of John Hudson and the Mary's River of William Hartless. Since Howard's father (who died when EH was between 7 and 10) was actually *h̄nmanáφu* (apparently a *Hántsa'yuk* band, living in a CK enclave on Palmer Creek on the West side of the Willamette adjacent to *Yámhala* country), it is possible these variations actually represent more northern varieties, not southern.

perhaps because of Hartless. According to Jacobs (1945: 146), he sometimes did and sometimes did not record glottalized consonants correctly. Hajda (1976: 26, 30–32) finds it “possible that some consonants which Frachtenberg sometimes writes aspirated were in fact glottalized.” Nevertheless, Frachtenberg (1913–14), together with Boas and Sapir, was one of the first Oregon linguists to real effort in writing such features as glottalization, aspiration, and vowel length (which surpasses Parker’s amateur attempts of 1835–36). Frachtenberg’s field materials, as well as his books of textual and grammatical notes, like those of Gatschet’s, are in the National Anthropological Archives of the Smithsonian. Of these, I have seen a copy of one myth text, plus his Grammatical Notes (NAA MS 1923-d, 3 volumes) and two boxes of slip files in the Jacobs Collection. To give him his due, his understanding of Kalapuya grammar was probably deeper than Jacobs’.

8 **Jaime de Angulo** and **Lucy S. Freeland** in Berkeley, California, at Jacobs urging, invited Louis Kenoyer to stay with them and act as their informant during the winter of 1928–29. They produced a 14-page grammatical sketch of Tualatin, plus texts and Kenoyer’s unfinished autobiography, which they sent off to Boas. At their suggestion, Boas forwarded the materials to Jacobs. (Box 91, Folder 5; Melville Jacobs Collection, UW Libraries, Seattle.)

9 **Melville Jacobs** was also a student of Boas’ at Columbia. His text collections are immense; arguably he did more work for Oregonian linguistics than did any other scholar. Over the course of eleven years, with some help from his wife (Elizabeth D. Jacobs), he filled 133 field notebooks (of 125 or 200 pages each). He entered the field some seventeen years after Frachtenberg, traveling out to southern Washington during the summers of 1926 and 1927 to record Klickitat and Upper Cowlitz Sahaptin. (His dissertation, *A Sketch of Northern Sahaptin Grammar*, is dated 1930 and was published in Seattle the following year.) During his third field trip (Jacobs 1929:v), apparently at the behest of Boas, Jacobs began recording Kalapuya. He started work with John Hudson at Grande Ronde on 30 January 1928 in notebook #33 and continued through early March, filling three and a half notebooks with grammatical material, myths and ethnological texts. (Hudson’s idiolect is so different from Eustace Howard’s, and Hudson himself uses so many periphrastic terms (e.g., CK {cave}: ‘a hole in the ground’, S-M) next to Howard with this latter’s much wider vocabulary, that one wonders if perhaps Hudson wasn’t a semi-speaker. His father was Halpam, his mother Yonkalla.)

Later in the year Jacobs filled most of a notebook (#45) with Yonkalla material elicited from Laura Blackerty Albertson. Unfortunately, neither she nor her sister (who had worked with Frachtenberg) recalled enough of their childhood language to give texts. On 17 December 1928, he began recording another dialect of Santiam or CK from Eustace Howard in West Linn, Oregon, filling notebooks #46 and 47. (Eustace Howard, like many or most native Oregonians, was of mixed ancestry, his father speaking the *Pənmanáfu* subdialect of *Hantsayuk*, his mother Santiam.) After some other language work, Jacobs returned to eliciting Eustace Howard's Santiam on 6 July 1929. He and Howard apparently did not get along especially well. Nevertheless, he filled fifteen more notebooks from Howard's dictations over the course of the next several months, in three trips. Jacobs would generally take dictations on odd pages, leaving the even ones for extra words, paradigmatic material or, in a pinch, for new texts or even as a next notebook. Jacobs went over Howard's notebooks with Hudson on different occasions (1930, 1932, 1936), correcting them as Hudson suggested.

Jacobs must have received the de Angulo-Freeman material upon completing his dissertation in 1930. His notes and partial first draft for a comparative grammar of the Kalapuyan dialects would naturally have resulted from his now being able to consult Northern materials. Unfortunately, it never got any further. In 1936, Jacobs asked old Louis Kenoyer if he would complete the autobiography with him that he had begun with de Angulo. They began to do so (notebooks #122–125); however Kenoyer died before the project could be finished or his texts properly translated. During the following year, Jacobs readied the texts he had from Hudson, most of Frachtenberg's from Hartless and Wheeler and the one in Yamhill from Louia Selkeah, as well as those of Gatschet as best he could. Together with his Hudson materials, they were all published eight years later as Jacobs 1945. Both the unfinished Kenoyer autobiography together with two other texts dictated to de Angelo and Freeman with notes and some of the Howard material was also prepared for the printer (Jacobs 1929–32), but never published. Jacobs never returned to his Kalapuya grammar.

10 Under a grant from Columbia University under the direction of Joseph Greenberg, **Morris Swadesh** and **Robert Melton** carried out a survey of Oregon and California languages called the 'Penutian Vocabulary Survey' (Swadesh and Melton 1953, Swadesh 1954). Some twelve languages of Oregon were surveyed, including

Santiam from John Hudson, now 85 years of age. The tape⁶ is excellent, containing some 550 words and short sentences in Hálpam, as well as about 10 minutes of connected dialogue from Hudson, talking at first about himself, and then (on a separate tape), the first half of the story of "Coyote, Turkey Buzzard and the Disease" (Jacobs 1945: 89–90).

⁶ Or tapes, available as OT 7408 and 7409, 85-555-F, from the Archives of Traditional Music, Indiana University.

Appendix VI

Comparative Table of Central Kalapuyan Symbols

The following table compares the major, different systems of symbols used to transcribe or write Central Kalapuya underlyingly. (Takeuchi (1969:iv) follows Shipley 1970 in thinking of "glottalization as nonphonemic", though in his vocabulary he wrote *p̣, ṭ, c̣, ḳ*.)

Symbol #	Lewis (this analysis)	Jacobs' notebooks	Jacobs 1945	Takeuchi (1969:iii)	Hajda (1976)	Berman (1990)
1	//a//	a, á, α, ə	a, ε	a	a	a
2	//i//	ɪ, ɪ, ɪ, ʊ, e, ε	i, ε	i	i	i, e
3	//u//	u, ʊ, ʊ, o, ɔ, ω	u	u	u	u, o
4	//aː//	a, aː	a, aː	a, aː	a, aː	a, aː
5	//iː//	ɪ, ɪː, ɪ, ɪː, ε, εː	i, iː, ε, εː	i, iː	i, iː	i, iː, (e,) eː
6	//uː//	ʊ, ʊː, ʊ, ʊː, o, oː, ɔ, ɔː, ω, ωː	u, uː, ω, ωː	u, uː	u, uː	u, uː, (o,) oː
7	//aa//	aː	aː	aː	aː	aː
8	//ii//	ɪ, ɪː, εː	iː, εː	iː	iː	iː, eː
9	//uu//	ʊː, ʊː, oː, ɔː, ωː	uː, ωː	uː	uː	uː, oː
10	//ay//	#1+#2	ai	[ai]	ai	ai
11	//aw//	#1+#3	au	[au]	au,	au
12	//uy//	#3+#2	ui	[ui]	ui	ui
13	//y//	y	y	y	y	y
14	//ỵ//	'y, y'	'y, y'	((')y	((')y	[']y
15	//w//	w	w	w	w	w
16	//ẉ//	'w, w'	'w, w'	((')w	((')w	[']w
17	//l//	l, ḷ	l	l	l	l
18	//ḷ//	'l, l'	'l, l'	l	((')l	[']l
19	//m//	m, n, ŋ	m, n, ŋ, m̥	m	m	m
20	//ṃ//	'm, m'	'm, m'	m	((')m	[']m
21	//n//	n, m, ŋ	n, m, ŋ, n̥	n	n	n
22	//ṇ//	'n, n'	'n, n'	n	((')n	[']n

Comparative Symbol Table (continued)

#	Lewis	Jacobs' notebooks	Jacobs 1945	Takeuchi	Hajda	Berman
23	//φ//	<i>f, h_w</i>	f, hw, f ^w	f	f	<i>f</i>
24	//s//	<i>s, c</i>	<i>s, c</i>	s	s	<i>s</i>
25	//š//	<i>'s, 'c</i>	<i>'s, 'c</i>	s	s	<i>s</i>
26	//ʎ//	<i>ʎ</i>	ɿ	ɿ	ɿ	<i>ɿ</i>
27	//ʎ̣//	<i>'ʎ</i>	'ɿ	ɿ	ɿ	<i>ɿ</i>
28	//h//	<i>h, ' </i>	<i>h, ' </i>	h	h	<i>h</i>
29	//p̣//	<i>p̣; 'p, 'p</i>	p̣; 'p, 'B	p[']	p̣	<i>p'</i>
30	//ḅ//	<i>p, P, B</i>	B	b	p	<i>b</i>
31	//p̣̣//	<i>p̣</i>	P	p	p	<i>p</i>
32	//ṭ//	<i>ṭ; 't, 'T</i>	ṭ; 't, 'T	t[']	ṭ	<i>t'</i>
33	//ḍ//	<i>T, T, D</i>	D	d	t	<i>d</i>
34	//ṭ̣//	<i>ṭ</i>	t	t	t	<i>t</i>
35	//tṣ//	<i>tṣ, ṭc̣; 'ts, 'tc</i>	<i>t's, t'c; 'ts, 'tc</i>	c[']	c̣	<i>c'</i>
36	//tṣ̣//	<i>ts, tc</i>	<i>ts, tc</i>	c	c	<i>c</i>
37	//ḳ//	<i>ḳ, q̣; 'k, 'q, 'K, 'Q</i>	<i>ḳ, q̣; 'k, 'q, 'G, 'G</i>	k[']	ḳ	<i>k'</i>
38	//g̣//	<i>K, K, Q, Q, G, G</i>	<i>G, G</i>	g	k	<i>g</i>
39	//ḳ̣//	<i>k, q</i>	<i>k, q</i>	k	k	<i>k</i>
40	//ḳ̣̣//	<i>k'w, q'w</i>	<i>ḳ̣̣, q̣̣̣</i>	k[']w	ḳ̣̣	<i>k'w</i>
41	//g̣̣//	<i>kw, Kw, Qw, Qw, gw, Gw, gw</i>	<i>G̣̣, G̣̣</i>	gw	ḳ̣̣	<i>gw</i>
42	//ḳ̣̣̣//	<i>kw, qw</i>	<i>ḳ̣̣̣, q̣̣̣̣</i>	kw	ḳ̣̣̣	<i>kw</i>
43	//ɿ//	<i>'</i>	<i>'</i>	?	?	<i>?</i>
	i	#2, #3, α	i, u	i/u	i, u	<i>iu</i>
	/x/	<i>x, x̣</i>	<i>x̣</i>	-	x	<i>x</i>
	/ŋ/	<i>ŋ</i>	<i>ŋ</i>	m, n	m, n	<i>n, m</i>

Table 15. Comparative symbols used for Central Kalapuya

Appendix VII

Reduplication in CK

This appendix describes three main types of reduplication in CK. The third type of reduplication, a progressive structure, apparently active in the Mary's River dialect when Frachtenberg recorded William Hartless' speech in 1913–14, does not seem to have been active in the speech of JH. Examples in this section are generally written in the script of *major allophones*, though some may be closer to phonemic (or phonetic in vowels).

Kalapuya reduplication is interesting for several reasons. We may note here in passing that unusual right-affixing CK reduplicants illustrate the following:

- (1) Reduplication illustrates clustering patterns by the onset carried to the right edge of the coda of root-morpheme syllables: **coda + onset = {(C₂), (R)(O_c)} + (O_b)C₁.**
- (2) It sheds light on syllabification and laryngeal assimilation patterns in the language.

1 Types of reduplication in CK.

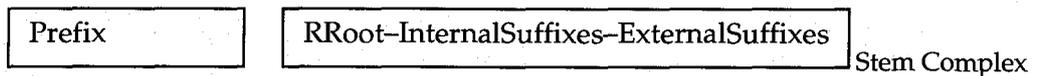
Type 1 reduplication is a partial reduplication in which the *pre-nuclear consonants* of a presumed (C₁)C₂V(R)(C₃) morphemic base—essentially the syllabic onset—are copied and suffixed as reduplicant. Type 2 reduplication is a full reduplication of the root, in which the entire morpheme, (C₁)C₂V(R)(C₃), is copied (and presumably suffixed, though this is not provable). Both Types 1 and 2 convey the sense of an augmentation or intensification of activity that implies an aspectual climax leading semantically and pragmatically to a change or upgrading in class of *Aktionsart*. Type 1 is transitive, Type 2 is intransitive. Thus, both a a punctual iteration or achievement or a continuous activity may lead to achievement and accomplishment. Type 1 reduplication I call AUGMENT for *augmentation*. It supplies an augment to the action, activity or transitivity, toward the induction of an accomplishment. Mechanically, Type 2 reduplication involves two kinds of words—onomatopoetic nouns and loans and also verbal roots. The second set, generally intransitive verbs, may express a quality of intensification leading to a similar achievement or accomplishment as Type 1. Type 2 generally identifies an intransitive object propelled by outside force. I call it INTENS for *intensification*.

Type 3 reduplication, of far more limited scope at least by the time of Hudson and Howard, copies the (R)(C₃) coda, apparently as a suffix to the root, where R = V; where R = l, m, n, (rather than y, w), V(C₃) is copied instead.

2 The CK verb

Before looking at the data, it is useful to know something of the CK verbal word. Both nominal and verbal words in CK effectively continue a TOPIC: FOCUS dichotomy into the morphological prefix and stem. Thus the verb prefix acts as an auxiliary to the stem containing root and suffixes. (Nouns and independent pronouns in CK may also be predicates by the assumption of a verbal prefix.)

(1) The CK Verb Complex:



(a) Verb Prefix:

Person/Tense/Aspect–Mode–Directional1–SubjectPlural–Directional2

(b) Verb Stem Complex:¹

(i) RRoot: Root–ReduplicatedRootOnset–FossilizedDerivMorphps

(ii) InternalSuffixes: DerivMorph–{StemVowel–Cont}/Pron.3–Appl–Pron.1/2

(iii) ExternalSuffixes: {Dur–Cont}/Adv–Inchoative/Passive–Nomin/Collect

3 Type 1 Reduplication

Type 1 reduplication, an onset-to-right-edge suffixation of the one or two consonants which compose the onset of the CK verb root base, has an unusual pattern among Pacific Northwest reduplication systems. Its primary function is emphatic augmentation and the highlighting of *Akionsarten*.

3.1 Overview of Type 1

See examples of Type 1 reduplication, as in (2b) below, with right-edge reduplicants. Thus a pre-nuclear (C₁)C₂ is copied and suffixed. According to available

¹ This is a very rough-and-ready analysis of the verb stem complex.

data, this type of reduplication occurs only on what appear to be monosyllabic roots and not on polysyllabic bases such as CVCVC. The reduplicant frequently forms the onset to a second stem syllable by marrying a succeeding stem vowel. While the glosses for the distinctions between the forms in column (a) (root bases) and in column (b) (base plus reduplicant) of (3) are nowhere near as clear as one would like, enough sense is conveyed that the overall pattern can easily be followed. A few particular varieties of AUGMENT emerge. The verbs in (2) were selected for their relatively clear glosses:²

(2) (a) (i)	-kúp ^h - (/–C), kúp- (/–V)	'cut (off)'	(b) (i)	-kúp+k-	'cut up, slice up'
(ii)	-fsmak ^h -	'hit (with s.t.)'	(ii)	-fsmak ^h +fsm-	'hit & hit, keep hitting'
(iii)	-snayk ^h -	'punch, hit with one's fist'	(iii)	-snayk ^h +sn	'hit (him) many times'
(iv)	-ts ^h ib-	'break (s.t.)'	(iv)	-ts ^h ib+ts ^h -	'break (s.t., by planning)'
(v)	-g ^w at ^h (/–#), g ^w at ^h - (/–C)	'break off'	(v)	-g ^w at ^h +g ^w -	'pull[, tear] off'
(vi)	-f ^h sal-	'would [not] rattle (s.t.)'	(vi)	-f ^h sal+f ^h s-	'would rattle (s.t.)'

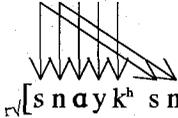
All of these examples are active or transitive (as opposed to stative or intransitive); they tend toward a sense of *intensity* or momentary *hyperactivity* in (2b). *Iteration* can be seen in (2b.i, .ii, .iii), *intensive* planning in (2b.iv, .v), and an *assertive* sense in (2b.vi) where the active positive sense contrasts with a lack of AUGMENT in the negative (2a.vi). These examples, then, express the AUGMENT as *intent* and *iteration*. Semantically, the examples in (b) show little peculiarization on the senses in (a), but rather are very similar to them. I gloss this augmentation or intensification as AUG on the reduplicated roots.

The physical process of Type 1 reduplication in CK involves a copying of the one or two consonants before the syllabic nucleus of the root—effectively, the onset of a verbal root syllable³—to the right edge. The CK root subject to reduplication, (C₁)C₂V(R)(C₃), is maximally five segments, with C₁ possibly ambisyllabic or heterosyllabic to the rest (when it appears). (R refers either to the second mora of a long vowel, or to any of the five sonorant resonants or to their glottalized equivalents.) Thus (C₁)C₂ from the left edge of the base is copied and suffixed to its right as in (3). Generally, only one (C₁) of two possible reduplicating onset consonants is an obstruent,

² These and other examples, if unmarked by type are from JH or John (Mose) Hudson, Santiam or *Hálpam*—central CK, as elicited by Jacobs. Otherwise, they may be from EH (Jacobs' elicitation from Eustace Howard, perhaps northern CK), or WH (Frachtenberg's elicitation of William Hartless' Mary's River or *P'íināpu*, south central CK).

³ No roots longer than a single syllable have been found in CK that undergo Type 1 or 2 redup.

though in at least one case (*sk^wil^t+sk^w*, 'untie-AUG') both are obstruents. (The vowel in bold face is accented with high pitch.)

- (3) (a) Normal: $\sqrt{[s\ n\ a\ y\ k^h]}$ 'punch (s.o.)'
 (b) Augmented:⁴ $\sqrt{[s\ n\ a\ y\ k^h]} - \text{AUG}$ 'punch (s.o.) again and again'

 (Type 1 Reduplication)

The schema in (3) suggests that under the pragmatically grammatical condition of AUGMENT, what passes for a primarily stressed syllable—the root syllable (always the first syllable of the stem)—undergoes the morphological change of copying its first consonant or two to its right edge. This Type 1 reduplicative process gives rise to a possible word-medial cluster of four consonants, the most complex in the language. (In such extreme cases, however, as *sk^wil^t+sk^w*, there is a tendency to simplify to three, e.g. *sk^wil.sk^w*.)⁵

3.2 Type 1 examples in detail.

We will now look at the examples from (2) in greater detail. Note the differences between the plain forms in (4a), (5a) and (5b) and the iterative forms of (4b), (5c) and (5d). The primary, unreduplicated meanings of the verbs *-kub* or *-ismak* convey a sense of individual acts of cutting or hitting, respectively (as in the cutting of the umbilical chord, (4a)). In (5a), the repetitive sense of the beating of the sticks during the winter dances is carried by the *-di-* durative suffix (here with epenthetic vowel).

(4) *-kub-* / *-kub+k-*

- (a) ...*ḡa-m-ni-kub* *ḡus-ḡin-p^hts^hii* "…they would cut its umbilical cord."
 USIT-IND-3.PL-cut that-3.SG.POSS-umbilical.cord (42.16-7)
- (b) ...*ḡi-ḡii-ni-kub+k-a-ḡ* *ḡus-[?]an-muk^hi[?]* "…as they were cutting up that meat..."
 AOR-TEMP-3.PL-cut+.AUG-STV-DUR that-DET-meat (105.15)

⁴ The arrows represent a special type of structural change unique to the root—reduplication—which may be thought of as having its own higher n-dimensional (where $2 < n < 3$) templatic marking. I am indebted to Darin Howe (2000) for the inspiration for these diagrams.

⁵ Four consonants, maximally RO.OO, may also arise at the junction of verb prefix and stem where the first obstruent is the directional *-ḡ* (though the third "O" is almost inevitably a R), and three consonants (maximally ROO) commonly arise at the junction of a determiner prefix and a noun. Simplification appears to occur in consonant clusters greater than three.

(5) $-\text{tsmak}^h-$ / $-\text{tsmak}^h+\text{tsm}-$

(a) ...gùs—d̥a-m-ni- tsmak^h -d̥i-ni d̥in-ni-láɣwa “...which they would hit on their hands.”
 that—USIT-IND-PL.3-hit-DUR-OBJ.3 POSS.3-PL.3-hand (72.19)

(b) ...gi-d̥ii-d̥- tsmak^h -d̥i-ni ʔə-wátak̚ hás—ʔan-k̚in...
 AOR-TEMP-DIR.thither-hit-DUR-OBJ.3 DET-stick this—DET-Coon (131.1; nb35.[77–87,]79.5)
 “...when she hit Coon with the stick...”

(c) ...gi-d̥ii- $\text{tsmak}^h+\text{tsm}$ -i-ni ʔə-wátak̚ d̥in-k̚apya² máaɣɔan-tsuh...⁶ (131.1-2; nb35:79.7)
 AOR-TEMP-hit+.AUG-TRANS-OBJ.3 DET-stick POSS.3-body all-anywhere
 “...(then) as she kept hitting him all over his body...”

(d) ...d̥in-nóɔna, d̥in-t̚gɔ́², máaɣɔan d̥in-k̚apya² gi-m- $\text{tsmak}^h+\text{tsm}$ -i-ni.⁶
 POSS.3-nose, POSS.3-tail, all POSS.3-body AOR-IND-hit+.AUG-TRANS-OBJ.3 (131.2-4; nb35:79.13)
 “... his nose, his tail, his whole body she kept hitting him.”

$-\text{tsmak}^h$, root of $-\text{tsmak}^h+\text{tsm}-$, requires a “beneficiary” of the beating, here directed through the objective third-person pronominal *-ni*, which also appears to promote the instrumental *an-wátak̚*, ‘stick’ as transitive agent. (*-ni* normally indicates the object of a single action, as opposed to *-na*; with such reduplicants, though, this does not hold.) The semantics of the repeated action are clear. Hudson opposes the first hard strike (5b) with the succeeding endless barrage (5c, d)—which impunity of inflicted pain of course is the first half of the widely-recognized dynamic “what goes around...” in the well-known story of Coon and his grandmother.⁷ Thus, these reduplicated verbs illustrate clear examples of the iterative form of AUGMENT.

Example (6), taken from Jacobs’s first notebook elicitation from John Hudson at the beginning of 1928,⁸ is given here with Jacobs’ own glossing. To show the maximal repetition, John Hudson uses the iterative AUGMENT plus the oblique third-person pronominal form with long stem vowel, *-a-adi*, which apparently is required by this verb. (I cannot account for Jacobs’ gloss “pl. no. of times” for *-ni* in (6b), except possibly that JH was trying to convey to him that this could be said over and over again.)

⁶ Jacobs actually wrote $-\text{tsmak}^h\text{tsm}-$, i.e., without a glottal mark on the reduplicant, 3 out of 4 times in the Hudson materials, though I think it can not be seriously doubted for tsmak^htsm . (K̚ → K̚h /—C.)

⁷ Coon, beaten nearly to death and abandoned outside, gets back at his grandmother by killing and eating her.

⁸ Berman, whose slip files of Jacobs’ elicited story material are superb, does not seem to have used this paradigmatic grammatical material (nor usually the vocabulary that accompanies it).

(6) **snayk^h / snayk^h-sn**

- (a) $\xi^w\acute{a}w\zeta \xi^w\acute{a}m$ -**snáyk^h** "He punched him, hit him with his fist (once)."
 he RFAST-punch
 (NB33:122)
- (b) $\xi^w\acute{a}w\zeta \xi^w\acute{a}m$ -**snáyk^h-ni** "He punched him, hit him with his fist (pl. no. of times)."
 punch-OBJ.ACC
- (c) $\xi^w\acute{a}w\zeta \xi^w\acute{a}m$ -**snáyk^h+sn-a-ađi** "He hit him many times, hit and hit him."
 punch.AUG.ITER-STV-OBJ.OBL

In (7c, e), the notion of augmentative intent in the examples becomes clearer. Central Kalapuyans used broken sticks as counters delivered together with a formal oral invitation and then counted off daily down to the important ceremonial event date. Whereas breaking may take place as a matter of course, intransitively (as when falling, out-of-control, [7a]) or transitively (as in the killing of game, [7b]), in (7c) the sticks are intentionally broken for a specific purpose. (7d) shows the same pattern continuing in the attributive or relative clause, "sticks broken for a specific purpose".

(7) **-ts^hib- / -ts^hib+ts^h** 'break (s.t.)'

- (a) $\acute{o}o \ y\acute{i}ik^h\text{un} \ \xi\acute{a}$ -**m-ts^hib-uu** $\acute{d}\acute{a}n$ -ts^hiđa.
 oh! maybe FUT.3-IND-break-INTR my-foot
 Oh! Maybe I'm going to break my legs! 90.1-2
- (b) $law^m\acute{d}\acute{e} \ \acute{d}\acute{a}$ -**m-ni-ts^hib-i-t^h** $\acute{d}\acute{a}n$ -búk^h $\acute{d}\acute{a}$ -đii-ni- ξ^w in
 then USIT-IND-PL.3-break-V.TRANS-DUR his-neck USIT-TEMP-PL.3-seize
 So, they broke their necks when they grabbed them. 25.1
- (c) ... $\acute{d}\acute{a}$ -đii-ni-húli $\acute{d}\acute{a}m$ -ni-géew-u- ϕ idaa, $law^m\acute{d}\acute{e} \ \acute{d}\acute{a}$ -**m-ni-ts^hib+ts^h-a-t** $^? \acute{a}$ -wátək
 USIT-TEMP-PL.3-want INF-PL.3-assemble-INTR-REC then USIT-IND-PL.3-break.+AUG-STV-DUR DET-stick
 ...when they wanted to get together, they would break the sticks 33.4
- (d) $law^m\acute{d}\acute{e} \ \acute{d}\acute{a}$ -**m-ni-méek^ha** ξ us- $^? \acute{a}$ -wátək $^?u$ -**ts^hib+ts^h-á-t^ha** ...
 then USIT-IND-PL.3-count that-DET-stick PRES.3.ATTR-break.+AUG-STV-AUT
 then they would count those broken sticks ... 33.5
- (e) $w\acute{a}^? \ n\acute{a}$ -mi-ma-hóola, $\acute{d}\acute{a}is$ $h\acute{a}s$ - $k^h\acute{w}\acute{a}ts^h\acute{a}\phi\acute{a}n$ -yuu $m\acute{a}đ\phi\acute{a}n \ \acute{d}$ -**m-ts^hib+ts^h-á-t**
 not FUT.2-TEMP-DIR.h-descend right.away this-on.the.side-also all FUT.1-IND-break.+AUG-
 STV-DUR
 If you don't come down right away,
 I will break this [the branches] on the other side of the tree, too! 141.11-12

In (7e), Skunk will intentionally shatter all the tree limbs on the opposite side of the tree, where Gray Fox is, in order to get him. (Contrast this intentionality with the intransitive INTENS of **ts^hib+ts^hib** in 3.1.)

In (8), **-g^wád+g^w-** gives a sense of both transitive or active intention as well as a some slight semantic variance. No one, certainly not the fisher, intended the spearhead to break off (the line of) the spear (or harpoon); the unreduplicated form is used, hence the stative, base form. But where facial hair is actively removed, fruit picked, or the pieces of one's body are directed to fall off, the active reduplicated form indicating *the breaking off of a bud or extension* is used.

(8) **-g^wat/t^h- / -g^wat^h+g^w-**

- (a) gùs—g^wi-ḍán-ḥúwálátá⁹ ʔə-m-t^h-k^wád¹⁰-ḵḵ
that—RECP.VBPRFX—my-spear 3.PRES-IND-DIR.thither-break.off-V.IN (95.20)
“that [what has been a] spear of mine is broken”
- (b) ḍám-ḥúwálátá g^w-əm-g^wád-ḵḵ “my spear is broken”
my-spear RECP-IND—break.off-V.IN (96.10)
- (c) ... gⁱ-m-hóḵḵ-ən gùs—gⁱ-ḍii-ni-g^wád+g^w-a-ḵḵi ḍi-ni-múḥḍi
AOR-IND—see.INT-3.ACC that—AOR-TEMP—break.off.+AUG-STV-OBL POSS.3-PL.3—facial.hair
“I saw them when they were pulling out their facial hair.” (30.11)
- (d) law²-mḵḵ gⁱ-ḍii-g^wád+g^w-a-(ḵ) ḍin-kapyá²
now AOR-TEMP—break.off.+AUG-V-DUR his-body (100.9)
“now when he broke off parts of his body”

The pair of examples in (9) centers around the use of reduplicative intention to indicate a probable course of action (stretching beyond actual rattling), not conveyed in the negative. This *assertive* sense is not distinct from the augmentative in examples above.

(9) **-tsal- / -tsal+ts-**

- (a) ... gùs ḍéé—ʔən-t^hk^héé wáʔ—ḍá-ḍá-ni-tsal-a-ḵ ḍin-t^hk^hḵ²
that how.COND—DET-rattlesnake not—USIT-CONTR-3.PL—rattle-V-ABS his-tail (77.2)
“if (on the other hand) the rattlesnake would not rattle its tail”
- (b) ... ḍá-m-tsal+ts-a-(ḵ) ḍin-t^hk^hḵ²
USIT-IND—rattle.AUG-V-ABS its-tail (76.14)
“it would rattle its tail”

⁹ For *-ḥúwá-látá*, ‘spear(-tool)’. (*-látá, tool*, is equivalent to Sahaptin *-lúwas*.)

¹⁰ Mistake for **-g^wád**.

3.3 The set of Type 1 examples and some phonological observations.

The examples of simple base versus reduplicated we have seen so far, as in (2), were chosen primarily for their clear distinctions in glossing. In (10) below, I give the Type 1 form of all such verbs I have run across,¹¹ for which both unreduplicated and reduplicated forms have been noted. A lozenge (diamond) next to the example indicates their treatment in section 1.2 above. Often, examples have been culled from lists with no subsequent facility to study the text in which they were recorded. Syllable types are noted at left.

(10)	<u>Plain form</u>	<u>Reduplicated base</u>	<u>Gloss for both</u> ¹²
(a) 3-segment bases, XXX.			
RVO	(i) wu ¹ (JH/EH)	wu[^h]+w (F:MR)	'pull (out), draw (s.t.), drag, haul'
OVR	(ii) p ³ oy	p ³ oy+p ³ (EH: p ³ uy+p ^h)	'grind finely; be finely ground, chewed up'
	(iii) g ³ uy	g ³ uy+g ³	'Kick him! Kick (him) and kick (him)!'*
	(iv) t ³ ul	t ³ ul+t ³	'poke, poke at'
	(v) ◇ t ³ ál	t ³ ál+t ³	'rattle'
	(vi) k ^h íl (F:MR sf.)	k ^h íl+k ^h	'tear it up; tear it all'
OVO	(vii) t ³ ap	t ³ ap ^h +t ³ (~ t ³ ap ^h +d)	'chop, chip, peck, tap, pick'
	(viii) t ³ ak ^h	t ³ ak ^h +t ³ , t ³ ak ^h +t ³ ^h	'grind, mash, with one's own teeth'
	(ix) t ³ uφ	t ³ uφ+t ³	'suck'
	(x) ◇ t ³ ip /-#	t ³ ip+t ³	'break; break up, off (TRANS)'
	(xi) k ^w is	k ^w is+k ^w	'smoke (TRANS); puff & puff (at pipe smoking)'
	(xii) ◇ k ³ ub /-V, k ³ up ^h /-C	k ³ ub+k ³ (~ k ³ up ^h +g)	'cut off, up, slice up; cut all (in)to pieces'
	(xiii) ◇ g ^w at /-#, g ^w ad /-V	g ^w at+g ^w , g ^w ad+g ^w	'break off, into parts; pull out; pick (fruit)'
ORV	(xiv) p ^h la (EH, JH) ¹³	p ^h la+p ^h l (F:MR)	'shoot (at); shoot lots'
(b) 4-segment bases, XXXX.			
RVRO	(i) malk ^h	malk ^h +m	'take, come out; lick'
OVVO	(ii) φiit /-#	φiid+φ	'pull out (one's own tooth/teeth)'
	(iii) p ^h iits ^h	p ^h iits ^h +b /-V, p ^h iits ^h +p ^h	'chip (off), peel (off)'

¹¹ Note that neither EH nor F.'s WH materials have been exhaustively searched in this regard.

¹² It is often not easy to discern distinct meanings of the two types from their notebook translations. One may assume a true distinction in examples where the second meaning is clearly more intense.

¹³ The JH/GB forms have the autonomous coda -t^h 'of itself'.

OVRO	(iv)	p ^h ilk /-#, k ^h /-V	p ^h ilk ^h +p ^h	'roll; make roll'
	(v)	g ^h ulb	g ^h ulb+g	'turn over, tip over; be easy to tip/turn over'
ORVR	(vi)	t ^h swal	t ^h swal+t ^h sw	'cry, whine, scream, yell, bellow (once; hard)'
ORVO	(vii)	p ^h lak /-#, k ^h /-V	p ^h lak ^h +p ^h l	'split open, split (lengthwise, into thin slices)'
	(xiii)	k ^h lug	k ^h lug+k ^h l	'whip, club'
	(ix)	t ^h swat	t ^h swat+t ^h sw	'gut, cut open and cut out entrails'
	(x)	◊ t ^h smak ^h	t ^h smak ^h +t ^h sm, t ^h smak ^h +t ^h sm	'hit; keep hitting'

(c) 5-segment syllables, XXXXX.

ORVRO	(i)	◊ snayk ^h	snayk ^h +sn	'(he) punched (him), hit (him) with his fist (once; many times); hit and hit (him)'
OOVRO	(ii)	sk ^h ilt /-#, sk ^h ild /-V	sk ^h ilt ^h +sk ^h , sk ^h il+sk ^h	'unwrap, loosen, unbraid; untie'

Table 16. Examples of Type 1 Reduplication in CK

Notice that roots of three different lengths—ORV, ORVR and ORVO, ORVRO and OOVRO, for a total of eight roots—involve double consonant suffixation. Seven of these are OR onsets, while only one has OO (sk^hilt).

Several phonological properties can be seen in these forms. First, all three phonation series (glottalized, plain, and aspirated types) can be seen to undergo reduplication, thus adding to the data supporting their verification.¹⁴ The strength of the identity constraint in CK Type 1 reduplication can be seen in the glottalization on consonants. While glottalization is not always observed, the fact that it shows up frequently enough to be recognized is remarkable. Items (10b.vi, viii, ix), for example, must break a strong allophonic constraint on occlusives that says that no laryngeal phonation other than breath will appear before another consonant ($\overset{h}{k} \rightarrow k^h /-C$) except before the accented stem vowel. In general, resonants follow other consonants in requiring aspiration at junctures, as we see at least in a few examples of (10b.ix). Accordingly, a number of forms, like (10a.ii), (10a.vii), (10a.viii), and perhaps (10a.xii), in addition to (10b.ix), tend to lose glottalization on the reduplicant:

(10) (a) (ii)	p ^h oy	(JH) p ^h oy+p ^h (EH: p ^h uy+p ^h)	'grind finely; be finely ground, chewed up'
(vii)	t ^h ap	(JH) t ^h ap ^h +t ^h (EH: t ^h ap ^h +t ^h)	'chop, chip, peck, tap, pick'

¹⁴ The small number of aspirates, and their inevitable environmental overlap with other phonation-types, suggests that they are recent in distinction.

- (viii) tsak^h (JH) tsak^h+ts (~ $\text{tsak}^h+\text{ts}^h$ 7/1) 'grind, mash, with one's own teeth'
 (xii) $\diamond \text{kub}$ /-V, kup^h /-C (EH) $\text{kub}+\text{k}$ (JH: kup^h+g 2/2) 'cut off, up, slice up; cut (in)to pieces'
 (b) (ix) $\diamond \text{tsmak}^h$ (JH) $\text{tsmak}^h+\text{tsm}$, $\text{tsmak}^h+\text{ts}^h\text{m}$ 'hit; keep hitting'

Reduction of glottals to aspirates may be interpreted as a triumph for the notion of 'the emergence of the unmarked'. However, it is only in the onset of a root *or* in the suffixed reduplicant that normal simultaneous glottalization on occlusives occurs at all. This holds true for both Types 1 and 2.

Some forms, exemplified here in (10a.xii, .xiii) and (13a.vi, viiA, ix, .x), behaving as though freely variant in base and reduplicant with regard to parallel adjustments in allophonic variation, allow lenis plain occlusives to sit before other lenis plain and before glottalized occlusives, instead of the aspirated forms. The two varieties of GC realizations reminds one of word-family sets. (At least some of these apparently freely varying examples are probably lexically determined.)

- (10) (a) (xii) $\diamond \text{kub}$ /-V, kup^h /-C $\text{kub}+\text{k}$ (~ kup^h+g) 'cut off, up, slice up; cut all (in)to pieces'
 (xiii) $\diamond \text{g}^w\text{at}$ /-#, g^wad /-V $\text{g}^w\text{at}^h+\text{g}^w$, $\text{g}^w\text{ad}+\text{g}^w$ 'break off, into parts; pull out; pick (fruit)'
 (12) (a) (vi) (EH) N $\text{dab}+\text{d}$; dap^h+d 'paint'
 (vii) (A) V $\text{dag}+\text{d}$, dak^h+d ; $\text{tak}+\text{t}$ (F) 'rain-snow-hail, precipitate'
 (ix) V $\text{kad}+\text{k}$ 'stripe'
 (x) V $\text{g}^w\text{ad}+\text{g}$ 'arise, get up'

One should also note that the locus of reduplication—between the base (ending often in RC_3) and the (possibly double-)consonantal onset of the reduplicated onset (C_1C_2)—produces the most complex set of consonant clusters ($\text{RC}_3+\text{C}_1\text{C}_2$) in the language. (Clusters of four consonants, $\text{RC}_3-\text{C}_1\text{C}_2$, may also arise across the juncture between the verbal prefix and the root syllable; clusters of three consonants, for example, $\text{N}-\text{O}_1\text{O}_2$, arise between the determiner and a nominal root.) Again, weakening of this pattern (to be observed in [25], where the final t [t^h] in the root syllable of $\text{sk}^w\text{t}+\text{sk}^w$ completely elides before the reduplicant) shows the (unmarked) simpler ROO pattern emerging.

3.4 Observations with regard to voice and rhematic scope of Type 1.

Semantically, these roots tend to indicate physical activities that may be naturally repetitive or iterative, involving an object, or simply punctual. Under AUGMENT,

however, punctual may become iterative, iterative may lead to achievement, or achievement to an accomplishment in the climax of discourse. The result may be qualitatively different than expected.

Type 1 reduplication is naturally transitive, and most of the verbs lend themselves to a transitive interpretation. In fact, there is only one example from the verbs in (11) that takes any passive morphology (i.e., intransitive *-u(u)* or inchoative *-yu*, or a combination). This is (11a.ii), *puy-p*, 'fine.mash-AUGMENT'. Example (11) follows some of the clause chaining.

(11) (a) *lawmde* *da-dii-tsh^hgə^l-uu-yuu* *da-m-ni-g^win* *da-m-ni-moy* *du-di-ni-bots*;
 then USIT-TEMP-dry-V.INTR-INCH USIT-IND-PL.3-take USIT-IND-PL.3-put.in OBL-POSS.3-
 PL.3-mouth

Then they would dry it, [and then] take it [and] put it in their mouths;

(b) *da-ni-tsk^hts^h1⁵-nii-di?* *da-di-ma-poy+p-yuu* *méenφan* *da-m-ni-malk^h-di?* *du-di-ni-bots*
 USIT-PL.3-grind.+AUG—COM-tooth USIT-TEMP-DIR.hither-mash.+AUG-INCH very.much
 USIT-IND-3.PL-take.out-OBL LOC-3.POSS-3.pl-mouth

They would grind it with their teeth until it was mashed up very fine;

[then]they would take it out of their mouths. (36.3-4)

There are two AUGMENTS in (11), *grinding with the teeth* and *mashing up fine*. Both reflect the hard work of the *masticator*. Note, however, that after the first of these, there is an apparent switch-reference, whereby the goal of interest, a cedar-bark burn-pill, momentarily becomes the intransitive subject, as well as the *object of mastication*, simply by adding the inchoative suffix. Thus we see that voice reversals *can* occur with Type 1 reduplication, but they are unusual.

3.5 Unpartnered Type 1 roots.

There are a number of CK verbs which look like Type 1 reduplicants, but whose matching simple base forms have not (yet) been found. With regard to the southernly neighboring language Takelma, which has a suffixing reduplication similar to CK Type 2, Sapir (1912:57) noted this phenomena finding a larger number of unmatched examples.¹⁶ At present, the number here is at paar or slightly less than in (10). Only reduplicated roots are listed in (12).

¹⁵ Should read *tsk^hts^h1* (by comparison with other passages).

¹⁶ "Some verbs, including a number that do not seem to imply a necessary repetitive action, are apparently never found in unreduplicated form."

(12) Unpartnered (and possibly lexicalized) Type 1 reduplicated roots.

(a) 3-segment syllables, XXX.

OVR	(i)		V, N	b̥ay+b̥	'roast'
	(ii)	(WH)	V	p ^h ul+p ^h [puul.p]	'blow' (cf. EH -p ^h uuφi' 'blow upon')
	(iii)		V	b̥um+b̥	'beat (a drum)'
OVO	(iv)		V	p ^h ut ^h +p ^h	'boil (s.t.)'
	(v)	(EH)	V	b̥as+b̥	'slap, pat'
	(vi)	(EH)	N	ɖab̥+ɖ; ɖap ^h +ɖ	'paint'
	(vii)	(A)	V	ɖag̥+ɖ; ɖak ^h +ɖ; ták+t (F)	'rain-snow-hail, precipitate'
		(B)(EH)	V	ɖak ^h +ɖ	'lie, stand, be piled up'
	(viii)		V	t̥siφ+t̥s	'twitch'
	(ix)		V	k̥ad+k̥	'stripe'
	(x)		V	g̥ɔɖ+g̥	'arise, get up'
	(xi)	(WH)	V	g̥ ^w is+g̥ ^w [k ^w is.k ^w]	'brush (it) off'
ORV	(xii)	(WH)	V	k̥lɔ+k̥	'be, get stuck (INTR)'

(b) 4-segment roots, XXXX.

RVRO	(i)	(WH)	V	yayk ^h +y	'laugh' ¹⁷
	(ii)	(WH)	V	lalg+l	'crawl'
OVVO	(iii)		V	p ^h iil+p ^h	'peel, skin'
	(iv)		V	t̥ ^h iil+t̥ ^h ; t̥ ^h εel+t̥ ^h	'peel, scrape' [EH t̥ ^h i(?) ?]
OVRO	(v)	(WH)	V	t̥ink ^h +t̥	'shake'

(c) 5-segment root, XXXXX.

ORVRO	(i)	(WH)	V	swang+sw	'crawl'
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The items in (12) above belong to the same general semantic categories as (10). Notice, however, that there are more examples with intransitive or middle senses than there were in (10), like 'boil', 'crawl', or 'twitch'. This may indicate greater lexicalization. Others are probably examples of transitive Type 1 for which the base forms have not yet come to light.

¹⁷ EH: -yaayk^hy- "roar with laughter".

There is a further set of possible Type 1 reduplication which is at once simpler and more problematical, as seen in (13).

(13) OVV (i)	(F:MR)	V	ts ^h ii+ts ^h [tsii+ts]	'be whining'
	(ii)	N	ts ^h uu+ts ^h	'nurse'
	(iii)	V	kii+k̄	'hang, choke (oneself)'

These examples are anomalous in two ways. First of all, as OVV, they are so simple that they could also be construed to be O[́]V with stress-induced length with OV reduplication. Second, they are apparently intransitive, while most of the others are transitive. I have only given a few of these here; they are enough to suggest that perhaps something different from Type 1 is occurring.

4 Type 2 Reduplication

Type 2 reduplication, less common than Type 1 in CK, applies to a number of natural or onomatopoeic roots, as well as certain generally intransitive verbal examples. It is formed by copying and suffixing the entire probable root syllable. In all of the following examples, the pitch accent falls on the first mora of the left syllable of each binomial.

4.1 Some Type 2 examples

Ordinary examples of Type 2 include a variety of onomatopoeic expressions, animal names, vocatives, and so on. Observe several kinds from this heterogenous class.

(14) Type 2 ordinary onomatopoeic words.

RVV	(WH)	N	máa+maa	'father! (voc)'
	(WH)	N	naa+náa	'mother! (voc)'
RVR	(WH)	N	wang+wang (? , < wan̩.wan̩)	'butterfly'
OVR		N	ts ^h uŋ+ts ^h uŋ	'bull snake'
	(WH)	N	gaw+gaw (? , < káukau)	'Oregon grape'
	(WH)	N	gut.gut (? , < qótqot)	'bullfrog'
ORVR	(WH)	N	smal+smal	'acorn mush'
OOVV	(WH)	N	p ^h duu+p ^h duu (? , < ptúuptuu)	'cricket'

Note that if we omit known (or most probable) loans, the forms left are somewhat complementary, the loans having a somewhat higher proportion of obstruents, as in (18):

(15) Common (onomatopoetic) loans.

RVO	N	mus.mus		'buffalo; cow, ox' (CJ)
OVR	N	g̣ul.g̣ul	(?, < qólqol)	'turkey'
	(WH)	ḥum.ḥum	(WH: pómpom)	'drum'
	N	ḍin.ḍin		'bell' [< F. <i>tintin</i> /onom.]
OVO	N	g̣uḅ.g̣uḅ		'small dentalia, round, strung on a sinew thread'
	N	ḳ ^w as.ḳ ^w as	< -q̣ ^w ásq̣ ^w as	'great blue heron, <i>Ardea herodias</i> '

Following these, however, are a number of interesting verb forms that are very different in one respect from those Type 1 reduplicant bases from those given above in (11): they are all indicative of intransitive states (though sometimes becoming transitive with derivational particles like -ẉa 'CAUS'). These intransitive states not only include patient-oriented verbs, they also include adjectival or attributive notions. They include generally transitive verbs occurring with an intransitive suffix like -u(u) (similar in sense to the English past participle) either alone or together with the inchoative or detransitivizing *ỵu*, even such strongly marked transitive verbs, such as -*pe^{ts}*, 'stab', (ex. [16a.vi] below) where the continuous AUT participial -*ts^a* renders a middle sense of 'as it was happening repeatedly that'.

(16) Type 2 as intensified intransitive predication: partnered and unpartnered forms.

(a) 3-segment roots, XXX.

RVR	(i)	V	wil+wil	'be round'	(-wil.wil-wa-ni, 'make it round')
RVO	(ii) (EH)	V	yaφ+yaφ	'be, get ichy'	
	(iii) (WH)	V	wug+wug	'(is) barking'	(?, < wóqwoq-o) [wu, 'wolf's howling']
	(iv) (WH)	V	lob+lob	'spotted'	(?, < lop.lop)
OVR	(v) (WH)	V	k ^h il+k ^h il	'torn (up)'	(?, < k ^h il.k ^h il-uu) [k ^h il', 'pull, tear apart]
OVO	(vi)	V	φe ^ʔ ts ^h +φe ^ʔ ts ^h	'he made many stabs in him; he struck, struck him'	(< -φe ^ʔ əts ^h .φe ^ʔ əts ^h -i-ts ^h a) [φe ^ʔ ts', 'stab']
	(vii) (also WH)	V	ts ^h ib+ts ^h ib	'(be) broken, shattered'	[ts ^h ib, 'break s.t.']; cf. Type 1, ts ^h ip-ts ^h
		V	k ^h ad+k ^h ad	(əŋ-qád.qád-i) '(the rat) is gnawing, scratching'	
	(viii)(also EH, WH)	V	g ^w ad-g ^w ad	'(be) broken (up, off)'	[g ^w ad, 'break (off)']

(b) 4-segment roots, XXXX.

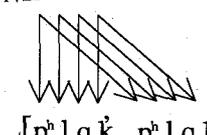
ORVO	(i) (A)	V	p ^h lak+p ^h lak	'it split in a few places'	
	(B) (EH)	V	p ^h lak+p ^h lak	'be(come) slit'	[p ^h lak, 'split (TRANS)'; cf. Type 1 p ^h lak ^h -p ^h l]
	(ii)	V	p ^h lats ^h +p ^h lats ^h	'(the firewood) is crackling, popping'	[p ^h lats ^h , 'take a shot at']
	(iii) (WH)	V	t ^h mus+t ^h mus (or d ^h mus-d ^h mus ?)	'lame'	(< tmóstmos-)
	(iv)	V	k ^w al+k ^w al	'(the light) is flickering'	[k ^w al, 'catch fire']
	(v)	V	k ^w lis+k ^w lis	'squirt (INTR)'	
OOVR	(vi) (EH)	V	sg ^w im+sg ^w im	'go flickering up, flicker'	
OOVO	(vii) (EH)	V	sgub+sgub ^s	'roll around with laughter'	(< sgúb.sgub-wa-yu) [sguup ^h , 'ashes, dust']

Table 17. Examples of Type 2 reduplication in CK

Note that both glottalization and labialization are carried over in the first O of the reduplicant of (16bv). In general, the Type 2 examples in (16) reveal the base forms of about half of its members, as against all of the examples in (10). The group of Type 2 examples as illustrated in (16), then, is like a combination of Type 1 (10) and (12), but with a third as many members. This may suggest more lexicalization or a somewhat less active system for Type 2 rather than for Type 1.

4.2 Mechanism of Type 2 reduplication.

Type 2, unlike Type 1, is a full reduplication: all segments of the base copy onto its reduplicant, as in (17).

- (17) (a) Normal: $\sqrt{[p^h l a k]}$ 'split (s.t.) lengthwise'
 (b) Intensified: $\sqrt{[p^h l a k]} - INT$ 'be completely split lengthwise'
- 
- (Type 2 Reduplication)

4.3 Examples of Type 2 reduplication.

Let us look at a few of these in context.

- (18) (a) gus $g-\text{am}-p^h l \acute{o}k-oo$ "it's going to split, all right"
 that 3.FUT-IND-**split**-INTR
- (b) $g-\text{am}-p^h l \acute{o}k+p^h l \acute{o}k-oo-\acute{y}o$ "it's going to split in a few places"
 3.FUT-IND-**split**+INT-INTR-INCH
- (c) $diilaga$ $g-\text{am}-p^h l \acute{o}k+p^h l \acute{o}k-oo-\acute{y}o$ "it split already in a few places" (nb34:88)
 already AOR-ATTR-**split**+INT-INTR-INCH
- (19) (a) $g^w-\text{am}-\text{p}^h l \acute{o}k-i-t^h a$ "he stabbed and stabbed him"
 RECP-IND-**stab**-TRANS-AUT
- (b) $g^w-\text{am}-\text{p}^h l \acute{o}k+\text{p}^h l \acute{o}k-i-t^h a$ ¹⁸ "he made many stabs in him; he stuck, stuck him"
 RECP-IND-**stab**+INT-TRANS-AUT (nb34:82)
- (20) (a) $la\acute{w}m\acute{d}e$ $g\acute{u}s$ $\acute{d}a-\acute{d}ii-ni-g^w\acute{i}n$ $\acute{d}a-m-ni-t^h i\acute{b}-it$ $\acute{d}in-b\acute{u}k^h$
 then that USIT-TEMP-3.PL-**grab** USIT-IND-3.PL-**break**-ABS(?) its-neck
 And when they caught them, they would break their necks. (24.9)
- (b) $diilaga$ $g-\text{am}-t^h i\acute{b}+t^h i\acute{b}-uu-\acute{y}u$ "it's already broken in a few places"
 already AOR-ATTR-**break**+INT-INTR-INCH (nb34:88)

That the general form of these reduplicants is clearly intransitive is clear, and contrastive with the group in (10) above. These examples in (17–20b) are the real Type 2 reduplicants.

¹⁸ The forms Jacobs actually recorded as a paradigmatic aside in his second Kalapuya notebook (not found in the Berman s.f. or in Jacobs 1945), where he was being unusually careful, included an excrescent schwa, $-\text{p}^h l \acute{o}k^h$, $-\text{p}^h l \acute{o}k^h \text{p}^h l \acute{o}k^h$. Elsewhere he gives $-\text{p}^h l \acute{o}k^h$ (J44.6) and $-\text{p}^h l \acute{o}k^h i\acute{b}$ or $-\text{p}^h l \acute{o}k^h i\acute{g}$ (J71.11, 71.14).

5 Type 3 Reduplication.

There exists a third type of reduplication in CK. This Type 3 reduplication does not follow the dichotomy I have suggested between transitive (active) and intransitive (stative) verbs for CK; rather they allow members of either class to appear in certain continuous aspects which may approach, for example, the system of English progressive tenses. I will briefly discuss Type 3 here.

5.1 Examples of Type 3 reduplication.

Type 3 reduplication involves the suffixation of -VC to the root. It is formed apparently by copying and suffixing the last vowel and the last consonantal segment of the root, not necessarily adjacent, as a -VC reduplicant. Jacobs' materials from John Hudson and Eustace Howard appear to show only two clear examples of this kind of reduplication.

- | | | | |
|----------|-----------|---------------|-------------------------------------|
| (21) (a) | klays-is- | (-klays-is-u) | 'smelling, stinking' |
| (b) | k'es-is | (-k'es-is-u) | 'smoke rising, seeping, pouring up' |

In the slip files of Leo J. Frachtenberg, however, are to be found a number of other examples, showing that this type of reduplication, along with some other functionally similar particles, were once an active part of the language, at least in the language of William Hartless (Mary's River) when F. worked with him 15 years earlier. In (22), I give some of his examples. (Recall that Frachtenberg did not distinguish a purely *aspirate* phonation type; his materials must therefore be used with extra care.)

- | | | | |
|----------|--------------------------------------|---|---------------------|
| (22) (a) | gélts ^h +its ^h | (-gélts ^h -its ^h -o(o)) ¹⁹ | 'bright' |
| (b) | ts ^h álk+ak | (-ts ^h álk-ak-oo) | '(be) shouting' |
| (c) | ts ^h wált+at | (-ts ^h wált-at-o) | '(be) bawling' |
| (d) | póoφ+uφ | (póoφ-uφ) | '(be) blowing' |
| (e) | tsómp+op | (tsómp-op-o) | 'shut (one's) eyes' |
| (f) | míts ^h +its ^h | (míts ^h -its ^h -φit) | 'are running' |
| (g) | óχ+oχ | (óχ-oχ-φit) | 'they cough' |

¹⁹ F.'s o(o) is here the stative form of undergoing, //u//.

The final **-u** is the intransitive V suffix, here completing the progressive stem, parallels the tense-maker **-(V)ku**, which is common in Frachtenberg's materials.

5.2 Mechanism of Type 3 reduplication.

Type 3, unlike the CC(X) reduplication of Type 1 or the total reduplication of Type 2, entails reduplication of the last part of the base: **-RC** of the CCVRC root base. There are apparently two patterns, according to the root. Where R is a vowel or glide, as in the type I root, $(O_b)C_1V(\widehat{G})(C_2)$, the second mora or vowel value of G reduplicates as **{G>V}O**, as in (23). Where R is a heavy resonant (lateral or nasal), for example in a type II root, $(O_b)C_1V(R_H\widehat{O}_c)$, the first mora or vowel reduplicates, as **-VO** (as in 24).

-V*O reduplicates (where * marks a space for the uncopied R), as in (24).

- (23) (a) Normal: $\sqrt{[k\ l\ a\ y\ s]}$ 'smell'
ORVRO
- (b) Situated: $r_v[k\ l\ a\ y\ s - \text{PROG}]$ '(be) stinking'

 $r_v[k\ l\ a\ y\ s\ i\ s]$ (Type 3 Reduplication)
- (24) (a) Normal: $\sqrt{[t^h\ w\ a\ l\ t]}$ 'bawl'
ORVRO
- (b) Situated: $r_v[t^h\ w\ a\ l\ t - \text{PROG}]$ '(be) bawling'

 $r_v[t^h\ w\ a\ l\ t\ a\ t]$ (Type 3 Reduplication)

Notice how the reduplication chooses either the second element of a diphthong (which I write VR) or, when the second element is R_H , the first element or vowel. Various progressive verbal features were used with this form. CK thus completes its tense system at the end of the stem, in a manner reminiscent of Upper Chinookan.

6 Summary.

In this appendix, I have shown the basic features the unique mechanism and pragmatic character of Central Kalapuyan Types 1 and 2 reduplication. These systems with their transitive/intransitive dichotomy go to the root of the language. Type 3 reduplication evinces another variation on the nearly ubiquitous durative/nondurative dichotomy underlying the semantics of verb states.