PROSODICALLY DRIVEN METATHESIS IN MUTSUN

by

Lynnika Butler

A Dissertation Submitted to the Faculty of the

DEPARTMENT OF LINGUISTICS

In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2013

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Lynnika Butler, titled Prosodically Driven Metathesis in Mutsun and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

_____ Date: (October 16, 2013)
Natasha Warner -- Chair

_____ Date: (October 16, 2013)
Michael Hammond

_____ Date: (October 16, 2013)
Adam Ussishkin

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

_____ Date: (October 16, 2013)
Dissertation Director: Natasha Warner

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of the requirements for an advanced degree at the University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

SIGNED: Lynnika G. Butler

ACKNOWLEDGEMENTS

This dissertation has been a long time coming. I would like to thank my husband Alex, who has the patience of Buddha, unflagging faith in me, and a sense of humor when mine is in short supply; he is the other half of my orange. Thanks also to my father, Jack Butler, whose life is writing and who understands better than anyone both the frustrations and the rewards of this journey; he taught me that nothing we learn is ever wasted.

I am deeply grateful to my dissertation committee, who have supported, encouraged, questioned and challenged me at every step along the way. My committee chair, Natasha Warner, introduced me to the Mutsun language and to the many delights and frustrations of working from archival data. Natasha kept me on task when my motivation flagged, and on many, many occasions helped me to re-orient after I had taken a wrong turn in my research. To Natasha, a thousand thanks, *kan-sireesum*.

Michael Hammond was an invaluable teacher, mentor, and thorn in my side throughout the writing process, questioning my most basic assumptions at every turn and making me laugh while doing so. Mike has more fun thinking about linguistic problems than anyone I know, and he paid me the great compliment of asking difficult questions and having confidence that I would find a way to answer them.

Adam Ussishkin introduced me to phonological theory in my first semester of graduate school, and has been a patient, kind, and incredibly knowledgeable guide over the years. He helped me to articulate (and indeed discover) some of the most fundamental ideas in this dissertation; and his ability to present complex problems with great clarity and eloquence—both on the page and during office hours—is the model to which I aspire.

Finally, I must thank Leanne and Helmuth Vollger, two dear friends with great intellects and generosity of spirit. Leanne and Helmuth have cheered me on and distracted me with coffee and cigars, dogs, movies, Japanese, poetry...the list is far too long to fit here. Drs. Vollger and Vollger have been like an extension of my family, and there is no one I would rather celebrate life's accomplishments with!

DEDICATION

For Alex and Jack

TABLE OF CONTENTS

TABLE OF CONTENTS — *Continued*

TABLE OF CONTENTS — *Continued*

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES — *Continued*

LIST OF TABLES — *Continued*

LIST OF TABLES — *Continued*

LIST OF TABLES — *Continued*

ABSTRACT

Among the many ways in which sounds alternate in the world's languages, changes in the order of sounds (metathesis) are relatively rare. Mutsun, a Southern Costanoan language of California which was documented extensively before the death of its last speaker in 1930, displays three patterns of synchronic consonant-vowel (CV) metathesis. Two of these patterns appear to have remained productive while the language was actively spoken. In stem-deriving metathesis, many disyllabic noun stems ending in a VC string (as well as a few trisyllabic noun stems) alternate with semantically related verb stems ending in a CV string: e.g., *cayic* 'strength' ~ *cayci* 'to be strong'. In reflexive metathesis, a subset of verb stems, which are normally vowel-final in all environments, surface in consonant-final form in the presence of the reflexive suffix *-pu* and/or the reciprocal suffix *-mu*, as in *kitro* 'to dress, to clothe' ~ *kitorpu* 'to get dressed, to dress oneself'. Finally, in suffix metathesis, the plural and locative suffixes (as well as the desiderative/irrealis enclitic) alternate between CCV and CVC forms depending on whether the preceding stem ends in a consonant or a vowel.

Based on data from a large corpus of archival records of the language compiled over a span of more than a century, all three patterns of metathesis in Mutsun appear to defy the types of phonological analysis that have been proposed in the literature to account for metathesis in a variety of other languages. The phonetic and phonological factors claimed to motivate metathesis in other languages, such as misinterpretation of acoustic cues, stress attraction, sonority hierarchies, and positional restrictions, are absent in Mutsun. In this dissertation, I argue that prosodic analyses based on syllable weight and prosodic templates are required to account for Mutsun metathesis. Mutsun stem metathesis in particular has less in common, morphophonologically speaking, with metathesis in other languages than it does with reduplication or templatic morphology.

CHAPTER 1

INTRODUCTION

Mutsun, a Southern Costanoan language of California which was documented extensively before the death of its last speaker in 1930, displays three patterns of synchronic consonant-vowel (CV) metathesis, two of which appear to have remained productive while the language was actively spoken. Based on data from a large corpus of archival records of the language compiled over a span of more than a century, all three patterns of metathesis in Mutsun appear to defy the types of phonological analysis that have been proposed in the literature to account for metathesis in a variety of other languages. The phonetic and phonological factors claimed to motivate metathesis in other languages, such as misinterpretation of acoustic cues, stress attraction, sonority hierarchies, and positional restrictions, are absent in Mutsun. In this dissertation, I argue that prosodic analyses based on syllable weight and prosodic templates are required to account for Mutsun metathesis. Mutsun stem metathesis in particular has less in common, morphophonologically speaking, with metathesis in other languages than it does with reduplication or templatic morphology.

1.1 Metathesis

Metathesis is an alternation in the linear order of two phonological segments within a word, e.g. XY vs. YX. Cross-linguistically, metathesis is far less prevalent than

other phonological alternations such as epenthesis, deletion, or assimilation (Hume 2001). Metathesis may involve the transposition of two adjacent consonants (CC metathesis), as in the examples in Table 1, or of an adjacent consonant and a vowel (CV metathesis), as in the examples in Table 2.

Table 1. CC metathesis

Aymara (data from Davidson 1977, cited in Hume 2000, 2002)		
Free variation in /w/+sonorant sequences:		**gloss**
cilwi ~	*ciwli*	'baby chick'
k'anwa ~	*k'awna*	'egg'
pirwa ~	*piwra*	'bin'

Zoque (data from Wonderly 1951, cited in Hume 2000, 2002)		
Underlying form	**surface form**	**gloss**
/y-hayah/	*hyayah*	'her husband'
/y-burru/	*byurru*	'his burro'
/y-faha/	*fyaha*	'his belt'

Table 2. CV metathesis

Alsea (data from Buckley 2007)			
tmús-x̣	'is closed'	*túms-a*	'door'
stlák-sal-tx̣	'had been sliding'	*stálk-t*	'slide it!'
ɬwáh-aw	'were climbing'	*ɬáwh-x̣*	'climb up!'

Rotuman (data from McCarthy 2000)		
Complete form	**incomplete form**	**gloss**
iʔa ~	*iaʔ*	'fish'
hosa ~	*hoas*	'flower'
sesɛva ~	*sesɛav*	'erroneous'

Metathesis may be observed at the surface level of the language (as in Aymara in Table 1, Alsea and Rotuman in Table 2 above), or in the comparison of a surface form to an underlying form (as in Zoque in Table 1). In some cases, metathesis appears to be at work across related languages, when a cognate in one language surfaces with a reversed string of segments in a second. When metathesis operates within a single language, it may do so diachronically or synchronically; that is, the relative order of segments within a word may reverse over time, or both permutations may occur at the same stage of the language.

In Mutsun, regular patterns of metathesis are all of the consonant-vowel (CV) type, affecting immediately adjacent segments; and are synchronic within the language, with both segment orders being used simultaneously under different conditions (as

opposed to diachronic metathesis, which is a change in segment order between a historical and a contemporary form). All three types of metathesis found in Mutsun date back to at least Proto-Costanoan, as shown by evidence from the closely related Rumsen and Chocheño languages; and data from several Miwok languages shows that some stem metathesis has its roots even earlier in Proto-Utian (metathesis in Costanoan and Miwok languages is discussed in Chapter 4). Data from within Mutsun demonstrate that metathesis in at least two paradigms (stem-deriving metathesis and suffix metathesis) remained productive, affecting Spanish loanword vocabulary which was introduced late in the history of Mutsun. Because of the apparently very long time depth of metathesis in Utian languages, in this dissertation I do not attempt to reconstruct the historical origins of Mutsun metathesis; rather, I am concerned with providing a primarily synchronic analysis of Mutsun metathesis (though I discuss contributing historical factors at various points, primarily in Chapter 4).

The three patterns of CV metathesis in Mutsun are: stem-deriving metathesis, reflexive metathesis, and suffix metathesis. The first two patterns alter the order of a consonant and vowel at the right edge of a stem, while suffix metathesis alters the order of consonants and vowels within a suffix (or enclitic). Stem-deriving metathesis in Mutsun is a non-concatenative morphological process that operates within a predominantly concatenating language, carrying morphological significance: alternating stems are verbs when V-final and nouns when C-final. In reflexive metathesis, some verb stems alternate between a C-final form when suffixed with either the reflexive *-pu* or the

reciprocal *-mu* and a V-final form in all other contexts. Finally, in suffix metathesis the CVC locative suffix *-tak*, plural suffix *-mak* (both nominal suffixes), and the enclitic *=tukne* alternate with CCV forms depending on whether the final segment of the preceding stem is a consonant or a vowel. All three suffix paradigms are illustrated in Table 3.

Table 3. Three metathesis paradigms

Stem-deriving metathesis:	
$[..VC]_{noun}$	~ $[..CV]_{verb}$
aSit	~ *aSti*
'California jay'	'to catch California jays'
Reflexive metathesis:	
$[..VC]_{stem}$-REFL/-RECP	~ $[..CV]_{stem}$
hiTor + pu	~ *hiTro*
'to stretch/pull/drag oneself'	'to stretch, to pull, to drag'
wayas + mu	~ *waysa*
'to be enemies to each other'	'to be an enemy'
Suffix metathesis:	
$[..C]_{stem}$-CVC/ =CVC...	~ $[..V]_{stem}$-CCV/ =CCV...
tiiwis + tak	~ *rukka + tka*
'in/on/at the flower(s)'	'in/at the house'
tiiwis + mak	~ *rukka + kma*
'flowers'	'houses'
kaan + tukne	~ *ekwe + tkun*
'if I...'	'if not'

The following sections provide an overview of Mutsun genetic affiliation, phonology, and major morphological processes. After presenting the corpus of archival materials from which the data in this dissertation are taken, and the methods used to ensure the most accurate interpretation of this data, in Chapter 2, I present metathesis data from Mutsun and review the major theories of CV metathesis in Chapter 3, and conclude that none can account for the types of metathesis found in Mutsun. Rather, I argue that productive metathesis in Mutsun is driven synchronically by prosodic factors: in stems, a strict prosodic template (as defined by McCarthy and Prince 1986 *et seq.* in their theory of Prosodic Morphology) which is strongly associated with verbs; and in suffixes, a pressure for heavy penultimate syllables at the word level. To support these claims, I examine phonological and morphological patterns evident in the surviving records of Mutsun, using statistical analysis of key data. In Chapter 4, I review the evidence of metathesis in related Costanoan and Miwok languages, and conclude that all three types of metathesis in Mutsun have their origins in earlier stages of the language; I assume (following Blevins's (2004) theory of Evolutionary Phonology) that CV metathesis originally emerged due to (likely unrecoverable) phonetic factors at work in Proto-Utian, with daughter languages (including Mutsun) inheriting the propensity for metathesis long after the original conditioning factors were lost. In Chapter 5 I review the conclusions from the previous chapters, and discuss some implications for teaching and learning metathesis as part of the Mutsun community's language revitalization efforts.

1.2 Mutsun language background

Mutsun is one of approximately seven languages[1] comprising the Costanoan branch of the Utian, or Miwok-Costanoan, language sub-family, whose other branch is the group of Miwok languages (Callaghan 1988 *et seq.*). Golla (2007:76) estimates that Proto-Costanoan diverged from Proto-Miwok approximately 4000-4500 years ago. Within the Costanoan group, Mutsun and its sister language Rumsen comprise the Southern Costanoan subgrouping of Costanoan. The Costanoan language grouping is shown in Figure 1, following Callaghan (2003).

[1] The precise number of distinct languages uncertain due to lack of surviving speakers or documentation; Kroeber (1910:241), cited in Callaghan (in press) elicited language data from Costanoan speakers at each of seven Catholic missions, and counted seven separate "dialects" corresponding to those missions, but this is likely a somewhat artificial grouping. In earlier work, Callaghan treated Ramaytush (spoken in the San Francisco area) as a separate, eighth language; but in her 2003 paper she appears to subsume it in a dialectal continuum; in her 2014 book (in press), she concludes that Tamyen, Chocheño, and Ramaytush were dialects of a single "San Francisco Bay" language.

I. Southern Costanoan

A. Mutsun

B. Rumsen

II. Northern Costanoan

A. Soledad/Chalon

B. Awaswas

C. Tamyen

D. Chocheño

III. Karkin

Figure 1. *Costanoan languages*

In referencing Costanoan and Utian languages and proto-languages in this dissertation (in Chapter 4 in particular), I diverge somewhat from Callaghan's abbreviation conventions. The abbreviations I use are as follows:

Table 4. Utian language abbreviations

PU	Proto-Utian
PCo	Proto-Costanoan
PSCo	Proto-Southern Costanoan
Mu	Mutsun
Ru	Rumsen
Cho	Chocheño
PMi	Proto-Miwok
PMie	Proto-Eastern Miwok
PMis	Proto-Sierra Miwok
Mie	Eastern Miwok
Mil	Lake Miwok
Miss	Southern Sierra Miwok

Mutsun was once spoken by approximately 2500 people in the area around present-day San Juan Bautista, California (Okrand 1977, citing Levy 1972). The last native speaker of the language, Ascensión Solórsano de Cervantes, died in 1930 (Okrand 1977); and while some of the other Costanoan languages were still spoken after that date, none are in use today.[2] The surviving records of Mutsun consist of grammatical descriptions, vocabulary and sentences elicited by various documenters of the language between the early nineteenth century and Mrs. Cervantes's death in 1930 (a digitized database of the major archival sources of Mutsun language data is used as the written corpus on which this dissertation is based; details about source material and digitization

[2] The last known speaker of Rumsen, Isabelle Meadows, died in 1939 (Harrington et al. 1981, vol. 2:86). Mrs. Cervantes apparently remembered some Chalon words, which she shared with Harrington (cf. Callaghan, in press), suggesting that there may have been some fluent or semi-fluent Chalon speakers alive in her lifetime.

are provided in Chapter 2). The modern-day Mutsun community is scattered throughout central California, and a subset of this population has initiated revitalization efforts based on the surviving archival descriptions of the language.

1.3 Mutsun phonology

Before examining Mutsun metathesis in detail, it is important to introduce certain aspects of Mutsun phonology which constrain both metathesis itself and the morphemes which are affected by metathesis. Section 1.3.1 describes the Mutsun phoneme inventory, and Section 1.3.2 describes the structure of the syllable in Mutsun. As we will see, all vowels and all but the lowest-frequency consonants in the language are involved in one or more types of CV metathesis. Prosodic restrictions on syllable structure limiting onsets and codas (when present) to a single consonant, and shortening super-heavy syllables in words of more than one syllable, limit the number and types of morphemes in which CV metathesis may occur.

1.3.1 Mutsun phoneme inventory and orthography

In order to make this dissertation (particularly the data portions) accessible to members of the Mutsun community as well as linguists, I present all Mutsun language data using the standard orthography developed jointly by Mutsun community members and Dr. Natasha Warner (University of Arizona). The phoneme inventory of Mutsun is

given in Table 5 in Mutsun standard orthography, with the appropriate IPA symbol to the right for sounds whose Mutsun representation differs from IPA.

Table 5. Mutsun phoneme inventory

Vowels: a,e,i,o,u						
Consonants:						
	bilabial	**dental/ alveolar**	**retroflex**	**(alveo-) palatal**	**velar**	**glottal**
stop	p	t	T /ʈ/	tY /tʲ/	k	’ /ʔ/
affricate		ts		c /ʧ/		
fricative		s		S /ʃ/		h
nasal	m	n		N /nʲ/		
lateral		l		L /lʲ/		
tap		r /ɾ/				
glide	w			y /j/		

Any of the five vowels may occur in any syllable without restriction (cf. Okrand 1977:87). The consonants /’, tY, N, ts, L/ are low-frequency, with some apparent positional constraints which are discussed in Section 1.3.2. The token frequency of each consonant in the corpus (22,600 utterances of one or more words each) is given in Table 6, in order from highest to lowest frequency (the corpus comprises 43,704 words,

containing a total of 152,720 native consonant tokens;[3] non-nativized consonants /b,d,g,j,q,v,z/ in loanword vocabulary comprise another 357 tokens).

Table 6. Consonant frequency (tokens in Mutsun corpus)

n	22,785
k	22,566
s	16,683
m	15,437
t	13,039
h	11,057
y	8720
p	8028
r	7826
w	7136
T	5707
l	4719
S	3934
c	3607
'	514[4]
tY	474
N	296
L	89
ts	103[5]

[3] Geminate consonants are counted as two consonants, and initial glottal stops are not counted: thus, both *akka* and *ekTe* are each counted as containing two consonants, while *pakka* and *pakTu* are each counted as containing three consonants.

[4] This figure is the total of all medial glottal stops in the corpus; if initial glottal stop is counted as a phonemic consonant, the total token frequency for /'/ is 10,508.

[5] There are 262 instances of the morphophonemic string "ts"; of these, 103 contain initial, final, pre- or post-consonantal "ts", which must be the affricate /ts/ rather than /t/ + /s/ since Mutsun phonotactics prohibit initial and final consonant clusters as well as medial clusters of three or more consonants. The remaining 159 instances of medial "ts" occur intervocalically in morphemes such as *wetse* 'to uncover', and

All Mutsun vowels occur in both short and long forms, with vowel length indicated by a double vowel ("aa", "ee", "ii", "oo", "uu"). Vowel hiatus is generally prohibited (most apparent examples are from Arroyo (1862), whose spelling was erratic and who often used VV strings in words elsewhere well attested with V'V, glide+V, or V+glide; see Section 2.1.1.2 for discussion of Arroyo's spellings). Table 7 shows words from the Mutsun corpus containing short vs. long vowels (minimal pairs differing in vowel length are discussed in a separate example later in this section).

Table 7. Vowel length

Vowel	short	long
a	*saTniS* 'popcorn, popped grain'	*saaTe* 'to toast'
e	*yekre* 'to be more extreme/more so/worse'	*yeere* 'to snag, get caught on'
i	*himah'a* 'all, every'	*hiimi* 'always'
o	*mokko* 'to be born/sprout/come up'	*mookoT* 'a fish like a catfish'
u	*aruh'a* 'morning; early'	*aruuta* 'tomorrow'

Likewise, geminate consonants occur frequently in Mutsun, and are written with a double consonant ("cc", "kk", etc.; geminate /ts/ and /tY/ are written "tts" and "ttY", respectively). Most consonants are attested in geminate form, with the exceptions of /'/

while Harrington (1922, 1929-30) treats "ts" as t+s in most such items (writing the string "t.s" rather than "ts", which he used to indicate the affricate), it is possible that some may contain phonemic medial intervocalic /ts/, which Harrington may not have been able to distinguish from t+s in intervocalic position.

(glottal stop), /L/, and /ts/; /NN/ is attested in a single word, *aNNis* 'other' (though this is occasionally recorded as *aNis* or *anyis* as well); and geminate glides /ww/ and /yy/, as well as /rr/, are very rare and in some cases likely reflect transcription errors, atypical pronunciations, and/or Spanish phonology.[6] In Table 8, attested main (non-variant) form examples of word-medial single and geminate consonants in similar environments are shown (minimal pairs differing in consonant length are discussed in a separate example later in this section).

Table 8. Consonant length

Consonant	single	geminate
'	*he'e* 'yes'	--
c	*ooco* 'ear'	*coccon* 'witchcraft'
h	*Tuuhis* 'day'	*Tuhhi* 'to dawn, become day'
k	*makam* 'you (pl.)'	*makke* 'we'
l	*hoole* 'God'	*holle* 'to be able'
L	*heLekpu* 'to be happy'	--

[6] There are no examples at all of geminate /''/ or /LL/, even in variant forms. Geminate /tts/ is attested once by Arroyo in the variant form *ettse* 'my uncle' (*ette* 'uncle' + *-s-* 'my'), whose canonical form (attested once by Harrington) is *etse*; and four times by Harrington in the variant form *ettse* 'to sleep', whose canonical form is *eTse* (recorded once by Arroyo and five times by Harrington). Thus, none of these three consonants is found as a geminate in a main (non-variant) form lexical item (see Chapter 2 for discussion of how main vs. variant status of a form is decided).

Consonant	single	geminate
m	*he<u>m</u>ec'a*	*he<u>mm</u>e*
	'one'	'to still be, still have, be anymore"
n	*pii<u>n</u>a*	*pi<u>nn</u>an*
	'that'	'yellowjacket'
N	*pi<u>N</u>i*	*a<u>NN</u>is*
	'perhaps'	'other'
p	*ee<u>p</u>e*	*ne<u>pp</u>e*
	'to pass by'	'this'
r	*ha<u>r</u>a*	*moya<u>rr</u>a*
	'to give'	'a type of fish' [7]
s	*oo<u>s</u>o*	*no<u>ss</u>ow*
	'to wake up'	'breath'
S	*muu<u>S</u>ek*	*mu<u>SS</u>i*
	'mouse'	'to be hot/warm'
t	*waa<u>t</u>e*	*wa<u>tt</u>i*
	'to come'	'to go, go away'
T	*Taa<u>T</u>ak*	*ka<u>TT</u>ak*
	'plain, valley'	'nape of the neck'
ts	*we<u>ts</u>e*	--
	'to uncover'	
tY	*kaa<u>tY</u>i*	*pa<u>ttY</u>an*
	'thus, like this'	'blood'
w	*oo<u>w</u>ena*	*so<u>ww</u>e*
	'wild carnation'	'to ask'
y	*saa<u>y</u>a*	*tsa<u>yy</u>alpu*
	'to shout far"	'to lie face up'

[7] Only two main form lexical items, *moyarra* and *tawtarria* 'green-black fly', are attested (once each) with medial /rr/; however, the former may not be a native word, and the latter is a Spanish loan word. Other examples of /rr/ occur in variant transcriptions of Spanish loan words and two Mutsun stems: *arra* 'then' (usually attested as *ara*), and *morriSu* 'to have a toothache' (a form given by Merriam (1902) for the stem usually attested elsewhere as *murSu*).

Vowel and consonant length carry lexical significance, as I discuss in Section 1.3.4. In addition, various combinations of vowel and consonant length distinguish several prosodic stem templates, which are introduced in Section 1.3.4, and which are invoked to account for metathesis in stems in Chapter 3.

1.3.2 The syllable in Mutsun

This section will detail the structure of the syllable in Mutsun, which is characterized by simple onsets and optional simple codas, and with contrasting vowel (but not consonant) length. Section 1.3.2.1 outlines the segmental structure of the Mutsun syllable; Section 1.3.2.2 discusses the prosodic structure of the syllable in Mutsun, which is crucial to my overall proposition that prosodic factors drive the various types of metathesis found in Mutsun.

1.3.2.1 Segmental structure of the syllable

Mutsun syllable structure is relatively simple: a single consonant onset is required in all non-initial syllables, and while coda consonants are allowed, they are also restricted to a single consonant. These restrictions on onset and coda length mean that word-medial consonant clusters may consist of at most two consonants (CC). Syllable nuclei consist of either a short or a long vowel (V or VV; vowel and consonant length is discussed in detail in Section 1.3.2.2).

Okrand (1977:78) describes the Mutsun syllable as CV(:)(C), with the restriction that the glottal stop (/’/) occurs, with few exceptions, only in stem-initial position.[8]However, the phonemic status of stem-initial glottal stops is uncertain. Because they occur predictably in the absence of any other initial consonant, they appear to be epenthetic, especially since non-initial glottal stop is so rare compared to the distribution of most other consonants; and Mutsun orthography reflects this analysis, with glottal stops spelled only when non-initial. On the other hand, in Harrington's (1922, 1929-30) field notes, initial glottal stop is recorded not only for words elicited in isolation, but in phrases and sentences, including after vowel-final words. This may suggest that initial glottal stops are in fact phonemic rather than phonetic. For this reason, I modify Okrand's description of Mutsun syllable sructure slightly to (C)V(:)(C), treating syllable onsets as optional word-initially. (The question of the phonological status of initial glottal stops is in any case irrelevant to a discussion of metathesis, since none of the three types of metathesis found in Mutsun involves stem-initial segments.) Examples of each syllable type are given in Table 9, with syllable boundaries marked by periods and the exemplified syllable structure underlined when it occurs in a polysyllabic word or morpheme.

Table 9. Mutsun syllable inventory

[8] Non-initial glottal stop occurs in only 17 lexical items (of a total recorded lexicon of 4078 words and morphemes). Of these, 11 contain word-final /’a/, which Callaghan (2003:59) analyzes as historical residue of an older nominal suffix -*’a*.

(C)V	*i.rek*	'stone'	*co.kor*	'fireplace'
(C)VV	*aa.sir*	'year'	*kuu.Tis*	'wild ginger'
(C)VC	*ek.Te*	'to be evil/bad'	*hem.ko*	'to set'
(C)VVC	*haay*	'mouth'[9]	*yuuh*	'turpentine'

Although a few consonants do not occur word-initially (/L/) or word-finally (/', L, tY/), there is no absolute restriction on which consonant types may begin or end a syllable; every consonant in the Mutsun phoneme inventory is attested in both onset and coda position. Examples morphemes which illustrate this fact are shown in Table 10.

Table 10. Consonants in onset and coda position

C	Onset		Coda	
'	--	*hi.mah.'a* 'all, every'	*coo.re'.Sa* 'alone'	--
c	*cay.ci* 'to be strong'	--	*oc.ko* 'to be deaf'	*ca.yic* 'strength'
h	*hor.ko* 'to swallow'	*uT.hin* 'two'	*toh.re* 'to cough'	*as.kih* 'bangs'
k	*kaan* 'I'	*hor.ko* 'to swallow"	*tak.nan* 'older brother'	*i.rek* 'rock'
l	*lii.ki* 'to kill'	*pap.lay* 'grandchild'	*yul.ke* 'to burn'	*kaa.tYul* 'calf of leg'

[9] Vowel length in monosyllabic stems is somewhat uncertain. Harrington (1922, 1929-30), the only documenter who consistently attempted to record vowel length, elicited 14 instances of *haay* with long /aa/ and 20 instances of *hay* with short /a/ for this stem in bare form or followed by a C-initial suffix; instances of *ha(a)y*+V-initial suffix were not counted, as a long /aa/ would be expected due to prosodically motivated vowel lengthening even if the underlying form has short /a/ (see Section 3.4.2.4 for discussion of vowel lengthening in suffixed "light" stems).

C	Onset		Coda	
L	--	*pit.Lan* 'dirt from gopher'	*peL.mo* 'to be soft'	--
m	*moo.hel* 'head'	*haS.mu* 'to be ashamed'	*nam.ti* 'to hear/ understand'	*haa.Sum* 'shame'
n	*nii.pa* 'to teach'	*as.nu* 'to sneeze'	*hin.wa* 'when?'	*a.sur.yan* 'sparrow'
N	*Not.ko* 'to be short'	*pi.Ni* 'maybe, perhaps'	*aN.Nis* 'other one'	*nim.mi.paN* 'fighter'
p	*pap.lay* 'grandchild'	*tem.pe* 'to dry up'	*pap.lay* 'grandchild'	*ci.rip* 'a shout'
r	*roo.te* 'to be at, to exist'	*toh.re* 'to cough'	*mu.kur.ma* 'woman'	*too.her* 'a cough'
s	*suu.re* 'to turn to coals'	*hay.sa* 'they'	*as.ki* 'to cut bangs'	*tu.res* 'crane'
S	*Sok.we* 'really; wow!'	*am.Si* 'so that, in order to'	*miS.te* 'well, good'	*ka.reS* 'worm'
t	*too.Te* 'meat'	*ruu.ta* 'to talk about'	*cit.mo* 'to twitch'	*sik.kot* 'mole, gopher'
T	*Tat.tYi* 'bone'	*mur.Tu* 'to be dark'	*uT.hin* 'two'	*ha.paa.paT* 'nephew; grandson'
ts	*tsay.la* 'to lie face up'	*aw.tsi* 'to be sweet'	*rits.ki* 'to be thin'	*ta.nats* 'ten'
tY	*tYot.tYo.ni* 'holly berry'	--	*kutY.le* 'to catch tarantulas'	--
w	*waak*	*ek.we*	*hiw.se*	*sot.tow*

C	Onset		Coda	
	'he/she/it'	'not; no'	'to want/wish/like/ love'	'fire'
y	*ye.te*	*huu.yi*	*ay.rac*	*kah.hay*
	'will; later'	'to fish'	'water bird'	'head louse'

Because both syllable onsets and codas maximally consist of a single consonant (C), consonant clusters may only occur word-medially (at the intersection of two syllables), and are restricted to two consonants (CC). Such clusters may be morpheme-internal (within a stem or affix), or they may be created by the concatenation of two morphemes, usually a stem+suffix (affixation is discussed in Section 1.4). The three palatalized consonants (/L, N, tY/), as well as the glottal stop (/’/) rarely occur in clusters; the liquids /r/ and /l/ never cluster together, and likewise, combinations of the coronal affricates c and ts with coronal fricatives and stops are very few, as are fricative + fricative or coronal stop + coronal stop clusters. Aside from these restrictions, however, most possible consonant combinations are attested in CC clusters, often in both possible orders. For a complete listing of attested consonant clusters, see Appendix A; a representative sample of word-internal consonant clusters is shown in (1), with morpheme-internal clusters in (1a-1e) and morpheme-boundary clusters in (1f-1i).

(1) **Word-internal consonant clusters**

a.	*kecwiSi*	'to do quickly'
b.	*matla*	'lie face down'
c.	*epSe*	'do not!'
d.	*-kniS*	'diminutive'
e.	*-msa*	'instrumental/locative nominalizer'
f.	*kan#raakat*	'my name'
g.	*Sumek#pu*	'to kiss'
h.	*makam#Tuk*	'with you all'
i.	*tuuris#way*	'winter'

1.3.2.2 Prosodic structure of the syllable

Mutsun syllables are quantity-sensitive, and I will show in Chapter 3 that syllable weight plays an important role in all types of metathesis in Mutsun. As alluded to in Section 1.3.2.1, both consonants and vowels may be phonologically long or short in Mutsun, with length contrasts carrying lexical significance. Syllable onsets carry no weight; vowels and coda consonants carry a mora each, so that a syllable containing a long vowel (VV or CVV) carries the same weight as a syllable with a coda consonant (VC or CVC). The moraic structure of Mutsun syllables is illustrated in Figure 2, with the syllable types from Table 9 grouped according to moraic structure (weight) into three categories: light syllables of one mora, heavy syllables of two mora, and super-heavy syllables of three mora.

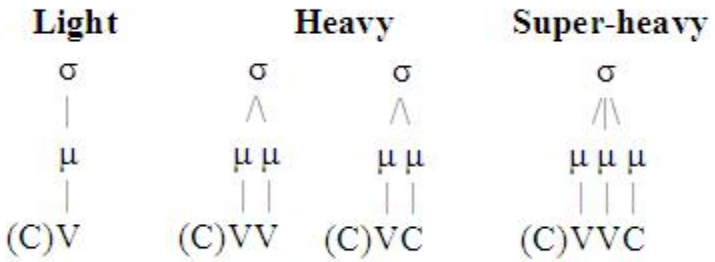


Figure 2. *Moraic structure of Mutsun syllables*

As this figure shows, light (L) syllables and super-heavy (SH) syllables each account for two of the syllable shapes listed in Table 9, with all of the remaining four syllable shapes being heavy (H).

Geminate consonants behave prosodically like consonant clusters, in that they only occur word-medially across a syllable boundary (Okrand 1977:79). Evidence for both the length of geminates and their prosodic equivalence to consonant clusters can be found in Harrington (1922, 1929-30), who uses double letters to indicate both true geminates within a morpheme and double consonants created by morpheme concatenation: for example, he writes "mm" both within stems such as ***ammani*** 'rain (n.)' and across morpheme boundaries as in ***makam-me*** 'with you all' (***makam*** 'you all' + ***-me*** 'personal locative', which he spells "makkamme"); likewise, he writes "tt" in the stem ***cutte*** 'to crawl' and in ***lottak*** 'in the mud' (***lot*** 'mud' + ***-tak*** 'locative'); and he frequently comments on geminates as sounding "long" or "double".[10] Geminates occur both within

[10] In at least one entry (1922, 1929-30:42/0874), Harrington indicates the division of a geminate into coda and onset, writing the word ***sittYimpi*** 'to cause to be small' (***sittYi*** 'to be small' + ***-mpi*** 'make, cause, let') as "sit.tʸim-pi", with separation of the /t/ closure and palatalized /tʸ/ release.

stems and in some cases--in particular the consonants /k, m, t/[11]--across morpheme boundaries, as the following examples show:

(2) **Geminate consonants in Mutsun**

a.	*ricca*	'speak'
b.	*muhhe*	'to be suspicious'
c.	*akku*	'enter'
d.	*holle*	'to be able to'
e.	*amma*	'eat'
f.	*enne*	'write, paint'
g.	*aNNis*	'other one'
h.	*neppe*	'this'
i.	*lissok*	'snake, earthworm'
j.	*hiSSe*	'to do, make'
k.	*hatte*	'who?'
l.	*hiTTew*	'wind'
m.	*TattYi*	'bone'
n.	*sowwe*	'ask'
o.	*tsayyalpu*	'turn oneself face up'
p.	*wak#koro*	'his/her foot'
q.	*makam#me*	'with you all'
r.	*lo(o)t#tak*	'in the mud'
s.	*raakat#te*	'to have a name'

[11] The greater frequency of geminate /kk, mm, tt/ compared to other geminate consonants across morpheme boundaries is almost entirely accounted for by the frequency of occurrence of the /k/-final third person possessive proclitic *wak=* before /k/-initial stems (22 instances); the /m/-initial suffix *-me* ('comitative') after /m/-final stems (4 instances); and the /t/-initial suffix *-tak* ('locative') after /t/-final stems (4 instances). Interestingly, the plural suffix *-mak*, which is much higher in frequency overall than *-me* (133 vs. 17 instances in word-final position), is not attested following any /m/-final stems such as *lom* 'brain', and thus does not account for any of the heteromorphemic /m#m/ sequences.

While most consonants can occur as single or geminate segments, a few restrictions are evident in the data. Geminate /LL/ is completely unattested. Geminate /rr/ is prohibited in native Mutsun vocabulary: while it is attested in eight instances, all of these are either variant pronunciations of forms attested elsewhere with singleton /r/ (as in *arra*, a twice-attested variant recording of *ara(a)* 'then', which occurs 43 times) or of forms with Spanish origins, reflecting Spanish rather than Mutsun phonology (as in *moyarra*, from Spanish *mojarra* 'a type of bream'). Geminate /NN/ is attested in 25 instances, all of which are recordings of the word *aNNis* 'other one'. Geminate /tts/ (/ts/+/ts/) is only attested five times in variously suffixed forms of *ettse* 'my uncle' and *ettse* 'to sleep, go to bed', which are almost certainly variants or erroneous recordings of *etse* and *eTse*, respectively.[12] Finally, geminate glides /ww/ and /yy/, though attested, are rare: /ww/ occurs nine times in six lexical items, all but two of which (*sowwe* 'to ask' and *haSSowwen/haSSowwin* 'place where the Esselen lived') appear to be variant pronunciations; while /yy/ occurs seventeen times in four lexical items, all of which are variant pronunciations except *tsayyalpu* 'to lie face up' and *nuyyulpu* 'to bow one's head'[13]

---

[12] 'My uncle' is formed from the stem *ette* 'uncle' and the infix *-s-* '1st person possessive', and is recorded once each as *ettse* and *etse*. The form *eTse* is likewise probably an infixed form consisting of the stem *eTTe* 'to sleep' and the distributive/plural infix *-s-*; the data contain four instances of *ettse* and eight of *eTse* with this meaning.

[13] Both of these items are reflexive forms of metathesizing verbs, which surface in non-reflexive form as *tsayla* and *nuylu*, respectively. Other metathesizing verb stems with medial /yC/ clusters, including medial /yl/, have corresponding C-final forms containing either a long first-syllable vowel (cf. *heeyes* 'beard' ~ *heyse* 'to shave', *maayit* 'laughter' ~ *mayti* 'to laugh') or a light first syllable (cf. *cayic* 'strength' ~ *cayci* 'to be strong', *eleymin* 'sparrowhawk' ~ *eyle* 'to catch sparrowhawks'), rather than geminate /yy/. *tsayyalpu(y)* is recorded three times by Harrington (1922, 1929-30), who notes "Prob[ably]. yy" (43/0127)

Strict minimal pairs differing only in consonant length are rare, but a few do exist:

Table 11. Minimal pairs (consonant length)

	Short C	**geminate CC**
1.	*ama* 'body, person'	*amma* 'to eat'
2.	*wike* 'to throw, fall'	*wikke* 'to shake, tremble'
3.	*tale* 'younger sibling'	*talle* 'to get blisters'
4.	*kane* 'to fight'	*kanne* 'before, so as not to'

It is somewhat more common to find minimal pairs differing only in the length of a vowel:

Table 12. Minimal pairs (vowel length)

	Short V	**long VV**
1.	*ciri* 'to hook with horns'; 'aunt'	*ciiri* 'horn(s)'
2.	*hope* 'to climb'	*hoope* 'to gather redwood'
3.	*maka* 'to throw powder'	*maaka* 'to cover with dirt'
4.	*cile* 'to ring a bell'	*ciile* 'chile/hot pepper (acc.)'

and "a good example of yy" (43/0470), and who records only one instance of ***tsayalpuy*** with singleton /y/; similarly, ***nuyyulpu(y)*** is recorded twice by Harrington (ibid.) and marked "c[learly] h[eard]. double" (38/0484), while he only records ***nuyulpu*** once).

	Short V	long VV
5.	*muse* 'to have breasts'	*muuse* 'breasts (acc.)'

The pairs in 12 (1-3) consist of single morphemes differing in vowel length; the long-vowel items in 12 (4-5) are suffixed stems which undergo regular vowel lengthening (cf. *cil* 'chile', *mus* 'breasts', *-(s)e* 'accusative').

More common in Mutsun than the minimal pairs in 11 and 12 are near-minimal pairs consisting of one stem containing a long vowel and single consonant (a "long stem" in Callaghan's terminology, of the shape (C)VVCV(C)) and another with a short vowel and geminate consonant (Callaghan's "geminate stem", of the shape (C)VCCV(C); see Section 1.3.4 for detailed description and discussion of stem shapes), but which are otherwise segmentally identical.

Table 13. Near-minimal pairs (consonant and vowel length)

	(C)VVCV	(C)VCCV
6.	*riica* 'language; word'	*ricca* 'to speak, talk'
7.	*Taala* 'heat, sweat, sunshine'	*Talla* 'to be hot, to sweat, to line in the sun'
8.	*maasa* 'to cover several things'	*massa* 'to cover'
9.	*nooto* 'to slap, hit, punch (repeatedly)'	*notto* 'to slap, hit, punch (once)'
10.	*haale* 'cattail'; 'to gather cattails'	*halle* 'to play a game'

	(C)VVCV	(C)VCCV
11.	*kaamu* 'to gather thin bulrush'	*kammu* 'to lend, to loan'
12.	*paaka* 'to shell'	*pakka* 'shoulderblade'; 'to seek'

Some such pairs are obviously related semantically, as in the examples in (1-4), and undoubtedly reflect historical stem paradigms which were no longer productive in Mutsun (cf. Okrand 1977:117, 195-198; Callaghan 1992 and in press); others appear to be coincidental, as in the examples in (5-7). A complete list of near-minimal (C)VVCV~(C)VCCV pairs is given in Appendix B.

1.3.3 Stress

The only documenter of Mutsun who attempted to systematically record stress was J.P. Harrington, in his (1922, 1929-30) field notes (a thorough discussion of which can be found in Section 2.1.3). Based on his review of an unknown portion of the Harrington material, Okrand (1977:97-103) makes the following generalizations about stress in Mutsun:

1. First-syllable stress

Lexical stress falls on the first syllable of a word, *except*:

2. Second-syllable stress in unsuffixed light stems

In unsuffixed disyllabic "light" stems of the shape (C)VCV(C), stress falls on the second syllable.

In addition to these lexical stress rules, Okrand posits that Harrington's acute accents in phrase-final syllables indicate phrasal intonation rather than lexical stress. However, Okrand acknowledges that the data is highly inconsistent, and presents these stress rules as the best approximation to the data he could determine. Several examples of unsuffixed stems recorded by Harrington with varying, and sometimes conflicting, stress patterns, are shown below, with the number of tokens of each in parentheses.

Table 14. Variable stress placement in Harrington (1922, 1929-30) (unsuffixed stems)

Gloss	**unmarked**	**1st syllable**	**2nd syllable**	**multiple syllables**
'leg, foot'	*koro* (18)	*kóro* (1)	*koró* (46), *korò*(1)	*kóró* (1), *kòró* (1)
'hole'	*cohol* (2)	*cóhol* (1)	*cohól* (4)	*cóhól* (2)
'ear'	--	*óoco* (17)	--	--
'name'	*raakat* (2)	*ráakat* (26)	--	*ráakát* (1)
'to eat'	*amma* (27)	*ámma* (15)	*ammá* (10)	*ámmá* (3), *ámmà*(1)
'fire'	*sottow* (18)	*sóttow* (2)	*sottów* (12)	*sóttów* (1)
'to rain'	*amne* (8)	*ámne* (11)	*amné* (2)	*ámné* (4)
'blanket'	*eshen* (16)	--	*eshén* (19)	*éshén* (2)

Harrington marked stems containing long initial-syllable vowels ("long stems"; see Section 1.3.4 below for stem shape terminology) fairly consistently, with stress nearly always marked on the first syllable and occasionally on both syllables, but never with stress on *only* the second syllable. Likewise, he tended to mark second-syllable stress on (C)VCV(C) stems ("light stems", see Section 1.3.4), in keeping with Okrand's rule (2)

above--though with some variability, as indicated by *koro* and *cohol* in Table 14. For other types of stems (and longer words), however, his stress placement is too variable to either confirm or invalidate Okrand's analysis. Because it is not possible to reconstruct the stress rules of Mutsun from the archival record, I will not invoke stress in my analysis of metathesis in this dissertation, though the relationship between stress and metathesis would be an important one to examine if reliable data were available.

1.3.4 Stem prosody

Most nouns and verbs in Mutsun conform to one of a small set of prosodic shapes, most of which are disyllabic. While noun stems may be monosyllabic or trisyllabic, verb stems are minimally disyllabic, as are the majority of both noun and verb stems; additionally, most disyllabic morphemes are noun and verb stems, with fewer than half of all non-noun/verb morphemes (adverbs, conjunctions, etc.) containing two syllables.[14] Given the limitations on syllable structure discussed in Section 1.3.2.2, the inventory of possible mono- and disyllabic stem shapes is as shown in Table 15 (super-heavy syllables are restricted to monosyllabic stems); however, only the shapes in bold type are attested as noun or verb stems in Mutsun (no distinction is made between stems with and without stem-initial consonants, as they do not affect syllable weight or prosody).

[14] This generalization does not take into account affixes (infixes and suffixes), which are all monosyllabic or smaller (e.g., a single consonant).

Table 15. Inventory of possible Mutsun mono- and disyllabic stem shapes

Monosyllabic stem shapes				
1.	Light (L)	**(C)V**	*ka*	'mother'
2.	Heavy (H)	**(C)VV**	*sii*	'water'
		(C)VC	*Tap*	'body hair'
3.	Super-heavy (SH)	**(C)VVC**	*waar*	'lily'
Disyllabic stem shapes				
4.	Light-light (LL)	**(C)VCV**	*koro*	'foot, leg'
5.	Light-heavy (LH)	(C)VCVV	--	
		(C)VCVC	*hikiT*	'scar'
6.	Heavy-light (HL)	**(C)VVCV**	*ooco*	'ear'
		(C)VCCV	*icci*	'to bite'
			carki	'to be quiet'
7.	Heavy-heavy (HH)	(C)VVCVV	--	
		(C)VCCVV	--	
		(C)VVCVC	*haaSum*	'shame'
		(C)VCCVC	*huppak*	'white clay'
			hismen	'sun'

Because the stems which undergo metathesis in Mutsun are disyllabic (or occasionally larger, in the case of nouns), I will not examine monosyllabic stems in any

detail here. It will be noted that, of all the potentially well-formed disyllabic stem shapes in Table 15, the three which are unattested are all vowel-final, and either LH or HH in terms of syllable weight (all contain long vowels in their second syllable); C-final LH and HH stems, on the other hand, do occur.

Callaghan (1992:39) groups Costanoan disyllabic stems into what she terms "light", "long", "geminate", and "cluster" stems, based on the initial syllable and medial consonant(s) of each stem--that is, without regard for the presence or absence of a stem-final consonant. The attested stem types from Table 15 are reorganized below in Table 16 according to Callaghan's categorization.

Table 16. Callaghan's (1992) disyllabic stem categories

1. Light stems[15]	**(C)VCV**	*koro* 'foot, leg'
	(C)VCVC	*hikiT* 'scar'
2. Long stems	**(C)VVCV**	*ooco* 'ear'
	(C)VVCVC	*haaSum* 'shame'
3. Geminate stems	**(C)VC$_1$C$_1$V**	*icci* 'to bite'
	(C)VC$_1$C$_1$V	*huppak* 'white clay'
4. Cluster stems	**(C)VC$_1$C$_2$V**	*carki* 'to be quiet'
	(C)VC$_1$C$_2$V	*hismen* 'sun'

[15] Callaghan also groups longer stems as light stems provided that they *begin* with either (C)VCV or (C)VCVC: e.g., *[tiwi]itYuk* 'killdeer' (the "light" portion of the stem is indicated by brackets). However, I treat trisyllabic noun stems separately in discussing metathesis.

Although Callaghan's stem categories are doubtless based on morphological paradigms involving extensive stem-internal length changes ("ablaut") in related languages which had largely disappeared in Mutsun, they are useful for the discussion of stem metathesis in Mutsun. As I show in Sections 3.1 and 3.2, the close association of the vowel-final cluster stem type (template) with verbal meaning is necessary to account for stem-deriving metathesis and reflexive metathesis, the two metathesis types which affect stems.

Light stems, whether ending in a vowel or a consonant, vary in the length of the second-syllable vowel (V_2) depending on suffixation. In isolation, and when suffixation creates a closed stem-final syllable, V_2 is short; however, when suffixation renders the stem-final syllable open, V_2 surfaces as a long vowel. This is shown in Table 17, with syllable boundaries indicated by periods.

Table 17. V_2 length alternations in light stems

Short V_2		**Long V_2**
me.he	*me.hey*	*me.hee.pu*
'to look, see'	'look!'	'to look at each other'
ca.la	*ca.lam.sa*	*ca.laa.su*
'to urinate'	'penis'	'to go to urinate'
ko.ro	*ko.rot.ka*	*ko.roo.sum*
'foot, leg'	'on the foot/leg'	'with the foot/leg'
co.hol	*co.hol.te*	*co.hoo.le*
'hole'	'to have a hole'	'hole-ACC.'
to.row	*to.row.mak*	*to.roo.wum*
'soaproot'	'soaproots'	'with soaproot'

Short V_2		Long V_2
i.r<u>o</u>k	*i.r<u>o</u>k.tak*	*i.r<u>oo</u>.kic*
'shit (n.)'	'in the shit'	'shitter'

In Section 3.4.2.4, I will argue that the underlying form of light stems contains a short V_2, which is lengthened for prosodic reasons in certain contexts. Long V_2 in suffixed light stems will be seen to be consistent with a general tendency in Mutsun toward penultimate heavy syllables at the word level, which I will argue is one of the motivating prosodic factors behind metathesis.

In the following section, I provide a brief overview of the major lexical categories and morphological operations in Mutsun, before introducing the three types of Mutsun metathesis in Section 1.1. Mutsun is primarily a suffixing language with simple morpheme concatenation; metathesis in stems, as we will see, is a prominent exception to this pattern.

1.4 Mutsun Morphology

This section provides an overview of the morphology of Mutsun, which is primarily suffixing.

1.4.1 Lexical Categories

Metathesis in Mutsun involves a subset of stems and suffixes, and one enclitic. The 2873 main form (non-variant pronunciation) morphemes attested in the Mutsun database primarily consist of verb stems (1811 entries including loan words), noun stems

(1138 entries including loan words), adverbs (112 entries) and affixes (73 entries). Other attested lexical categories include pronouns, exclamations, question words, quantifiers, numerals, inherent imperatives, and conjunctions (fewer than 50 entries each). Adjectival constructions are formed via suffixation of stative verb stems ('to be white', 'to be large', 'to be quiet', etc.), and derivation of morphologically complex nouns and verbs is highly productive.

1.4.1.1 Stems

Mutsun stems are of two types, noun stems and verb stems, a grammatical distinction which is quite strict in contrast to Rumsen and Chocheño, in which stems seem to be more flexible with respect to lexical category (cf. data in Miller and Callaghan 1999, Callaghan in press). The majority of both noun stems and verb stems in Mutsun are disyllabic, though this tendency is noticeably stronger for verb stems. Verb stems are almost always vowel-final disyllables, while noun stems tend to be consonant-final disyllables (see Section 1.3.4 above for more detailed discussion of stem shapes). Unsuffixed verb stems express non-past meanings, while unsuffixed noun stems express nominative case and may be interpreted as singular or plural depending on context; several examples are shown below in Table 18.

Table 18. Unsuffixed stems

Noun stems		**Verb stems**	
rukka	'house'	*cupka*	'to be white'

Noun stems		**Verb stems**	
appa	'father'	*haSmu*	'to be ashamed'
moohel	'head'	*haywe*	'to see'
Taarah	'sky'	*hiwse*	'to want/wish/like/love'

Stems are inflected and derived via suffixes (in most cases) and occasionally via infixes to express case, number, and other syntactic features. Suffixation and infixation are described below in Sections 1.4.1.2-1.4.1.3. Suffixation and, to a lesser extent, infixation are regular and productive morphological operations. In a very few instances, morphological distinctions can also be denoted with stem-internal alternations in the length of vowels and consonants, though these are historical residue and are neither regular nor productive; such alternations are described in Section 1.4.1.4.

1.4.1.2 Suffixes

Mutsun is primarily a suffixing language. In verb stems, inflectional suffixes denote features such as tense, aspect, and number (in imperatives only); while derivational suffixes primarily form various categories of deverbal nouns. Noun stems take inflectional suffixes for features such as number (plural), case (accusative), etc.; while derivational suffixes form denominal verbs or novel nouns. A few representative examples of verb and noun suffixation are given in Tables 19 and 20; a full list of suffixes can be found in Appendix H.

Table 19. Verbal suffixes

Affix	Gloss/function	Example	
-hne	passive	*riccahne* 'to be spoken to'	(*ricca* 'to speak')
-pu	reflexive	*essepu* 'to dress oneself'	(*esse* 'to dress/cover')
		hiTorpu 'to drag/pull oneself'	(*hiTro* 'to pull, drag, stretch')
-s	distant past	*waates* 'came'	(*waate* 'to come')
-mak	plural nominalizer	*hassamak* 'angry ones'	(*hassa* 'to be angry')
-paN	habitual/derogatory nominalizer	*yummepaN* 'liar'	(*yumme* 'to lie, deceive')
-Smin	agent nominalizer	*ekTeSmin* 'bad one'	(*ekTe* 'to be bad/evil')

Table 20. Nominal suffixes

Affix	Gloss/function	Example	
-mak/-kma	plural	*Taaresmak* 'men'	(*Taares* 'man')
		Tippekma 'knives'	(*Tippe* 'knife')
-(s)e	accusative	*pirese* 'earth (acc.)'	(*pire* 'earth, land')
-tak/-tka	locative	*timmahtak* 'on the forehead'	(*timmah* 'forehead')
		rukkatka 'in the house'	(*rukka* 'house')
-min	'one characterized by N'	*irekmin* 'rich person'	(*irek* 'money')
-te	verbalizer 'to have, be characterized by'	*hiinte* 'to have eyes'	(*hiin* 'eyes')
-ti	verbalizer 'to be, become'	*Taaresti* 'to be a man'	(*Taares* 'man')

Multiple suffixes may be concatenated, within certain limits which are described in detail by Okrand (1977); for the purposes of this dissertation, a few examples are sufficient to illustrate suffix concatenation:

(3) **Suffix concatenation**

a. *hiSSemit!*

hiSSe	*-mi*	*-t*
do	-BEN	-1.ACC.IMP

'Do it for me!'

b. *oneeyamakse*

oneeya	*-mak*	*-se*
friend	-PL	-ACC
'friends (acc.)'		

c. *horkostak*

horko	*-s*	*-tak*
swallow, gulp	-INS.NMLZ	-LOC
'in the throat'		

Suffixation, as stated in the previous section, is the most frequent and productive morphological operation in Mutsun. In the following section, I describe the more minor process of infixation.

1.4.1.3 Infixes

While suffixation is by far the most prevalent type of morphological process in Mutsun, three verbal infixes and a nominal infix are also found in disyllabic stems. In both verb and noun stems, the infix is inserted immediately after a medial consonant, with geminate consonants reducing to singletons where infixation would otherwise result in a prohibited CCC cluster; in a few stems with a medial C_1C_2 cluster, infixation replaces the second consonant of the cluster. The nominal infix *-s-* denotes the first person possessive for kinship terms only (the more general possessive forms for all persons are expressed using pronominal proclitics). The verbal suffixes are *-s-* 'distributive/repetitive', *-tY-* 'intensive', and *-w-* 'open/undo'. Examples of infixed noun and verb stems are shown in Table 21.

Table 21. Nominal and verbal infixes

-s-	1.sg possessive (kin terms)	*apsa* 'my father'	(*appa* 'father')
-s-	plural subject/object/repetitive action	*semso* 'many die'	(*semmo* 'to die')
-tY-	intensive	*rictYa* 'to talk a lot'	(*ricca* 'to speak')
-w-	undo, release	*hiTwa* 'to unsew'	(*hiTya* 'to sew')

Infixation in Mutsun may have arisen historically from CV suffixation of CVC roots (see Okrand's 1977:119-122) treatment of *-w-* 'open, undo' as a "stem-deriving suffix" of shape *-wi* or *-wV*), which would make it less anomalous in the context of the overwhelmingly suffixing morphology of the language. Nevertheless, synchronically it is a fairly transparent and predictable operation.

1.4.1.4 Stem-internal length alternations (ablaut)

In addition to affixation, stem-internal alternations in vowel and consonant length are morphologically significant for a restricted set of lexical items. In a number of noun-verb stem pairs, nouns of the form CVVCV (long stems) alternate with phonologically and semantically related verbs of the form CVCCV (geminate stems): for example, *ciite* 'a dance' ~ *citte* 'to dance'.

There are also a few cases of alternating verb stem forms in which geminate stems denote singularity or instantaneousness, while long-vowel stems denote plurality or a

stative quality of the verb. One example is *notto* 'to slap, hit, punch once' ~ *nooto* 'to slap, hit, punch repeatedly'.

There are many additional pairs of verb stems which follow the phonological pattern described above, but whose semantics do not suggest that the length alternations are morphologically significant. In some cases, no difference in meaning can be determined from the text data, which could mean that there is free variation, that the speaker was not sure of the form (Harrington's [1922, 1929-30] notes often suggest this), or that any original meaning difference had been lost by the time the forms were documented, indicating a diachronic loss of grammatical ablaut either through normal processes of language change or as a result of attrition. In other cases, there are differences in meaning between the two types of stems, but they appear to be specific to particular verb pairs rather than falling into any recognizable morphological pattern.

Callaghan (1992 *et seq.*) has analyzed metathesizing stem pairs in Mutsun as two of several stem shapes (prosodic templates) in a more extensive system of stem ablaut (stem-internal segment alternations). In terms of historic origins, stem metathesis may indeed be a remnant of an earlier templatic system with a larger variety of stem shapes comprising alternations in both the length and order of vowels and consonants (Mutsun templates are discussed in detail in Section 3.1.3, and historical origins of templates in Sections 4.1-4.2); synchronically, however, length alternations in stem pairs are neither productive nor morphophonologically related to stem metathesis. Stem pairs alternating in vowel and consonant length are listed in Appendix B.

1.5 Prosodic templates

In this section, I introduce the concept of the prosodic template, an invariant prosodic shape which is associated with some class or subset of morphemes in a language. Prosodic templates are best known in connection with reduplication (in a wide range of languages) and the templatic (non-concatenating) morphology of Semitic languages, but I will argue in Section 3.1.3 that they are the driving force behind stem-deriving metathesis in Mutsun. In addition to the synchronic importance of prosodic templates in Mutsun, in Chapter 4, I provide historical evidence, based largely on the work of Catherine Callaghan, which shows that a system of prosodic templates was already active in the morphology of Proto-Utian over 4000 years ago.

The idea of the prosodic template emerged from the earlier concept of the "segmental skeleton", "CV-skeleton", or "CV-template", conceived of as an ordered array of "slots" or positions specified only for consonant (C) or vowel (V), to which phonemic, prosodic, and suprasegmental information is linked to yield surface morphemes (cf. Archangeli 1983:349, citing Goldsmith 1976, Halle and Vergnaud 1980, McCarthy 1979 and 1981, Clements and Keyser 1981, and Steriade 1982). Archangeli (1983), in her analysis of Yawelmani Yokuts verb stem shapes, uses the term "CV-template" to refer to ordered strings of consonants and vowels associated with specific morphological categories (in particular, underlying and suffixed verbs). Archangeli uses autosegmental phonology (Goldsmith 1976)--in which prosodic, segmental, and suprasegmental information are conceived of as separate "tiers" which are linked to form the

phonological output of morphemes--as the formal framework by which templates are associated with the phonological material specific to individual morphemes. In Yawelmani Yokuts, Archangeli argues that certain affixes impose CV-templates on verbs, whose underlying shape may or may not be identical to the affix-supplied template.

Archangeli shows that verb stems with the durative suffix *-(ʔ)iixo* conform to a prosodic template of the shape CVC(C), while verb stems with the reflexive/reciprocal adjunctive suffix *-wsiil* conform to a template of the shape CVCVV(C). This can be seen in Table 22:

Table 22. Yawelmani CV templates in suffixed verb stems (from Archangeli 1983)

Underlying stem	**CVC(C) (with *-(ʔ)iixo*)**	**CVCVV(C) (with *-wsiil*)**
caw	*caw-*	*cawa(a)-*
ʔamc'	*ʔamc'-*	*ʔamaac'-*
c'uum	*c'um-*	*c'umo(o)-*

In her account, these CV-skeleta or templates are not necessarily prosodic in nature (1983:350, fn. 5), though prosodic restrictions determine their surface forms in many cases. However, in later work (Archangeli 1991), she concludes that Yokuts templates are in fact inherently prosodic, and (following previous work by McCarthy and Prince 1986, 1988, 1990b, Hayes 1989, and Itô 1989), that prosodic templates offer a

better explanatory device for various phonological phenomena than (non-prosodic) CV-skeleta.

The prosodic template to which Archangeli (1991) refers grows largely out of the work of McCarthy (1981) and McCarthy and Prince (1986 *et seq.*). According to McCarthy (1981:387), "[a prosodic template]...specifies the overall prosody, or syllable pattern, of a form," rather than merely segmental features. Like the earlier concept of the CV-skeleton, McCarthy's prosodic templates specify only the features "segmental" ([-syllabic], e.g. consonant) and "syllabic" (vowel), represented by C and V, and represent categories or sets of forms which share a prosodic shape but differ in the particular consonants and vowels of which they are composed; but crucially, the Cs and Vs of a prosodic template must be analyzable in terms of prosody. Examples of prosodic templates can be seen in the following data from Modern Hebrew (from Ussishkin 1999):

Table 23. Modern Hebrew prosodic templates (nouns/denominal verbs)

CVC (nouns)		**CVCVC (denominal verbs)**	
dam	'blood'	*dimem*	'to bleed'
kar	'cold'	*kirer*	'to chill, to cool'
kaʃ	'straw'	*kaʃaʃ*	'to gather straw'
tik	'file'	*tijek*	'to file'

In these examples, the prosodic templates are CVC (nouns) and CVCVC (denominal verbs). In keeping with McCarthy and Prince's (1986, 1990a, 1990b, *et seq.*) "Prosodic Morphology Hypothesis", the noun template specifies a particular

monosyllabic shape, while the denominal verb template specifies a particular disyllabic shape. The Prosodic Morphology Hypothesis explicitly defines morphological templates according to their prosodic structure:

"[Prosodic t]emplates...are defined in terms of the authentic units of prosody: the mora, the syllable, the foot, and the phonological word. (McCarthy and Prince 1990b and elsewhere)"

In other words, templates cannot specify merely any sequence of consonants and vowels: for instance, CCC (three consonants) does not constitute a prosodic template, since a CCC string cannot be divided into prosodic units.[16]Likewise, in a language like Mutsun with simple syllable onsets, CCV... is not a valid prosodic template because only one consonant in the string can be syllabified (see Section 1.3.2.1 above).

The Prosodic Morphology Hypothesis is predicated on Optimality Theory (OT; Prince and Smolensky 1993); however, the fundamental concept of a morphophonological template composed of prosodic units need not be tied to a particular formalism. Blevins (2012), for example, analyzes cross-linguistic duality of patterning (in which "discrete meaningless parts combine to form meaningful units that, themselves, recombine [p. 275]") from a probabilistic perspective, concluding that duality of patterning is a statistical tendency of languages rather than a linguistic universal. While duality of patterning typically treats segments as the "meaningless parts" from which

[16] This generalization holds true for most languages; in Imdlawn Tashlhiyt Berber, which has syllabic consonants (Dell and Elmedlaoui 1985), CCC syllables exist and thus CCC could in theory be a valid prosodic template.

morphemes and words are built, Blevins discusses the possibility that not only segments, but individual phonological features as well as prosodic structures may have meaning in some languages. Referring specifically to prosodic templates in Semitic languages, she holds that "syllable structure (independent of segmental content) can act as an atomic element in word-formation [p. 278]"; i.e., that particular prosodic shapes can have morphological significance.

Callaghan's (1958 *et seq.*) extensive historical work on Utian languages does not invoke any formal phonological theory such as OT. Nevertheless, in Proto-Utian, Callaghan (in press) finds certain prosodic templates (though she does not use precisely this term) associated with particular categories of nouns and verbs, very much analogous to the prosodic templates of Semitic languages introduced above. Table 24 below summarizes some of Callaghan's generalizations about Proto-Utian stem templates (all forms are Proto-Utian reconstructions unless otherwise specified):

Table 24. Proto-Utian prosodic templates

CVCV(C) & $CVC_1C_2V(C)$ ("basic" nouns & verbs)	**CVC:V(C) (nouns)**	**CVVCV(C) (durative verbs/ abstract nouns)**
**pukuy* 'to whirl (wind)'	**pukkuy* 'whirlwind'	--
**'ektu* 'to dream'	--	**'eekut* 'to be dreaming'
PMi **nenut* 'to know'	--	--
PCo **uyka*	--	--

CVCV(C) & $CVC_1C_2V(C)$ ("basic" nouns & verbs)	**CVC:V(C) (nouns)**	**CVVCV(C) (durative verbs/ abstract nouns)**
'yesterday'		
--	**'ekku(s)* 'hand'	--
--	--	**paaTal* 'sores'

In this dissertation, I do not invoke the Prosodic Morphology Hypothesis or OT specifically to account for Mutsun metathesis, though such an analysis of the data could certainly be made. Rather, I argue in Section 3.1.3 that the statistical distribution of certain prosodic stem templates in the Mutsun lexicon exerts a powerful influence on stem morphology, resulting in stem-deriving metathesis as a derivational word-formation strategy in a subset of stems.

CHAPTER 2

THE MUTSUN CORPUS

Many phonological analyses rely on a written corpus of some kind, often consisting of a small set of data taken from a descriptive grammar of the language being studied. This dissertation uses a very large digitized corpus ("the Mutsun database") of nearly 22,600 utterances, all of which were recorded between about 1815 and 1930 (cf. Callaghan 1958; Okrand 1977), with varying degrees of phonological accuracy on the part of the documenters involved. Because there are no living speakers with whom to verify or clarify data; and because none of the languages most closely related to Mutsun survive or are as extensively documented as Mutsun, making side-by-side comparison difficult, it is necessary to examine the Mutsun data itself for clues to its accuracy and reliability. Evaluating the quality of data, particularly when it comes from a secondary source, is important to establishing the validity of any linguistic analysis, since conclusions based on flawed or insufficient data are inherently suspect.

Because Mutsun was documented by several different scholars, one important way to determine the accuracy of the data is by cross-comparison of similar forms across authors: if a particular word is recorded in substantially the same way by all or several scholars, we can be fairly confident that their transcriptions accurately reflect the pronunciation of the word. As an example of such a case, in the Mutsun database the word 'rock' is recorded by three different scholars with varying spellings which, however,

all lead to the same standard orthography spelling ***irek***. This is outlined in (4), with a brief explanation following.

(4) **Spelling comparison across multiple sources: 'rock'**

a. Harrington: *irek, ’irek* > ***irek***

b. Arroyo: *irec* > ***irek***

c. Merriam: *ḗr-ā́k* > ***irek***

Harrington's (4a) spelling of 'rock' is identical to the standard Mutsun orthography, except that in some cases he indicates an initial glottal stop with an apostrophe (’). As I discussed in Section 1.3.2, the glottal stop is phonetically inserted in vowel-initial Mutsun words and is not reflected in initial position in the standard orthography; therefore, the two spellings are phonologically the same. Arroyo's spelling (4b), with final 'c' instead of 'k', merely reflects his use of Spanish spelling conventions (detailed discussion in Section 2.1.1); the sound represented by 'c' is /k/. Finally, Merriam's (4c) spelling is slightly complicated by his use of macrons and a hyphen indicating syllable division; but according to his own account (see Section 2.1.2) of his spelling conventions, 'ē' represents /i/ and 'ā' represents /e/ or /e^{j}/, either of which is equivalent to 'e' in Mutsun standard orthography, thus yielding the same form ***irek*** as given by Harrington and Arroyo.

In other instances, authors disagree or are variable in their spellings of a word. For such words, we must find a way to arrive at the spelling most likely to accurately reflect the typical pronunciation of the word. In (5), the Mutsun word for 'house' is spelled (after

conversion to standard orthography) either *rukka* (with a geminate medial /k/), or *ruka* (with a single medial /k/) by different authors at different times.

(5) **Spelling comparison across multiple sources: 'house'**

a. Harrington: *rukka, ruka* > *rukka*

b. Arroyo: *ruca, rucca* > *ruka, rukka*

c. Merriam: *roo-kah, ruk-kah* > *ruka, rukka*

Harrington always spells 'house' with a geminate /k/ (an underlined consonant in his 1922 field notes always corresponds with a double consonant in 1929-30 field notes). However, both Arroyo and Merriam spell the same word with a geminate /k/ in some instances and a singleton in others. This suggests two possibilities: either the word was variably pronounced with a short or long medial /k/; or transcribers categorized the sounds variably, perhaps due to their own perceptual biases (neither English, the native language of Harrington and Merriam, nor Spanish, Arroyo's native language, have contrastive consonant length). When scholars disagree about the representation of a word or utterance in this way, or are inconsistent in their renderings of a word, we must examine the biases, strengths and weaknesses of each author which are known or can be deduced from his work (i.e., native language, other work, professional training, etc.); information about the speakers from whom data was recorded; and diachronic change and language attrition which may have yielded different data at different historical periods.

This chapter gives an overview of the archival sources which served as input for the Mutsun database, and the methods used in creating and analyzing the corpus. Because

this dissertation examines largely phonological phenomena, special attention is given to factors that impede or facilitate a clear understanding of Mutsun phonology, and the methods by which we have attempted to overcome the many imperfections and gaps in the data.

In Sections 2.1-2.1.3, the major archival sources are listed, the strengths and weaknesses of the data from each source are discussed, and sample data are presented along with a discussion of the methods used in interpreting them. Section 2.2 gives an overview of the current state of the database, including a detailed description and examples of data entry and analysis, with subsections discussing methods for text input, morphological parsing, distinguishing between main and variant forms, lexical input, and data revision and re-checking.

2.1 Overview of the archival sources: Harrington, Arroyo, Merriam, Mason, and Okrand

The surviving archival documentation of the Mutsun language consists of three major primary sources, which comprise the bulk of the corpus: a list of utterances compiled by Father Francisco Arroyo de la Cuesta (1862); vocabulary recorded by C. Hart Merriam (1902); and extensive field notes by John P. Harrington (1922, 1929-30). (A few other, smaller sources are not included in the database which serves as the corpus for this dissertation: a vocabulary recorded by H.W. Henshaw, published as Heizer 1955 and comparative data sets recorded by Kroeber 1910 and Dixon and Kroeber 1919.)

Secondary sources, which are used to a lesser extent in the lexicon portion (but not the text corpus) of the database, are J. Alden Mason Mason (1916) and Marc Okrand (1977). Because each of these documents is formatted differently, references are customized to the particular source. Data from Arroyo (1862) are cited by utterance number, e.g. (1862:435) for the 435th utterance in his compilation, following Arroyo's own numbering system. Both Merriam's (1902) and Harrington's (1922, 1929-30) data are organized and stored on microfilm, and thus are cited by frame and reel number within the collection in which each is housed: for example, "Merriam (1902:68III376)" is a reference to reel 68, section III, page 376 of the Merriam collection; and "Harrington (1922, 1929-30:41/0276)" indicates a word or phrase on reel 41, frame 279 of the Harrington collection. Finally, Mason (1916) and Okrand (1977) are cited by page number.

The three primary sources (Arroyo, Merriam, and Harrington) vary in terms of both quantity and quality of data. Harrington (1922, 1929-30) is by far the largest source of data, with over 16,000 separate entries; Arroyo (1862) consists of just over 2900 entries, and Merriam (1902) just over 1200. For reasons that will be discussed in detail in Sections 2.1.1-2.1.3, Harrington (1922, 1929-30) is also considered to be the most phonologically reliable rendering of Mutsun. However, since Arroyo's (1862) work is the earliest record of Mutsun, it almost certainly reflects some aspects of Mutsun which were subsequently lost through attrition. Similarly, though Merriam (1902) is the smallest set of data and contains significant orthographic inconsistencies, it includes some lexical items (in particular, words relating to plants, animals, and traditional tools and crafts)

which were either not recorded or were imprecisely glossed by Arroyo and/or Harrington. Sections 2.1.1-2.1.3 outline the strengths and weaknesses of each primary source, and discuss the methods by which data from each are interpreted and used in the Mutsun database and in this dissertation.

Of the two secondary sources of Mutsun language data, Okrand (1977) is the most important, as his grammatical analysis of Mutsun forms the basis for parsing of words and phrases in the database and informs the discussion of metathesis and related phenomena in this dissertation. Section 2.1.4 briefly discusses how Okrand arrived at his analyses; but detailed discussion of specific points of phonology and grammar, including instances in which my own analysis diverges from that of Okrand, is addressed in the relevant sections of Chapter 3.

Arroyo's (1862) *Vocabulary*, all known Harrington (1922, 1929-30) field notes, and the Mason (1916) and Merriam (1902) data have been compiled into an electronic database, which allows concordance and analysis of attested morphemes and utterances. This database consists of two main parts: a lexicon containing more than 4,200 morphemes (excluding variant pronunciations), and a text corpus of over 22,600 attested utterances. The database is the source for all data presented in this dissertation unless otherwise indicated, and in conjunction with Okrand's (1977) grammar, is the basis for the morphological and phonological descriptions given throughout. In addition, the database is intended as a tool for contemporary Mutsun community members to use in their efforts to revitalize the Mutsun language. Because the print sources on Mutsun are

largely inaccessible and/or illegible; follow widely divergent transcription norms; contain specialized linguistic notation (Harrington 1922, 1929-30) and/or Spanish glosses and description (Arroyo 1861, 1862); Harrington 1922, 1929-30); and are not searchable, an electronic database containing all of the source documents recorded in a consistent transcription system is indispensable for serious language study (as well as for serious linguistic analysis).

2.1.1 Arroyo

The earliest of the Mutsun archival sources are a list of nearly 2,900 utterances (*A Vocabulary or Phrase Book of the Mutsun Language of Alta California*; [Arroyo 1862]) and a grammatical description of the language (*Grammar of the Mutsun Language, Spoken at the Mission of San Juan Bautista, Alta California*; [Arroyo 1861]) compiled in 1815 and 1816, respectively, by Father Felipe Arroyo de la Cuesta, a Spanish missionary at the San Juan Bautista mission near modern-day Monterey, California, and published posthumously. Only utterances from Arroyo's (1862) *Vocabulary* are included as text entries in the Mutsun database, as the bulk of the *Grammar* (1861) is descriptive prose written in Spanish, with illustrative Mutsun examples duplicated from the (1862) *Vocabulary*. The Arroyo records are extremely valuable, as they are the only record of the language from a time when it was still actively spoken. However, there are several issues which complicate the interpretation of Arroyo's data.

2.1.1.1 Dialect and variability in the data

The first problem is that Arroyo does not note any dialectal differences (or any other type of variation among speakers) in the Mutsun that he documented; but because of the mission setting, in which Indians from a surrounding area were gathered into a single Catholic mission without regard for their own cultural or regional identities, it is likely that speakers of several dialects (and indeed other neighboring languages) contributed to his data. The only information given by Arroyo about the speakers from whom he gathered his corpus is the following (from Arroyo 1861; translated from the Spanish):

> With respect to the construction of the parts of the sentence of this language one need not refer to classical Authors, nor to sophisticated persons, which are the principles of our [language]: What we must do here is observe how those of the greatest ability speak, and the elders; thus these, and they explain themselves with propriety, elegance, and purity; and this is what I have practiced in order to be able to comprehend this language in the way that I am explaining it. (Arroyo 1861:Ch. 14, paragraph 1)

This passage seems to suggest that Arroyo sought out older, fluent speakers of Mutsun, possibly of a prestige variety (cf. "propriety, elegance, and purity"; though this may merely refer to their ability to explain their language in Spanish). However, there is no definitive way to identify or distinguish Mutsun dialects since the language declined so rapidly after Arroyo's time; but as a rule of thumb, forms which occur frequently and are represented more or less consistently in his data, and/or forms which are corroborated in later records of the language made with the help of different speakers, are treated as "standard" Mutsun pronunciation (for lack of a better term). As an example, a verb stem

pronounced *amne*, meaning 'to rain', is recorded 39 times by Harrington and five times by Arroyo.[1] An alternate form *inanme* occurs three times in Arroyo's records--the repetition suggesting that this was not simply a misspelling or mishearing on Arroyo's part--but is unattested in any other sources in the database. A few example sentences from the corpus (represented in standard orthography) are shown in (6).[2]

(6) **Determining the "main" (standard) form of a word: 'rain'**

a. *amnenin makke.* Ar 5[3]
'We got rained on.'

b. *tollon amnen.* Ha 42/0900
'It rained a lot.'

c. *upihte makse kocop inanme.* Ar 2833
'We are covered if it rains.'

Based on these data, we treat the form *amne* as the standard Mutsun verb for 'to rain'. Arroyo's *inanme* may be from a different dialect or a closely related language, or it may be an archaic Mutsun form that was already on its way out by the early nineteenth century when Arroyo recorded it; in the database, it is treated as a variant form of *amne*. (A representation of the complete lexical entry for *amne*, including the variant *inanme* and other variant forms, is given in Appendix C.)

---

[1] Merriam records 'rain' as *amenni* and *aminne* (two instances each); possible explanations for this variation will be discussed in Section 2.1.2.

[2] When Mutsun words or utterances are cited from the text database, the source document's author is abbreviated as follows: Ar = Arroyo; Ha = Harrington; Me = Merriam.

[3] Utterances from Arroyo (1862) are cited with the utterance number assigned by Arroyo; his numbering is sequential according to his own quasi-alphabetic ordering.

2.1.1.2 Orthography

The second problem in interpreting Arroyo is that he uses Spanish writing conventions to represent Mutsun sounds (Callaghan 1962:98; Warner, et al. 2006:259); but there are a number of Mutsun phonemes which do not occur in Spanish, such as T (/ʈ/) and S (/ʃ/). Arroyo's spelling of such sounds is highly variable, owing no doubt to both his lack of linguistic training and his attempt to render novel sounds in a sometimes ill-equipped orthography (it is also true that his Spanish spelling is itself not always consistent: for example, the word ***dije*** 'I said' is written 22 times as 'dixe' and five times as 'dije' (standard modern Spanish spelling) in his 1861 *Grammar*). Mason (1916:402-405) offers an approximate guide for understanding Arroyo's spelling conventions, but he did not have the advantage of being able to compare Arroyo's forms with those documented by other researchers (most notably Harrington 1922, 1929-30); and his interpretation of Arroyo's spelling is suspect or demonstrably mistaken for some sounds.

For some words, conversion is straightforward once Spanish spelling conventions are taken into account. A few of the simpler spelling conventions frequently used by Arroyo include the Spanish use of a "silent" (unpronounced) letter 'h', especially in initial position; the letters 'j' and 'g' for /h/; and 'hu', 'gü', and 'u' to represent a prevocalic glide /w/. In (7), the Spanish use of 'h' as a silent (unpronounced) letter yields vowel-initial

morphemes in standard Mutsun orthography, which are consistent with other authors' recordings[4]:

(7) **"Silent" initial 'h'**

a. *hocse* > *okse* 'long ago'

b. *hac* > *=ak* 'he/she/it'

In some instances, Arroyo also appears to have used 'h' between vowels to indicate vowel length, as in his spelling 'tahanan' for Mutsun *taanan* 'older sister'; more often, however, Arroyo's use of word-medial 'h' correlates with a glottal stop recorded in the same words by Harrington (these are usually intervocalic, but occasionally occur between a consonant and a vowel).

(8) **Medial 'h' for glottal stop**

a.	*inaha (3), iñaha (3)*	> *hiNa'a (9)*	'shortly, soon'
b.	*gehe (16)*	> *he'e (22)*	'yes'
c.	*asaha (8)*	> *asa'a*	(26) 'truly'
d.	*naha (18)*	> *ney'a (53), ne'a (3)*	'now'[5]
e.	*japuha (2), japuhu (1)*	> *hapuh'a (2)*	'never, until now'
f.	*imaha (3)*	> *himah'a (48)*	'all, every'

Taken together, spellings like those in (7) and (8) confirm Callaghan's (1962:98) speculation that Arroyo used 'h' "to separate syllables or to indicate glottal stop": all

[4] A slightly different interpretation is that initial 'h' was intended to represent the glottal stop, which is not written in standard Mutsun orthography, but which may be phonemic (see discussion in Section 1.3.1); this would be consistent with Arroyo's use of intervocalic 'h' for medial glottal stop, discussed below.

[5] Arroyo consistently records the word for 'now' as *na'a* (standard orthography), vs. *ney'a* as recorded by Harrington; this likely reflects a dialectal difference between Arroyo's speakers and Mrs. Cervantes, since Arroyo typically records the same vowels as Harrington for a given word (as is the case for the other examples in this list).

vowel-initial words have a phonetic initial glottal stop, and medial glottal stop (just like any other medial consonant) separates syllables within a word. (In (8e-8f), Arroyo writes only 'h' for an intervocalic /h/ + glottal stop sequence, but because of Spanish orthographic conventions it is much more likely that his 'h' in such forms is for the glottal stop than for the phoneme /h/.)

Similarly, items spelled with 'j' in any position, or with 'g' followed by 'e' or 'i', are easily interpreted as containing the phoneme /h/, as in the examples in (9).

(9) **/h/ written as 'j' or 'g'**
   a. *injanin* > ***inhanin*** 'became sick'
   b. *yojon* > ***yohon*** 'to become loose'
   c. *girena* > ***hirena*** 'pine nut'
   d. *esgen* > ***eshen*** 'clothing'

Depending on context, Arroyo employs various Spanish spelling conventions to represent the glide /w/. In initial and intervocalic position, he typically spells /w/ with 'hu' (10a-c) or 'gü' (10d-e) (the latter usually followed by 'e' or 'i'); while 'u' alone may be used intervocalically or between a consonant and a vowel (10f-g).

(10) **/w/ written as 'hu', 'gü', or 'u'**
   a. *huac* > ***wak*** 'he/she/it'
   b. *huisa* > ***wisa*** 'to uncover'
   c. *ehuoie* > ***ewoye*** 'was about to'
   d. *güeren* > ***weren*** 'rabbit'
   e. *güigianpe* > ***wihyanpe*** 'to annoy'
   f. *Chauepui* > ***cawepuy*** 'praise yourself!'
   g. *lesocua* > ***lesokwa*** 'earthworm'

While Arroyo's choice of which spelling to use for /w/ in a given word is often unpredictable (for instance, (10b) and (10e) both begin with /wi/, but he spells ***wisa*** with 'hui' and ***wihyanpe*** with 'güi'), each spelling is easily interpretable as /w/.

If Arroyo's orthographic problems were limited to the type of Spanish spelling conventions illustrated in the above examples, conversion would not be a great challenge. However, letter combinations which are intended to represent Mutsun sounds outside the Spanish phoneme inventory are much more difficult to intrepret, especially in light of the fact that Arroyo does not consistently use the same letter combination for the same Mutsun sound.

Arroyo's consonants are often particularly difficult to reconcile with Mutsun phonotactics and/or other scholars' spellings. While the letters "l, m, n, p, r, s, t" are usually equivalent in Spanish and Mutsun, other consonants tend to be variably and idiosyncratically spelled. A case in point is Arroyo's rendering of the Mutsun retroflex stop /T/. He writes /T/ variably as "thr", "ths", "sth", "th", "sths", "hs", "ch", and possibly other configurations (cf. Okrand 1977:22; Arroyo 1862; Mason 1916:404; Warner, et al. 2006:262-263). This orthographic inconsistency can be seen in the six vocabulary items given in (11), with standard orthographic spellings in the leftmost column and Arroyo's original spellings in the column immediately to the right.

(11) **Arroyo's transcriptions of T (/ʈ/)**
(all examples are from Arroyo (1862); numbers correspond to utterance numbers in the printed text)

Standard orthography	**Arroyo spelling(s)**	**English gloss**	**Arroyo utterance(s)**
1. *Tura*	thrura	'to thunder'	500, 2710
2. *ekeT*	equeths	'evil, sin (n.)'	32, 518, 640, 868, 1881
3. *maT(T)er*	masther mather mathrer	'tobacco'	339 561 1479, 1693, 1894
4. *ereT*	eresths	'piece of money'	1007
5. *apapaT*	apapahs	'nephew/grandson'	253
6. *Tawra*	chaura chaora	'sit/stay/reside'	1663, 2154 79, 469, 1200, 1729, 1912, 1918, 1983, 2108, 2200, 2341

Several of the six words in (11) occur frequently in the corpus and reliably contain /T/ (spelled "tr"[6]) when documented by Harrington and/or Merriam, as can be seen in the spellings in (12).

[6] Harrington distinguishes between retroflex T and the consonant sequence tr (which only occurs word-medially) by writing 't.r' for /tr/ (e.g. 'wet.resᵞmin' for *wetreSmin* 'large one'. The Merriam data does not contain any words with a 'tr' sequence.

(12) a. *Tura*: **tr**ura, **tr**uraa (Ha); **tr**oo-rah (Me)

b. *ekeT*: ’eke**tr**, ’éké**tr**, ’eké**tr**, ’éke**tr** (Ha)

c. *maTTer*: mat**tr̥**ér, mat**tr**ér, mat**tr**er, mat**tr̥**er, mát**tr**ér̥, má**tr**‘er (Ha); mat'-**tr**et, mat-**tr**er (Me)

d. *ereT*: ’ere**tr** (Ha)

e. *hapaapaT*: hapāpa**tr**, hápā́pa**tr**, hapā́pa**tr̥**, hapāpa**tr̥**, hapaapa**tr**, hápápa**tr**‘ (Ha)

f. *Tawra*: **tr**áwra, **tr**awrá, **tr**awrá‘, **tr**awra, **tr**áwrá, **tr̥**áwrá, **tr**‘áwra, **tr**áwrá‘ (Ha); **tr**ow'-rah (Me)

For these particular words, comparison to other sources clarifies Arroyo's spellings; however, because /T/ can occur in combination with other consonants in word-medial clusters, as in well-attested forms such as *uThin* 'two' and *kuTra* 'to put on a belt', it is sometimes unclear whether a string of letters represents /T/ alone or /T/ preceded or followed by another consonant. This is especially true for items which are not well attested by other authors: for example, it is impossible to know whether Arroyo's spelling 'pothrol' ('yellow-headed blackbird') is intended for *poTol* or *poTrol*, since Harrington is only able to elicit a form *poTTol* from Mrs. Cervantes as a guess, commenting, "Nesc. [does not know]...Adivina [guesses]" (Harrington 1922, 1929-30:42/0734).

Arroyo's recording of Mutsun words is additionally problematic because he rarely indicated vowel or consonant length (cf. Callaghan 1962:98), both of which are phonemic in Mutsun, as discussed in detail in Sections 1.3.1 and 1.3.4. Whether this oversight is also attributable to Arroyo's Spanish bias (Spanish does not have phonemic length distinctions), to Arroyo's inability to hear length distinctions, or perhaps to his simply not realizing that length distinctions were important, it results in the misrecording of a great

many words and uncertainty about the correct pronunciation of others. In total, Arroyo only writes double-vowel sequences (e.g. "aa", "ee", etc.) in 85 instances; and because he used "i" for Mutsun y, many of his "ii" sequences are actually intended to represent /iy/, as in *atkiy* 'break it!' ("atquiy" in his spelling) or /yi/, as in *sunyin* 'to become full' (which he spelled "suniin"). A number of other double-vowel strings in Arroyo's transcription are for words attested elsewhere with an intervocalic glottal stop, such as *himah'a* 'all, every' (attested 48 times with glottal stop), which Arroyo spelled "imaa" (elsewhere he spelled it "imaha", with the 'h' representing the glottal stop; see above for Arroyo's use of intervocalic h to indicate glottal stop).[7] Once these items and a few obvious typesetting errors (a string "ec" in the manuscript printed "ee" in the published version) are taken into account, only 28 instances (14 if the analysis in Chapter 2, fn. 7 is correct) of double-vowel strings remain in Arroyo's data.[9]

Compared to vowel length, Arroyo was much more likely to record consonant length, with a total of 853 instances of double-consonant sequences in his spelling (most of which are accounted for by "nn" [255], "pp" [115], "ss" [194], and "tt" [226] sequences). Some of these are certainly errors and/or idiosyncratic spellings for which no

---

[7] In 14 instances, Arroyo records the second-person plural pronoun (main form *makam*, which Arroyo typically spelled "macam") as "maam". This suggests a variant pronunciation of the pronoun, which I speculate was likely *ma'am* (/maʔam/) rather than *maam* (with a long vowel), just as his "imaa" denotes *himah'a* rather than **hima(h)a*.

[9] A handful of such entries are attested in Harrington's data as actually containing long vowels, suggesting that at least in a few cases vowel length was salient enough to Arroyo for him to record it: for example, he writes *keese* 'oh my!' (attested five times by Harrington with a long /ee/, and according to his notes a word Mrs. Cervantes knew "perfectly") as "queese"; likewise *haakan* 'snake's rattle', attested eight times by Harrington with long /aa/, is recorded by Arroyo as "jaacan".

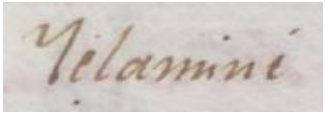
geminate form can be found in Harrington (i.e. Arroyo's "succumu", suggesting a form *sukkumu* for the verb 'to smoke', which is instead recorded consistently by Harrington as *sukmu*); however, a great many do in fact coincide with Harrington forms containing geminate consonants: *tokko* (Arroyo's "tocco") 'to spread out', *amma* 'to eat', *kannis* (Arroyo's "cannis"), *neppe* 'this', *issu* 'hand', and *hittYe* (Arroyo's "ittie") 'come on!' are just a few examples. Evidently Arroyo found consonant length more salient, or considered it more important to document, than vowel length; but his transcription is nevertheless quite unreliable with respect to consonant length, as seen in forms like *aku* (written "acu") for *akku* 'to enter', *capu* (written "chapu") for *cappu* 'to prick', and *hute* (written "jute") for *hutte* 'to light a fire', all of which are recorded dozens of times by Harrington with geminate consonants. Additionally, while Arroyo did sometimes record geminate stops (p,t, T, tY), fricatives (s), nasals (m,n), affricates (c), and even liquids (l), he never recorded geminate glides (w,y) or geminate /h/, all of which do occur in Mutsun (though /yy/ is attested in only one form, *tsayyalpu* 'to turn/lay oneself face upward').

The general rules for converting Arroyo's Spanish-based orthography to Mutsun standard orthography are given in Appendix D; however, these guidelines are sometimes insufficient, requiring a case-by-case evaluation of many lexical items. Specific questions stemming from such orthographic problems are addressed as they arise throughout this dissertation.

2.1.1.3 Typesetting errors and illegible data

An additional transcription-related problem with Arroyo's data is that, for the (1862) *Vocabulary*, both handwritten and print versions exist, but the spellings in the two documents do not always agree (Warner, et al. 2006:259). Side-by-side comparison reveals frequent typesetting errors, with for example handwritten 'c' and 'n' often being mistaken for 'e' and 'u' respectively, as shown by the excerpts in (13).

(13)

Arroyo (manuscript)	**Arroyo (print)**	**Reconstructed form (standard orthography)**[10]	**Arroyo utterance no.**
 [Yelamini]	Iclamini	*yeela mini!* 'Hey, wait!'	1862:1022
 [ayugüespuiuths]	aijuguespuinths	*haywespuyuT!* 'Watch yourselves!'	1862:131

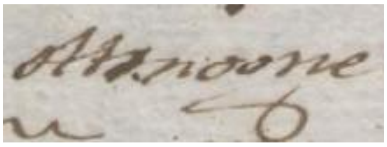
When a form found in the published version of the Vocabulario is suspicious (violates Mutsun phonotactics, differs from other instances of the same word, etc.), the manuscript copy is consulted and in some cases can clarify Arroyo's intended spellings, as in the two examples above.

In other cases, however, the print spelling is questionable but the handwritten document is simply not legible enough to determine with certainty what letter was intended. When the print version is suspect but the handwritten version is illegible, the

[10] Based on morphology and comparison to other sources, especially Harrington (1922, 1929-30).

original spelling field for a database entry is a best guess, and a notation is made that the entry is illegible. An example of such an entry is shown in (14):

(14)

Arroyo (manuscript)	Arroyo (print)	Reconstructed form	Arroyo utterance no.
	ottengone	?	1862:330

In this case, the print form 'ottengone' does not look like any Mutsun word attested in any other entry in the database; however, Arroyo's handwritten form is so difficult to read that it cannot be determined with any certainty whether the form is 'ottengone', 'ottenogne', 'ottngone', 'ottnogne', etc.

2.1.1.4 Lack of context

Finally, a problem of discourse and semantics arises because Arroyo organized the (1862) *Vocabulary* alphabetically by the first letter (according to his orthographic conventions) of the first word of each utterance. Since his original field notes did not survive, and he did not retain information regarding the original order of the utterances he recorded, any contextual information which might have helped to resolve the meaning or usage of questionable phrases and sentences is lost (cf. Warner, et al. 2006:259). Especially in cases where Arroyo is the only source of a word, or in which glosses of a word vary among recorded utterances, this type of contextual information would be very

valuable in reconstructing meanings. Two examples of such problematic entries are given in (15).

(15) a. *Aii* *tomome.* [Ar 53]
haayi *tomo-me!*
come.IMP ??=2.SG
Ven, te hago pedazos con los dientes.
'Come, I'll tear you to pieces with my teeth!'

b. *Ara ca* *ianunis.* [Ar 10]
ara-ka *yanunis.*
then=1.SG hurt.in.belly-INRF-RPST
Y despues me dolió el vientre.
'And later my belly hurt.'

(15a) is the only example from any source of a stem resembling *tomo*, and because whatever utterances originally preceded this one are impossible to identify, there is no way to know if the stem actually means 'to tear to pieces with the teeth' or simply 'to tear to pieces', with 'teeth' perhaps being referred to explicitly in an earlier utterance. Another problem with this reconstruction is that, if *-me* is in fact the 2nd person singular enclitic, it is nominative case (accusative would be *-mes*), suggesting that 'you' is the subject of the sentence, rather than the object. In (15b), all morphemes other than *yanu* are frequent and well understood from other attestations in both Arroyo and other sources. However, it is unclear whether 'belly' is a restriction on the kind of pain denoted by the verb *yanu*, or whether perhaps the belly is referred to explicitly in a separate utterance, and *yanu* simply means 'to hurt'. (Later utterances in both Arroyo [1862:1064] and Harrington [1922, 1929-30:42/0167] conflict with respect to the semantics of this

verb.) In such cases, once the corpus has been searched for other instances of a form, there is little that can be done other than to take Arroyo's glosses literally and note any questions that remain.

2.1.1.5 General rules for interpreting Arroyo

As a rule of thumb, Arroyo's phonological forms are compared with Harrington's when possible (see Section 2.1.3 for a discussion of Harrington's superior transcription). When the two authors give similar forms but disagree on some phonological or orthographic point such as consonant/vowel length, etc., Harrington's version is usually used as a "main" (standard) form, and Arroyo's version is treated as a variant form. Lexical items that only appear in Arroyo's data may be treated as main forms (especially if there is no other attested Mutsun word with the given meaning, suggesting a form that fell out of use or was missed by later scholars); or as variant forms, as with the example (6c) *inanme* for 'to rain', which is substantially phonologically different from, and much less frequent than, the main form *amne*. When examples are cited from Arroyo in this dissertation, questions of phonological accuracy, semantics, and usage will be addressed as they relate to the larger topic being discussed, and in particular when an analysis hinges on the interpretation or accuracy of the data.

2.1.2 Merriam

A smaller primary source of Mutsun language data is a word list compiled by the naturalist C. Hart Merriam (1902). Merriam's data are less extensive than Arroyo's, and much less so than the (1922, 1929-30) field notes Harrington later compiled; but Merriam elicited many terms for specific plant and animal species, baskets, tools and other important natural or cultural phenomena sometimes missed or imprecisely glossed by Arroyo and Harrington (cf. Warner, et al. 2006:259). Merriam's handwriting is extremely clear and easy to read, and the main problem with his data is that he uses English-based spelling conventions to represent Mutsun sounds, with the inevitable result that there is often a many-to-one or many-to-many relationship between Merriam's spelling and Mutsun standard orthography. This results in a significant degree of phonological uncertainty in interpreting his data; and this uncertainty is compounded by the fact that Merriam evidently did not have a particularly good ear for Mutsun, as evidenced by forms containing "extra" syllables that conflict with both Mutsun phonotactics and other authors' records, differences in vowel quality for words well attested by other authors, and inconsistencies among multiple tokens of the same word (see Berman 2002:428 and Warner, et al. 2006:259, 263-264 for discussions of Merriam's transcriptional inadequacies).

A few Mutsun words elicited by Merriam, together with his original spellings, are given in (16) to illustrate some of his more typical spelling conventions.

(16) **Sample Merriam transcriptions**

Standard orthography	**Merriam spelling**	**English gloss**	**Merriam utterance(s)**
1.*mukurma*	*moo-koo'-rā-mah*	'woman'	74a, 1-13
2.*haay*	*hi*	'mouth'	74a, 1-40
3.*koro*	*kor-do*	'foot'	74a, 2
4.*pitan*	*pe-ton*	'chief'	74a, 2-23

In (2), "oo" represents the phoneme /u/ as in English words such as 'fool'; "ā" stands for /e/ as in 'pay' (cf. Warner, et al. 2006:264); and "ah" represents the vowel /a/ in an open syllable. Thus, Merriam's transcription can be converted to Mutsun orthography as *mukurema*, which is very close to the form attested frequently elsewhere as *mukurma* (*mukurema* is treated as a variant of the main form *mukurma*). In (2), the letter "i" in an open syllable is Merriam's way of representing the diphthong /aj/, yielding the standard orthography equivalent *hay* for 'mouth', a pronunciation which is well attested in data from other sources. In (3), Merriam's intervocalic "r-d" appears to represent the voiced alveolar tap /r/ (IPA /ɾ/), based on correlations with other sources for several words, and on the fact that Mutsun has no phoneme /d/ in native words. Interpreting "r-d" as /r/ yields the spelling *koro* in Mutsun orthography, which is consistent with Arroyo and Harrington's records. Finally, (4) exemplifies two more transcription conventions of Merriam's: "e" in an open syllable for the high vowel /i/ (as in the English word 'me'; Warner, et al. 2006:263-264), and "o" in a closed syllable for /a/ (as in English 'pot'),

giving a reading of *pitan* for 'chief', which is again corroborated by other archival sources.

A rough guide to converting Merriam's spelling to Mutsun standard orthography is given in Appendix E; however, a case-by-case evaluation is often required because of the lack of a one-to-one spelling correspondence, Merriam's inconsistent use of his own spelling conventions, and his very imprecise interpretation of non-English sounds. When a Merriam form used in this dissertation is in doubt, the specific questions arising from his orthography are discussed.

2.1.3 Harrington

The linguist J.P. Harrington was the last scholar to work with a living Mutsun speaker (Ascensión Solórsano de Cervantes), and thus the data he recorded presumably reflect a considerable degree of language attrition; yet his work is both the most voluminous and the most phonologically accurate record of the language. Because of this, his data are considered more reliable when the phonological form of a word is in question, and are given preference over the other two major primary sources of data (Arroyo 1862 and Merriam 1902), which were discussed in the previous sections (2.1.1-2.1.2).[11]

In 1922 and 1929-30, Harrington wrote several thousand pages of field notes based on interviews with Mrs. Cervantes before her death (Harrington 1922, 1929-30).

[11] Harrington's forms were generally preferred by Warner, Butler *et al.* in organizing the lexicon portion of the Mutsun database; and are usually relied on as being more accurate in the analyses in this dissertation; see below for further discussion of Harrington's accuracy.

Harrington's data include re-elicitations of Arroyo's (1862) *Vocabulary* corpus and part of his (1861) grammar, as well as of several smaller sources; and extensive additional information volunteered by Mrs. Cervantes. Harrington's transcription is considered to be very accurate phonetically (cf. Warner, et al. 2006:260): Callaghan (1975) notes that his transcriptions of Karuk, an indigenous language still spoken in far Northern California, are consistent with modern audio recordings of the language; and as that, as a French and German tutor and translator of Russian, he was praised by colleagues for his excellent pronunciation. My own research in Wiyot (a dormant Algic language indigenous to a stretch of coast around Humboldt Bay in Northern California), confirms that Harrington's transcriptions of Wiyot from the 1940s are consistent not only with the transcriptions of other linguists (principally the 1922 field notes of Gladys Reichard and the ca. 1965 file slips of Karl Teeter); but also with audio recorded by Teeter (1989, 1994, and undated) of two of the last known fluent Wiyot speakers: Harrington faithfully records phonological contrasts such as aspirated vs. unaspirated stop consonants and phonemic glottal stop in consonant clusters (detail which was ignored or undetected by many late 19th and early 20th century documenters); as well as phonetic detail such as (non-contrastive) variability of vowel height in the mid-high rounded vowel (/o/~/u/) and intonational vowel and consonant lengthening, which were also documented and commented on by Reichard and Teeter, and are evident in the audio recordings.

Harrington went to great pains to document phonologically important features of Mutsun such as stress, palatalization, and vowel and consonant length; as well as

phonetic detail including (non-phonemic) aspiration and variations in the acoustic qualities of /s/. Below, I discuss the important points regarding Harrington's treatment of phonological characteristics of Mutsun.

Harrington attempted to document stress in Mutsun words, and was the only scholar to do so with any consistency (Arroyo [1862] indicates stress in only 73 of 3074 text entries, and Merriam [1902] in only 532 of 2994 entries). However, Harrington appears to have conflated a wide range of prosodic and intonational influences on vowel sounds, including but not limited to stress, using a wide range of probably inconsistent diacritics to denote phonetic-level prosody, likely reflecting any combination of pitch, duration, and amplitude. In (17), Harrington indicates initial-syllable stress in (17a), final-syllable stress in (17b), and both initial and final stress in the same word in (17c).

(17) a. *háysa* *'ámma* *yűkise* [Ha 41/0159]
haysa *amma* *yuukis-e*
3.PL eat acorn-ACC
'they eat acorns'

b. *hotrwéy* *'ammán* [Ha 41/0157]
hoTwe-y *amma-n*
serve-IMP eat-NMLZ
'serve the food!'

c. *trákkarpúy* [Ha 41/0364]
Tawra-pu-y
sit-REFL-IMP
'Sit down!'

Although Okrand (1977), examining a portion of the Harrington field notes, generalized that stress in Mutsun falls on the initial syllable of all but one category of stem (in which stress falls on the second syllable), his analysis is problematic for the reasons discussed in Section 1.3.3. Because of the significant uncertainties presented by the data, I do not consider the role of stress in Mutsun metathesis.

Unlike Arroyo and Merriam, Harrington clearly distinguishes between phonemically palatalized consonants and consonant + palatal clusters, in particular /tY/ (IPA /tʲ/) vs. /ty/, /N/ (IPA /nʲ/) vs. /ny/, and /L/ (IPA /lʲ/) vs. /ly/. This can be seen in Harrington's careful transcription, in which palatalization is represented by a superscript “y”, while consonant + palatal glide clusters are written “C.y”, with the period indicating separate segments. In the table below, these transcription differences can be clearly seen by comparing Harrington's transcription of consonant + palatal clusters in (18) vs. palatalized consonants in (19).

(18) **Consonant + y**

a. s̲ʸot.yohte [Ha 42/0251]
Sotyohte
'hair is tied in a ponytail'
"[y] starts new syl[lable]."

b. pul.yas̲ʸte [Ha 41/0494]
pulyaSte
'curly'
"[l.y] not mere lʸ."

c. humun.ya [Ha 39/0228]
humunya
'hummingbird'
"Not nʸ."

(19) **Palatalized consonant**

a. trattʸisum [Ha 41/0155]
TattYisum
'with a bone'

b. pit.lʸán [Ha 42/0841]
pitLan
'dirt dug up by gopher'
"A good example of lʸ."

c. *aNNistak* [Ha 41/0315]
'in another place'
ʾánnʸis̲tak

The notes accompanying several of these entries further clarify the distinction between consonant + palatal glide clusters and palatalized consonants. For the C+y

clusters, Harrington noted syllable boundaries in some cases (18a) or explicitly contrasted a cluster with a similar palatalized consonant, as in (18b-18c).

Consonant and vowel length, both carefully recorded by Harrington, are phonologically and morphologically significant in Mutsun: forms such as ***raakat*** (long vowel) and ***maTTer*** (long consonant) are preferred over ****rakat*** and ****maTer*** because of a tendency toward heavy penultimate syllables (see Section 3.4.2.1 for discussion and data); and vowel length sometimes distinguishes pairs of morphemes, such as the free and enclitic forms of the third person pronoun (respectively ***waak*** and ***=wak***) and the related verb stems ***nooto*** 'to hit repeatedly' and ***notto*** 'to hit once'. Length is largely ignored by Arroyo and Merriam (Callaghan 1975:183 observes that most of Harrington's contemporaries ignored length when documenting languages), making Harrington's notes particularly valuable for reconstructing Mutsun phonology. Harrington uses macrons to indicate long vowels, and underlined (1922) or double (1929-30) consonants to indicate geminate consonants.

(20) a. mehēti — Ha 41/0381
meheeti
'to keep looking'

b. pīna — Ha 41/0477
piina
'that'

c. tcōre’s^{y}a — Ha 41/0467
coore'Sa
'alone'

d. ’amma — Ha 42/0235
amma
'to eat'

e. rúk̲á (1922), rukka (1929) — Ha 38/0241
rukka
'house'

f. tap̲ur (1922), tappur (1929) — Ha 38/0342
tappur
'wood'

In addition to the detail found in the transcription itself, Harrington's efforts to record Mutsun words with the greatest possible precision is evident in the notes which accompany many of his entries. He comments on segment length where it is in question (21a-21d), including the lexical significance of length in related morpheme pairs, as in (21d). His notes also disambiguate similar phonemes, such as the affricate /c/ vs. the (apparently noisy and easily misinterpreted) retroflex /T/ (21e) or the alveolar vs. alveopalatal fricatives /s/ and /S/ (21f).

(21) a. *hapaapaT* — Ha 41/0373
"[a] long, clearly heard forever."

b. *amSi* — Ha 41/0502
"short, not i¯ at all."

c. *raakatte* — Ha 41/0645
"[tt] double, ch. [clearly heard] for good."

d. *maasay* — Ha 41/0367
"But mássay when the object is singular."

e. *ayrac* Ha 41/0360
"[c] not tr"

f. *henseksi* Ha 41/0494
"[I] convince myself after 10 hearings, and she is in bright condition, that it is s̲ʸ * not s̬. [A]dopt this forever."

One of the strengths of Harrington's data is that he frequently elicited the same item multiple times in order to be certain of its pronunciation, as indicated in (21f). On the other hand, nearly all of his data is from a single speaker, and it is almost certain that the language she recalled had undergone considerable attrition since Arroyo's time (Warner, et al. 2006:265). Comments such as, "..inf[ormant] does not remember well and is not sure…" (Harrington 1922, 1929-30:38/0302); "[Mrs. Cervantes s]ays she does not get this sentence exactly right" (Harrington 1922, 1929-30:38/0412) illustrate the difficulty Mrs. Cervantes sometimes had remembering nuances of her first language. Nonetheless, Harrington considered her an excellent and highly reliable source (Okrand 1977:5, quoting Clarke 1930); and his notes indicate that she often volunteered words and phrases that he had not asked for, corrected apparent mistakes in Arroyo's Vocabulario and ungrammatical forms suggested by Harrington, and was consistent in her pronunciations even over spans of months or years.

A guide to Harrington's transcription system is provided in Appendix F.

2.1.4 Secondary sources: Mason and Okrand

In addition to the primary sources, two secondary works deserve mention. In 1916, J. Alden Mason published a Mutsun-English dictionary based on Arroyo's (1862) materials (which were written in Spanish). Six decades later, Okrand (1977) wrote an excellent comprehensive grammar of the language, based on an unknown portion of the original Harrington (1922, 1929-30) notes, which at the time had not yet been catalogued or published. Okrand (1977:7) estimated that he had access to about 3% of Harrington's Mutsun field notes, but comparison of Okrand with the complete set of Harrington's surviving Mutsun data suggest that the actual figure may be higher. Many lexical items were first entered in the lexicon portion of the Mutsun database when the Mason and Okrand documents were digitized; with a few exceptions, these lexical items have since been found in the primary source data, but source attributions to Mason and Okrand are retained in addition to the primary sources. Mason and Okrand were not used as part of the text corpus, however, since doing so would simply duplicate primary source entries. Mason's main contributions are his word-level analysis of Mutsun, which Arroyo glossed only at the sentence level, and his translation of Arroyo's Spanish glosses (though the latter are not always entirely accurate). Okrand is much more important overall, providing very clear and theory-neutral analyses of Mutsun phonology, morphology, and syntax which are much more well informed than those found in Arroyo's (1861) *Grammar*.

2.2 Database input and analysis methods

The Mutsun language database utilizes Fieldworks Language Explorer ('FLEx') software, developed by the Summer Institute of Linguistics SIL (2012). All words and utterances from Arroyo (1862), the portions of Harrington (1922, 1929-30) containing Mutsun language data elicited from Mrs. Cervantes[12], and Merriam (1902) have been entered into the text database, analyzed for constituent morphemes, and these morphemes entered into a lexical database with glosses, parts of speech, and other relevant information. With the exception of a small portion of Catholic catechisms translated by Arroyo into Mutsun (reproduced in Harrington 1922, 1929-30:reel 57), the majority of the text has been parsed and is reasonably well understood.

2.2.1 Digitizing archival data

The transfer of archival data into the electronic database is now complete. This work was done using Shoebox (SIL 1998), LinguaLinks (SIL 2002) and FLEx (SIL 2012); however, the categories of data which are contained in a text or lexical entry are software-independent. Because the data originates from archival field notes and other pre-existing records of Mutsun, several types of metadata pertaining to the archival source documents are retained along with the language data itself. This ensures that scholars working with the digitized Mutsun corpus have access to the same information

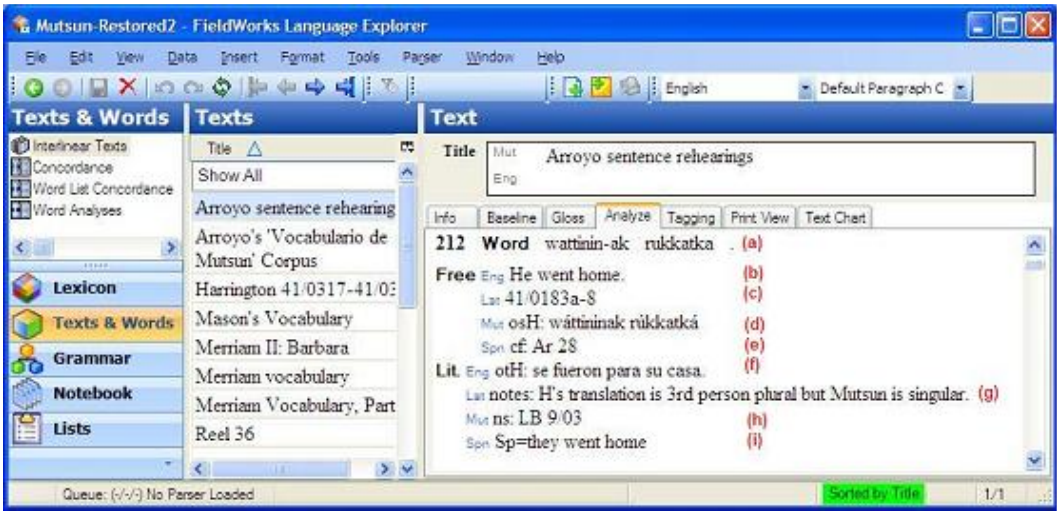
[12] Harrington also elicited a smaller number of Mutsun forms from Isabelle Meadows, a Rumsen speaker, but her data are not included in the database.

contained in the original archival source documents, while also having the advantage of rapid concordance, morphological analysis, and other sophisticated database features.

The database is centered around the text corpus, which is simply a digitized collection of all the Mutsun utterances found in the archival source documents, with metadata attached to each entry. A string of text (word, phrase or sentence) from the original source document is converted to Mutsun standard orthography according to author-specific conventions discussed in the preceding section, and typed in as baseline text. Associated metadata is then entered into several fields associated with each text entry.

A sample text entry (before parsing) is shown in (22) as it appears in FLEx, with red letters to the right of each line corresponding to several categories of metadata which are described below the example.

(22)



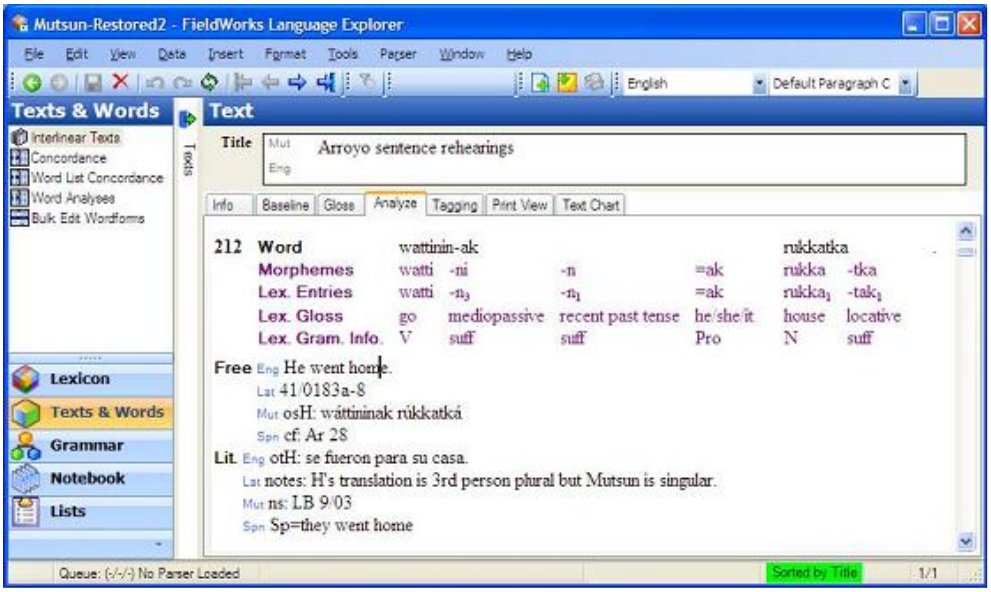
The entry above is from reel 41, frame 183 of Harrington (1922, 1929-30), indicated in line (c), and is part of a re-elicitation of the 28th utterance recorded in Arroyo (1862), which is cross-referenced in (e). Harrington's original spelling, shown in (d), has been converted to Mutsun standard orthography (a) according to the conventions detailed in Appendix F. Harrington's Spanish translation (f), which is translated to English in (i), does not quite match the Mutsun morphology, as noted in (g); thus the free translation in (b) has been corrected to agree with the Mutsun. Retaining metadata in this way allows a researcher to locate an entry in its archival source document if needed and to reach his/her own conclusions about the data, whether or not these agree with our own analyses.

2.2.2 Parsing a text entry

Parsing a text entry is a straightforward process when the utterance contains previously well-attested and well-understood morphemes. On the other hand, it can become quite difficult and require comparison with other entries and repeated revisions when low-frequency morphemes or variant forms are involved, or when the gloss given in the original source document appears to conflict with the Mutsun. In the most difficult cases (a small fraction of utterances), a satisfactory parse may never be achieved. In this section, examples will be given of parsing a transparent text entry versus one that is more uncertain.

In (23), morpheme-by-morpheme lexical and gloss fields are displayed as they appear in FLEx. This is an example of an entry whose constituent morphemes are well understood, making parsing easy.

(23) **Parsing an 'easy' entry**



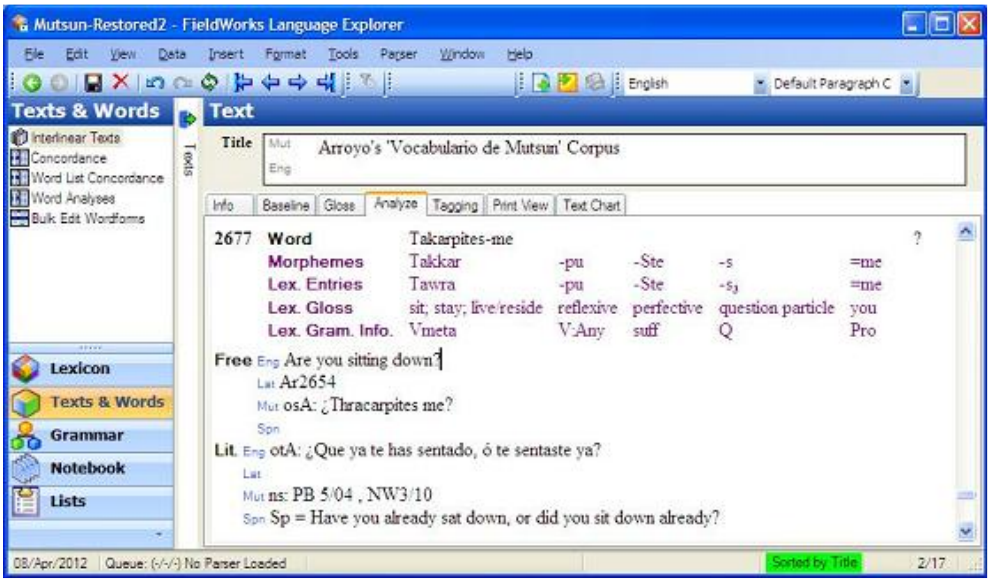
In this (23), all of the constituent morphemes are well attested in several of the original sources. The verb stem ***watti*** (also attested occasionally as ***wati***) occurs more than 250 times throughout the data, glossed consistently as 'to go'; the suffixes ***-ni***[13], ***-n***, and ***-tka/-tak***, as well as the enclitic pronoun ***=ak***, occur hundreds of times each, and their respective grammatical functions are clear from glosses and descriptions in Harrington (1922, 1929-30) and Okrand (1977); and ***rukka*** (sometimes recorded as ***ruka***) occurs more than 100 times, always glossed as 'house'. Each of these morphemes and

[13] The term 'mediopassive', which is used by Okrand (1977), refers to what current syntacticians call the inherent reflexive.

glosses is assigned manually by selecting from the lexicon, if it has been previously entered there. (When a lexical entry contains a previously unattested morpheme, but the context and/or gloss in the original source make its meaning clear, the new morpheme is entered into the lexical database and the text entry is then parsed in the same way.)

A more difficult entry to parse is shown in (24).

(24)



This entry is more complicated than the entry illustrated in (23) for several reasons. This is the only attestation of a string like *Takarpites*, or even *Takarpi-* or *Takarpite-*. A first pass, based on a comparison of the Mutsun string and Arroyo's original gloss, yields *-me* 'you' (based on independent evidence and the use of second-person singular in the gloss) and *Takar-* as something related to 'to sit' or 'chair', based on entries such as *Takkarpu* 'to sit (oneself) down' and *Taawar* 'chair' [14]. There are three

[14] k/w alternations reflect a historical labiovelar consonant *k^{w} (Callaghan 1992:41, Okrand 1977:124-125).

well-attested suffixes *-s* in Mutsun: the question particle, the remote past tense inflection, and a nominalizer. Based on other attestations of *-s* and the absence of the free question particle *moT* in this entry, combined with Arroyo's gloss in question form, it is reasonable to assume that this *-s* is the question particle rather than either of the other choices. Furthermore, the question particle suffix *-s* is relatively common in Arroyo but rare in the later sources, suggesting it underwent attrition.

This leaves the string *-pite*, which does not correspond to any known morpheme. Arroyo does often transcribe a suffix *-pi* which appears to be an older alternant of the reflexive *-pu*; but the only known morpheme *-te* is a verbalizer, which attaches to noun stems and certainly could not follow the verbal reflexive suffix. On the other hand, there is a perfective suffix *-Ste* (with a known variant *-hte*) that is well attested throughout all of the original source texts, and which is semantically consistent with Arroyo's gloss of this string. It is therefore plausible that Arroyo's *-te* in this entry can be taken as another variant pronunciation of *-Ste*.

Returning to the stem *Takar-*, entries such as *Takkarpuy* 'sit down!' Harrington (1922, 1929-30:38/0322, 38/0326, 38/0510, 41/0312, 41/0364); *Takkarpuhte-ka* 'I am sitting down' Harrington (1922, 1929-30:38/0322); and *Tawra-ka* 'I'm sitting' Harrington (1922, 1929-30:38/0322) support a verb stem which surfaces as *Takkar-* with the reflexive suffix and *Tawra* in its absence. This is consistent with a well-described pattern of certain lexically specified verb stems surfacing consonant-finally before the reflexive and reciprocal suffixes and vowel-finally elsewhere (cf. Okrand 1977:224-228 and

detailed discussion in Section 3.2). Arroyo is known to frequently ignore vowel and consonant length, so it is probably not significant that he records the stem as *Takar-* rather than *Takkar-* as in Harrington.

This parse, then, treats *Takar-*, *-pi*, and *-te* as variant spellings/pronunciations of *Takkar-*, *-pu*, and *-Ste* respectively, while *-s* and *-me* are evident based on context. This parse can be glossed as 'Are you sitting down?', and is reasonably consistent with the gloss given by Arroyo (though that alone is not a sufficient basis for a parse). If conflicting evidence should turn up in a later entry, this parse would be re-evaluated; otherwise, it is considered the best-supported reconstruction of the string *Takarpites-me*.

2.2.3 Creating a lexical entry

Lexical entries (entries in the lexicon portion of the database) are morphemes extracted from the text corpus as part of the parsing process discussed above; the exception to this is when a new word is created by the community for a modern concept for which no Mutsun word is recorded, in which case a new lexical entry is added to the lexicon without reference to the text corpus. While the process of adding neologisms to the language will continue indefinitely, the lexicon as derived from archival sources is complete and in the final stages of editing for publication as a Mutsun-English/English-Mutsun dictionary. The major types of information contained in a lexical entry are the following:

Morpheme form:	The main or standard phonological form of a morpheme, as best can be determined
Lexical category:	Verb, noun, etc.
Morpheme type:	Root, suffix, etc.
Variants:	Non-standard forms (if any)
Gloss(es):	English glosses as determined by comparing documenters' glosses, morphological evidence, etc.
Examples:	Utterances from the text corpus which contain the lexical item
Allomorphs (if any):	Obligatory suffixes, semantic restrictions, etc.
Usage notes:	Obligatory suffixes, semantic restrictions, etc.

Lexical entries in the database are divided into main forms (forms reflecting what we believe to have been the typical pronunciation of a morpheme) and variant forms (forms reflecting what we believe to be questionable transcription, dialectal variation or idiosyncratic, atypical pronunciations). There are two reasons for attempting to reconstruct main forms and separate them from variant forms. First, it is desirable to give prospective Mutsun language learners a consistent pronunciation of each morpheme: telling them that the noun 'north' can be pronounced as any of *akkas*, *a'was* or *awar* only requires the learner to memorize more forms, with no principled reason for their differences. Second, main forms reflect what we believe to be the most accurate

reconstruction of a morpheme: they are typically based on a greater number of examples or more compelling evidence than variant forms, making linguistic analysis more likely to be historically accurate.

Generally speaking, Harrington's transcriptions are more trusted than other sources because of his training in linguistics, his precise phonetic notation, repetitive elicitation and highly consistent transcriptions, and his reputation as an extremely accurate phonetician (as discussed in Section 2.1.3 above). In (25), all attested instances of the unsuffixed[15] stem meaning 'north' are listed in their original transcription (first line) and conversion to Mutsun orthography (second line).

(25) **Distinguishing between main forms and variant forms: 'north'**

a. ak-kas [Me 74a, 78c]
akkas

b. ʾákkaṣ, ʾákkás [Ha 41/0364, 58/0147]
akkas

c. ʾáʾwáṣ [Ha 41/0364]
a'was

d. aguar [Ar 251]
awar

In this case, several factors combine to make ***akkas*** the most likely reconstruction of the main form for 'north'. First, two of three sources (Merriam and Harrington) agree

[15] The stem is also attested several times with suffixes, but only by Harrington and always as ***akkas*** (identical to one of the unsuffixed forms in the example); therefore, these items are not included in the current example.

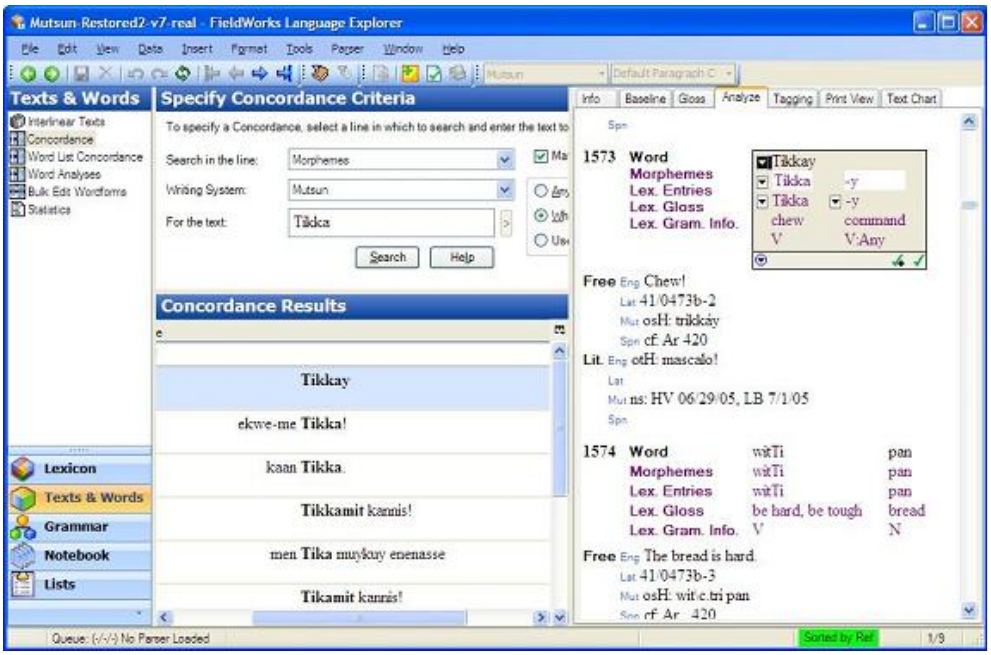
on the transcription (putting aside phonetic and suprasegmental details and transcription conventions). Second, Harrington gets this pronunciation several times, with ***a'was*** given only once; and in his notes for this entry, he writes, " ʾakkaṣ̯ = ʾáʾwáṣ̯… Clearly heard forever" Harrington (1922, 1929-30:41/0364), indicating a high level of confidence in his transcription and suggesting that ***a'was*** is an interchangeable but less typical form of the word. Arroyo's single attestation of 'north' becomes slightly less divergent when the handwritten manuscript (Arroyo 1862) is consulted. Here, it becomes clear that the final "r" in the published version was a typesetting error, and was intended instead as an "s", suggesting a form ***awas*** (Spanish spelling conventions and other Arroyo entries support "gu" as equivalent to "w"). This is very close to Harrington's ***a'was***, and the lack of a glottal stop may or may not be significant, since the only fairly reliable indication of a glottal stop in Arroyo's data is an intervocalic letter "h"; in other environments where other sources have a glottal stop, Arroyo rarely represents it in his spelling.

Based on all of the above considerations, we construct a main form lexical entry ***akkas*** 'north' and two variant forms ***a'was*** and ***awas***. Variant forms are listed after the main form dictionary headword, but are not listed as separate dictionary entries (though they will be made available to the community if needed). Within the database, they are cross-referenced to the corresponding main form. If evidence is later found which suggests that a main or variant form is incorrect, the lexical entry is edited and occurrences of the relevant forms are re-parsed in the text database to reflect the updated information.

2.2.4 Checking our work: concordances

Digitization of the Mutsun corpus allows researchers to run concordances on a given word, morpheme, translation, or in fact any information contained in any database field, yielding comprehensive data that are extremely difficult and time-consuming to extract from the handwritten and manuscript (non-digitized) data. This back-checking is crucial for ensuring that no attested usage of a particular item has been overlooked in creating that item's lexical entry; for comparing different archival sources' information about a lexical item or determining that the item is attested in only one source; and for deciding which pronunciation of a lexical item is most likely to be the main form and which are probably variants. (26) shows the results of a concordance for all strings parsed as the morpheme *Tikka*:

(26)



The lower left pane shows the concordance results: nine utterances in the corpus contain the morpheme *Tikka* (both the canonical geminate stem *Tikka* and variant light stem form *Tika*), which is glossed by all documenters as 'to chew', and which morphological context (principally the verbal suffixes *-y* 'imperative', *-mi* 'benefactive', *-t* '1.obj imperative') show to be a verb stem. The right hand pane shows the full text entry for the highlighted utterance, *Tikkay*; all nine search results can be examined in the same way. This concordance demonstrates that *Tikka* can be used in bare form (it does not require, for example, the inherent reflexive suffix *-n/-ni* as do some intransitive verbs); it is also attested with the imperative suffix *-y* and the benefactive *-mi* + first person imperative object *-t* (yielding the gloss 'chew it for me').

2.3 Summary

This chapter has described the strengths and weaknesses of the archival records of Mutsun, as well as the methods used to digitize those records, in order to establish how data for this dissertation is searched, retrieved, and analyzed. By carefully recording details of the original archival documentation with each text entry in the database, and by comparing every attested instance of a form in order to deduce its most likely pronunciation and usage, it is possible to reconstruct much of the language with a considerable degree of accuracy. Throughout this dissertation, example morphemes, words, and utterances are given in the canonical forms arrived at through the comparative analysis described above, with discussion of any variability or uncertainty in the data (for

example, variable recordings of vowel or consonant length) where it affects a proposed analysis.

CHAPTER 3

THREE METATHESIS PARADIGMS IN MUTSUN

In this chapter, I provide data and analysis of three metathesis paradigms in Mutsun, and argue that unlike better-known patterns of phonologically and phonetically motivated metathesis in other languages, all types of metathesis in Mutsun are prosodically driven. I will show that the two types of stem-internal metathesis (stem-deriving and reflexive) resemble reduplication and templatic morphology in their prosodic behavior, and do not resemble more typical patterns of synchronic metathesis, which are often driven by phonological (but not prosodic) constraints such as positional restrictions on particular segment types. Like languages with better-known templatic morphology, such as Arabic, Mutsun has a number of strict prosodic templates which correspond with varying degrees of regularity (depending on the template) to specific lexical categories: in Mutsun, those categories are noun and verb, and I will show that a single template strongly associated with verbs drives all instances of stem metathesis. Mutsun stem metathesis, like reduplication in other languages, derives a set of prosodically uniform morphemes (in this case, verb stems) from a prosodically variable set of input morphemes (in this case, noun stems and reflexive or reciprocal verb stems). Suffix metathesis, the third metathesis type in Mutsun, is motivated by a separate (though overlapping) prosodic preference for heavy penultimate syllables at the word level.

All three metathesis paradigms in Mutsun involve metathesis of an adjacent consonant and vowel (CV metathesis).[1] In each instance, metathesis occurs near the right edge of a stem: both stem-deriving metathesis and reflexive metathesis alter the order of the rightmost two segments of a stem, while suffix metathesis reverses the order of segments in two suffixes and a clitic.[2] The three types of metathesis are illustrated in 25 (reproduced from Section 1.2)

[1] The exception to this is *-mak/-kma*, in which the string C_1VC_2 metathesizes not to C_1C_2V (as expected), but rather to C_2C_1V. An explanation for this additional complication is given in Section 3.4.1.

[2] Metathesizing suffixes in some cases occur after a stem+suffix, as in *hakkispismak* 'diapers' (*hakki* 'to wrap around, to diaper' + *-spis* 'nominalizer' → *hakkispis* 'a diaper') and *horkostak* 'in the throat' (*horko* 'to swallow' + *-s* 'agent nominalizer' → *horkos* 'throat'); in these cases, the preceding derived form is treated as a stem.

Table 25. Three metathesis paradigms

Stem-deriving metathesis:	
$[..VC]_{noun}$	~ $[..CV]_{verb}$
aSit	~ *aSti*
'California jay'	'to catch California jays'
Reflexive metathesis:	
$[..VC]_{stem}$-REFL/-RECP	~ $[..CV]_{stem}$
hiTor + *pu*	~ *hiTro*
'to stretch/pull/drag oneself'	'to stretch, to pull, to drag'
wayas + *mu*	~ *waysa*
'to be enemies to each other'	'to be an enemy'
Suffix metathesis:	
$[..C]_{stem}$-C**V**C/ =C**V**C...	~ $[..V]_{stem}$-C**C**V/ =C**C**V...
tiiwis + *tak*	~ *rukka* + *tka*
'in/on/at the flower(s)'	'in/at the house'
tiiwis + *mak*	~ *rukka* + *kma*
'flowers'	'houses'
kaan + *tukne*	~ *ekwe* + *tkun*
'if I...'	'if not'

Superficially, reflexive metathesis and suffix metathesis look much like metathesis attested in other languages, in which adjacent phonological material (the string /pu/ or /mu/ in reflexive metathesis, a consonant or vowel in suffix metathesis) triggers a reversal of segment order.

Stem-deriving metathesis, on the other hand, is very unusual cross-linguistically in that it occurs in the absence of any triggering or conditioning phonological material, and has lexical or morphological significance (Okrand 1979:127). Deeper analysis reveals that all three Mutsun metathesis patterns are conditioned by prosodic restrictions.

We will see that the two types of Mutsun stem-internal metathesis, reflexive metathesis and stem-deriving metathesis, are both motivated by a prosodic template specific to verb stems which is disyllabic, vowel-final, and contains a medial consonant cluster. This template, which I refer to as the vowel-final cluster stem template (borrowing Callaghan's [1992:39] terminology), accounts for 40% of all verb stems in Mutsun, far more than any other single prosodic template. Reflexive and stem-deriving metathesis differ, however, in their conditioning environments: reflexive metathesis is conditioned by the presence or absence of the reflexive or reciprocal stem, while stem-deriving metathesis is conditioned by lexical category rather than by any surrounding phonology. The third category of metathesis in Mutsun, suffix metathesis, differs from both types of stem metathesis in that it is *conditioned* by the category (vowel or consonant) of an immediately preceding segment, but *motivated* by prosody: specifically, by a strong preference for heavy penultimate syllables at the word level.

Sections 3.1-3.4 provide detailed data for each of the three patterns of synchronic metathesis in Mutsun, with careful analyses of the relevant phonological and morphological factors at play in each type of metathesis. In Section 3.1, I demonstrate that stem-deriving metathesis in Mutsun is a process which derives novel verb stems

conforming to a single prosodic stem template from more prosodically variable noun stems; and I compare the behavior of metathesizing stems to templatic phenomena in Semitic languages and reduplicating languages. In Section 3.2 I describe reflexive metathesis, and argue that it is the lexicalized residue of a historical process that derived vowel-final verb stems from consonant-final verb stems following the same templatic restrictions that rule (synchronic) stem-deriving metathesis. In Section 3.4.1 I examine the previously accepted analysis of Mutsun suffix metathesis as consonant cluster avoidance (Mason 1916:405, 409-10; Okrand 1979:128-129, fn. 17), and conclude that it is based on flawed assumptions about the underlying form of the affected suffixes. I propose an alternative analysis in Section 3.4.2 in which suffix metathesis functions as a repair strategy for dispreferred light penultimate syllables created by suffixation (and, occasionally, cliticization), an idea first suggested by Hume (1998b) and supported here with evidence from several areas of Mutsun morphophonology.

3.1 Stem-deriving metathesis

In this section, I describe a pattern of stem-internal CV metathesis in Mutsun, which I call “stem-deriving metathesis”. The data show that stem-deriving metathesis operates independently of phonological environment, and therefore cannot be considered a type of phonological metathesis in the usual sense. In fact, the only apparent function of stem-deriving metathesis is to distinguish verb stems from noun stems; thus, this type of metathesis falls into the category of "grammatical" (rather than phonological) metathesis

(as discussed by Thompson and Thompson 1969, Okrand 1979), though I will argue that phonological pressure in the form of highly specific prosodic restrictions is the underlying motivation for metathesis. I present evidence that stem-deriving metathesis derives verb stems from noun stems in Mutsun (though diachronically, derivation was likely bidirectional at an earlier stage of the language, as I discuss in Section 4.2.2), while preserving a strictly limited repertoire of prosodic verb stem templates.

3.1.1 Description of stem-deriving metathesis

Most stems in Mutsun are clearly either a noun or a verb (e.g. *koro* 'foot/leg' is a noun with no obvious related verb stem, and *mehe* 'to see' is a verb with no obviously related noun stem). There are both nominalizing suffixes and verbalizing suffixes that allow one to derive verbs from nouns and vice versa: *ocko* 'to be deaf' → *ockoSmin* 'deaf one', *sitnun* 'child' → *sitnunte* 'to have children'. There are pairs of cognate noun/verb stems (without suffixes) as well, but they account for only a fraction of the lexicon, at just over 200 stem pairs.[3] The largest set of related noun-verb stem pairs, comprising 194 pairs,[4] consists of stems which participate in what I have termed "stem-deriving metathesis". In stem-deriving metathesis, certain noun stems of varying prosodic shapes--

[3] In addition to the 194 metathesizing stem pairs, 10 pairs consisting of a "long stem" noun and an apparently related "geminate stem" or "light stem" verb have been identified. An example pair is *miiTe* 'size' ~ *miTTe* 'to grow (up)'; all such pairs can be found among the minimal and near-minimal pairs listed in Appendix B.

[4] Two pairs also alternate with a related adverbial form; an additional metathesizing pair consists of an adverb and verb, with no related noun stem. See AppendixG for a list of all known metathesizing stems/sets.

usually (and minimally) disyllabic and consonant-final, but occasionally trisyllabic--alternate with semantically related verb stems which, crucially, are invariant in their prosodic shape: such verbs are always disyllabic vowel-final cluster stems[5] (Callaghan's [1992:39] terminology; see Section 1.3.4 for an overview of stem shapes in Mutsun). The stem shapes (prosodic templates) which participate in stem-deriving metathesis are schematized below, with examples of attested stems:

Table 26. Stem shapes of metathesizing noun-verb pairs

Noun stems		**Verb stems**	
C-final light stems: $(C_0)VC_1VC_2$		V-final cluster stems: $(C_0)VC_1C_2V$	
aSit	'California jay'	*aSti*	'to catch California jays'
hireh	'woodrat'	*hirhe*	'to hunt woodrats'
C-final long stems: $(C_0)V{:}C_1VC_2$			
tooyoh	'bumblebee, wasp'	*toyho*	'to catch bumblebees/wasps'
uuner	'wild onion'	*unre*	'to gather wild onions'
C-final geminate stems: $(C_0)VC_1{:}VC_2$			
ippih	'rattlesnake'	*iphi*	'to catch rattlesnakes'
maTTer	'tobacco'	*maTre*	'to get high on tobacco; to gather tobacco'

[5] With the single exception of the pair *tiwiitYuk* 'flicker (a type of bird)' ~ *tiwiitYku* 'to catch flickers', which preserves the prosodic and segmental content of the entire trisyllabic noun stem; see Section 3.1.2.1 for discussion of trisyllabic noun stems in stem-deriving metathesis.

Noun stems		**Verb stems**	
Trisyllabic noun stems:			
cicikniS	'small squirrel'	*cicki*	'to hunt small squirrels'
loopotok	'dock (an edible plant)'	*lopto*	'to gather dock'
sokkoci	'laurel tree/fruit'	*sokco*	'to gather laurel fruit'

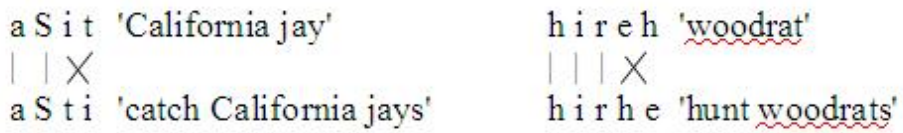
All metathesizing noun stems contain at least two non-initial consonants, which I have labeled "C_1" and "C_2" in the above examples; initial consonants, labeled "C_0", may or may not be present and do not affect metathesis. The minimum stem size which can meet this non-initial 2-consonant requirement is a disyllabic stem with a final consonant: thus, monosyllabic noun stems such as *mas*[6] 'beads', *por* 'flea'; and vowel-final disyllabic noun stems such as *koro* 'leg', *paaya* 'speed', *rukka* 'house' do not metathesize. The only regular disyllabic noun stem shape which never metathesizes is the V-final cluster stem shape (e.g. *siska* 'milkweed'), which is phonologically and prosodically indistinguishable from metathesizing verb stems from metathesizing verbs like *cicki* or *sokco* above.[7]

[6] Harrington was more inconsistent in his notations of vowel length for monosyllabic stems than he was otherwise, and it is likely that vowel length was not distinctive in monosyllabic forms. Okrand (1977) posits that some monosyllabic stems have underlyingly short vowels, while others have underlyingly long vowels; and that the underlying vowel length can be seen only in suffixed monosyllables, since all monosyllabic stems surface with short vowels in unsuffixed form. However, this analysis does not entirely concord with Harrington's data, in which unsuffixed monosyllabic stems with long vowels are attested.

[7] Vowel-final cluster stems which are nouns are very rare, with only 23 attested vs. 894 verb stems of the same shape (if Spanish loanwords such as *wolsa* 'bag' (< *bolsa*) and cluster stems formed by infixation of *-s-* '1.SG.POSS', such as *apsa* 'my father' (from *appa* 'father' + *-s-*) are ignored, the figure is reduced to 11 noun stems). Metathesis of a noun stem like *siska* would yield a C-final verb stem like **sisak*, **siisak*, or **sissak*, all of which are stem shapes much more closely associated with nouns than verbs. I argue later in this section that stem-deriving metathesis is templatic in nature and crucially depends on the association of specific prosodic templates with lexical categories, with the most important of these associations being that of V-final cluster stems and verbal meaning. Since metathesis of V-final cluster

Among metathesizing stems, the prosodically simplest alternation is that between (C-final) light stem nouns and (V-final) verb stems. In these pairs, each segment in the noun stem corresponds precisely to a segment in the verb stem and vice versa, with no alternations in vowel or consonant length; the only phonological difference between the two is in the order of the final two segments, which are ...VC in the noun stem and ...CV in the verb stem.

(27) **Light stem metathesis segment correspondence**



Further examples of metathesizing stem pairs whose noun stems are of the "light" shape are shown below:

(28) **Stem-deriving metathesis (light stems)**

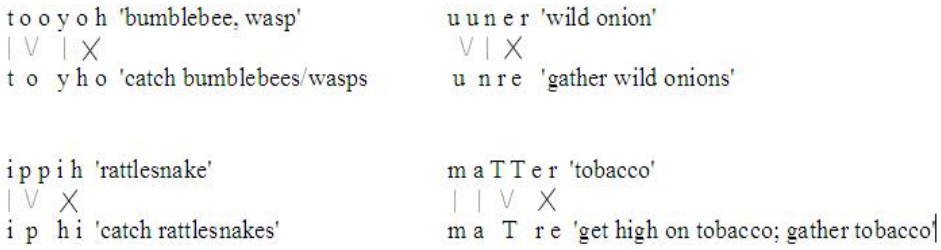
a.	*howos*	'sweet potato'	~	*howso*	'to gather sweet potatoes'
b.	*wacik*	'crack (n.)'	~	*wacki*	'to crack, split'
c.	*warak*	'crying, a cry'	~	*warka*	'to cry'

---

stem nouns would invert this association, such stems are presumably not eligible for metathesis. In fact, the homophonous noun-verb pairs *karka* 'fire drill' ~ *karka* 'to kindle a fire' and *lupyu* 'burden basket' ~ *lupyu* 'to carry on back' suggest that homophony is preferable to metathesis to derive verbs from prosodically "verb-like" noun stems.

In metathesizing pairs whose noun stem is a long stem or geminate stem, a long vowel (in long stems) or geminate consonant (in geminate stems) in the noun stem corresponds to a single segment in the verb stem; otherwise, segmental mapping is identical to that in light stem pairs, with inversion of the stem-final ...VC and ...CV.

(29) **Long & geminate stem metathesis segment correspondence**



Additional examples of stem-deriving metathesis pairs with long stem nouns (30) and geminate nouns (31) are shown below.

(30) **Stem-deriving metathesis (long stem nouns):**

a.	*cuu**tuk***	'fever'	~	*cut**ku***	'to have a fever'
b.	*hee**yes***	'beard'	~	*hey**se***	'to shave'
c.	*roo**kos***	'bulrush'	~	*rok**so***	'to gather bulrush'

(31) **Stem-deriving metathesis (geminate stem nouns):**

a.	*is**sut***	'a dream'	~	*is**tu***	'to dream'
b.	*maTT**er***	'tobacco'	~	*maT**re***	'to get high on tobacco; to gather tobacco'
c.	*wil**lep***	'lightning'	~	*wil**pe***	'to strike/flash (lightning)'

Finally, there is a fourth variation on the type of noun stems which may be affected by stem-deriving metathesis: a few metathesizing noun stems contain additional phonological material to the right of the metathesizing portion of the stem, as shown below.

(32) **Trisyllabic noun stem metathesis segment correspondence**

c i c i k n i S	'small squirrel'	l o o p o t o k	'dock (an edible plant)'
| | | X		| V | X	
c i c k i	'to hunt small squirrels'	l o p t o	'to gather dock'

s o k k o c i	'laurel tree/fruit'
| | V X	
s o k c o	'to gather laurel fruit'

The additional segmental material may align with the beginning of a third syllable, as in /ci.cik.niS/ (in which the entire third syllable /niS/ is outside the bounds of metathesis); or it may constitute only the rhyme of a third syllable, as in /loo.po.tok/ (in which the onset /t/ metathesizes while the rhyme /ok/ does not) and /sok.ko.ci/ (in which the onset consonant /c/ metathesizes while the final vowel /i/ does not).

The additional stem pair examples in (33) further illustrate that metathesis involving trisyllabic noun stems may be tautosyllabic, as in (33a-33d); or heterosyllabic, as in (33e-33f). (In each example, syllable boundaries are marked with a period, and only the segments in bold metathesize).

(33) **Stem-deriving metathesis (trisyllabic noun stems):**

a.	*e.**ley**.min*	'sparrowhawk'	~	*el.**ye***	'to catch sparrowhawks'
b.	*huu.c**ek**.niS*	'dog'	~	*huc.**ke***	'to catch dogs'
c.	*lii.t**uk**.wa*	'angleworm'	~	*lit.**ku***	'to catch angleworms'
d.	*he.m**ec**.'a*	'one'	~	*hem.**ce***	'to do once'
e.	*he.s**ee.l**u*	'small lizard'	~	*hes.**le***	'to catch small lizards'
f.	*hik.k**a.n**i*	'tar (n.)'	~	*hik**na***	'to tar (v.)'

The metathesizing portion (the first two syllables) of the nouns in this group of alternations is not prosodically uniform: it may correspond to a light stem (*hemec-, eley-, heseel-*[8]), a long stem (*huucek-, liituk-*), or a geminate stem (*hikkan-*). In some cases, the "extra" material in these nouns (the phonological material to the right of the metathesizing segments, and which does not appear in the verb form) is a recognizable nominal suffix. Examples include (33a), whose noun form contains the nominal suffix *-min* 'one characterized by'; and (33b), with the nominal suffix *-kniS* 'diminutive' (possibly *-niS* after a /k/-final stem); however, the "stem" portion in these forms (i.e., *eley*, *huucek*) is unattested in bare form. In such cases, it makes sense to treat the portion preceding the suffix as a bound stem which is subject to metathesis. In stems like (33c-e), the phonological material outside the scope of metathesis (*-wa*, *-'a*, *-u*) does not correspond to any known suffix in Mutsun (though *-wa* is found in several words for snakes and worms, possibly indicating an archaic suffix, and *-'a* may be a lexicalized vestige of a Proto-Costanoan suffix of the same form meaning 'one' according to Callaghan

[8] Callaghan includes any stem whose first four segments are (C)VCV as a light stem, with additional material optional; so even if a second-syllable vowel is long as in *heseelu*, the stem still counts as "light".

1988:443). However, structurally these nouns behave identically to bound stems with suffixes, with a disyllabic, C-final portion of each noun (the underlined portion in the above examples) alternating with the disyllabic, V-final verb stem listed to its right. Thus, for the purposes of metathesis, these nouns may be treated as suffixed bound stems even though some of the "suffixes" in question are not actual morphemes.

As mentioned in the introduction to this section, stem-deriving metathesis occurs in affected stems in both bare and suffixed forms, with no identifiable phonological or morphological trigger. For these stems, lexical category (noun vs. verb) is entirely determined by the sequence of the final two segments of a stem (CV vs. VC), placing stem-deriving metathesis in the category of morphological metathesis, as discussed in Chapter 1. Examples of a single verb/noun stem pair (*tappur* 'wood'~ *tapru*- 'to gather wood') in a variety of phonological and morphological contexts are given in (34) to illustrate the independence of metathesis from the surrounding phonology.

(34) a. *terse-y* ***tappur!*** Ha 42/0350
cut-IMP wood
'Cut the wood!'

b. *haTTa-y* *nuk* ***tappur****-um!* Ha 38/0447
hit-IMP 3.SG.OBJ wood-INS
'Hit him with a stick!'

c. ***tappur****-tak* *salpa-hne.* Ha 43/0336
tree-LOC hang-PASS
'It is hung in a tree.'

d. *watti-n* *makke* ***tapru****-na.* Ha 38/0378
go-INTR 1.PL gather.wood-AND
'We're leaving to go gather firewood.'

e. ***tapru****-yis!* Ha 38/0280
wood-AND.IMP
'Go gather firewood!'

f. ***tapru*** Ha 38/0280
gather.wood
'to gather firewood'

In (34a-c), the consonant-final noun stem ***tappur*** remains unchanged in both bare and suffixed forms, as well as in phrase-initial and phrase-final position. In (34d-f), the verb stem ***tapru*** surfaces consistently in vowel-final form, regardless of suffixation or position in the phrase. This shows that stem-deriving metathesis operates independently of phonological or morphological context: from the data given thus far, it appears to simply function as a mechanism by which stems of one lexical category are distinguished from related stems of another lexical category.

3.1.2 Direction of derivation in stem-deriving metathesis

The existence of synchronically co-occurring metathesizing stem pairs raises a question: Which (if either) stem is the input to metathesis, and which is the output or result of metathesis?[9] As implied by the term "stem-deriving metathesis" used in this dissertation, I propose that the relationship of the two stems (one noun, one verb) which constitute a metathesizing stem pair is one of derivation: specifically, that the verb stems in such pairs are (synchronically, and perhaps in some cases historically) derived from the corresponding noun stems, rather than nouns from verbs. There are several types of evidence within Mutsun to support a claim that stem-deriving metathesis is a process applied to noun stems to derive verb stems, and little evidence to suggest that the reverse is true. The first piece of evidence for noun→verb derivation comes from prosodic restrictions on Mutsun syllables, which render the shape of metathesizing verb stems predictable if derivation from noun stems is assumed, but cannot account for the seemingly arbitrary shapes of noun stems if the direction of derivation is verb→noun (importantly, whether or not metathesis occurs in the first place cannot be predicted regardless of the direction of derivation). Prosodically speaking, this is the same argument employed by Okrand to support his analysis of reflexive metathesis as deriving vowel-final verb stems from older consonant-final stems (see Section 3.2.1); however,

[9] This assumes that the morpho-phonological process in question is in fact metathesis. Conceivably, both stems could be the output of some other (non-metathesis) process with origins in a third form (see Section 3.5.3 for a discussion of vowel epenthesis and deletion from historic trisyllabic stems as one possibility); but evidence for such a development of stem-deriving metathesis in Mutsun is weak at best.

the prosodic argument I advance in Section 3.1.2.1 is synchronic rather than diachronic. A second type of evidence is the existence of two non-metathesis noun→verb derivation patterns which share the characteristic of deriving disyllabic vowel-final verb stems from consonant-final noun stems. Third, among stem-deriving metathesis pairs with Spanish loanword origins, the borrowed word in all cases (with one possible exception discussed below) is a noun rather than a verb. Finally, the semantic relationship of 'hunting/gathering' metathesizing stem pairs, which constitute a large subset of all stem-deriving metathesis pairs, is most plausible in a noun→verb derivation scenario.

3.1.2.1 Prosodic evidence for noun-verb derivation

Stem-deriving metathesis involves a set of noun stems comprising a variety of prosodic shapes, paired with corresponding verb stems of a single prosodic shape (namely, disyllabic vowel-final cluster stems). This prosodic asymmetry of metathesizing stem pairs, when combined with restrictions on syllable structure in Mutsun, makes noun→verb derivation prosodically predictable, while verb→noun derivation is not. I will argue that predictability (i.e., prosodic uniformity) of *output* supports an analysis of stem-deriving metathesis as a morpho-phonological operation which derives verbs from noun stems rather than the reverse.

As described in Section 3.1.1, all metathesizing verb stems are invariably disyllabic, vowel-final cluster stems (i.e., stems of the shape (C)VC$_1$C$_2$V), although this is just one of four attested regular verb stem shapes in the language (the inventory of

regular verb stem shapes--or templates--is given in Section 1.4.1.1). Metathesizing noun stems, on the other hand, occur in all of the forms listed in Table 27 (individual metathesizing noun stems do not vary; this is rather a typology of attested metathesizing noun stem shapes, summarizing the types that appear in examples above).[10]

Table 27. Variable noun stem shapes in stem-deriving metathesis

Noun stem shapes	**Examples**	**Metathesizing cluster verb stem $(C_0)VC_1C_2V$**
Light stem $(C_0)VC_1VC_2$)	*cayic* 'strength'	*cayci* 'to be strong'
Long stem $(C_0)V{:}C_1VC_2$)	*aaTih* 'vomit (n.)'	*aThi* 'to vomit'
Geminate stem $(C_0)VC_1{:}VC_2$)	*hakkaw* 'black clams'	*hakwa* 'to get black clams'
Trisyllabic stem	*cicikniS* 'young ground squirrel'	*cicki* 'to hunt young ground squirrels'
	kutYeelu 'tarantula'	*kutYle* 'to catch tarantulas'
	kaakari 'raven'	*kakra* 'to catch ravens'
	sokkoci 'laurel tree/fruit'	*sokco* 'to gather laurel fruit'

[10] In trisyllabic stems, only the first two syllables--plus the onset consonant of a third syllable when not preceded by a coda consonant--are subject to metathesis; this foot-sized portion of a trisyllabic stem has the same range of possible shapes as do disyllabic noun stems: i.e., light (/cicik/, /kutYeel/); long (/kaakar/); or geminate (/sokkoc/). For this reason, trisyllabic stems are actually subtypes of light, long, and geminate stems as defined by Callaghan (1992:39); nevertheless, I treat them as a fourth stem category for the purpose of elucidating templatic effects on metathesis later in this section.

Thus, although most metathesizing noun stems are disyllabic and consonant-final—neatly mirroring the disyllabic, vowel-final pattern of corresponding verb stems—they are otherwise less restricted in shape than metathesizing verb stems, with vowel and consonant length varying across lexical items. Additionally, as exemplified by the trisyllabic stems in Table 27, metathesizing noun stems may contain additional phonological material to the right of the metathesizing segments, rendering some nouns trisyllabic (and occasionally vowel-final); in contrast, metathesizing verb stems never contain phonological material to the right of the metathesizing segments.

Prosodically speaking, stem-deriving metathesis either operates on multiple inputs (multiple noun templates) to yield a single output, or on a single input to produce multiple outputs. In other words, the verb stems are predictable given the noun stems, but not vice versa. This is schematized below, where each capital letter represents a stem template: A = C-final light stem; B = C-final long stem; C = C-final geminate stem; D = trisyllabic stem; and X = V-final cluster stem.

Noun→verb metathesis Input {A,B,C,D} → Output {X}

Verb→noun metathesis Input {X} → Output {A,B,C,D}

The Mutsun syllable, with very rare exceptions, is of the shape (C)V(:)(C) (cf. Okrand 1977:78). Because no onset or coda can consist of more than a single consonant, two-consonant (CC) clusters--which may consist of heterogeneous consonants or a geminate consonant--can occur only across syllable boundaries (word-medially) in native

vocabulary[11]. In minimally disyllabic words, closed syllables may contain only short vowels, while vowels may be either long or short in open syllables (with a maximum of one syllable per word containing a long vowel; cf. Okrand 1977:89). Put another way, in words of two or more syllables, super-heavy syllables--i.e., syllables containing both a long vowel and a coda consonant--are prohibited. Vowel length distinctions are less clear for closed monosyllables, as Harrington transcribes both long and short vowels at different times for monosyllabic words such as *hin* 'eye/face' (1922, 1929-30:42/0312, 44/0244); but this question need not be settled for the purposes of analyzing stem-deriving metathesis, since all metathesizing stems are minimally disyllabic.

Based on these restrictions on the syllable, it is impossible, given a verb stem of the shape (C)VC$_1$C$_2$V, to predict which of the forms in Table 27 a corresponding metathesizing noun stem will take, since all are phonologically and prosodically well-formed. That is, given a verb such as *yopko* 'to snow', we know that the corresponding noun stem 'snow (n.)' cannot take the shape **yopook*, **yooppok*, **yopokk*, etc. because such forms contain super-heavy syllables (respectively, /pook/, /yoop/, /pokk/); but any of the hypothetical forms *yopok*, *yoopok*, *yoppok*, or even *yoopokic* (with additional phonological material (/ic/) outside the domain of metathesis) are phonotactically

[11] This restriction appears to be violated in a few instances such as *Sokkwe* 'cool!', *ekkwe* 'not' (variant of *ekwe*), *siwkker* 'red-tailed hawk', and *siwkre* 'to hunt red-tailed hawks'. However, all of the cited examples involve sequences of /kw/ or /wk/, which are likely remnants of the proto-Costanoan labiovelar *k^w, rather than separate phonemes. *k^w reduced to simple /k/ in most environments in Mutsun (cf. Callaghan 1962:99-100, 1992:41, in press; Okrand 1977:124-125); but it makes more sense to assume that these exceptions to the usual syllable canon reflect incomplete decay of the proto-form than to stipulate an arbitrary exception to the restrictions for certain phonemes.

permissible. In fact, the attested noun stem is *yopok*, but the only way to know this is to look at the data. On the other hand, given any of the nonsense noun forms *pecok* (light stem), *peecok* (long stem), *peccok* (geminate stem), or *pecoklu* (trisyllabic stem), the Mutsun restrictions on closed syllable length and consonant clusters, together with the generalization that all metathesizing verb stems are of the shape (C)VC_1C_2V, lead to only one possible metathesized verb stem: *pecko*. (This was observed by Okrand (1977:117, fn. 68) for metathesizing noun/verb pairs, and presumably is the reason for his analysis of V-final stems as derived from underlying C-final stems.) Although it is conceivable that a certain prosodically restricted class of verb stems undergo a metathesis process whose resulting derived noun stems are arbitrary in shape, it is simpler to assume that the uniformity of the verb template in stem-deriving metathesis is the outcome of a process applied to any of several prosodic classes of noun stems.

3.1.2.2 Stem-deriving metathesis in Spanish loan words

Several Spanish loan words undergo stem-deriving metathesis indistinguishable from that which occurs in native vocabulary: that is, borrowed noun stems (of a variety of prosodic shapes) metathesize to form vowel-final cluster verbs. Crucially, the borrowed stem in each pair corresponds (both in semantics and in segment order) to a Spanish noun rather than a Spanish verb (with one partial exception discussed below). The list of all attested metathesizing stem pairs of Spanish origin is shown in Table 28.

Table 28. Stem-deriving metathesis in Spanish loan words

Mutsun noun stem	Spanish noun	Mutsun verb stem	Spanish verb
hatul 'cornmeal mush'	(< *atol*)	*hatlu* 'to make cornmeal mush'	--
huraacu 'a drinker, a drunk'	(< *borracho*)	*hurca* 'to be drunk'	--
huuwas 'grapes'	(< *uvas*)	*huwsa* 'to pick grapes'	--
posol 'corn stew'	(< *pozole*)	*poslo* 'to make corn stew'	--
tawah 'difficulty/work (n.)'	(< *trabajo*)	*tawhari* 'to work'	(< *trabajar*)

In all but one of these instances, the form borrowed from Spanish is the noun stem, with the metathesized verb stem an entirely Mutsun innovation (there are no Spanish verbs resembling *hatlu*, *hurca*, *huwsa* or *poslo*). The only potential counterexample is *tawah*~*tawhari*, which may actually be a case of both the verb *trabajar* and the noun *trabajo* being borrowed independently. If both words were borrowed, nativization might coincidentally result in two Mutsun stems which appear to be related by metathesis. Nativization--which also included simplification of the initial consonant cluster /tr/ to /t/ and non-native /b/ to /w/ in both forms--would have reduced the length of both stems to better conform to Mutsun stem prosody, deleting an unstressed syllable[12] in each word in order to preserve syllables made prominent by stress

[12] This refers to the stress in the Spanish words; Mutsun stress, as best Okrand (1977) could determine, fell on the initial syllable in most words and on the second syllable in light stems. However, this

in the original Spanish. Since the verb *trabajar* has final-syllable stress (*tra.ba.ˈjar*), and the noun *trabajo* has penultimate-syllable stress (*tra.ˈba.jo*), the deleted syllable would have been different for each word: penultimate in the verb and final in the noun. (For a discussion of Spanish stress reflected in Mutsun and the motivation behind syllable deletion in such loan words, see Section 3.4.2.3). If this proposal of a dual borrowing is historically accurate, surface metathesis between these two stems is in fact merely the coincidental result of native phonology applied to two very similar Spanish words.

Both the borrowed nouns and the resulting derived verbs in these examples behave identically to native Mutsun stems, undergoing regular suffixation and cliticization, as shown in (35).

(35) a.

hatuulum		*hatluy*	
hatul	*-um*	*hatlu*	*-y*
cornmeal.mush	-INS	to.make.cornmeal.mush	-IMP
'with cornmeal mush'		'make cornmeal mush!'	

b.

posoole		*poslo-ka*	
posol	*-e*	*poslo*	*=ka*
corn.stew	-ACC	to.make.corn.stew	=1.SG
'corn stew (acc.)'		'I make corn stew'	

c.

huraacu-k		*hurcaSte*	
huraacu	*=k*	*hurca*	*-Ste*
drunk	=3.SG	to.be.drunk	-PRF
's/he is a drunk'		'drunk (adj.)'	

---

pattern is probably not reliable, and Okrand himself points out that it is very unsure; see discussion in Section 1.3.3.

d.	*huuwase*			*huwsana*		
	huuwas	*-e*		*huwsa*	*-na*	
	grapes	-ACC		to.pick.grapes	-AND	
	'grapes (acc.)'			'to go to pick grapes'		
e.	*tawahte-k*			*tawharin-ak*		
	tawah	*-te*	*=k*	*tawhari*	*-n*	*=ak*
	work	-VBLZ	=3.SG	to.work	-RECPST	=3.SG
	's/he has work'			's/he worked'		

Not only do the loan word stems in (35) concatenate normally with native morphemes, in (35a-35b) we also see stem-internal vowel length changes in the suffixed noun stems *hatuulum* and *posoole*. This is identical to the vowel lengthening required in native light stems when followed by (C)V-initial suffixes, e.g. *koro* 'leg' → *koroosum* 'by means of a leg' (cf. the detailed discussion of second-syllable vowel lengthening in light stems in Section 3.4.2.4). Since there is no distinction between the morphological behavior of borrowed stems and native stems in the context of suffixation or encliticization, there is no reason to believe that they are exceptional in the way that they undergo metathesis.

In contrast to the borrowed noun stems in (35), there are no examples of verb stems borrowed from Spanish with metathesized noun stems innovated in Mutsun, even though potential candidates (borrowed verbs with medial consonant clusters) do exist. Spanish loan word vocabulary in Mutsun includes 54 verbs, and of these, eleven fit the vowel-final cluster template which characterizes all regular metathesizing stems, and thus are prosodically eligible for metathesis. Examples of such verbs include *komhe* 'to

confess' (< Sp. *confesar*), *monto* 'to pile up, stack' (< Sp. *amontonar*), *ronko* 'to growl' (< Sp. *roncar* or *ronco*). Such verbs, if metathesis derived nouns from verb stems, could--but do not--metathesize to derive hypothetical nouns such as **kommeh* 'confession', **moonot* 'a pile/stack', **ronok* 'a growl, growling'. (For example, for 'confession', a nominalized form *komhes* is attested using the stem *komhe* plus the instrumental nominalizer *-s*; as is a nominalized form of an apparently native stem, *Samalpimsa*).

Finally, another stem pair of Spanish origin at first appears to be anomalous, but upon closer examination lends further credence to a noun → verb direction of derivation in stem-deriving metathesis. The etymology and behavior of this pair is quite interesting, as metathesis appears to operate directly on a Spanish noun which was itself not lexicalized in Mutsun, probably because a native noun already existed. The noun meaning 'holly berry' is *tYottYoni*, which is quite different prosodically and segmentally from the Spanish *tollón* (/tojon/) of the same meaning; however, the verb form *toyno* is straightforwardly analyzed as the metathesized form of **toyon*, not *tYottYoni*, whose hypothetical metathesized verb form would be **tYotYno*. The Spanish *tollón*, which Harrington spells quasi-phonetically as "toyon", is directly referenced in glosses for both *tYottYoni* and *toyno*, indicating that the phonological similarity of the Mutsun verb to the Spanish noun is not likely coincidental. In other words, a gap in the verbal lexicon can seemingly be filled via metathesis whose input is a known (but not borrowed) noun from another language. There is no instance of such a process operating in reverse, i.e.

metathesis of a Spanish verb not lexicalized in Mutsun to derive a novel Mutsun noun stem.[13]

Taken together, the positive evidence of borrowed noun → verb metathesis and the absence of borrowed verb → noun metathesis supports the idea that in Spanish loan word vocabulary, stem-deriving metathesis is structurally a process which operates on existing noun stems to derive novel verbs. Furthermore, since the behavior of loan word vocabulary is in other respects indistinguishable from that of native stems, I assume that metathesis in borrowed stems follows the same pattern as metathesis in native stems: again, with nouns as the input and verbs as the output. The existence of stem-deriving metathesis in Spanish loanword vocabulary further indicates that metathesis remained a

---

[13] Another more ambiguous stem pair with Spanish origins is *weeru*/*weero* 'leather, hide' ~ *werho* 'to tan leather', from Spanish *cuero* 'leather'. The verb *werho* implies a noun form **we(e)roh*, with final /h/, which however is never indicated in Harrington's transcription. Even if a final /h/ were dropped in unsuffixed forms due to low perceptual salience (final /h/-dropping is common in many unsuffixed nouns), it should surface in suffixed forms, e.g. **weerohse* 'leather (acc.)', **weerohmak* 'leathers, hides'; but the attested forms are rather *weerose* and *weerokma*. Still, there is no infix **-h-* to account for a verb like *werho*, nor is /h/-insertion a regular phonetic operation. It may be that the borrowing is old enough to have added and subsequently lost a final /h/; and if so, the loss of /h/ may have been due not only to perceptual factors, but also to potential confusion with the attested forms *weero-hte* 'big-mouthed' and *weero-hmin* 'big-mouthed one', which are suffixed variants of the stem *weyro* 'to be big-mouthed'. However, there are inconsistencies in the data inherent in the way it was collected (see Chapter 2), and it is not possible to explain every unexpected form completely.

Additionally, a vowel-final cluster verb of Spanish origin, *kawra* 'to run out, finish, end' while clearly a borrowing, is prosodically mismatched to the Spanish and looks tantalizingly like a metathesized form, though in this case the base for metathesis would be a verb. The Spanish verb for 'to run out, finish, end' is *acabar* and, if nativized along the lines of many other Spanish verbs, should have resulted in a form like **(a)kawaari*, which would metathesize nicely to *kawra*. Perhaps this is an example of metathesis from an earlier borrowed form like **(a)kawaari*, which was replaced in the lexicon by the metathesized form. If true, other verbal borrowings like *kasaari* 'to hunt' (< Sp. *cazar*), *yutaari* (< Sp. *ayudar*) might have undergone the same nativization-via-metathesis to **kasra*, **yutra*, with eventual loss of the longer forms, had Mutsun continued to be spoken.

productive grammatical process at least until after the arrival of the Spanish, possibly up until the loss of the last Mutsun speakers.

3.1.2.3 Semantics of metathesizing noun-verb pairs

The semantic relationships of a large proportion of metathesizing noun-verb pairs offer another type of evidence which is suggestive of a noun→verb direction of derivation. In these stem pairs, nouns frequently denote objects, people, plants, animals, and other directly observable entities in the physical world, and their corresponding verb stems denote some activity, condition, or process which assumes the existence or use of the thing named by the noun. Many metathesizing verb stems are thus more semantically specific (involving both an activity, condition, or process and some actor, agent, patient, characteristic, etc.) than their related noun stems. (However, the semantics of the metathesizing verb stems as a class is probably broader than that of the related nouns, encompassing whatever action or state is likely to be related to the noun.)

By far the largest subset of noun-verb stem pairs has to do with specific plant and animal species, and comprises 72 of the total 194 metathesizing pairs attested in Mutsun.[14] Of these, 66 pairs include a verb meaning to hunt, gather, or collect the plant or animal specified (see Table 93 in Appendix G).[15] Several examples of these 'hunting/gathering' stem pairs are shown in 29.[16]

---

[14] This figure includes 191 noun-verb stem pairs, two noun-adverb-verb stem triplets (*cayar~caayare~cayra* and *Tuumuy~Tuumuye~Tumyu*), and one adverb-verb stem pair (*yaasir~yasri*); the three exceptional stem sets are discussed in Section 3.1.2.1 and listed in Appendix G, Table 101.

[15] The six plant/animal stem pairs whose verbs are not related to hunting/gathering are:

Table 29. Metathesizing stem pairs: hunting/gathering

Plant/animal noun stem	Hunting/gathering verb stem
ceeyes 'hare, jackrabbit'	*ceyse* 'to hunt jackrabbits'
happet 'wild sweet potatoes'	*hapte* 'to gather wild sweet potatoes'
huuraka 'salmon'	*hurka* 'to fish for salmon'
huuwas 'grapes'	*huwsa* 'to pick grapes'
sikkot 'mole, gopher'	*sikto* 'to hunt moles, gophers'

The verb stems in these pairs exist in spite of the fact that Mutsun has several independent, non-species-specific verbs for activities such as hunting and gathering, such

---

1.*kahhay* 'head louse, black louse' ~ *kahya* 'to get/have lice' OR 'to remove lice'

2.*reeTem* 'nit (louse egg)' ~ *recme* 'to have nits' / *reTme* 'to remove nits'

3.*saakar* 'nit (louse egg)' ~ *sakra* 'to have nits' OR 'to remove nits'

4.*muumuri* 'fly (insect)' ~ *mumru* 'to fill up with flies'

5.*lissok* 'snake, earthworm' ~ *lisko* 'to slip'

6.*tiiwis* 'flower' ~ *tiwsi* 'to bloom'

Notably, the first four are things one is unlikely to want to hunt or gather (except in order to remove them), and flowers are perhaps more often simply seen than gathered for human use.

[16] A single non-plant stem pair appears to fall in this category: *siiwey* 'conical seed basket' has a corresponding metathesized verb *siwye*, attested in the sentence *siwye-ka*, which Mrs. Cervantes explained meant 'estoy con el negocio de juntar *siiwey* baskets' (translation: 'I'm in the business of gathering *siiwey* baskets'; Harrington 1922, 1929-30:39/0488). It may seem unclear why one would gather baskets, but several following entries give the same gloss for other types of basket-related verbs (though these are not of the metathesizing type). It is therefore tempting to think that these verbs are elicited hypothetical forms with somewhat nonsensical meanings, but Mrs. Cervantes commented in the entry for *siwye*, "a good word & used." These verbs may simply refer to going around piling up the baskets in preparation for a group of people going gathering for something that one is going to carry back in the baskets.

as *payta* 'to hunt', *hooyo* 'to get, grab' and *ruuta* 'to gather', which can be used in verb + noun constructions, as in the sentences in (36).

(36) a. *paytana makse laalakse.* [Ha 42/0203]
'We go to hunt geese.'

b. *paytana makke koocise.* Ha 39/0382
'We go to hunt pigs.'

c. *hanni-me hooyona pattihse?* Ha 41/0286
'Where do you go to get chia?'

d. *mukurmakma wattin hooyona rookose.* Ha 37/0530
'The women are going to gather bulrush.'

e. *ruutay tiiwis!* Ha 41/0182
'Pick flowers!'

f. *ruutay eenena!* Ha 42/0177
'Pick blackberries!'

Despite such examples, all of these verbs are used more frequently either without an object (e.g. 'I hunt', 'you go gathering') or, in the case of *hooyo*--as well as two additional verbs not listed, *paTTi* 'to hold, catch, grasp' and *aayi* 'to pick, harvest, remove'--for more general getting/grabbing of all types of objects ('get some paper!', 'they're going to get soup', etc.) rather than specifically for hunting/gathering plants or animals. Thus, it seems that when the goal is hunting, gathering, or harvesting of a particular plant or animal, the preference is to express it via a species-specific verb rather than with a general verb + object noun. A productive noun-to-verb metathesis paradigm

allows for specific hunting and gathering terms to be created as needed from a large pool of species-name noun stems; whereas, if metathesis were verb-to-noun, the language would need to have a complete inventory of preexisting species-specific verbs in order to derive the species names themselves (in order to be able to refer to them outside a hunting/gathering context, e.g. for sentences like 'Rabbits run fast', 'He has a cat', etc.)--a situation which is far less semantically plausible.

Another significant category of metathesizing stem pairs whose semantic relationship supports a noun→verb direction of derivation is the subset having to do with illness, body parts, and physical conditions[17]: these account for 30 metathesizing noun/verb pairs (the complete list is in Appendix G, Table 94). In each pair, the noun stem names a physical feature or condition, while the verb stem is (primarily) used in descriptive constructions, and is typically glossed as 'to have X feature/condition/characteristic'.[18] The meaning might be understood as 'to have a noteworthy X', where a noteworthy body part is often a large one. Several example pairs are listed in 30.

[17] Pairs relating to flies, lice, and nits are included in this category because their verb stems essentially mean 'to be infested with' the particular vermin, which is a physical condition comparable to disease.

[18] However, a few verb stems in this category have dual glosses: for instance, *sepke* carries the meaning 'to have a beard' in the constructions *sepkeSmin* 'bearded one' and *sepkemak* 'bearded ones'; but means 'to trim or shave the beard' in the construction *sepket kannis* 'Cut my beard!' (cf. noun stem *seepek* 'beard').

Table 30. Metathesizing stem pairs: body parts/conditions

Body part/conditon noun stem	**Related verb stem**
heser 'birthmark, freckle, mole'	*hesre* 'to have a birthmark/freckle/mole'
hunnuh 'mucus, snot'	*hunhu* 'to have mucus'
moohel 'head'	*mohle* 'to have a big head'
paaTar 'measles, smallpox'	*paTra* 'to have measles/smallpox'
raanaT 'long neck'	*ranTa* 'to have a long neck'

The most common usage for bodily feature/condition verb stems is in nominalized or perfective constructions used to describe people: eighteen of these verbs are attested with the suffix *-Smin* (or its variant *-smin*), e.g. *heyseSmin* 'bearded one', *katYluSmin* 'thick-legged one', *puyciSmin* 'one who has moles'; and twelve stems occur with the perfective suffix *-Ste* (*-ste*), as in *lopcoste* 'has a (prominent) navel', *raTmaSte* 'has boils/pimples', *tokloSte* 'has sores on the neck'. Most verb stems are attested with one or the other of these two suffixes (and occasionally with *-mak* 'plural nominalizer', which is the plural equivalent of *-Smin*); only one stem, *samli* 'to have a female STD' is unattested with either *-Smin* or *-Ste*.[19] The examples in (37) contrast phrases and

[19] However, there is no reason grammatically why verb stems in this category which are not attested with *-Smin* or *-Ste* could not be used with those suffixes to make well-formed words such as (unattested) *hesreSmin* 'freckled one', *samliSte* 'has a female STD', etc.; rather, it is likely that these are accidental gaps.

sentences using noun and verb stem forms to describe bodily conditions and characteristics.

(37) **Noun stem examples** **Verb stem examples**

a.

kaan	*meheesi*	*men-puuyicse.*	*puyciSmin*
kaan	*mehe-si*	*men=puuyic-se*	*puyci-Smin*
1.SG	see-just	2.SG.POSS=mole-ACC	have.moles-NMLZ
'I'm just looking at your mole.' [Ha 42/0820]			'one who has moles'

b.

men-seepek	*kata*	*hire.*	*sepkeSmin*
men=seepek	*kata*	*hire*	*sepke-Smin*
2.SG.POSS=beard	like/as	wood-rat	have.beard-NMLZ
'Your beard is like a woodrat.' [Ha 38/0130]			'bearded one' [Ha 37/0643]

c.

hiwaanin	*paaTar.*	*paTraSte-k.*	*paTran-ka.*
hiwa-ni-n	*paaTar*	*paTra-Ste=k*	*paTra-n=ka*
arrive-INRF-PST	smallpox	have.small-pox-PRF=3.SG	have.smallpox-INRF=1.SG
'The smallpox came.' [Ha 42/0308]		'He has smallpox.' [Ha 42/0307]	'I have smallpox.' [Ha 41/0758]

Another set of 25 stem pairs comprises names for various foods, objects, substances, sounds, and verbs which mean 'to make or do X'. Examples are shown in Table 31 (all 25 pairs are listed in Appendix G, Table 95).

Table 31. Metathesizing stem pairs: make/do X

X (noun stem)	Make/do X (verb stem)
hatul 'mush'	*hatlu* 'to make mush'
issut 'a dream'	*istu* 'to dream'
saawel 'sweat (n.)'	*sawle* 'to sweat'
wacik 'a crack'	*wacki* 'to crack'

A further 20 stem pairs have to do with a variety of types of tangible and directly observable people, things, and objects, and corresponding verbs meaning roughly "be X person, thing, object". Some examples of such pairs are shown in (the full list is in Appendix G, Table 96).

Table 32. Metathesizing stem pairs: be X

X (noun stem)	Be X (verb stem)
aawits 'sweet thing'	*awtsi* 'to be sweet'
iTTas 'new one'	*iTsa* 'to be new'
mukurma 'woman'	*mukru* 'to be a woman'
sakker 'fat, lard'	*sawre* 'to be fat/fatty'
waayas 'enemy'	*waysa* 'to be an enemy'

Finally, a set of 12 stem pairs denotes an instrumental relationship between stems: that is, verbs for actions paired with nouns naming the object or instrument used to perform the action. Several of these pairs are given in (the complete set is in Appendix G, Table Table 98).

Table 33. Metathesizing stem pairs: actions and instruments

Instrument noun stem	**Action verb stem**
huppak 'white clay'	*hupka* 'to smear'
lullup 'flute'	*lulpu* 'to play the flute'
sukum 'cigarette, cigar, pipe'	*sukmu* 'to smoke'
Taawar 'chair, seat'	*Tawra* 'to sit, stay, reside'

These five subsets of metathesizing stem pairs together account for 153 (78.9%) of the total 194 stem-deriving metathesis pairs.[20] Most stem pairs in these sets refer to tangible or physically observable objects, people, entities, or phenomena, which--because they can be described, perceived, used, and referred to outside of the semantic scope of their verb stems--most plausibly originate as nouns. On the other hand, verbs in these sets

[20] The remaining 45 stem pairs include a set of 21 pairs denoting abstract or intangible qualities and associated verbs, e.g. *iicel* 'envy (n.)'~*icle* 'to envy', *hinnus* 'knowledge'~*hinsu* 'to know', etc., which are more semantically ambiguous with respect to direction of derivation (Appendix G, Table 97); 16 pairs whose semantic relationships are not easily categorized into subgroups (Appendix G, Table 100); four pairs with action/patient relationships (Appendix G, Table 99); and three exceptional sets which include non-noun stems (Appendix G, Table 101).

typically denote *both* an action, process, state, etc. (i.e. "verby" meanings) *and* a particular actor, object, instrument, etc. (a specified nominal argument). This is illustrated below for a representative stem pair from each of the semantic groupings discussed above.

Table 34. Semantic content of metathesizing stem pairs

Noun stem	**Semantic content**	**Verb stem**	**Semantic content**
happet	sweet potatoes	*hapte*	gathering + sweet potatoes
moohel	head	*mohle*	possessing + large head
hatul	mush	*hatlu*	making + mush
mukurma	woman	*mukru*	existing + woman
sukum	cigarette, etc.	*sukmu*	smoking + object smoked

These verbs are thus more semantically complex than the nouns to which they correspond; or, to put it another way, the semantic content of a given verb typically *includes* the semantic content of its corresponding noun, along with additional verbal meaning. While the morpho-phonological operation at work in metathesis involves an alteration to the order of--as opposed to the addition of--phonological material, semantically speaking it is comparable to derivation via suffixation, which is the predominant word-building strategy in Mutsun. This fact can be seen by comparing the semantic content of bare and suffixed (derived) stems in Table 35 with the metathesizing stem pairs above in Table 34.

Table 35. Semantic content of suffixed stems

Noun/verb stem	Semantic content	Suffixed stem	Semantic content
piTTe 'to tie, tie up'	tying	*piTTemsa* 'rope'	tying + instrument
miSSi 'to be good'	being good	*miSmin* 'good one'	being good + person/thing
irek 'stone, money'	stone/money	*irekmin* 'rich person'	money + possessor
raakat 'name'	name	*raakatte* 'to have a name'	name + having

The assumption that complex words like *piTTemsa* are derived from simpler forms like *piTTe*, rather than the reverse, is uncontroversial. All of the suffixes in Table 35 are well-attested and productive. The parallel between the semantic simplicity vs. complexity of metathesizing noun/verb stem pairs and bare/suffixed stem sets is perhaps the strongest semantic argument for noun→verb derivation in stem-deriving metathesis. Just as suffixation--the predominant derivational pattern in Mutsun--operates on a semantically simpler morpheme to derive a more semantically complex one, it makes sense to assume that stem-deriving metathesis derives more complex propositions from simpler ones, albeit via a very different morpho-phonological process.[21]

[21] A possible argument against semantics as evidence for noun→verb derivation in stem-deriving metathesis is the existence of 108 disyllabic noun stems ending in /h/, /n/, or /s/ which correspond to semantically related verb stems minus the final consonant of the nouns: e.g., *pattih* 'chia' ~ *patti* 'to gather chia'; *Sollon* 'mouse' ~ *Sollo* 'to hunt mice'; and *riris* 'hem' ~ *riri* 'to hem, to baste'. Morphologically speaking, these noun stems look like nominalized forms of the corresponding verbs, since *-h*, *-n*, and *-s* are all nominalizing suffixes in Mutsun. However, Mutsun also has other semantically related noun-verb pairs differing only in the presence or absence of a final consonant other than /h,n,s/: e.g., *wakSiS* 'coyote' ~

In summary, a variety of phonological and semantic evidence supports the conclusion that the noun forms are basic and the verb forms are derived from them. This evidence comes from both native words and borrowings.

3.1.3 Stem-deriving metathesis as template-driven

I will turn now to the question of what in the grammatical system causes the alternations in stem-deriving metathesis to occur, and will argue that it is a result of templatic morphology. Unlike the templatic morphology of Semitic languages such as Arabic and Semitic, in which various types of derivation and inflection are accomplished via an extensive repertoire of prosodic templates, templates in Mutsun are not part of the inflectional morphology, which is almost entirely suffixing; synchronically, their morphological significance is largely limited to the derivation of verbs from certain types of noun stems.

In Mutsun, prosodic templates for noun and verb stems consist of regular orders of consonants and vowels mapped to specific prosodic structures, and carrying morphological significance (verb or noun). These are the eight stem shapes introduced in Section 1.3.4 and discussed in detail in the preceding sections of this chapter: namely,

---

wakSi 'to hunt coyotes'; *huyhuy* 'cutgrass, bunchgrass' ~ *huhyu* 'to gather cutgrass'; *siprek* 'bone awl' ~ *sipre* 'to stab'. Because *-h*, *-n*, *-s* are the only single-consonant nominalizers in Mutsun, nouns in the latter group of stem pairs cannot be explained as nominalized verb stems: rather, their corresponding verbs appear to be derived via truncation of the final consonant of the noun. Thus, some or all of the stem pairs with /h,n,s/-final nouns may also have arisen via truncation from noun stems to derived verb stems, and only coincidentally look like nominalization due to the homophony of their final consonants with the nominalizing suffixes.

light, long, geminate, and cluster stems, which (in a majority of stems) further divide into noun and verb stems based on the presence or absence of a final consonant.

In Section 3.1.3.1, I will show that templatic stems far outnumber atemplatic stems in the Mutsun lexicon; in Section 3.1.3.2, I examine templatic behavior in loan verbs based on Spanish infinitives to demonstrate that templatic effects are generalized to other areas of the language; and in Section 3.1.3.3, I draw comparisons between templatic behavior in Mutsun metathesis and that found in morphological paradigms other than metathesis in a variety of languages. In Section 3.1.3.4, I summarize my findings on stem-deriving metathesis before considering reflexive metathesis.

3.1.3.1 Proportion of templatic stems in the lexicon

Most nouns and verbs in Mutsun--but especially verbs--conform to one of a small set of prosodic templates. A majority of both noun and verb stems are disyllabic, though this tendency is stronger in verbs than in nouns; and, importantly, the set of disyllabic templates is largely restricted to noun and verb stems, with only 116 (less than half of a total 266) non-noun/verb morphemes (adverbs, pronouns, conjunctions, etc.) conforming to one of these templates. Within the pool of templatic stems, noun stems are more often consonant-final than vowel-final, while verb stems are nearly universally vowel-final. One stem template in particular, the vowel-final cluster stem template, accounts for more verbs than any other. In this section, I present data to show that each of these observations is statistically significant; and in Section 3.1.3.3 I argue that the strong

association between verbal identity and a specific prosodic template is the driving force behind metathesis in Mutsun stems.

The full inventory of disyllabic stem templates introduced in Section 1.4.1.1 is reproduced below in 36-38, with the number of stems attested in each category listed in parentheses.

Table 36. Noun stem templates (697 disyllabic stems)

(C)VCV(C)	*ama* 'body, person, fruit, seed'
Light stems (153)	*ciri* 'paternal aunt'
	hipor 'bone awl'
	uyak 'evening, afternoon'
(C)VVCV(C)	*aacic* 'pipe'
Long stems (217)	*kuuTis* 'wild ginger'
	Soole 'sadness'
	iina 'sickness, disease'

(C)VC$_i$C$_i$V(C) Geminate stems (171)	*akkes* 'salt' *ette* 'uncle' *huttYa* 'mountain' *poTTol* 'yellow-headed blackbird'
(C)VC$_i$C$_j$V(C) Cluster stems (156)	*arwa* 'spirit' *omkon* 'maggot' *Simpur* 'eyebrow, eyelash' *tikwiS* 'badger'

As I pointed out in Section 1.3.4, there is a gap in the inventory of occurring (vs. expected) disyllabic stem templates: in each category of stem (light, long, geminate, cluster), disyllables with a CVV (long vowel) second syllable are absent from the lexicon, while disyllables with both CV and CVC (the other two well-formed non-initial syllable shapes) do occur. In non-final position, there is good evidence that CVC and CVV syllables are both moraically heavy in Mutsun (based on Mrs. Cervantes's consistent preference for pronouncing unfamiliar disyllables as (C)VC.CV(C) or (C)VV.CV(C) over (C)V.CV(C)); but perhaps word-final consonants are extrasyllabic, yielding word-final CVC syllables light while (C)VV syllables are heavy regardless of position in the word. If true, this would explain the asymmetry in disyllabic stem templates: only LL (light) and HL (long, geminate, and cluster) stems are permitted—or, to put it more succinctly, word-final syllables must be light. There is no reliable way to test such a hypothesis, however, since Mutsun stress rules appear to be largely unrecoverable (see Section 1.3.3).

As discussed briefly in Section 1.5, template shape does appear to have correlated to some extent with semantic content in Proto-Utian stems (Callaghan in press; this topic is discussed in more depth in Section 4.1). Synchronically, however, within a lexical category (verb or noun), stem templates do not appear to have any semantic significance: a wide range of noun meanings such as plants and animals, implements, clothing and regalia, people and kinship terms, directions, time, geographical features, weather, body parts, physical ailments, and a variety of abstract concepts are all attested in each of the four noun stem types; and likewise, transitive and intransitive verbs expressing a range of feelings, actions, processes, states, etc. are found as light, long, geminate, and cluster stems. (Verbs for hunting, gathering, having certain bodily features, conditions, or ailments are perhaps most numerous in the cluster stem category.)

In a language with fluent speakers, the morphological salience of prosodic templates could be tested using well-formedness judgments on nonce words of various prosodic shapes, or by other experimental techniques. However, given the finite set of lexical data that comprise our total knowledge of Mutsun, I approached the question of the role of prosodic templates in the morphology of Mutsun via statistical analysis of attested stems.

Native (non-loan word) monosyllabic nouns number just 49 of 909 total native noun stems[22]; only three of a total 700 disyllabic stems are irregular, violating Mutsun

[22] The lexicon contains 1408 total main form (non-variant) nouns. Excluding all known loan words, phrasal and compound stem nouns, and suffixed forms results in a total of 909 noun stems which are analyzed as monomorphemic native Mutsun forms; there are likely a few suffixed and/or non-native

phonotactics (e.g., *poocruk* 'paper wasp', with a super-heavy initial syllable), leaving 697 stems which conform to one of the four templates illustrated above in Table 36; and trisyllabic noun stems total 145, but are variable in their prosodic structure (e.g. *asuryan* 'sparrow', *cululiS* 'beans', *heweepa* 'devil'). Only fifteen nouns consist of four or more syllables. This distribution of noun stems by syllable count is illustrated below in Table 37.

Table 37. Noun stem distribution by syllable count

Syllables	**No. of stems**
1	50
2	580
3	154
4+	14

From this data, noun stems appear to be heavily skewed toward disyllabic forms. To test whether the distribution of noun stems by syllable count as shown in Table 37 is significantly greater than chance, a chi-squared goodness of fit test was performed, yielding highly significant results, χ^2 (3, N=798) = 1020, $p < .001$. Thus it is clear that while noun stems in Mutsun are minimally monosyllabic, they are preferably disyllabic and conforming to one of the four disyllabic templates in Table 36 (only 2 of the 580 disyllabic noun stems, *poocruk* 'paper wasp' and *sauker* 'place name stem', do not conform to any template).

(borrowed from other California languages) stems remaining in this count, but there is insufficient information to analyze them conclusively as such, so they are included as native stems.

Verb stems, unlike noun stems, are minimally disyllabic,[23] comprising essentially the same four prosodic template types as disyllabic nouns: light, long, geminate, and cluster stems. The difference is that, while noun stems may end in a vowel or consonant, disyllabic verb stems are always vowel-final.[24] The four disyllabic verb stem templates are thus structurally identical to the vowel-final noun stem templates; they are illustrated with example verb stems in Table 38.

Table 38. Verb stem templates (1614 disyllabic stems)

(C)VCV	*hene* 'to be unequal'
Light stems (137)	*paya* 'to run'
	wiLe 'to hide'
(C)VVCV	*niipa* 'to teach'
Long stems (206)	*saaTe* 'to toast'
	tYuuke 'to jump'

[23] Two monosyllabic stems are attested: *am*, an apparent copula which is well attested by Arroyo (76 instances; also recorded twice by Merriam) but never used by Mrs. Cervantes, indicating that it had likely become archaic by her time; and *nuk* 'it is said', recorded just 14 times by Arroyo and 7 times by Harrington, suggesting that this form had also fallen out of common use. While both are categorized as verbs in the Mutsun lexicon, they do not behave like other verb stems: perhaps most tellingly, neither can undergo suffixation, perhaps suggesting that in fact they are not true verbs.

[24] The single exception to this generalization is the stem *ayun*, which is almost always used as an inherent imperative (without the imperative suffix *-y*) to mean 'bring/give me it!' This form appears to be more verb-like than *am* and *nuk* discussed in footnote 23, in that it is attested with very limited suffixation: five instances of *ayunyuT* 'you all bring/give me it!', and a single instance of *ayuna*, glossed as (non-imperative) 'to go to bring'. However, there are no examples of *ayun* with other common verbal suffixes, which may indicate that it is not entirely verbal; or may simply be due to the fact that many common verbal suffixes, such as recent past *-n*, would create ill-formed final consonant clusters.

(C)VC$_i$C$_i$V Geminate stems (325)	*cutte* 'to crawl' *honno* 'to wrap' *sissa* 'to threaten'
(C)VC$_i$C$_j$ Cluster stems (946)	*asnu* 'to sneeze' *cirko* 'to scrape' *luTpi* 'to have wet hair'

Only one disyllabic verb stem does not conform to one of the four templates in Table 38: *siwkre* 'to catch large white hawks' (as well as the related noun stem *siwkker* 'large white hawk') contains a medial CCC cluster, which is normally prohibited in Mutsun. As is the case with nouns, some longer, atemplatic verb stems like *Suurire* 'to have a ringing in the ears' do exist in Mutsun, but they are relatively few: just 120 trisyllabic verbs out of a total 1739 monomorphemic native verb stems; only two (apparently) monomorphemic native stems larger than three syllables are attested: *oTokame* 'to be spotted' and *wimurwikku* 'to lift, raise'. The distribution of verb stems by syllable count is shown below in Table 39.

Table 39. Verb stem distribution by syllable count

Syllables	**No. of stems**
1	2
2	1616
3	100
4+	2

As was the case for noun stems, the distribution of verb stems by syllable count was tested via a chi-squared goodness of fit test, and was found highly significant, χ^2 (3, N=1720) = 4376.428, $p < .001$.

As pointed out in Section 1.3.4, the four disyllabic stem templates (putting aside for the moment the distinction between C-final and V-final templates) are in a sense trivial, emerging automatically from a general (though not absolute) requirement that noun and verb stems be disyllabic, together with the restriction against long vowels in the second syllable of a disyllabic word, or word-finally. In other words, the four disyllabic templates represent all of the prosodically allowable combinations of two syllables.

However, not all templates occur with equal frequency, either within a lexical category (noun or verb) or between lexical categories. The skewed distribution of certain templates and characteristics among noun and verb stems is statistically significant, as I show below. The key facts are these: first, as mentioned above, most (573 of 700) disyllabic noun stems end in a consonant, and all but one disyllabic verb stems end in a vowel; and second, the cluster stem template accounts for far more verb stems than any other (949 of 1615 disyllabic stems). In Tables 40-43, I present the chi-squared goodness of fit tests (40-41) or tests of independence (42-43) used to establish each of these facts.

Table 40 tests whether the greater number of disyllabic (vs. all other size) noun stems is significant (monosyllabic, trisyllabic, and quatrisyllabic noun stems were grouped together as "not disyllabic").

Table 40. Chi-squared test: Noun stems by syllable count

Disyllabic	**Not disyllabic**
580	218
χ^2 (1, N=798) = 164.22, p < .001	

These results demonstrate that indeed, noun stems are significantly more likely to be disyllabic than any other size. Table 41 shows the same test for verb stems.

Table 41. Chi-squared test: Verb stems by syllable count

Disyllabic	**Not disyllabic**
1616	104
χ^2 (1, N=1720) = 1329.15, p < .001	

Again, the much greater proportion of disyllabic vs. non-disyllabic verb stems is highly significant.

In Table 42, the number of V-final and C-final stems (regardless of syllable count) is given for nouns and verbs, to test whether final C or V is independent of lexical category.

Table 42. Chi-squared test: Stems by lexical category (noun vs. verb) and final segment (V-final vs. C-final)

	V-final	**C-final**
Noun stems	225	573
Verb stems	1716	4
χ^2 (1, N=2518) = 1580.78, p < .001		

This test shows that the final segment of a stem (vowel or consonant) is strongly associated with lexical category (noun or verb): specifically, final C with nouns and final V with verbs.

Finally, since cluster stems constitute the largest single category of templatic verb stems, and more than half of all templatic verb stems, stem template type (cluster vs. non-cluster--i.e. light, long, geminate, and "other" (non-conforming)--disyllabic stems) was tested by lexical category (noun, verb) to determine whether being a cluster stem is independent of lexical category.

Table 43. Chi-squared test: Stems by lexical category (noun vs. verb) and template type (cluster vs. non-cluster)

	Cluster stems	**C-final**
Noun stems	102	478
Verb stems	946	670
χ^2 (1, N=2196) = 291.19, p < .001		

The significant result in this case shows that there is an association between lexical category and cluster vs. non-cluster stem templates, with cluster stems strongly associated with verbs. Cluster stems are the only template type with a significant positive

association with lexical category: a chi-squared test of geminate vs. non-geminate noun and verb stems was not significant, χ^2 (1, N=2196) = 2.58, p > 0.1. Chi-squared tests of light vs. non-light and long vs. non-long stem templates both yielded significant results (χ^2 (1, N=2196) = 104.10, p < .001 and χ^2 (1, N=2196) = 130.08, p < .001, respectively); however, in both cases, the association was a negative one: both noun and verb stems were more likely to be *non*-light (i.e., long, geminate, cluster, or irregular) than light and more likely to be *non*-long (i.e., light, geminate, cluster, or irregular) than long.

The data presented in this section point to several generalizations which, while not in all cases universal, are nevertheless morphophonologically significant. What they show is that Mutsun has stem templates, which are disyllabic templates that are specific to noun vs. verb stems.

Mutsun stem templates

1. Disyllabic templates are specific to noun and verb stems
2. Noun stems are C-final
3. Verb stems are V-final
4. Cluster stems are verbs

The significance of the associations between lexical category and stem-final vowel or consonant, as well as that between the cluster stem template and verbs, would certainly have psychological reality for speakers. That is, when confronted with an unfamiliar disyllabic stem, a speaker would tend to interpret it as a noun if C-final and as a verb if V-final, especially if it contained a medial cluster. I will also argue in a later section that the strong association between cluster stems and verbs makes it very likely

that any regular and productive pattern of verbal derivation outside the suffixing morphology (i.e. the verbalizers *-te* 'have X' and *-ti* 'be X') would yield new verb stems conforming to the cluster verb template.

3.1.3.2 Templatic behavior outside stem metathesis: Spanish infinitival loan verbs

Spanish verbs in the infinitival form invariably end in *-ar*, *-er*, or *-ir*. In loan verbs based on the Spanish infinitive (of which 19 are recorded), Mutsun epenthesizes a final *-i*, yielding nativized forms ending in final *-a(a)ri*, *-e(e)ri*, or *-i(i)ri*, as the examples in (38) illustrate.

(38)	a.	*paSSari*	'to travel'	*(< pasear)*
	b.	*orkari*	'to strangle'	*(< ahorcar)*
	c.	*wenteri*	'to sell'	*(< vender)*
	d.	*wistiri*	'to dress'	*(< vestir)*
	e.	*hukaari*	'to play'	*(< jugar)*
	f.	*mulaari*	'to sharpen'	*(< amolar)*
	g.	*wareeri*	'to sweep'	*(< barrer)*
	h.	*yunaari*	'to fast'	*(< ayunar)*

Okrand (1977:260-261) notes that final /i/-epenthesis derives vowel-final verbs (verbs are always vowel-final[25], as discussed in Section 3.1.3.1), which then behave like ordinary Mutsun verb stems, taking the usual native verbal suffixes. This can be seen below in (39), which shows suffixed forms of several of the verbs from (38).

[25] Okrand's view is that all *derived* verbs must be vowel-final (p. 260); see Section 3.2.1 for a discussion of Okrand's analysis of primary and derived verb stems in the reflexive and reciprocal inflections.

(39) a. *paSSariSmak*
paSSari *-smak*
to.travel -HPLNOM
'travelers'

b. *orkariy*
orkari *-y*
to.hang/strangle -IMP
'hang/strangle him!'

c. *wenteris*
wenteri *-s*
to.sell -DSTPST
'(someone) sold it'

d. *wistirin*
wistiri *-n*
to.dress -RECPST
'(someone) dressed him/her'

e. *hukaariyis*
hukaari *-yis*
to.play -ANDIMP
'go to play!'

f. *wareeriy*
wareeri *-y*
to.sweep -IMP
'sweep!'

What Okrand does not go on to observe, however, is that the infinitival forms themselves look prosodically exactly like Mutsun templatic verb stems with the addition

of a final suffix *-ri* (which we can think of as simply denoting Spanish verbal origin). Treating *-ri* as a suffix yields the following disyllabic bound stems:

(40) a. *paSSa-*
b. *orka-*
c. *wente-*
d. *wisti-*
e. *hukaa-*
f. *mulaa-*
g. *waree-*
h. *yunaa-*

Prosodically speaking, the "mini-stem" in (40a) fits the geminate stem template, while those in (40b-40d) match the cluster stem template; the stems in (40e-40h) conform to the light stem template, with a prosodically important alternation which will be discussed below. The neat fit between existing native Mutsun verb stem templates and these proposed Spanish-origin mini-stems is likely more than coincidental: while in some cases the mini-stems match the number of syllables in the original Spanish infinitives, in others, syllabic material has been deleted--in order, I would argue, to better conform to native Mutsun stem templates. The following examples show loan verb mini-stems (ignoring *-ri*) that do and do not match the syllable count of the original Spanish infinitives.[26]

[26] The syllable *structure* is not always precisely prosodically aligned, as a coda in the Spanish may correspond to an onset in the Mutsun or vice versa; rather, the correspondence between syllables in these examples is based on corresponding syllable nuclei.

(41) a. *ven*$_{\sigma}$ *der*$_{\sigma}$ 'to sell'
| |
wen$_{\sigma}$ *te*$_{\sigma}$ *[ri]*

b. *ves*$_{\sigma}$ *tir*$_{\sigma}$ 'to dress'
| |
wis$_{\sigma}$ *ti*$_{\sigma}$ *[ri]*

c. *a*$_{\sigma}$ *hor*$_{\sigma}$ *car*$_{\sigma}$ 'to hang/strangle'
| |
-- *hor*$_{\sigma}$ *ka*$_{\sigma}$ *[ri]*

d. *a*$_{\sigma}$ *mo*$_{\sigma}$ *lar*$_{\sigma}$ 'to sharpen'
| |
-- *mu*$_{\sigma}$ *laa*$_{\sigma}$ *[ri]*

e. *a*$_{\sigma}$ *yu*$_{\sigma}$ *nar*$_{\sigma}$ 'to fast'
| |
-- *yu*$_{\sigma}$ *naa*$_{\sigma}$ *[ri]*

f. *tra*$_{\sigma}$ *ba*$_{\sigma}$ *jar*$_{\sigma}$ 'to work'
| |
taw$_{\sigma}$ -- *ha*$_{\sigma}$ *[ri]*

In (41a-b), all of the syllables of the Spanish infinitive verbs are retained in the nativized Mutsun forms, but in each of the verbs in (41c-f), one syllable in the Spanish verb has been deleted in the Mutsun, and it is not the same syllable in every case: while in (41c-e) the deleted syllable is an initial /a/, in (41f) it is the nucleus /a/ of the second syllable (the onset /b/ is nativized to /w/ and becomes the first-syllable coda in the Mutsun verb).

As further evidence of the morphological reality of these disyllabic mini-stems formed from Spanish verbs, a number of other Spanish loan verbs appear to have been formed via truncation to disyllabic stems, rather than /i/-epenthesis.

(42)	a.	*halsa*	'to lift, raise'	*(< alzar)*
	b.	*teewe*	'to owe'	*(< deber)*
	c.	*tukka*	'to knock; to play music; to ring a bell'[27]	*(< tocar)*
	d.	*skohe*	'to choose'[28]	*(< escoger)*
	e.	*komhe*	'to confess'	*(< confesar)*
	f.	*piiso*	'to stomp on'	*(< pisotear)*
	g.	*monto*	'to pile up, stack'	*(< amontonar)*

In (42a-d), truncation is simply the deletion of the final -r of the Spanish verbs. The verbs in (42e-f), however, are formed by deleting the last one to two syllables of the Spanish verbs: /sar/ from *confesar* and /te.ar/ from *pisotear*. Finally, the stem *monto* (42g) is the result of deleting both the initial syllable /a/ and the final syllable /nar/ from Spanish *amontonar*. While these stems are truncated to varying degrees and at various places within the original verb, they all result in disyllabic, vowel-final Mutsun verbs, which is exactly what occurs in /i/-epenthesized verbs if *-ri* is treated as a suffix.

A final observation about the templatic nature of many Spanish loan verbs involves the lengthening or non-lengthening of the penultimate syllable vowel /a,e,i/ in *-ri* verbs. This vowel is lengthened only in loan verbs whose "mini-stems" match the

[27] Spanish /o/ is often, but not always, borrowed as /u/ in Mutsun, suggesting its quality may have been intermediate to Mutsun /o/ and /u/.

[28] The complex onset /sk/ violates Mutsun syllable structure, but is permitted presumably because it does not affect the prosody of the resulting stem.

Mutsun light stem template; when the mini-stem fits the geminate or cluster template (there are no examples of long stem Spanish loan verbs), vowel lengthening does not occur. To illustrate this, the stems in (38) are shown again below, labeled according to the template to which each mini-stem corresponds.

Table 44. Vowel lengthening in Spanish infinitival loan verbs

Stem template	**Mutsun verb**
Geminate	*paSSari*
Cluster	*orkari*
	wenteri
	wistiri
Light	*hukaari*
	mulaari
	wareeri
	yunaari

3.1.3.3 Comparison to other templatic languages

Mutsun noun and verb templates look strikingly similar to prosodic templates found in Yawelmani Yokuts[29] and in Semitic languages, though they are less

[29] Yawelmani Yokuts is one of "at most three" Yokuts dialects or languages, according to Callaghan (in press). Callaghan (1997, 2001) provides sets of apparent cognates between reconstructed Yokuts and Utian (Costanoan-Miwok) languages which suggest the possibility of a larger language family, dubbed "Yok-Utian", which includes Yokuts and the Utian languages. If this analysis is correct, Mutsun and Yawelmani Yokuts are distantly related.

morphologically specific, indicating lexical category only (vs. inflectional or derivational classes of stems).

In Yawelmani, regular verb stems conform to one of six shapes, depending on whether they contain two or three consonants (Archangeli 1983):

(43) **Yawelmani stem templates** (adapted from Archangeli 1983)

Biconsonantal stems	CVC	CVVC	CVCVV
	caw	*c'uum*	*hoyoo*
Triconsonantal stems	CVCC	CVVCC	CVCVVC
	ʔamc'	*diiyl*	*biniit*

In addition to these regular templates which are argued to be inherent or underlying in verb stems, further templates are imposed on regular stems by the addition of certain suffixes, so that stems with the underlying shapes in (43) surface with a prescribed prosodic shape in the presence of a given suffix, regardless of the stem's underlying template. Affix-imposed templates are shown below:

(44) **Yawelmani template-supplying suffixes** (adapted from Archangeli 1983)

Suffix	**Template**	**Examples**	**Underlying stem template**	
-(ʔ)iixo 'durative'	CVC(C)	*caw'eexot*	CVC	(*caw*)
		ʔamc'eexot	CVCC	(*ʔamc'*)
		c'um'eexot	CVVC	(*c'uum*)
		taw'teexot	CVVCC	(*taawt*[30])
		hoy'eexot	CVCVV	(*hoyoo*)
		low'neexot	CVCVVC	(*luuw'n*[31])
-wsiil 'refl./recip. adjunctive'	CVCVV(C)	*cawawsel*[32]	CVC	(*caw*)
		ʔamaac'iwsel[33]	CVCC	(*ʔamc'*)
		c'umowsol[34]	CVVC	(*c'uum*)
		diyeeliwsel	CVVCC	(*diiyl*)
		hoyowsel[35]	CVCVV	(*hoyoo*)
		bineetiwsel[36]	CVCVVC	(*biniit*)

[30] This is the underlying form assumed by Archangeli (1983); regular phonological processes unrelated to suffix-supplied templates prevent it from surfacing with a long vowel.

[31] This is the underlying form implicitly assumed by Archangeli (1983); regular processes of vowel lowering and shortening unrelated to suffix-supplied templates prevent it from surfacing in this form.

[32] The form *cawaaw-* does not surface here due to an independent process of closed vowel shortening; however, in Archangeli's (1983) analysis, this is the underlying template supplied by the suffix, and is in fact the surface stem shape in other *-wsiil* forms.

[33] The vowel /i/ between the stem and the suffix in this form, as well as in *diyeeliwsel* and *biineetiwsel* below, is epenthetic.

[34] The form *c'umoo-* does not surface here due to the same closed-syllable vowel shortening process as in *cawawsel*, but is assumed to be the underlying stem shape for this form.

[35] The form *hoyoo-* does not surface here due to the same closed-syllable vowel shortening process as in *cawawsel* and *c'umowsol*, but is assumed to be the underlying stem shape for this form.

Thus, in Yawelmani, templates can denote simply verbal status, as in (43); or certain verbal inflections, as in (44), much as Mutsun templates denote nouns and verbs (with statistical tendencies toward noun or verb depending on the specific template). As I showed in Section 3.1.3.1, Mutsun is similar to Yawelmani in having regular prosodic stem templates (though both languages also have irregular stems). In Mutsun, affixes do not impose templates on stems as do some Yawelmani suffixes, though due to phonotactic restrictions, certain shapes of suffixes can only occur with C-final or V-final stems (for example, -CCV suffixes such as *-ksi* 'intensive' can only attach to V-final stems because medial consonant clusters may not exceed two consonants[37]).

Mutsun stem templates also resemble, though with considerably less variety and morphological nuance, the extensive verbal templatic morphology of Semitic languages such as Arabic and Hebrew. In Semitic languages, specific prosodic templates are associated more or less predictably with particular morphosyntactic properties. Examples of four Arabic verb templates (in this case, for the infinitive or uninflected forms of verbs) are shown in Table 45.

---

[36] This form does not surface as **biniitiwsel* due to long-vowel shortening.

[37] This is a somewhat trivial point, however, since eleven of the twelve -CCV... suffixes are verbal, and verb stems are always V-final. Only one -CCV... suffix, *-kniS* 'diminutive', attaches to nouns, and is simplified to *-niS* when the preceding noun stem is C-final (e.g., *saTniS* 'little toasted thing', from *saT* 'toasted thing'; *hucekniS* 'dog', from the bound stem *hucek*, which we know is /k/-final since it alternates with the verb stem *hucke* 'to gather/hunt dogs'); in all other cases, the preceding noun stem is V-final.

Table 45. Arabic stem template examples (adapted from McCarthy 1981)

Template shape	**Example**	
CaC_iC_iaC	*ʕallam*	'to teach'
	kaððab	'to consider a liar'
	marraḍ	'to nurse'
CaaCaC	*kaatab*	'to correspond'
	raasal	'to correspond'
	saafar	'to travel'
□aC_iC_jaC	*ʔajlas*	'to seat'
	ʔaʔkal	'to feed'
	ʔašʔam	'to go to Syria'
$staC_iC_jaC$	*stawjab*	'to consider necessary for oneself'
	staslam	'to surrender oneself'
	stawzar	'to appoint as vizier'

Templates in Arabic, of which there are several dozen in total, also denote morphosyntactic properties such as reflexive, reciprocal, active, passive, perfective, etc. In Mutsun, templates are far more general, denoting simply noun or verb (though according to Callaghan's (in press) reconstructions, a more extensive system of morphophonological templates existed in earlier stages of the Utian language family).

Just as in Arabic, however, templatic form in Mutsun is highly predictive of morphosyntactic category, albeit within a narrower range of choices (noun vs. verb).

An additional parallel between the templatic morphology of Semitic languages and that of Mutsun has to do with the prosody of stems derived from loanword vocabulary. As I demonstrated in Sections 3.1.2.2 and 3.1.3.2, nouns borrowed from Spanish are fairly diverse in size (ranging from one to three syllables; in addition to the examples cited previously, a few four-syllable borrowed nouns are also attested) and prosodic shape (Spanish borrowings do not always conform to Mutsun prosodic restrictions). However, both Spanish loan verbs and denominal verbs derived from Spanish loan nouns are almost always disyllabic and vowel-final. A very similar pattern holds in Modern Hebrew, in which borrowed nouns and adjectives of a variety of lengths and prosodic shapes are derived to form disyllabic verbs conforming to one of several *binyan*, or verb stem templates. A few examples from Bat-El (1994) are shown below to illustrate this fact.

Table 46. Loan nouns and derived verbs in Modern Hebrew

Loan word		**Derived verb**	
1. *faks*	'facsimile'	*fikses*	'to fax'
2. *blof*	'bluff'	*bilef*	'to bluff'
3. *praklit*	'lawyer'	*priklet*	'to practice law'
4. *transfer*	'transfer'	*trinsfer*	'to transfer'
5. *ʔabstrakti*	'abstract'	*ʔibstrekt*	'to abstract'

Loan word		Derived verb	
6. *stenograf*	'stenographer'	*stingref*	'to take shorthand'
7. *pravoslavi*	'Orthodox Christian'	*hitpravslev*	'to become Orthodox Christian'[38]

The noun stems above range from one syllable (1-2) to two (3-4), three (5-6), and even four syllables (7); yet in every case, the derived verb form is disyllabic (*hit-* in *hitpravslev* is a prefix occurring on all denominal verbs of the *hitpa?el* binyanim, with *pravslev* the actual denominal verb stem). While Mutsun derivation of novel verb stems from Spanish loan nouns is restricted to the metathesizing stem pairs introduced in Section 3.1.2.2, of which there are only five (assuming that *tawah~tawhari* is indeed a case of metathesis; see the discussion following Table 28 as well as fn. 12 in Section 3.1.2.2 for discussion of this pair), a comparison of Spanish loan nouns vs. verbs shows more diversity in nouns compared to verbs. This can be seen in the following examples:

Table 47. Spanish loan nouns and verbs by syllable count

Syllables	No. loan nouns	No. loan verbs
1	11	0
2	92	26 (45)
3	74	23 (4)
4	11	3 (2)

[38] This gloss is from McCarthy (1984); Bat-El's (1994) gloss 'to perform a striptease' is presumed to be an error based on the immediately preceding verb in her example list.

The numbers in parentheses in the loan verbs column are the counts that result if Spanish infinitival loan verbs ending in /ri/ are interpreted as stems followed by a "loanword suffix" -*ri*, an analysis which I showed in Section 3.1.3.2 is supported by prosodic behavior of the stems in question. In other words, trisyllabic verb stems whose third syllable is /ri/ (e.g. *wenteri* 'to sell', *mulaari* 'to sharpen') are interpreted as suffixed disyllabic stems, while the single four-syllable loan verb containing final /ri/, *salutari* 'to greet', is treated as a suffixed trisyllabic stem. Under this analysis, loan verbs are seen to be much more restricted in their stem size--with only six of 51 stems containing more than two syllables, and none containing just one syllable--while noun stems, though tending to have two syllables, may have anywhere from one to four. Thus, like Modern Hebrew, verb stems in Mutsun would seem to have a more limited repertoire of prosodic shapes and sizes than do nouns.

The verbal paradigms of Hebrew, Arabic, and other Semitic languages are not unique in displaying templatic behavior, though they are perhaps the most well known and extensive examples. As alluded to earlier in this section, reduplication is another morphological operation which is characterized by prosodic templates in many languages. A comparison of certain prosodic aspects of Mutsun stem-deriving metathesis to those found in the reduplication paradigms of several languages strengthens the argument for analyzing stem-deriving metathesis as a many-to-one, thus noun-to-verb, derivation.

Reduplication, in which some portion of a "base" morpheme's phonological content is reduplicated, or copied, and affixed to the base as a separate morpheme (the "reduplicant") for inflectional or derivational purposes, is a well studied morpho-phonological operation which is often analyzed as templatic in nature (cf. McCarthy 1981 *et seq.* and references therein). This is because in many languages with reduplication, the reduplicant affix is a prosodically invariant unit such as a particular syllable type (light, heavy, or of a specified shape), a foot, etc. (though the base morpheme may be prosodically variable). Crucially, the reduplicant can be no larger than the base, and is often smaller. Examples from Ilokano (Table 48) and Kinande (Table 49) are shown in the following two tables.

Table 48. Reduplication in Ilokano (Hayes and Abad 1989)

Base morpheme		**Derived form with reduplication**	
1. *bu.neŋ*	'a kind of knife'	*si-bu-bu.neŋ*	'carrying a *buneng*'
2. *jya.ket*	'jacket'	*si-jya-jya.ket*	'wearing a jacket'
3. *pan.di.líŋ*	'skirt'	*si-pa-pan.di.líŋ*	'wearing a skirt'
4. *kal.díŋ*	'goat'	*kal-kal.díŋ*	'goats'
5. *bu.téŋ*	'afraid'	*naka-but.-bu.téŋ*	'very afraid'
6. *tra.bá.ho*	'to work'	*ʔag-trab-tra.bá-ho*	'is working'

The Ilokano data are from several different morphological paradigms, but prosodically they fall into two types: "light" reduplication (items 1-3), in which the initial CV of a base morpheme is copied; and "heavy" reduplication (items 4-6), in which the

initial CVC of a base is copied. Base morphemes vary from two to three syllables, and while in some cases the reduplicant is identical to the first syllable of the base (as in 1-2 and 4), the syllabification of reduplicants does not always match that of the base: in (3), the first syllable of the base *pan.di.líŋ* is CVC, but the reduplicant /pa/ is a light CV syllable; while in (5-6), base morphemes with light CV initial syllables have CVC reduplicants, matching the first 3 segments of the base but not a prosodic constituent. In Kinande reduplication, the reduplicant is identical in prosodic shape (though differing somewhat in tone) to a disyllabic noun stem (*oku-, aká-, omu-* are prefixes).

Table 49. Reduplication in Kinande (Mutaka and Hyman 1990)

Base morpheme		**Derived form with reduplication**	
1. *oku-gulu*	'leg'	*oku-gulu-gulu*	'a real leg'
2. *aká-húkà*	'insect'	*aká-húká-húkà*	'a real insect'
3. *omu-longò*	'village'	*omu-longo-longò*	'a real village'

It is often the case that that in a single language, reduplicants of one prosodic shape carry one meaning, while those of a different prosodic shape carry another meaning (though in Ilokano, "light" and "heavy" reduplicant templates each participate in several morphological paradigms). In Bontok, a light syllable (CV) reduplicant indicates intensive aspect in verbs and plural in nouns; a heavy syllable (CVC) reduplicant indicates progressive aspect in verbs and a derivational morpheme in nouns; and a minimally bimoraic foot (μμ) reduplicant marks repetitive aspect in verbs and a second

class of derivational morpheme in nouns (Thurgood 1997). Examples of Bontok light-syllable, heavy-syllable, and foot reduplication are given in Tables 50-52, with the reduplicant affix underlined; data are reproduced from Thurgood (1997).

Table 50. Bontok light syllable reduplication

Base morpheme		**Form with reduplication**	
1. *kamaŋan*	'to hurry'	*ka-kamaŋan*	'to hurry a lot'
2. *lima*	'arm'	*li-lima*	'arms'
3. *siki*	'leg'	*si-siki*	'legs'

In Bontok progressive reduplication (verbs) and derivational reduplication (nouns), the reduplicant affix consists of a heavy (CVC) syllable:

Table 51. Bontok heavy syllable reduplication

Base morpheme		**Form with reduplication**	
1. *ʔikkan*	'to do'	*ʔik-ikkan*	'is doing'
2. *payʔən*	'to put'	*pay-payʔən*	'is putting'
3. *ʔinti*	'sugar candy'	*ʔin-inti*	'herb having a sweet smell'

In Bontok repetitive reduplication (verbs) and a second type of derivational reduplication (nouns), the reduplicant affix consists of an entire (minimally bimoraic) foot:

Table 52. Bontok foot reduplication

Base morpheme		**Form with reduplication**	
1. *sayu*	'to splash water'	*sayu-sayu*	'to keep splashing water'
2. *yaŋgu*	'to dance (men)'	*yaŋgu-yaŋgu*	'keep on dancing (men)'
3. *sagni*	'to dance (women)'	*sagni-sagni*	'keep on dancing (women)'
4. *ʔamʔama*	'married man with children'	*ʔamʔa-ʔamʔama*	'old man'
5. *ʔinʔina*	'married woman with children'	*ʔinʔi-ʔinʔina*	'old woman'

In all of the examples above, the prosodic template (light syllable, heavy syllable, foot) for the reduplicant maps directly to an identical prosodic constituent of the base: If the reduplicant is a light (CV) syllable, the same phonological string in the base is also a light syllable, not merely the first CV of a heavy syllable; likewise, if the reduplicant is a heavy (CVC) syllable, the copied string in the base is also a heavy syllable, not for instance a light syllable plus the onset of another light syllable; and if the reduplicant is a foot, the copied phonological string in the base also constitutes a foot, rather than part of a foot or a foot plus part of a following syllable. However, as we saw in the Ilokano examples, this direct mapping of prosodic structure does not occur in all types of reduplication.

The relationship of a Mutsun metathesized verb stem to its corresponding noun stem is partially analogous to that between a base morpheme and its reduplicant in templatic reduplication:

- Mutsun metathesizing verb stems and reduplicants are prosodically invariant, while Mutsun metathesizing noun stems and base morphemes need not be.
- Mutsun metathesizing verb stems contain no more phonological material than their corresponding noun stems, and may contain less in the case of metathesis with trisyllabic nouns; just as reduplicants can be no larger than their base morphemes, and are often shorter.
- Prosodic constituents of a Mutsun metathesizing verb stem may correspond to prosodic constituents of its corresponding noun stem, but in the case of trisyllabic noun stems they may not; just as prosodic constituents of a reduplicant may or may not correspond to prosodic constituents of a base.

This last point echoes a major idea from McCarthy and Prince (1994:13):

> Whether the initial syllable of the base is closed or open has no effect on the affix; rather, the prosodic shape of the affix remains constant throughout a particular morphological category. Thus, it is the morphology--via the template--and not the syllabification of the base that is the determinant of the outcome. Reduplication specifies a templatic target, not a constituent to be copied.

The last line of the above quote is central to an understanding of stem-deriving metathesis. Like the prosodic templates that define reduplicants in many languages, stem-deriving metathesis in Mutsun is an operation which fulfills a templatic target (vowel-final cluster stems) to create new lexical items (verbs) based on "base"-like morphemes

(noun stems) which--once certain minimum size and consonant requirements are met--can vary in their prosodic structure.

3.1.3.4 Summary of stem-deriving metathesis

From all of the data discussed in this section, we can see that Mutsun stem-deriving metathesis is a way to derive verbs from nouns, with the derived verb meaning any activity or state related to the noun. All of the phonological, semantic, and cross-linguistic evidence from templatic morphology in other systems supports the conclusion that the direction of derivation is from the noun to the verb. More importantly, we also see that this type of metathesis in Mutsun bears strong similarities to the templatic morphology one finds in Semitic non-concatenative morphology and in reduplication in other languages. This supports the conclusion that this type of metathesis in Mutsun represents the effects of prosodic templates in the language's grammar.

3.2 Reflexive metathesis

I turn now to the second type of metathesis we will examine in Mutsun, in order to determine whether is also shows evidence of templatic morphology. "Reflexive metathesis" is a cover term referring to a pattern of stem metathesis attested only in the reflexive and reciprocal forms of some Mutsun verbs. Like stem-deriving metathesis, reflexive metathesis involves an alternation in the order of a contiguous consonant and vowel (CV metathesis) at the right edge of a stem. However, unlike stem-deriving

metathesis, reflexive metathesis is conditioned by one of two following suffixes, and does not change the morphological category of the affected stems. All verb stems which undergo reflexive metathesis are disyllabic, vowel-final cluster stems (containing a medial C_1C_2 consonant cluster) in their unsuffixed forms, and are thus prosodically (and in some cases lexically) identical to the verb stems derived by stem-deriving metathesis. In the presence of the conditioning suffixes, metathesizing reflexive verb stems are consonant-final disyllables which may be light, long, or geminate stems, and thus are prosodically parallel to three of the four shapes of metathesizing noun stem (there are no trisyllabic reflexive verb stems).

Reflexive metathesis is conditioned by the presence or absence of the reflexive suffix *-pu* or the reciprocal suffix *-mu* (*-mu*, though not rare--a concordance finds 128 instances--is much less frequently attested than *-pu*, which occurs in 1257 instances). When followed by either of these two suffixes, a metathesizing verb stem surfaces with a final VC string. In all other environments, the same stems surface in CV-final form. Several examples of stems demonstrating this alternation are given below.

Table 53. Reflexive metathesis

Reflexive/reciprocal form	**Bare stem**	**Suffixed stem**
hiwesmu 'to like each other'	*hiwse* 'to like'	*hiwsenin* 'liked'
namitpu 'to hear oneself'	*namti* 'to hear'	*namtis* 'hearing (n.)'
kappalmu	*kapla*	*kaplaSmin*

Reflexive/reciprocal form	Bare stem	Suffixed stem
'to hug each other'	'to hug'	'hugger'
heeyespu	*heyse*	*heyseSte*
'to shave oneself'	'to shave'	'shaven'

The alternations above illustrate the three prosodic variations which are possible in reflexive metathesis: Stems like *hiwes*/*hiwse* and *namit*/*namti*, whose C-final forms are of the type dubbed "light stems" by Callaghan (1992:39) because they contain a light first syllable; stems with a geminate medial consonant in their C-final form (Callaghan's "geminate stems"), exemplified by *kappal-* (the form **kapal-* is phonologically well-formed but unattested); and finally, stems containing a long first-syllable vowel in C-final form (Callaghan's "long stems"), exemplified by *heeyes-* (**heyes-, *heyyes-*). In their V-final forms, all three stem types conform to an identical (C)VC_1C_2V prosodic structure, characterized by a medial consonant cluster (Callaghan calls such stems "cluster stems"). As the examples above show, V-final stems occur not only when affected stems are unsuffixed, but when followed by any inflectional (*-ni* 'inherent reflexive', *-Ste* 'perfective') or derivational (*-s*, *-Smin* 'nominalizer') suffix other than *-pu* or *-mu*.[40]

[40] There are eight instances of isolated exceptions to this generalization (out of a total 365 words/631 tokens) containing a C-final verb stem + *-pu* or *-mu*. The andative suffix *-na* occurs twice with the C-final form of a verb stem, in *tapurna* 'to go to get wood' (elsewhere *tapruna*) and *tɯSirna* 'to go to get kindling' (cf. noun *tɯSir* 'kindling'; a verb **tɯSri* is unattested). Likewise, the excessive/derogatory nominalizer *-paN* occurs twice with C-final verb stems, in *wayispaN* 'angry/offended one' (cf. *wayispu* 'to be offended'; V-final **waysi* is unattested) and *maherpaN* 'one who always sticks out the tongue' (cf. *mahre*, *maherpu* 'to stick out one's tongue'). The causative suffix *-si* occurs once with a C-final stem in *kapalsi* 'to cause to hug' (cf. *kapla* 'to hug', *kappalmu* 'to hug each other'), and a homophonous suffix *-si* whose meaning is not entirely clear (but which in at least some entries appears to mean 'just') occurs with C-final stems in *cooholsi* '(just?) be full of holes' (cf. *cohol* 'hole', *cohlo* 'to be full of holes'), *caakulsi* 'to

As mentioned above, reflexive metathesis affects some stems, but not others: Many verb stems never surface in C-final form even in the presence of the reflexive and/or reciprocal suffix, as the data in Table 54 show:

Table 54. Reflexive forms with no metathesis

Reflexive/reciprocal form	**Bare stem**	**Suffixed stem**
hiswipu 'to give birth'	*hiswi* 'to give birth'	*hiswin* 'gave birth'
tipkipu 'to cut one's hand'	*tipki* 'to cut the hand'	*tipkiSte* 'hand is cut'
pistumu 'to pinch each other'	*pistu* 'to pinch'	*pistus* 'hugger'
heeyespu 'to shave oneself'	*heyse* 'to shave'	*heyseSte* 'pinched'

The stems in Table 54 are prosodically identical to the V-final stem shapes in Table 53--i.e., they are cluster stems--yet they do not surface in C-final form even when suffixed with *-pu* or *-mu* (the phonotactically possible forms **hi(i)s(s)iwpu, *ti(i)p(p)ikpu, *pi(i)s(s)utmu* are unattested, and **tipikpu* is explicitly denied by Mrs. Cervantes). Of all medial-cluster verb stems, 50 follow the pattern in Table 54, i.e. they are attested in vowel-final form even when suffixed with *-pu* or *-mu*. Another 97 are attested in C-final (metathesized) form with one or both of the conditioning suffixes, like the examples in Table 53. Approximately 600 other medial-cluster verb stems do not

(just?) bend over' (cf. *caklu* 'to bend over', *caakulpu* 'to bend oneself over'), and *aTeysi* 'to (just?) be different' (cf. *aTye* 'to be different').

occur anywhere in the data with either the reflexive or the reciprocal suffix, so that it is impossible to know which of them might undergo reflexive metathesis.

Table 55. Verb stem forms with reflexive and reciprocal suffixes

V-final refl./recip.	**C-final refl./recip.**	**Unattested with refl./recip.**
50	97	600

In addition to metathesizing, non-metathesizing and unattested reflexive/reciprocal stems, the data contain a small number of "variable" stems. Variable reflexive stems are those which are attested in both V-final and C-final forms with one or the other of the conditioning suffixes. In all, nine verb stems are variably attested; these are listed in (45), with the number of attested instances of each form in parentheses.

(45) a. *waysamu (2), wa(a)yasmu (5)*
'to be enemies (of each other)'

b. *hiwsepu (2),* *hiwesmu (1)*
'to like/love oneself' 'to love each other'

c. *inhapu (1), inahpu (3)*
'to get sick'

d. *istupun (1), isutpu (1), isutpin (1)*
'to dream'

e. *kutrapu (1), kuTrapu (1), kuTarpu (8)*
'to put on one's belt'

f. *mopTupuy (2), moppuTpuy (2)*
'close your mouth!'

g. *okyepu (3), okeypu (2)*
'to confess'

h. *Sotyopu (4), Sotoypu (2)*
'to tie one's hair in a ponytail'

i. *haywepu (3), haywemu (2), haweymu (1)*[41]
'to see oneself' 'to see each other'

In some cases, the appearance of variable stems may be largely due to language attrition: Mrs. Cervantes was not always certain of the correct form of a word, and sometimes admitted more than one possible form. Another possibility is that Harrington may have pushed too hard for a particular form, so that she allowed that the form might be possible even if she was not sure. For example, in eliciting the reflexive form of the verb *okye* 'to confess', Harrington (1922, 1929-30:43/0211) commented as follows (the first line is his comment copied verbatim; the second is paraphrased, with Mutsun words in standard orthography):

> *"On going over it again, thinks both 'okyepu and 'okeypu are words, always vs. 'ok.yepu."*
> On going over it again, [Mrs. Cervantes] thinks both *okyepu* and *okeypu* are words, always volunteers *okyepu*.

Similarly, when asked for a re-elicitation of the Arroyo (1862:1960) entry *isutpin* 'dreamed' (*-pi* is an older variant of *-pu* that appears frequently in Arroyo's data), Mrs. Cervantes did not know the form, but Harrington (1922, 1929-30:42/0720) wrote that she

[41] The expected C-final form of this stem, **ha(a)yew*, is unattested.

"thinks *issupun-ka* would be usable...but would say *istupun-ka*"[42] to mean 'I dreamed'; while in another entry she "guesses *isutpu*"[43] (ibid). Multiple entries elsewhere suggest that Mrs. Cervantes was quite familiar with the verb stem *istu* 'to dream' (and, to a lesser extent, the noun stem *issut* 'dream (n.)'; see Section 3.1 for detailed discussion of noun and verb stems related by metathesis) in other morphological contexts. In fact, there are 18 tokens of *istu* without *-pu* (usually with inherent reflexive *-ni*/*-n* instead) and only four with, so the variability on this form may reflect Harrington trying too hard to elicit the verb with a suffix it did not usually take.

For a few stems, such as *waysa-* 'to be an enemy' and *inha-* 'to get sick', Mrs. Cervantes admitted to both a C-final and a V-final reflexive or reciprocal form without appearing to prefer one over the other. For the stem *Sotyo* 'to tie hair in a ponytail', she admitted both *Sotyopuy* and *Sotoypuy* 'tie your hair in a ponytail!', but commented explicitly that she "remembers that she heard them say" the latter (C-final stem) form Harrington (1922, 1929-30) ("them" probably refers to her parents).

Mrs. Cervantes's variable acceptance of such stems suggests a range of possibilities. On the one hand, her uncertainty may be due to having rarely, if ever, heard the stem with *-pu* or *-mu*, so that she in effect never learned whether the stem in question was a metathesizing stem. Since Mutsun was already severely endangered when she was acquiring it from her parents, gaps in her lexical knowledge are hardly surprising. On the

---

[42] Verbatim: "thinks ’íssupuŋ ka would be usable...but wd. say ’iṣtupuŋká"

[43] Verbatim: "Adivina ’iṣutpu"

other hand, if reflexive metathesis was diachronically in transition, some stems might have been ambiguously attested, with both metathesizing and non-metathesizing forms in use. Finally, some of her uncertainty may be attributable to her poor health at the time Harrington worked with her: given so many other metathesizing forms in the language, she may have over-generalized the phenomenon in some cases. She may also have wanted to be agreeable in her work with Harrington, and he suggested many forms repeatedly, in effect priming them.

3.2.1 Okrand's analysis: Reflexive metathesis as underlying consonant-final stems

Okrand (1977:113-114, 223) analyzes the consonant-final verb stem forms which co-occur with *-pu* 'reflexive' and *-mu* 'reciprocal' suffixes as "primary" or underlying (e.g. *kappal-* as in *kappalmu* 'to hug each other'), and their metathesized vowel-final forms—which surface with all other suffixes and in bare stems (e.g. *kapla* 'to hug', *kaplay* 'hug!' [*-y* 'imperative'])—as derived. This approach is presumably based on the predictability of stem shapes: given a consonant-final stem form, the metathesized vowel-final form is predictable from Mutsun phonotactics, but the reverse is not true. To illustrate this observation, let us take as an example the verb stem *liwka* 'to hide', which surfaces as *liiwak-* in the reflexive form *liiwakpu* 'to hide oneself'. Given these two stem forms, and assuming that one is derived from the other, the possibilities for the direction of derivation and for the resulting derived stem shapes are as shown in (46) (syllable boundaries are indicated with a period):

(46) **Hypothetical stem derivations in reflexive metathesis**

a. *lii.wak → liw.ka, *liiw.ka*

b. *liw.ka → *li.wak, lii.wak, *liw.wak*

In this example, derivation via metathesis from a C-final form to a V-final form as in (46a) is predictable in that only one phonotactically well-formed stem shape, namely *liwka*, results. This is because simple CV metathesis of /ak/ → /ka/ creates a closed first syllable /liiw/, which requires vowel shortening since super-heavy syllables, e.g. (C)VVC, are prohibited in disyllabic Mutsun morphemes (Okrand 1977:88-89; see Section 1.3.4 for discussion and examples). A derivation via metathesis from a primary stem *liwka* as in (46b), however, could result in any of the three phonotactically acceptable consonant-final stems shown in the example. In fact, however, only *liiwak* (CVVCVC) is attested.

With other stems, however, the C-final forms in *-pu*/*-mu* constructions may have different prosodic shapes. Some stems surface in C-final form as (C)VCVC (light stems) as in *pasik-* 'to visit', which parallels unattested **liwak-* in (46b); while others are realized as (C)VC:VC (geminate stems) as in *liccey-* 'to stand', paralleling the unattested form **liwwak*. Finally, of course, it bears repeating that not all medial-cluster verb stems have a consonant-final form with *-pu* or *-mu* (see examples in Table 54). Thus, whether metathesis occurs at all in this context cannot be predicted given only a V-final verb stem. It is thus simplest, in a formal sense, to assume that metathesis derives V-final stem forms from C-final forms, rather than the reverse. This is clearly similar to the argument

made for stem-deriving metathesis in Section 3.1.2 above. The predictability relationship is illustrated graphically in Table 56.

Table 56. Attested stem derivations in reflexive metathesis

C-final stem forms			derivation	V-final stem form
(C)VCVC	**(C)VVCV**	**(C)VCCV**	**↔**	**(C)VCCV**
**liwak-*	*liiwak-*	**liwwak-*		*liwka*
pasik-	**paasik-*	**passik-*		*paski*
**licey-*	**liicey-*	*liccey-*		*licye*
**pisut-*	**piisut-*	**pissut-*		*pistu*

Given only the V-final form of these verb stems (i.e. assuming a leftward direction of derivation in this graph), it cannot be predicted which shape the C-final form will take (if any), since all three phonotactically permissible possibilities occur for at least some stems in the data. Assuming that the V-final stem form is the result of derivation via metathesis rather than the underlying form (i.e. assuming a rightward direction of derivation in the graph) simplifies derivation since multiple underlying C-final stem shapes all result in the same V-final derived stem shape, namely (C)VCCV.

Okrand does not attempt to formulate a theoretical analysis of reflexive metathesis, since the primary purpose of his work is descriptive. Reflecting the emphasis of phonology at the time on choosing the underlying forms that make as many patterns as possible predictable, he also does not account for the fact that his 'primary' (underlying) verb stems only surface before specific (not phonologically unique) suffixes. Later, both

Okrand (1979) and Adams (1985, citing Okrand 1977) speculate that metathesis in stems may have had its roots in the avoidance of CCC clusters, which would have arisen if underlying C-final verb stems were concatenated with CC-initial suffixes such as *-ksi* 'intensive' or *-Ste* 'perfective'. In order for this analysis to work, it must be assumed that the many medial-cluster verb stems which surface as V-final even before the reflexive and/or reciprocal suffix, like *pistu*, are either underlyingly V-final (they never had C-final forms), or else underwent CV metathesis in all contexts including the reflexive and reciprocal (perhaps by analogy with their behavior with CC-initial suffixes, since a C-final stem + *-pu/-mu* would result in perfectly acceptable CC (not CCC) clusters). The historical process would therefore be something like the following (hypothetical historical stem forms indicated with *):

1. Oldest stage: (At least some) verb stems are C-final:

**hassak* 'to scratch', **moppuT* 'to close the mouth'

2. Suffixation creates CCC clusters in some environments, but only CC in others:

**hassak-Ste* 'to be scratched', **hassak-pu* 'to scratch oneself', **hassak-si* 'to cause to scratch'

3. Syllable structure is simplified, making CCC clusters ungrammatical; clusters repaired by metathesis:

haska-Ste 'to be scratched', **hassak-pu* 'to scratch oneself', **hassak-si* 'to cause to scratch'

4. Regularization metathesizes C-final verb stems in most environments:

**hassak-pu* → *haska-pu* 'to scratch oneself', *haska* (unsuffixed) 'to scratch', *haska-si* 'to cause to scratch', *mopTu* 'to close the mouth', *mopTu-si* 'to cause to close the mouth'

5. Some unmetathesized stems remain as historical residue only before -pu/-mu:

moppuT-pu 'to close one's mouth'

Such a sequence of events, which seems implausible, raises at least two questions. First, since reflexive metathesis synchronically affects only medial-cluster verb stems (those stems whose V-final alternations contain a medial C_1C_2 cluster), does this mean that only medial-cluster stems were originally consonant-final (or indeed, that all of them were)? There is no evidence in the Mutsun data to suggest that other verb stem types (vowel-final light stems and geminate stems, such as *koco* 'to make fun of' or *amma* 'to eat') were ever C-final or are the result of metathesis. Secondly, if C-final stems are in fact the vestiges of an earlier C-final form of verb stems, why do they persist only in the reflexive and reciprocal forms? Some hints as to the answer to the first question can be found in related languages (see discussion in Chapter 4). The second question may not have a conclusive answer, but it is interesting that at least one other verbal suffix with the prosodic shape CV, *-na* 'to go to do', is attested twice with C-final stems in the forms *tuSirna* 'to go to get kindling' (cf. *tuSir* 'kindling') and *tapurna* 'to go to get wood' (cf. *tappur* 'wood' but *tapru* 'to gather wood'). The latter word is recorded by Mason (1916:7) along with the more frequently attested form *tapruna*, but *tuSirna* is recorded by the more phonetically reliable Harrington, who wrote that Mrs. Cervantes "says this is the way and not *tusʸrinaka [**tuSrina-ka* 'I go to gather kindling']" (1922, 1929-30:43/0121). This offers some slim suggestion that C-final verb stems may have persisted later in the language's history when followed by CV suffixes.[44]

[44] Alternatively, *tuSir-na* may be an instance of a noun (irregularly) taking the verbal suffix *-na* to create a denominal verb. The possibility of normally verbal suffixes attaching to noun stems is discussed below.

Another possibility is that the metathesizing verb stems before *-pu*/*-mu* are derived from older noun forms. Prosodic and semantic relationships between certain noun stems (and types) and metathesizing reflexives/reciprocals are suggestive of a historical/grammatical connection between reflexive metathesis and stem-deriving metathesis.

Metathesizing reflexive stems (stems whose reflexive and/or reciprocal form is attested as C-final) are, in their C-final forms, prosodically indistinguishable from three common disyllabic, C-final noun stem types: light stems, long stems, and geminate stems. Three prosodically identical stem pairs in Table 57 illustrate this fact.

Table 57. Prosodic comparison of templatic noun stems and C-final reflexive verb stems

	Noun stem	**C-final reflexive (bound) verb stem**
Light stem (C)VCVC	*ereT* 'piece of money'	*pasik-* 'to visit'
Long stem (C)V:CVC	*hiipur* 'wooden digging stick'	*liiwak-* 'to hide'
Geminate stem (C)VC:VC	*kaTTak* 'nape of the neck'	*kappal-* 'to hug'

In some cases, we find that there is a noun stem which is identical (or nearly so) to a C-final reflexive or reciprocal stem, as is the case for the five stems in Table 58 (reflexive/reciprocal suffixes are in brackets).

Table 58. C-final reflexive verb stems with prosodically similar noun stems

Noun stem	**C-final reflexive verb stem**	**V-final verb stem**
waayas 'enemy'	*waayas[mu]* 'to be enemies of each other'	*waysa* 'to be an enemy'
hunnuh 'snot, mucus'	*hunnuh[pu]* 'to blow one's nose'	*hunhu* 'to blow one's nose'
heesen 'nest'	*hesem[pu]* 'to make oneself a nest'	*hesne* 'to make a nest'
heewes 'shadow, shade'	*hewes[pu]* 'to look at one's reflection'	--[45]
ahhes 'soaproot brush'	*ahhes[pu]* 'to brush one's hair'	*ahse* 'to brush'[46]

The question raised by noun/reflexive stem pairs is 1) whether the nouns are derived from the reflexive/reciprocal forms of certain metathesizing verb stems (in which case, we would have to assume forms like **hewse* even where they are unattested); 2) whether the reflexive/reciprocal constructions are in fact exceptional forms, with *-pu* and *-mu*--normally exclusively verbal suffixes--occasionally attaching to noun stems, yielding derived verbs meaning roughly 'to enemy each other', 'to brush oneself', 'to snot oneself', 'to nest oneself' (presumably some semantic drift is involved in the derivation

[45] The expected V-final verb stem **hewse* is unattested; a related exceptional C-final form *hewes* 'to shade, to make shade', however, is recorded once by Arroyo (1862:902), but its well-formedness is uncertain.

[46] Mrs. Cervantes was uncertain whether *ahse* could be used (Harrington 1922, 1929-30:38/0003).

from 'shadow + reflexive' to 'to look at one's reflection')[47]; or 3) whether some noun/verb pairs can be homophonous.

A few additional reflexive/reciprocal constructions with non-metathesizing stems support one of the latter two interpretations. The reflexive verb *rukkapu* (cf. stem *rukka* 'house') is recorded as meaning 'to build oneself a house', and the word for 'village' was documented by Merriam as *rukamuksi*[48], which appears to consist of the stem *rukka* + suffixes *-mu* 'reciprocal' and *-ksi* 'intensive'. These are the only two instances in which *rukka* is used with verbal meaning, alone or in combination with other suffixes (though a related verb *ruksa*, attested five times and likely from *rukka* + *-s-* 'many do/do repeatedly', may mean 'to make a house', 'to hang out unwanted in others' homes', or 'to enter/be in some place'). Parallel to these low-frequency constructions with *rukka* is the reflexive *sinnipu* 'to turn into a child, be childlike', related to *sinni* 'child', a common noun which only behaves like a verb in the reflexive and in one recorded instance of *sinniSmin* 'childish one', with the nominalizer *-Smin* 'one characterized by'; analogous to *ruksa*, there are also two strictly verbal forms, *sinsi* and *sinyi*, attested four and five times respectively and both glossed as 'to be childlike'.

Two additional reflexive forms seem to be closely related to nouns. The verb *mucuupu* 'to eat breakfast/lunch' (with no apparent literal reflexive meaning; idiomatic

---

[47] There is also a parallel example in which the reflexivized stem is not a noun: the adverb *huSun* 'further on', *huSum-pu* 'to move oneself further on'

[48] As discussed in Section 2.1.2, Merriam's transcription of both vowel and consonant length is highly unreliable, so the short /k/ here is not problematic.

use of *-pu* is common) is well attested, but the expected verb stem *mucu* occurs only once in a non-reflexive construction; however, the noun *muccuw* 'breakfast/lunch' is well attested, and occurs twice in the alternate form *muccup*. Harrington (1922, 1929-30:42/0646)[49]. There is no Mutsun nominalizer *-w* (or *-p*), so that if *muccuw* is derived from the verb *mucu* it is not through any regular nominalization process; however, in a reflexivized noun scenario, *muccuw* + *-pu* could easily have been reinterpreted phonetically as /muccuupu/, with subsequent shortening of the medial geminate /cc/ (to avoid contiguous heavy syllables) yielding the attested *mucuupu*. The second reflexive form which looks like a possible reflexivized noun construction is *nossowpu* 'to breathe' (or possibly 'to sigh'), related to the noun *nossow* 'breath, spirit' and the verb *noswe* 'to breathe'. The expected reflexive **noswepu* (or **nossewpu*, in a reflexive metathesis paradigm) is unattested.

In any case, there is not sufficient evidence in the remaining record of Mutsun (or the Costanoan languages generally) to make a conclusive case for how reflexive metathesis developed diachronically. From a synchronic perspective, the key observation is that reflexive metathesis *resulted* in V-final cluster stem verbs, with just a small, lexically specified, subset of verbs retaining their underlying C-final forms in the presence of the reflexive and/or reciprocal suffixes.

---

[49] Reflexives in Chocheño and Rumsen sometimes delete the final vowel, yielding /p/-final forms analogous to *muccup*, which raises the possibility that an entire reflexive verb construction might be used as a noun; on the other hand, /p/ and /w/ are both bilabials and the /p/-final form may be phonetic or phonological rather than a morphological reflexive.

3.3 Comparison of stem-deriving metathesis and reflexive metathesis

In their prosodic structure, the noun stems in examples (28-31) (e.g. *howos* 'sweet potato', *cuutuk* 'fever', *maTTer* 'tobacco') are indistinguishable from the C-final verb stem shapes discussed above in Section 3.2. In some cases, the same verb stem may participate in both stem-deriving and reflexive metathesis, with a V-final stem alternating with both a C-final noun (stem-deriving metathesis) and a C-final verb form (reflexive metathesis), though the two C-final forms are not always prosodically identical. Several such stem sets are shown in (47); where the reflexive and noun stem forms differ in their prosodic shape (vowel/consonant length), those differences are underlined.

(47)

Verb stem	**Reflexive stem**	**Noun stem**
aThi 'to vomit'	*a̲Tihpu* 'to vomit on oneself'	*a̲a̲Tih* 'vomit (n.)'
cayci 'to be strong'	*cayicpu* 'to do with all one's might'	*cayic* 'strength'
hemce 'to be one'	*hemecpu* 'to do/be once'	*hemec'a* 'one'
heyse 'to shave, have a beard'	*he̲yespu* 'to shave oneself'	*he̲e̲yes* 'beard'
hinsu 'to know'	*hi̲nuspu* 'to feel'	*hi̲n̲us* 'knowledge'
hotho 'to put on shoes'	*hottohpu* 'to put shoes on oneself'	*hottoh* 'shoes'
hunhu 'to have mucus, to be snotty'	*hunnuhpu* 'to blow one's nose'	*hunnu(h)* 'mucus'
iTka	*iTakpu*	*iTak*

'to pay'	'to pay, to reward'	'payment'
istu	*isutpu*	*issut*
'to dream'	'to dream'	'a dream'
sepke	*seppekpu*	*seepek*
'to cut the beard'	'to cut one's beard'	'beard'
tohre	*toherpu*	*tooher/tohher*
'to cough'	'to cough'	'a cough'
Tawra	*Takkarpu*	*Taawar*
'to sit, stay, reside'	'to sit down'	'chair'

When the C-final stem forms in the two metathesis patterns differ prosodically, it is typically the reflexive metathesis C-final form which has a short first-syllable vowel (*aTih-pu*) or medial consonant (*isut-pu, toher-pu*) while the noun stem has a long vowel (*aaTih*) or consonant (*issut, tohher*). In fact, in all but four of the above examples, the reflexive forms are light stems, while only three of the noun stems (*cayic*, *hemec'a*, *iTak*) are light. Again, this is similar to the situation and argumentation for stem-deriving metathesis.

3.4 Suffix metathesis

We turn now to the third type of metathesis found in Mutsun, metathesis within the suffixes. A pattern of phonological metathesis has long been noted in two high-frequency Mutsun suffixes, the plural *-mak/-kma* and the locative *-tak/-tka*: the alternating forms of each suffix are documented extensively by Arroyo (1861, 1862) and Harrington (1922, 1929-30), and their metathesis is discussed explicitly by Mason (1916:405, 409-410), Okrand (1977:108; 1979:127-128), Hume (1998b) and others. As I

will explain below, a similar type of metathesis also occurs in one encliticizing morpheme, the desiderative/irrealis *=tukne/=tkun*; this latter fact seems to have been overlooked due to its much lower frequency of occurrence in the Mutsun data (*=tukne* occurs 43 times and *=tkun* 50 times, versus 926 tokens of *-mak*/*-kma* and 804 of *-tak*/*-tka*).[50] Because the same alternations occur and are triggered by the same phonological conditioning environment, I use the term "suffix metathesis" to include metathesis in both suffixes and the enclitic. Briefly, suffix metathesis is consonant-vowel (CV) metathesis which is specific to the three morphemes mentioned (the plural and locative suffixes and the desiderative/irrealis clitic), and is conditioned by the final segment of the preceding stem.

In suffix metathesis, CVC forms[51] of the affected morphemes (*-mak*, *-tak*, *=tukne*) surface when the preceding stem is consonant-final; but when preceded by a vowel-final stem, the CCV forms *-kma*, *-tka*, *=tkun* occur instead.

Examples of C-final and V-final suffixed/encliticized stems for all three suffixes/enclitics that alternate are given in Tables 59-64 to illustrate this alternation. Tables 59-60 exemplify the plural suffix alternation.

---

[50] The plural suffix *-mak*/*-kma* undergoes an alternation in the relative order of the consonants /m/ and /k/ in addition to CV metathesis. Possible motivations for the reordering of consonants (which occurs only in this suffix) are discussed at the end of this section.

[51] In the case of *=tukne*, the clitic is not just CVC but CVCCV; likewise, its alternate (metathesized) form *=tkun* is CCVC rather than CCV. However, the form *=tukne* will be referred to as the CVC form for simplicity, parallel to the *-mak* and *-tak* forms of the suffixes; and in keeping with *-tka* and *-kma*, *=tkun* will be referred to as the CCV form of the enclitic.

Table 59. Plural *-mak* with C-final noun stems

C-final noun stem		**Stem + plural**	
weeren	'rabbit'	*weeren<u>mak</u>*	'rabbits'
wimmah	'wing'	*wimmah<u>mak</u>*	'wings'
muuSek	'bird'	*muuSek<u>mak</u>*	'birds'
tuupuy	'tail'	*tuupuy<u>mak</u>*	'tails'
moohel	'head'	*moohel<u>mak</u>*	'heads'

Table 60. Plural *-kma* with V-final noun stems

C-final noun stem		**Stem + plural**	
luppe	'flat bulrush'	*luppe<u>kma</u>*	'flat bulrushes'
ama	'person; body'	*ama<u>kma</u>*	'people; bodies'
rukka	'house'	*rukka<u>kma</u>*	'houses'
mukurma	'woman'	*mukurma<u>kma</u>*	'women'
koro	'foot, leg'	*koro<u>kma</u>*	'feet, legs'
sinni	'child'	*sinni<u>kma</u>*	'children'
paraatYu	'woodpecker'	*paraatYu<u>kma</u>*	'woodpeckers'
seemo	'dead one'	*seemo<u>kma</u>*	'dead ones'

Metathesis in the locative suffix, which like the plural *-mak*/*-kma* attaches exclusively to nouns, is structurally nearly identical to plural suffix metathesis, as shown in Tables 61-62:

Table 61. Locative *-tak* with C-final noun stems

C-final noun stem		**Stem + locative**	
akkas	'north'	*akkastak*	'in the north'
muruT	'darkness'	*muruTtak*	'in the dark'
Taawar	'seat'	*Taawartak*	'in/on the seat'
somsom	'armpit'	*somsomtak*	'in the armpit'
sottow	'fire'	*sottowtak*	'in/by the fire'
lot	'mud'	*lottak*	'in the mud'

Table 62. Locative *-tka* with V-final noun stems

C-final noun stem		**Stem + locative**	
huttu	'belly'	*huttutka*	'in the belly'
Taala	'sunshine'	*Taalatka*	'in the sunshine'
kalle	'sea'	*kalletka*	'in/by the sea'
seemo	'armpit'	*seemotka*	'among the dead'
paarani	'hill'	*paaranitka*	'on the hill'

Finally, "suffix" metathesis in the desiderative/irrealis enclitic looks much like plural and locative metathesis; however, the enclitic attaches to a clause-initial word, regardless of lexical category:

Table 63. Desiderative/irrealis enclitic =*tukne* with C-final words

C-final initial word		**Initial word + desiderative/irrealis**	
koc	'if/when'	*koc-tukne*	'if it were'
kaan	'I'	*kaan-tukne*	'if I...'

Table 64. Desiderative/irrealis enclitic =*tkun* with V-final words

V-final initial word		**Initial word + desiderative/irrealis**	
hara	'to give'	*hara-tkun*	'would give'
hooyo	'to grab'	*hooyo-tkun*	'would grab'

These forms demonstrate that it is the categorical distinction of consonant vs. vowel, rather than any narrower phonological criteria within those categories (such as vowel height, sonorance, etc.) which triggers metathesis. The final consonants of the stems in Tables 59, 61, and 63 include voiced and voiceless consonants, glides (*tuupuy*, *sottow*), liquids (*moohel*, *Taawar*), fricatives (*wimmah*, *akkas*), nasals (*weeren*, *somsom*, *kaan*), affricates (*koc*), and stops (*muuSek*, *muruT*). Conversely, the entire Mutsun vowel inventory /a,e,i,o,u/ is represented in the final vowels of the stems in Tables 60, 62, and 64.

Evidence for the productivity of suffix metathesis (at least in the plural and locative suffixes, for which the most data is available) is twofold: first and most obviously, exceptions to metathesis in suffixes are vanishingly rare, occurring for example in a single instance of *siitak* (*sii* + *-tak* 'in the water', elsewhere *siitka* [16

instances; also 5 instances of *sitka* recorded by Arroyo, probably for *siitka*]) and in the place name *waranitak* (*wara* 'to cut' + *-ni* 'inherent reflexive' + *-tak*), attested once by Merriam, in which *-tak* functions as an indicator of place name status.[52] Secondly, the two high-frequency metathesizing suffixes (*-tak*/*-tka* and *-mak*/*-kma*) are found attached to Spanish loan words, in CVC form after C-final nouns and CCV form after V-final nouns. A few examples are given in (48) to demonstrate the fact that suffix metathesis with loanword vocabulary is indistinguishable from that which occurs with native stems.

(48) **Suffix metathesis with Spanish loan words**

a. *kooral-**tak*** 'in/to the corral'

b. *miSon-**tak*** 'at the Mission'

c. *ramaata-**tka*** 'in the ramada'

d. *hileeSa-**tka*** 'in/to the church (<*iglesia*)'

e. *huuwas-**mak*** 'grapes (<*uvas*)'

f. *muuhas-**mak*** 'nuns, virgins (<*monjas*)'

g. *haltiya-**kma*** 'underskirts (<*faltilla*)'

h. *waaka-**kma*** 'cows (<*vaca*)'

For the (relatively few) Spanish loan words ending in a consonant, the locative and plural suffixes surface as *-tak* and *-mak*, respectively, just as with Mutsun stems; while with the more common vowel-final Spanish loan words, the locative metathesizes

[52] This example would seem to suggest that *-tak*, when used in place names, may not be subject to metathesis; however, it is from Merriam, whose other recordings of placenames with ...Vtak strings are all recorded by Harrington with ...htak: for example, Merriam's *toyotak* 'Gavilan/Fremont Peak' is rendered *tooyohtak* by Harrington, who also records the stem *tooyoh* 'bumblebee, wasp' in non-placename contexts. Thus it is possible that Merriam's *waranitak* is actually for *waranihtak*, i.e. 'at the cut one' (with *-h* nominalizer); or that it is an error or an irregular form.

to *-tka* and the plural to *-kma*, exactly as with native stems. This shows that suffix metathesis was still productive when Spanish was spoken in Mutsun territory, up until the time of the last Mutsun speakers.

Any analysis of suffix metathesis in Mutsun must also account for the fact that the alternation *-mak*/*-kma* involves a reordering of consonants in addition to CV metathesis (the sequence /m...k/ vs. /km/)—in contrast to *-tak*/*-tka* (and *tukne*/=*tkun*), in which the relative order of consonants /tk/ is unchanged by metathesis. Hume (1998b) invokes Okrand's (1977:71) observation that monosyllabic morphemes in Mutsun are never /m/-final, suggesting that perhaps /m/ is a dispreferred coda consonant generally, akin to the prohibition against coda /h/ in Spanish[53] and English, except that it is a probabilistic tendency rather than a (near-)categorical pattern.[54]

Okrand states that the only final sonorants attested in monosyllables are /n,r,w,y/[55], and based on this Hume (1998b:171) proposes a constraint barring syllable-final /m/, e.g. "*$M_{]CODA}$" which is not active in determining an optimal output for *-tak*/*-tka* (or

---

[53] The word *reloj* (/reloh/ 'clock, watch') is the only exception to this prohibition in Spanish, though it is typically pronounced /relo/ in many dialects.

[54] Hume (1998b:170) also cites an example given by Okrand of non-phonemic schwa-epenthesis after the final /m/ of the disyllabic pronoun *makam* 'you all', in the sentence *makam riccapu* 'you all speak among yourselves' (phonetically recorded as /makamərɪʧːapu/), as evidence that when /m/ does occur word-finally before a following consonant-initial word, it is phonetically resyllabified as an onset due to its dispreferred status as a coda consonant. Since Okrand's data come from Arroyo (1862) and Harrington (1922, 1929-30), it is a simple matter to find the entry to which he refers in the Mutsun database. However, the cited entry, Harrington (1922, 1929-30:42/0575), is the *only* instance among 230 entries containing an /m/-final morpheme followed by a C-initial word in which schwa-epenthesis occurs. Thus, there is nothing generalizable about coda /m/ in this single observation.

[55] To this should be added the liquid /l/, which occurs in coda position in the monosyllabic loan word *cil* 'chile/hot pepper' (< Spanish *chile*).

tukne/=*tkun*), but forces a reordering of consonants in *-mak*/*-kma* to avoid forms like **sin.nim.ka* 'children' (cf. *sinni* 'child'), with a coda /m/. This is a problematic approach because it turns out that /m/ in coda position is far from unusual in Mutsun, and in fact can be found in a monosyllabic stem (the noun *lom* 'brain'). A concordance finds 2251 instances of medial coda /m/ (1277 if words with medial geminate /mm/ are excluded), and 855 instances of word-final /m/. Several examples of monomorphemes with medial and final coda /m/ are shown in (49).

(49) **Coda /m/ in monomorphemic Mutsun words:**

a. *com.le* 'squat'
b. *hum.ri* 'baptize'
c. *nam.ti* 'hear'
d. *tim.re* 'give one a headache'
e. *haa.Sum* 'shame'
f. *maa.kam* 'you all'
g. *ree.Tem* 'nit'
h. *su.kum* 'cigarette'

Coda /m/ also occurs in complex words. When an /m/-final stem, such as those in (49e-49h), is concatenated with a CV-initial suffix, the result is a word-medial coda /m/. Additionally, two CCV suffixes with initial /m/, *-msa* 'instrumental/locative nominalizer' and *-mpi* 'causative'[56], yield a coda /m/ when attached to V-final verb stems. Finally, the

[56] The causative suffix *-mpi* is probably a historical fusion of *-n* 'inherent reflexive' and *-pi*, a form of the reflexive suffix recorded by Arroyo (1861, 1862) but which had apparently regularized to *-pu* by Mrs. Cervantes's time (cf. discussion in Okrand 1977:215-219; and reconstructions in Callaghan in press).

infixes -s- 'do repeatedly, many do' and -tY- 'very, really, extremely', when inserted into a stem with medial /m/, yield medial coda /m/.[57] Examples appear in (50).

(50) a. *ma.kam.se*
makam *-se*
2.PL -ACC
'you all (acc.)'

b. *nep.kam.se*
nepkam *-se*
these -ACC
'these (acc.)'[58]

c. *nep.kam.Tuk*
nepkam *-Tuk*
these -COM
'with these'

d. *haa.Sum.te*
haaSum *-te*
shame -VBLZ
'to have shame'

e. *ak.kum.pi*
akku *-mpi*
enter -CAUS
'bring (something) inside'

---

[57] Mutsun's other two infixes, *-s-* 'my' and *-w-* 'undo', could in theory also be inserted into stems with medial /m/; however, *-s-* 'my' is used exclusively with kinship terms, and Mutsun has no kinship terms with medial /m/; while the absence of medial /m/ stems with *-w-* 'undo' appears to be simply a gap in the data (not surprising, since *-w-* is only attested 163 times, with just 35 stems).

[58] The word *nepkam* is a frozen form from the irregular derivation *neppe* 'this' + *-mak* 'plural' (see Section 3.4.1).

f. *Taa.kam.pi*

Taaka	*-mpi*
arrive	-CAUS

'bring'

g. *cor.kom.pi*

corko	*-mpi*
dry	-CAUS

'to dry (something)'

h. *piT.Tem.sa*

piTTe	*-msa*
tie	-INSNOM

'rope'

i. *huu.pum.sa*

huupu	*-msa*
buy/sell	-INSNOM

'market'

j. *am.pim.sa*

ampi	*-msa*
roast	-INSNOM

'roasting spit'

k. *hum.su*

hummu	*-s-*
fly	-DISTR-

'many fly'

l. *sem.son*

semmo	*-s-*	*-n*
die	-DISTR-	-INRF

'many die'

m. *mom.tYeS.min*

momme	*-tY-*	*-Smin*
be.late	-INTS-	-AGTNOM

'a very late one'

n. *am.tYa.mak*

amma	*-tY-*	*-mak*
eat	-INTS-	-PLNOM

'big eaters, ones who eat a lot'

Given the data in (49-50), it is clear that although Mutsun has only one *monosyllabic* /m/-final word (*lom* 'brain'), this fact cannot be generalized to claim that coda /m/ is itself prohibited, since both medially (49a-49d), (50) and word-finally (49e-49h) it is well attested. Furthermore, it is not at all clear why a purported restriction on coda consonants in monosyllables should affect a suffix which more often than not attaches to disyllabic stems (*-mak*/*-kma* is attested in 40 entries after monosyllabic stems, in 83 entries after stems & suffixed stems of three or more syllables, and in 795 entries after disyllabic stems; see Section 1.3.4 for a discussion of Mutsun stem length). Instead of focusing on /m/ alone, it may be more to the point to note that there are only six stems in the Mutsun data (occurring in a total of 14 instances) containing an /mk/ sequence. Of these, only *tumku* 'to gather taro potatoes' is volunteered by Mrs. Cervantes; the rest are given by Arroyo, and repeated by Mrs. Cervantes as “guesses”, meaning that she was not personally familiar with them, though they may have been in use in earlier generations. These facts suggest that the sequence /mk/ is strongly dispreferred in Mutsun, providing a

motivation for “repairing” the /mk/ cluster created by metathesis of *-mak* to **-mka*. All six stems containing the /mk/ sequence are listed in (51).

(51) **Stems containing /mk/ sequence:**

a. *hemko* 'to set'

b. *yimku* 'to turn seat around'

c. *simke* 'to be silent'

d. *omkon* 'maggot'

e. *umkun* '?'

f. *tumku* 'to gather taro potatoes'

Several types of data suggest that the reason for the dispreferred status of /mk/ is likely a requirement that nasals assimilate in place of articulation to following stop consonants, a restriction that is both phonetically and cross-linguistically unsurprising.[59] First, assimilation of /n/ to /m/ before /p/ is evident both diachronically and synchronically. Diachronic evidence includes the evolution of the inherent reflexive-causative suffix *-mpi* from the historical two-suffix sequence *-n* 'inherent reflexive' + *-pi* 'causative (?)' (Okrand 1977:215-16): Arroyo's (1862) data contain 86 instances of the inherent reflexive-causative suffix recorded as *-npi* or *-npe*, with only 21 instances of -

[59] English and Japanese are two examples of languages with nasal place assimilation. As Padgett (1994) observes, nasal place assimilation to a following stop is found in the English prefix *in-*, which surfaces as *im-* before the labial stops /b/ and /p/ in words like *imbalance*, *imbue*, *impossible*, and *impermissible*. In Japanese, the coda nasal assimilates to /m/ before the labial consonants /b/ and /p/, as in *zembu* 'all, whole' and *kempou* 'fencing'; to /ŋ/ before the velar consonants /g/ and /k/, as in *bangou* /baŋgoː/ 'number' and *genki* /gɛŋki/ 'health(y)'; and to /n/ before coronal consonants, as in *hontou* 'really', *nande* 'why?', *ninja* 'ninja', etc. (cf. Vance 1987).

mpi or *-mpe*; while Harrington's (1922, 1929-30) data, recorded over a century later, contain 489 instances of *-mpi* versus just 10 instances of *-npi*/*-npe*, strongly suggesting a historical morpho-phonological change which was all but complete by Mrs. Cervantes's time.[60] Synchronically, labial place assimilation can be seen in the reflexive forms of three metathesizing verbs otherwise attested with /n/: *hesempu* 'to make oneself a nest' vs. *hesne* 'to make a nest'; *amempu*[61] 'to cloud up' vs. *amne* 'to rain'; and *situmpu* 'to have a child' (idiomatic reflexive) vs. *sitnu*[62] 'to have a child'. Additionally, while Mutsun has no phonemic velar nasal /ŋ/, at the phonetic level Harrington frequently (410 instances) records /ŋ/ when it occurs before /k/ both morpheme-internally and across morpheme boundaries, which lends further support to the idea that Mutsun tended to assimilate nasals to following stops.

If nasal place assimilation before stops is the rule in Mutsun, then unassimilated nasal+stop clusters such as /mk/ and /np/ should occur with significantly less frequency than assimilated clusters such as /mp/ and /nt/. This prediction was tested by chi-square analysis for both morpheme-internal clusters and word-internal clusters across morpheme boundaries (/nk/ sequences are treated as assimilated), with all of the non-labial stops /k,t,T,tY/ grouped together.

---

[60] It could also be the case that Mrs. Cervantes's dialect was different from that of (most of) the speakers recorded by Arroyo, with assimilation occurring in one or more dialects but not in others.

[61] The form *amempu* is attested in 5 instances; unassimilated *amenpu* is also attested in 7 instances, making this item ambiguous with respect to labial place assimilation.

[62] The verb form *sitnu* 'to have a child' does not occur in isolation or before other non-metathesizing suffixes, but is assumed based on *situmpu* and the related noun *sitnun* 'child'; absent the noun form, the non-reflexive form of the verb stem might equally be assumed to be **sitmu*.

Table 65. Distribution of morpheme-internal medial nasal+stop clusters (token)

	p	**k t T tY**
m	567	66
n	18	668
(X-squared = 1004.933, df = 1, p-value < 2.2e-16)		

Table 66. Distribution of word-internal nasal+stop clusters across morpheme boundaries

	p	**k t T tY**
m	17	15
n	107	234
(X-squared = 5.4651, df = 1, p-value = 0.0194)		

These tests show that assimilated nasal+stop clusters are indeed significantly more frequent than unassimilated clusters, both within morphemes and across morpheme boundaries. These findings suggest a general tendency in the language to avoid unassimilated nasal + stop clusters, which may be at work in the restructuring of expected **-mka → -kma* from underlying *-mak*.[63]

Assimilation appears to apply only to nasal+stop sequences; as outlined in Section 1.3, consonants in Mutsun can in most cases cluster freely with other consonants

[63] The unassimilated nasal+stop sequence could just as well be avoided by assimilating /m/ to the following /k/, yielding the allomorph **-nka* (phonetically /ŋka/). The most persuasive argument for why metathesis is preferable to assimilation in this instance is that **-nka* would be phonetically and phonologically identical to the very frequent (480 instances) suffix+enclitic sequence *-n* 'inherent reflexive' (or *-n* 'recent past') + *=ka* '1st person singular', as in *wattin-ka* (*watti -n =ka*) 'I am leaving', *kommenin-ka* (*komme -ni -n =ka*) 'I got tired'. This would make pluralized vowel-final nouns, which are often structurally identical to verb stems, easily confusable with certain inflected verbs, while metathesis avoids the potential ambiguity of such constructions.

regardless of place of articulation. The most significant exceptions to this are the palatalized consonants /L,N,tY/, which rarely occur in clusters (and never in clusters with another palatalized consonant, e.g. */LN/, */NtY/, */tYL/); liquid+liquid clusters (*/rl/, */lr/) and several fricative+fricative, affricate+fricative, and fricative+affricate clusters; and clusters containing the affricate /ts/. (The full inventory of attested consonant clusters, with examples, is given in Appendix A; cf. also Okrand 1977:79-85.) Because assimilation does not apply to stop+stop sequences, the relative order of consonants remains unchanged in *-tak*/*-tka* metathesis.

3.4.1 Previous account of Mutsun suffix metathesis: CCC cluster avoidance

Mutsun suffix metathesis has been analyzed as a strategy to avoid illegal CCC clusters (cf. Adams 1985), which would arise if the CCV forms of the metathesizing morphemes attached to C-final stems. as in the ungrammatical forms in (52).

(52) a. **weeren-kma* 'rabbits'
b. **moohel-kma* 'heads'
c. **akkas-tka* 'in the north'
d. **Taawar-tka* 'in/on the seat'
e. **koc=tkun* 'if it were'
f. **kaan=tkun* 'if I...'

However, this analysis implicitly assumes that the underlying forms of the metathesizing suffixes and enclitic in question are CCV, when in fact it is the CVC forms that appear to be underlying, as I demonstrate in the examples below. If this is true,

problematic CCC clusters would never arise since a stem-final consonant + CVC suffix/enclitic yields a perfectly legal CC cluster; and this leaves no apparent motivation for metathesis to occur. In Section 3.4.2, I will discuss an alternative analysis, based on an observation by Hume (1998b), which is consistent with CVC underlying forms and also supported by evidence from elsewhere in the language. Under this analysis, the role of suffix metathesis is to create heavy penultimate syllables where suffixation/cliticization would otherwise yield phonologically dispreferred light syllables.

Several types of evidence point to the CVC forms *-mak* and *=tukne* as primary or underlying. This includes the existence of a non-metathesizing CVC suffix which is homophonous with, and semantically related to, *-mak* but grammatically distinct from it; plural pronouns which contain the string /mak/ and are almost certainly historically related to the suffix *-mak*; and a few instances of sentence-initial (non-clitic) *tukne*, the desiderative/irrealis morpheme. I will discuss each of these in turn below.

The non-metathesizing suffix, which I will refer to as *-mak*$_2$ in order to distinguish it from the nominal plural *-mak*, is a plural nominalizer which attaches to verb stems to form plural nouns, as in *awlimak* 'sour ones', derived from the verb *awli* 'to be sour'. Unlike the nominal plural suffix *-mak*, however, *-mak*$_2$ never surfaces as *-kma* (CCV), even though it usually follows a vowel-final stem (*-mak*$_2$ is a verbal suffix, and almost all verb stems are V-final). Thus, a plural deverbal noun of the form **awlikma* 'sour ones' is ungrammatical. The data in (53) give further examples of deverbal plural nouns with C-final stems followed by *-mak*$_2$.

(53) **Plural nominalized verb stems (no metathesis)**[64]

a.	*ekTe**mak**, *ekTekma*	'bad ones'	*(ekTe'to be bad')*
b.	*cupka**mak**, *cupkakma*	'white ones'	*(cupka'to be white')*
c.	*hiwho**mak**, *hiwhokma*	'old ones'	*(hiwho'to be old')*
d.	*hasku**mak**, *haskukma*	'sharp ones'	*(hasku'to be sharp')*

Were the plural nominalizer *-**mak**$_2$* in fact derived from an underlying CCV form /kma/, we would be left with the question of what motivates the alternation to CVC at the surface level; and given the environment of a preceding V-final stem, the avoidance of CCC clusters cannot be the answer. Without compelling evidence of some other trigger, the lack of a surface form **-**kma**$_2$* suggests that there is no such underlying form for this particular morpheme. The existence of the two homophonous, semantically related but grammatically distinct CVC suffixes *-**mak*** and *-**mak**$_2$*, only one of which consistently alternates with a CCV form, argues that the common origin for both was of the shape CVC. It is likely that the *-**mak**/-**mak**$_2$* pair originated as a single suffix **-**mak*** signifying plurality, but which was not lexically restricted, i.e. could attach to both noun and verb stems (or perhaps to stems which were themselves not strictly specified for lexical category), with later phonological changes (metathesis) affecting *-**mak*** but not *-**mak**$_2$*.

Another hint that the underlying form of the plural suffix *-**mak*** is CVC (rather than CCV) comes from the first and second person plural pronouns ***makke*** and ***makam***,

[64] Although most of the stems occurring with *-**mak**$_2$* are stative verbs describing physical or other characteristics, the plural nominalizer is occasionally found suffixed to a non-stative verb stem, as in ***tikromak*** 'kneelers' (from ***tikro*** 'to kneel') and ***pahcamak*** 'knowledgeable ones' (from ***pahca*** 'to know').

respectively. These two plural morphemes contain the sequence /mak/, not /kma/, suggesting that if they are etymologically related to the plural suffix (which is highly likely, given phonological and semantic similarity), the CVC form is older. Additionally, the shortened, proclitic possessive form of the first person plural is *mak=*, as in *mak-huus* 'our noses' (*huus* 'nose'). Since word-initial consonant clusters are prohibited in Mutsun, forms like **kmam* 'you all' or **kma-huus* 'our noses' could never arise; but one can imagine phonologically plausible plural pronouns such as **akme* 'we' or **akmam* 'you all', which would support a CCV origin for the plural suffix *-mak*, but which do not occur.[65]

Another tantalizing, though slightly more complicated, piece of evidence in favor of CVC origins comes from irregular plurals of the form /kam/, which occur exclusively in the words *nepkam* 'these', *nupkam* 'those', and (in a single attestation) *pinkam* 'those' (related to *piina* 'that'). The forms *nep-* and *nup-* are bound stems, presumably reduced from the free morphemes *neppe* 'this' and *nuppe* 'that', respectively. In diachronic terms, /kam/ likely comes from the Proto-Utian plural, which Callaghan (in press) reconstructs as **-kom*; however, synchronically the form is exceptional. In any case, it is interesting that for these words, stem reduction is apparently preferable to suffix metathesis (e.g.

[65] An alternative analysis of *makam* might be that it developed from a shortened second person singular pronoun in the form of *me* (which is certainly attested by Harrington, though the usual form is *meen*), suffixed with the *-kam* variant of the plural (which I discuss in the paragraph below), yielding *mekam*, which could then have undergone vowel harmony to become *makam*. However, Callaghan (1997) reconstructs the Proto-Costanoan first person plural subject pronoun as **mak*, and the Proto-Utian second person plural subject pronoun as **mok-kom*, suggesting that a /mVk/ string is etymologically tautomorphemic (PU /o/ became /a/ in most cases in Proto-Costanoan).

non-attested forms like **neppekma*, **nuppekma*)[66], which would be the expected plural form for these stems.

Finally, the CVC-initial irrealis form *tukne*, which usually behaves as an enclitic (typically following the first word of a clause), is attested occasionally in sentence-initial position. Though this is not absolutely diagnostic of a CVC-initial underlying form (since a free morpheme **tkun* would violate Mutsun phonotactics), it is suggestive because a non-enclitic form such as **etkun* would be phonotactically permissible, but does not occur. All five attested instances of initial *tukne* are shown in (54).

(54) a. *tukne-ka insu, ne-tkun-ka-mes monse.* [Ar 2698]
tukne=ka hinsu neppe=tkun=ka=mes monse
IRR=1 know this=IRR=1=2.OBJ tell
"If I knew, I would tell you this."

b. *tukne-ka hinsu, kaan-tukne-mes monse.* [Ha 43/0341]
tukne=ka hinsu, kan=tukne=mes monse
IRR=1 know 1=IRR=2.OBJ tell
"If I knew, I would tell you."

c. *tukne-me akas ereS ukca...* [Ar 2732]
tukne=me waak-se ereS ukca
IRR=2 3-OBJ really offer
"If you really offered it..."

[66] A form *nupkamak* 'those' is also attested twice, although there is no stem **nupka*; however, *nupkam* is far more frequent, and Mrs. Cervantes comments in one entry that *nupkamak* is incorrect and *nupkam* is the only correct form (Harrington 1922, 1929-30:38/0203).

d. *tukne-me-was ukca.* [Ha 43/0367]
tukne=me=was ukca
IRR=2=3.OBJ offer
"You would offer [it] to him."

e. *tukne kan wik ekwe wayanpe.* [Ar 2619]
tukne kaan uyka ekwe waya -mpi
IRR 1 yesterday not miss -INRF.CAUS
"If only I hadn't made it miss [missed a shot] yesterday."

Two of these sentences ((54b) and (54d)) are from Harrington, and each is a re-elicitation from Mrs. Cervantes of an Arroyo sentence ((54a) and (54c), respectively; for (54e), Harrington re-elicited only the verb form *wayampi*). [67]

These entries suggest the possibility that the enclitic *=tukne* may have developed from what was originally a free morpheme *tukne*, later undergoing metathesis to *=tkun* after V-final stems, perhaps by analogy with the behavior of *-mak* and *–kma*.

Whatever the motivations for suffix metathesis (I propose a prosodic motivation in Section 3.4.2), it is clear that it only affects a subset of CVC suffixes (in addition to the

[67] In (54a), Arroyo has both initial *tukne* and the clause-initial (non-enclitic) string /netkun/, which at first glance looks like yet another (mysterious) permutation of *tukne/=tkun*. Evidently Harrington and Mrs. Cervantes also interpreted /netkun/ as a morpheme, but an ungrammatical or irregular one: in giving a sentence with the same meaning during re-elicitation (54b), Mrs. Cervantes uses the initial *tukne* in the first clause and enclitic *=tukne* rather than (hypothetical morpheme) *netkun* in the second clause. In a following entry, Harrington notes that Mrs. Cervantes "[a]lso agrees to" *netkun* (Harrington 1922, 1929-30:43/0341), but the fact that she volunteers only *tukne* in initial position suggests that she considered it the more grammatical form. However, rather than assume some type of long-distance metathesizing alternant, I analyze /netkun/ as consisting of the reduced form *ne* of *neppe* 'this', with encliticized *=tkun*. (*ne* is attested only 65 times, vs. 252 instances of *neppe*, but seems to be a more or less free variant.) Because /netkun/ is recorded only three times, always by Arroyo (who also recorded all but 18 of the 65 instances of *ne* in the database), and the glosses given are unclear, *ne=tkun* would seem to be the most economical hypothesis.

clitic *=tukne/=tkun*). Besides *-mak/-kma* and *-tak/-tka*, the Mutsun suffix inventory includes many more CVC suffixes, none of which undergoes metathesis despite the fact that they often (in some cases exclusively) attach to V-final stems. A representative sample of non-metathesizing CVC suffixes is given in Table 67.

Table 67. Non-metathesizing CVC suffixes

Bare stem	**CVC suffix**		**suffixed stem**
Tumma 'flavor'	*-min* 'one characterized by'	→	*Tummamin, *Tummamni* 'flavorful thing'
hiiwo 'to scold'	*-paN* 'one who overdoes'	→	*hiiwopaN, *hiiwopNa* 'scolder'
sinni 'child'	*-way* 'time of'	→	*sinniway, *sinniwya* 'childhood'
citte 'to dance'	*-yuT* 'plural imperative'	→	*citteyuT, *citteyTu* 'you all dance!'

The four suffixes illustrated in Table 67 are representative of all other CVC suffixes, such as *-sum* 'instrumental', *-was* 'attributive', and *-yis* 'andative imperative', which never undergo metathesis. There is no overriding pattern, phonological or otherwise, which explains why three morphemes are subject to suffix metathesis but the majority of suffixes are not. Taken individually, certain suffixes may resist metathesis due to phonological complexity, morphological ambiguity, or other reasons. For example, *-paN* may be blocked from metathesizing to **-pNa* because of the secondary articulation (palatalization) of /N/ (see Section 3.5.1.1, where I discuss the fact that none of the

phonemes with secondary articulations participates in other types of metathesis). The suffixes *-sum* and *–tum*, if metathesized to *-smu*/*-tmu*, could be misinterpreted as containing the reciprocal suffix *-mu*; and motion imperatives metathesized from *-yis* to **-ysi* might be difficult to distinguish from continuative forms, which are (V-final) verb stems suffixed with *-si*. However, there is considerable homophony among Mutsun suffixes otherwise, such as three distinct high-frequency suffixes *-n* (recent past, patient nominalizer, and an allomorph of the inherent reflexive), so phonological overlap with *-mu* etc. might not have caused any problem. A more simplistic explanation might simply be that suffix metathesis only affects the most frequent CVC suffixes: *-mak*/*-kma* occurs 942 times word-finally, and *-tak*/*-tka* 684 times (and many more times followed by additional suffixation); while the next most frequent CVC suffix, *-sum*, is attested only 168 times, with other CVC suffixes even less frequent. Under such an analysis, *=tukne* would be exceptional, since it is is attested only 43 times; however, it may have been particularly prone to metathesis by analogy with *-tak*/*-tka* and *-mak*/*-kma* because of its parallel phonological structure containing a coda /k/, which is not found in any of the lower-frequency verbal suffixes. The complete list of non-metathesizing CVC suffixes is given below in Table 68, with the type of stem to which each suffix attaches in the righthand column.

Table 68. Non-metathesizing CVC suffixes (with attested stem types)

Suffix	**gloss**	**attaches to**
-kin	plural	V-final stem (only occurs with *hatte* 'who?')
-mak$_2$	plural nominalizer	V-final stems
-min	'one characterized by X'	C/V-final stems
-mis	diminutive (?)	C-final stems
-paN	habitual/derogatory nominalizer	C/V-final stems
-(s)um	instrumental	C/V-final stems
-tis$_1$	deceased relative suffix	C/V-final stems
-tis$_2$	'a little' (?)	C-final stems (only occurs with *minmuy* 'down, below' and *taprey* 'up, above')
-Tuk	comitative	C/V-final stems
-tum	ablative	C/V-final stems
-was	attributive	C/V-final stems
-way	'time of'	C/V-final stems
-yis	andative imperative	V-final stems
-yuT	plural imperative	C/V-final stems

If, as the above discussion suggests, *-mak/-kma* and *-tak/-tka* are underlyingly CVC (and *=tukne/=tkun* are underlyingly CVC-initial), then there is no basis for an analysis of suffix metathesis predicated on avoiding CCC clusters, since such clusters would never arise: suffixed V-final stems would yield V#CVC sequences (no cluster),

while suffixed C-final stems would yield sequences of the form C#CVC, which contain a perfectly permissible word-medial CC cluster. In that case, the question is why suffixes of the form CCV should arise in the first place, rather than how best to transform such a suffix to avoid illegal clusters.

3.4.2 Alternative analysis: suffix metathesis as a route to heavy penultimate syllables

There appear to be several phonological processes in Mutsun that lead to the penultimate syllable of a word being heavy (i.e., containing either a long vowel or a consonant coda). This may relate to the pattern of templates for noun and verb forms introduced in Section 1.3.4 and discussed in greater detail in Section 3.1 above. The presence of several phonological processes that all create similar outcomes (in this case, a heavy penultimate syllable) could be considered an example of Kisseberth's (1970) "phonological conspiracies."

An analysis of Mutsun suffix metathesis which does not assume consonant cluster-avoidance as a motivation is found in Hume (1998b:170-171), as part of an OT-based analysis of metathesis in Leti. Hume presents Mutsun suffix metathesis as an example of gradient violations of the LINEARITY constraint, which specifies that a phonological string must occur in the same linear order in the output as in the input (McCarthy and Prince 1995). She assumes (though "non-crucially") a CVC input for each

suffix (i.e., *-mak*/*-tak* and not *-kma*/*-tka*[68]), which as we have seen would remove the conditions for illegal CCC clusters to arise in suffixation. Instead, Hume hints at a more plausible analysis of Mutsun suffix metathesis when she proposes an undefined but high-ranking constraint "**C**", which she "speculate[s]...is related to foot structure given that penults are typically heavy in Mutsun" (1998b:171). Hume does not specify what constitutes a heavy syllable in Mutsun (namely, a syllable containing either a long vowel, i.e. (C)VV, or a coda consonant, i.e. (C)VC); cf. Section 1.3.2.2 for a detailed discussion of syllable weight). Implicit in her framing of **C** is that the scope of any heavy-penult requirement in Mutsun must be the word (rather than the morpheme) in order for the constraint to affect suffixed stems. If the assumption inherent in **C** as Hume postulates it--that heavy penultimate syllables in Mutsun words are common because they are preferred prosodically--is correct, then metathesis in *-mak/-kma, -tak/-tka,* and *=tukne/=tkun* is a strategy to repair the dispreferred light penultimate syllables that are created when a V-final stem is followed by a CV-initial suffix or clitic. In Hume's analysis, Mutsun suffix metathesis thus satisfies a highly-ranked prosodic structure constraint (**C**) at the expense of the lower-ranked LINEARITY constraint.

In this section, I present several types of data which support a preference in Mutsun for heavy penultimate syllables at the word level. As I will show, both verb and noun stems--which in many cases may stand alone as well-formed words--are frequently

[68] Hume's Mutsun example makes reference only to *-mak* and *-tak*; the pair *=tukne/=tkun*, which metathesizes under the same conditions, is of much lower frequency in the corpus and therefore has never to my knowledge been included in discussions of Mutsun metathesis.

disyllabic, with the majority of disyllabic stem shapes containing a heavy penultimate syllable. This tendency in native stems often carries over to loanword vocabulary as well, with vowel lengthening and final vowel epenthesis being common strategies to make words of Spanish origin conform more closely to the Mutsun stem shape. Mrs. Cervantes's intuitions about the most likely pronunciations of unfamiliar words (which Harrington tried to elicit based on Arroyo's much earlier documentation) also demonstrate a strong preference to render light stems (i.e., stems of the shape (C)VCV(C))[69] in particular as either (C)VVCV(C) or (C)VCCV(C) (i.e., with heavy penultimate syllables). Finally, in multimorphemic words, there is widespread evidence of epenthetic /h/-insertion before certain CV suffixes, which Harrington and subsequent researchers have assumed was evidence of underlying stem-final /h/, but which on closer examination is best explained as a broad repair strategy to add codas to light penultimate syllables formed by suffixation. Viewed in this context, suffix metathesis is simply another route to achieving heavy penultimate syllables in complex words.

3.4.2.1 Noun and verb stems with heavy penultimate syllables

An analysis invoking a preference for heavy penultimate syllables in Mutsun words finds partial support in Okrand (1977), who lists four of six disyllabic noun stem shapes (he refers to them as roots) with heavy initial (penultimate) syllables. An

[69] Stems recorded as (C)VCV(C)--or in the terminology adopted from Callaghan, as light stems--are disproportionately found in Arroyo's documentation, since he rarely indicated vowel length and was only slightly more likely to indicate consonant length; cf. Sections 2.1.1.2 and 3.4.2.2 for discussion of Arroyo's transcription.

inventory of disyllabic noun stem shapes, adapted with modifications from Okrand (1977:112), is presented in Table 69, with syllable boundaries marked and presence or absence of heavy penultimate syllables noted.

Table 69. Heavy penultimate syllables in Mutsun noun stems

Stem shape[70]	**Example**		**Heavy penult?**
(C)V.CVV	*ko.roo*	'foot'	no
(C)V.CVVC	*to.roow*	'soaproot'	no
(C)VV.CV	*too.Te*	'deer, meat'	yes
(C)VV.CVC	*pii.roy*	'fishing net'	yes
(C)VC.CV	*is.su*	'hand'	yes
(C)VC.CVC	*sot.tow*	'fire'	yes

Of the disyllabic noun stems shown in Table 69, the four types with heavy penultimate syllables all occur in their listed forms as bare stems (unsuffixed). However, the first two stem shapes in the list, with light initial syllables and long second-syllable vowels, do not occur in their listed forms in isolation: rather, the second-syllable vowels are short in bare form, e.g. *koro* 'foot' and *torow* 'soaproot'. The long second-syllable vowels in this type of stem occur only in the presence of a (C)V-initial suffix such as *-(s)e* '-ACC' or *-(s)um* 'instrumental', yielding trisyllabic words like *ko.roo.se* ('foot-ACC') and *to.roo.we* ('with soaproot'), whose penultimate syllables are made heavy via vowel

[70] Okrand analyzes initial glottal stops as consonants, but for reasons discussed in Chapter 1 I treat initial glottal stops as phonetic rather than phonemic; thus, stems are universally C-initial in Okrand, but may be C- or V-initial in my analysis (i.e., *[ʔissu]* is CVCCV for Okrand but VCCV for my purposes).

lengthening. When a V-final stem of this type is concatenated with a CCV suffix, a heavy penult is created in the resulting word by syllabification of the suffix-initial consonant as coda of the second-syllable stem vowel, i.e. *koro#tka* → *ko.rot.ka* 'on the foot'.

Heavy penultimate stems account for an even greater proportion of verb stem types than nouns. Of the verb stem shapes Okrand (1977:114), all but one of the 'derived' stem types—with derived stems typically being the surface forms of stems under his analysis—contain heavy initial syllables. This means that a large number of verbs, like nouns, fit the pattern of having heavy penultimate syllables when unsuffixed.[71]

Table 70. Heavy penultimate syllables in Mutsun verb stems

Stem shape	Example		Heavy penult?
a. $(C_0)V.C_1VV$	*ma.lee*	'to rub with saliva'	no
b. $(C_0)VV.C_1V$	*hii.wo*	'to scold'	yes
c. $(C_0)VC_1.C_1V$	*ak.ku*	'to enter'	yes
d. $(C_0)VC_1.C_2V$	*pas.ki*	'to greet'	yes

The verb stem shapes given in Table 70 are Okrand's 'derived' shapes, which in almost all cases are the surface forms of stems. The stem shape illustrated in (d) is a conflation of four of Okrand's types, whose 'derived' forms are identical, as presented above; but whose 'primary' forms are C-final bound stems e.g. *pasik, liiwak, liccey, irok*,

[71] As noted previously, many verb stems function as words in unsuffixed forms; many others require the suffix *-n* 'inherent reflexive' in order to be well-formed. However, since the addition of /n/ to a V-final stem does not cause resyllabification, if a stem has a heavy penultimate syllable before suffixation, the heavy penult is preserved in the resulting word.

which only surface in the presence of the reflexive suffix *-pu* and/or the reciprocal suffix *-mu* (a detailed discussion of these stems follows in Section 3.2). Okrand separates these into four categories depending on the shape of the 'primary' (C-final) stem, but I am concerned here with prosodic structure at the surface level. Thus the four subtypes are all realized as cluster stems in all but a very restricted set of surface representations, since their V-final forms contain heterogeneous medial CC clusters. Of five verb stem types as categorized here, then, only one type lacks a heavy penultimate syllable. Here again, it may be significant that (analogous to the light-penult noun stems in Table 69), verb stem type (a) only occurs in the presence of a CV suffix such as reflexive *-pu*, such as *ma.lee.pu* 'to rub saliva on oneself', which results again in a trisyllabic word with a heavy penultimate syllable. In bare form (if allowed) and when followed by non-CV suffixes, such stems surface with a short second-syllable vowel, e.g. *soro* (**soroo*) to 'flow', *maley* (**maleey*) 'rub with saliva!' (*-y* 'imperative'), *meheSte* 'have seen' (**meheeSte*, cf. *mehe* 'to see', *-Ste* 'perfective').

As discussed in Section 1.3.4, disyllabic stem shapes such as the ones listed in Tables 69 and 70 account for a majority of monomorphemic Mutsun nouns (to the extent that morphological structure can be determined) and a large majority of Mutsun verbs, respectively. Trisyllabic stems do not necessarilly contain heavy penultimate syllables, as evidenced by forms like *wee.ci.ci* 'burrowing owl', *loo.po.tok* 'dock (an edible plant)', and *coprore* 'to be full of holes'; however, they very frequently do, as in *hu.tee.pa* 'bonfire', *pa.raa.tYu* 'big woodpecker', and *re.Tee.Tih* 'blackberry bramble'.

The data presented in this section show a tendency at the most basic level of Mutsun word formation (bare noun and verb stems) to favor words containing heavy penultimate syllables. In the following section, I show that this stem-level preference for heavy penults was active in the last speaker's grammar, leading her to "correct" apparent light penults in stems read to her from older documentation.

3.4.2.2 Correction to heavy penultimate syllables in re-elicited words

A preference for heavy penultimate syllables can be seen in Mrs. Cervantes's pronunciation of many words re-elicited from Arroyo, who rarely indicated vowel or consonant length in his transcriptions (cf. Callaghan (1962:98) and discussion in Section 2.1). When confronted with a known verb stem pronounced as written by Arroyo, such as *a.ma* for 'to eat' or *li.ki* for 'to kill', Mrs. Cervantes "corrected" the stem by lengthening either a vowel or a consonant, resulting in forms like *am.ma* and *lii.ki*, both of which contain heavy penultimate syllables. This is true as well for Arroyo forms which she did not recognize (archaic forms, Arroyo's mishearings, words she never learned, or even words from languages other than Mutsun)[72]: she nevertheless frequently modified the pronunciation of such words to conform to a prosodic structure that sounded natural to her, thus offering phonotactic judments even when she was unable to give a lexical

[72] Most frequently, Harrington indicated that Mrs. Cervantes was unfamiliar with a word by noting "adivina" or "adiv." ('guesses') or "nesc." (for Latin *nescit*, i.e. 'does not know'; cf. Harrington et al. 1981). A concordance of the database finds 270 instances of "adivina", 190 of "adiv.", and 1290 of "nesc." in Harrington's notes; additionally, he noted "guess(es)" (in English) for 36 entries, and "doesn't know" or "does not know" (also in English) for 138 entries.

judgment. This tendency prosodically "correct" unknown words from Arroyo often results in forms with heavy penultimate syllables, as Harrington's notes illustrate (translations of Harrington's Spanish and abbreviations are given in brackets; standard orthography equivalents are in bold type in brackets).

(55) **Prosodic "correction" of unknown words by Mrs. Cervantes**

a. "Manuscript *juri* [***huri***]. Adivina hū´ri [Guesses ***huuri***]." [Ha 41/0227]

b. "[Arroyo] M[anu]s[cript]. ev[idently]. *Incaninta hac eie* [**inkaninta-ak eye**]…After long discussion thinks hiŋkaninak 'é¯ye [**hinkanin-ak eeye**]. It seems to sound better." [Ha 42/0172]

c. "Adivina [Guesses] *hú¯mutr* [**huumuT**], or possibly *hummutr* [**hummuT**]. Nesc. [Does not know]" [in response to Arroyo's "*jumuths*" [***humuT***]] [Ha 42/0400]

d. "*kittray [**kiTTay**] sounds better than kí¯tray [**kiiTay**]." [in response to Arroyo's "*Quithrai*" [***kiTay***]] [Ha 42/0826]

In (55a-55b), Mrs. Cervantes prefers long vowels in the penultimate syllable (*huu.ri* and *ee.ye* rather than Arroyo's *hu.ri* and *e.ye*). Since both geminate /rr/ and /yy/ in Mutsun are very rare (the former attested in only two Mutsun lexical items, at least one of which is a Spanish borrowing; and the latter in only one reflexive form), she does not offer forms like **hur.ri* or **ey.ye*, which would be another route to heavy penults for these stems. However, in (55c), where the medial consonant is /m/—a consonant which can be, and frequently is, geminated in Mutsun—she seems to find both a long initial vowel (*huu.muT*) and a geminate medial consonant (*hum.muT*) preferable to the light-penult form (*hu.muT*) which Arroyo's transcription suggests; and in (55d), she explicitly

prefers a geminate form to both the light stem suggested by Arroyo's transcription and to a long stem form. The example of *kiTTay* (55d) in particular makes clear that it is the weight of the penultimate syllable, rather than vowel length specifically (which Harrington may have confused with stress, since vowels he marked as long were very often marked as stressed as well) that was the basis for Mrs. Cervantes's judgments. Her "corrections" of unfamiliar verb stems thus demonstrate that, attrition notwithstanding, she had a definite sense of Mutsun prosodic structure which included a preference for heavy penultimate syllables.

3.4.2.3 Vowel lengthening in Spanish loan words as a route to heavy penultimate syllables

A tendency toward heavy penultimate syllables can also be seen in the nativization of many Spanish loanwords in Mutsun. Spanish phonotactics has no prohibition against light syllables, penultimate or otherwise; but when a Spanish word is borrowed into Mutsun, a light penultimate syllable often undergoes vowel lengthening. The examples below show original borrowed Spanish words on the left, and the nativized Mutsun forms on the right, with syllable boundaries and (for Spanish words) primary stress marked.

Table 71. Vowel lengthening in Spanish loan words

Spanish word	**gloss**	**Nativized Mutsun form**
1. ˈ*u.vas*	'grapes'	*huu.was*

Spanish word	gloss	Nativized Mutsun form
2. *bo.ˈrra.cho*	'drunk'	*hu.raa.cu*
3. *cien.#ˈpe.sos*	'100 pesos'	*Sem.pee.sus*
4. *a.yu.ˈdar*	'to help'	*yu.taa.ri*

In both disyllabic (1) and trisyllabic (2-4) Spanish loanwords, the penultimate vowel is lengthened in the nativized Mutsun word; final syllables and (in trisyllabic words) initial syllables may be light or heavy. The penultimate-syllable vowel lengthening shown at right is also analyzed as a reflex of the original Spanish stress system by Okrand (1977:91), but since Spanish primary stress often falls on the penultimate syllable, this does not contradict vowel lengthening as a Mutsun phonotactic strategy to create heavy penults. Rather, it can be argued that the two factors (representing Spanish stress with vowel length, and a preference for heavy penults) reinforce each other in loanword adaptation.[73]

[73] In the relatively small number of cases when the primary stress of the original Spanish word falls on a non-penultimate syllable *and* vowel lengthening occurs, such lengthening may prioritize the original Spanish stress pattern or the creation of heavy penults. In the following examples, stressed vowels are lengthened but penultimate syllables remain light:

1.*to.toor* (< Sp. *doc.ˈtor*) 'doctor'

2.*ha.moon (< ja.ˈmon)* 'ham'

3.*saa.wa.tu (< sá.ba.do)* 'Saturday'

4.*maa.ki.na (< má.qui.na)* 'car'

In other nativized words, vowel lengthening creates heavy penultimate syllables but does not match the stress pattern of the original Spanish, as the following examples show:

1.*koo.ral (< co.ˈrral)* 'corral'

2.*so.lee.ta (< So.le.ˈdad)*'Soledad (place name)'

These examples may be interpreted as less nativized forms vs. more nativized forms, perhaps related to the recency of a given borrowing. Alternatively, they are the result of variability in resolving the conflict between two prosodic constraints which are not typically opposed.

Some of the exceptions to penultimate-syllable vowel lengthening in Spanish loan words are transparently attributable to Mutsun phonotactics. This can be seen in the nineteen Spanish loan verbs based on infinitives, of which only ten exhibit vowel lengthening corresponding to stress in the Spanish (in Spanish, the infinitive forms of verbs--e.g. *ayudar* in the above example--always have final-syllable stress). A representative sample of vowel-lengthening and non-lengthening infinitival loan verbs is shown in (56), reproduced from (38) (the final /i/ in these forms is epenthesized as part of nativization).

(56)

a.	*paSSari*	'to travel'	*(< pasear)*
b.	*orkari*	'to strangle'	*(< ahorcar)*
c.	*wenteri*	'to sell'	*(< vender)*
d.	*wistiri*	'to dress'	*(< vestir)*
e.	*huk<u>aa</u>ri*	'to play'	*(< jugar)*
f.	*mul<u>aa</u>ri*	'to sharpen'	*(< amolar)*
g.	*war<u>ee</u>ri*	'to sweep'	*(< barrer)*
h.	*yun<u>aa</u>ri*	'to fast'	*(< ayunar)*

In (56e-56h), vowel lengthening occurs as expected, resulting in new words with heavy penultimate syllables. In (56b-56d), however, vowel lengthening (e.g. **orkaari*, **paSSari*, **wenteeri*, **wistiiri*) is blocked because Mutsun does not allow a tautomorphemic heavy syllable + VV sequence (Okrand 1977). While this prohibition is not universally obeyed in loanword vocabulary--as is evident in *Sempeesus* (Table 71) and *wanteeha* 'tray' (< *bandeja*)--it is quite regular in the infinitival loan verbs, with the single exception of *salutari* (< *saludar*), whose expected form would be **salutaari*

(*salutari* is also the only one of the nineteen infinitival loan verbs with more than three syllables).

Not all Spanish loanwords surface with heavy penults, as forms like *sul.ta.tu* (rather than **sul.taa.tu*) 'soldier' (< Spanish *sol.ˈda.do*) demonstrate. However, such prosodically unmodified borrowings are the minority of cases.

3.4.2.4 Vowel lengthening in suffixed light stems as a route to heavy penultimate syllables

The previous sections have dealt with heavy penultimate syllables within bare stems (both native and Spanish). However, in order to argue that suffix metathesis is influenced by a prosodic preference for heavy penults, the relevant constraint must apply at the level of the word rather than only the stem. Evidence for the prosodic importance of heavy penultimate syllables in suffixed Mutsun words without metathesis can be found in two patterns affecting the right edge of stems under certain types of suffixation. In the first pattern, which I examine in this section, the second vowel (V_2) in native light stems is lengthened when the stem is followed by a CV-initial suffix (in the case of V-final stems) or a V-initial suffix (in the case of C-final stems). A second pattern involving stem-final /h/ epenthesis before CV-initial suffixes will be examined in Section 3.4.2.5.

In what appears, based on Harrington's (1922, 1929-30) data, to be a productive pattern, Mutsun light stems--disyllabic stems with a light initial syllable, of the shape (C)VCV(C), e.g. *mehe* 'to see' and *cohol* 'hole'--undergo lengthening of the second-

syllable vowel (V_2) in the presence of suffixes (and clitics) of a certain prosodic shape. For V-final stems like *mehe*, the conditioning suffix/clitic shape is CV, while for C-final stems like *cohol*, the conditioning suffix/clitic shape is V (or V-initial). Both types of suffixation/cliticization have the effect of adding a syllable to the right of the stem, leaving the penultimate syllable open; this can be seen in the examples in (57), where morpheme concatenation is shown in the first line and syllable boundaries, marked with (.), are indicated in the second line.

(57) **V_2 lengthening in stems with (C)V-initial suffixes**

a.	*mehe*	*mehe =ka*	*mehe -pu*	*mehe -na*
	me.he	*me.hee.ka*	*me.hee.pu*	*me.hee.na*
	'see'	'I see'	'see oneself'	'go to see'
b.	*cala*	*cala =ka*	*cala -su*	*cala -yis*
	ca.la	*ca.laa.ka*	*ca.laa.su*	*ca.laa.yis*
	'urinate'	'I urinate'	'go to urinate'	'go urinate!'
c.	*koro*	*koro -sum*	*koro -se*	
	ko.ro	*ko.roo.sum*	*ko.roo.se*	
	'leg'	'with the leg'	'leg-ACC'	
d.	*cohol*	*cohol -um*	*cohol -e*	
	co.hol	*co.hoo.lum*	*co.hoo.le*	
	'hole'	'because of a hole'	'hole-ACC'	
e.	*torow*	*torow -um*	*torow -e*	
	to.row	*to.roo.wum*	*to.roo.we*	
	'soaproot'	'with soaproot'	'soaproot-ACC'	

f. *irok* *irok -ic*
i.rok *i.roo.kic*
'shit (n.)' 'shitter'

Okrand's (1977:89-92) analysis of light stems assumes that V_2 is underlyingly long, with vowel shortening occurring when V_2 surfaces in a word-final syllable (e.g. bare stems like *koro*, *cohol* or stems followed by suffixes consisting of a single consonant, as in *mehen* 'saw', with past tense suffix *-n*); and when V_2 is followed by a CC cluster as the result of suffixation, as in *mehehne* 'to be seen', with passive suffix *-hne*, or *coholtak* 'in the hole', with locative suffix *-tak*.[74] The other interpretation of the data is that light stems have short underlying V_2, which undergoes lengthening in the presence of certain suffixes in order to create a heavy penultimate syllable at the word level. The latter analysis, in which a morpho-phonemic process derives heavy penultimate syllables, is more consistent with the numerous other processes (suffix metathesis, vowel lengthening in loan words, /h/-epenthesis (discussed below), etc.) which derive heavy penultimate syllables in Mutsun.[75] Whether the long form of V_2 is underlying or derived, however, is not crucial to the surface observation that suffixation of light stems yields

[74] If correct, this would mean that C-final light stems contain an underlying super-heavy second syllable (e.g. underlying *mehee, cohool*), a prosodic structure which is otherwise not permitted in Mutsun polysyllabic words (and which is only variably recorded in some monosyllabic stems; see Section 1.3.4 for a discussion of the prosodic structure of such stems).

[75] On the other hand, Okrand's analysis of light stem V_2s as underlyingly long makes more sense if his (1977:97-103) account of Mutsun stress is correct: namely, that primary stress falls on the first syllable of a word, *unless* the word is an unsuffixed light stem, in which case stress falls on the second syllable (i.e. V_2, which is short in unsuffixed light stems). In his view, stress in such words is a compensatory indicator of lost vowel length (ibid, 1977:100-101). However, Okrand admits that Harrington's notations of stress are inconsistent and complicated, and his analysis depends on several assumptions which cannot be corroborated (such as assuming that Harrington's acute accent in word-final syllables in some circumstances is actually an indicator of phrasal intonation rather than stress). Thus, stress assignment alone does not constitute strong evidence for underlying long V_2 in light stems.

complex words with heavy penultimate syllables in a great many cases, whether due to the length of the stem V_2 or to CC clusters at the right edge of the stem resulting from suffixation.[76] In (58), the same stems shown with long V_2 in (57) are given with suffixes which create CC clusters at morpheme boundaries, yielding heavy penultimate syllables through simple morpheme concatenation (and without the need for vowel lengthening).

(58) **No V_2 lengthening in stems with CC-initial suffixes**

a.	*mehe*	*mehe -hne*	*mehe -yni*
	me.he	*me.heh.ne*	*me.hey.ni*
	'to see'	'to be seen'	'to come to see'
b.	*cala*	*cala -msa*	*cala -kma*
	ca.la	*ca.lam.sa*	*ca.lak.ma*
	'to urinate'	'penis'	'urines'[77]
c.	*koro*	*koro -tka*	*koro -kma*
	ko.ro	*ko.rot.ka*	*ko.rok.ma*
	'foot/leg'	'on the foot/leg'	'legs'
d.	*cohol*	*cohol -tak*	*cohol -te*
	co.ho	*co.hol.tak*	*co.hol.te*
	'hole'	'in the hole'	'has a hole'
e.	*torow*	*torow -mak*	

[76] The exceptions to this generalization are certain configurations of multiply-suffixed (or suffixed + cliticized) stems, such as *calaasisu* 'to just go to pee', in which the light-syllable suffix *-si* 'just' does not contain a long vowel before the additional light-syllable suffix *-su* 'go to do'. This would seem to suggest that vowel lengthening applies only to stems, not to suffixes; or, under an assumption of underlyingly long V_2 in light stems, that suffix vowels are underlyingly short (suffix vowels are uniformly short at the surface level, so the latter claim is unproblematic from either perspective).

[77] In this example, *cala* is a noun 'urine' homophonous with the verb stem 'to urinate' in the three preceding words; the verb and noun stems behave identically with respect to V_2 length.

	to.ro	*to.row.mak*
	'soaproot'	'soaproots'

f.	*irok*	*irok -tak*	*irok -sum*
	i.rok	*i.rok.tak*	*i.rok.sum*
	'shit'	'to the shit'	'with the shit'

If V_2 lengthening is a strategy for achieving heavy penultimate syllables in suffixed words where simple concatenation would yield a light penult (and where metathesis does not occur), then it makes sense to ask why it applies only to light stems: in other words, why are words like **rukkaase* (*rukka -se*) ungrammatical? In actual fact, a few such forms are attested by Harrington, but they are quite rare[78] and are usually accompanied by parallel suffixed forms without V_2 lengthening, suggesting that they are occasional errors of transcription on his part or of pronunciation on the part of Mrs. Cervantes. Several examples of such dually-attested suffixed light stems, contrasted with examples of regular (non-lengthening) suffixed stems, are given in Table 72.

Table 72. Suffixed non-light stems with and without V_2 lengthening

[78] A concordance finds 24 non-light stems attested in a total of 40 instances with long V_2 in the conditioning environment; of these, eight stems are attested in the conditioning environment *only* with long V_2. (A perhaps disproportionate number of such exceptional long-V_2 items--five stems in ten instances--contain the lengthened V_2 before the andative suffix *-na*. Among the non-light stems attested with both long and short V_2, *-na* forms account for nine instances of long V_2 in five stems, which is more than any other single conditioning suffix in these examples: *-tum* 'from' occurs in four instances with a single stem, and *-pu* 'reflexive' occurs once with each of three stems, while other suffixes are attested only once or twice each with exceptional long-V_2 stems. It is tempting to summarize therefore that *-na*, compared to other conditioning suffixes, exerts a particular lengthening pressure on V_2 in non-light stems; but since non-light stems surface with (grammatical) short V_2 in 743 instances before *-na*, it is difficult to see what the generalization would be.)

Morphemes + gloss	Short V_2 (expected)	Long V_2 (not expected)
humri -na 'to go to baptize'	*humrina* (5)	*humriina* (3)
kamre -na 'to go to gather dwarf sunflowers'	*kamrena* (1)	*kamreena* (2)
sunyi -pu 'to fill oneself up'	*sunyipu* (2)	*suniipu[y]* (1)
elwe -na 'to go to eat the last meal'	*elwena* (1)	*elweena* (1)
yuukis -e 'acorns-acc'	*yuukise* (12)	*yuukiise* (1)

It is conceivable that V_2 lengthening in these non-light stems is indicative of an incipient generalization of the V_2-lengthening process to penultimate syllables beyond the stem. If so, this would suggest that the requirement for word-level heavy penultimate syllables was itself being broadened within the language; however, the examples are not numerous enough (see Chapter 3, fn. 78) to make such a claim. Given the numbers, however, it is more important to account for the generalization that V_2 lengthening does not, as a rule, occur in non-light stems. A likely explanation is that there is a prohibition on consecutive heavy syllables within a stem (or perhaps within a single morpheme; since stems are the longest morphemes in Mutsun, the distinction is trivial). The existence of 329 disyllabic HH stems (all either (C)VCCVC or (C)VVCVC, e.g. *aaTin* 'earring', *Tuylun* 'vulture') in the lexicon would seem to contradict such a prohibition; but it may be the case that word-final consonants are extrametrical (they do not contribute a

mora to a word-final syllable). If this is the case, stems like *aaTin* and *Tuylun* when unsuffixed are prosodically HL: in other words, prosodically identical to V-final stems like *eeye* 'to pass by' and *cirpi* 'to shout'. When followed by any CV-initial suffix such as the plural *-mak*, the final consonant of such stems would be moraic, yielding heavy penultimate syllables in words such as *aa.Tin.mak* 'earrings' and *Tuy.lun.mak* 'vultures'; and the final consonant of the suffix, /k/ in the case of *-mak*, would be unfooted. Analyzing word-final C as extrametrical, then, offers a possible explanation for fact that Mutsun has several disyllabic stem templates with final CVC, but none with final CVV (in unsuffixed stems): HH stems are prohibited.

3.4.2.5 /h/ epenthesis as a route to heavy penultimate syllables in suffixed stems

The V_2 lengthening described above is a regular process which applies to all light stems, with a very few apparent exceptions. On the other hand, /h/ epenthesis is a sporadic phenomenon which affects some non-light stems but not others, apparently arbitrarily. Harrington analyzed variable stem-final /h/ as underlyingly /h/-final stems whose final /h/ was frequently dropped in bare (unsuffixed) forms; and while this may well be the correct analysis in some cases, I propose that it is not sufficient for all instances of variable stem-final /h/.

Many Mutsun stems (usually nouns) are unambiguously /h/-final, attested in all instances with final /h/: examples include ***ra(a)h*** 'bodylouse' (14 entries)[80], ***askih*** 'bangs' (5 entries), and ***kureh*** 'red ochre' (5 entries). Such stems may be light, non-light, or even monosyllabic; and in many cases, the final /h/ is analyzable as the nominalizer ***-h***, as in ***askih***, which consists of the verb stem ***aski*** 'to cut bangs' + ***-h***. (Other h-final stems which do not show synchronic evidence of being nominalized verbs may nevertheless have their origins as such.) However, other stems are attested with final /h/ in only some instances, being recorded elsewhere as vowel-final: examples include ***tiwi(h)*** 'feather headdress' (recorded 4 times as ***tiwi*** and 6 times as ***tiwih***), ***tammala(h)*** 'mountain lion' (recorded 9 times as ***tammala*** and 3 times as ***tammalah***), and ***kurka(h)*** 'roasted corn, pinole' (recorded 17 times as ***kurka*** and 26 times as ***kurkah***).

For some of the variable stems like ***kurka(h)***, Harrington's analysis of /h/ dropping is likely to be correct: in such stems, diachronic weakening of /h/ in final position may have led to variable pronunciation (and if the language had continued to be spoken, may have eventually led to final /h/ in such stems disappearing entirely). Harrington usually records the stem ***kurka(h)*** with final /h/ (25 instances, including once in unsuffixed form); but sometimes as ***kurka*** (vowel-final; 10 instances, both bare and suffixed forms); and twice as "***kurka‘***", with (‘) indicating final aspiration. While aspiration after a vowel in Harrington's data is usually found phrase-finally, indicating

[80] Merriam has one entry for this stem, which he spells "rah"; his final -h is ambiguous, as it could merely represent English-like spelling ("ah" for /a/, a convention he frequently uses; see Section 2.1.2), or it could represent an actual /h/.

that it is a phonetic artifact, both instances of "*kurkaʻ*" occur in the suffixed forms "*kurkaʻsum*" (with the comitative suffix *-sum*); *kurkahsum* (with full /h/) is also attested twice, as is *kurkase* (no /h/, no aspiration, with the accusative suffix *-se*), suggesting that for this stem, there is actual variation among /h/-final, vowel-final, and intermediate forms of the stem with final aspiration. Harrington notes of the stem-final /h/ in *kurkahsum*: "caught forever" (1922, 1929-30:42/0036); and in *kurkahse*, "c[learly].h[eard]." (1922, 1929-30:42/0211), "[s]trikes her better with h" (1922, 1929-30:42/0535), "carefully caught" (1922, 1929-30:38/0534), and "full h" (1922, 1929-30:58/0187); but in an entry for *kurka* (in isolation), Harrington notes, "Shows there may be words ending in -h and without -h" (1922, 1929-30:58/0188). Thus, in spite of Harrington's careful effort to capture the correct form of the stem, he found genuine variability in Mrs. Cervantes's pronunciation, which could plausibly be due to weakening of a historic final /h/.

Under a deletion scenario, stem-final /h/ is retained in suffixed forms because it is non-final (i.e., for phonetic reasons). If /h/ is epenthesized in at least some stems under suffixation, the motivation is phonological: to repair a dispreferred light penultimate syllable. /h/ epenthesis applies where V_2 lengthening is blocked, i.e. in non-light stems (though there is no clear reason why it does not apply regularly to all non-light stems); analyzing the /h/ as epenthetically attached to the following suffix rather than the stem gets around the problem of deriving HH stems, which is (presumably) the reason why V_2 lengthening cannot apply to non-light stems.

In addition to V_2 lengthening, a pattern of /h/ epenthesis in some V-final stems before CV (or CV-initial) suffixes also results in complex words containing penultimate heavy syllables where strict concatenation of stem + suffix would yield light penults. Stems attested with epenthesized /h/ are almost exclusively non-light, suggesting that /h/ epenthesis operates specifically in those environments where V_2 lengthening is blocked.

66 genuinely /h/-final stems are attested in Mutsun; many of these are nouns derived from V-final verb stems + the nominalizing suffix *-h*, as in *tokkoh* 'mat, bed', from the verb *tokko* 'to spread out'. Other stems like *wimmah* 'wing' and *yuuh* 'turpentine', for which no verbal origin is apparent, are analyzed as underlyingly /h/-final because they are recorded with final /h/ in both suffixed and bare forms. Suffixation of these inherently /h/-final stems, not surprisingly, yields complex words containing /h/ before the suffix: e.g., *tokkohtak* 'in a bed', *tokkohte* 'to have a bed', *wimmahmak* 'wings', *yuuhmin* 'turpentiney thing', *yuuhte* 'to have turpentine'; such words contain heavy penultimate syllables merely as the result of simple morpheme concatenation.

On the other hand, a number of stems which are attested in bare form--and in many cases in some number of suffixed forms--as vowel-final are recorded with final /h/ in one or more suffixed forms. Harrington analyzed such variable h-final stems as containing an underlying final /h/ which was frequently dropped in less careful speech, yielding vowel-final surface forms in the absence of suffixation. At first glance this is a

plausible hypothesis, since /h/ is likely one of the least perceptually salient consonants in the Mutsun inventory.[81]

Harrington's analysis of this type of apparent "h-dropping" stem can be seen in his notes for an entry ***haysahTuk***'with them' (cf. ***haysa*** 'they'), in which he comments that the stem-final /h/ preceding the suffix -***Tuk*** was “c[learly] h[eard] forever & imp[ortan]t for writing hays/°ah [***haysah***]" (Ha 37/0655, emphasis added). That is, Harrington viewed ***haysah*** as the correct form of the third person plural pronoun, in spite of the fact that it is attested in unsuffixed form as ***haysa*** (no final /h/) 373 times, as well as 56 times in suffixed form (42 with CV suffixes) with no final /h/; in fact, the *only* instance of /h/-final ***haysah*** is this single entry containing the comitative suffix -***Tuk***. This overwhelming preponderance of evidence for ***haysa*** as a vowel-final stem contradict Harrington's analysis, and suggest rather that /h/ in ***haysahTuk*** is epenthesized.

It does seem probable that some stems in Mutsun are genuinely /h/-final; indeed, since every consonant in the Mutsun inventory (with the possible exception of /L/ (IPA /lʲ/)and /tY/ (IPA /tʲ/), two of the lowest-frequency consonants) is attested in final position in at least a few words, and since /h/ is a high-frequency phoneme in Mutsun, an absence of any words or morphemes with final /h/ would be a surprising gap. Final /h/ attested in elicited unsuffixed stems is more likely to be underlying, since there is no phonotactic

[81] This claim cannot be directly tested, given the absence of living speakers (or audio recordings of speakers) to provide data for testing perceptual salience. However, its variable recording by both Arroyo and Harrington certainly suggests that its perceptual salience was low. Furthermore, as Mielke (2001) observes, deletion of [h] is found in many languages, presumably due to its relatively low perceptual salience.

reason to epenthesize /h/ word-finally (there is no requirement for word-final syllables to be heavy, nor for stems to end in a consonant, though many noun stems do). Some examples of bare stems recorded with final /h/ are given in (59).

(59) **Bare stems attested with final /h/**

a. *wimmah* 'wing'
b. *rah* 'body louse'
c. *yuuh* 'turpentine'

(59a) is more ambiguous than (59b) and (59c): in bare form, it is attested variably as *wimmah, wimma,* and *wima* (the latter form by Arroyo); and in suffixed form as *wimmah* (in *wimmahmak* 'wings') and *wiimah* (in *wiimahtak* 'on the wing(s)').[82] However, both *raah* and *yuuh* are most frequently attested with final /h/ by Harrington; and both are spelled by Arroyo with a final 'g' in their unsuffixed forms, indicating the presence of an audible final consonant which was most likely /h/ (there is a clear correspondence between Arroyo's coda 'g'--presumably based on Spanish, which uses the letter "g" to represent /x/ or /h/ in certain environments--and Harrington's coda "h" in other morphemes such as *-hte* 'perfective' [variant of *-Ste*], *-hne* 'passive', etc.; cf. the discussion in Section 2.1.1.2, and in particular the data in (9)).

[82] It is also possible that *wimmah* actually consists of two morphemes, an unknown verb stem *wimma* + the nominalizing suffix *-h*; but if so, the deverbal noun form had been lexicalized by the time Mutsun was documented.

On the other hand, there are a great many stems like *haysa* which only surface with a final /h/ when followed by a CV (or CV-initial) suffix.[83] For such stems, there is no evidence other than these suffixed forms to suggest that a final /h/ is underlying; and in many cases, there is additional evidence, in the form of suffixed forms without /h/, that /h/ is an addition to the stem rather than a deletion. Several noun stems fitting this description are given in their attested bare (unsuffixed) forms in (60).

(60) a. *tammala* 'mountain lion'
b. *TattYi* 'bone'
c. *ciiri* 'horn'
d. *appa* 'father'

Each of the stems in (60) is also attested in the data in one or more suffixed forms, also without a stem-final /h/, as shown in the examples in (61) (the number of tokens of each form is given in parentheses):

(61) a. *tammala**kma*** 'mountain lions' (4) *tammalasum* 'mountain lion-INS' (1)

[83] Another noun stem, *kalle(h)* 'sea', is variable in both unsuffixed and suffixed forms (number of tokens in the corpus is given in parentheses for each form):

- *kalle* (8) vs. *kalleh* (4)
- *kalletka* (13) vs. *kallehtak* (8) 'in/to the sea'
- *kalletkawas* 'from the sea' (1)
- *kallewas* 'of the sea' (1)
- *kallehse* 'sea (acc.)' (1)
- *kallehmak* 'seas' (1)

Harrington also records a single instance of unsuffixed *kalle* with final aspiration (‘), and the only comment from Mrs. Cervantes about this stem is that "[b]oth *kalletka* and *kallehtak* are good words" Harrington (1922, 1929-30:38/0124), suggesting that perhaps this was a truly variable stem.

b. *TattYi**kma***
'bones'
(1)

TattYisum
'bone-INS'
(1)

TattYise
'bone-ACC'
(1)

c. *ciiri*
'horns'
(1)

ciirite
'has horns'
(1)

ciirimin
'horned one'
(1)

d. *appa**kma***
'fathers'
(12)

*appa**tka***
'to the father'
(2)

appase
'father-ACC'
(10)

appawas
'father's'
(4)

In the plural forms in (61a-d), and in the one locative form in (61d), metathesizing suffixes are used in their CCV forms, which can only co-occur with a V-final stem. This indicates that at the time of these recordings, each stem was analyzed by the speaker as phonologically V-final. However, each of the stems recorded as in (60) and (61) is also attested in a more restricted set of suffixed forms *with* a final /h/, as shown in (62).

(62) a. *tammalah**mak***
'mountain lions'
(1)

tammalahTuk
'mountain lion-COM'
(2)

b. *TattYih**mak***
'bones'
(1)

c. *ciirih**mak***
'horns'
(1)

d. *appahTuk*
'father-COM'
(2)

In (62a-62c), the use of the CVC form (*-mak*) of the plural suffix--with stems which are attested elsewhere with the CCV form of the plural suffix (*-kma*) and without the final /h/--indicates that /h/ in these forms is a phonological rather than a phonetic addition to the stems, since a purely phonetic aspiration cannot condition morpho-phonological alternations. While these data could be interpreted as a set of originally /h/-final stems in the later stages of a historical shift in which final /h/'s are dropped and stems are reanalyzed as V-final, additional examples of /h/ before the suffix *-Tuk* 'comitative' give further support to the idea that /h/ in such words is in fact epenthetic. These examples (63) show /h/ occurring not only stem-finally, but also as the final segment of the CCV plural suffix *-kma*, which all phonological evidence indicates does *not* contain an underlying final /h/. Stems attested in bare form and with the plural suffix, but without final /h/, are shown in (63); the number of instances of each form is given in parentheses at right.

(63) **Bare and suffixed stems without final /h/**

a. *mukurma* 'woman' (97)
b. *mukurmakma* 'women' (14)
c. *piina* 'that' (88)
d. *piinakma* 'those' (2)

Below, the same stems and plural forms are shown with a final suffix *-Tuk* 'comitative', this time with final /h/:

(64) **Stems and complex forms with final /h/ before -Tuk (comitative)**

a. *mukurma**h**Tuk*

mukurma	*-Tuk*
woman	-COM

'with the woman'
(3)

b. *mukurmakma**h**Tuk*

mukurma	*-kma*	*-Tuk*
woman	-PL	-COM

'with the women'
(1)

c. *piina**h**Tuk*

piina	*-Tuk*
that	-COM

'with that'
(1)

d. *piinakma**h**Tuk*

piina	*-kma*	*-Tuk*
that	-PL	-COM

'with those'
(1)

The forms **mukurmah*, **mukurmakmah*, **piinah*, and **piinakmah* (or indeed any form ending in **-kmah*) are unattested without following suffixes. It is noteworthy that in the forms in (64), /h/ surfaces immediately to the left of *-Tuk*, regardless of

whether the morpheme in that position is a stem (*mukurma, piina*) or a preceding suffix (*-kma*): in other words, its presence is dependent on the final suffix *-Tuk* rather than on the stem.

The singular forms in (64) are all well attested within the data, both with and without suffixes, yet except in a few instances with the suffix *-Tuk*, they are never recorded with final /h/. Likewise, the suffix *-kma* in the two plural forms, *mukurmakma* 'women' and *piinakma* 'those', is attested with final /h/ only in these two instances with *-Tuk* and in a single instance with *-tak* 'locative' in the word *mukurma-kmah-tak* 'to the women'. Both with and without additional suffixation, *-kma* is attested without final /h/ 448 times throughout the database. Since *-kma* is known to be the metathesized form of *-mak* (which contains no /h/), and since the *-kmah* form is only found in these three instances with *-Tuk* and in one additional instance before *-tak*, it is highly unlikely that /h/ is an underlying phoneme in this suffix; rather, it appears to be epenthesized in these few isolated instances.

An analysis of final /h/ in these forms as epenthesized (rather than underlying, and dropped elsewhere) accounts for both the absence of /h/ in bare stems and the fact that /h/ surfaces specifically when followed by a CV (or CV-initial) suffix. /h/-epenthesis in some stems does not preclude the existence of other underlyingly /h/-final stems; rather, it is likely that there are two categories of /h/-final stems, those whose final /h/ is underlying and those whose final /h/ is inserted in a particular phonological environment in order to make penultimate syllables heavy. Since some stems with phonological final

/h/ may undergo /h/-dropping in some cases, there is bound to be some ambiguity between underlying and epenthesized stem-final /h/ in surface forms; however, as a rule of thumb, a stem which at least sometimes surfaces with final /h/ in bare form may be considered an /h/-final stem, especially if it is also attested with final "g" by Arroyo; while a stem whose bare form is invariably V-final, but which appears with final /h/ only in the presence of a CV (or CV-initial) suffix such as -*Tuk*, may be assumed to have undergone /h/-epenthesis.

3.4.3 Summary of Suffix Metathesis

In this section, I have offered an account of Mutsun suffix metathesis based on a far more extensive corpus of data than has been available to previous scholars. As I have demonstrated, “suffix” metathesis in fact affects not only the two suffixes -*mak*/-*kma* 'plural' and -*tak*/-*tka* 'locative', but also the enclitic irrealis morpheme =*tukne*/=*tkun*, a fact which has not (to my knowledge) been noted in other analyses, no doubt due to the comparatively low frequency of this morpheme. Suffix metathesis is clearly a phonotactic phenomenon, motivated by a requirement that penultimate syllables in many words be heavy and conditioned by the category (consonant or vowel) of the preceding stem-final segment.

Although it has been suggested that suffix metathesis serves to prevent phonologically prohibited CCC clusters, this analysis can only be true if the CCV forms of the affected morphemes are underlying; but several types of evidence suggest that this

is not the case. The existence of the homophonous but non-metathesizing plural suffix -*mak*$_2$ 'plural nominalizer'; several plural pronouns containing the CVC sequence /mak/, which appear to be related historically to -*mak*; and a lexically specified CVC variant -*kam* 'plural', all point to CVC origins for the plural suffix -*mak* . Additionally, the fact that CVC-initial *tukne* occasionally occurs clause-initially (i.e., in the absence of any preceding conditioning segment) supports an analysis in which CCV forms are derived from underlying CVC forms via metathesis, rather than the reverse.

The more plausible movitation for suffix metathesis is that derived CCV , monosyllabic morphemes following a V-final stem create words with preferred heavy penultimate syllables, e.g. *hut.tu-t.ka* 'in the belly' (in lieu of forms like **hut.tu.-tak* with light penultimate syllables). The claim that heavy penultimate syllables are preferred in Mutsun is supported by the fact that a majority of noun and verb stem shapes contain heavy penultimate syllables. Furthermore, Spanish loanwords often undergo lengthening of the penultimate-syllable vowel as part of nativization, resulting in heavy penults. Mrs. Cervantes often “corrected” unfamiliar words with light penults from Arroyo to make the penultimate syllable heavy, via either vowel lengthening or gemination of a medial consonant. Finally, stem-final /h/ is frequently epenthesized only in the environment of a following CV (or CV-initial) suffix, creating a heavy penultimate syllable where simple morpheme concatenation would yield a light one, and where in some cases (e.g. the suffix -*Tuk*) metathesis is not an option.

In addition to providing an account of suffix metathesis itself, I have also attempted to explain why the metathesized form of *-mak* is *-kma* rather than **-mka* (reversing the relative order of consonants). I have shown that Hume's hypothesized constraint barring coda /m/ is undermined by the fairly frequent occurrence of coda /m/ in the Mutsun corpus. Instead, I have proposed that the sequence /mk/ is avoided because nasal + stop clusters in Mutsun are optimally homorganic.

3.5 Inadequacy of existing models to predict Mutsun metathesis

In this section, I review several theoretical approaches to CV metathesis by Hume (2001) and Blevins and Garrett (1998), which propose phonetic (perceptual), phonological (vowel epenthesis and deletion), and stress-based motivations for metathesis. I present data from Mutsun to show that each approach fails to provide an adequate synchronic account for the types of metathesis found in Mutsun.

3.5.1 Perception-based accounts

Blevins and Garrett (1998)and Hume (2001) both propose that certain types of phonological metathesis arise as the result of perceptual factors. In perceptual metathesis (Blevins and Garrett 2004), metathesis is the result of misperception and reinterpretation on the part of the listener; in perceptual optimization (Hume 2001), metathesis is a means of maximizing the perceptual cues for affected consonants.

3.5.1.1 Perceptual metathesis

Ohala (1992), in a paper on the motivations for sound change over time, argues that sound change occurs due to misperception of ambiguous or missing acoustic cues on the part of listeners, who then pass on the perceived sounds (rather than the intended sounds) in their own speech. According to Blevins and Garrett (2004), *perceptual metathesis* (their term) results from a misperception of the timing of inherently long consonant cues, such as aspiration (spread glottis) and glottalization, relative to an immediately adjacent vowel: thus, a sequence such as /ha/ may over time come to be reinterpreted as /ah/ or vice versa. Perceptual metathesis is a diachronic process, and is by definition restricted to affecting only a subset of consonants, namely, those with inherently long phonetic cues; it is conceived as an acoustic rather than articulatory phenomenon (but see discussion of coarticulatory metathesis, another type of metathesis posited elsewhere in the same paper). Blevins and Garrett cite liquids, laryngeals, pharyngeals, and glides as consonant types which are prone to perceptual metathesis (ibid.:513). Indeed, in the brief descriptions of metathesis in various languages on Hume's (2000) website, a cursory count finds a large proportion of phonological metathesis patterns restricted to such segment types (however, segmental restrictions are sometimes broader, e.g. all sonorants).

Perceptual metathesis is a three-stage diachronic process under Blevins and Garrett's analysis, with an intermediate stage in which the “migrating” consonant's cues

are interpreted ambiguously on both sides of the vowel (note that consonant migration can proceed in either direction; I have illustrated a rightward shift for convenience):

Perceptual metathesis: Stage 1: …C_iV… → Stage 2: …C_iVC_i… → Stage 3: …VC_i…

Under Blevins and Garrett's model of perceptual metathesis, a Mutsun verb stem like *aThi* 'to vomit' might have arisen from reinterpretation of the timing of acoustic cues for /h/ in the string /ih/ of the noun stem *aaTih* 'vomit (n.)' (assuming noun → verb derivation, for which I provide evidence in Section 3.1.2). However, as discussed above, perceptual metathesis crucially affects a restricted set of consonant types. This is problematic for a perceptually-based analysis of Mutsun stem-deriving metathesis, since the consonants involved are not restricted by natural class, nor are they all characterized by long acoustic cues.

In Mutsun stem-deriving metathesis, the only consonants not attested as changing position in at least one instance of a metathesizing stem pair are the three palatalized consonants, /L/ (IPA /l^j/), /N/ (IPA /n^j/), and /tY/ (IPA /t^j/). This may simply be an accidental gap, since the three palatalized consonants are among the least frequently occurring consonants in the language.[84, 85] However, if metathesis were the result of

[84] /L/ is attested in 89 instances, /N/ in 296, and /tY/ in 474; if recordings by Arroyo, which may or may not be reliable, are excluded, the totals are 81 for /L/, 187 for /N/, and 275 for /tY/. Though the palatalized consonants are most often found in stems, two also occur in affixes: /N/ in the excessive/habitual nominalizer *-paN* 'one who overdoes' and /tY/ in the intensive infix *-tY-* 'very, really, extremely'.

[85] There is some variability in Harrington's recording of palatalized consonants, with words such as 'cat' being recorded in some instances with a single palatalized consonant (*peNek*) and in others with a consonant+palatal glide (*penyek*); however, this probably reflects Harrington's attempts to record precise phonetic detail, rather than actual phonological variability (such as an incipient reanalysis of palatalized consonants into Cy clusters).

misperception of long consonant cues, palatalized consonants should be especially prone to reordering, since the acoustic cues for palatalization are quite long (Ohala 1992). The fact that metathesis of a palatalized consonant and adjacent vowel is completely unattested in Mutsun considerably weakens the argument for length of consonant cues as a factor.

Mutsun /r/ and /l/ (liquids), /h/ (laryngeal), /w/ and /y/ (glides)—consonant types with inherently long acoustic cues—all occur in stem-deriving metathesis pairs, consistent with a perceptual metathesis account; but so do nasals, stops, fricatives and affricates, which generally have shorter acoustic cues and therefore should not be as subject to misperception. In fact, the most frequently attested metathesizing consonant in the stem-deriving metathesis paradigm is /k/, a stop (occurring in 29 stem pairs). Perceptual metathesis cannot account for metathesis in forms whose metathesizing consonant is a stop, since stops have short acoustic cues relative to other consonant types. Below are several examples of metathesizing stem pairs whose affected consonants are stops:

(65)	a.	*aSt̲i*	'to catch California jays' ~	*aSSit̲*	'California jay'
	b.	*cirp̲i*	'to shout' ~	*cirip̲*	'a shout'
	c.	*ekT̲e*	'to be bad' ~	*ekeT̲*	'evil, badness (n.)'
	d.	*hupk̲a*	'to smear' ~	*huppak̲*	'white clay'

Even if we posited that perceptual metathesis operated gradiently according to length of acoustic cues of metathesizing consonants, the Mutsun data do not fit the

model. In a gradient form of perceptual metathesis, we would expect to find metathesis more often in stems containing the types of consonants noted by Blevins and Garrett (liquids, laryngeals, pharyngeals, and glides), with consonants characterized by shorter acoustic cues (stops, affricates, etc.) metathesizing less frequently. As it turns out, however, in Mutsun nearly the opposite is true for metathesizing stem pairs: stops are the most frequently metathesized consonant types, with glides and the laryngeal fricative /h/ among the least frequently metathesized consonant types, as shown by the data in Table 73.

Table 73. Frequency of metathesizing consonant types in stem-deriving metathesis

Consonant type	**Consonants**	**No. of metathesizing stem pairs**
stops	p, t, k, T	56[86]
fricatives	s, S	42
liquids	r, l	40[87]
glides	w, y	19[88]
laryngeals	h	18
nasals	m, n	13[89]

[86] This total includes two stem pairs recorded with alternating or variable metathesizing consonants: *torow~torke* (reflecting a historical labiovelar k^{w}; see Section 4.2.2 and 9) and *paakuT/pakkuT/paakuc~pakTu/pakcu* (the reflexive stop /T/ was noisy and was sometimes confused with the affricate /c/, but it is not at all clear which form is canonical for this pair). These pairs are also counted in the glide total (*torow*) and the fricative total (*paakuc~pakcu*), but are only counted once each in the total number of stem pairs.

[87] One irregular pair, *weeren~wenre*, could be considered liquid metathesis or nasal metathesis, since /r/ and /n/ change position relative to both the second-syllable vowel and to each other. This pair is counted in both the liquid and the nasal totals, but only once in the total number of stem pairs.

[88] This total includes the pair *torow~torke*; see footnote 86.

[89] This total includes the pair *weeren~wenre* (see footnote 87), which is also included in the liquids total, but is only counted once in the total number of metathesizing stem pairs.

Consonant type	Consonants	No. of metathesizing stem pairs
affricates	c, ts	9[90]
palatalized	L, N, tY	0
Total metathesizing pairs:		**194**[91]

Overall, unexpected consonants (stops, fricatives, affricates, and nasals) are attested in 122 metathesizing stem pairs[92], more than half again as many as expected consonants (liquids, glides, laryngeals), which are attested in only 76 stem pairs. Additionally, while the palatal glide /y/ metathesizes in 11 stem pairs, the palatalized consonants /L,N,tY/ never metathesize; but, as Ohala (1981:193; 1989:189; 1992:26) points out, palatal cues are also long, so under Blevins and Garrett's analysis, the palatalized consonants should be among the more frequently attested consonant types affected by metathesis. From this data, then, it is clear that perceptual metathesis motivated by long acoustic cues cannot fully account for stem-deriving metathesis in Mutsun.

The problems with a perceptual metathesis account of Mutsun reflexive metathesis are essentially the same as for stem-deriving, with a slight difference in attested metathesizing consonants (since only a few verb stems are attested as members of both the stem-deriving and reflexive metathesis paradigms). As was true for stem-

[90] This total includes the pair *paakuc~pakcu*, which is also recorded as *paakuT/pakkuT~pakTu* and counted in the stops total; however, it is only counted once in the total number of metathesizing stem pairs.

[91] This total includes two metathesizing triplets (noun, verb, and other) and a metathesizing adverb/verb pair (see Appendix G); recorded pairs consisting only of a noun and verb total 193.

[92] This figure is reduced from the apparent total of 123 because one variable pair (*paakuT/pakkuT/paakuc~pakTu/pakcu*) is included in both the stop and affricate subtotals, but is only counted as one pair in the overall total.

deriving metathesis, the metathesizing consonants found in reflexive metathesis verb stems are not restricted to consonant types characterized by long acoustic cues. The complex consonants /L,N,tY/ are absent from the reflexive metathesis paradigm, just as was true for the stem-deriving metathesis paradigm, and likely for the same reason (overall low frequency in the language). The distribution of metathesizing consonants in reflexive metathesis stems is somewhat different from that of consonants in stem-deriving metathesis pairs, and is given below.[93]

Table 74. Frequency of metathesizing consonant types in reflexive metathesis

Consonant type	**Consonants**	**No. of metathesizing stems**
liquids	r, l	22
stops	p, t, k, T	20
glides	w, y	13
fricatives	s, S	12[94]
laryngeals	h	5
affricates	c, ts	5
palatalized	L, N, tY	0
Total metathesizing stems:		**77**

In all three of the alternations that comprise suffix metathesis in Mutsun (*-mak*/*-kma*, *-tak*/*-tka*, *=tukne*/*=tkun*), the consonant which is metathesized relative to an

[93] I have not calculated the proportion of all verb stems with a given consonant type which undergo reflexive metathesis; this is because most verb stems are unattested in the reflexive or reciprocal forms, so that it is impossible to know which may have undergone reflexive metathesis when the language was still in use.

[94] This number excludes a great many reflexive forms ending in *–spu* for which the origin of the /s/ is uncertain (there is no clear evidence of a /Cs/ cluster in a V-final form of the stem), and which have thus been analyzed as containing the suffix *-spu* rather than *-pu*.

adjacent vowel is /k/, a stop. This presents the same problem for perceptual metathesis as has been described for stem-deriving and reflexive metathesis: stops are characterized by short acoustic cues relative to other consonant types, and would not be predicted to be subject to misperception in the same way as consonants with longer acoustic cues (liquids, glides, pharyngeals, laryngeals). Therefore, perceptual metathesis does not make sense as an explanation of Mutsun suffix metathesis.

Blevins and Garrett claim that perceptual metathesis frequently violates one of the typical explanations of metathesis, namely that it sacrifices the precedence relations of segments in order to minimize markedness. Under the assumption discussed in Section 3.1.2 that Mutsun stem-deriving metathesis derives new verb stems from existing noun stems, markedness is decreased by converting syllables with codas (more marked) into open syllables (less marked).

Blevins and Garrett also point out that 'symmetrical metatheses' occur, i.e. metathesis results in the cross-linguistically preferred order LV (L=liquid) in one language but VL in another, suggesting that universal markedness constraints do not select preferentially for one or the other linear order. Markedness seems similarly irrelevant in Mutsun stem-deriving metathesis, since both VC-final (noun) and CV-final (verb) stems occur synchronically (the language does not 'prefer' one or the other form). The same observations apply to both reflexive metathesis and suffix metathesis.

3.5.1.2 Metathesis as perceptual optimization

In contrast to Blevins and Garrett's model of perceptual metathesis, which is strictly a diachronic outcome resulting from perceptual uncertainties, Hume's (2001) perceptually-motivated account of phonological metathesis assumes that metathesis has in some sense a goal: namely, to optimize the perceptibility of segments via rearrangement of their linear order. Metathesis thus repairs perceptually sub-optimal segment sequences by rearranging segment strings into more acoustically salient sequences ('perceptual optimization') (2001:8-9). In Hume's examples from Lithuanian, the segment order …ST#V… (where S=fricative, T=stop, #=morpheme boundary, and V=vowel) is perceptually unproblematic because acoustic cues are robust for all segments in the sequence, and such a string would not be a likely target of metathesis. However, suffixation of an ST-final stem with a stop-initial morpheme (for example) would result in a sequence …ST#T… , rendering the perceptual cues of the stem-final stop much less salient. The solution under perceptual optimization is to reverse the stem-final ST sequence to TS, resulting in a suffixed form containing the string TS#T. This new sequence is preferable because the acoustic cues of the stem-final stop are more easily perceived in a following fricative than a following stop consonant.

Returning to an example from the preceding section, under a Perceptual Optimization account, the verb stem *aThi* 'to vomit' optimizes the perceptibility of /h/ by moving it to pre-vocalic position; while in the noun stem *aaTih* 'vomit (n.)' from which the verb is derived, /h/ is in sub-optimal position for perceptual salience, since its acoustic

cues are easily lost in word-final position (see Mielke 2001 for discussion of perceptibility of [h] in various environments). The same would hold for most stem pairs, since (in unsuffixed form, or followed by a C-initial suffix) a stem-final consonant would typically have less salient acoustic cues than a prevocalic consonant; however, not all consonants are equally weak, even in final position. In fact, retroflex consonants have been shown to be more perceptually salient in post-vocalic than pre-vocalic position (see discussion in Steriade 1997, 2001). This means that Mutsun retroflex /T/ should not metathesize to prevocalic position for perceptual reasons, so that we should not expect to see metathesis of *ekeT* 'evil, badness' (greater perceptibility of /T/) to *ekTe* 'to be evil/bad' (lower perceptibility of /T/); but in this and three other stems /T/ metathesizes from a more salient (post-vocalic) to a less salient (prevocalic) position.[95]

A discussion of the merits of Perceptual Optimization as a motivator for stem-deriving metathesis is not complete without considering how perceptual factors are affected by suffixation. Since Mutsun stems occur frequently in both bare and suffixed forms, the perceptual salience of metathesizing stem consonants must be examined in the environment of following suffixal material. As it happens, all verbal suffixes in Mutsun are C-initial, as are all nominal suffixes, with the exception of two allophonic variants: *-um* (allophone of *-sum* 'instrumental') and *-e* (allophone of *-se* 'accusative'). This means

[95] In addition to *ekeT→ekTe*, metathesis involving the retroflex /T/ occurs in *hikiT* 'a scar' → *hikTi* 'to have a scar'; *raanaT* 'long neck' → *ranTa* 'to have a long neck'; and *puhuT* 'bread' → *puhTu* 'to make bread'. (The noun *hikiT* is also variably attested as *hiTik*, with /T/ in prevocalic position.) Metathesis might have affected /T/ in the later stages of phonologization, but there is no evidence that this is the case.

that suffixation of almost any C-final stem will result in $C_1\#C_2$ sequences, impairing the perceptual salience of C_1 to varying degrees, depending on the acoustical properties of C_1 and C_2. Several disyllabic C-final noun stems with attested suffixes are given below, along with more optimal (for perception of the underlined consonant) but unattested metathesized forms at right.

(66) a. *ekeT-sum, *ekTe-sum* 'by means of evil'
b. *tuuris-way, *tursi-way* 'winter (time of cold)'
c. *tappur-was, *tapru-was* 'made of wood'
d. *irek-tak, *irke-tak* 'on the rocks'
e. *sirak-se, *sirka-se* 'hazelnuts (acc.)'
f. *weeren-mak, *werne-mak* 'rabbits'

Stem-final consonants in these examples could be rendered more perceptually salient by metathesis, as shown by the unattested suffixed forms, but in the case of noun stems they are not. Verb stems, on the other hand, are almost universally CV-final, and for certain cluster stem verbs, this final CV is the result of metathesis (see Section 3.1.2 for evidence regarding the direction of derivation in stem-deriving metathesis). Although in some cases, it might appear that metathesis improves the perceptibility of a consonant, the overall pattern does not support this as a motivation for metathesis in Mutsun.

If Perceptual Optimization were at work in reflexive metathesis (with metathesis repairing the C#C clusters created by suffixation of underlying C-final verb stems in order to make the first C more perceptually salient), then we might expect to find differences in the categories of consonants that do and do not metathesize before *-pu*/-

mu. Consonants with less perceptually salient acoustic cues, such as glides and /h/, might reasonably be expected to have migrated to prevocalic position early in the development of reflexive metathesis, with more perceptually salient consonants such as affricates moving later. Since it seems likely that reflexive metathesis was no longer productive when Mutsun was documented, the C-final forms of reflexive and reciprocal stems still remaining in use should be those that were latest to undergo regularization (via metathesis) to V-final stem form, and therefore to be skewed towards noisier, more perceptually salient consonants. In fact, however, as I observed in Section 3.5.1.1, low-salience consonants like glides and /h/ are well represented among C-final stems in reflexive and reciprocal constructions; and in fact, all consonant types except the palatalized consonants /L,N,tY/ occur at the right edge of C-final stems in the reflexive metathesis paradigm.

For suffix metathesis, which I have shown in Section 3.4 to be most plausible as a reordering from underlying CVC forms to CCV forms rather than the reverse (*-tak* → *-tka* rather than *-tka* → *-tak*), the result of metathesis would be to make C_2 more perceptually salient by placing it in prevocalic position. While Perceptual Optimization thus might be argued to motivate the leftward migration of /k/ in *-tak*/*-tka* and *=tukne*/*=tkun*, it cannot account for the fact that the final /k/ of *-mak* after metathesis occurs not prevocalically, but before another consonant (/m/ in *-kma*), a low-salience position.

In more general terms, Perceptual Optimization is not a satisfactory explanation for metathesis in Mutsun because of the fact that in every metathesis paradigm, both CV and VC segment orders occur at the surface level. If metathesis were triggered by low perceptibility of final consonants, we should expect to find only final CV synchronically, but in fact most Mutsun noun stems remain C-final. The categorical CV-final stem shape of all unsuffixed verb stems, regardless of the type of consonant (high or low perceptual salience) is further evidence that perceptual factors do not play a role in synchronic metathesis.

3.5.2 Prosodic account: Compensatory metathesis

A second type of metathesis (also diachronic) proposed by Blevins and Garrett (1998) is 'compensatory metathesis'. Briefly, compensatory metathesis is viewed as the movement over time of a prosodically weak vowel across a consonant (or cluster) into a stressed syllable. Because the vowel is the 'migrating' segment in this type of metathesis, the class of consonants which occur in such alternations need not be restricted (the consonant is incidental to the process). However, a number of language-specific characteristics are thought to be particularly conducive to the development of compensatory metathesis. These include: a small vowel inventory (vowel coalescence is more likely than metathesis in languages with many vowels crowded together in the perceptual space); relatively stable vowel pronunciation (i.e. the phonetic quality of a

given vowel does not vary much); simple consonants (no secondary articulations); no geminates or consonant clusters; and stressed feet.

Mutsun displays some, but not all, of the characteristics listed above that might make it a candidate for compensatory metathesis. The Mutsun vowel inventory, as described in Section 1.3.1, consists of only five vowels well dispersed in the vowel space. Mutsun vowels do appear to be quite stable, with no reduction in unstressed syllables or fast speech (e.g. to a central vowel such as /ə/): this is evident both in the consistency with which vowels were recorded across more than a century by several scholars, and by the lack of any central vowel such as /ə/ recorded by Harrington (1922, 1929-30), who recorded fine phonetic detail.[96]

As additional evidence of the stability of Mutsun vowels, there appears to be minimal variability in vowel pronunciation: a word such as *sii* 'water' never surfaces as e.g. /see/. (Merriam (1902) does appear to confuse vowel quality in his notes, but this is likely due to his use of English spelling conventions rather than variability in the vowels he recorded, especially given the consistency of vowel quality in Harrington and Arroyo (1862).) In Spanish loanwords, /o/ in the original borrowed word varies between /o/ and /u/ in the Mutsun, as in *hesk<u>o</u>pa* 'broom' (< *esc<u>o</u>ba*) vs. *hiil<u>u</u>* 'string' (< *hil<u>o</u>*). However, this may simply indicate that Spanish /o/ was intermediate between Mutsun /o/ and /u/,

[96] The only instance of /ə/ in Harrington's Mutsun notes is in the phrase *tappur* roote 'there is the tree' (1922, 1929-30:58/0020), in which he noted that he "almost" heard an epenthetic /ə/ after the final /r/ of *tappur*, a noun well attested as being disyllabic and /r/-final; but there is no instance of a phonetic /ə/ in the place of a canonical vowel.

rather than signaling variability in Mutsun vowels, especially since /o/ and /u/ do not vary lexically within native vocabulary: Mutsun words differing only in vowel height may nevertheless be quite distinct semantically, as seen in the pair *mooroS* 'blind mole' / *muuruS* 'molar tooth'.

Although Mutsun does have three complex consonants (L, N, tY), as we have seen these are relatively rare throughout the language and do not participate in metathesis, so their existence does not necessarily preclude the possibility of compensatory metathesis occurring. On the other hand, both geminates and word-medial consonant clusters are quite common, which would seem to weaken the argument for compensatory metathesis. Finally, stress cannot be invoked as a motivating factor of metathesis in Mutsun because of the uncertainty of Mutsun stress patterns, as discussed in Section 1.3.3 and in Okrand (1977:101-102).

3.5.3 Pseudometathesis: Vowel epenthesis and deletion

In addition to perceptual metathesis (which affects certain consonants with long acoustic cues) and compensatory metathesis (in which vowels are attracted into prosodically strong syllables across a consonant), Blevins and Garrett (1998) offer another category which they term 'pseudometathesis'. In their analysis, perceptual and compensatory types of metathesis arise from phonetically natural processes, while pseudometathesis appears to be a catchall term for synchronic metathetic alternations

originating in other, non-phonetically motivated, phenomena (or whose origins are "unrecoverable").

According to Blevins and Garrett, surface metathesis which arises through a diachronic process of epenthesis and deletion falls under the category of pseudometathesis. Schematically, the process may be thought of as follows (with brackets indicating reduction and parentheses indicating an optional stage of the process):

Pseudometathesis as diachronic vowel epenthesis and deletion
(Weakening of original vowel) → copy vowel epenthesis → deletion of original vowel

In this schematic, a copy vowel (V') is epenthesized on the opposite side of a consonant from an original vowel (V) (note that this process could convert …VC to …CV or vice versa; I have only illustrated the former). This epenthesis may be triggered by weakening of the original vowel V (illustrated in parentheses), by coarticulation across the consonant, or by other factors such as stress shift. Eventually, the copy vowel V' becomes a full vowel while the original vowel V is reduced and ultimately lost, resulting in a surface form whose relation to the original input form appears metathesized. If the epenthesis/deletion process occurs only in certain phonological or morphological contexts, leaving the original form of the morpheme in others, the surface alternation that results is synchronic metathesis.

Applying this to Mutsun, the most convincing evidence for the type of process outlined above would be data from an intermediate stage of the language in which both the original vowel V and the copy vowel V' were pronounced. In Mutsun, there is no

evidence for such a stage of the metathesizing suffixes and clitic: i.e., forms like **-taka* for the locative *–tak/-tka* or **=tukun(e)* for the desiderative/irrealis clitic *=tukne/=tkun* are not attested (nor is any form such as **-maka* for the plural *–mak/-kma*, though in any case an epenthesis/deletion account of metathesis in this suffix would not be sufficient to explain why the relative order of /m/ and /k/ also alternates).

On the other hand, there is at best weak evidence of such an intermediate stage for a number of verb and noun stems, making epenthesis/deletion a possible diachronic explanation for Mutsun verb stem metathesis and/or stem-deriving metathesis. The Mutsun lexical database contains approximately 100 attested examples of variant forms containing an additional vowel (compared to the corresponding main forms). A limited number of these forms correspond to metathesizing forms; examples of these are given in (67).

(67) a. *akini* 'to be thirsty' (Ha 42/0253; cf. *akni*/*akki* ~ *aak*/*akkin*/*aakin*)
b. *ekeTe* 'to be bad' (Ar 1331; cf. *ekTe* ~ *ekeT*)
c. *humiri* 'to baptize' (Ar 26, 146, 527, 945, 981; cf. *humri* ~ *humirpu*)
d. *laya(a)Ta* 'length/height' (Ar 391, Ha 41/0457; cf. *layTa* ~ *layaT*)
e. *maayiti* 'to smile/laugh' (Ha 36/0284, 43/0383; cf. *maayi* ~ *mayti* ~ *maayit*)
f. *matala* 'to be face down' (Ar 1718; cf. *matla* ~ *mattalpu*)
g. *cukuri* 'to have diarrhea' (Ar 344, 1063; cf. *cukri* ~ *cuukir*)
h. *cukari* 'to have diarrhea' (Me 74c10; cf. *cukri* ~ *cuukir*)

In the examples in (67a-f), the 'additional' vowels (as compared to corresponding V-final verb stems) are identical to the final vowel of the main form stems, making an

explanation based on apocope/copy vowel epenthesis plausible. In (67g), however, the extra vowel matches the first vowel of the stem rather than the second; and in (67h), the extra vowel matches neither the first nor the second stem vowel. Because both stem-deriving metathesis and reflexive metathesis involve metathesis of a stem-final vowel and consonant, epenthesis of a copy vowel based on the stem-initial vowel as in (67g), or of an unrelated vowel as in (67h), is not consistent with an epenthesis/deletion-based development of metathesis.

There are several other issues which make an epenthesis/deletion story problematic for the variant forms in (67). The first issue has to do with transcriber reliability: the vast majority of the 100+ variant stem forms in the database come from Arroyo (1862), whose transcriptions are known to be suspect or problematic for various reasons discussed in Section 2.1.1. On the one hand, because Arroyo was writing a century before Merriam and Harrington, his transcriptions of stems with 'extra' vowels could certainly reflect an earlier stage of the language when trisyllabic stems were more common; on the other hand, the extra vowels may be due to the lack of a precise transcription system such as the IPA and/or a Spanish L1 bias. For the smaller number of variant 'extra-vowel' forms attested by Merriam, transcriber error is more likely based on his overall poor quality and inconsistency of transcription (see Section 2.1.2).

Another problem for the epenthesis/deletion analysis of these variant stems is that in several cases, there is a plausible alternate analysis of the variant forms which does not involve vowel epenthesis. For the form *akini*, since both *akki* and *akni* are attested as the

verb 'to be thirsty', the final *–ni* of the variant stem could be interpreted as the intransitive verbal suffix attached to *akki*. Similarly, the form *maayiti* is ambiguous because it could be interpreted either as a three-syllable form related via epenthesis to *maayit* or *mayti*, or as the stem *maayi* with the continuative verbal suffix *–ti* attached.

A third complication is the fact that the vast majority of the 100+ attested variants with 'extra' vowels do not correspond to disyllabic metathesizing stems at all. This is not definitive proof against an epenthesis/deletion account of metathesis, but it does raise the question of why metathesizing stems do not constitute a larger percentage of the variant stems. The variants in (68), like those above in (67), consist of stems whose second and third vowels match (68a-b), stems whose first and second vowels match (68c-d), and stems with a second vowel which matches neither the first nor the third vowel (68e-f). None of the stems in (68) is recorded anywhere as undergoing metathesis (neither as nouns, e.g. **kipir*, **Sukur*, nor as reflexive/reciprocal stems, e.g. **mihirpu*, **peLempu*, etc.).

(68)
a. *kipiri* 'to be twisted' (Ar 1919, 2231, 2236; cf. *kipri*)
b. *Sukuru* 'tickle' (Ar 1672; cf. *Sukru*)
c. *mihira* 'peel (v.)' (Ar 1810; cf. *mihra*)
d. *peLemo* 'to be soft' (Ar 2204; cf. *peLmo*)
e. *ociko* 'to be deaf' (Ar 2028, 2030, 2039, 2068; cf. *ocko*)
f. *ay(h)uwe* 'see' (Ar 107 131, 145, 208, 228, 505, 1191, 2511, 2771; cf. *haywe*)

In summary, while variant, trisyllabic stem forms are occasionally attested in Mutsun, they do not constitute strong evidence for an intermediate stage of stems with a copy vowel as a step toward metathesis. Discrepancies in the quality and position of "extra" vowels in such forms, the questionable accuracy of some recordings, the possibility of suffixation as the source of third-syllable vowels, and the lack of evidence that most trisyllabic stem variants ever participated in metathesis all make it more likely that such variants are part of an unrelated phenomenon.

3.6 Conclusion

In the preceding sections, I have shown that several approaches to CV metathesis based on phonetic and phonological factors cannot account for the full range of metathesis in Mutsun. Mutsun stem-deriving metathesis allows both segment orders in a variety of phonological environments, with lexical category the only determining factor; both stem-deriving and reflexive metathesis affect all vowels and most consonants in the language rather than preferentially affecting certain categories of sounds; and in suffix metathesis, previous phonological treatments have been shown to be based on assumptions that reverse the most likely underlying and output forms of the morphemes involved.

Therefore, the best explanation for why the grammar of Mutsun has these three patterns of metathesis is that metathesis generates forms that match the prosodic templates of the language, and the language has statistically significant (though not

absolute) templatic constraints on nouns and (especially) verbs. Related templatic constraints affect all three types of metathesis, stem-deriving (noun-verb), reflexive (verb-verb), and suffix (suffix-suffix) metathesis. Alternative explanations based on perceptual cues, stress, or alternative historical derivations are not well supported by the data. In Chapter 4, I turn to the possible historical development of this templatic system.

CHAPTER 4

HISTORICAL ORIGINS OF METATHESIS

Given the cross-linguistic rarity of synchronic metathesis compared to other morphophonological alternations such as assimilation and deletion (see for instance Hume 1998a, 1998b), a question that arises is why Mutsun--an otherwise transparently concatenating language, as outlined in Section 1.4--has metathesis, not merely in a single paradigm, but in three. I argue that, while the synchronic motivations for Mutsun metathesis are entirely prosodic (metathesis preserves a strict system of stem templates and satisfies a preference for heavy penultimate syllables in words), its availability as a morphophonological strategy is due to historical developments.

Blevins's (2004) theory of Evolutionary Phonology holds that synchronic phonological patterns are the result of diachronic sound change, which is itself driven largely by phonetic factors. The phonetic basis of phonological change is proposed as the reason why certain phonological patterns are typologically common while others are rare (i.e., all humans have the same articulatory and perceptual apparatus, which constrains and shapes sound change across languages). Because the time depth is so deep (at least 4000 years), whatever phonetic (or other) factors may have led to the original appearance of metathesis in Utian languages is likely unrecoverable; however, I will show that patterns of CV metathesis affecting the right edge of stems are found across most of the Utian languages, and argue that this historical pattern of stem metathesis, though realized

in unique ways synchronically in Mutsun, is the reason that stem metathesis occurs in Mutsun: in other words, a historically pre-existing structural pattern became a means of fulfilling certain prosodic requirements of Mutsun.

Blevins (2006), in a review of the major tenets of Evolutionary Phonology, offers five routes by which different languages may arrive at similar phonological patterns:

> (i) inheritance from a mother tongue
> (ii) parallel evolution in the form of parallel phonetically motivated sound change
> (iii) physical constraints on form & function, in particular, innate aspects of speech perception & production, and potential phonological universals
> (iv) 'non-natural' or external factors (e.g. language contact, prescriptive norms, literacy, second-language learning)
> (v) or mere chance.
> Blevins (2006:120)

I will present data from several Miwok and Costanoan languages to argue that patterns of metathesis, though realized in different ways in each language, are inherited from an earlier stage of development dating back Proto-Utian for stem metathesis and Proto-Costanoan for reflexive and suffix metathesis (option (i) in the list above).

As explained in Section 1.2, the Utian language family is made up of the Miwok and Costanoan branches, with Mutsun belonging to the Southern sub-branch of Costanoan. The organization of the Costanoan languages is shown again in Figure 3.

I. Southern Costanoan

A. Mutsun

B. Rumsen

II. Northern Costanoan

A. Soledad/Chalon

B. Awaswas

C. Tamyen

D. Chocheño

III. Karkin

Figure 3. Costanoan languages

This chapter, including most of the data from Costanoan languages other than Mutsun, historical reconstructions of Proto-Costanoan and Proto-Utian, and many analyses of lexical items, relies heavily on the work of Catherine Callaghan of Ohio State University, a historical linguist who has spent several decades analyzing comparative data from Miwok, Costanoan, Yokuts, and other languages and has reconstructed the Utian (formerly called Miwok-Costanoan) language family in considerable detail. Chocheño data and analysis is based on Callaghan's work along with Miller and Callaghan (1999). (For a list of abbreviations used in this chapter, refer to Table 4 in Section 1.2).

4.1 Templatic stems and stem metathesis in Proto-Utian

According to Callaghan (1997:54), “Metathesis is a fully operative process in all Utian languages”. In her reconstruction, metathesis in Utian languages is part of a larger

system of stem "ablaut", or regular prosodic shape alternations among stems. Using Callaghan's (1992:39) terminology for Costanoan stem shapes, Utian ablaut consists of length and metathesis alternations among disyllabic light, long, geminate, and cluster stems (see Section 1.3.4 for discussion and examples of these stem templates), which frequently carry grammatical significance. In prosodic terms, Utian ablaut can be considered a templatic system, with specific prosodic stem templates tending to map to specific grammatical categories. As I showed in Section 3.1.3, Mutsun has templatic system which is quite robust in terms of the association between stem shape and lexical category, with C-final disyllabic stems accounting for a large proportion of nouns and V-final disyllabic stems accounting for nearly all verbs; but it is a basic system in the sense of distinguishing only these two lexical categories, when compared to (for example) the far more extensive and specific lexical and grammatical information encoded by the templatic morphology of Arabic. The Utian template system, as (partially) reconstructed by Callaghan, is more complex than that of Mutsun, though not as rich as that found in Arabic: though evidently not absolute, Callaghan (in press) finds the following general correlations between stem template shapes and lexico-grammatical meaning (lexical items are from Callaghan, 1997:48-49 and in press); spellings are converted from Callaghan's orthography to standard Mutsun orthography):

Light and cluster stems:

"Basic" nouns and verbs

PU **pukuy* 'to whirl (wind)', PMi **nenut* 'to know'

PU **ektu* 'to dream', PCo **uyka* 'yesterday'

Geminate stems:

Nouns

PU **pukkuy* 'whirlwind', PU **ekku(s)* 'hand'

Long and lengthened (derived long) stems:

Durative verbs and (often abstract) nouns

PU **paaTal* 'sores', PU **eekut* (?) 'to be dreaming'

Figure 4. Utian stem templates ("ablaut grades")

Callaghan states that this templatic, or ablaut, system was "at least semiactive in some daughter languages [of Proto-Utian] (Callaghan 1997:50)," and considers Mutsun to have retained it to a greater extent than other Costanoan languages (ibid. in press). (As I discuss in Section 1.4.1.4, however, only a few remnants of the stem-internal length alternations illustrated below are attested in Mutsun, and such length alternations certainly do not appear to have remained morphologically productive). Several reconstructed Proto-Utian templatic stem sets with metathesis have metathesizing cognate stems in Mutsun, providing direct lexical evidence of inherited stem metathesis. Examples adapted from Callaghan (1997:48 and in press) are given below in Table 75 (spelling has been converted from Callaghan's conventions to standard Mutsun

orthography, with initial glottal stops spelled only in non-Mutsun items, as they are considered phonetic in Mutsun):

Table 75. Utian stem template (ablaut) examples with metathesis

	Light (C)VCVC	**Cluster (C)VC$_2$C$_3$V (verbs)**	**Geminate (C)VC:VC (nouns)**	**Lengthened (C)V:CVC (nouns, durative verbs)**
1.	PU **pukuy* 'to whirl (wind)'	**Mu **pusyu*** 'to whirl (wind)'	PU/PMis **pukkuy* **Mu *pussuy*** 'whirlwind'	
2.	PU **wilep* 'to flash(lightning)'	PCo **wilpe* Cho/**Mu *wilpe*** Ru *welpe* 'to flash (lightning)'	PU **willep* PMie/**Mu *willep*** 'lightning'	Miss *wiilep-a-* Ru *weelp* 'lightning' Ru *weelep* 'to flash'
	Cluster (C)VCCV			
3.	PU **'ektu* PMi **'ekcu* Ru/**Mu *istu*** Cho **'iStu* 'to dream'		PU **'ekkut* PMie **'ekkut* **Mu *issut*** 'a dream'	PU **'eekut* Mil *'uukuts* Ru *'iisut* 'to be dreaming' Ru *'iist* 'a dream'

Proto-Utian /*k/ became became /s/ in the environment of high vowels in Costanoan languages (Callaghan 1962:99, in press), as can be seen in the stem sets for 'whirlwind' and 'dream'. Stem metathesis for the three stem sets in Table 75 can thus be traced all the way back to Proto-Utian, though not all of the reconstructed stem forms appear to be extant in Mutsun: there is no attested light stem form (e.g. **pusuy*, **wilep*) of 'whirlwind'/'to whirl' or 'lightning'/'to flash' in Mutsun, nor does Mutsun have the lengthened (long) stem form of 'dream' (**iisut*) which was preserved (or possibly developed independently; cf. Callaghan, in press) in Lake Miwok *'uukuts* and Rumsen *'iisut*.

While the number of cognate stem sets for which metathesis can be reconstructed at the Proto-Utian stage is somewhat limited, it is clear from a number of stem sets without known Mutsun cognates that the Miwok languages had metathesis (along with other templatic stem alternations) that followed the same pattern as in the examples in Table 75 above. Three such Miwok stem sets are shown below in Table 76.

Table 76. Miwok stem templates (ablaut) examples with metathesis

	Light **CVC_2VC_3** **(nouns/verbs)**	**Cluster** **CVC_2C_3V** **(verbs)**	**Geminate** **CVC:VC** **(nouns)**	**Lengthened** **CV:CVC** **(nouns, durative verbs)**
1.	Mil *hoyut* 'to start'	PMi **hoytu* 'to start'		Mil *hooyut* 'to start, one by one'

	Light CVC_2VC_3 (nouns/verbs)	**Cluster CVC_2C_3V (verbs)**	**Geminate CVC:VC (nouns)**	**Lengthened CV:CVC (nouns, durative verbs)**
2.	PMie **ToTuuy-u-* 'to foam'	Miss *ToTyu-lee-ni-* 'to bubble up'	Miss *ToTTuy* 'beer'	Miss *TooTuy* 'stuff that makes foam'
3.	PMis ***hakis* 'to smoke (fire)'	PMis **haksi* 'to get smoky'	PMis **hakkis* 'smoke (from fire)'	

Metathesizing stems in Miwok are prosodically identical to those reconstructed for Proto-Utian, fitting into the same templatic categories and with largely the same associated lexical meaning. Unlike Mutsun, metathesis in the various Miwok languages does not function as a prosodic distinguisher of noun and verb stems, since C-final forms may be nouns or verbs; it would seem that the association of V-final disyllabic stem shapes with verbs, noted by Okrand (1979:129) for Mutsun, is a Costanoan innovation.

In addition to metathesis in Proto-Utian and Miwok stem sets, there are cases in which metathesis can be reconstructed across Miwok and Costanoan languages, suggesting either inheritance from a metathesizing Proto-Utian stem set or the parallel development of metathesis in both Miwok and Costanoan. An example is the set of stems having to do with sores and rashes, shown in Table 77 (all but two stems are from Callaghan, in press; the remaining Mutsun stems, indicated by †, are cited from the Mutsun database).

Table 77. Metathesizing stem sets across languages

Cluster **CVC_2C_3V** **(verbs)**	**Long** **CV:CVC** **(nouns, durative verbs)**
†Mu *paTra* 'to have smallpox/measles'	PU **paaTal* 'sores, rash'
	Mil *paaTal* 'to break out in sores; scabs, sores'
	Mu *paaTar* 'smallpox/measles'
Mil *p'otslo-Ti~ potslo-Ti* 'to break out; rash'	PU **poocol* 'a sore, rash'
†Mu *pocro* 'to have sores'	Mu *poocor* 'sores'

For this set, Callaghan did not reconstruct a Proto-Utian cluster verb stem such as **paTla* or **poclo*, though she might well have proposed such stems had she known of the Mutsun cluster stems *paTra* and *pocro*. More convincing evidence that metathesis in these stems was inherited directly from Proto-Utian would be metathesizing cognate stems from other Costanoan and Miwok languages; but even if metathesis in these stems developed independently in Lake Miwok and Mutsun, it is likely to have done so by analogy to verifiably ancient metathesizing stems such as those in Table 75. A common origin for metathesis in Miwok and Costanoan languages is consistent with both Callaghan's (1997:49) theory of "deep Utian ablaut" (templatic alternations including

metathesis) and Okrand's (1979:123) view that patterns of metathesis in Miwok and Costanoan stems are related.

The data in this section have shown that stem metathesis, as part of a larger set of templatic stem alternations, originated at least as early as Proto-Utian. I will show in Section 4.2 that the same types of patterns were active in Proto-Costanoan, with a number of metathesizing stem sets in Mutsun cognate with metathesizing stem sets in other Costanoan languages.

4.2 Templatic stems and stem metathesis in Costanoan

In this section, I present data from the Costanoan languages, along with Callaghan's reconstructed Proto-Costanoan and Proto-Southern Costanoan forms, to show that stem metathesis was active in Costanoan languages even for stems not clearly traceable to Proto-Utian. In Section 4.2.1, I present and discuss cognate data sets from Mutsun, Rumsen and Chocheño; in Section 4.2.2, I narrow the focus to cognate stems with historical labiovelar consonants and show that regular sound changes reconstructed by Callaghan can be used to date the origin of these metathesizing stems to Proto-Costanoan.

4.2.1 Metathesizing cognate stems in Mutsun, Rumsen, and Chocheño

Among the three of the Costanoan languages (Mutsun and Rumsen (S. Costanoan) and Chocheño (N. Costanoan)), stem-deriving metathesis can be observed in

a number of cognate sets documented by Callaghan (1992, in press) and partially reproduced below along with Callaghan's Proto-Costanoan and Proto-Southern Costanoan reconstructions (all data are converted to standard Mutsun orthography, except for /x/, which is a Rumsen phoneme not found in Mutsun; Rumsen underlying vowels dropped via regular vowel loss are in brackets):

Table 78. Metathesizing cognate stems in Costanoan and Proto-Costanoan

	Mutsun	**Rumsen**	**Chocheño**	**Proto-Costanoan**	
1.	*murTu*	*murts[u]*	*murTu*	PCo **murTu*	'to be dark'
	muruT	*murruts*	*murut* 'at night'	PCo **muruT*	'night, darkness'
2.	*heyse*	*'eys[e]*	*heyke-*	PCo **(h)eyse*	'to shave, to have a beard'
	heyespu	*'eyyesp*			'reflexive'
	heeyes	*'eey[e]s*	*heeyek*	PCo **heeyes*	'beard, facial hair'
3.	*uyka*	*'uyk[a]*	*'uykani*	PCos **uyka*	'yesterday'
	uyak		*'uyak*	PCo **'uyak*	'afternoon, evening'
	uyka(n)		*'uyka(n)* 'afternoon'	PCo **'uyka(n)*	'to get late'
4.	*irko*		*'irko*	PCo **'irko*	'to defecate'
	irkopu				'reflexive'
	irok		*'irok*	PCo **'irok*	'excrement'
5.	*tiwsi*		*tiwSi*		'to bloom'

	Mutsun	Rumsen	Chocheño	Proto-Costanoan	
	tiiwis		*tiwiS ~ tiwwiS*		'flower'
6.	*tapru*		*tapro*		'to gather wood'
	tappur		*tappor*		'wood, stick, tree'
7.	*mohle*		*moTlo- ~ motlo-*		'to have a big head'
	moohel		*mooTel ~ motel ~ mooTil ~ mootil*		'head'

The metathesizing stem sets (1-2) above show metathesizing cognate stem pairs (a V-final and C-final pair for each language) common to both Southern Costanoan languages and Chocheño, a Northern Costanoan language. Barring wholesale borrowing into Chocheño, the parallel stem pairs in both Northern and Southern Costanoan languages strongly suggest that these stems were inherited as metathesizing pairs from at least as early as Proto-Costanoan. The stem pairs in (3) have cognates in all three languages, but Rumsen does not appear to have a metathesizing pair; nevertheless, the existence of V-final/C-final metathesizing pairs in Mutsun (Southern) and Chocheño (Northern) argue for descent from Proto-Costanoan. The same is true for the Mutsun-Chocheño pairs (with no attested Rumsen cognates of either shape) in (4-7). With the exception of the stems in (3), the pairs in Table 78 show not only metathesis, but the distinction between verbal (V-final) and nominal (C-final) lexical category that characterizes stem-deriving metathesis in Mutsun. This is in contrast to the Proto-Utian

and Proto-Miwok patterns of stem metathesis, which are prosodically very similar to Proto-Costanoan but have C-final stems with both verbal and nominal meaning. It appears, then, that the noun-verb distinction which is at the heart of Mutsun stem-deriving metathesis has its origins in Proto-Costanoan.

In addition to metathesizing stem pairs/sets which can be traced to Proto-Utian or Proto-Costanoan, cognate stem pairs attested only in Mutsun and Rumsen provide evidence of stem metathesis at the level of Southern Costanoan. Several of these pairs are given in Table 79 (/ʂ/ is a Rumsen phoneme not found in Mutsun; as in Table 78 above, underlying Rumsen vowels dropped via regular vowel loss are indicated in brackets).

Table 79. Metathesizing cognate stems in Southern Costanoan

	Mutsun	**Rumsen**	**Chocheño**	**Proto-Costanoan**	
1.	*sukmu*	*ʂukmu*	*Sukmu*	PCo **ʂukmu*	'to smoke tobacco'
	sukum	*ʂukkum-ʂ-*		PCo *ʂukum* 'pipe stem'	'cigarette'
2.	*hiwse*	*'iwse(n)*		PCos **(h)iwse(n)*	'to want, to like/love'
	hiwesmu				'to like/love each other'
	hiiwes	*'iiw[e]s*		PCos **(h)iiwes*	'dear one, beloved'
3.	*warka*	*wark[a]*	*warka*	PCo **warka*	'to cry'
	warak 'crying, lament'	*warrak*		PCos **warak*	'crier'

The stem pair in (1) may actually date back to Proto-Costanoan rather than Proto-Southern Costanoan, since Callaghan documents a Chalon (N. Costanoan) form *ʂukum* 'cigarette' cognate with Mutsun *sukum*. The pairs in (2-3), with both C-final and V-final forms only found in the S. Costanoan languages, suggest a Proto-Southern Costanoan origin for metathesis (though, like Chalon *ʂukum*, Chocheño *warka* shows that at least one stem of the pair has Proto-Costanoan origins). As with the Proto-Costanoan pairs, metathesizing stem pairs in Southern Costanoan fall into clear categories of V-final verbs and C-final nouns (even when individual languages had some variation in lexical meaning, as in Mutsun *warak* 'crying, lament' vs. Rumsen *warrak* 'crier', lexical *category* remained consistent).

Stem metathesis is also evident at the level of individual Costanoan languages: Taken separately, both Rumsen (S. Costanoan, sister language of Mutsun) and Chocheño (N. Costanoan) have attested pairs of metathesizing stems which do not appear to have cognates in Mutsun. If there were cognates which were not documented for Mutsun, such pairs would be further evidence of Proto-Costanoan or Proto-Southern Costanoan origins; if, on the other hand, such pairs are indeed without Mutsun cognates, they suggest that both Rumsen and Chocheño continued to apply a productive pattern of (noun/verb) stem metathesis to language-specific stems (i.e., stems not inherited from an earlier proto-language). Several Chocheño stem pairs are shown in (69).

(69) **Chocheño metathesizing stem pairs**

a.	*hucri*	'to have diarrhea'	*hucir*	'diarrhea'
b.	*yorSe-n*	'to laugh'	*yoreS*	'laugher'
c.	*lipSi-*	'to have a big tongue (?)'	*lippiS*	'tongue'
d.	*uTTka(a)-ni*	'to play'	*uuTak-iS*	'doll, toy'

A verbal meaning for *lipSi-* is assumed based on the suffixed form *lipSinakSe* 'big-tongued one' (*-nakSe* is evidently a nominalizing suffix [Callaghan, in press]). Likewise, *-ni* is the inherent reflexive verbal suffix (from PU *-ne-*/*-ni-*, PCo *-n*/*-ni-* (Callaghan, in press) and *-kiS* is a diminutive nominal suffix (ibid.).

Two facts about the Chocheño metathesizing stem pairs merit discussion. First and perhaps most significantly, the pairs in (69) demonstrate that it is the *pattern* of stem-deriving metathesis rather than the stems themselves which are shared with Mutsun: for each of these four stem pairs, Mutsun has a non-cognate stem pair (often a metathesizing pair) with the same meaning, so that the lack of cognates is not due to a gap in the Mutsun data, but is rather an example of a shared metathesis pattern applied to distinct lexical items in the two languages.[1] This is important to note because, were stem-deriving metathesis in Chocheño limited exclusively to stems with cognates in Mutsun, this type of metathesis could be explained as a set of lexical items inherited by both languages, but whose surface metathesis remained productive in Mutsun while merely reflecting an

[1] The corresponding Mutsun stems/stem pairs are (in order of their corresponding Chocheño stems in (69); glosses provided where they differ slightly from Chocheño pairs): (69a) *cukri~cuukir*; (69b) *maayi*/*mayti* 'to laugh'~*mayit* 'laughter'; (69c) *latwe* 'to stick out the tongue'~*lasse(h)* 'tongue'; (69d) *amSe*/*rorSo~hiica'miS* (obviously this last pair is not a metathesizing one in Mutsun).

earlier stage of the language family in Chocheño. However, the existence of metathesis in non-cognate stems in Chocheño argues that stem-deriving metathesis was productive in Chocheño as well, if perhaps not to the extent found in Mutsun (though the paucity of Chocheño examples may simply be an artifact of the very small amount of total data extant for Chocheño compared to Mutsun).

Secondly, a number of metathesizing stem pairs in Mutsun have a single cognate (noun or verb) stem in Chocheño, but no evidence of a corresponding metathetically related (verb or noun) stem. For example, the Mutsun pair *yuukis* 'acorn'~*yuksi* 'to gather acorns' has a Chocheño cognate noun *yuukiS*, but a verb **yukSi* is unattested; likewise, Mutsun *maTTer* 'tobacco'~*maTre* 'to get high on tobacco' has the Chocheño cognate noun variants *maTTer* and *mattel*, but no evidence of a verb **maTre* or **matle*. Conversely, the Chocheño verb stems *warka* 'to cry' and *hiswi* 'to give birth' are phonologically identical to Mutsun verb stems with the same meanings, but the metathetically related Mutsun noun stems *warak* 'a cry, a lament' and *hisiw* 'one who recently gave birth' are absent from the Chocheño data. These and several other cognates which metathesize in Mutsun but do not appear to do so in Chocheño present two possibilities: either they are mere gaps in the Chocheño data, or they represent a decay of metathesis in Chocheño, a gradual loss of the less frequently used members of inherited metathesizing stem pairs which continued to be used in Mutsun. The latter possibility is somewhat supported by the additional fact that the converse situation (metathesizing stem pairs in Chocheño with only the verb or noun stem cognate attested in Mutsun) appears to

occur only once with the Chocheño stem pair *wepre~wepper*, which is related to the Mutsun verb which surfaces variably as *wey(e)ro*, *weclo*, *wesolo*, *wesaro* (always with the meaning 'to have a big mouth').

In Rumsen, stem-deriving metathesis is still evident, though superficially it is often obscured by other prosodic changes which render verb stems C-final in certain contexts (principally, the loss of underlying vowels in certain positions). In (70), the typical noun/verb metathesis contrast is clearly exemplified (without vowel loss) in several stem pairs.

(70)	a.	*oxSe-ni-n*	'to become a sorceror'	*ooxeS-ta*	'sorceror-LOC.'
	b.	*xawsa-ni-n*	to 'to become a brother-in-law'	*xawwas-ta*	'brother-in-law-LOC.'
	c.	*kuwma-n*	'to gather fennel-like plant (?)'	*kuwwam*	'a plant with leaves like fennel'
	d.	*xekco-y*	'hurry!'	*xeekoc-ta*	'strength-LOC. (?)'

Looking at the pairs in (70) isolation, V-final verb stems appear to alternate with C-final noun stems in a pattern indistinguishable from Mutsun and Chocheño stem-deriving metathesis. However, the situation is quite a bit more complex in Rumsen, with the same verb stems surfacing in C-final form (identical or nearly so to their nominal counterparts) in a number of contexts. Table 80 contrasts V-final and C-final forms of several Rumsen verb stems, with the conditioning environments[2] for each.

[2] The descriptions of conditioning environments (which are mostly inflectional suffixes) are tentative and deduced from the glosses found in the data; more precise analysis will require a thorough study of the entire Rumsen corpus.

Table 80. V-final and C-final Rumsen stems by conditioning environment

Conditioning environment	**V-final stem form**	**C-final stem form**
inherent reflexive *-n(i)*	*ewSo-ni-n* 'he became old'	
	kuwma-n 'to gather fennel-like plant (?)'	
	ripwu-n 'to become unsewn'	
	aa=ripwu-n 'cont.=unsew-inrf (?)'	
	Tumrri-ni-n 'he tasted it'	
	ukSe-n 'to drink'	
	xilmo-ni-n 'he became slow'	
agentive/patient nominalizer (?) *-st*/*-xt*[3]	*kuwma-st* 'gatherer of fennel-like plant (?)'	
	ripwi-st 'unsewer'	
	ucni-st 'inviter'	
	ucni-xt 'invited one'	
	ukSe-st 'drinker'	
	xilmo-st 'patient (one), calm (one)'	
past *-ki*	*ucni-ki* 'to invite-pst'	
causative *-won*	*ucni-won* 'to invite-caus'	
reciprocal *-min*	*ucni-min* 'to invite-recip.'	

[3] These suffixes are very similar to the Mutsun perfective suffix *-Ste* (with variant pronunciation *-hte*), and are likely related; but based on glosses, the Rumsen suffixes appear to have nominalizing force in most cases.

Conditioning environment	**V-final stem form**	**C-final stem form**
transitive imperative *-n=k*[4]	*ripwi-n=k* 'unsew it!'	*ucin=k* 'invite him!'
	xaxwe-n=k 'comb him!'	
andative imperative *-s/-is*	*ucni-s* 'go invite!'	*ukkeS-is* 'go drink!'
	ukSe-s 'go drink!'	
future *-∅/-s*		*kuwwam* 'to gather fennel-like plant-fut.'
		rippiw 'to unsew-fut.'
		uccin-s 'to invite-?'
		ukkeS 'to drink-fut.'
		ukkeS-s 'to drink-fut. (?)'
		xaxxew 'to comb-fut.'
hortative (?) *-in, -ik*		*ukkeS-in* 'let's drink (?)'
		ukkeS-ik 'let's drink (?)'
continuative *=aa*[5]		*eewoS=aa* 'to get old=contin. (?)'
		uucin=aa 'to invite=contin (?)'
unsuffixed verb forms		*Tummir* 'to be tasty'
		xillom '?' [6]

[4] Here I assume that *=k* functions as a third person object clitic (though it is the reduced third person *subject* clitic in Mutsun and, according to Callaghan (2003), had the same function in Proto-Costanoan). If this is correct, -n carries the imperative meaning here and its homophony with the inherent reflexive (?) is coincidental. Alternatively, it is possible that *-nk* is a single transitive imperative suffix.

[5] *aa* is also attested as (apparently) a proclitic in *aa=ripwu-n* 'he is unsewing it', but does not condition a C-final stem form in that position.

Based on the data available, some of the conditioning environments for a C-final form of the verb stem include: the future tense, which is expressed with either *-s* or a zero suffix; the suffixes *-in* and *-ik*, which occur in hortative constructions (e.g. *iccemak ukkeSin* 'let's drink!'); and a continuative (?) enclitic *=aa*, usually glossed as 'just doing X'. Two additional constructions, which I tentatively analyze as a transitive imperative and andative imperative, respectively, are attested with both V-final and C-final forms of the verb stem, suggesting an ambiguity either in the morpho-phonology or possibly in the accuracy of Mrs. Meadows's recall. For the last two stems in the table, *Tummir* and *xillom*, the reason for a C-final shape of the verb (in the absence of suffixation or any obvious tense, aspect, etc.) rather than a V-final shape is unclear.

Whatever a more complete analysis of the Rumsen data may ultimately reveal in terms of the precise factors motivating the use of vowel-final vs. consonant-final verb stem shapes[7], even a limited set of data demonstrates quite clearly that both stem shapes are used with verbal meanings, and that in most cases a given inflection or other grammatical context requires either a V-final or C-final stem shape to the exclusion of the

---

[6] Harrington indicated that Mrs. Meadows thought *xillom* was 'probably the shorter form of the word', but does not provide a gloss; however, since it is given in the context of two other verbal forms (*xilmost* and *xilmonin*), I assume that *xillom* is also verbal.

[7] This discussion leaves out the additional complication of monosyllabic stem shapes, which are derived from cluster stems (both noun and verb) whose last consonant is not a sonorant (Callaghan 1992). For verbs, monosyllabic stem alternants are indicated in largely the same morphological environments as the C-final stems in Table 80, and I therefore assume that they are reduced forms of the C-final alternants: e.g. *Tallk* 'to be bright' is underlyingly *Tallak*, whose V-final form is *Talka*. This analysis of monosyllabic alternants as derived from C-final rather than V-final stems is further supported by the fact that, within the stem-deriving metathesis paradigm, nouns may be disyllabic and C-final or monosyllabic (e.g. *xeekoc*, *xeekc* 'strength'), but never disyllabic and V-final (*xekco* is glossed as a verb 'to hurry', never as the noun 'strength').

other. Compared to Mutsun (and assuming that Mutsun is, as claimed earlier, the more historically conservative of the two languages), Rumsen stem-deriving metathesis looks more like reflexive metathesis but with many environments in addition to the reflexive which specify the C-final form of verb stems.[8]

In the following section, I turn to several Costanoan metathesizing stem pairs with regular /k/~/w/ alternations reflecting a historical labiovelar consonant. These pairs offer a further type of evidence, in the form of diachronic sound change, that some metathesizing stem pairs in Mutsun have their origins in Proto-Costanoan.

4.2.2 Metathesis in stems with historical labiovelars

Proto-Costanoan had a voiceless labiovelar stop /*k^w/ which was simplified in Southern Costanoan languages to /w/ before consonants and /k/ before vowels (Callaghan 1992:41, in press); while in Northern Costanoan, the labiovelar simplified to /w/ in all environments (Callaghan 1988:449, in press). The cognate sets from Mutsun and Rumsen (S. Costanoan) and Chocheño (N. Costanoan) in Table 81 below show the diachronic simplification from Proto-Costanoan /*k^w/ to /k/ or /w/ depending on language and context (data from Callaghan 1992).

[8] The question of the direction of derivation of stems in Rumsen stem metathesis (both reflexive and non-reflexive) deserves investigation, but is beyond the scope of this dissertation.

Table 81. Costanoan cognate stems with historical labiovelar /*k^{w}/

	Mutsun	Rumsen	Chocheño	Proto-Costanoan	gloss
1.	*ukke*	*'ukk[e]*	*'uw(w)e*	**ʔukʷːe*	'to get water'
2.	*akke-n*	*'akke-n*	*'awwe-n*	**ʔakʷːe-n*	'to dawn'

In both of the sets above, where /k/~/w/ occurs before a vowel, the Chocheño forms contain /w/ while Mutsun and Rumsen have /k/, making the reconstruction of Proto-Costanoan /k^{w}/ straightforward. An additional group of metathesizing cognate stems with /k/~/w/ alternations is given in Table 82 (data from Callaghan 1992, in press).

Table 82. Metathesis in Costanoan cognate stems with historical labiovelar /*k^{w}/

	Mutsun	Rumsen	Chocheño	Proto-Costanoan	gloss
1.	*sawre*	*sawre-n*	*sawre*	***sakʷre*	'to get fat'
	sakker	*sakker*	*sawwer*	**sakʷːer*	'fat, grease'
2.	*awse*	*'awse*	*'awSe*	***ʔakʷsẹ*	'to salt'
	akkes		*'awweS*	**'akʷːeṣ*	'salt'

(1) shows a metathesizing cognate stem pair in all three languages; in (2), Rumsen lacks an attested C-final noun stem for 'salt', but the existence of metathesizing pairs in both Mutsun (S. Costanoan) and Chocheño (N. Costanoan) shows that metathesis is a pan-Costanoan alternation for these stems. As with the stems in Table 81, for both cognate sets we find /w/ in all of the Chocheño forms and before consonants in the Mutsun and Rumsen verb stems, but /k/ before vowels in the Mutsun and Rumsen noun

stems. The existence of these pairs is incontrovertible evidence that the pattern of stem-deriving metathesis described for Mutsun in Section 3.1 dates back at least as far as Proto-Costanoan. Had labiovelar simplification preceded metathesis, we would expect to find Southern Costanoan verb/noun pairs containing *either* /k/ *or* /w/, depending on whether the base for metathesis was the verb stem (with /k^{w}/ preceding a vowel, resulting in /k/ in Mutsun and Rumsen) or the noun stem (with /k^{w}/ preceding a consonant, yielding /w/ in Mutsun and Rumsen). Since the Southern Costanoan cognate pairs contain /k/ before vowels but /w/ before consonants, labiovelar simplification must have occurred *after* metathesis created verb/noun stem pairs, with /*k^{w}/ in prevocalic position in noun stems but preconsonantal position in verb stems. The resulting Mutsun noun/verb stem pairs, with medial /k/ in the noun stems and /w/ in the verb stems, are shown in (71), along with a third Mutsun stem pair which follows the same pattern but whose cognates are not (to my knowledge) attested in the Rumsen or Chocheño literature (all data are from the Mutsun database; (71a-71b) are also documented by Callaghan (1992, in press).

(71)

	C-final noun stem		**V-final verb stem**	
a.	*akkes*	'salt (n.)'	*awse*	'to salt (v.)'
b.	*sakker*	'fat (n.)'	*sawre*	'to be fat'
c.	*Takkir*	'odor'	*Tawri*	'to stink'

(71c) shows that this pair, like the preceding two, underwent metathesis in Proto-Costanoan or earlier.[9]

[9] An additional Mutsun stem pair which appears to have evolved from earlier forms containing the labiovelar is *torow* 'soaproot' ~ *torke* 'to gather soaproot'. This pair is more problematic historically than the

4.3 Reflexive metathesis in Southern Costanoan

While there is good evidence that Mutsun stem-deriving metathesis evolved from patterns of stem metathesis dating back to Proto-Utian, reflexive metathesis appears to have first arisen after Costanoan split into Northern and Southern sub-branches. Reflexive metathesis, in which some verb stems surface with final VC before the reflexive and/or reciprocal suffix (in Mutsun) but with final CV elsewhere, is not attested in Chocheño (verb stems are attested with final CV in all environments), but appears to be regular in Rumsen (unlike Mutsun, in which it is a lexically specified operation).

In the previous section, I presented two sets of metathesizing stem pairs with alternating medial /k/ or /w/ to date stem metathesis in those pairs to Proto-Costanoan, when earlier forms of the same stems contained a medial labiovelar /k^{w}/. An additional set of stems with alternating /k/~/w/ in Mutsun suggests that reflexive metathesis, like stem-deriving metathesis, also dates back to Proto-Costanoan. This set includes a vowel-final verb stem, a consonant-final reflexive verb stem, and a consonant-final noun stem, thus displaying both stem-deriving and reflexive metathesis; all three stem forms are derived from Proto-Costanoan **Tak^{w}ra* 'to sit, stay' (Callaghan 1992), and are shown in (72).

---

examples given above, however: Since the presumed labiovelar is stem-final (not preconsonantal), labiovelar simplification should yield the unattested noun stem **torok*. (Another, smaller variety of soaproot is called *toroowis*, which Mrs. Cervantes told Harrington was a diminutive form; as with *torow*, it is unclear why this form does not surface as **torookis*, unless perhaps *-is* (an infrequent and evidently unproductive suffix) is a reduction of a formerly consonant-initial diminutive morpheme, perhaps related to the productive Mutsun diminutive *-kniS*.)

(72) **Reflexive and stem metathesis in Mutsun with /k/~/w/**

a. *Tawra* 'sit, stay, reside'
b. *Takkarpu* 'sit down'
c. *Taawar* 'chair'

The divergence from historical */*kʷ/* to /w/ in *Tawra* (before a consonant) but /k/ in *Takkar-* (before a vowel) puts the origin of reflexive metathesis at least as far back in time as that of stem-deriving metathesis, for the same reasons outlined for the three stem pairs in (71) in Section 4.2.2. The additional wrinkle in this set, however, is the existence of the noun stem *Taawar*. Because */*kʷ/* > /k/ prevocalically, this stem should be identical to the reflexive stem form *Takkar-*; or if different prosodically (with perhaps a long vowel or a geminate medial consonant), it should nevertheless contain a medial /k/ rather than /w/ because of the following vowel /a/. The fact that the medial consonant is /w/ would seem to suggest that, for this particular stem, the historical sequence was as follows:

1. **Reflexive metathesis in Proto-Costanoan:**

   PCo **Takʷra* → **Takʷ:ar-* before reflexive **-pi* ~ **-pe* [10]

2. **Labiovelar simplification:**

   PCo **Takʷra* > Mutsun *Tawra*

3. **Stem-deriving metathesis in Costanoan:**

   Mutsun *Tawra* (verb) → *Taawar* (noun)[11]

[10] The PCo reflexive suffix as reconstructed by Callaghan (in press), who also states that the "underlying" (C-final) forms of stems were always used before the reflexive in Proto-Costanoan. Unlike in Mutsun, however, at the Proto-Costanoan stage the C-final stem forms of verbs may not have been limited to reflexive (and sometimes reciprocal) constructions.

The fact that one metathesis process occurred *after* labiovelar simplification in this instance simply shows that stem-deriving metathesis continued to be productive as Proto-Costanoan diverged into the Northern and Southern Costanoan languages. This is borne out by the fact that Rumsen has two non-reflexive forms of the verb stem 'to sit, stay': *Tawra-* (when suffixed) and *Tawwar* (unsuffixed), both with /w/, indicating that the Rumsen stem *Tawra* underwent metathesis after labiovelar simplification, though metathesis was motivated by a different set of rules than for Mutsun (a Rumsen-specific process which Callaghan calls "De-metathesis"; see Callaghan [1992:37, 40-41] for data and detailed discussion). This historico-phonological evidence for the continued productivity of metathesis in Costanoan provides additional indirect support for my contention that suffix metathesis and stem-deriving metathesis are productive in Mutsun (see (48) in Section 3.4 for suffix metathesis and Section 3.1.2.2 for stem-deriving metathesis in Spanish loan words), since it would be surprising to find that metathesis had gone "dormant" for some period after Proto-Costanoan only to become active again in Mutsun.

According to Callaghan (1992:44, fn. 2), Proto-Costanoan had two reflexive suffixes: a simple reflexive **-pi* and an imperative reflexive **-pu*. In Mutsun, while a reflexive *-pi* is attested in a limited number of items, mostly older forms recorded by Arroyo (e.g. *likkipin* 'he killed himself', from the stem *liiki* 'to kill' and with the recent

---

[11] If this sequence of events is correct, the pair *Tawra* ~ *Taawar* is an example of verb → noun derivation, in contrast to the noun → verb directionality I have argued for in Section 3.1.2. However, the fact that Mutsun stem-deriving metathesis operates on nouns to produce novel verb stems does not preclude the possibility of verb → noun derivation (or bidirectional derivation) in an earlier stage of the language.

past tense suffix *-n*), *-pu* became the regular simple reflexive, with imperative inflection added via additional suffixation of *-y* (singular) or *-yuT* (plural), as in the pair *hitwipuy* 'clean yourself!' ~ *hitwipuyuT* 'clean yourselves!' (from the stem *hitwi* 'to clean'). In Chocheño, the reflexive/reflexive imperative distinction was maintained, with additional variants *-p* and *-pe* for the simple reflexive and *-po* for the reflexive imperative (though there are occasional instances of *-pu*/*-po* glossed as a simple reflexive, and one instance of *-pi* glossed as a reflexive imperative, indicating that the distinction may have begun to blur). The variants *-pe* and *-po* likely arose before the Northern/Southern Costanoan split, since Arroyo and Harrington document them in a few isolated Mutsun forms, such as *suyunpe*[12] 'to wear out, consume' and *nossopo* 'to sigh', which is attested elsewhere as *nossopu*. Because stems behave identically with the simple reflexive and reflexive imperative suffixes in Chocheño, only the simple reflexive forms will be given in this section for purposes of illustration.

In Chocheño, virtually all traces of the consonant-final verb stem forms assumed to be underlying in Costanoan reflexive metathesis have disappeared: stems are typically identical in their unsuffixed and reflexive forms, and are unvaryingly vowel-final,

[12] In the Mutsun data, *-pe* is almost always preceded by /m/ or occasionally /n/ as in this example; *-npe*/*-mpe* forms are undoubtedly related to the inherent reflexative-causative *-mpi*, which when attached to a verb stem yields the meaning 'cause to become X', and which probably originated as *-n* 'inherent reflexive' + *-pi* 'reflexive', with assimilation of /n/ to /m/ over time: witness the verb form 'to shake someone' (literally 'to cause someone to shake'), recorded as *ruymanpe* by Arroyo but as *ruymampi* by Harrington (cf. *ruyma* 'to shake').

regardless of stem type. In (73), verb stems with medial singleton or geminate consonants and others with medial consonant clusters are shown in unsuffixed and reflexive forms.

(73)

	Stem		**Reflexive**	
a.	*ere(e)*	'to bathe, throw water on'	*ere-p(i)*	'to bathe oneself'
b.	*moSSi*	'to be/get warm'	*moSSi-pi*	'to warm oneself'
c.	*haSSe*	'to do, to make'	*haSe-pe*	'to become, turn oneself into'
d.	*hicwe(e)*	'to comb someone's hair'	*hicwe-pi*	'to comb one's hair'
e.	*Tuhru*	'to come to mind'	*Tuhru-p*	'to remember'
f.	*etwee*	'to turn'	*etwe-p*	'to turn over in bed'
g.	*henwe*	'to think'	*henwe-p(e)*	'to think'
h.	*uhne*	'to hide'	*uhne-p(e)*	'to hide (oneself)'

Just as in Mutsun, light and geminate V-final stems, as in (73a-c), do not alternate with C-final forms in the reflexive. More importantly for comparison with Mutsun, however, are the examples in (73d-h), in which V-final cluster stems never surface in C-final form, even in the reflexive. For these and all other cluster stems found in the Chocheño data with a reflexive suffix, there is no evidence of C-final stem forms such as e.g. **hicew-*, **Tuhur-*, **etew-*, **henew-*, **uhen-*.[13] If these data are representative of Chocheño reflexives generally, then it would seem that reflexive metathesis--or more precisely, the C-final forms of verb stems which were the input to reflexive metathesis in

[13] The only apparent partial exception to this generalization is the reflexive/reflexive-imperative form *hunnuypu* 'to blow one's nose/blow your nose!', with stem-final /y/; however, the non-reflexive verb stem is *hunhu*, not *hunyu*, so it is not entirely clear that metathesis accounts for *hunnuy-*.

Proto-Costanoan--disappeared from Chocheño, leaving metathesized V-final verb stems in all environments.

In Rumsen, on the other hand, reflexive metathesis in cluster stems appears to be universal, since all cluster stems surface as C-final before the reflexive suffix *-p(i)*, but as V-final before other suffixes.[14] Several examples of this contrast are given in (74).

(74)

	Non-reflexive	**Reflexive**
a.	*ka=Tumrri-ni-n* 'I tasted it'	*ka=Tummir-pi-n* 'I tasted'
b.	*wa=matla-ni-n* 'he became face down (?)'	*wa=mattal-pi-n* 'he became (?) face down'
c.	*wa=cusku-ni-n* 'he farted'	*paccu cussupk* 'he is farting (himself)'
d.	*ucni-xt* 'invited'	*uccim-pi-n* 'he invited himself (?)'
e.	*xekco-y* 'hurry up!'	*xekkoc-p* 'hurry (yourself) up!'

Cluster stems surface with final vowels before the inherent reflexive *-ni* (74a-74c), the patient stative *-xt* (74d), and the imperative *-y* (74e); but with final consonants before reflexive forms. (The reflexive *cussupk* is underlyingly *cussuk-p*, with metathesis

[14] A possible exception is the stem *enwe~ennew* 'to point (at)': Isabelle Meadows offered both V-final (*enwe-p*/*enwe-pi-n*) and C-final (*ennew-pi-n*) reflexive forms of this stem (Harrington 1922, 1929-30:36/0654).

of final /kp/ to /pk/.)[15] However, it is not necessarily the case that all such C-final reflexive stems are the historically underlying forms of cluster stems, which undergo metathesis to V-final form in non-reflexive contexts (as is the analysis for reflexive metathesis in Mutsun). A Rumsen-specific pattern of vowel deletion in unsuffixed stems creates monosyllabic stems which--if the underlying stem was C-final--contain final consonant clusters, as the examples in (75) illustrate.

(75) a. *oTT* 'to gather' (< **oTo*)
b. *kaay* 'to ache' (< **kaayi*)
c. *pattx* 'sage' (< **pattih*)
d. *rummṣ* 'back' (< **rummeṣ*)

Because the underlying stems in (75c-75d) each contain a second-syllable vowel between two consonants, deletion of that vowel results in a monosyllabic stem with a final cluster. However, the second member of a stem-final cluster cannot be a sonorant, so insertion (or restoration) of a vowel before a final sonorant is used to repair such impermissible clusters, resulting in e.g. *ṣukkum* rather than **ṣukm* for the unsuffixed form of the verb 'to smoke' (< Proto-Costanoan **ṣukmu*) (Callaghan 1992). Callaghan calls this cluster repair strategy "de-metathesis", since underlyingly C-final disyllabic stems which metathesize to V-final form in some contexts must be "de-metathesized" to

[15] Evidently /kp/ is an ill-formed consonant cluster in Rumsen: In addition to *cussukp→cussupk*, Isabel Meadows, in discussing a hypothetical Rumsen stem *xalka~xallak* 'to be blind' (extrapolated from Chocheño *halak* 'blind person'), corrected the reflexive form from *hallakpin* to *hallapkin* (Harrington 1922, 1929-30:40/0049). This contrasts with Mutsun, which has no such restriction on /kp/ sequences, as evidenced by well-attested reflexives like *corokpu* 'to become sad', *Sumekpu* 'to kiss', and *pasikpu* 'to greet'.

C-final form to avoid consonant + sonorant clusters.[16] Thus, for disyllabic cluster stems whose last consonant is a sonorant, C-final stem forms may be underlying in the reflexive, or may be the result of de-metathesis; for stems whose last consonant is not a sonorant, such as *cusku~cussuk* and *xekco~xekkoc*, de-metathesis does not apply, so we may assume that either such stems are underlyingly C-final, or that they metathesize from V-final form by analogy to the behavior of other reflexive stems. It seems likely that analogical metathesis is at work in some stems, since cluster stems never surface in V-final form in the reflexive, as would be expected if some stems are underlyingly V-final. This is in contrast to Mutsun, in which many cluster stems are V-final in the reflexive.

An additional fact about Rumsen is that C-final forms of verb stems surface not only before the reflexive, but before a long list of suffixes (unlike in Mutsun, in which C-final verb stems only occur when followed by the reflexive and/or reciprocal suffix, and only in a limited number of stems). Since C-final verb stems occur only in a lexically specified subset of reflexive/reciprocal forms in Mutsun, and appear to be entirely absent in Chocheño, it would seem that Rumsen expanded reflexive metathesis from its historical environment to a broader set of environments; the reasons for this may have to

---

[16] Callaghan (1992:41) supports her analysis of disyllabic, C-final verb stem forms like *ʂukkum* as "de-metathesis" rather than underlyingly C-final stems with the example of Rumsen *Tawwar* 'to sit, stay' vs. the reflexive imperative form *Takkar-ap* 'to sit down': since Proto-Costanoan **k*^{w} became /k/ prevocalically in Rumsen, *Takkar* is the underlying C-final form of the stem, while *Tawwar* must be a "de-metathesized" C-final form based on *Tawra*, the V-final form of the stem (which, historically, is the Rumsen reflex of **Tak*^{w}*ra*, metathesized from **Tak*^{w}*ar*). For stems without such an internal sound change or cognates with which to reconstruct a historical form, the distinction between de-metathesis and metathesis is not meaningful, since the C-final form of a stem like *xilmo~xillom* 'to be slow' would be *xillom* regardless of whether it is underlying or derived.

do with Rumsen-specific phonological and prosodic changes such as vowel loss and de-metahesis.

To summarize, there is phonological evidence of reflexive metathesis at the Proto-Costanoan stage (in the form of Mutsun *Tawra~Takkar~Takkarpu*, descended from PCo *Tak^{w}ra*). Of the three Costanoan languages for which there is substantial data, Chocheño shows no evidence of reflexive metathesis; Rumsen appears to have regular and universal metathesis with both the reflexive and other suffixes; and Mutsun has reflexive metathesis only in a small set of stems. All of this evidence suggests that reflexive metathesis in Mutsun is the residue of an earlier historical pattern which was lost in Chocheño but broadened in Rumsen.

4.4 Suffix metathesis in Costanoan

In this section, I will show that suffix metathesis can be seen to a limited extent in Chocheño (Northern Costanoan), similar to that found in Mutsun for some stems, but with additional variation not found in Mutsun; however, metathesis does not occur at the surface level in Rumsen (Southern Costanoan) suffixes. Since Rumsen is more closely related than Chocheño to Mutsun (see Figure 3 in the introduction to this chapter), this indicates that the origins of suffix metathesis predate the split from Proto-Costanoan into Northern and Southern branches of Costanoan, with suffix metathesis being lost in Rumsen but retained in Mutsun and Chocheño.

4.4.1 Plural suffix metathesis in Chocheño and Rumsen

Callaghan (in press) reconstructs the origins of Mutsun's *-mak/-kma* plural suffix to a Proto-Utian plural suffix **-kom*, which developed to **-mak/*-kma* by the Proto-Costanoan stage. The latter reconstruction (based entirely on Mutsun data) is assumed by Callaghan (ibid.) to have behaved identically to Mutsun, i.e. with **-mak* after C-final stems and **-kma* after V-final stems.

Where Mutsun has regular alternation between *-mak* and *-kma* in the plural suffix (with *-kam* in some frozen forms which Callaghan analyzes as reflexes of the PU **-kom*), Chocheño has identical forms as well as *-ikma* (presumably a variant of *-kma*) and *-yma*, though it is not clear what phonotactic process accounts for the latter. In the available Chocheño data (Miller and Callaghan 1999), *-kma* is by far the most commonly attested plural suffix, occurring after vowel-final stems as in Mutsun. The form *-mak* is attested in a handful of words with consonant-final stems, but also occurs with three vowel-final stems and therefore seems to be both less regular and less frequent than *-kma*. In the examples in Table 83, the regular *-mak/-kma* forms of the plural suffix are shown with C-final and V-final stems, respectively (the singular form of a noun is given at right when it differs from the pluralized stem).[17]

[17] All Costanoan (and Miwok) data in this dissertation is represented in Mutsun standard orthography to make the data more easily comparable to Mutsun. The phoneme /x/, which does not exist in Mutsun, is written as 'x' in accordance with IPA conventions, as well as with the orthography of Harrington and Callaghan. Words written with initial '(/ʔ/) by Harrington and Callaghan are vowel-initial in my analysis (as with Mutsun); the question of the phonemic status of initial glottal stop is not important for the discussion of metathesis, since metathesis does not affect morpheme-initial segments.

Table 83. Plural -mak/-kma alternations in Chocheño and Mutsun

	Chocheño plural	**Mutsun cognate plural**	**gloss**
1.	*arukuSmak*	--	'others'
2.	*utenmak*[18]	*uttenmak*	'dancer(s)' (Cho); 'doctors, sorcerors' (Mu)
3.	*uThinmak* (*uThin* = 'two')	*uThinmak*	'two people/both people'
4.	*aawi(i)kma*	--	'orphans'
5.	*coccokma*	--	'grandchildren'
6.	*howweepokma* (sg. *howepokSay*)	--	'poor things'
7.	*ruwwaakma* (sg. *ruwa* ~ *ruwway*)	*rukkakma*	'houses'

Based only on the data in Table 83, then, suffix metathesis in the Chocheño plural is indistinguishable from that found in Mutsun. However, as mentioned above, the CVC form *-mak* also surfaces with V-final stems in several instances; these are shown in Table 84.

[18] Callaghan (in press) says that this form is an idiomatic construction with singular meaning ('dancer'); however, it is glossed at least once in the data as a plural.

Table 84. Plural -mak after V-final stems in Chocheño

	Chocheño plural	Mutsun cognate plural	gloss
1.	*accamak* (sg. *accakiS*)	*atSayikma* (sg. *atSakniS*)[19]	'girls'
2.	*aytamak* (sg. *aytakiS~ayttakiS*)	--	'women'
3.	*waakamak*	--	'those, they'

It may be significant that the singular forms of 'girl' and 'woman' (1-2) both contain the suffix *-kiS*: perhaps at an earlier stage the plural forms were *accakiSmak* and *aytakiSmak*, in which case the CVC form *-mak* would be the expected plural (since *-kiS* is C-final[20]); later dropping of *-kiS* could have left *-mak* unmetathesized. However, this fails to explain the use of *-mak* (vs. the expected *-kma*) in *waakamak*, since *waaka* 'that' is vowel-final and unsuffixed in its singular form. Furthermore, a contrasting example can be found in Table 83 (6) above, in which the singular form is *howepokSay*, with an

[19] This form with final *-yikma* (or *-ikma*) looks like a Chocheño borrowing (at least of the plural suffix); see discussion below of Chocheño *-ikma*. The singular form has the Mutsun diminutive suffix *-kniS*, so the expected plural would be *atSakniSmak* (or *atSakma*).

[20] Pluralization of (already) suffixed nouns is occasionally attested in Mutsun, as is demonstrated by forms such as *askihmak* 'bangs' (*aski* 'to cut bangs' + *-h* 'nominalizer' + *-mak* 'plural'), *hiwokniSmak* (*hiwho* 'to get old' + *-kniS* 'diminutive' + *-mak* 'plural'), and *haTmapaNmak* (*hacma* 'to fight' + *-paN* 'habitual/derogatory nominalizer' + *-mak* 'plural'). Observing such constructions, Okrand (1977:136) lists the plural suffix as the only Mutsun nominal suffix which can follow another suffix; so a similar stem + suffix + plural suffix construction in Chocheño would not necessarily be surprising. (Mutsun nouns containing archaic suffixes are also frequently pluralized, but such nouns were likely treated by speakers as monomorphemic stems: e.g. *liisonwakma* 'striped green water snakes', in which *-wa* is an archaic suffix found on many snake, insect, and plant names, and the stem *liison-* never occurs alone.)

apparent suffix *-Say* that is dropped in the plural, with suffix metathesis yielding *-kma* in *howweepokma* (treating V-final *howweepo* as the stem for purposes of metathesis).

Finally, some Chocheño plurals have *-yma* and *-ikma* rather than either *-mak* or *-kma*. These are shown in Table 85, with Mutsun cognates where they exist (singular stems are given in parentheses only when they differ from the stem form found in the plural).

Table 85. Plural -yma/-ikma alternations in Chocheño

	Chocheño plural	**Mutsun cognate plural**	**gloss**
1.	*hunTayma* (sg. *hunTaS*)	--	'old men'
2.	*meereyma* (sg. *meereS*)	*meeresmak*	'nephews' (Cho); 'nephews, grandsons, brothers-in-law' (Mu)
3.	*Taareyma* (sg. *TaareS*)	*Taaresmak*	'men'
4.	*inniima* (sg. *inniS*)	*innismak*	'sons'
5.	*iTakikma~iTaakikma*	--[21]	'younger ones'
6.	*attuuSikma*	*alaaSukma* (?)[22]	'young babies'
7.	*hittiiSikma*	*hiica'miSmak*	'domesticated animals'
8.	*mayyanikma*	*ma'yanmak*	'coyotes'
9.	*miwikma~miiwikma*	--	'men'

[21] There is one instance of a form *iTakmak*, glossed 'new ones', with a note from Harrington suggesting it might have been intended for 'younger children'; but this form is very uncertain.

[22] Though this form bears some resemblance to the Chocheño, the differences in vowels and medial /t/ vs. /l/ make them questionable as cognates; Callaghan (in press) lists the Chocheño form *attuS* for 'baby'.

The stems in (1-4) suggest that a stem-final /S/ (IPA /ʃ/) is the conditioning environment for use of *-yma* (or a variant *-ima*) in the plural, since all four of these stems are /S/-final; however, /S/-final stems are also attested in plural form with *-mak* in Table 83 (1), and with *-ikma* in (6) and (7) above. This variability may be the result of gradual loss of a formerly regular *-yma* plural with /S/-final stems, or conversely of an incomplete regularization of a newer *-yma* plural exclusive to /S/-final stems. In any case, it is a noteworthy contrast with the Mutsun plural suffix, which does not recognize featural differences in stem-final phonemes beyond that of consonant/vowel.[23] The plural forms in (5-9) above appear to be the least predictable of all among Chocheño plurals, with no common feature among the final consonants (/k, S, n, w/) of the preceding stems. It is not even clear that the vowel /i/ in these items belongs to the plural suffix; it could as easily be analyzed as final vowel epenthesis in C-final stems. When taken together with the relative infrequency of the *-mak* form of the plural, such an analysis presents an interesting possibility for the development of plural suffix metathesis in Chocheño: namely, that over time, *-kma* became the preferred form of the plural suffix, perhaps for prosodic reasons; with /i/-epenthesis arising to render C-final stems V-final, thereby allowing suffixation with *-kma* without creating illegal CCC clusters. Such an analysis is in keeping with Callaghan (in press), who generalizes the Chocheño plural suffixation paradigm as: *-kma* after V-final stems, *-ikma* after C-final stems, and *-mak* after both V- and C-final stems (she does not discuss the *-yma* form). However the data are analyzed, it

[23] Two additional forms with *-yma* are used as singular nouns: *uhrayma* 'Mutsun person' and *keckeyma* 'woman'; the unsuffixed stems **uhra* and **kecke* are unattested in Miller and Callaghan (1999).

is clear that suffix metathesis was not a regular and productive operation in Chocheño as in Mutsun, though the existence of both *-mak* and *-kma* forms would seem to suggest that it may have been at one time (alternatively, the *-mak* form of the plural could be a Mutsun borrowing).

In Rumsen, Mutsun's sister language, the plural suffix takes the forms *-(a)kay* and, less frequently, *-way* or *-kan*, with no observable metathetic alternation. From the limited data available, it appears that *-akay* follows C-final stems (including stems with final CC clusters), while V-final stems take *-kay* (this is also Callaghan's [in press] conclusion): this pattern is shown in (76).

(76) a. *yeccem-akay* 'devils'
b. *yakSun-akay* 'Indians'
c. *kecyeS-akay* 'ugly ones'
d. *siiy-akay* 'waters'
e. *loxxost-akay* 'lazy ones'
f. *Tuuxs-akay* 'days'
g. *xeewx-akay* 'shadows'
h. *lacyankw-akay* 'women'
i. *atSankw-akay* 'girls'
j. *heente-kay* 'people'
k. *Sa-kay* 'the-PL'
l. *amma-kay* 'people'

In items (76a-d), stems ending in nasals, a fricative, and a glide take the *-akay* form of the plural, while in (76e-i) stems with a variety of final CC clusters[24] also take *-akay*, suggesting that this is the default plural suffix after C-final stems. In (76j-l), stems with final /a/ or /e/ take the *-kay* form; without further data for stems with final /i,o,u/ it is impossible to be certain, but it seems likely that the *-kay* plural applies to all V-final stems.

A *-kan* form of the plural suffix occurs with a few /ya/-final stems:

(77) a. *nepya-kan* 'these'
b. *pinya-kan* 'those'
c. *amya-kan* 'people'

The similarity of (77a) and (77b) to Mutsun *nepkam* 'these' and *nupkam* 'those' suggests that Rumsen *-kan* and Mutsun *-kam* are related (and this is precisely Callaghan's (in press) reconstruction: both *-kam* and *-kan* are reflexes of Proto-Utian **-kom*). Together with the paucity of examples, this makes it seem likely that *-kan*, like *-kam*, is a lexically specified, frozen historical form of the plural. It is less clear what factors are at work in *amyakan* (77c), which is a plural form of *amma* 'person': Isabelle Meadows, Harrington's Rumsen consultant, preferred *amyakan* in one instance but gave the seemingly regular *ammakay* (76l) in another. Without more data, the generalization is simply that noun stems ending in /ya/ take *-kan* in the plural.

---

[24] The status of /kw/ in *lacyankw*, *atSankw*, and several other stems with final *-nkw* is uncertain; it may be a vestige of Proto-Costanoan /*k^{w}/, but in any case it is found in both singular and pluralized forms of some stems.

Finally, two Rumsen stems are attested with *-kway* (or possibly *-nkway*) in plural form: *kecyenkway* 'bad ones' (singular *kecenS*) and *miSxinkway* 'good ones' (singular *miSSix*). It is not clear from these two examples what morpho-phonological process may be at work in these forms, though if *-n* is a suffix separate from the plural, and if it is a cognate of the Mutsun nominalizing suffix *-n*, then these two plurals can be analyzed as verb stem (*kecye*, *miSxi*) + *-n* + *-kway*, with *-kway* simply another lexically specified irregular plural suffix. (Presumably some additional morphological process is at work in the alternation between the two 'bad' stem forms *kecenS* and *kecye*.)

In summary, while Chocheño retains some surface-level metathesis in the plural alternation *-mak*/*-kma*, which is similar to that found in Mutsun, metathesis seems to have become a non-productive pattern in the language, with *-kma* more frequent than *-mak*, and *-mak* attested after both C-final (as in Mutsun) and V-final stems. Epenthesis of /i/ after stem-final consonants appears to be a strategy that arose to license the use of *-kma* after underlyingly C-final stems, indicating that plural suffixation in Chocheño moved away from metathesis and toward a more uniform use of *-kma* (rather than *-mak*) in most plurals. Finally, an irregular form *-yma* is found only with /S/-final stems, though not in all cases (some stems ending in /S/ take *-[i]kma*). Thus, the Chocheño data exhibit sufficient similarity to Mutsun plurals (in the use of *-mak*/*-kma*) to warrant a claim that plural suffix metathesis is a historical paradigm inherited from Proto-Costanoan, but retained as a productive alternation only in Mutsun. In Rumsen, the plural suffix forms *-kay*/*-akay* resemble Mutsun only to the extent that they share the segments /k/ and /a/;

the lexically specified form *-kan* is evidently a cognate of the similarly restricted *-kam* in Mutsun, but the (also lexically specified) *-kway* appears to be a uniquely Rumsen innovation. None of these forms show evidence of metathesis, which is a further indication that plural suffixes in Mutsun remain closer to an older pattern (cf. Callaghan 1992:42 and in press), who contends that Mutsun's phonotactics are historically "conservative").

4.4.2 Locative suffix metathesis in Chocheño and Rumsen

Callaghan (2003:62) reconstructs the Proto-Costanoan (PCo) "allative" suffix (what I refer to as the "locative" throughout this dissertation, following Okrand's [1977] analysis for Mutsun) as **-tak*/**-tka*, which is identical to the Mutsun metathesizing locative suffix. Under Callaghan's analysis, this suffix comes from Proto-Utian **-to* 'allative' + PCo **=k*, the reduced form of the third person singular enclitic, which survives as *=(a)k* in Mutsun. If her analysis is correct, then the historically older form *-tak* is the same as the synchronically underlying form of the Mutsun locative (cf. my earlier claim in Section 3.4.1 that *-tak* is the underlying form of the Mutsun locative suffix, with *-tka* the outcome of--rather than the input to--metathesis). The data below show that while metathesis in the locative suffix persisted from Proto-Costanoan to Mutsun essentially unchanged, metathesis in this suffix, though still visible in some items, had likely begun to wane in Chocheño, while disappearing entirely in Rumsen.

Metathesis in the locative suffix *-tak*/*-tka* in Chocheño appears to be identical to Mutsun, with *-tak* following consonant-final stems and *-tka* following vowel-final stems in what seems to be a regular and productive pattern, as illustrated by the examples in Table 86 (data from Miller and Callaghan 1999).

Table 86. Locative -tak/-tka alternations in Chocheño and Mutsun

	Chocheño locative	**Mutsun cognate**	**gloss**
1.	*innutka*	*innutka*	'in the road'
2.	*ruwwatka*	*rukkatka*	'in the house'
3.	*rummetka*	*rummetka*	'by/in the creek' (Cho); 'in the river' (Mu)
4.	*ommutka*	--	'in the sea'
5.	*mooTeltak*	*mooheltak*	'on the head'
6.	*weppertak*	--	'from the mouth'
7.	*ullaaStak*	--	'in the bed'
8.	*miinyihtak*	--	'in the heart'

While the data in (1-3) and (5) might be explained as historical residue since these stems as well as the locative suffix are cognate with Mutsun, several stems found in Chocheño but not in Mutsun (*ommu*, cp. Mutsun *kalle*; *wepper*, cp. Mutsun *hay*; *ullaaS*, cp. Mutsun *eeT*; and *miinyih*, cp. Mutsun *sire* or *ruutYuy*) also take *-tak* or *-tka* depending on their final consonant. Though the Chocheño data are quite limited, together with the absence of other locative suffix forms or exceptions to the V-final/C-final stem conditions for metathesis, the use of metathesizing suffixes with non-cognate vocabulary

suggests that locative suffix metathesis operated independently of the lexical origins of stems, and was still productive in the language.

In Rumsen, the locative suffix appears as *-ta* following most C-final stems, and as *-tk* following V-final stems.

Table 87. Locative -ta/-tk alternations in Rumsen

	Rumsen locative	Mutsun cognate	gloss
1.	*tarrax-ta, tarrax-tay*	*Tarahtak*	'in the sky'
2.	*muruT-ta*	*muruTtak*	'in the dark'
3.	*ullas-ta*	--	'in the jar'
4.	*pooSek-ta*	--	'stinging caterpillars-LOC'
5.	*kakke-tk*	*kawetYka*[25]	'at/on the edge'
6.	*cacca-tk*	*cattYatka*[26]	'in the buckeye (trees)'
7.	*xay-tak*	*haytak*	'in/from the mouth'

In the last example above (7), the locative surfaces as *-tak* (identical to Mutsun *-tak*) in *haytak* 'in/from the mouth', suggesting that both *-tk* and *-ta* derive from underlying *-tak*[27]; however, this item is the only example I found of the Proto-Costanoan

[25] This is an irregular form attested 6 times and known well by Mrs. Cervantes; though ***kawe** is unattested in isolation (the more common word for 'edge' is *tunne*), it looks likely to be a cognate of Rumsen *kakke*.

[26] *cattYa* is attested in unsuffixed and several suffixed forms, but not with the locative; however, the locative form is predictable based on regular and productive concatenation of *-tka* after V-final stems.

[27] Underlying *-tak* surfacing as *-tk* could perhaps be a case of Rumsen final-syllable vowel deletion (cf. Callaghan 1992:37), though according to Callaghan the rule only applies to stems (not suffixes).

locative suffix used in its full form in Rumsen. In lieu of metathesis, Rumsen appears to have moved to dropping the /a/ from the locative following V-final stems and the final /k/ following C-final stems (in a few instances, as in (1) above and *kallen-ta(y)* 'in/from the sea', substitution of suffix-final /y/ for /k/ is optional; historically, perhaps /k/ weakened to /y/ before the coda consonant was dropped entirely).

The data from Chocheño and Rumsen show that Chocheño, a Northern Costanoan language, had apparently productive suffix metathesis that was identical to that found in Mutsun, a Southern Costanoan language. The presence of matching patterns of suffix metathesis in these two more distantly related languages, combined with its absence in Mutsun's sister (S. Costanoan) language Rumsen, means that suffix metathesis likely originated in Proto-Costanoan or earlier and was lost in Rumsen due to language-specific changes, but retained in Mutsun and Chocheño.

4.4.3 Desiderative/irrealis enclitic metathesis in Chocheño

The Chocheño desiderative enclitic *=tuk/=tku*, attested in Miller and Callaghan (1999) in only three words, parallels the reduced enclitic form of its Mutsun cognate, which occurs as a free morpheme as *tukne* and in clitic form as *=tukne* following a consonant or *=tkun* following a vowel. The wider distribution in Mutsun versus Chocheño suggests inheritance from an ancestor language, with Mutsun retaining more productive use of the metathesizing desiderative suffix than Chocheño. A free form of the

---

Alternatively, perhaps suffix metathesis in Rumsen yields underlying *-atk*, with /a/ deleted following a stem-final vowel to avoid vowel hiatus.

morpheme, equivalent to Mutsun *tukne*, is not attested in the Chocheño data, and no cognate morpheme was found in the Rumsen data. The three Chocheño words with *=tuk/=tku* are given in Table 88.

Table 88. Desiderative/irrealis enclitic =tuk/=tku alternations in Chocheño

	Chocheño desid./irrealis	**Mutsun cognate**	**gloss**
1.	*hinnin=tuk*	--	'if only he would come'
2.	*huuTu=tku*	--	'if only he would die'
3.	*wattin=tuk*	*wattin-tukne*[28]	'that he might go'

Based on the limited data available, the enclitic follows the overall pattern of suffix metathesis in Costanoan: It is most prevalent and productive in Mutsun, with traces remaining in Chocheño but none in Rumsen.

4.5 Summary

This chapter has shown that all three types of Mutsun metathesis (stem-deriving, reflexive, and suffix metathesis) have their origins in earlier historical alternations. While Mutsun reflexive metathesis appears to be a frozen, lexically-specified set of alternations left over from an earlier stage of the language in which the reflexive suffix was always preceded by a C-final form of the verb stem, stem-deriving and suffix metathesis were productive alternations motivated synchronically by Mutsun prosody but *available* to

[28] This construction is unattested in Mutsun, but predictable based on *wattin* 'to go-INRF' and *=tukne* after other V-final morphemes.

Mutsun morphology because of inherited patterns whose original motivations in Proto-Utian and Proto-Costanoan are unrecoverable, but were likely quite different from those at work in Mutsun.

In Section 4.1, I presented cognate sets reconstructed for Proto-Utian to argue that Mutsun metathesis evolved from a historically richer templatic system which also included stem-internal length alternations, and that metathesizing stem pairs in Proto-Utian did not have the same morphological function of marking noun/verb lexical category at that stage. In Section 4.2, I examined more cognate sets from several Costanoan languages to show that stem metathesis remained active in Proto-Costanoan, at which stage it appears to have begun to be associated with marking lexical category (V-final verb stems and C-final noun stems); however, at the level of individual Costanoan languages, the noun/verb distinction marked by metathesis seems to have been in effect for Mutsun and Chocheño, but not for Rumsen, which had both V- and C-final verb stems. The existence of metathesizing stem pairs in Chocheño with no Mutsun cognates, and of a great many metathesizing Mutsun stem pairs without Chocheño cognates, is evidence that stem metathesis was productive in both languages (though its synchronic function in Chocheño may or may not have been the same as in Mutsun, i.e. deriving novel verb stems from existing noun stems). In Section 4.3, we saw that reflexive metathesis has Proto-Costanoan origins and remained in Mutsun only as a non-productive remnant of a historical alternation which was lost altogether in Chocheño but broadened in Rumsen. Finally, Sections 4.4 showed that suffix metathesis also likely

originated in Proto-Costanoan, and remained productive in Mutsun and for the locative suffix and desiderative/irrealis enclitic (but probably not for the plural suffix) in Chocheño; but phonological and prosodic changes in Rumsen obliterated any trace of suffix metathesis.

Tracing the historical origins of metathesis in Mutsun helps to explain why such a cross-linguistically unusual alternation occurs at all in one language, and why in not one but three unrelated paradigms. The occurrence of such a pattern in an earlier stage of the language also accounts for its presence (or at least traces of it) in related languages. From the perspective of Evolutionary Phonology Blevins (2004), metathesis which emerged (possibly motivated by phonetic or phonological factors no longer recoverable) in a proto-language would then be available as a synchronic morpho-phonological strategy in the daughter languages. In other words, metathesis is possible in Mutsun because it already existed in Proto-Costanoan and Proto-Utian; and it continues to operate in Mutsun because metathesis can fulfill certain requirements of Mutsun morpho-phonology.

CHAPTER 5

DISCUSSION

5.1 Summary of findings

In Chapter 3, I reviewed the three types of synchronic metathesis that occur in Mutsun: stem-deriving metathesis, in which VC-final noun stems alternate with CV-final verb stems; reflexive metathesis, in which some disyllabic verb stems surface in C-final form before the reflexive and/or reciprocal suffixes, but in V-final form in all other environments; and suffix metathesis, in which the locative and plural suffixes, as well as the desiderative/irrealis enclitic, surface in CVC form after C-final stems and in CCV form after V-final stems. I showed that both stem-deriving and suffix metathesis have strong synchronic motivations in the prosody of Mutsun, while suffix metathesis is best explained as a lexically-specified alternation with historical origins. Finally, I reviewed major phonetic and phonological theories of metathesis in recent literature and demonstrated that none provides as convincing an account of Mutsun metathesis as does prosody.

In Section 3.1, we saw that Mutsun stem-deriving metathesis pairs consist of (usually disyllabic, but sometimes longer) noun stems containing a (usually) final VC string, which alternate with phonologically similar and semantically related disyllabic verb stems containing a final CV. The noun stems in such pairs may be “light” stems

(with a short V_1 and open initial syllable), as in *aSit* 'California jay' ~ *aSti* 'to catch California jays'; "long" stems (with a long V_1 and open initial syllable), as in *uuner* 'wild onion' ~ *unre* 'to gather wild onions'; "geminate" stems (with a short V_1 and medial geminate C), as in *maTTer* 'tobacco' ~ *maTre* 'to get high on tobacco; to gather tobacco'; or trisyllabic stems, as in *cicikniS* 'small squirrel' ~ *cicki* 'to hunt small squirrels'. I demonstrated that the VC~CV strings which metathesize in such pairs comprise all five vowels and all but the three lowest-frequency consonants in the language, and that metathesis occurs regardless of surrounding phonological or morphological environment: in all instances, metathesizing stems are C-final if nouns and V-final if verbs.

Using evidence from prosodic predictability (based on Mutsun restrictions on syllable shape), metathesizing Spanish loanword vocabulary, and semantics, I demonstrated that synchronically, stem-deriving metathesis is an operation which derives verbs from nouns, rather than nouns from verbs (or bidirectionally). That is, the uniform shape of metathesizing verb stems, which is always CVC_1C_2V, makes metathesis entirely predictable given a noun stem as input, but the reverse is not true; metathesis affects nouns borrowed from Spanish, but never borrowed verbs; and finally, the semantic content of many stem pairs, especially those related to plants, animals, hunting, and gathering, is arguably simpler for nouns and more complex for verbs.

Finally, in Section 3.1.3 I argued that Mutsun stem-deriving metathesis is templatic in nature. I compared the prosodic behavior of stem-deriving metathesis to that of templatic morphology in Semitic languages and Yawelmani Yokuts, as well as to

reduplication in multiple languages. I showed that Mutsun stem templates are comparable to prosodic templates in Semitic languages, with stem templates defined by mora, syllables, and feet (McCarthy and Prince's "authentic units of prosody") and with specific prosodic templates corresponding to morphological categories: disyllabic, C-final stems with nouns, and disyllabic, V-final stems (in particular, cluster stems) with verbs.

Comparing the prosodic characteristics of metathesizing stems with reduplicating morphology, I demonstrated that in Mutsun stem-deriving metathesis, noun stems are comparable to "base" morphemes in reduplication, while verb stems are comparable to the reduplicants. Metathesizing verb stems are invariably no larger than their corresponding noun stems, and are sometimes (in the case of trisyllabic noun stems) smaller, just as reduplicant morphemes may be as large as, but no larger than, base morphemes. Just as reduplicants may copy material that does not constitute a prosodic unit (mora, syllable, or foot) in a base morpheme, metathesizing verb stems whose corresponding noun stems are trisyllabic may be "based" on noun stem material that does not constitute a prosodic unit: for example, in the metathesizing pair *loopotok* 'dock (an edible plant)' ~ *lopto* 'to gather dock', the final syllable /to/ of the verb stem is based on metathesis of the string /ot/ in the noun, which is heterosyllabic (/o/ is the nucleus of the second syllable and /t/ the onset of the third).

Section 3.2 reviewed reflexive metathesis, a pattern in which V-final verb stems of the same shape as in stem-deriving metathesis ((C)VC_1C_2V), such as *namti* 'to hear' surface in C-final form only when followed by the reflexive and/or reciprocal suffix, as in

namitpu 'to hear oneself'. Based on predictability of prosodic shape, I concluded that Okrand's (1977) analysis of these stems as underlyingly C-final, with metathesis to V-final shape in non-reflexive environments, was correct; but that reflexive metathesis is not synchronically productive and is best treated as a lexically-specified alternation.

In Section 3.4, I addressed suffix metathesis, in which the plural and locative suffixes and the desiderative/irrealis enclitic surface in CVC form (respectively, *-mak*, *-tak*, *=tukne*) following C-final stems, but in CCV form (*-kma*, *-tka*, *=tkun*) following V-final stems. I presented evidence that CVC is the underlying form of these morphemes and the input for metathesis, and that CCV forms are the output. Under previous analyses which assumed that suffix metathesis served to avoid illegal CCC clusters formed by suffixation, the opposite would have to be true, since CCC clusters could only arise if a C-final stem were followed by a CCV suffix (or enclitic). Thus, I concluded that a cluster-avoidance analysis is inapplicable to Mutsun suffix metathesis: rather, metathesis of CVC to CCV yields words with heavy penultimate syllables, which are preferred in Mutsun. All but one of four major disyllabic stem templates in Mutsun have heavy penults (the light stem type does not), and many words consist of unsuffixed stems. Words composed of stem+suffix also typically have heavy penultimate stems, including suffixed light stems when suffixation results in an open second syllable. Spanish loanword vocabulary supports a preference for heavy penults, with vowel lengthening in penultimate syllables except where blocked by a preceding heavy syllable. Finally, /h/ epenthesis can be observed in a number of cases between a stem-final (and occasionally

suffix-final) vowel and a word-final, CV-initial suffix, yielding words with heavy penults. All of these facts lead to the conclusion that the creation of heavy penultimate syllables is a better explanation for suffix metathesis than is consonant cluster avoidance.

Section 3.5 contains a review of several theories of CV metathesis which have been proposed in recent literature, with data and discussion to show that none of the theories can account for the patterns of metathesis which occur in Mutsun. Mutsun metathesis is more general in its application than predicted by perceptually-based theories, and phonologically and prosodically-based diachronic accounts cannot explain the synchronic patterns of metathesis that occur in Mutsun.

Two theories of metathesis invoke perceptual factors. Perceptual metathesis, as formulated by Blevins and Garrett (2004), occurs when listeners misinterpret the sequence of adjacent vowels and certain consonants with inherently long acoustic cues. Because it is a diachronic process and is restricted to certain classes of consonants with long acoustic cues, perceptual metathesis cannot account for Mutsun metathesis, which is synchronic and not restricted to consonants with long cues. Hume's (2001) theory of perceptual optimization proposes that metathesis in a sense "corrects" sequences of segments with low perceptibility to make them more easily perceptible. Like perceptual metathesis, perceptual optimization would be more likely to apply to some types of consonants (those with lower perceptual salience) than others; this cannot explain why stem-deriving and reflexive metathesis affect almost all Mutsun consonants.

Blevins and Garrett propose another type of diachronic CV metathesis, which they call compensatory metathesis, in which a prosodically weak vowel is attracted to a stressed syllable, moving across a consonant or CC cluster over time. Unlike the two perceptually-based theories of metathesis summarized above, compensatory metathesis is not restricted to specific classes of consonants, since it is the vowel which changes position. However, compensatory metathesis is diachronic, where metathesis in Mutsun is synchronic, with both CV and VC segment orders occurring at the surface level; and more importantly, stress in Mutsun is uncertain, but if Okrand's (1977) account is even partially correct, primary stress occurs in the first syllable of a word, i.e. at the *left* edge, while metathesis in Mutsun stems results in rightward movement of vowels (or leftward movement of consonants).

The last metathesis theory reviewed in Chapter 3 is that of pseudometathesis (Blevins and Garrett 1998), which is also a diachronic process and therefore insufficient to account for synchronic metathesis in Mutsun. Pseudometathesis results from vowel epenthesis and deletion, with the effect over time being that of movement of a vowel from one position to another. While Mutsun does have some attested trisyllabic forms of stems usually recorded as being disyllabic, there is no historical evidence that these were an intermediate stage of such stems, and in many cases they are likely to be transcriber errors. While pseudometathesis may have given rise to metathesis at a very early stage, there is no direct evidence that such is the case, and synchronically it fails to account for Mutsun metathesis.

In Chapter 4, I reviewed historical reconstructions of Proto-Costanoan and Proto-Utian and compared metathesis in Mutsun to that found in Chocheño and Rumsen. I concluded that all forms of metathesis in Mutsun have their origins in older stages of the language, and that while the synchronic motivations for metathesis in Mutsun are different from those in its precursor languages, the *availability* of metathesis as a morpho-phonological strategy is explained by its pre-existence in the Utian and Costanoan languages.

5.2 Theoretical questions

5.2.1 Prosody and stress

One question which this dissertation has been unable to answer concerns the role of stress in Mutsun prosody. While Okrand's (1977) best reconstruction of Mutsun stress rules (based on J.P. Harrington's 1922, 1929-30 field notes) assumes primary stress on the first syllable of most words, but on the second syllable in unsuffixed light stems (see discussion in Section 1.3.3), Harrington's notation contains enough inconsistency--and likely confounds stress with vowel length in many cases--that it is far from clear whether Okrand's proposed stress rules are accurate. If we put aside Harrington's notation and Okrand's analysis and ask, based on what can be observed about Mutsun prosodic *shapes*--syllable and morpheme structure in particular--where stress might be expected to fall, we can make certain predictions. In languages with weight-sensitive stress, stress tends to fall on heavy syllables (cf. Hayes 1995, Gordon 2002 and references therein).

Since Mutsun is a language with moraic weight distinctions, it would not be surprising to find that stress is attracted to heavy syllables, i.e. syllables containing either a long vowel or a coda consonant. If we consider unsuffixed noun and verb stems, the majority of which are templatic (see Section 3.1.3.1), we find that all but the light stem template have a heavy first syllable ((C)VC in geminate and cluster stems, (C)VV in long stems); for C-final non-light noun stems, both the first and the second syllable are heavy. Based on syllable weight, then, we might predict the following for non-light stems:

1. For V-final stems (all verb stems and some noun stems), stress falls on the initial syllable
2. For C-final stems (most noun stems), stress falls on the initial syllable; OR
3. For C-final stems, stress falls on the final syllable

Whether 2 or 3 is true depends on whether stress is counted from the right or left word edge. If stress is counted from the left word edge, e.g. "stress the first heavy syllable from the left edge of a word", then V-final and C-final unsuffixed stems should show the same (initial-syllable) stress pattern; if stress is counted from the right word edge, then we would expect V-final non-light stems to have initial-syllable stress, but C-final non-light stems to have final-syllable stress. Since unsuffixed light verb stems (and V-final light noun stems such as *koro* 'leg') have no heavy syllables, stress would likely be assigned by default to either the first or second syllable; however, we would expect that unsuffixed C-final light stem nouns (e.g. *hikiT* 'scar') would have stress on the second syllable, which is heavy. To summarize the predictions thus far:

	V-final	**C-final**
Non-light (long, geminate, cluster) stems	Initial stress: *óoco* 'ear' *ícci* 'to bite' *cárki* 'to be quiet'	Initial or final stress (?): *háaSum* 'shame' *húppak* 'white clay' *hísmen* 'sun' ...OR *haaSúm*, *huppák*, *hismén*
Light stems	Initial or final stress (?): *kóro* OR *koró* 'leg'	Final stress: *híkiT* OR *hikíT* 'scar'

If we return to Okrand's interpretation of Mutsun stress, we can reconcile some--but not all--of the predictions given above with his account. Okrand interprets stress in non-light stems as falling on the initial syllable, which is the same prediction made for stress-by-weight for V-final stems, and is also consistent with a stress-by-weight account for C-final stems *if* stress is counted from the left edge of the word (the leftmost heavy syllable is stressed). Assigning stress to heavy syllables beginning at the left word edge also captures Okrand's generalization of second-syllable stress in C-final light stems, since the only heavy syllable in a C-final light stem is the final one; however, left-to-right stress assignment cannot explain second-syllable stress on unsuffixed V-final light stems (Okrand interprets Harrington's data to mean that stress falls on the second syllable of *all* unsuffixed light stems, whether C- or V-final). (If we again consider the possibility raised in Section 3.1.3.1, that word-final consonants are extrametrical, left-to-right stress assignment to heavy syllables predicts initial stress in C- and V-final non-light stems--in agreement with Okrand--but cannot account for second-syllable stress in unsuffixed light

stems without stipulation of some kind; presumably, in the absence of any heavy syllable, left-to-right stress assignment would default to the leftmost syllable, rather than the rightmost.) Without verifiable data, it is impossible to say whether syllable weight is indeed the primary determiner of stress, whether stress is assigned left-to-right or right-to-left, or whether in fact Okrand's interpretation of first-syllable stress in all but unsuffixed light stems is correct.

5.2.2 The nature of metathesis

I have shown that in Mutsun, metathesis has no plausible synchronic phonetic basis, but is rather motivated by strong prosodic constraints on noun and verb stem shapes (stem-deriving metathesis) and on the penultimate syllables of words, which are preferentially heavy (suffix metathesis). An interesting question to ask, then, is whether other cases of metathesis which cannot be explained as phonetically-motivated alternations--in particular, instances of morphological metathesis (in which one segment order is associated with one lexical category, and its inverse order with a different lexical category)--*must* be templatic in nature. In other words, are phonetics and prosody the only two routes to metathesis?

If this were true, we should expect to find two classes of metathesis with divergent characteristics. Phonetically motivated metathesis should affect some segments in a language, but not others, depending on the specific phonetic motivation: for example, if metathesis comes about through the misperception of long acoustic cues which spread

over multiple segments (as argued by Blevins and Garrett 1998, 2004 for perceptual metathesis), then segments with longer cues (glides, palatals, etc.) should metathesize in certain environments, while those with shorter cues (stops, etc.) in the same environments should not. Phonetically motivated metathesis need not be limited to specific morphological categories, nor have morphological significance; and should be found both in languages with and without (morphologically significant) prosodic templates. Templatic metathesis, on the other hand, should occur only in languages with relatively salient prosodic templates, and should not be restricted to particular classes of segments; but, since prosodic templates typically have some morphological significance in a language--designating lexical category, inflection class, etc.--metathesis should be associated with some lexical or morphological distinction, and may be only one of numerous templatic morphophonological alternations in a language. In other words, templatic metathesis in any language should behave much like stem-deriving metathesis in Mutsun (and/or Proto-Costanoan). It is not at all clear whether metathesis can indeed be divided into just these two classes (phonetic and templatic); but the question does offer a novel perspective from which to approach metathesis, particularly when a given metathesis paradigm appears to resist a phonetic account.

Another perspective from which to examine metathesis involves sporadicity vs. regularity: Is metathesis observable only sporadically within the lexicon of a language, or is it regular and predictable? Blevins and Garrett (1998) claim that perceptually motivated metathesis ("perceptual metathesis") occurs over time due to misperception on

the part of listeners of the timing of far-spreading acoustic cues in some types of consonants, with subsequent reanalysis of the relative positions of those consonants. Ohala (beginning with a 1981 paper, and in several subsequent publications) made a similar claim for dissimilation as a sound change resulting from the "hyper-correction" of certain sound sequences on the part of listeners, and implied that this might have to do with dissimilation being an "irregular" sound change (sporadic within the lexicon). Metathesis is also typically an irregular sound change in most languages where it occurs. In Mutsun, however, metathesis is far more productive, and reflexive metathesis is regular, applying in all relevant environments, if the consonant-final stem is indeed considered the underlying one. This suggests a possible argument for why metathesis is not restricted to sounds with far-reaching acoustic cues in Mutsun: perhaps the generalization that metathesis involves acoustic characteristics that spread across several segments is only relevant for metathesis that is an irregular change, affecting a few words across the lexicon. Perhaps the sporadic nature of most metathesis is the result of its phonetic origins, which by definition only affect certain types of sounds; while the far more regular, productive metathesis in Mutsun is motivated, as I have shown, by factors other than perceptual cues: namely, prosodic factors, especially prosodic noun and verb templates.

5.3 Metathesis in language revitalization

Having examined the three types of Mutsun metathesis from a linguistic perspective, I now consider how metathesis might be approached in language revitalization efforts. Because Mutsun is a "dormant" language with no living speakers, the modern-day Mutsun community must rely on the existing archival documentation of the language in their attempts to create new speakers. The native language of most Mutsun learners is English, a language with neither metathesis nor the strict prosodic templates which govern stem-deriving metathesis in Mutsun. Since metathesis will likely seem strange to many learners, it will probably be helpful to address it in some detail in teaching materials.

Suffix metathesis appears to be the most productive and frequent of the three types of metathesis, and because the plural suffix in particular is an easy concept for English-speaking L2 learners (the locative may be less immediately intuitive, since there is no such suffix in English), suffix metathesis might be the easiest way to introduce the concept of metathesis more generally.[1] For suffix metathesis, the key point will be to draw learners' attention to the final segment of the stem (vowel or consonant). Initially, choosing *-mak* or *-kma* for each type of stem will involve memorization. Activities such as matching games (Concentration, etc.) can be used to reinforce the association of C-

[1] On the other hand, the additional wrinkle of *-mak*/*-kma* involving reordering of consonants and vowel may make it confusing; perhaps the best approach would be to have learners simply memorize the two forms, calling closer attention to specific segment order once they begin to practice metathesis with other suffixes and stems.

final forms with *-mak* and V-final stems with *-kma*: for example, pairs of illustrated cards, e.g. *penyek* (image of a single cat)~ *penyekmak* (image of multiple cats), *rukka* (image of a single house)~ *rukkakma* (image of multiple houses), etc. can be used to introduce the pattern. Once learners have generalized the pattern with the plural and are able to apply it to novel stems, the locative suffix can be introduced, perhaps again beginning with images (or actual objects) such as a hand (*issu*), a rock *in* a hand (*issutka*), a chair (*Taawar*), a rock *on* a chair (*Taawartak*), etc. The desiderative/irrealis clitic may be more appropriate for a somewhat more advanced level of language learning because it is used in complex sentences (and is also much more difficult to illustrate in simple images), while plural and locative forms can occur in very simple sentences (e.g., *hinTis nuppi?* 'What is that?' / *nuppi penyek.* 'That is a cat.' / *hinTis nupkam?* 'What are those?' / *nupkam penyekmak.* 'Those are cats.' / *hanni penyek?* 'Where is the cat?' / *penyek (roote) rukkatka.* 'The cat is in the house.', etc.) and are relatively easy to represent visually.

Because stem-deriving metathesis only affects a subset of noun and verb stems, it need not be taught until a learner has mastered some of the more basic morphology of Mutsun, such as high-frequency stems, suffixes, and the personal pronominal and possessive clitics. Because metathesizing noun stems may be light, long, geminate, or trisyllabic stems, it may be easiest to present metathesizing stem pairs by category. Since light stem nouns map most transparently to their corresponding verb stems (simple VC→CV transposition with no length alternations), they would be the ideal way to

introduce stem metathesis. Long and geminate stem metathesis could be taught next, with metathesis in trisyllabic noun stems taught last. Although stem-deriving metathesis is more complex and less productive than suffix metathesis, it has the advantage that many metathesizing stem pairs express culturally significant activities and concepts, such as traditional foods and medicines, wildlife, and hunting and gathering practices. The cultural value of such language content may offer an additional incentive for community members to learn their heritage language's rather unusual way of linking related nouns and verbs via metathesis. Lessons containing useful phrases which incorporate these culturally meaningful stem pairs can be taught as part of a program of simultaneous language and cultural revitalization. A stem-deriving metathesis lesson might follow a simple script like the following:

A. *hinTis neppe?* 'What is this?'

B. *neppe pokker.* 'This is a wild cherry.'

(*neppe lalak.* 'This is a goose.')

A. *hiwsen-ka pokre.* 'I want to gather wild cherries.'

(*hiwsen-ka lalka.* 'I want to hunt geese.')

B. *he'e, pokrena makke!* 'Yes, let's go gather wild cherries!'

(*he'e, lalkana makke!* 'Yes, let's go hunt geese!')

By substituting different stem pairs in the same conversation, students can practice basic (and useful) sentence structures while discovering metathesis and learning to talk about traditional resources and practices at the same time.

Reflexive metathesis, which affects fewer stems than stem-deriving metathesis and which is not a productive pattern in Mutsun, can be learned as a lexically-specified alternation. A learner already familiar with stem-deriving metathesis will find the stem alternations familiar, and will merely need to learn which stems have C-final forms in the reflexive (and/or reciprocal).

For reflexive and stem-deriving metathesis (both of which are less regular and less phonologically predictable than suffix metathesis), it will probably be very helpful to learners to encode the alternations in dictionary entries as a reminder of the patterns learned from a textbook, class, or other language activity. For example, dictionary entries for metathesizing noun stems should cross-reference their corresponding verb stems, e.g. *cayic* n. 'strength' (cf. *cayci* v. 'to be strong'). Entries for verb stems with reflexive metathesis should list C-final reflexive forms as subentries of their main, V-final forms, e.g. under *namti* 'to hear' a learner would also find *namitpu* 'to hear oneself'.

If approached incrementally and introduced in a way that allows learners to discover patterns (rather than simply stating the patterns and expecting learners to memorize them); and by emphasizing the cultural element of some metathesizing stem pairs in particular--thus incorporating cultural learning into the language lesson (and potentially making language learning more engaging and less intimidating for new

learners)--Mutsun metathesis can be included in a community language curriculum in an approachable way. It is my hope that this dissertation, in addition to offering some new perspectives on Mutsun metathesis to linguists, can also serve as a useful resource to the Mutsun community in creating lessons and activities around metathesis, and illuminate in some small way the workings of this fascinating and unusual pattern in a newly re-awakening California language.

APPENDIX A

ATTESTED MEDIAL CONSONANT CLUSTERS

The chart below gives main form (non-variant) examples of medial consonant clusters in Mutsun words. Some consonant clusters are only attested heteromorphemically; all morpheme boundaries are indicated with #.

	c	**h**	**k**	**l**	**L**	**m**	**n**	**N**	**p**	**r**
c	*ricca*	*hachaci*	*ocko*	*icle*	--	*hacma*	*Sacni*	--	*Sacpu*	*kucru*
h	*pahca*	*kahhay*	*wahku*	*cehle*	--	*hahme*	*-hnis*	--	*lahpa*	*tohre*
k	*wakci*	*makhu*	*makke*	*cekle*	--	*sukmu*	*taknan*	--	*pasik#pu*	*pakrarwa*
l	*polco*	*helhelte*	*calku*	*holle*	--	*elme*	--	--	*selpe*	--
L	--	--	*heLke*	--	--	*peLmo*	--	--	--	--
m	*tamci*	*emhe*	*yimku*	*comle*	--	*amma*	*amne*	--	*Simpur*	*humri*
n	*uncuSmin*	*inha*	*hinka*	--	--	*minmuy*	*hanni*	--	*amenpu*	*wenre*
N	--	--	--	--	--	*hatmapaN#mak*	--	*aNNis*	--	--

	c	**h**	**k**	**l**	**L**	**m**	**n**	**N**	**p**	**r**
p	*lopco*	*kaphan*	*cupka*	*paplay*	--	*hoop#mak*	*opne*	--	*neppe*	*kipri*
r	*curcu*	*wirhe*	*horko*	--	--	*mukurma*	*hirne*	--	*cirpi*	*moyarra*[1]
s	--	*eshen*	*aski*	*puslu*	--	*hismen*	*cisnan*	--	*uspu*	*hesre*
S	*aSciri*(?)	--	*poSkoy#min*	--	--	*haSmu*	*aSnu*	--	*ameS#pu*	*cuSra*
t	--	*pothe*	*cutku*	*katlu*	*pitLan*	*citmo*	*sitnun*	--	*atpet*	*wetre*
T	--	*uThin*	*tuTki*	*saTla*	--	*yaTme*	*eTne*	--	*luTpi*	*maTre*
ts	--	--	*ritski*	--	--	--	--	--	*pellets#pu*	--
tY	--	--	*amatYka*	*katYlu*	--	*katYmi*	--	--	--	--
w	*hewceyi*	*ciwhe*	*tawki*	*sawle*	*hewLe*	*torow#mak*	*hawnan*	--	*nossow#pu*	*Tawra*
y	*cayci*	*toyho*	*kuyke*	*meylo*	--	*caymu*	*kuynu*	--	*uypa*	*ayrac*

[1] From Spanish *mojarra* (a type of fish).

	s	S	t	T	ts	tY	w	y
c	*ric#s#a*	--	*ooc#tak*	--	--	--	*kecwiSi*	*licye*
h	*cehse*	*tihSin*	*Tarah#tak*	*lahTe*	--	*muh#tY#e#Smin*	*yihwi*	*kahya*
k	*okse*	*wekSo*	*lokto*	*ekTe*	*ektse*	*Tuk#tY#a*	*ekwe*	*hukyin*
l	*halsa*	*helSo*	*olte*	*yolTo*	*peltse*	*cal#tY#a*	*lalwe*	*kulyan*
L	--	--	--	--	--	--	*oLwe*	--
m	*Tamsi*	*amSi*	*namti*	*tamTa*	*hemtso*	*mom#tY#e*	*kamwe*	*Tumyu*
n	*hinsu*	*onSe*	*cintu*	*hinTis*	--	*hin#tY#e*	*hinwi*	*onye*
N	*lippa#paN#se*	--	--	--	--	--	*hoNwe*	--
p	*Tapse*	*tipSin*	*hapte*	*kapTa*	--	*miptYi*	*hapwe*	*cupyu*
r	*tursi*	*orSe*	*cirti*	*murTu*	--	*partYu*	*parwes*	*asuryan*
s	*assu*	--	*mostor*	*mees#Tuk*	--	*rus#tY#e*	*oswe*	*pesyo*
S	*kaSsup*(?)	*hiSSe*	*aSti*	*atSa#kniS#Tuk*	--	--	*waSwe*	*kiSya*(?)
t	*cutsu* [2]	*atSa*	*uttu*	*witTi*	--	--	*cutwa*	*Sotyo*

[2] Harrington was careful to distinguish between the intervocalic cluster t+s (which he wrote as "t.s") and the intervocalic affricate /ts/, which he wrote as "ts"; *cutsu* is an example of the former.

	s	**S**	**t**	**T**	**ts**	**tY**	**w**	**y**
T	*eTse*	*eTSe*(?)	*eT#tak*	*hoTTo*	--	--	*hiTwi*	*iTyan*
ts	--	--	--	--	--	--	--	--
tY	--	--	--	--	--	--	--	*utYyu*
w	*hiwse*	*awSi*	*sottow#tak*	*towTo*	*awtsi*	--	*sowwe*	*awye*
y	*haysa*	*oySo*	*payta*	*kayTi*	*huytsu*	*kaytYi*	*haywe*	*tsayyalpu*

APPENDIX B

VOWEL AND CONSONANT LENGTH ALTERNATIONS

The following tables list all known Mutsun disyllabic, main form (not variant) morpheme pairs and triplets differing in consonant and/or vowel length only. (Monosyllabic morphemes do not have length contrasts in Mutsun, and single morphemes consisting of three or more syllables are not numerous enough to yield length-based minimal pairs, though occasional segment-based minimal pairs such as *acima* 'Milky Way' ~ *aciwa* 'to be silly' do occur.) Pairs which are known or believed to be semantically related are listed in bold; items attested only once (and whose pronunciation is therefore somewhat uncertain) are listed in brackets. "Light" stems of the shape (C)VCV(C) typically undergo lengthening of the second vowel only when followed with a CV-initial (for (C)VCV light stems) or V-initial (for (C)VCVC light stems) suffix or enclitic; such stems are listed with the lengthened vowel in parentheses if and only if such lengthening is attested in the corpus (vowel lengthening is not assumed to be regular in all other stems, as at least one stem (*mure*) appears to resist lengthening, being attested twice by Harrington in the conditioning environment without undergoing vowel lengthening).

Table 89. Three-way vowel and consonant length contrast

(C)VCV	(C)VVCV	(C)VCCV
ama(a)	*aama*	*amma*
'body, person'	'to believe'	'to eat'
yuma(a)	*yuuma*	*yumma*
'to worsen, get sicker'	'come on!'	'to fall (a lot), to pour'

Table 90. Minimal pairs: vowel length

(C)VCV(C)	(C)VVCV(C)	(C)VCCV(C)
[ati]	*aati*	--
'to get wheat'	'to straighten'	
ciri(i)	***ciiri***	--
'to hook with horns'; 'paternal aunt'	'horn(s)'	
hawi	*haawi*	--
'to enclose'	'to wrap up'	
hope(e)	*hoope*	--
'to climb'	'to gather redwood'	
maka(a)	***maaka***	--
'to throw powder'	'to cover with dirt'	
marah	*maarah*	--
'fur, leaf, hair'	'alder'	
mure	*muure*	--
'to get late in the day, get dark'	'to gather clover'	
paya	***paaya***	--
'to run'	'speed'	
pina(a)	***piina***	--
'here; there'	'that'	
ruta(a)	*ruuta*	--
'to gather, pick, harvest'	'to speak/talk about'	

(C)VCV(C)	(C)VVCV(C)	(C)VCCV(C)
[supi] 'ankle'	*suupi* 'to tie/stick/sew onto, splice'	--
tiru 'to miscarry, abort'	*tiiru* 'very, much, really'	--
ware(e) 'to follow'	*waare* 'to gather lilies'	--

Table 91. Minimal pairs: consonant length

(C)VCV(C)	(C)VVCV(C)	(C)VCCV(C)
aha(a) 'to comb'	--	*ahha* 'to give wood'
ana 'to desire to'	--	*anna* 'to forgive, pardon, be pitiful, pity'
[ata] 'wampum'	--	*atta* 'to look out; to show oneself'
hine(e) 'look!'	--	*hinne* 'to walk; to move; to go'
[huni] 'grass'; 'to finish life'	--	*hunni* 'to mix, stir'
kane(e) 'to fight over something'; 'to go ahead'	--	*kanne* 'before; so as not to'
[patah] 'willow'	--	*pattah* 'skin, hide'
[soto] 'flint'	--	*sotto* 'to break'
tale 'younger sibling'	--	*talle* 'to have blisters'

(C)VCV(C)	(C)VVCV(C)	(C)VCCV(C)
wike(e)	--	*wikke*
'to throw, fall'		'to tremble, shake'

Table 92. Near-minimal pairs: vowel AND consonant length contrast

(C)VCV	(C)VVCV	(C)VCCV
--	*aami*	*ammi*
	'to bewitch'	'to carry, bring'; 'injury, wound'
--	***ciite***	***citte***
	'dance (n.)'	'to dance'
--	***eeTe***	***eTTe***
	'to be asleep; to sleep'	'to sleep; to go to bed'
--	*haale*	*halle*
	'cattail'; 'to gather cattails'	'to play a game'
--	*haani*	*hanni*
	'pillow'	'where?'
--	*haaTa*	*haTTa*
	'to steal, rob'	'to hit, strike, beat'
--	*hiise*	*hisse*
	'to gather wormwood'	'to choose; to select, separate out'
--	*hoole*	*holle*
	'God'	'can, to be able to; to grab, catch'
--	*hoolo*	*hollo*
	'to eat silently'	'to be a cap of a shell'
--	*huule*	*hulle*
	'to change'	'to worry'
--	*huusu*	*hussu*
	'lamprey, eel'	'to bury and roast'

(C)VCV	(C)VVCV	(C)VCCV
--	*iina* 'disease, sickness; sick one'	*inna* 'to drop; to fall; to fall down'
--	*kaamu* 'to gather thin bulrush'	*kammu* 'to lend, loan'
--	*kuuTa* 'to hogtie'	*kuTTa* 'to suffer, endure, tolerate'
--	*maaka* 'to cover with dirt'	*makka* 'to be hard to see'
--	***maasa*** 'to cover several things'	***massa*** 'to cover (one thing)'
--	***miiTe*** 'size'	***miTTe*** 'to grow, grow up'
--	*muumi* 'to bet'	*mummi* 'to join'
--	***nooto*** 'to slap; to hit; to punch (repeatedly)'	***notto*** 'to slap; to hit; to punch'
--	*ooto* 'to make dirty'	*otto* 'to mend, fix'
--	*paaka* 'to shell'	*pakka* 'to seek, look for'; 'shoulder-blade'
--	*piiti* 'tripe; animal stomach'; 'to clean the stomach/intestines'	*pitti* 'to flow'
--	*pooke* 'to make thick mush'	*pokke* 'to get fire'
--	*poolo* 'to paint'	*pollo* 'to have anal sex'
--	***riica*** 'language; word'	***ricca*** 'to speak, talk'

(C)VCV	(C)VVCV	(C)VCCV
--	***rooto***	***rotto***
	'to tie up'	'to hang, strangle'
--	*ruuka*	*rukka*
	'to twist, spin'	'house'; 'to visit, to build a house'
--	***seemo***	***semmo***
	'dead one, corpse'	'to die'
--	***suune***	***sunne***
	'hunger'	'to be hungry'
--	***Soole***	***Solle***
	'sadness'	'to be sad'
--	*taapa*	*tappa*
	'to turn the tables, pay in kind'	'to suit, fit, match'; 'to cover'
--	***taata***	***tatta***
	'to grab'	'to touch'
--	***tuune***	***tunne***
	'to be last'	'to come to; to end; to reach to'; 'edge, border'
--	***Taala***	***Talla***
	'heat, sweat, sunshine'	'to be hot, sweat, lie in the sun'
--	*Tiipe*	*Tippe*
	'to thresh grain'	'knife'; 'to stab/cut with knife, cut for laces'
--	*uuni*	*unni*
	'to want'; 'to answer, respond'	'to let, allow, permit'; 'to have'
--	*uuTa*	*uTTa*
	'relative; owner'[1]	'to take care of, wait for'

[1] This form is listed in the database as a variant pronunciation of the main form ***wuuTa***, but is attested frequently (9 times vs. 15 for ***wuuTa***). After repeatedly eliciting ***wuuTa***, Harrington notes, "Ask ’űtra or wűtra", and Mrs. Cervantes eventually "denies wűtra", suggesting that ***uuTa*** may be the correct form; in which case it is possible that ***uuTa*** and ***uTTa*** are a semantically related pair (since relatives often care for each other).

A few other length-based, semantically related pairs analogous to those in Table 92, but with one consonant-final member, also occur, as in *Tuhhi* 'to dawn, become day' ~ *Tuuhis* 'day, daytime' and *yummu* 'to rot, decay, spoil' ~ *yuumus* 'filth, grime, dirt'. However, if the C-final forms are in fact suffixed, their component V-final stems (e.g. *Tuuhi-*, *yuumu-*) are unattested in isolation (or with other suffixes) and appear to have become lexicalized in their suffixed forms.

APPENDIX C

SAMPLE LEXICAL ENTRY: MAIN FORM *AMNE* WITH VARIANT FORMS

Below is a text rendering of the lexical database entry for the main form verb stem *amne* 'to rain'.

amne *V*	**1)** rain, be rained on *Noun:* **ammani 1**. **2)** cloud up, get ready to rain
Sense 1	Gloss: **rain, be rained on** Grammatical Info.: Verb
Example:	*amnen yete?*
Translation:	Is it going to rain?
Example:	*amnenin makkese.*
Translation:	It rained on us.
Example:	*amempu siise.*
Translation:	It rains water.
Example:	*corokpu makse koc amne.*
Translation:	We are sad when it rains.
Example:	*hittYe makke rukkatka amsi-me ekwe amnehne!*
Translation:	Come on, let's go home so that you don't get rained on!
Example:	*amnehte maksen.*

Translation:	It's rained on us.

Lexical Relations

Nominal Form or Related Noun: ammani 1

Sense 2	Gloss: **cloud up, get ready to rain**
	Grammatical Info.: Verb
Example:	*amenpu Tara.*
Translation:	The sky is clouding up.

Variants

Variant Form:	**aminne**
Variant Type:	Merriam
Variant Form:	**amma**
Variant Type:	Harrington
Variant Form:	**amman**
Variant Type:	Harrington
Variant Form:	**amme**
Variant Type:	Harrington
Variant Form:	**inanme**
Variant Type:	Arroyo
Variant Form:	**amenni**
Variant Type:	Merriam

APPENDIX D

ARROYO CONVERSION GUIDELINES

Arroyo's spelling		Standard orthography	Examples		
a,e,i,o,u	→	a,e,i,o,u	tacunis chopsonte	→	*takunis* *copsonte*
c	→	k	urcan	→	*urkan*
ch	→	c or T	chayare chaora	→	*cayare* *Tawra*
g (syllable-initial)	→	h	gimanin	→	*himanin*
g (syllable-final)	→	h or k	pagcha jotiognis	→	*pahca* *hotyokniS*
gu, gü	→	w	jaguaicun sagüe	→	*hawaykun* *saawe*
h	→	∅	hacas	→	*akas*
h (V__V)	→	'	asaha	→	*asa'a*
hs	→	T	Apapahs	→	*apapaT*
j	→	h	jasapis	→	*hassapis*
l	→	l	lucluc	→	*lukluk*
ll	→	L	Llelluerthre	→	*LeLwerTe*
m	→	m	Macam	→	*makam*
n	→	n	Najana	→	*nahana*
ni (__V)	→	N or niy	monien nia	→	*monyen* *niya*

Arroyo's spelling		**Standard orthography**	**Examples**		
ñ	→	N	Iñaha	→	*iNa'a*
p	→	p	Papsa	→	*papsa*
q	→	k	macqe	→	*makke*
que	→	ke or kwe	arquenin Eque	→	*arkenin* *ekwe*
qui	→	ki or kwi	quilite Socsoquian	→	*kilite* *soksokyan*
r	→	r	rotes	→	*rootes*
s	→	s	succumui	→	*sukkumuy*
si (__C)	→	si	siretca	→	*siretka*
si (__V)	→	S	siocue	→	*Sokwe*
si (__#)	→	si or Si	oisiosi quechigu□esi	→	*oySosi* *keciweS*
sth, sths	→	T	Isthcamit isthsgine	→	*iTkamit* *iThine*
t	→	t	Teretis	→	*teretis*
thr, ths, th	→	T	Thramantac Attetiyuths thrithinpin	→	*Tammantak* *attetiyuT* *TiTinpin*
y	→	y	yete	→	*yete*

APPENDIX E

MERRIAM CONVERSION GUIDELINES

Merriam's spelling		Standard orthography	Examples		
a (closed syllable)	→	a	hoo'-nas	→	*hunas*
a (open syllable)	→	a or e	sir-ka-na	→	*sirkana*
ah	→	a	ah-hes'	→	*ahes*
ā	→	e	mish-tā	→	*miSte*
e (closed syllable)	→	e	ah-hes'	→	*ahes*
e (open syllable)	→	i or e	tre-wah'k 'e-ne-na	→	*Tiwak* *enena*
ee	→	i	ahm-mah-nees	→	*ammanis*
eh	→	e	room-meh	→	*rumme*
i (closed syllable)	→	i	mish-tā	→	*miSte*
i (open syllable)	→	ay or i	chi-cheek hi-tsha-mis	→	*cayci-k* *hicamis*
o (closed syllable)	→	a or o	pop-sah tor-ro-mah	→	*papsa* *toroma*
o (open syllable)	→	o	tor-ro-mah	→	*toroma*
oo	→	u	hoo'-nas	→	*hunas*
ow	→	aw or ow	hah-kow to-row	→	*hakaw* *torow*
u	→	u	tshut-tus	→	*cuttus*

Merriam's spelling		Standard orthography	Examples	
ch	→	c	choo-tush	→ *cutuS*
d (r__V)	→	r	kor-do	→ *koro*
h (syllable-initial)	→	h	hoo'-nas	→ *hunas*
h (syllable-final)	→	∅ or h	room-meh tih-shyin	→ *rumme* *tihSin*
k	→	k	kah-kah-re	→ *kakari*
l	→	l	lak'-kah	→ *lakka*
m	→	m	moo'-moor'-re	→ *mumuri*
n	→	n	kah nah'-nan	→ *kan-anan*
ny	→	N	ri-nya	→ *riNa*
p	→	p	ri-nya	→ *riNa*
r	→	r	ruk-shoon	→ *rukSun*
s	→	s	se'-e	→ *sii*
sh, shy	→	S	ruk-shoon shya-shyran	→ *rukSun* *SaSran*
t	→	t	et-tesh	→ *etteS*
tch, tsh	→	c	we'-kitch tshut-tus	→ *wikic* *cuttus*
tr	→	T	trah'-trahk'	→ *TaTak*
ty	→	tY	tyot-tyo-ni	→ *tYottYoni*
w	→	w	wil-lep	→ *willep*
y	→	y	yah"-we	→ *yawi*

APPENDIX F

HARRINGTON CONVERSION GUIDELINES

Harrington's spelling	**Standard orthography**	**Examples**	
’ (initial)	→ ∅	’attéy	→ *attey*
’ (medial	→ '	’áruh’a	→ *aruh'a*
‘ (aspiration)	→ ∅	púriwri‘	→ *puriwri*
a,e,i,o,u á,é,í,ó,ú	→ a,e,i,o,u	humrimak hopéy	→ *humrimak* *hopey*
ā, ē, ī, ō, ū	→ aa, ee, ii, oo, uu	kā̲n ’ū̲he tōtreṣe hīyiṣpu hinēruṣe	→ *kaan uuhe* *tooTese* *hiiyispu hineeruse*
C̲ (any consonant; 1922 notes only)	→ CC (geminate consonant)	rúk̲á rúm̲es wat̲in	→ *rukka* *rummes* *wattin*
CC (any consonant)	→ CC	’ahheṣ ṣínnikmá ’alle	→ *ahhes* *sinnikma* *alle*
c (rare)	→ S	cóllón	→ *Sollon*
h	→ h	happet	→ *happet*
j (rare, only found in 1922 notes)	→ y	hát̲aj	→ *hattay*
k	→ k	kaplaynuk	→ *kaplay nuk*
l	→ l	lā̲lak	→ *laalak*
l^{y}	→ L	pel^{y}mó	→ *peLmo*

Harrington's spelling		Standard orthography	Examples	
m	→	m	mákám	→ *makam*
n	→	n	nan̥say	→ *nansay*
ŋ	→	n (before k)	hiŋkasí	→ *hinkasi*
nʸ	→	N	nʸotkompi	→ *Notkompi*
p	→	p	papláy	→ *paplay*
r	→	r	rírís̥	→ *riris*
s, s̥	→	s	s̥its̥ús	→ *sitsus*
sʸ, s̲ʸ	→	S	humrisʸmin s̲ʸokwé	→ *humriSmin Sokwe*
t	→	t	tattay	→ *tattay*
tc	→	c	tcóltcolwa	→ *colcolwa*
tr	→	T	tritrkún	→ *TiTkun*
tʸ	→	tY	tʸóttʸoní	→ *tYottYoni*
w	→	w	wak wettér	→ *wak-wetter*
y	→	y	yihwíy	→ *yihwiy*

APPENDIX G

METATHESIZING STEM PAIRS

Table 93. Animals/plants & hunting/gathering (66 pairs)

	Noun stem	Verb stem
1.	*aSit* 'California jay'	*aSti* 'to catch California jays'
2.	*ceeyes* 'hare, jackrabbit'	*ceyse* 'to hunt jackrabbits'
3.	*cicikniS* 'small squirrel'	*cicki* 'to hunt small squirrels'
4.	*curuutu* '(hairy) woodpecker'	*curtu* 'to catch woodpeckers'
5.	*eleymin* 'sparrowhawk'	*elye* 'to catch sparrowhawks'
6.	*haawas* 'horse-bean'	*hawsa* 'to gather horse-beans'
7.	*hakkaw* 'mussel, clam'	*hakwa* 'to get mussels/clams'
8.	*happet* 'wild sweet potato'	*hapte* 'to gather wild sweet potatoes'
9.	*haSSan* 'abalone (shell)'	*haSna* 'to get abalone'
10.	*heseelu* 'small lizard'	*hesle* 'to catch small lizards'
11.	*hireeni* 'pine'	*hirne* 'to gather pine'

	Noun stem	Verb stem
12.	*hireh* 'woodrat'	*hirhe* 'to hunt woodrats'
13.	*hoowos* 'sweet potato'	*howso* 'to gather sweet potatoes'
14.	*hucekniS* 'dog'	*hucke* 'to gather/hunt dogs'
15.	*humuunya* 'hummingbird'	*humyu* 'to catch hummingbirds'
16.	*huumis* 'great horned owl'	*humsi* 'to catch/hunt great horned owls'
17.	*huumus* 'bird'	*humsu* 'to catch birds'
18.	*huuraka* 'salmon'	*hurka* 'to fish for salmon'
19.	*huuwas* 'grapes'	*huwsa* 'to pick grapes'
20.	*ippih* 'rattlesnake'	*iphi* 'to catch rattlesnakes'
21.	*kaakari* 'raven, large crow'	*kakra* 'to catch ravens'
22.	*kaamer* '(seeds of) dwarf sunflower,narrow-leaf mule-ear plant'	*kamre* 'to gather dwarf sunflowers'
23.	*kareS* 'worm'	*karSe* 'to get worms, get caterpillars'[1]
24.	*kutYeelu* 'tarantula'	*kutYle* 'to catch tarantulas'
25.	*kuuTis* 'wild ginger root, angelica'	*kuTsi* 'to gather wild ginger root'

[1] An apparently related stem ***karse*** is glossed as 'to fill/get infested with worms'.

	Noun stem	Verb stem
26.	*laalak* 'goose'	*lalka* 'to hunt geese'
27.	*liitukwa* 'earthworm, angleworm'	*litku* 'to get/collect angleworms'
28.	*loopotok* 'dock (an edible plant)'	*lopto* 'to gather dock'
29.	*maTTer* 'tobacco'	*maTre* 'to gather tobacco'[2]
30.	*mommoh* 'small type of salty seed'	*momho* 'to gather *mommoh* plants'
31.	*moonoy* 'jimsonweed; datura alcohol'	*monyo* 'to gather jimsonweed'[3]
32.	*mooroS* 'blind mole'	*morSo* 'to hunt for blind moles'
33.	*muuSek* 'bird'	*muSke* 'to catch birds'
34.	*ores* 'bear'	*orse* 'to hunt bears'
35.	*oowena* 'wild carnation'	*owne* 'to gather wild carnations'
36.	*oTTow* 'red fire ant'	*oTwo* 'to catch red fire ants'
37.	*penyek* 'cat'	*penke* 'to catch cats'

[2] While *maTTer* is always glossed 'tobacco', *maTre* has a second, instrumental meaning 'to get high on tobacco' which is more frequently attested (5 entries) than 'to gather tobacco' (4 entries); while Mrs. Cervantes seems to have volunteered the 'gathering' gloss, she told Harrington that she preferred the construction *rutaana-ka* *maTTere* (with the verb *ruta* 'to gather' and noun stem *maTTer*) over *maTrena-ka* (with verb stem *maTre*) for 'I go to gather tobacco'.

[3] A (near-) homophonous pair *monoy*~*monyo* means 'promiscuity'~'to be promiscuous'.

	Noun stem	Verb stem
38.	*pokker* 'wild cherry'	*pokre* 'to gather wild cherries'
39.	*polookic* 'grasshopper'	*polco* 'to catch grasshoppers'
40.	*puruuriS* 'bear herb, coffee/pigeon berry'	*purSu* 'to gather bear herb, coffee/pigeon berry'
41.	*puutik* 'a tasty seed'	*putki* 'to gather *puutik* seeds'
42.	*rammes* 'weasel'	*ramse* 'to catch weasels'
43.	*rappak* 'Douglas fir, small oak tree/acorns'	*rapka* 'to gather acorns'
44.	*riris* 'dogwood'	*rirsi* 'to gather dogwood'
45.	*rookos* 'bulrush'	*rokso* 'to gather bulrush'
46.	*rooreh* 'clover'	*rorhe* 'to gather clover'
47.	*saatar* 'large tick'	*satra* 'to get large ticks'
48.	*saaray* 'crow'	*sarya* 'to catch crows'
49.	*siirih* 'bald/golden eagle'	*sirhi* 'to catch bald eagles'
50.	*sikkot* 'mole, gopher'	*sikto* 'to hunt moles/gophers'
51.	*sirak* 'hazelnut'	*sirka* 'to gather hazelnuts'
52.	*siwkker* 'large white hawk'	*siwkre* 'to catch large white hawks'

	Noun stem	Verb stem
53.	*sokkoci* 'laurel tree/fruit'	*sokco* 'to gather laurel fruit'
54.	*soorokwa* 'medicinal sunflower'	*sorko* 'to gather medicinal sunflowers'
55.	*tappur* 'tree, wood'	*tapru* 'to gather wood'
56.	*tiwiitYuk* 'killdeer'	*tiwiitYku* 'to catch killdeers'[4]
57.	*tooyoh* 'bumblebee, wasp'	*toyho* 'to catch bumblebees/wasps'
58.	*torow* 'soaproot'	*torke* 'to gather soaproot'
59.	*tummuk* 'seaweed/lily-pad-like plant'	*tumku* 'to gather *tummuk*'
60.	*tures* 'crane, sandhill crane'	*turse* 'to catch/hunt cranes'
61.	*Tiwak* 'flicker'	*Tiwka* 'to catch flickers'
62.	*ummuh* 'wolf'	*umhu* 'to hunt wolves'
63.	*uttYuy* 'roadrunner'	*utYyu* 'to catch roadrunners'
64.	*uuner* 'wild onion'	*unre* 'to gather wild onions'
65.	*weeren* 'rabbit'	*wenre* 'to hunt rabbits'
66.	*yuukis* 'acorn'	*yuksi* 'to gather acorns'

[4] This is the only recorded exception to the uniform V-final cluster stem shape which characterizes all other metathesizing verb stems. The expected, but unattested, form ***tiwtYi*** would perhaps violate some prohibition against palatalized consonants participating in metathesis (see discussion in Section 3.5.1.1).

Table 94. Bodily features & conditions (30 pairs)

	Noun stem	Verb stem
1.	*cayar* 'bowlegs'	*cayra* 'to be bowlegged'[5]
2.	*cuutuk* 'fever'	*cutku* 'to have a fever'
3.	*heeyes* 'beard, facial hair'	*heyse* 'to have a beard'[6]
4.	*heser* 'birthmark, freckle, mole'	*hesre* 'to have a birthmark/freckle/mole'
5.	*hikiT/hiTik* 'a scar'	*hikTi* 'to have a scar'
6.	*hookoy* 'a sore'	*hokyo* 'to have sores'
7.	*hunnuh* 'mucus, snot'	*hunhu* 'to have mucus'[7]
8.	*huupur* 'boil, carbuncle'	*hupru* 'to have boils/carbuncles'
9.	*kahhay* 'head louse, black louse'	*kahya* 'to get head lice'[8]
10.	*kaatYul* 'leg, calf of leg'	*katYlu* 'to have thick legs'

[5] The noun *cayar* is attested in only one entry from Arroyo (1862:530), where it appears as *cayarmis*, with the diminutive suffix *-mis*. However, an adverbial form *caayare* 'bowlegged' is recorded five times, once by Arroyo and four times by Harrington: see the discussion of non-noun metathesizing stems in Section 3.1.2.1.

[6] The verb *heyse* is also used to mean 'to shave'.

[7] The verb *hunhu* is also used to mean 'to blow/clean the nose', especially in reflexive constructions, where it surfaces as *hunnuhpu* (see Section 3.2).

[8] In some entries, the verb *kahya* is glossed 'to remove lice'; it seems to have both meanings.

	Noun stem	Verb stem
11.	*lop(p)oc/poloc* 'navel, belly button'	*lopco/polco* 'to have a (large) navel'
12.	*maahul* 'phlegm'	*mahlu* 'to have phlegm'
13.	*marah* 'fur, leaf, hair'	*marha* 'to have body hair'
14.	*moohel* 'head'	*mohle* 'to have a (big) head'
15.	*muumuri* 'fly (insect)'	*mumru* 'to fill up with flies'
16.	*muuruS* 'toothache'	*murSu* 'to ache (teeth)'
17.	*paaTar* 'measles, smallpox'	*paTra* 'to have measles/smallpox'
18.	*pattas* 'vulva'	*patsa* 'to have a butt'
19.	*poocor* 'a sore'	*pocro* 'to have sores'
20.	*puuyic* 'mole (on skin)'	*puyci* 'to have a mole'
21.	*raanaT* 'long neck'	*ranTa* 'to have a long neck'
22.	*raaTam* 'boil, pimple'	*raTma* 'to have a boil/pimple'
23.	*reeTem* 'nit (louse egg)'	*recme* 'to have nits'[9]
24.	*roomos* 'rash, sore, blotch'	*romso* 'to have a rash/sores/blotches'

[9] An alternate verb form *reTme* is glossed as 'to remove nits'.

	Noun stem	Verb stem
25.	*saakar* 'nit (louse egg)'	*sakra* 'to get/have nits'[10]
26.	*saamil* 'female STD'	*samli* 'to have a female STD'
27.	*seepek* 'beard'	*sepke* 'to have a beard'[11]
28.	*tiiraS* 'rear, hip, back, small of buttocks'	*tirSa* 'to have a large rear/hips/buttocks'
29.	*timmah* 'forehead'	*timha* 'to have a large forehead'
30.	*tookol* 'sores on the neck'	*toklo* 'to have sores on the neck'

Table 95. Result/product & action/process (25 pairs)

	Noun stem	Verb stem
1.	*aaTih* 'vomit (n.)'	*aThi* 'to vomit'
2.	*ammis* 'injury, wound'	*amsi* 'to injure'
3.	*cirip* 'a shout'	*cirpi* 'to shout loudly'
4.	*cuukir* 'diarrhea'	*cukri* 'to have diarrhea'
5.	*hatul* 'mush'	*hatlu* 'to make mush'
6.	*heesen* 'nest'	*hesne* 'to make a nest'

[10] In some entries, the verb *sakra* is glossed as 'to remove nits'; it appears to be used with both meanings.

[11] The verb *sepke* is also used to mean 'to trim the beard'.

	Noun stem	Verb stem
7.	*heeweh* 'shadow, shade'	*hewhe* 'to shade, make shade'
8.	*hiTTew* 'wind'	*hiTwe* 'to blow (wind)'
9.	*irok* 'shit (n.)'	*irko* 'to shit, to defecate'
10.	*issin* 'burrow, hole'	*isni* 'to make a squirrel hole'
11.	*issut* 'a dream'	*istu* 'to dream'
12.	*maayi(t)* 'laughter'	*mayti* 'to laugh'[12]
13.	*moTTeh* 'egg'	*moThe* 'lay eggs'
14.	*posol* 'pozole'	*poslo* 'to make posole'
15.	*puhuT* 'bread'	*puhTu* 'to make bread'
16.	*puluuma* 'bread'	*pulmu* 'to make bread'
17.	*saawel* 'sweat (n.)'	*sawle* 'to sweat'
18.	*tiiwis* 'flower'	*tiwsi* 'to bloom'
19.	*tohher/tooher* 'a cough'	*tohre* 'to cough'
20.	*Tallik* 'game of 10 sticks'	*Talki* 'to play *Tallik*'

[12] The pair *maayit~mayti* is attested along with *maayi* and *maayiti* as additional noun forms and *maayi* as an additional verb form.

	Noun stem	Verb stem
21.	*Tuumuy* 'a smile'	*Tumyu* 'to smile'[13]
22.	*wacik* 'a crack'	*wacki* 'to crack, to split'
23.	*warak* 'lament, crying'	*warka* 'to cry, weep, sob'
24.	*willep* 'lightning'	*wilpe* 'to strike, flash (lightning)'
25.	*yopok* 'hail, snow (n.)'	*yopko* 'to snow, to hail'

Table 96. Things, people, objects (20 pairs)

	Noun stems	Verb stems
1.	*aaTey* 'different/other place'	*aTye* 'to be/look different'
2.	*aawits* 'sweet thing, something sweet'	*awtsi* 'to be sweet'
3.	*awiS* 'left hand, left'	*awSi* 'to be left-handed, be left'
4.	*iTTas* 'new one'	*iTsa* 'to be new'
5.	*cohol* 'hole'	*cohlo* 'to be full of holes'
6.	*halak* 'blind person'	*halka* 'to have one eye, be blind'
7.	*huraacu* 'a drinker, a drunk'	*hurca* 'to be drunk, to be high'

[13] These two stems are part of an exceptional three-stem metathesizing set whose third stem is the adverb *Tuumuye* 'smiling' (see discussion in Section 3.1.2).

	Noun stems	Verb stems
8.	*isil* 'ice'	*isli* 'to sleet, to frost, be icy, freeze'
9.	*makkuh* 'husband'	*makhu* 'to get married'
10.	*meecekniS* 'fog'	*mecke* 'to be cloudy'
11.	*mooniS* 'white person, colonialist, Spaniard'	*monSi* 'to be reasonable; to be a Spaniard, be white'
12.	*mukurma* 'woman'	*mukru* 'to be a woman'
13.	*pussuy(nis)* 'whirlwind'	*pusyu* 'to make a whirlwind'
14.	*roocok* 'bleary person, mussed up one'	*rocko* 'to be bleary, be mussed'
15.	*sakker* 'fat, lard'	*sawre* 'to be fat/fatty'
16.	*towoT* 'stiff thing'	*towTo* 'to be stiff, rigid'
17.	*tuuhis* 'tip, point'	*tuhsi* 'to be pointy'
18.	*Taares* 'man, male'	*Tarse* 'to be a man'
19.	*ureh* 'bride, groom'	*urhe* 'take a wife/husband'
20.	*waayas* 'enemy'	*waysa* 'to be an enemy'

Table 97. Qualities, concepts, states (21 pairs)

	Noun stem	Verb stem
1.	*aasir* 'year'	*asri* 'to begin a (new) year'
2.	*akkin* 'thirst'	*akni* 'to be thirsty'
3.	*carak* 'whiteness'	*carka* 'to be white, be clear'
4.	*cayic* 'strength'	*cayci* 'to be strong'
5.	*ekeT* 'sins, badness, evil'	*ekTe* 'to be evil, be bad'
6.	*hemec'a* 'one'	*hemce* 'to do once, be once'
7.	*hinnus* 'knowledge'	*hinsu* 'to know'
8.	*iicel* 'envy (n.)'	*icle* 'to envy'
9.	*iTTak* 'payment'	*iTka* 'to pay'
10.	*laayaT(a)/layaaT(a)* 'length, height'	*layTa* 'to be tall, be long'
11.	*monoy* 'promiscuity'	*monyo* 'to be promiscuous'[14]
12.	*muruT* 'darkness; night'	*murTu* 'to be dark, be blackish'
13.	*tawah* 'work (n.)'	*tawhari* 'to work'

[14] The noun *monoy* 'promiscuity' is attested only once by Arroyo (1862:558) in accusative form (*monoye*). This stem may or may not be etymologically related to *moonoy* 'datura alcohol, jimsonweed'.

	Noun stem	Verb stem
14.	*tuuris* 'cold (n.)'	*tursi* 'to be cold'
15.	*Tahas* 'cold, coolness'	*Tahsa* 'to be cool, be cold'
16.	*Takkir* 'smell, odor'	*Tawri* 'to stink, smell bad'
17.	*Tuuhis* 'day'	*Tuhsi* 'to be daytime'
18.	*usup* 'a fast'	*uspu* 'to fast'
19.	*uyak* 'evening, afternoon'	*uyka* 'to be later in the day'
20.	*wetter* 'size'	*wetre* 'to be large/big'
21.	*yuumus* 'filth, grime, dirt'	*yumsu* 'to be filthy, grimy'

Table 98. Instruments (12 pairs)

	Noun stem	Verb stem
1.	*ahhes* 'comb, soaproot brush, little comb'	**ahse* 'to brush'
2.	*akkes* 'salt'	*awse* 'to salt'
3.	*hikkani* 'tar (n.)'	*hikna* 'to tar'
4.	*hottoh* 'shoe'	*hotho* 'to put on shoes'
5.	*huppak* 'white clay'	*hupka* 'to smear'

	Noun stem	Verb stem
6.	*huTel* 'earring'	*huTle* 'to put on earrings'
7.	*kureh* 'red ochre, red paint'	*kurhe* 'to paint white; to paint'
8.	*lullup* 'flute'	*lulpu* 'to play the flute'
9.	*pakkuT/paakuc* 'ball'	*pakcu/pakTu* 'to play ball'
10.	*sallik* 'splitstick'	*salki* 'to play the splitstick'
11.	*sukum* 'cigarette, cigar, pipe'	*sukmu* 'to smoke'
12.	*Taawar* 'chair, seat'	*Tawra* 'to sit, stay, reside'

Table 99. Action/patient (4 pairs)

	Noun stem	Verb stem
1.	*hiiwes* 'beloved'	*hiwse* 'to love, like'
2.	*hoowos* 'servant'	*howso* 'to order, command'
3.	*oneeya/ooney* 'friend'	*onye* 'to look for a companion'[15]
4.	*toolos* 'knee'	*tolso* 'to break knees'

[15] This is one of two glosses for ***onye***; the other is 'accompany', denoting the activity of an agent (one who seeks a friend/companion) rather than a patient (the friend/companion being sought).

Table 100. Miscellaneous (15 pairs)

	Noun stem	Verb stem
1.	*hisiw* 'one who recently gave birth'	*hiswi* 'to give birth'
2.	*hocol* 'well (n.)'	*hoclo* 'a hole forms'
3.	*irek* 'stone, rock, money'	*irke* 'to have money'
4.	*lissok* 'snake, earthworm'	*lisko* 'to slip'
5.	*mooloy* 'a women's dance'	*molyo* 'to dance the *mooloy*'
6.	*peelek* 'soft soil, river silt'	*pelke* 'to loosen, stretch'
7.	*punuT* 'bread'	*punTu* 'to be big-bellied, be fat'
8.	*rawik* 'dance caller, orator'	*rawki* 'to give a speech'
9.	*sallik* 'splitstick'	*Salki* 'to split'[16]
10.	*seelep* 'a type of dance'	*selpe* 'to get high; to be mischievous, be half-crazy'
11.	*siiwey* 'conical seed basket'	*siwye* 'to get conical seed baskets'
12.	*TaaTak* 'plain, valley'	*TaTka* 'to go to a plain'
13.	*uris* 'weapon, tool, net'	*ursi* 'to have a weapon/tool/net'[17]

[16] cf. the alternate verb form *salki* 'to play the splitstick', in Table 98.

	Noun stem	Verb stem
14.	*utten* 'doctor; sorceror, medicine man'	*utne* 'to have magic'
15.	*waakis* 'current, stream'	*waksi* 'to flow'

Table 101. Exceptional stem sets including non-noun stems (3 sets)

	Non-verb stem	Lexical category	Noun stem	Verb stem
1.	*caayare* 'bowlegged'	adverb	*cayar* 'bowlegs'	*cayra* 'to be bowlegged'
2.	*Tuumuye* 'smiling'	adverb	*Tuumuy* 'smile (n.)'	*Tumyu* 'to be smiling'
3.	*yaasir* 'much, very'	quantifier	--	*yasri* 'to be enough, suffice'

[17] The verb *ursi* is attested only once, and its gloss is uncertain, and may mean 'to be owned'.

APPENDIX H

LIST OF MUTSUN SUFFIXES

The following are all known Mutsun suffixes, organized by the type of stem to which they attach (verb or noun), and final segment (consonant or vowel) of the stem.

Table 102. Nominal affixes

Affix	Stem type	Gloss/function	Example	cf.
-(i)c	C/V-final	'person characterized by N'	*waraakic* 'crybaby'	*warak* 'a cry, lamentation'
-(k)niS	C/V-final	diminutive	*atSakniS* 'girl, young woman'	*atSa* 'girl, young woman'
-mak/-kma	C/V-final	plural	*Taaresmak* 'men'	*Taares* 'man'
			Tippekma 'knives'	*Tippe* 'knife'
-me	C/V-final	personal comitative/locative	*pappame* 'with/to the grandfather'	*pappa* 'grandfather'
-min	C/V-final	'one characterized by N'	*irekmin* 'rich person'	*irek* 'money'
-mis	C-final	diminutive (?)	*pakkuTmis* 'little ball'	*pakkuT* 'ball'

Affix	Stem type	Gloss/function	Example	cf.
-na	C/V-final	'number of times'	*uThina* 'twice'	*uThin* 'two'
			hemeTcana 'once'	*hemec'a* 'one'
-s-	V-final (?)	1.sg possessive (kin terms)	*apsa* 'my father'	*appa* 'father'
-(s)e	C/V-final	accusative	*pirese* 'earth (acc.)'	*pire* 'earth, land'
-si	C/V-final	'by numbers'	*uuTitsi* 'by fours, four at a time'	*uuTit* 'four'
			hemcesi 'one by one'	*hemce* 'to be one'
-(s)um	C/V-final	instrumental	*issusum* 'with/by one's hand'	*issu* 'hand'
			urkanum 'with/by a mortar'	*urkan* 'mortar'
-tak/-tka	C/V-final	locative	*timmahtak* 'on the forehead'	*timmah* 'forehead'
			rukkatka 'in the house'	*rukka* 'house'
-tak/-tka	C/V-final	placename locative	*tooyohtak* 'Fremont/Gabilan Peak'	*tooyoh* 'bumblebee'
			saasatka 'unknown place name'	*saasa* '?'

Affix	Stem type	Gloss/function	Example	cf.
-te	C/V-final	verbalizer 'have, be characterized by'	*hiinte* 'to have eyes'	*hiin* 'eyes'
			iinate 'to be sick (have sickness)'	*iina* 'disease, sickness'
-ti	C/V-final	verbalizer 'be, become'	*Taaresti* 'to be a man'	*Taares* 'man'
			wuuTati 'to be a relative'	*wuuTa* 'relative'
-tis	C/V-final	deceased relative	*appatis* 'one's late father'	*appa* 'father'
			aanantis 'one's late mother'	*aanan* 'mother'
-Tuk	C/V-final	comitative	*tawsesTuk* 'with a younger sibling'	*tawses* 'younger sibling'
			wuuTaTuk 'with a relative'	*wuuTa* 'relative'
-tum	C/V-final	ablative	*kariytum* 'from outside'	*kariy* 'outside'
-tuwas	C-final	locative attributive (contraction of *-tak* + *-was*)	*akkastuwas* 'from the north'	*akkas* 'north'
-wa	C-final (?)	snakelike (?)	*lissokwa* 'striped green water snake'	*lissok* 'snake, earthworm'
-was	C/V-final	attributive	*hurekwas* 'made of sinew'	*hurek* 'sinew'
-way	C/V-final	'time of'	*sinniway* 'childhood'	*sinni* 'child'

Table 103. Verbal affixes

Affix	Stem type	Gloss/function	Example	cf.
-h	V-final	patient nominalizer	*rucceh* 'braids'	*rucce* 'to braid'
-hne	V-final	passive	*riccahne* 'to be spoken to'	*ricca* 'to speak'
-hnis	V-final	passive (past)	*ennehnis* 'was written'	*enne* 'to write'
-kiSpu	V-final	pretend, act like	*semookiSpu* 'to play dead'	*semmo* 'to die'
-(k)sa	C/V-final	1.sg possessive (spouse)	*hawnaksa* 'my wife'	*hawna* 'to look for/have a wife'
			makkuhsa 'my husband'	*makkuh* 'husband'
-ksi	V-final	intensive	*cutsuksi* 'to be really green'	*cutsu* 'to be green'
-m	V-final	plural imperative (1st person object)	*monsem* 'you all tell me!'	*monse* 'to tell'
-mak	C/V-final	plural nominalizer	*hassamak* 'angry ones'	*hassa* 'to be angry'
-mi	V-final	benefactive	*hiSSemi* 'to do for someone'	*hiSSe* 'to do/make'
-mpi	V-final	(inherent reflexive) causative	*Taakampi* 'to bring'	*Taaka* 'to arrive'
-msa	V-final	instrumental/locative nominalizer	*cittemsa* 'dancing ground'	*citte* 'to dance'

Affix	Stem type	Gloss/function	Example	cf.
-mu	C/V-final	reciprocal	*keyeemu* 'to elbow each other'	*keye* 'to shove/elbow someone'
			kappalmu 'to hug each other'	*kapla* 'to hug'
-n	V-final	patient nominalizer	*amman* 'food'	*amma* 'to eat'
-n(i)	V-final	inherent reflexive	*cupkan* 'to turn/become white'	*cupka* 'to be white'
-na	C/V-final	andative	*meheena* 'to go to see'	*mehe* 'to look/see'
			tuSirna 'to go to get kindling'	*tuSir* 'kindling'
-nu	V-final	positional causative	*matlanu* 'to put someone face down'	*matla* 'to be face down'
-paN	C/V-final	habitual/derogatory nominalizer	*yummepaN* 'liar'	*yumme* 'to lie, deceive'
			wayispaN 'angry/offended one'	*waysi* 'to be angry/offended'
-pu	C/V-final	reflexive	*essepu* 'to dress oneself'	*esse* 'to dress/cover'
			hiTorpu 'to drag/pull oneself'	*hiTro* 'to pull, drag, stretch'
-s-	V-final	plural subject/object/repetitive action	*semso* 'many die'	*semmo* 'to die'
-s	V-final	instrumental nominative	*horkos* 'throat'	*horko* 'to swallow'

Affix	Stem type	Gloss/function	Example	cf.
-s	V-final	distant past	*waates* 'came'	*waate* 'to come'
-si	C/V-final	causative	*hiSSesi* 'to make/order someone to do'	*hiSSe* 'to do/make'
			kapalsi 'to cause to hug'	*kapla* 'to hug'
-si	C/V-final	progressive/continuative?	*meheesi* 'to be watching'	*mehe* 'to watch, look'
			cooholsi 'to be full of holes'	*cohlo* 'to be full of holes'
-smak	V-final	habitual nominalizer	*cittesmak* 'dancer(s)'	*citte* 'to dance'
-Smin	V-final	agent nominalizer	*ekTeSmin* 'bad one'	*ekTe* 'to be bad/evil'
-(s)pis	C/V-final	instrumental nominalizer (?)	*sukmuspis* 'cigarette'	*sukmu* 'to smoke'
			itokpis 'napkin'	*hitko* 'to clean, wipe'
-spu	V-final	plural subject/object, repeated action (?)	*riccaspu* 'to talk among oneselves (?)'	*ricca* 'to speak'
-stap	V-final	passive (past)	*hiSSestap* 'was made'	*hiSSe* 'to do/make'
-Ste	V-final	perfective	*semmoSte* 'has died/is dead'	*semmo* 'to die'
-su	V-final	andative	*ammasu* 'to go to eat'	*amma* 'to eat'
-t	V-final	imperative (1st person object)	*mehet* 'look at me!'	*mehe* 'to look/see'

Affix	Stem type	Gloss/function	Example	cf.
-ti	C/V-final (?)	continuative	*meheeti* 'to keep looking'	*mehe* 'to look/see'
			paTkinti 'to be sparkling (?)'	*paTkin* 'to sparkle-INRF'
-tY-	V-final	intensive	*rictYa* 'to talk a lot'	*ricca* 'to speak'
-w-	V-final	undo, release	*hiTwa* 'to unsew'	*hiTya* 'to sew'
-wu	V-final	venitive	*ammawu* 'to come to eat'	*amma* 'to eat'
-y	V-final	imperative	*haray* 'give!'	*hara* 'to give'
-yis	V-final	andative imperative	*citteyis* 'go to dance!'	*citte* 'to dance'
-yni	V-final	venitive	*citteyni* 'to come to dance'	*citte* 'to dance'
-yuT	C/V-final	plural imperative	*ammayuT* 'you all eat!'	*amma* 'to eat'
			ayunyuT 'you all bring/give me it!'	*ayun* 'bring/give me it!'

Table 104. Other affixes

Affix	Stem type	Gloss/function	Example	cf.
-'a	C/V-final	reflex of historical 'one' (?)	*hiNa'a* 'shortly, soon'	
			hemec'a 'one'	

Affix	Stem type	Gloss/function	Example	cf.
-kin	V-final	plural	*hattekin* 'who? (pl.)'	*hatte* 'who?'
-kus	C/V-final	past	*numankus* 'that which was'	*numan* 'that, which, who, where'
			ekwekus 'was not'	*ekwe* 'no, not'
-Sa	C-final	'alone, only'	*meenSa* 'only you'	*meen* 'you'
-tis	C-final	'a little' (?)	*minmuytis* 'a little below'	*minmuy* 'below, bottom, under'

Phonologically speaking, affixes fall into four categories: a) those which, due to syllable structure, require either a C-final or a V-final stem; b) those which could phonotactically attach to both C-final and V-final stems, but are only attested with one or the other; c) those few which occur with both types of stems, but undergo alternation within the suffix to make the concatenations phonotactically permissible; and finally, d) those which can occur with both types of stems without restriction (this category includes suffixes which attach to metathesizing stems).

Type a) suffixes consist of either a single consonant (e.g. *-h* 'nominalizer', *-y* 'imperative') or contain an initial consonant cluster (e.g. *-ksi* 'intensive', *-yni* 'venitive') and, because of restrictions on syllable structure, can only follow a vowel-final stem; not coincidentally, all such suffixes are verbal, with the exceptions of the metathesized forms *-tka* and *-kma*, which attach to vowel-final noun stems.

Type b) affixes consist of the four single-consonant infixes (*-s-*$_1$, *-s-*$_2$, *-tY-* and *-w-*) and many of the suffixes which contain an initial CV string. Because the infixes alter the medial consonant string of a stem, they are phonologically independent of the stem-final segment and therefore could in theory be inserted into both vowel- and consonant-final stems. In practice, however, the infixes are universally attested in V-final stems: for the three verbal infixes, this is simply because nearly all verb stems are V-final; and for the one nominal infix, *-s-*$_1$, all of the kinship terms to which it is restricted happen to be V-final as well.[1] Phonotactically, CV-initial suffixes of type b) (such as *-min*, *-Tuk*, *-nu*, and *-yis*) could follow either a C- or V-final stem, since both V+CV and C+CV result in permissible syllable structures. However, any given suffix in this category is in fact only attested with one or the other stem type: for instance, *-min* occurs only with C-final noun stems even though V-final nouns such as *rukka* 'house' are relatively common; while *-yis* occurs only with V-final verb stems, for the simple reason that C-final verb stems are synchronically nonexistent.

The suffixes *-(i)c*, *-(k)niS*, *-(k)sa*, and *-(s)pis*, belong to category c), occuring (as best can be determined, since all of these are rare stems with somewhat confusing data) with both C- and V-final stems, but altering their shape depending on the final segment of the stem: *-(i)c* surfaces as *-c* in *iinac* 'sick person', the only instance in which the

[1] Okrand's (1977:117-121) analysis of the infixes *-w-* 'undo, release' and *-s-*$_2$ 'iterative/distributive' as suffixes *-wi* and *-sV*, respectively, may be historically relevant: if infixes originated as -CV suffixes on CVC roots (cf. Adams's [1985] speculative reconstruction of CVC roots in Mutsun), then such suffixation would yield V-final stems; however, this alone does not account for the synchronic V-final shape of stems in the absence of suffixes-turned-infixes.

preceding stem (*iina* 'to be sick') ends in a vowel; while *-(k)niS*, *-(k)sa*, and *-(s)pis* each lose the first consonant of the suffix when preceded by a C-final stem (this is distinct from the behavior of *-(s)um* and *-(s)e*, which surface respectively as *-um* and *-e* after liquids, nasals, glides, and fricatives, but as *-sum* and *-se* after vowels and all other consonants.

Type d) suffixes are most often nominal suffixes, and are typically CV-initial (the exceptions being *-mak* and *-tak*, which alternate with the CCV forms *-kma* and *-tka*).

APPENDIX I

SINGLE (NON-METATHESIZING) CHOCHEÑO STEMS WITH METATHESIZING MUTSUN COGNATE STEM PAIRS

Chocheño noun stem	**Chocheño verb stem**	**Mutsun noun stem**	**Mutsun verb stem**
yuukiS 'acorn'	--	*yuukis* 'acorn'	*yuksi* 'to gather acorns'
maTTer/mattel 'tobacco'	--	*maTTer* 'tobacco'	*maTre* 'to get high on tobacco'; 'to gather tobacco'
Siwker/Sewker 'hawk species'	--	*siwkker* 'large white hawk'	*siwkre* 'to catch large white hawks'
TaareS/taariS/TaariS 'man'	--	*Taares* 'man'	*Tarse* 'to be a man'
--	*Sukmu* 'to smoke'	*sukum* 'cigarette'	*sukmu* 'to smoke'
--	*hiswi* 'give birth'	*hisiw* 'give birth'	*hiswi* 'one who recently gave birth'
--	*warka* 'to cry'	*warak* 'a cry, a lament'	*warka* 'to cry'

REFERENCES

Adams, Douglas Q. 1985. Internal reconstruction in Mutsun morphology. *International Journal of American Linguistics* 51(4):329-31.

Archangeli, Diana. 1983. The root CV-template as a property of the affix: Evidence from Yawelmani. *Natural Language and Linguistic Theory* 1:347-84.

_____. 1991. Syllabification and prosodic templates in Yawelmani. *Natural Language and Linguistic Theory* 9(2):231-83.

Arroyo de la Cuesta, Felipe. 1861. Grammar of the Mutsun language spoken at the mission of San Juan Bautista, Alta California. *Shea's Library of American Linguistics,* 4. New York: Cramoisy Press.

_____. 1862. A vocabulary or phrase book of the Mutsun language of Alta California. *Shea's Library of American Linguistics,* 8. New York: Cramoisy Press.

Bat-El, Outi. 1994. Stem modification and cluster transfer in modern Hebrew. *Natural Language & Linguistic Theory* 12(4):571-96.

Berman, Howard. 2002. Merriam's Palewyami vocabulary. *International Journal of American Linguistics* 68(4):428-46.

Blevins, Juliette. 2012. Duality of patterning: Absolute universal or statistical tendency? *Language and Cognition* 4(4):275 – 296.

_____. 2006. A theoretical synopsis of Evolutionary Phonology. *Theoretical Linguistics* 32(2):117–166.

_____. 2004. *Evolutionary Phonology: The Emergence of Sound Patterns.* Cambridge: Cambridge University Press.

Blevins, Juliette, and Andrew Garrett. 2004. The evolution of metathesis. In *Phonetically-based phonology,* ed. by Bruce Hayes, Robert Kirchner, and Donca Steriade, 117-56. Cambridge: Cambridge University Press.

_____. 1998. The origins of consonant-vowel metathesis. *Language* 74(3):508-56.

Buckley, Eugene. 2007. Vowel-sonorant metathesis in Alsea. *International Journal of American Linguistics* 73(1):1-39.

Callaghan, Catherine A. In press. *Proto Utian Dictionary and Grammar. With Notes on Yokuts.* Berline, Boston: De Gruyter Mouton.

_____. 2003. Proto-Utian (Miwok-Costanoan) case system. *International Journal of American Linguistics* 69(1):49-75.

_____. 2001. More evidence for Yok-Utian: A reanalysis of the Dixon and Kroeber sets. *International Journal of American Linguistics* 67(3):313-45.

_____. 1997. Evidence for Yok-Utian. *International Journal of American Linguistics* 63(1):18-64.

_____. 1992. The riddle of Rumsen. *International Journal of American Linguistics* 58(1):36-48.

_____. 1988. Karkin revisited. *International Journal of American Linguistics* 54(4):436-52.

_____. 1975. J.P. Harrington--California's great linguist. *Journal of California Anthropology* 2(2):183-87.

_____. 1962. Comparative Miwok-Mutsun with notes on Rumsen. *International Journal of American Linguistics* 28(2):97-107.

_____. 1958. California Penutian: History and bibliography. *International Journal of American Linguistics* 24(3):189-94.

Clements, G. and S. J. Keyser. 1981. A three-tiered theory of the syllable. *MIT Center for Cognitive Science Occasional Paper* 19.

Davidson, Joseph Orville. 1977. *A contrastive study of the grammatical structures of Aymara and Cuzco Kechua.* Berkeley: University of California, Berkeley Ph.D. dissertation.

Dell, François and Mohamed Elmedlaoui. 1985. Syllabic consonants and syllabification in Imdlawn Tashlhiyt Berber. *Journal of African Languages and Linguistics* 7:105-30.

Dixon, Roland B. and A.L. Kroeber. 1919. Linguistic families of California. *University of California Publications in American Archaeology and Ethnology* 16:47-118.

Goldsmith, J.A. 1976. *Autosegmental phonology.* Vol. 159. Bloomington: Indiana University Linguistics Club.

Golla, Victor. 2007. Linguistic Prehistory. *California prehistory: Colonization, culture, and complexity*.71-82.

Gordon, Matthew J. 2002. A phonetically driven account of syllable weight. *Language* 78(1):51-80.

Halle, M. and J.-R. Vergnaud. 1980. Three-dimensional phonology. *Journal of Linguistic Research* 1:83-105.

Harrington, John P. 1922, 1929-30. The papers of John Peabody Harrington in the Smithsonian Institution. Microfilm volume II, reels 37-61, and volume IX, reel 17.

Harrington, John Peabody, Elaine Mills, Ann Brickfield, and Louise Mills. 1981. *The Papers of John Peabody Harrington in the Smithsonian Institution, 1907-1957. A Guide to the Field Notes.* Millwood, NY: Krauss International Publications.

Hayes, Bruce. 1995. *Metrical stress theory: Principles and case studies.* Chicago: University of Chicago Press.

_____. 1989. Compensatory lengthening in moraic phonology. *Linguistic Inquiry* 20:253-30.

Hayes, Bruce and May Abad. 1989. Reduplication and syllabification in Ilokano. *Lingua* 77:331-74.

Heizer, R.F. 1955. California Indian linguistic records: The mission Indian vocabularies of H. W. Henshaw. *Anthropological Records* 15(2):. Berkeley and Los Angeles: University of California Press.

Hume, Elizabeth. 2002. Predicting metathesis: the ambiguity/attestation model. Ms, Ohio State University. Available as ROA-546 from the Rutgers Optimality Archive.

_____. 2001. Surface syllable structure and segment sequencing. *HIL Occasional Papers,* ed. by Hume, Elizabeth, Norval Smith & Jeroen van de Weijer., Leiden, NL: HIL.

_____. 2000. Metathesis Website. Online: http://www.ling.ohio-state.edu/~ehume/metathesis.

_____. 1998a. The role of perceptibility in consonant/consonant metathesis. *Proceedings of the West Coast Conference on Formal Linguistics* 17:293-307.

_____. 1998b. Metathesis in phonological theory: The case of Leti. *Lingua* 104(3-4):147-86.

Itô, Junko. 1989. A prosodic theory of epenthesis. *Natural Language and Linguistic Theory* 7:217-59.

Kisseberth, Charles W. 1970. On the functional unity of phonological rules. *Linguistic Inquiry* 1(3):291-306.

Kroeber, A.L. 1910. The Chumash and Costanoan languages. *University of California Publications in American Archaeology and Ethnology* 9:237-71.

Levy, Richard. 1972. Costanoan. *Handbook of North American Indians* 8:485-95.

Mason, J. Alden. 1916. The Mutsun dialect of Costanoan based on the vocabulary of De La Cuesta. *University of California Publications in American Archaeology and Ethnology* 11(7):399-472.

McCarthy, John J. 2000. The prosody of phase in Rotuman. *Natural Language & Linguistic Theory* 18(1):147-97.

McCarthy, John J. 1984. Prosodic structure in morphology. *Linguistics Department Faculty Publication Series* Paper 64:299-317.

_____. 1981. A prosodic theory of nonconcatenative morphology. *Linguistic Inquiry* 12(3):373-418.

_____. 1979. *Formal problems in Semitic phonology and morphology.* Cambridge, Massachusetts: Massachusetts Institute of Technology Ph.D. dissertation.

McCarthy, John J. and Alan Prince. 1995. Faithfulness and reduplicative identity. In Jill Beckman, Suzanne Urbanczyk and Laura Walsh Dickey, eds. *University of Massachusetts Occasional Papers in Linguistics.* 18:249-384.

_____. 1994. Prosodic morphology. In *A Handbook of Phonological Theory,* John Goldsmith, ed., 318-366. Oxford: Basil Blackwell.

_____. 1990a. Prosodic morphology and templatic morphology. In M. Eid and J. McCarthy, eds. *Perspectives on Arabic Linguistics.* II:1-54. Amsterdam: Benjamins.

_____. 1990b. Foot and word in prosodic morphology: the Arabic broken plural. *Natural Language and Linguistic Theory* 8:209-82.

_____. 1988. Quantitative transfer in reduplicative and templatic morphology. *Linguistics Department Faculty Publication Series.* Paper 99.

_____. 1986. Prosodic morphology. Ms., University of Massachusetts, Amherst, and Brandeis University.

Merriam, C. Hart. 1902. C. Hart Merriam Papers. Microfilm collection number: BANC MSS 80/18c. Negative number: BNEG Box 1556, reels 69, 74. Berkeley, CA: Bancroft Library, University of California, Berkeley.

Mielke, Jeff. 2001. Explaining directional asymmetry in Turkish [h] deletion: A crosslinguistic study of perceptibility. *Ohio State University Working Papers in Linguistics* 55.

Miller, Amy and Catherine A. Callaghan. 1999. Ms., Chocheño dictionary based on the field notes of J.P. Harrington.

Mutaka, Ngessimo and Larry M. Hyman. 1990. Syllables and morpheme integrity in Kinande reduplication. *Phonology* 7(1):73-119.

Ohala, John. 1992. What's cognitive, what's not, in sound change. In *Diachrony within synchrony: Language history and cognition [Duisburger Arbeiten zur Sprach-und Kulturwissenschaft],* ed. by Kellermann, Günter & Michael D. Morrissey, 14, 309-55. Frankfurt/M: Peter Lang Verlag.

_____. 1989. Sound change is drawn from a pool of synchronic variation. In *Language Change: Contributions to the study of its causes. [Series: Trends in Linguistics, Studies and Monographs],* ed. by L. E. Breivik & E. H. Jahr, 43, 173-98. Berlin: Mouton de Gruyter.

_____. 1981. The listener as a source of sound change. In *Papers from the Parasession on Language and Behavior,* ed. by C. S. Masek, R. A. Hendrick, & M. F. Miller, 178-203. Chicago: Chicago Linguistics Society.

Okrand, Marc. 1979. Metathesis in Costanoan grammar. *International Journal of American Linguistics* 45(2):123-30.

_____. 1977. *Mutsun Grammar.* University of California, Berkeley Ph.D. dissertation.

Padgett, Jaye. 1994. Stricture and nasal place assimilation. *Natural Language & Linguistic Theory* 12(3):465-513.

Prince, Alan and Paul Smolensky. 1993. Optimality Theory: constraint interaction in generative grammar. Ms, Rutgers University & University of Colorado, Boulder.

Reichard, Gladys. 1922. Gladys Reichard field notebooks on Wiyot Indians, BANC MSS 2004/111 c, the Bancroft Library. University of California, Berkeley.

Summer Institute of Linguistics. 2012. *FieldWorks.*

_____. 2002. *LinguaLinks.*

_____. 1998. *Shoebox.*

Steriade, Donca. 2001. Directional asymmetries in place assimilation: a perceptual account. In Elizabeth Hume and Keith Johnson, eds. *The role of speech perception in phonology,* San Diego: Academic Press.

_____. 1997. Phonetics in phonology: The case of laryngeal neutralization. Ms., UCLA.

_____. 1982. *Greek prosodies and the nature of syllabification.* Cambridge, Massachusetts: Massachusetts Institute of Technology Ph.D. dissertation.

Teeter, Karl V. ca. 1965. Wiyot file slips (in the Papers of Karl V. Teeter, 1769-2003 and 1956-2007). Ms., Harvard University.

_____. 1989, 1994, and undated. Wiyot audio recordings (in the Papers of Karl V. Teeter, 1769-2003 and 1956-2007). Ms., Harvard University.

Thompson, Laurence and Terry Thompson. 1969. Metathesis as a grammatical device. *International Journal of American Linguistics* 35:213-19.

Thurgood, Elzbieta. 1997. Bontok reduplication and prosodic templates. *Oceanic Linguistics* 36(1):135-48.

Ussishkin, Adam. 1999. The inadequacy of the consonantal root: Modern Hebrew denominal verbs and output-output correspondence. *Phonology* 16(3):401-42.

Vance, Timothy J. 1987. *An Introduction to Japanese Phonology.* Albany: State University of New York Press.

Warner, Natasha, Lynnika Butler, and Quirina Luna-Costillas. 2006. Making a dictionary for community use in language revitalization: The case of Mutsun. *International Journal of Lexicography.* 19(3):257-85.

Wonderly, W. 1951. Zoque II: phonemes and morphophonemes. *International Journal of American Linguistics* 17(2):105-23.