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A SKETCH OF SERI VERB MORPHOPHONEMICS

Stephen A. Marlett

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0. INTRODUCTION

The analysis presented in this paper is based primarily on a body of data comprising seven allomorphic prefixes and a representative number of verb stems listed in their third person singular forms.¹ An earlier, unpublished structural analysis of the same data yielded four ad hoc verb root classes, three of which were divided into subclasses. Even then, certain of the verb root sets did not fit the classification.

The analysis below was done within the generative framework and was especially designed to account for the verb paradigms given in Tables A-E. Any data that may seem to be exceptional to the rules below require careful consideration before changes are made since certain morphemes (such as -a- (causative)) are marked to not undergo some rules. Where possible, non-verb forms are provided to give additional confirmation of the validity of this analysis. It should be borne in mind that this paper represents an initial attempt to analyze Seri verbs from the generative approach. Considerable refinement will be necessary as study continues.

1. VERB PREFIXES AND STRUCTURE

Seven forms of each verb are listed in Tables A-E. Although at first glance these verbs appear to be highly irregular, most noticeably the vowels, the analysis presented below is able to account for all but three forms. (See the asterisked forms in Tables A and D.) The following affixes, though having considerable allomorphy on the surface, have the underlying forms (UF's) shown below.

Nominalizers

k- (Non-negative nominalizer)²

im- (Negative nominalizer)

Subject-Person Marker

-Ø- (3rd person)

Intransitive Markers

-o- (Intransitive marker)

Object Markers

-i- (3rd object marker)

Tense/Mode Markers

po- (Dependent Future)

yo- (Past)

Xo- (Emphatic)

si- (Future; this tense requires the use of the clitic =ka?a after the verb stem when the verb is intransitive and the clitic =a?a when the verb is transitive.)

mi- (Perfect)

t- (Interrogative Past)

The structure of the verb forms used in this analysis is as follows:

Non-negative nominalized form:

Non-neg Nom, (3rd Object), Verb Stem, (Clitics)

Negative nominalized form:

(3rd Object), Neg Nom, Verb Stem, (Clitics)

Finite verb form:

(3rd Object), SPM, Tense/Mode, Verb Stem, (Clitics)

Some verbs may be used transitively or intransitively (see Table C). Most of these verbs when used intransitively require the intransitive marker -o- after the nominalizer or Tense Marker. (See Table D for verbs that do not use this intransitive marker.) This o is marked [+D] (plus diacritic) because it is never deleted by any deletion rule. It is also marked [+D] since Brute Force Rule II applies only in situations where this o occurs.

2. VOWEL SYSTEM

Seri vowels are treated according to quality by a two-feature system in this morphophonemic analysis.

+front -front

i	o	+hi
e	a	-hi

There are also phonemic long vowels (2 mora length) corresponding to each of these vowels in the phonemic system. (At present, I consider vowels of three and four mora length to be the result of clusters of long and short vowels.)

3. ANALYSIS

The following morphophonemic rules account for the verbs listed in Tables A-E.

Brute Force Rule I

The following rule accounts for the occurrence of e or ee in a number of forms where we would expect to find oi or ai otherwise.

Brute Force Rule I: $o + i(i) \Rightarrow ee$
[+D]

The following data illustrate the operation of this rule.

	'jump across' (Trans.) (Nom.)	'jump across' (Intr.) (Nom.)	'jump across' (Trans.) (Past)	'jump across' (Intr.) (Past)
UF	k-i-íXW ³	k-o-íXW	i-yo-íXW	yo-o-íXW
BF I	---	keéXW	---	yoéeXW
OR	kííXW	---	iyíXW	yéeXW
SF	kfiXW	kéeXW	iyíXW	yéeXW
	'shout' (Trans.) (Nom.)	'shout' (Intr.) (Nom.)	'shout' (Trans.) (Perf.)	'shout' (Intr.) (Perf.)
UF	k-i-finx	k-o-finx	i-mi-finx	mi-o-finx
BF I	---	kéenx	---	miéenx
OR	kfinx	kéenx	imfinx	méenx
SF	kfinx	kéenx	imfinx	méenx

The e that results from the application of this rule is treated as a non-stem vowel by our later Stressed Vowel Lengthening rule. (See the derivation of *jump across* (Intr., Nom.) above.) As we stated above, it is the morpheme -o- (Intransitive marker) that is marked [+D]. This explains why the rule is not applied in the derivation of forms such as *jump across* (Trans., Past).

X Labialization

X is labialized in the environment specified below.

X Labialization: $X \rightarrow XW / \# _ o + o$

This rule is bled by Brute Force Rule I. It is ordered before Brute Force Rule II because Brute Force Rule II has the potential of bleeding X Labialization, but does not. Labialized X (XW) does not alternate with X elsewhere in the language, so far as we know. The operation of this rule is illustrated by the following data.

	'be five' (Emph.)	'hop' (Emph.)	'cry' (Emph.)	'jiggle' (Emph.)	'stub toe' (Intr.) (Emph.)
UF	Xo-óitom	Xo-oxást	Xo-óo?a	Xo-óoseta	Xo-o-átني
BF I	---	---	---	---	---
X Lab	XWoóitom	XWooxást	XWoóo?a	XWoóoseta	XWooátني
OR	XWáitom	XWaxást	XWá??a	XWésseeta	XWátnي
SF	XWáitom	XWaxást	XWá??a	XWésseeta	XWátnي

	'point out' (Intr.) (Emph.)	'stand' (Emph.)	'look at' (Emph.)	'shout' (Intr.) (Emph.)
UF	Xo-o-tíς	Xo-áp	i-Xo-óokta	Xo-o-ínx
BF I	---	---	---	Xoéénx
X Lab	XWootíς	---	---	---
OR	XWatíς	Xóop	iXóokta	Xéénx
SF	XWatíς	Xóop	iXóokta	Xéénx

Brute Force Rule II

The following rule accounts for the occurrence of a in a number of forms where we would expect to find oo otherwise.

Brute Force Rule II: o + o (o) → a / ___ and the verb is intr.

This rule is ordered after Brute Force Rule I because it is bled by that rule. It is ordered after X Labialization because it has the potential of bleeding that rule. The following forms illustrate the operation of this rule.

	'swallow' (Intr.) (Past)	'swallow' (Trans.) (Past)	'cry' (Emph.)	'look at' (Past)	'shout' (Intr.) (Emph.)
UF	yo-o-ám	i-yo-ám	Xo-óo?a	i-yo-óokta	Xo-o-ínx
BF I	---	---	---	---	Xoéénx
X Lab	---	---	XWoóo?a	---	---
BF II	yaám	---	XWá?a	---	---
OR	yám	iyóom	XWá??a	iyóokta	Xéénx
SF	yám	iyóom	XWá??a	iyóokta	Xéénx

a Fronting

A stressed short a is fronted to become e when it is followed by a morpheme boundary, an optional consonant (or consonant cluster ?) and an e (any length). This rule is fed by Brute Force Rule II. The following forms illustrate the operation of this rule.

	'jiggle' (Emph.)	'flap' (Emph.)	'stagger' (Emph.)	'stagger' (Perf.)	'cut hair' (Intr.) (Emph.)
UF	Xo-óseta	Xo-óepX	Xo-ótexa	mi-ótexa	Xo-o-kéeeX
BF I	---	---	---	---	---
X Lab	XWoóseta	XWoóepX	XWoótexa	---	XWookéeeX
BF II	XWáseta	XWáepX	XWátexa	---	XWakéeeX
a-Front	XWéseeta	XWéepX	XWétexa	---	---
OR	XWéseeta	---	XWétteexa	mótteexa	---
SF	XWéseeta	XWéepX	XWétteexa	mótteexa	XWakéeeX

kaméepiit 'marvel'
 ?a?éet 'stick used to cut maguey'

This rule could be formulated as follows:

a Fronting: a → e / ___ + (C) e
 [+str]

i Deletion

An i is deleted when it is preceded by a consonant and followed by a morpheme boundary, consonant, and stressed vowel. This rule does not operate across word boundaries. The effect of this rule (and others) is to make the presence of the 3rd object morpheme and the i of the future and perfect morphemes virtually unseen except in forms which have verb stems whose UF begins with a short non-high vowel. This rule is illustrated by the following data.

	'taste' (Nom.)	'poison proj. points' (Nom.)	'swallow' (Trans.) (Nom.)	'be lightweight' (Perf.)
UF	k-i-pfi	k-i-áanx	k-i-ám	mi-áfšX
OR	---	---	---	---
<u>i</u> -Del	kpfi	---	---	---
OR	---	káanx	kím	mífšX
SF	kpfi	káanx	kím	mífšX

móosni 'turtle'
 kí??o 'he who sees'
 mosnikí??o 'he who has the power of the turtle'
 ítti 'on it'
 íttii kóa?tołka 'paint the face during first fruit harvest'

This rule can be formulated as follows:

i Deletion: i → ∅ / C ____ + C V
 [+str] Condition: Word-bounded.

This rule is crucially ordered before several rules as I indicate later.

m Assimilation

An m becomes n before a non-labial front consonant and ŋ before a back consonant when it follows an unstressed vowel. This rule is illustrated by the following data.

	'be lukewarm' (Neg. Nom.)	'shiver' (Neg. Nom.)	'be four' (Neg. Nom.)	'own basket' (Neg. Nom.)	'lack' (Neg. Nom.)
UF	im-méke	im-XápW	im-šóoXkW	im-íisx	i-im-káiɫ
OR	---	---	---	---	---
<u>i</u> -Del	---	---	---	---	---
<u>m</u> -Assim	---	ɪŋXápW	inšóoXkW	---	iɪŋkáiɫ
OR	immékke	---	---	---	---
SF	immékke	ɪŋXápW	inšóoXkW	imíisx	ɪŋkáiɫ

This rule is ordered before a rule not used in verb formation which deletes the first stress of a compound word, as the data below illustrate.

xpanáams	'seaweed'	imám	'fruit'
xpanamsáokɫ	'seaweed (spec.)'	imamkíimka	'fruit-eating ant'
xpanamsyaiɫkk ^w óiɫ	'blue green'		

This rule follows the i Deletion rule because i Deletion feeds it.

	'be lukewarm' (Perf.)	'swallow' (Trans.) (Perf.)	'lack' (Perf.)	'break up' (Perf.)
UF	mi-méke	i-mi-ám	i-mi-káiɫ	i-mi-sík
OR	---	---	---	---
<u>i</u> -Del	mméke	---	imkáiɫ	imsík
<u>m</u> -Assim	---	---	ɪŋkáiɫ	insík
OR	immékke	imíim	---	---
SF	immékke	imíim	ɪŋkáiɫ	insík

This rule operates across word boundaries.

kanóaa kom ano míiskim	'He got in the boat.'
ináɪɫ kon tmátx	'Is his skin hot?'
ʔást koŋ kontímma	'He went to the mountains.'
kom	'long'

Xíkkaa ʔapámyam	'pills'
Xíkkaa ʔapámyaŋ ki? táššoo ʔfimine	'I gave her one of the pills.'

This rule can be formulated as follows:

$$\underline{m} \text{ Assimilation: } m \rightarrow \left[\begin{array}{c} -\text{lab} \\ \alpha\text{front} \end{array} \right] / \left[\begin{array}{c} V \\ [-\text{str}] \end{array} \right] \text{ --- } \left[\begin{array}{c} C \\ -\text{lab} \\ \alpha\text{front} \end{array} \right]$$

Condition: Clause-bounded

Vowel Deletion I

The vowel of a prefix is deleted when it precedes a short high stem vowel. It is also deleted before the causative morpheme -a- (not treated in this paper) and the intransitive marker -o-. The morpheme -i- (3rd object) is marked to not undergo this rule. This rule does not apply to vowels which are not in prefixes and operates across morpheme boundaries only, as shown by the forms below.

ʔaio káaix	'flicker'	ʔái	'wind'
kiáoto	'neck hump of bull'	ano	'from'
ʔatoókʔ	'big toes'	ʔái no	'from the wind'
Xíkka oánʔoax	'their equipment'		

'find'
(Fut.)

UF	i-si-áʔo=aʔa
OR	---
i-De1	---
m-Assim	---
VD I	---
OR	isíiʔʔoaʔa
SF	isíiʔʔoaʔa

The following forms illustrate the operation of this rule.

	'taste'	'sew basket strings'	'straighten'	'straighten'	'straighten'
	(Past)	(Past)	(Past)	(Perf.)	(Nom.)
UF	i-yo-píi	i-yo-áp	i-yo-íp	i-mi-íp	k-i-íp
OR	---	---	---	---	---
i-De1	---	---	---	---	---
m-Assim	---	---	---	---	---
VD I	---	---	iyíp	imíp	---
OR	---	iyóop	---	---	kfíp
SF	iyopíi	iyóop	iyíp	imíp	kfíp
móosni	'turtle'		kokášni	'snake'	
ipnáitʔ	'his/her skirt'		íttaak	'his/her bone'	
mosnipnáitʔ	'seaweed (spec.)'		kokašníttaak	'snake vertebrae'	
ʔi	'my'				
énniim	'knife'				
ʔénniim	'my knife'				
ʔánt šiki ntkmináa		'You really didn't go anywhere?'			
šo		'a'			
iki		'with'			

This rule can be formulated as follows:

Vowel Deletion I: $V \rightarrow \emptyset / \text{---} + V \begin{bmatrix} -\text{long} \\ +\text{hi} \end{bmatrix}$ Condition: Clitic-bounded.

Vowel Deletion II

A vowel is deleted when it precedes a morpheme boundary and a long vowel. This is illustrated by the following data.

	'be light-weight' (Past)	'be fast' (Past)	'be fast' (Perf.)	'look at' (Perf.)	'look at' (Nom.)	'hear' (Nom.)
UF	yo-áfšX	yo-áafšX	mi-áafšX	mi-óokta	k-i-úokta	k-i-fi
OR	---	---	---	---	---	---
VD II	---	yáafšX	máafšX	móokta	kóokta	kíi
OR	yóofšX	---	---	---	---	---
SF	yóofšX	yáafšX	máafšX	móokta	kóokta	kíi
?	'my'		mókni	'tree (spec.)'		
áaʔ	'spouse'		óoXW	'excrement'		
ʔáaʔ	'my spouse'		moknóoXW	'sap of the mókni tree'		

This rule may not operate across clitic boundaries, as illustrated by the forms below.

ʔái 'wind'
ʔaiáaʔa 'it is really windy'

This rule can be formulated as follows:

Vowel Deletion II: $V \rightarrow \emptyset / \text{---} + V \begin{bmatrix} -\text{str} \\ +\text{long} \end{bmatrix}$ Condition: Clitic-bounded.

This rule is bled by Brute Force Rule II.

Vowel Deletion III

An unstressed vowel is deleted after an identical vowel and a morpheme boundary. This is illustrated by the following data.

	'lack' (Neg. Nom.)	'look at' (Fut.)	'find' (Fut.)	'jump across' (Trans.) (Nom.)
UF	i-im-káit	i-si-óokta=a?a	i-si-á?o=a?a	k-i-íXW
OR	---	---	---	---
i-De1	---	---	---	---
m-Assim	i _ŋ káit	---	---	---
VD I	---	---	---	---
VD II	---	isóoktaa?a	---	---
VD III	i _ŋ káit	isóokta?a	---	---
OR	i _ŋ káit	---	isíi??oa?a	kíiXW
SF	i _ŋ káit	isóokta?a	isíi??oa?a	kíiXW

This rule does not operate across word boundaries.

itássi iyokéeppe 'When he drank it, he liked it.'

This rule can be formulated as follows:

Vowel Deletion III:
$$\left[\begin{array}{c} V \\ -str \\ \alpha F \end{array} \right] \rightarrow \emptyset / \left[\begin{array}{c} V \\ \alpha F \end{array} \right] + _$$

Stress Shift

I am assuming in this analysis that stress is underlying, at least in verbs. The stress of the initial vowel of a verb stem is shifted to the vowel of the prefix sometimes, however. This is illustrated by the following forms.

	'be fast' (Perf.)	'be light- weight' (Perf.)	'straighten' (Nom.)	'sew baskets' (Trans.) (Nom.)	'straighten' (Past)
UF	mi-áafšX	mi-áfšX	k-i-íp	k-i-áp	i-yo-íp
OR	---	---	---	---	---
VD I	---	---	---	---	iyíp
VD II	máafšX	---	---	---	---
VD III	---	---	---	---	---
S Shift	---	míafšX	kíip	kíap	---
OR	---	míifšX	---	kíp	---
SF	máafšX	míifšX	kíip	kíp	iyíp

This rule is ordered after Vowel Deletion I and Vowel Deletion II because it is bled by those rules. It is ordered before Vowel Deletion IV because it feeds that rule. This Stress Shift rule can be formulated as follows:

Stress Shift:
$$\begin{array}{ccccc} V & & V & \Rightarrow & V & & V \\ & & [+str][+str] & & & & \\ 1 & & 2 & & 1 & & 2 \end{array}$$
 Condition: Word-bounded.

Vowel Deletion IV

A short unstressed non-high vowel is deleted after a vowel and a morpheme boundary. The causative morpheme -a- is marked to never delete. The operation of this rule is illustrated by the following data.

	'swallow' (Trans.) (Nom.)	'sew baskets' (Trans.) (Nom.)	'swallow' (Trans.) (Past)	'poison proj. points' (Past)	'order' (Past)
UF	k-i-ám	k-i-áp	i-yo-ám	i-yo-áanx	i-yo-éaał
OR	---	---	---	---	---
VD II	---	---	---	iyáanx	---
VD III	---	---	---	---	---
S Shift	kíam	kíap	iyóam	---	iyóéaał
VD IV	kím	kíp	iyóm	---	iyóaał
OR	---	---	iyóom	---	---
SF	kím	kíp	iyóom	iyáanx	iyóaał
ʔái	'wind'				
ano	'from'				
ʔái no	'from the wind'				

This rule can be formulated as follows:

Vowel Deletion IV: $V \rightarrow \emptyset / V + \underline{\quad}$ Condition: Clause-bounded.
 $\begin{bmatrix} -str \\ -hi \end{bmatrix}$

i Lowering

A short i becomes e when it is followed by a morpheme boundary and an a (short or long). This is illustrated by the following data.

	'order' (Nom.)	'order' (Int. Past)	'order' (Perf.)	'order' (Past)
UF	k-i-éaał	i-t-éaał	i-mi-éaał	i-yo-éaał
OR	---	---	---	---
S Shift	kíéaał	---	imíéaał	iyóéaał
VD IV	kíaał	---	imíaał	iyóaał
<u>i</u> -Low	kéaał	---	imeaał	---
OR	---	---	---	---
SF	kéaał	itéaał	imeaał	iyóaał
ʔi-	'my'		i-	'his, her, its'
ʔéaš	'my mother's father'		áaXt	'parasite plant'
			éaXt	'its parasite plant'

This rule is ordered after Vowel Deletion IV because it is fed by that rule. This rule can be formalized as follows:

i Lowering: $i \rightarrow e / _ + a$

Stressed Vowel Lengthening

A high stressed vowel is lengthened when it is followed by a morpheme boundary and a consonant. The morpheme -i- (3rd object) is marked to not undergo this rule. The operation of this rule is illustrated by the following data.

	'swallow' (Trans.) (Past)	'swallow' (Trans.) (Nom.)	'swallow' (Trans.) (Perf.)	'break up' (Int. Past)
UF	i-yo-ám	k-i-ám	i-mi-ám	i-t-sík
OR	---	---	---	---
S Shift	iyóam	kíam	imíam	---
VD IV	iyom	kím	imím	---
SVL	iyóom	---	imíim	---
SF	iyóom	kím	imíim	itsík

'wear around neck'
(Intr.)
(Past)

UF	yo-o-ápxk	šó	'which?, what?'
OR	---	šó šíixya	'What thing?'
BF II	yaápxk		
a-Front	---		
i-Del	---		
m-Assim	---		
VD I	---		
VD II	---		
VD III	---		
S Shift	yáapxk		
VD IV	yápxk		
i-Low	---		
SVL	---		
OR	---		
SF	yápxk		

This rule could be formulated as follows:

Stressed Vowel Lengthening: $V \rightarrow [+long] / _ + C$
 $\left[\begin{matrix} +hi \\ +str \end{matrix} \right]$

Condition: Word-bounded.

This rule is ordered after Vowel Deletion IV because it is fed by that rule.

Unstressed Vowel Lengthening

An unstressed vowel is lengthened if it follows a stressed vowel and a consonant and precedes a consonant. The unstressed vowel must be in the same morpheme as the stressed vowel. The operation of this rule is illustrated by the following data.

	'find' (Fut.)	'find' (Perf.)	'find' (Int. Past)	'be lukewarm' (Fut.)
UF	i-si-á?o=a?a	i-mi-á?o	i-t-á?o	si-méke=ka?a
OR	---	---	---	---
i-De1	---	---	---	smékeka?a
m-Assim	---	---	---	---
VD I	---	---	---	---
VD II	---	---	---	---
VD III	---	---	---	---
S Shift	isía?oa?a	imía?o	---	---
VD IV	isí?oa?a	imí?o	---	---
SVL	isíi?oa?a	imíi?o	---	---
UVL	---	---	---	smékeeka?a
OR	isíi??oa?a	imíi??o	itá??o	smékkeeka?a
SF	isíi??oa?a	imíi??o	itá??o	smékkeeka?a
	'break up' (Fut.)			
UF	i-si-sík-a?a		pomékkeeX	'if it is lukewarm'
OR	---			
i-De1	issíka?a		iyóossi	'he drank it'
m-Assim	---			
VD I	---		itássii ma	'after he drank it ...'
VD II	---			
VD III	---		itássii máanpX	'After he drank it, he went.'
S Shift	---			
VD IV	---			
SVL	---			
UVL	---			
OR	issíkka?a			
SF	issíkka?a			

This rule can be formulated as follows:

Unstressed Vowel Lengthening: $V \rightarrow [+long] / \begin{matrix} V & C & \text{---} & C \\ [+str] & & & \end{matrix}$

Condition: The unstressed vowel and stressed vowel must be in the same morpheme.

i Epenthesis I

Both nominalized forms of a verb occur most commonly with the clitic =ʔa after the verb stem. When the verb stem ends in a consonant, an i is epenthesized between that consonant and the glottal stop. This i is never lengthened; therefore this rule is ordered after Unstressed Vowel Lengthening. This i does provide the proper conditions so that Consonant Lengthening can apply; therefore this rule is ordered before Consonant Lengthening. The following forms illustrate the operation of this rule.

iŋkáil	'lack' (Neg. Nom.)
iŋkáilʔa	'lack' (Neg. Nom. with clitic)
impíi	'taste' (Neg. Nom.)
impíiʔa	'taste' (Neg. Nom. with clitic)
insík	'break up' (Neg. Nom.)
insíkkiʔa	'break up' (Neg. Nom. with clitic)

This rule can be formulated as follows:

i Epenthesis I: $\emptyset \rightarrow i / C _ =ʔ$

i Epenthesis II

An i is inserted at the beginning of a word that begins with a nasal followed by a consonant if the word begins a clause or if the previous word ends in a consonant. The following data illustrate the operation of this rule.

	'be lukewarm' (Perf.)	'shiver' (Perf.)	'be four' (Perf.)	'own basket' (Perf.)
UF	mi-méke	mi-XápW	mi-šóoXk ^W	mi-ʔisx
OR	---	---	---	---
<u>i</u> -Del	mméke	mXápW	mšóoXk ^W	---
<u>m</u> -Assim	---	XápW	nšóoXk ^W	---
<u>VD</u> I	---	---	---	---
<u>VD</u> II	---	---	---	mʔisx
<u>VD</u> III	---	---	---	---
<u>S</u> Shift	---	---	---	---
<u>VD</u> IV	---	---	---	---
<u>i</u> -Low	---	---	---	---
<u>SVL</u>	---	---	---	---
<u>UVL</u>	---	---	---	---
<u>i</u> -Epen I	---	---	---	---
<u>i</u> -Epen II	imméke	iŋXápW	iŋšóoXk ^W	---
<u>OR</u>	immékke	---	---	---
<u>SF</u>	immékke	iŋXápW	iŋšóoXk ^W	mʔisx
ʔánt šiki ntkmináa	'You really didn't go anywhere?'			
intkmináa	'you really didn't go ...'			

mi- (2nd person subject)
 šíX k? insíi??iit paX 'if you are going to eat something ...'
 ?apáspos šo mpáai ta 'when you make a paper ...'

This rule can be formulated as follows:

i Epenthesis II: $\emptyset \rightarrow i / \left\{ \begin{matrix} C \\ \# \end{matrix} \right\} \text{---} \begin{matrix} C \\ [+nas] \end{matrix} C$

Condition: Clause-bounded.

This rule is ordered after i Deletion because it is fed by that rule.

Consonant Lengthening

A consonant is lengthened if it follows a stressed vowel and precedes a vowel. There is a condition that a clitic boundary may not follow the stressed vowel. The operation of this rule is illustrated by the data below.

	'be lukewarm' (Fut.)	'put into mouth dry' (Fut.)	'speak' (Fut.)
UF	si-méke=ka?a	si-ópokim=ka?a	si-áitom=ka?a
OR	---	---	---
<u>i</u> -Del	smékeka?a	---	---
m-Assim	---	siópokiŋka?a	siáitonka?a
VD I	---	sópokiŋka?a	---
VD II	---	---	---
VD III	---	---	---
S Shift	---	---	síaitonka?a
VD IV	---	---	síitonka?a
<u>i</u> -Low	---	---	---
SVL	---	---	---
UVL	smékeeka?a	sóppokiŋka?a	---
<u>i</u> -Epen I	---	---	---
<u>i</u> -Epen II	---	---	---
CL	smékkeeka?a	sóppookiŋka?a	---
OR	---	---	---
SF	smékkeeka?a	sóppookiŋka?a	síitonka?a
impíi?a	'taste' (Neg. Nom. with clitic)		
inkáiti?a	'lack' (Neg. Nom. with clitic)		
insíkki?a	'break up' (Neg. Nom. with clitic)		
?			
ást	'rock'	ktám	'man'
ássataya	'rock, my eye'	ktámm imíippe	'bad man'
iki?ímš	'to have ringworm'		
iki?ímmašaya	'to have ringworm, my eye'		
kpée?šX	'concave thing'		
kpée??ašXaya	'concave thing, my eye'		

It is interesting to notice that what superficially seems to be a counter-example, the form *speak* (Fut.) above, is not one because the long i is actually a stressed short i followed by an unstressed short i. The derivation makes this clear. This rule is also ordered after the i Deletion rule because it is fed by that rule. This consonant lengthening rule could be formulated as follows:

Consonant Lengthening: $C \rightarrow [+long] / \begin{matrix} V \\ [+str] \end{matrix} _ V$

Condition: Clause-bounded.

s Assimilation

An s becomes š when it precedes an š. This is illustrated by the forms below.

smékkeekaʔa	'be lukewarm' (Fut.)
sXápWkaʔa	'shiver' (Fut.)
sáafšXkaʔa	'be fast' (Fut.)
ššóoXkk ^W aʔa	'be four' (Fut.)

This rule is ordered after i Deletion because it is fed by that rule. It can be formulated as follows:

s Assimilation: $s \rightarrow \text{š} / _ \text{š}$ Condition: Word-bounded.

k Labialization

When a k^W is followed by a k, the labialization is pronounced after the second k. This is illustrated by the forms below.

smékkeekaʔa	'be lukewarm' (Fut.)
sXápWkaʔa	'shiver' (Fut.)
ššóoXkk ^W aʔa	'be four' (Fut.)
yošóoXk ^W	'be four' (Past)

This rule can be formulated as follows:

$k^Wk \Rightarrow kk^W$ Condition: Word-bounded.

Q Assimilation and Deletion

There are a number of verbs that superficially appear to be quite irregular. Some of these are listed in Table E. Sometimes a double consonant appears and at other times no consonant appears. I am proposing here that these verbs have stems that begin with a special consonant (I will use the symbol Q here) which is never seen as a contrastive segment on the surface. When this consonant follows another consonant, it assimilates completely to that consonant. When it follows a vowel, it deletes. These rules are ordered after i Deletion since Q Assimilation is fed by that rule, and after Stress Shift since Q Deletion has the potential of feeding that rule, but does not. The effects of these rules are illustrated below.

	'be red' (Nom.)	'be red' (Dep. Fut.)	'be red' (Past)	'be red' (Fut.)
UF	k-Qí?W	po-Qí?W	yo-Qí?W	si-Qí?W
OR	---	---	---	sQí?W
<u>Q</u> -Assim	kkí?W	---	---	ssí?W
<u>Q</u> -Del	---	poi?W	yoi?W	---
OR	---	---	---	---
SF	kkí?W	poi?W	yoi?W	ssí?W

These rules can be formulated as follows:

Q Assimilation: $Q \rightarrow \begin{matrix} C \\ [\alpha F] \end{matrix} / \begin{matrix} C \\ [\alpha F] \end{matrix} _$

Q Deletion: $Q \rightarrow \emptyset / V _$

TABLE A. INTRANSITIVE VERBS

<u>Nom.</u>	<u>Dep. Fut.</u>	<u>Past</u>	<u>Emph.</u>	<u>Fut.</u>	<u>Perf.</u>	<u>Neg. Nom.</u>	<u>Int. Past</u>
kméke	poméke	yoméke	Xoméke	smékkeekaʔa	imméke	imméke	tméke 'be lukewarm'
kXápW	poXápW	yoXápW	XoXápW	sXápWkaʔa	iŋXápW	iŋXápW	tXápW 'shiver'
kšóoXk ^W	pošóoXk ^W	yošóoXk ^W	XošóoXk ^W	ššóoXkk ^W aʔa	inšóoXk ^W	inšóoXk ^W	tšóoXk ^W 'be four'
kfix	pfix	yfix	Xfix	sfixskaʔa	mfix	imfix	tfix 'own basket'
káafšX	páafšX	yáafšX	XáafšX	sáafšXkaʔa	máafšX	imáafšX	táafšX 'be fast'
kóoʔʔa	páʔʔa	yáʔʔa	XWáʔʔa	sóoʔʔaakaʔa	móoʔʔa	imóoʔʔa	tóoʔʔa 'cry'
kóonšX	pánšX	yánšX	XWánšX	sóonšXkaʔa	móonšX	imóonšX	tóonšX 'spin thread'
káfšX	póofšX	yóofšX	XóofšX	sfiifšXkaʔa	mfiifšX	imáfšX	táfšX 'be lightweight'
kápka	póopka	yóopka	Xóopka	sfiipkakaʔa	mfiipka	imápka	tápka 'rain'
kánx	póonx	yóonx	Xóonx	sfinxkaʔa	mfinx	imánx	tánx 'roar'
káitom	póitom	yóitom	Xóitom	sfiitonkaʔa	mfiitom	imáitom	táitom 'speak'
káap*	póop	yóop	Xóop	sfiipkaʔa	mfiip	imáp	táp 'stand'
kóitom	páitom	yáitom	XWááitom	sóitonkaʔa	móitom	imóitom	tóitom 'be five'
koxást	paxást	yaxást	XWaxást	soxástkaʔa	moxást	imoxást	toxást 'hop'
kóppookim	páppookim	yáppookim	XWáppookim	sóppookiŋkaʔa	móppookim	imóppookim	tóppookim 'put into mouth dry'
kótx	pátx	yátx	XWátx	sótxkaʔa	mótx	imótx	tótx 'arise'

TABLE A, con.

<u>Nom.</u>	<u>Dep. Fut.</u>	<u>Past.</u>	<u>Emph.</u>	<u>Fut.</u>	<u>Perf.</u>	<u>Neg. Nom.</u>	<u>Int. Past</u>	
kóosseeta	péseeta	yéseeta	XWéseeta	sóosseetaka?a	móosseeta	imóosseeta	tóosseeta	'jiggle'
kóepX	péepX	yéepX	XWéepX	sóepXka?a	móepX	imóepX	tóepX	'flap'
kótteexa	pétteexa	yétteexa	XWétteexa	sótteexaka?a	mótteexa	imótteexa	tótteexa	'stagger'

* The long vowel in this form is irregular.

TABLE B. TRANSITIVE VERBS

<u>Nom.</u>	<u>Dep. Fut.</u>	<u>Past</u>	<u>Emph.</u>	<u>Fut.</u>	<u>Perf.</u>	<u>Neg. Nom.</u>	<u>Int. Past</u>
kɸi	ipɸfi	iyɸfi	iXɸfi	ispfiaʔa	impfi	impfi	itpfi 'taste'
kkáɪʔ	ipokáɪʔ	iyokáɪʔ	iXokáɪʔ	iskáɪlaʔa	iŋkáɪʔ	iŋkáɪʔ	itkáɪʔ 'lack'
ksfk	ipɸfk	iyɸfk	iXɸfk	issfkkaʔa	insfk	insfk	itsfk 'break up'
kxɸit	ipoxɸit	iyoxɸit	iXoxɸit	isxɸittaʔa	iŋxɸit	iŋxɸit	itxɸit 'drop load from basket'
kšXók	ipošXók	iyošXók	iXošXók	iššXókkaʔa	inšXók	inšXók	itšXók 'hack off'
kXóɪk ^w	ipoxóɪk ^w	iyoxóɪk ^w	iXoxóɪk ^w	isXóɪk ^w aʔa	iŋXóɪk ^w	iŋXóɪk ^w	itXóɪk ^w 'sip'
kfi	ipfi	iyfi	iXfi	isfiaʔa	imfi	imfi	itfi 'hear'
kóokta	ipóokta	iyóokta	iXóokta	isóoktaʔa	imóokta	imóokta	itóokta 'look at'
kóon	ipóon	iyóon	iXóon	isóonnaʔa	imóon	imóon	itóon 'carry (pl. items)'
káanx	ipáanx	iyáanx	iXáanx	isáanxaʔa	imáanx	imáanx	itáanx 'poison proj. points'
kéepx	ipéepx	iyéepx	iXéepx	iséepxaʔa	iméepx	iméepx	itéepx 'peel'
kíʔʔo	ipóoʔʔo	iyóoʔʔo	iXóoʔʔo	isfiʔʔoaʔa	imfiʔʔo	imáʔʔo	itáʔʔo 'find'
kɸip	ipɸp	iyɸp	iXɸp	isɸppaʔa	imɸp	imɸp	itɸp 'straighten'
kéaaɪ	ipóaaɪ	iyóaaɪ	iXóaaɪ	iséaaɪaʔa	iméaaɪ	iméaaɪ	itéaaɪ 'order'

TABLE C. VERBS USED TRANSITIVELY AND INTRANSITIVELY

<u>Nom.</u>	<u>Dep. Fut.</u>	<u>Past</u>	<u>Emph.</u>	<u>Fut.</u>	<u>Perf.</u>	<u>Neg. Nom.</u>	<u>Int. Past</u>	
kíimmoX	ipíimmoX	iyíimmoX	ixíimmoX	isíimmoXa?	imíimmoX	imíimmoX	itíimmoX	'butcher' T
kéemmoX	péemmoX	yéemmoX	xéemmoX	séemmoXka?	méemmoX	iméemmoX	téemmoX	'butcher' I
kínx	ipínx	iyínx	ixínx	isínxa?	imínx	imínx	itínx	'shout' T
kéénx	péénx	yéénx	xéénx	séénxka?	méénx	iméénx	téénx	'shout' I
kíipxk	ipíipxk	iyíipxk	ixíipxk	isíipxka?	imíipxk	imíipxk	itíipxk	'wrestle' T
kéépxk	péépxk	yéépxk	xéépxk	séépxkka?	méépxk	iméépxk	téépxk	'take hold of' I
kíiXW	ipíiXW	iyíiXW	ixíiXW	isíiXWa?	imíiXW	imíiXW	itíiXW	'jump across' T
kéeXW	péeXW	yéeXW	xéeXW	séeXWka?	méeXW	iméeXW	téeXW	'jump horizontally' I
kítñi	ipóotñi	iyóotñi	ixóotñi	isítñia?	imítñi	imátñi	itátñi	'stub toe' T
kóotñi	pátñi	yátñi	xwátñi	sóotñika?	móotñi	imóotñi	tóotñi	'stub toe' I
kímmaax	ipóommaax	iyóommaax	ixóommaax	isíimmaaxa?	imíimmaax	imámmaax	itámmaax	'attend fiesta' T
kóommaax	pámmaax	yámmaax	xwámmaax	sóommaaxka?	móommaax	imóommaax	tóommaax	'attend fiesta' I
kíiXW	ipóoXW	iyóoXW	ixóoXW	isíiXWa?	imíiXW	imáXW	itáXW	'defecate' T
kóoXW	páXW	yáXW	xwáXW	sóoXWka?	móoXW	imóoXW	tóoXW	'defecate' I
kípxk	ipóopxk	iyóopxk	ixóopxk	isíipxka?	imíipxk	imápck	itápck	'wear around neck' T
kóopxk	pápxk	yápxk	xwápxk	sóopxkka?	móopxk	imóopck	tóopck	'wear around neck' I

TABLE C, con.

<u>Nom.</u>	<u>Dep. Fut.</u>	<u>Past</u>	<u>Emph.</u>	<u>Fut.</u>	<u>Perf.</u>	<u>Neg. Nom.</u>	<u>Int. Past</u>	
kím	ipóom	iyóom	iXóom	isímma?a	imíim	imám	itám	'swallow' T
kóom	pám	yám	XWám	sóomka?a	móom	imóom	tóom	'swallow' I
kíp	ipóop	iyóop	iXóop	isíppa?a	imíip	imáp	itáp	'sew baskets' T
kóop	páp	yáp	XWáp	sóopka?a	móop	imóop	tóop	'sew baskets' I
kí??iit	ipóo??iit	iyóo??iit	iXóo??iit	isí??iita?a	imíi??iit	imá??iit	itá??iit	'eat' T
kóo??iit	pá??iit	yá??iit	XWá??iit	sóo??iitka?a	móo??iit	imóo??iit	tóo??iit	'eat' I
kíip	ipíip	iyíip	iXíip	isíippa?a	imíip	imíip	itíip	'carry on head' T
kéep	péep	yéep	Xéep	séepka?a	méep	iméep	téep	'carry on head' I
kkéeeX	ipokéeeX	iyokéeeX	iXokéeeX	iskéeeXa?a	in kéeeX	in kéeeX	itkéeeX	'cut hair' T
kokéeeX	pakéeeX	yakéeeX	XWakéeeX	sokéeeXka?a	mokéeeX	imokéeeX	tokéeeX	'cut hair' I
ksánx	iposánx	iyosánx	iXosánx	issánxa?a	insánx	insánx	itsánx	'carry child' T
kosánx	pasánx	yasánx	XWasánx	sosánxka?a	mosánx	imosánx	tosánx	'carry child' I
ktís	ipotís	iyotís	iXotís	istíssa?a	intís	intís	ittís	'point out' T
kotís	patís	yatís	XWatís	isotíska?a	motís	imotís	totís	'point out' I

TABLE D. VERBS USED TRANSITIVELY AND INTRANSITIVELY WHICH DO NOT USE THE -ó- (intransitive) MORPHEME [+D]

<u>Nom.</u>	<u>Dep. Fut.</u>	<u>Past</u>	<u>Emph.</u>	<u>Fut.</u>	<u>Perf.</u>	<u>Neg. Nom.</u>	<u>Int. Past</u>	
kíix	ipóix	iyóix	iXóix	isíixa?a	imíix	imáix	itáix	'fetch water' T
káix	póix	yóix	Xóix	síixka?a	míix	imáix	táix	'fetch water' I
kímW	ipóomW	iyóomW	iXóomW	isíimWka?a	imíimW	imámW	itámW	'hunt' T
kámW*	póomW	yóomW	XóomW	síimWka?a	mímW	imámW	támW	'hunt' I
kíttaat**ipíttaat	iyíttaat	iyíttaat	iXíttaat	isíttaata?a	imíttaat	imíttaat	itíttaat	'gather torote stems' T
kíttaat	píttaat	yíttaat	Xíttaat	síttaatka?a	míttaat	imíttaat	títtaat	'gather torote stems' I

TABLE E. VERBS WHICH HAVE A STEM-INITIAL CHAMELEON CONSONANT

kkéenx	ipoéenx	iyoeéenx	iXoeéenx	isseéenxa?a	imméenx	imméenx	ittéenx	'play instrument' T
koéenx	poéenx	yoéenx	Xoeéenx	soéenxka?a	moéenx	imoéenx	toéenx	'play instrument' I
kkíi	ipoíi	iyoií	iXoií	issíia?a	immíi	immíi	ittíi	'feel'
kkóts	ipóots	iyóots	iXóots	issótsa?a	immóots	immóots	ittóots	'suck'
kkí?W	poi?W	yoí?W	Xoi?W	ssí?Wka?a	immí?W	immí?W	ttí?W	'be red'
kkáktim	ipoáktim	iyoaáktim	iXoaáktim	issááktima?a	immááktim	immááktim	ittááktim	'use'
kkíimmíix	ipoiímmíix	iyoiímmíix	iXoiímmíix	issíimmíix...immíimmíix	immíimmíix	immíimmíix	ittíimmíix	'be very much'
kkámW	poániW	yoámW	XoámW	ssámWka?a	immámW	immámW	ttámW	'be brilliant'

*The long vowel in this form is irregular. **The short vowel in this form is irregular.

APPENDIX A: UNDERLYING FORMS OF VERBS LISTED IN TABLES A-E

Table A

méke	'be lukewarm'
XápW	'shiver'
šooXk ^W	'be four'
íisx	'own basket'
áafšX	'be fast'
óo?a	'cry'
óonšX	'spin thread'
áfšX	'be lightweight'
ápka	'rain'
ánx	'roar'
áitom	'speak'
áp	'stand'
óitom	'be five'
oxást	'hop'
ópokim	'put into mouth dry'
ótx	'arise'
óoseta	'jiggle'
óepX	'flap'
ótexa	'stagger'

Table B

píi	'taste'
káit	'lack'
sík	'break up'
xíit	'drop load from basket'
šXók	'hack off'
Xótk ^W	'sip'
íi	'hear'
óokta	'look at'
óon	'carry (pl. items)'
áanx	'poison proj. points'
éepx	'peel'
á?o	'find'
íp	'straighten'
éaał	'order'

Table C

íimoX	'butcher'
íinx	'shout'
íipxk	'wrestle'
íXW	'jump across'
átni	'stub toe'
ámax	'attend fiesta'
áXW	'defecate'
áp _x k	'wear around neck'
ám	'swallow'
áp	'sew baskets'
á?it	'eat'
íip	'carry on head'
kéeeX	'cut hair'
sánx	'carry child'
tís	'point out'

Table D

áix	'fetch water'
ámW	'hunt'
ítat	'gather torote stems'

Table E

Qéénx	'play instrument'
Qíi	'feel'
Qóots	'suck'
Qí?W	'be red'
Qáktim	'use'
QíimiX	'be very much'
QámW	'be brilliant'

APPENDIX B. RULE SUMMARY

1. Brute Force Rule I

$$\begin{matrix} o \\ [+D] \end{matrix} + i(i) \Rightarrow ee$$

2. X Labialization

$$X \rightarrow XW / \# \text{ ___ } o + o$$

3. Brute Force Rule II

$$o + o (o) \Rightarrow a / \text{ ___ } \text{ and the verb is intransitive.}$$

4. a Fronting

$$\begin{matrix} a \\ [+str] \end{matrix} \rightarrow e / \text{ ___ } + (C) e$$

5. i Deletion

$$i \rightarrow \emptyset / C \text{ ___ } + C \begin{matrix} V \\ [+str] \end{matrix} \quad \text{Condition: Word-bounded.}$$

6. m Assimilation

$$m \rightarrow \begin{bmatrix} -lab \\ front \end{bmatrix} / \begin{matrix} V \\ [-str] \end{matrix} \text{ ___ } \begin{matrix} C \\ \begin{bmatrix} -lab \\ front \end{bmatrix} \end{matrix} \quad \text{Condition: Clause-bounded.}$$

7. Vowel Deletion I

$$V \rightarrow \emptyset / \text{ ___ } + \begin{matrix} V \\ \begin{bmatrix} -long \\ +hi \end{bmatrix} \end{matrix} \quad \text{Condition: Clitic-bounded.}$$

8. Vowel Deletion II

$$\begin{matrix} V \\ [-str] \end{matrix} \rightarrow \emptyset / \text{ ___ } + \begin{matrix} V \\ [+long] \end{matrix} \quad \text{Condition: Clitic-bounded.}$$

9. Vowel Deletion III

$$\begin{matrix} V & \rightarrow & \emptyset & / & V & + & ___ \\ \left[\begin{smallmatrix} -str \\ \alpha F \end{smallmatrix} \right] & & & & [\alpha F] \end{matrix} \quad \text{Condition: Clause-bounded.}$$

10. Stress Shift

$$\begin{matrix} V & & V & & V & & V \\ & [+str] & & [+str] & & & \\ 1 & & 2 & & 1 & & 2 \end{matrix} \quad \text{Condition: Word-bounded.}$$

11. Q Assimilation

$$Q \rightarrow \begin{matrix} C \\ [\alpha F] \end{matrix} / \begin{matrix} C \\ [\alpha F] \end{matrix} ___$$

12. Q Deletion

$$\underline{Q} \rightarrow \emptyset / V ___$$

13. Vowel Deletion IV

$$\begin{matrix} V & \rightarrow & \emptyset & / & V & + & ___ \\ \left[\begin{smallmatrix} -str \\ -hi \end{smallmatrix} \right] \end{matrix} \quad \text{Condition: Clause-bounded.}$$

14. i Lowering

$$i \rightarrow e / ___ + a$$

15. Stressed Vowel Lengthening

$$\begin{matrix} V & \rightarrow & [+long] & / & ___ & + & C \\ \left[\begin{smallmatrix} +hi \\ +str \end{smallmatrix} \right] \end{matrix} \quad \text{Condition: Word-bounded.}$$

16. Unstressed Vowel Lengthening

$$V \rightarrow [+long] / \begin{matrix} V \\ [+str] \end{matrix} C ___ C \quad \text{Condition: The unstressed and stressed vowel must be in the same morpheme.}$$

17. i Epenthesis I

$$\emptyset \rightarrow i / C ___ = ?$$

18. i Epenthesis II

$$\emptyset \rightarrow i / \left\{ \begin{matrix} C \\ \# \end{matrix} \right\} ___ \begin{matrix} C \\ [+nas] \end{matrix} C \quad \text{Condition: Clause-bounded.}$$

19. Consonant Lengthening

$$C \rightarrow [+long] \quad / \quad \begin{array}{c} V \\ [+str] \end{array} \quad \text{---} \quad V \quad \text{Condition: Clause-bounded}$$

20. s Assimilation

$s \rightarrow \check{s} / _\check{s}$ Condition: Word-bounded.

21. k Labialization

 $k^w k \Rightarrow k k^w$ Condition: Word-bounded.

APPENDIX C. RULE ORDERING

FOOTNOTES

¹I am indebted to Ed and Becky Moser for so willingly providing the data used in this paper and for the many hours they graciously spent in checking the manuscript. My thanks also go to Rich Rhodes for his help in this analysis. All errors are, of course, my own.

²The data used in this paper has been phonemicized. The only non-standard symbols are X which is used for the voiceless uvular trill and Q which is used for the chameleon consonant of Seri.

The following abbreviations are used:

Dep. Fut., Dependent Future	Neg. Nom., Negative Nominalizer
Emph., Emphatic	Nom., Non-negative Nominalizer
Fut., Future	Perf., Perfect
Int. Past, Interrogative Past	SPM, Subject Person Marker
Intr., Intransitive	Trans., Transitive

³Stress has been assumed to be underlying. Perhaps further study will prove the case to be otherwise.