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ASPECTS OF SERI PHONOLOGY

Stephen A. Marlett

0. Introduction. An abstract analysis of Seri, a Hokan language of northern Mexico, might posit the following systematic phonemes.[1]

Consonants

lab	dent	alv	retrofl alv-pal	pal	vel	back vel (uvular)	glot
p	t				k		?
f [Φ]		s ɬ	ṣ̌		x	χ	
m	n						
w		l		y			

Vowels

i i:

o o:

e [æ] e: [æ:] a a:

In the following sections I will discuss the presence of the surface segments W, kʷ, χʷ, ŋ, and nasalization, and the status of the phoneme /w/ in present-day Seri. I will also discuss other prominent aspects of Seri phonology, especially those features in which this analysis differs from that of Moser and Moser 1965.

1. Consonant and vowel lengthening. A striking feature of the Seri language is what Moser (1978) has called a "staccato delivery" since consonants and vowels are noticeably lengthened under certain conditions.[2] The following sentence illustrates the pervasiveness of lengthened segments. (Forms written without brackets are intermediate representations.)

(1) i-ʔámok kʔ iti t-om ma-χ i-ʔí:saχ tintika t-átaχ-χ →

[iʔám:o:kʔititom:aχiʔí:s:a:χtintikatát:a:χ]

When she would lie down at night, when her spirit would go, ...

The long i in [iʔí:s:a:χ] is an underlying long vowel. The long m in [tom:aχ] is the result of the juxtaposition of two morphemes, one ending in m, one beginning with m. Non-nasal geminate consonant clusters and also clusters such as kkʷ tend to degeminate except when both consonants are in the same word and the second consonant is stem-initial; in the latter case they are realized as single long consonants. These rules are stated informally and illustrated below.

(2) Degemination: $\underset{[-nas]}{C_i} \rightarrow \emptyset \;/\; C_i \underset{[-segment]}{Z} \_\_$

where $Z \neq \#$

(3) Coalescence: $\underset{1}{C_i}\;\underset{2}{C_i} \Rightarrow \underset{1}{[+lng]}\;\underset{2}{\emptyset}$

(4) iʔp-p-á:pɨ → [iʔpá:pɨ] *when I am cold*

s-ʔámok-kaʔa → [sʔám:o:kaʔa] *it will be night*

po-pánʂ̩-χ-χ → [popánʂ̩χ] *if he runs*

χépe kom m-í:pe → [χép:e:kom:í:p:e] *The sea is good (calm).*

ʂ̩iχ k-káp → [ʂ̩iχk:áp] *thing that flies, i.e. airplane*

To avoid confusion, I will henceforth represent long consonants which result from (3) as clusters.[3]

Consonant lengthening. A consonant is lengthened if it follows a stressed vowel nucleus of a certain type and precedes a vowel. The amount of lengthening is greater with a higher degree of stress. The stressed vowel nucleus may be composed of a single vowel (long or short) or a short vowel followed by a short high front vowel (i). This is obviously a restriction on total nucleus length that is difficult to capture notationally.[4] There is also a condition that the consonant be in the same word as the stressed vowel and not be a suffixal consonant. The rule is given in (5).

(5) Consonant Lengthening: $C \rightarrow [+lng] \;/\; \underset{\langle -lng \rangle}{\acute{V}} \left\langle \begin{matrix} V \\ \begin{bmatrix} -lo \\ -bac \\ -lng \end{bmatrix} \end{matrix} \right\rangle \_\_ V$

Conditions: 1) The C must be in the same word as the stressed V.
2) The C may not be a suffixal C.

This formalization represents rules (6) and (7) below which are illustrated individually. The need for the conditions is illustrated in (8) and (9).

(6) $C \rightarrow [+\text{lng}] \;/\; \underset{[-\text{lng}]}{\acute{V}} \; \begin{matrix} V \\ \begin{bmatrix} -\text{lo} \\ -\text{bac} \\ -\text{lng} \end{bmatrix} \end{matrix} \;\_\_\; V$

k-á-iko-t	→	[káik:o:t]	*kill for someone (sg. punct., nom.)*
k-óipaɨ-im	→	[kóip:a:ɨim]	*be elliptical (sg. iter., nom.)*.
?-áonam	→	[?áonam]	*hat*
k-apói:n-im	→	[kapói:nim]	*wring out (sg. iter., nom.)*
k-ká:iχ-im	→	[kká:iχim]	*scrape away (sg. iter., nom.)*
k-áaɨ-im	→	[káaɨim]	*play (sg. iter., nom.)*

(7) $C \rightarrow [+\text{lng}] \;/\; \acute{V} \;\_\_\; V$

k-á:t-im	→	[ká:t:im]	*cook in ashes (sg. iter., nom.)*
k-á:fap-im	→	[ká:f:a:pim]	*arrive (sg. iter., nom.)*
k-kápapχ-im	→	[kkáp:a:pχim]	*crack with teeth (sg. iter., nom.)*
?áχox	→	[?áχ:o:x]	*shore*

(8) Condition: The consonant must be in the same word as the stressed vowel.

mó-k-a-t	→	[mók:a:t]	*come (pl. punct., nom.)*
?ant po-fí: ta	→	[?ant pofí: ta]	*when it is tomorrow*
?ái kop	→	[?ái kop]	*the wind*

(9) Condition: The consonant may not be a suffixal consonant.

mó-k-a-t	→	[mók:a:t]	*come (pl. punct., nom.)*
k-á:-tim	→	[ká:tim]	*grind grain (sg. iter., nom.)*
s-pí:-ka?a	→	[spí:ka?a]	*he will taste it*

Notice that the conditions are responsible for the generation of surface contrast between long and short consonants in the forms k-á:t-im [ká:t:im] *cook in ashes (sg. iter., nom.)* and k-á:-tim [ká:tim] *grind grain (sg. iter., nom.)* (see (7) and (9) above).

Vowel lengthening. There is also a vowel lengthening rule that lengthens an unstressed vowel when it follows the same type of stressed vowel nucleus and a consonant and is followed by a consonant. Conditions similar to those in (5) apply for this rule also. Compare k-ó:s-iʔa [kó:s:iʔa] *sing (sg. punct., nom.)* with k-ó:si-ʔa [kó:s:i:ʔa] *sing (pl. punct., nom.)*. The rule is given as (10).

(10) Vowel Lengthening:

$$\underset{\text{[-str]}}{V} \rightarrow \text{[+lng]} \;/\; \underset{\langle\text{-lng}\rangle}{\acute{V}} \left\langle \begin{matrix} V \\ \begin{bmatrix}\text{-lo}\\ \text{-bac}\\ \text{-lng}\end{bmatrix}\end{matrix} \right\rangle C \_\_ C$$

Conditions: 1) The V must be in the same word as the stressed V.
2) The V may not be a suffixal V.

These lengthening rules are productive and yet they do not apply to most loanwords, as seen in the data in (11).

(11)

singular	plural	
[mó:na]	[mó:nax]	*monkey*
[paš̩á:to]	[paš̩á:tox]	*shoe*
[třó:ki]	[třó:kix]	*car, truck*
[ʔáp:a:ts]	[ʔáp:a:ts]	*Apache*
[káp:o:ta]	[káp:o:tax]	*jacket*
[kót:o:n]	[kót:o:š̩ax]	*shirt, blouse*
[mí:st]	[mí:s:a:tx]	*cat*

a-Infixation. It may be easily shown that the lengthening rules are productive in spite of the data in (11). One way to indicate disbelief or disgust in Seri is by using the appropriate intonation and adding the suffix /-aya/ to a word.

(12) sták sták-aya *pumice*

The effect of this morpheme is to change a word such as sták *pumice* into something equivalent to the English 'Pumice? Ha!' or 'Pumice, my eye!' The phonetic realization of sták-aya is as expected: [sták:aya]. If a consonant cluster immediately follows the stressed vowel nucleus (which has the same restrictions as above), however, an a is infixed following the first consonant of that cluster, as shown below. (The a of /-aya/

sometimes deletes by a rule that degeminates vowels under certain conditions (see note 3).

(13)	ʔást	ʔás-a-t-aya	*stone*
	ptkámn	ptkám-a-n-aya	*lobster*
	ná:pχa	ná:p-a-χa-ya	*red-headed buzzard*
	yéktṣ̌	yék-a-tṣ̌-aya	*Yaqui*
	k-pán-ko-χ-ɬka	k-pán-a-ko-χ-ɬka-ya	*run (sg. iter., nom.)*
	któik-ɬk	któik-a-ɬk-aya	*lizards*

Therefore the morpheme is actually /-aya/ [+LPM a-Infixation] where LPM means label the preceding morpheme to undergo, in this case, the morphological rule of a-Infixation. This rule might be written as (14).

(14) a-Infixation: $\emptyset \rightarrow +a+ \;/\; \underset{\langle -\text{lng}\rangle}{V} \left\langle \begin{bmatrix} V \\ -\text{lo} \\ -\text{bac} \\ -\text{lng} \end{bmatrix} \right\rangle C \_\_ C$

Condition: 1) Word-bounded.
2) The first C may not be suffixal.

The condition is necessary to explain the following type of data.

(15) ṣ̌á:-ɬka ṣ̌á:-ɬka-aya *caves*

This rule feeds Consonant Lengthening, but the a does not lengthen since it is an infix.

(16) ʔás-a-t-aya → [ʔás:ataya] *stone*

Loanwords may undergo lengthening if a-Infixation has applied. (The suffix /-aya/ itself is not generally used with loanwords, the infixation rule along being used.)

(17) elefánte elefán-a-te → [elefán:ate] *elephant*

The a-Infixation rule is also used with the morpheme ʔaɬχ *rather*.

(18) m-ó:χp *It is white.*

ʔaɬχ m-ó:χ-a-p *It is rather white.*

I will be using this rule as an important test in later sections of this paper.

Problems. There are some additional data that should be compared with respect to Consonant and Vowel Lengthening. The segments ʔ and i lengthen in the verb /-aʔit/ *eat*.

(19) k-á?it → [ká?:i:t] *eat (sg. punct., nom.)*

The causative prefix may be added to this root, the resulting verb meaning *feed; go fishing*. Note that the lengthening rules still apply. (The stress shifts from the stem vowel to the prefix vowel and the sequence áa is realized as [á:].)

(20) k-á-a?it → [ká:?:i:t] *feed (sg. punct., nom.)*

This form poses a problem unless the lengthening rules could apply to a form whose stressed vowel nucleus consists of two identical short vowels. I have tentatively ruled out this solution on the basis of a very few forms such as the following which I analyze as having a sequence of short vowels. Note that the lengthening rules have not applied.

(21) k-áaɬ-im → [ká:ɬim] *play (sg. punct., nom.)*

I have not decided what is the best way to handle these few problematical data.

2. The round consonants. There are three round surface consonants in Seri which would be posited as phonemes in a less abstract analysis (see Moser and Moser 1965). Although I cannot yet account for all of their occurrences, it has become obvious that these are derived segments. (The labialized velar fricative xʷ also occurs occasionally at the most detailed phonetic level. This segment will be discussed later.) First I will discuss the phonetic realizations of kʷ, χʷ, and W.[5]

Offglide. A round consonant has a voiced offglide when it precedes a (voiced) vowel or semivowel. (Again, the representations on the left are intermediate. The symbols kʷ and χʷ in the intermediate representations signify [+rd] consonants, the phonetic realizations of the feature [round] being specified by the environment in which the round consonant occurs. In the phonetic transcriptions, kʷ and χʷ represent back consonants with voiced offglides.)

(22)	ktámkʷ-i?a	→	[ktámkʷi?a]	*They are men.*
	ktámkʷ-ya	→	[ktámkʷya]	*Are they men?*
	?i-ş̌a?ó:χʷ-i?a	→	[?iş̌a?ó:χʷi?a]	*It is my upper arm.*
	k-kápW-i?a	→	[kkápWʷi?a]	*He is chewing it.*

A consonant followed by a glottal stop is realized as a glottalized consonant. Therefore kʷ and a following ? are realized as [k'ʷ]--an ejective velar stop with a voiced offglide (since it only occurs before vowels). The rule is given informally as (23). (Most of the phonetic transcriptions in this paper will not be so detailed so as to show the effect of this rule.)

(23) C ? ⇒ C' Ø
     1 2   1 2

(24) kʷ-ʔ-á:s → [k'ʷá:s] *Give it to him to drink!*

The segment kʷ has a voiceless offglide before a (voiceless) obstruent. (The offglide is only variably perceptible before strident segments.)

(25) kʷ-t-pánṣ̌χ → [kᵂtpánṣ̌χ] *He is running like him.*

k-ó:kʷsx → [kó:kᵂsx] ~ [kó:k̮sx] *shake (sg. punct., nom.)*

Stops are optionally slightly aspirated before pause in Seri (Moser and Moser 1965:53) and probably it is by this same process that kʷ is sometimes realized as [kᵂ] in this position.

(26) ʔókʷ → [ʔók̮] ~ [ʔókᵂ] *wood*

Elsewhere than the environments described above the round consonants do not have an offglide, but only simultaneous lip-rounding.

(27) k-tí:pχʷṣ̌-i+ → [ktí:pχ̮ṣ̌i+] *squeeze (pl. punct., nom.)*

ʔá:mχʷ → [ʔá:mχ̮] *maguey*

k-í-kʷnix → [kíᵘ̽k̮nix] *shake (sg. punct., nom.)*

I will refer to these processes affecting the offglide of the round consonants as the Offglide Detail rule.

Rounding. Back consonants become [+round] following a [+round] consonant.

(28) Rounding: $\underset{[+bac]}{C} \rightarrow [+rd] \,/\, \underset{[+rd]}{C}$ __ (left to right iterative)

Condition: Phrase-bounded.

(29) k-ṣ̌ó:χʷk → [kṣ̌ó:χ̮kᵂ] *be four (sg. punct., nom.)*

s-χápW-kaʔa → [sχápWkʷaʔa] *He will tremble.*

kʷ-χo-pánṣ̌-χ → [kᵂχʷopánṣ̌χ] *He ran like him!*

Notice the following derivations.

(30)

	ktámkʷ k-ṣ̌ó:χʷk koi	ktámkʷ k-ṣ̌ó:χʷk k-tíns-o koi
Round (28)	kʷ kʷkʷ	kʷ kʷkʷ
Degem (2)	∅ ∅	∅ ∅
C Length (5)		
V Length (10)		
Offglide	kᵂ χ̮ kʷ	kᵂ χ̮ kᵂ
	[ktámkᵂṣ̌ó:χ̮kʷoi]	[ktámkᵂṣ̌ó:χ̮kᵂtínsokoi]
	the four men	*the four men scraping*

	k-ṣ̌ó:χʷk χa? k-ápχa	?ókʷ ki?
Round (28)	kʷχʷ	kʷ
Degem (2)		∅
C Length (5)		kʷ:
V Length (10)		
Offglide	χ̮ k^{W}χʷ	kʷ:
	[kṣ̌ó:χ̮k^{W}χʷa?kápχa]	[?ókʷ:i?]
	four and three	*the wood*

	t-?anɬ t-ṣ̌ó:χʷk kʷ-k-í:?
Round (28)	kʷ kʷ
Degem (2)	∅
C Length (5)	
V Length (10)	
Offglide	χ̮ kʷ
	[t?anɬtṣ̌ó:χ̮kʷkʷí:?]
	fourteen

Diphthongization. As described in Moser and Moser 1965, a [-round] vowel immediately preceding a [+round] consonant in the same word becomes a diphthong with a non-low round offglide that agrees in the feature [high] with that vowel. The rule is given in (31).

(31) Diphthongization: $\emptyset \rightarrow \begin{bmatrix} -syl \\ -cns \\ \alpha hi \\ -lo \\ +bac \\ +rd \end{bmatrix} \Big/ \begin{matrix} V \\ \begin{bmatrix} \alpha hi \\ -rd \end{bmatrix} \end{matrix} \_\_ \begin{matrix} C \\ [+rd] \end{matrix}$

Condition: Word-bounded.

(32)	?áχʷɬ	→	[?á^{o}χ̮ɬ]	*cherry stone clam*
	k-í-kʷ-t	→	[kí^{u}k^{W}t]	*kill (pl. punct., nom.)*
	?-akéWk	→	[?aké^{o}Wk^{W}]	*firewood*
	?ókʷ	→	[?ók^{W}]	*wood*
	?á: kʷ-í-fp	→	[?á:kʷí:fp]	*his arrival there*

Velarization. When a p follows kʷ in the same word, the p becomes kʷ (the resulting geminate cluster being realized as a long segment). This process tends to apply in casual speech even when the p is in the following word.

(33) Velarization: $\begin{bmatrix}+\text{lab}\\+\text{ant}\\-\text{cnt}\\-\text{son}\end{bmatrix} \rightarrow \begin{bmatrix}+\text{bac}\\+\text{hi}\end{bmatrix} \;/\; \begin{bmatrix}+\text{lab}\\+\text{bac}\\-\text{cnt}\end{bmatrix}$ ___

Conditions: Word-bounded in careful speech.
Pause-bounded in casual speech.

(34)	kʷ-po-pánṣ̌-χ	→	[kʷkʷopánṣ̌χ]	*when he runs like him*
	ʔókʷ pak	→	[ʔókᵂpak] ~ [ʔókʷkʷak̹]	*some wood*

kʷ and χʷ as units. It is demonstrable that kʷ and χʷ are clearly units and not the sequences kW and χW (or even kw and χw) by the way these segments interact with the a-Infixation rule.

		derogatory	
(35)			
	ʔókʷ	ʔókʷaya	*wood*
	kó:kʷsx	kó:kʷasxaya	*shake (sg. punct., nom.)*
	ʔáχʷɬ	ʔáχʷaɬaya	*cherry stone clam*
	kṣ̌áχʷt	kṣ̌áχʷataya	*speak (sg. punct., nom.)*

kʷ, χʷ and W as derived segments. Although kʷ and χʷ are units at the level in the derivation at which a-Infixation applies, there is evidence that they are both derived from underlying ko and χo respectively, and that W derives from /o/, as I will now demonstrate.

For many verbs iterative aspect is expressed simply by suffixing /-tim/ to the verb stem as shown in (36). The t of /-tim/ is deleted following a consonant that is preceded by an unstressed vowel.

(36)	k-méke	k-méke-tim	*be lukewarm*
	k-moṣ̌íme	k-moṣ̌íme-tim	*be drunk*
	k-á:a	k-á:a-tim	*call*
	k-pítoɬ	k-pítoɬ-im	*be bloated*
	k-ípon	k-ípon-im	*cry out*

The deletion rule could be stated as (37).

(37) t-Deletion: $t \rightarrow \emptyset \;/\; \underset{[-\text{stress}]}{V}\;\; C + \_\_$

Iterative aspect is indicated by this suffix on many verbs and in addition punctiliar aspect is indicated on these verbs by deleting a vowel in the verb stem. Some examples are given in (38). The deletion rule is given in a simplified form in (39).

(38)	k-níp	k-nípa-tim	*hit with hand*
	k-kóxp	k-kóxop-im	*bolt*
	k-míʔṣ̌χ	k-míʔiṣ̌χ-im	*slip*
	k-ká:kp	k-ká:kop-im	*pound*

(39) Syncope: $V \rightarrow \emptyset \;/\; \underset{[+\text{stress}]}{V} \;(V)\; C \;\_\_$ in certain forms

(The operation of this deletion rule is actually quite idiosyncratic for a given verb--it may apply in any or all of the four forms marked for number/aspect.) In addition, when the vowel to be deleted is an o and when it is contiguous to a back consonant, labialization or W usually shows up in the "syncopated" form. Some examples are given below. (There is also a rule by which x becomes + in forms other than the singular punctiliar.)

(40)	k-í-kʷ	k-í-ko-tim	*kill*
	kʷ-k-i-ʔáχʷ+	kʷ-k-i-ʔáχo+-im	*have eating utensil*
	k-kápWx	k-kápo+-im	*chew*
	k-χápWx	k-χápo+-im	*tremble*

The syncope rule then must have two parts; it is given informally as (41). The first part of this pair of rules will generate W; a separate rule will coalesce back consonants and W.[6]

(41) Syncope:

$$\left.\begin{array}{c} o \rightarrow W \\ \hline V \rightarrow \emptyset \end{array}\right\} \;/\; \acute{V}(V) \left\{\begin{array}{c} \left\{\begin{array}{l} \begin{bmatrix}C\\ +\text{bac}\end{bmatrix} \_\_ \\ C \;\_\_\; \begin{bmatrix}C\\ +\text{bac}\end{bmatrix} \end{array}\right\} \\ \hline CC \;\_\_ \end{array}\right\} \quad \text{in certain forms}$$

(42) Coalescence:

$$\underset{1}{\begin{bmatrix}C\\ +\text{bac}\end{bmatrix}} \;\underset{2}{W} \Rightarrow \underset{1}{[+\text{rd}]} \;\underset{2}{\emptyset}$$

There is additional evidence for this analysis. The form 'loco' *crazy* was borrowed from Spanish in quite regular ways. The voiced lateral was replaced by [ř]. Stressed vowels in loanwords are lengthened when they precede a consonant. Also, some version of the syncope rule applied. The Seri form is therefore řó:kʷ. The verb *make crazy* is k-a-řó:ko-t.

The rule deleting t given above (rule (37)) does not take care of all the instances where the t of a suffix is deleted. This t also deletes if it is preceded by a consonant cluster. I will formalize this as (43) below. Notice that (39) has applied in some of the plural forms in (45).

(43) t-Deletion II: t → Ø / CC + __

(44)

singular punctiliar	plural punctiliar	gloss
k-méke	k-mék-tox	*be lukewarm*
k-ása	k-ása-tox	*be spoiled*
k-píto+	k-pít+-ox	*be bloated*
k-i-kó:po+	k-i-kó:p+-ox	*become dark*

By comparing the forms of (44) with the forms of (45) below (which take different suffixes for the plural forms), we see that we must accept either a more complicated version of t-Deletion II or agree that Coalescence (45) has applied and bled t-Deletion II.

(45)

sing punct	sing iter	plur punct	plur iter	gloss	root
k-ʂ̌áχʷ	k-ʂ̌áχʷ-tim	k-ʂ̌áχʷ-t	k-ʂ̌áχʷ-to+ka	*talk*	-ʂ̌aχo
k-í-kʷ	k-í-ko-tim	k-í-kʷ-t	k-í-kʷ-tox	*kill*	-ako

In summary, it appears to be the case that most (perhaps eventually all) occurrences of W may be generated from underlying o's. The sequences kW and χW are converted by a context-free rule to kʷ and χʷ resepectively. From that point on, these sounds function as units.

x-Deletion. There is now an important point to be clarified that was problematic for Moser and Moser (1965). In (40) we gave the singular punctiliar forms of *chew* and *tremble* as kkapWx and kχápWx respectively. We know that the x is there because of the x → + rule and the fact that the syncope rule requires a contiguous back consonant. The x is not present phonetically, however. The following rule accounts for its deletion.

(46) x-Deletion: $x \rightarrow \emptyset \; / \; \underset{[+rd]}{C} \; \_\_ \; Z$

Conditions: In careful speech $Z \neq \underset{[+bac]}{V}$

In casual speech there is no condition on Z.

As the conditions indicate, the rule will not apply in careful speech if the x is followed by a back vowel. Otherwise, the x always deletes.

Moser and Moser (1965:54) set up the sequence kW in contrast with the unit kʷ on the basis of the superficially anomalous form [ʔayáʕkᵂ] *anklebone*.

> On the basis of the examples [ʔokʷ] *wood* and [ʔayáokW] *ankle bone*, /kʷ/ has been set up as in contrast with /kW/. There is a fairly large number of words which for some speakers terminate in [kW]. For all such words except [ʔayáokW], this varies freely toward [kʷ]. There is thus no convincing evidence of contrast apart from this one example. Morphophonemic evidence bears out the uniqueness of ʔayákW. All other words ending in isolation in either /kʷ/ or /kW/, when followed by a vowel in combined forms, have /kʷ/, not /kW/: ktamkʷ *men*, ktámkʷiʔa *they are men*; kšooχkW *to be four*, kšóoχkʷiʔa *there are four*.

Elsewhere on the same page they add,

> The phoneme /W/ after /k/, however, is clearly heard as an additional segment [in the word *anklebone*--SM]: ʔayákW *ankle bone*, ʔayákWiʔa *it is an ankle bone*.

I will now present evidence that the morpheme *anklebone* is -yakʷx (< /-yakox/), and that the final x̲ is what causes the word to be pronounced differently from words ending in k̲ʷ̲. The plurals of *anklebone* are -yákʷɨk and -yákʷɨxox (collective). Nouns that have plurals with -ɨk(a) often have singular forms ending in x̲ (for whatever reason historically).

A few examples are given in (47).

(47)	tákx	tákɨk	*porpoise*
	ʔápax	ʔápaɨk	*octopus*
	ṣ̌ámix	ṣ̌ámiɨk	*palm*
	kopsí:x	kopsí:ɨka	*jellyfish*
	kótx	kótɨka	*manta ray (sp.)*
	ká:nx	ká:nɨka	*sea bass (sp.)*

The plural suffix -ɨk(a), however, also occurs on noun stems that do not end in x̲.

(48)	ná:pχa	ná:pχaɨk	*red-headed buzzard*
	nó:si	nó:siɨk	*mourning dove*
	kíṣ̌i	kíṣ̌iɨk	*sardine (sp.)*
	ʔáχ	ʔáχɨk	*projectile point*
	koyóko	koyókoɨk	*dove*

Therefore we might hypothesize a final x̲ for [ʔayáo̥kᵂ] which would delete after it provides the environment for the̲ Offglide Detail rule.

The best evidence comes from the a-Infixation rule, however.

(49) [ʔayáᴽkʷ:axaya] *Anklebone, my eye!*

There the x surfaces indisputably--and quite mysteriously unless we posit ʔayákʷx as a proper (intermediate) representation of *anklebone*.

Since the rule deleting x after kʷ may be collapsed with the x-Deletion Rule (46), it seems unnecessary to posit two separate x-Deletion rules (although I have not yet checked to see if the conditions on (46) apply to the other rule also). It is also important to point out that this is the only word that I am aware of for which a rule x → ∅ / kʷ ___ is necessary. Therefore it seems highly desirable to consider deletion of x in ʔayakʷx and the deletion of x in kχápWx to be effected by the same rule, even though in some cases the x is not recoverable from the phonetic form. The derivation of ʔayákʷx and ʔayákʷaxaya would be as follows:

(50)			
	UF	/ʔa-yákox/	/ʔa-yákox-aya/
	Syncope (41)	ʔayákWx	ʔayákWxaya
	Coalescence (42)	ʔayákʷx	ʔayákʷxaya
	a-Infixation (14)	-------	ʔayákʷaxaya
	Rounding (28)	ʔayákʷxʷ	-----------
	C Length (5)	--------	ʔayákʷ:axaya
	V Length (10)	--------	------------
	Diphthong (31)	ʔayáᴽkʷxʷ	ʔayáᴽkʷ:axaya
	Offglide	ʔayáᴽkᵂxʷ	ʔayáᴽkʷ:axaya
	x-Deletion (46)	ʔayáᴽkᵂ	------------
		[ʔayáᴽkᵂ]	[ʔayáᴽkʷ:axaya]

It is important to notice that x-Deletion (46) must apply after the Offglide Detail rule has applied.

Other rules generating kʷ and Xʷ. Not all occurrences of intermediate kʷ and xʷ are generated by Syncope and Coalescence. The third person referent clitic has two allomorphs: kʷ- and ko-. It is usually kʷ- except before consonant clusters of which the first member is ʔ, m, or k in which case it is ko- as seen by the data below.

(51)

kʷ-ʔ-á:s	*Give it to him to drink!*
kʷ-k-a:s	*(he) who gives to drink*
kʷ-yo-pánṣ̌-χ	*He ran like him.*
kʷ-s-pánṣ̌-χ-kaʔa	*He will run like him.*
kʷ-t-pánṣ̌-χ	*Did he run like him?*
ko-m-pánṣ̌-χ	*He is running like him.*
ko-k-pánṣ̌-χ	*(he) who runs like him*
ko-ʔ-pánṣ̌-χ	*Run like him!*

The third person referent clitic is also ko- in imperative forms if the verb stem begins with a short low vowel. By regular morphophonemic rules, the intermediate forms on the left in (52) result.

(52) imperative

kó:-mxk	*Take it to him/her!*	< ko-ámxk
an kó:-ṣ̌kim	*Come in!*	< an ko-áṣ̌kim
kó:-taχ	*Go like a ...!*	< ko-átaχ

A special rule will be needed to handle the alternation between kʷ and ko in this morpheme.

The segment χʷ is also generated directly by a morphophonemic rule. When a prefix ending in o precedes a (long or short) o, the vowels coalesce and become short a if and only if the verb is intransitive. (Otherwise, the prefix vowel deletes.)

(53)

stem	po- (dep fut)	yo- (past)	t- (interr)	gloss
-otx	pátx	yátx	tótx	*arise*
-o:s	pás	yás	tó:s	*sing*
-o:poł	pápoł	yápoł	tó:poł	*be black*

The rule describing this process could be summarized as (54).

(54) Vowel Coalescence:

$$\underset{1}{\overset{V}{\begin{bmatrix}+\text{bac}\\-\text{lo}\end{bmatrix}}} + \underset{2}{\overset{V}{\begin{bmatrix}+\text{bac}\\-\text{lo}\end{bmatrix}}} \Rightarrow \underset{1}{\overset{V}{\begin{bmatrix}+\text{lo}\\-\text{lng}\end{bmatrix}}} \ \underset{2}{\emptyset} \ / \ \underline{\quad}\ ]_{V\ \text{intr}}$$

When the prefix χo- (emphatic) is added to these stems, coalescence takes place and in addition the χ becomes χ^w. The emphatic forms of the verbs above are: χ^wátx, χ^wás, and χ^wánš̥χ. The rule describing this rounding could be written as (55).[7]

(55) χ-Rounding: $\chi \rightarrow [+rd] \; / \; \_\_ \; \begin{matrix} V \\ \begin{bmatrix} +bac \\ -lo \end{bmatrix} \end{matrix} + \begin{matrix} V \\ \begin{bmatrix} +bac \\ -lo \end{bmatrix} \end{matrix} \; // \; \_\_ \;]_{V\ intr}$

There is another rule that generates intermediate k^w. When k follows W, they coalesce to become k^w.

(56) Coalescence II: $\begin{matrix} W & k & \Rightarrow & \emptyset & [+rd] \\ 1 & 2 & & 1 & 2 \end{matrix}$

In the following derivation (which goes to an intermediate level), another (syntactico-phonological) rule applies which deletes x when it precedes k in singular punctiliar forms; I call this the x-Rule.

(57) *burst*	sing punct	sing iter
UF	/k-mápoxk/	/k-mápoxk-tim/
x-Rule	kmápok	------------
Syncope (41)	kmápWk	------------
Coalescence II (56)	kmápk^w	------------
t-Deletion (37)	------	kmápoxkim
	kmápk^w	kmápoxkim

In the following verb, the x-Rule applies in the singular punctiliar form but not in the plural punctiliar form and is therefore the underlying cause of the surface contrast. (The plural punctiliar morpheme is -Ø for this verb.)

(58) *be vertical*	sing punct	sing iter	plur punct
UF	/k-ó:?oxk/	/k-ó:?oxk-tim/	/k-ó:?oxk/
x-Rule	kó:?ok	------------	--------
Syncope (41)	kó:?Wk	------------	kó:?Wxk
Coalescence II (56)	kó:?k^w	------------	-------
t-Deletion (37)	------	kó:?oxkim	-------
Rounding (28)	------	---------	kó:?W$x^w k^w$
C Length (5)	------	kó:?:oxkim	---------
V Length (10)	------	kó:?:o:xkim	---------
Diphthong (31)	------	-----------	---------
Offglide	kó:?k^W	-----------	kó:?Wx̬k^W
x-Deletion (46)	------	-----------	kó:?Wk^W
	[kó:?k^W]	[kó:?:o:xkim]	[kó:?Wk^W]

As I have said, there are very few occurrences of W that cannot be accounted for. One outstanding example is the verb k-aWáṣ̌p *be crushed; crush*. In spite of such words, the preceding analysis seems to be well-motivated and probably historically valid as well.

3. Nasalization. Moser and Moser (1965:55) noted that "nasalization is restricted to vowel nuclei preceded by /k^w/." Nasalized vowels are derived by three rules: two that lenite m to w̃, and one that subsequently nasalizes the vowel or vowels that follow this nasal glide.[8] The rules are given informally and illustrated below.

(59) Nasal Lenition I: $m \rightarrow \tilde{w} \;/\; k^w$ __ (Pause-bounded)

(60) Nasalization: $V \rightarrow [+nas] \;/\; \begin{bmatrix}-cns\\ +nas\end{bmatrix}$ __ (left to right iterative)

(61) ktámk^w mó-k-a-t koi → [ktámk^ww̃ṍk:a:t]
men toward-NOM-move-PLUR the

the men who are coming

k^w-m-atíkpan → [k^ww̃ãtíkpan]
3R-PERF-work

he is working with him

tok kʷ-mí:-s̥kam → [tokʷw̃ĩ:s̥kam]
there 3R-PERF-[arrive-PLUR]

they arrived there

(62) Nasal Lenition II: m → w̃ / k __ (Word-bounded)

(63) k-mám → [kw̃ã́m] *that which is cooked*
NOM-[be cooked]

k-m-atíkpan → [kw̃ã́tíkpan] *Don't work!*
IMP-NEG-work

kmíke → [kw̃ĩ́k:e] *person; Seri*
person/Seri

i?-sk-m-á:i-a?a → [i?skw̃ã:ĩã?a] *I shouldn't do it.*
1SUB-FUT-NEG-do-CLITIC

ták-+k pak mó-k-a-t-i?a → [ták+kpakmók:a:ti?a]
porpoise-PLUR-some toward-NOM-move-PLUR-DECL

Some porpoises are coming.

The switch-reference marker /ma/ seems to be optionally cliticized to the verb by some speakers, in which case it undergoes (62); otherwise it does not.

(64) t-?ámok(=)ma → [t?ám:o:kw̃ã] ~ [t?ám:o:kma]
DP-night SCP

when it is night

Rules (59) and (62) are bled by a rule that epenthesizes an o when a [-labial] consonant is followed by a nasal and another consonant; for example, k-m-páns̥-χ (IMP-NEG-run) becomes kompáns̥χ *Don't run!*.

Moser and Moser caught these changes as they were spreading through the lexicon and the speech community and contrasted forms to which the rules had applied with forms to which the rules had not yet applied; therefore they considered nasalization phonemic, although considerable alternation was noted. Since then, the rules have generalized to the entire lexicon for younger speakers although older speakers continue to not lenite m in certain words.

4. Process affecting /m/. An m that follows an unstressed vowel assimilates to the general point of articulation of a consonant that follows it.[9] Thus an m becomes n (dental) before dentals, alveolars and palatals, and ŋ before velars and back velars; it remains m elsewhere.[10] (When a nasal precedes a glottal stop in a word, the two segments metathesize. When the glottal stop is in the following word, metathesis may occur in casual speech.) Since according to E. Moser (personal communication) the nasal is dental and not palatal before y, the rule is somewhat

difficult to state formally.

(65) m-Assimilation: $\underset{\begin{bmatrix}\text{+nas}\\ \text{-cor}\end{bmatrix}}{\text{C}} \rightarrow \begin{bmatrix}\alpha\text{bac}\\ -\alpha\text{ant}\\ -\alpha\text{cor}\end{bmatrix} \;/\; \underset{[\text{-str}]}{\text{V}} \;\_\_\; \begin{bmatrix}\text{-syl}\\ \alpha\text{bac}\\ \beta\text{ant}\\ \beta\text{cor}\end{bmatrix}$ (Pause-bounded)

The effect of this rule is illustrated by the following data.

(66) i-m-á: → [imá:] *who is not grinding grain*

i-m-pí: → [impí:] *who is not tasting it*

i-m-sí: → [insí:] *who is not smelling it*

i-m-yá: → [inyá:] *who does not own it*

i-m-ká: → [iŋká:] *who is not looking for it*

kmíke ktám i-kanóa: k-tápo+k-im ki? yó:-fp
person male 3POSS-boat NOM-[be broken] the PAST-arrive

[kw̃ík:e: ktám: ikanóa: ktáp:o:+kiŋ ki? yó:fp]

The man whose boat is broken arrived.

The phoneme /n/ never assimilates to labial or velar points of articulation.

(67) s-ó:-men-ka?a → [só:m:e:nka?a] *He will winnow.*

Some morphemes do not have allomorphs with m; one example is komká:k [koŋká:k] *people; Seris.* Old word lists indicate that this word was once pronounced [komká:k]. Pinart (1879) and and Bartlett (1852) both give komkak. McGee (1894), however, gives kuⁿ-kak. For tomkox kʷ-k-í:? [toŋkox kʷkʷí:?] *seven*, Pinart gives tomkaχkue, and Pimentel (1875) gives tomkujkcui. For komkái: [koŋkái:] *old woman*, however, McGee gives kŭnkai'e and Pimentel konkabre.

Backing. Another rule generating ŋ is characteristic of younger speakers. By this rule an m following an unstressed vowel becomes ŋ when it occurs before pause. This rule could be stated as (68). It does not apply to n.

(68) Backing: $\underset{\begin{bmatrix}\text{+nas}\\ \text{-cor}\end{bmatrix}}{\text{C}} \rightarrow \begin{bmatrix}\text{+bac}\\ \text{+hi}\end{bmatrix} \;/\; \underset{[\text{-stress}]}{\text{V}} \;\_\_\; \|$

Thus k-á:i-tim *do (sg. iter., nom.)* is often pronounced [ká:itiŋ].

Influence of secondary stress. The assimilation and backing rules are blocked by secondary stress which is assigned by two rules. The first rule assigns secondary stress to a vowel following a vowel with primary stress. (I will discuss primary stress placement later.)

(69) $V \rightarrow [2\ \text{stress}]\ /\ \begin{matrix} V \\ [1\ \text{stress}] \end{matrix}$ ___

Therefore s-á:om-ka?a becomes [sá:òmka?a]; m-Assimilation (65) does not apply. Secondary stress does not condition Consonant or Vowel Lengthening: ká:om-i?a → [ká:òmi?a]. (Therefore these rules need to be rewritten with [1 stress] as the feature on the stressed vowel.)

Secondary stress is also generated during compound word formation. In compound words the stress on the first member of the compound is reduced. (The loss of vowel length will be discussed later.)

(70)	χó:p	*Bursera microphylla*
	í-nɨ	*its fingers*
	χòpínɨ	*Bursera hindsiana*

There are many other words that obviously are compound words although they may have undergone further phonological change, most notably a loss of consonant or vowel in a cluster.

(71)	χépe	*sea, tide*
	ano	*in*
	ká:y	*horse*
	χèpenoká:y	*mythological sea creature*
	k-ákʷɨ	*(they) who are big*
	χòpkákʷɨ	*Bursera laxiflora*
	χpaná:ms	*seaweed*
	χpanàmsákʷɨ	*sargassum*

It should be noted that in words such as χpanàmsákʷɨ in (71) the m follows a vowel with secondary stress and so does not assimilate to the following consonant. It is expected that as the internal structure of compound words becomes more opaque, the m-Assimilation rule will apply. A possible example pointed out to me by M. Moser is the initial unanalyzable sequence in the words in (72).

(72)	χomka?í:ft	→	[χoŋka?í:ft]	*oregano bush*
	χomka?óix	→	[χoŋka?óix]	*Opuntia reflexispina*
	χomχẹ́ṣ̌iṣ̌	→	[χoŋχẹ́ṣ̌iṣ̌]	*ocotillo*

The last word in (72) has a variant in the idiolect of at least one speaker: moχẹ́ṣ̌iṣ̌.

<u>Exceptions to m-Assimilation</u>. There are a few interesting exceptions to the assimilation rule. Phrases that serve as demonstratives are composed of a locative plus an article. The underlying form of *there* is seen in the data in (73).

(73) ?im i-t-ákatχ ma *leaving it there*
there TR-DP-leave SCP

This locative combines with the definite articles (which are derived historically from various verbs (cf. Moser 1977) to form demonstrative adjectives and pronouns; these demonstratives are stressed on the locative morpheme.

(74) ?ím-intika tok ko-ntí-k-a → [?ímintikatokontík:a]
[that one] there 3R-away-NOM-move

There he goes.

ktám ?ím-kop → [ktàm?íŋkop]
man [that]

that man (standing)

Obviously the problem is that the m has assimilated to the velar point of articulation even though the preceding vowel is strongly stressed. These demonstratives are also unusual in that they are exceptions to Consonant and Vowel Lengthening: the form ?ímintika is phonetically [?ímintika]. The aberrant pattern of these forms might be accounted for by positing a special late (phrase?) stress rule for them.

<u>Special m-Assimilation</u>. A final rule that applies uniquely to the commonly used verb -o:m *lie, be prone* is given as (75).

(75) Special m-Assimilation:

$$\underset{\begin{bmatrix}+\text{nas}\\-\text{cor}\\-\text{bac}\end{bmatrix}}{C} \rightarrow \begin{bmatrix}\alpha\text{bac}\\-\alpha\text{ant}\\-\alpha\text{cor}\end{bmatrix} / \_\_ \underset{\begin{bmatrix}\alpha\text{bac}\\\beta\text{ant}\\\beta\text{cor}\end{bmatrix}}{C} \quad \text{(Pause-bounded)}$$

Condition: This rule applies only to the verb -o:m *lie, be prone*.

(This verb cannot be interpreted as having a vowel cluster as its nucleus since it undergoes Consonant and Vowel Lengthening.) Compare the following forms.

(76)

lie	*swallow (intr.)*	
-o:m lie	-o-am INTR-swallow	
[kó:m:i?a]	[kó:m:i?a]	*He is ....*
[kó:nya]	[kó:mya]	*Is he ...?*
[só:ŋka?a]	[só:mka?a]	*He will ....*

Alternatively, the verb -o:m *lie, be prone* could be marked as a positive exception to m-Assimilation (65).

There are two remaining occurrences of [ŋ] that cannot or should not be handled by any of the above rules: the verb *to speak wrong* [k-aʔíoŋ], [k-aʔíoŋ-tax] (plural) and the name of a certain species of duck [któ:ŋk], which is obviously onomatopoetic.

5. The chameleon consonant. There are approximately twenty verbs which exhibit a peculiar variety of allomorphy. In order to effectively demonstrate the superficially irregular behavior of these verbs, I will briefly sketch the more typical morphophonemic changes that occur with prefixation in Seri.

Consonant-initial stems are relatively straightforward. (Finite verb forms are cited with third person subject, unmarked in Seri, and third person object (where applicable), also unmarked. Singular punctiliar stems will be used throughout.)

(77)	Subject Nominalized	Interrogative	Future	Past
	k-	t-	si-	yo-
-meke *be lukewarm*	k-méke	t-méke	s-méke	yo-méke

The i of the future prefix /si-/ (and certain other morphemes) deletes by an early rule that is irrelevant here.

Vowel-initial verb stems may be divided into the following types based primarily on the quality and length of the vowel: those beginning with (a) a short low vowel, (b) a high back vowel and the verb is intransitive, (c) any other vowel. The forms below illustrate type (a).

(78)	k-	t-	si-	yo-
-anx *roar*	k-ánx	t-ánx	sí:-nx	yó:-nx

Notice that the stem vowel deletes and the prefix vowel, which now carries the stress in the future and past forms, is lengthened. The following forms illustrate type (b).

(79)	k-	t-	si-	yo-
-otx *arise*	k-ótx	t-ótx	s-ótx	yátx
-o:ʔa *cry*	k-ó:ʔa	t-ó:ʔa	s-ó:ʔa	yáʔa

Notice that the prefix vowel i deletes, but the prefix vowel o coalesces with the stem vowel to yield short a. The following forms illustrate verbs of type (c). (The prefix /-i-/ is a transitive marker.)

(80)	k-	t-	si-	yo-
-a:npχ *return home*	k-á:npχ	t-á:npχ	s-á:npχ	y-á:npχ
-o:n *carry*	k-ó:n	i-t-ó:n	i-s-ó:n	i-y-ó:n
be seated *be seated*	k-í:x	t-í:x	s-í:x	y-í:x
-itχł *become pieces*	k-ítχł	t-ítχł	s-ítχł	y-ítχł

As with previous data, rules are formulable to express the alternations and deletions seen in these forms, but these are not germane to our discussion. It is only important to notice the types of changes that occur with vowel-initial stems.

Many verbs may be used transitively or intransitively, in which case the intransitive form requires the intransitive marker /-o-/. This morpheme occurs directly before the stem and often coalesces with the stem vowel to yield yet additional allomorphs, some of which are given in (81). The transitive forms require the transitive marker (as do all transitive verbs in Seri); this marker follows the subject nominalizer, usually deleting by one of various rules, and otherwise occurs only preceding a finite verb that has third person subject and object, as do the forms in (81).

(81)	k-	t-	si-	yo-
-sanx	k-sánx	i-t-sánx	i-s-sánx	i-yo-sánx
carry child	k-o-sánx	t-o-sánx	s-o-sánx	ya-sánx
-am	k-í-m	i-t-ám	i-sí:-m	i-yó:-m
swallow	k-ó:-m	t-ó:-m	s-ó:-m	yá-m
-i:p	k-í:p	i-t-í:p	i-s-í:p	i-y-í:p
carry on head	k-é:p	t-é:p	s-é:p	y-é:p

I will now present some forms of verbs that do not at all pattern like the majority of the verbs in Seri.

(82)	k-	t-	si-	yo-
play violin	k-ké:nx	i-t-té:nx	i-s-sé:nx	i-yo-é:nx
	k-o-é:nx	t-o-é:nx	s-o-é:nx	yo-é:nx
be shiny	k-kámWx	t-támWx	s-sámWx	yo-ámWx

The allomorphs of verbs such as those in (82) are not predicted by any rule that has been posited above.

An abstract analysis. An abstract analysis of these stems would posit an abstract 'chameleon' consonant as the initial segment of the verb stems in (82); I will use the symbol Q for this segment. Only two simple rules would be needed; these are given as (83) and (84). An illustrative derivation is given in (85).

(83) $Q \rightarrow C_i \;/\; \underset{[+cns]}{C_i}$ __

(85) $Q \rightarrow \emptyset \;/\; [-cns]$ __

(86)		t-QámWx	yo-QámWx
	(83)	ttámWx	--------
	(84)	------	yoámWx
		ttámWx	yoámWx

The imperative forms of Q-verbs illustrate the reason why rule (85) deletes Q after non-consonantal segments rather than after vowels alone.

(87) ¡?-é:nx *Play it (violin)!* < ?-Qé:nx

Negative forms of Q-verbs, as well as other forms, are consistent with this analysis.

(88) yo-m-mámWx *It wasn't shiny.*
PAST-NEG-[be shiny]

These verbs must be marked [Label Preceding Morpheme -Coalescence (54)] to prevent the application of the rule of coalescence that applies in the derivation of yasánx from underlying /yo-o-sánx/ (see (81)). From underlying /yo-o-Qé:nx/, the surface form yoé:nx results rather than yaé:nx or yée:nx as would otherwise be expected. Additional evidence for claiming that these verbs are consonant-initial will be presented below.

Causative prefix. The causative prefix in Seri has several suppletive allomorphs whose distribution is determined primarily by the phonological shape of the following morpheme. (There are a few additional data that do not correlate with the following characterization of the distribution but which do not affect the argument presented below.)

The causative prefix is /-a-/ when followed by a consonant as in (89).

(89) -pokt *be full* -a-pokt *fill*

The prefix is /-ak-/ when followed by a short low vowel or the intransitive morpheme as in (90).

(90) -anox *burn (intr.)* -ak-anox *burn (tr.)*

-o-amχ (>-o:mχ) *say (intr.)* -ak-o-amχ (>-akó:mχ) *denounce, accuse*

The prefix is /-a?-/ when followed by a stem vowel that is not a short low vowel as in (91).

(91)	-i:pe	*be good*	-a?-i:pe-t	*fix*
	-a:npχ	*return home*	-a?-a:npχ	*return (something)*
	-iχpχax	*quiver*	-a?-iχpχax	*shake (tr.)*

The allomorph /-a-/ is also used with a small set of verbs that are not consonant-initial and which must therefore be specially marked to take this form of the causative morpheme.

(92) -a?it *eat* -a-a?it *feed; fish*

There are two more allomorphs that occur with a small number of verbs: /-k-/ as in (93) and /-k-/ plus an ablaut rule (an abstract analysis of this allomorph is also possible) as in (94).

(93)	-aš̥χ	*be torn*	-k-aš̥χ	*tear*
(94)	-i:tixk	*drip*	-k-e:txk	*cause to drip*

What is important to note is that the allomorph that occurs with consonant stems is /-a-/, although this allomorph also occurs with a few other verbs, as stated above. This allomorph is the one that occurs with Q -verbs, which fact would follow unsurprisingly from the analysis of these verbs as having consonant-initial stems.

(95)	-Qi?ʷx	*be red*	(as in k-kí?ʷx)
	-a-Qi?ʷx	*make red*	(as in k-á-i?ʷx)

Infinitive. The infinitive prefix in Seri also has several suppletive allomorphs. The infinitive morpheme is /ika-/ when the verb is intransitive, the a often deleting by regular phonological rules.

(96)	ikaméke	*to be lukewarm*	(< ika-méke)
	iké:χʷ	*to jump (intr.)*	(< ika-o-íχʷ)

The allomorph /i?-/ plus an ablaut rule occurs when this morpheme is followed directly by a transitive verb that begins with a high vowel. (Again, an abstract analysis of this allomorph is possible.)

(97)	i?é:χʷ	*to jump across*	(< i?-íχʷ)
	i?ákta	*to look at*	(< i?-ó:kta)
	i?é:	*to hear*	(< i?-i:)

The allomorph /i?a-/ occurs elsewhere.

(98) iʔáṣ̌iχ *to cut* (< iʔa-áṣ̌iχ)

iʔapí: *to taste* (< iʔa-pí:)

The allomorph that occurs with consonant-initial transitive verbs, therefore, is /iʔa-/, which also occurs with Q-verbs that are transitive, such as (99)

(99) -Qí: *feel* iʔái: *to feel*

Note that if this verb began with a high vowel, it would have been expected to take the /iʔ-/ plus ablaut allomorph of the infinitive.

i-Epenthesis. There is a late phonological rule that inserts i as follows (simplified slightly).

(100) $\emptyset \rightarrow i \;/\; \left\{\begin{matrix} \| \\ C \end{matrix}\right\} (\#\#) \;\_\_\; \left\{\begin{matrix} ʔ \\ C \\ [+nas] \end{matrix}\right\} C$

Condition: Word-bounded.

(101)	/m-t-áʔo/ 2SUB-INTER-see	→	imtáʔo	*Did you see him?*
	/ktám kʔ m-t-áʔo/ man the	→	ktám kʔ imtáʔo	*Did you see the man?*
	/áṣ̌-ya m-t-áʔo/ what-INTER	→	áṣ̌ya mtáʔo	*What did you see?*

One allomorph of the imperative morpheme is /ʔ-/ and it often provides the environment for this Epenthesis rule.

(102) ʔ-í:m *Sleep!*

iʔ-pí: *Taste it!*

Note that this rule has applied in the following forms.

(102) iʔíṣ̌o *Lift it!* (< ʔ-Qiṣ̌o)

iʔótṣ̌ *Suck it!* (< ʔ-Qotṣ̌)

These forms can be explained by ordering the Q-Deletion rule after i-Epenthesis.

Other evidence. On the basis of the allomorphs of the passive morpheme, the third person referent clitic, and the action nominalizer, other evidence of the type presented in the paragraphs above could be developed. Since the arguments would be essentially identical, however, I will not present this evidence here.

A concrete analysis. A concrete analysis would, of course, claim that the verbs under consideration do not begin with an abstract consonant. One concrete solution would be to choose one of the allomorphs beginning with a consonant, say -tamWx or -kamWx, and mark the stem-initial consonant to undergo special assimilation and deletion rules that unmarked consonants do not undergo. This alternative does not seem to be well-motivated because there is no basis for choosing one consonant over another and rules parallel to those in the abstract solution would be necessary. Also, this solution would 'predict' that should these verbs be regularized in a reanalysis by the speakers of the language, they will emerge as t-initial or k-initial stems. I do not know of any evidence at present in support of this claim.[12]

Another concrete solution would be to posit the vowel-initial allomorph as underlying and mark the verb in the following way: [Label Preceding Morpheme +Special Consonant Lengthening]. Special Consonant Lengthening would be a minor rule, given as (103).

(103) $\underset{[+cns]}{C} \rightarrow [+lng] \ / \ \_\_ +_{Vs}[$

(104)		t-ámWx	yo-ámWx
	(103)	ttámWx	-------
		ttámWx	yoámWx

These verbs would also have to be marked in an ad hoc fashion to take the various allomorphs of the morphemes such as causative, imperative, and passive. In the case of the causative prefix, this is not without precedent since it has been seen that there is already at least one ad hoc class that takes the /-a-/ allomorph. There is also a need to distinguish the behavior of these verbs with regard to the prefix vowels from that of the regular verbs shown in (78) - (81). Compare again the forms in (105).

(105)	-anx	*roar*	yó:-nx
	-(Q)amWx	*be shiny*	yo-ámWx
	-i:	*hear*	i-y-í:
	-(Q)i:	*feel*	i-yo-í:

The 'irregular' verb would have to be marked [Label Preceding Morpheme -Vowel Deletion].

A more difficult problem is presented by the i-Epenthesis rule. The rule would have to be amended to allow epenthesis before long consonants unless of course the lengthening rule (103) were rewritten as a gemination rule. These verbs are still positive exceptions to this rule when the prefix is /ʔ-/ since the environment for the application of the rule does not exist and yet the rule (seemingly) applied. One might suggest that rule (103) should be revised to say that any consonant lengthens, including glottal stop; after applying i-Epenthesis one could apply a rule shortening long glottal stops. I do not know whether clusters arising from prefixing the imperative morpheme to Q-initial stems surface as long or short glottal stops; therefore, the crucial data on this question are missing.

Comparing solutions. The abstract analysis is forced to posit an underlying segment to which it can assign no definite phonetic feature except [-syl]. This solution quite neatly explains some otherwise rather bizarre allomorphy. One problem is that it implies that Q-verbs are regular verbs except for this abstract consonant. We have seen that this is not the case, however, since these verbs must be specially marked so that the rule coalescing prefix vowels (rule (54)) does not apply to them. To avoid abstractness the concrete solution must add several ad hoc features to the verbs and it is not certain that it can adequately handle all of the facts. The proposal raises some questions, nevertheless, that will require further research.

Is the chameleon consonant /w/? Although a synchronic analysis of Seri does not give many clues concerning the phonetic nature of the chameleon consonant, the questioning of a sixty-year-old speaker of Seri revealed that the word k-kí?Wx (< k-Qí?Wx) used to be pronounced kwí?Wx, and ttí?Wx used to be pronounced twí?Wx. This evidence suggests that Q is actually /w/. It should be noted that Seri does not have a phoneme w at the taxonomic level.

6. Laterals. The segments l and ɬ (voiceless lateral fricative) merit comment. Words with the voiced lateral are rarely found in contemporary Seri (M. Moser, personal communication) and are typically place names or words in which voiced and voiceless l alternate, the variant with ɬ definitely being more common. At this point we would not know if an earlier contrast has been basically neutralized or if the voiceless lateral originated as a variant of the voiced lateral. The old word lists seem to indicate that the voiceless lateral existed in the late 19th century because the transcriptions waver on the manner in which to transcribe it.

(106)	Present	McGee	Bartlett	Pinart	Pimentel
blue/green	k-óiɬ	kóil^{qlh}	kovilch	kovül̃X'	kobslh
yellow	k-másoɬ	mossol^{qt}	k'masol	kmassol̃X'	kmozol
black	k-ó:poɬ	kópolt	kopolcht	kopoX'l	jikopohl
head/hair	?a-ɬít	a^{h}leht	ih'lit	ill'it	

Therefore there is no evidence that the voiceless lateral is a contemporary innovation. What is true, however, as native speakers have remarked, is that the almost complete replacement of l by ɬ has occurred within the last two generations.

7. Vowels. With respect to the vowel system, I feel that it is necessary to posit underlying long vowels in contrast with short vowels, but this contrast is found almost exclusively in the environment of stress.[13] (Likewise, vowel clusters are found almost exclusively in the environment of stress.) I will present evidence that these are long vowels and not geminates.

Prefix vowels delete before long vowels, as shown in (107).

(107) po-á:npx → pá:npx *if/when he returns home*
DF-[return home]

Prefix vowels do not delete before short low stem vowels. Instead the stem vowel deletes and the prefix vowel, which takes on the stress of the stem vowel, lengthens.[14]

(108) po-átaχ → pó:taχ *if/when he goes*
DF-go

Certain spell-out rules are sensitive to vowel length. To give but one example, the imperative prefix has an allomorph /k-/ that occurs only before the negative morpheme and before a stem whose initial vowel is a short low vowel, as shown in (109) below.

(109) k-m-ó:kta *Don't leave!*
IMP-NEG-[look at]

k-átaχ *Go!*
IMP-go

k-émen *Winnow it!*
IMP-winnow

Before long low vowels and certain other types of stems the allomorph /ʔ-/ is used.

(110) ʔ-á:i *Do it!*
IMP-do

ʔ-á:ši *Carry it away!*
IMP-[carry away]

Some surface occurrences of long vowels are derived from juxtaposed short vowels. One example is the form ká:pχʷɨ *(he) who causes to be brittle*. This is a derived form composed of the causative prefix /-a-/ plus the stem -apχʷɨ *be brittle*.

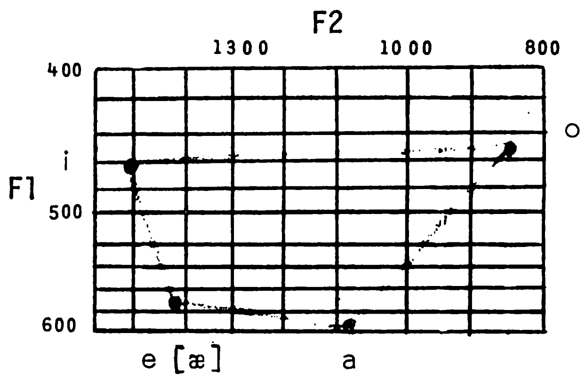
Long vowels tend to shorten when the primary stress is weakened. Thus pá:npx *if/when he returns home* becomes panpx when the word stress is weakened or lost. Moser and Moser (1965:56) give the example of an idiomatic expression composed of ná:pχa *red-headed buzzard* and -kím *throw at*; the expression is napχa k-kím and means *to have poor luck begging food*. Note that the loss (or reduction) of stress on ná:pχa results in the loss of vowel length.

This analysis of the vowels contrasts with that of Moser and Moser (1965: 55) who claimed that "sequences of two and three identical vowels are ... structurally analogous to sequences of diverse vowels" and so did not set up vowel length as phonemic; "long" vowels were analyzed as geminates.

Moser and Moser also claimed that the four vowels "contrast as to high and low and as to front and back (1965:55)." The correctness of this statement has been borne out by the way in which the vowels operate in spell-out and morphophonemic rules. The vowels i, i:, o and o: systematically function as non-low vowels and e, e:, a, and a: as low vowels. An initial study of the acoustic nature of these vowels has yielded the following results (disregarding length):

Average formants

	F1	F2
i	464	1502
o	450	843
a	594	1089
e	572	1419



8. Stress. Primary stress is predictable to a high degree, stress usually falling on the first vowel of the stem. It may be shifted by later rules to prefix vowels, however, as we have seen in (108) above.[15] Some verbs that do not fit into this pattern are the result of the reanalysis of prefix material. For example, there is a verb -kaiɨ *lack (tr.)*. Other transitive verbs may be passivized by adding the passive prefix and then nominalized by the prefix /ʔa-/; for example, ʔa-p-áʔit (NOM-PASS-eat) *that which is eaten, food*. The verb -kaiɨ, however, does not have a derived nominalized passive form ʔ-aʔ-káiɨ as would be expected. Instead a verb meaning *to be lacking* is used: -aʔkáiɨ. The nominalized form takes the subject nominalizer /k-/: k-aʔkáiɨ *(that) which is lacking*. Although this form cannot be derived synchronically from -kaiɨ, it is obvious that such was the case historically.

Not all verbs with stress on the second syllable of the stem are so easily analyzed. Compare the following forms.

(111) /-moṣíme/ *be drunk*

/-moképe/ *be sick*

/-motóman/ *be weak*

The significance of the sequence mo- is unknown.

There is more surface irregularity with nouns since many were probably compounds or derived nouns historically.

Moser and Moser (1965:56) claimed that stress was phonemic on the basis of the following type of data. My analysis is given on the right.

(112) ʔípχaʂ̌ *my nephew* /ʔi-apχaʂ̌/ → ʔi-ápχaʂ̌ → ʔí-pχaʂ̌

ʔipχáʂ̌ *our flesh* /ʔi-pχaʂ̌/ → ʔi-pχáʂ̌

9. Summary. In this paper I have attempted to clarify some of the low-level phonological processes operating in Seri. It has been shown that nasalization and ŋ are generated by some of these rules. I have also suggested that a more abstract source can be found for k^w, χk and W, and that the chameleon consonant is /w/. Evidence was given for a set of long vowels and the assignment of word stress was discussed. These revisions in the analysis of Seri should make comparative work between Seri and other Hokan languages more accurate just as they have aided in internal reconstruction.

FOOTNOTES

[1]I am deeply indebted to Mary B. Moser and the late Edward W. Moser for their guidance and encouragement, as well as many of the data on which this paper is based. M. Moser read the manuscript at various stages of preparation and prevented me from making many mistaken assertions; those that remain are my responsibility. I also thank Dr. Margaret Langdon for commenting on early drafts of this paper. Many of the data were taken from Moser 1961, Moser and Moser 1965, Moser and Moser 1976, field notes by Edward and Mary Moser, as well as notes from fieldwork that I did under the auspices of the Summer Institute of Linguistics.

The following abbreviations are used:

DECL	declarative clitic	PERF	perfect
DF	dependent future	pl, plur, PLUR	plural
FUT	future	POSS	possessive
IMP	imperative	punct	punctiliar
INTER	interrogative	R	referent clitic
intr	intransitive	SCP	subject-change-past
INTR	intransitive marker	SUB	subject
iter	iterative	sg, sing, SING	singular
NEG	negative	tr	transitive
nom	nominalizer	TR	transitive marker
NOM	nominalized		

The following brief characterization of the verb morphology may be helpful:

Finite verb forms:

(TR), SUB person, Tense, (NEG), (INTR), (Causative), (Passive), Root, Number/Aspect

Impersonal nominalized verb forms:

NOM, TR, (NEG), (INTR), (Causative), (Passive), Root, Number/Aspect, (Clitics)

The transitive marker occurs with all nominalized transitive verbs and with finite transitive verbs that have third person subject and object. The intransitive marker occurs with the (nominalized or finite) intransitive form of transitive/intransitive verb pairs regardless of subject or object person.

[2]A lengthened consonant is often 150-230 msecs. long in normal speech; lengthened vowels are 250-350 msecs. in length.

[3]Geminate vowels degeminate when a boundary other than a stem boundary (#) separates them. Sequences of identical vowels, which may occur morpheme internally, are realized as single surface segments, the lengths of which are a total of the individual units.

[4]This restriction on the stressed syllable nucleus is also required for the Vowel Lengthening rule below and the a-Infixation rule. Other similarities in the environments and conditions of these rules suggest that the lengthening of post-stress segments should be handled by a single process. I will not attempt to formulate such a rule, however.

[5]It is worthwhile quoting Moser and Moser (1965:54) concerning the phonetic quality of W:

> /W/ varies from lightly spirant to vocoid articulation.[6] After /k/ in any position or preceding a vowel or /y/, the lip rounding is released rather than sustained: kWšášni [kWṣášni] *species of plant*.... Elsewhere a variant [o̥] occurs: kaaW [ˈkáaoO] *species of bush*....

Footnote 6 is:

> The distribution of /W/ corresponds, in general, to that of both vowels and consonants.... Interpretation of this segment of /W/ rather than as /O/ yields simpler, more consistent morphophonemics, in that morphemes following /W/ take the shape which follows consonants and not vowels.

An example of the latter is the fact that the declarative clitic is /-ʔa/ following a vowel and /-iʔa/ following a consonant. Notice the following forms: ká:W *seep willow*, ká:Wiʔa *it is a seep willow*. The reader should note that I will be interpreting the "sequence" kW differently than Moser and Moser.

[6]There is no surface segment x^w generated by rule (42) because the sequence xW is apparently never generated by rule (41).

[7]It is obvious that the environment of rule (54) has been written into the environment of rule (55). The two rules might be collapsed as follows:

$$\underset{1}{\langle \chi \rangle} \; \underset{2}{\begin{matrix}\mathrm{V}\\ \begin{bmatrix}\mathrm{+bac}\\ \mathrm{-lo}\end{bmatrix}\end{matrix}} \; + \; \underset{3}{\begin{matrix}\mathrm{V}\\ \begin{bmatrix}\mathrm{+bac}\\ \mathrm{-lo}\end{bmatrix}\end{matrix}} \Rightarrow \underset{1}{\langle \mathrm{+rd} \rangle} \underset{2}{\begin{bmatrix}\mathrm{+lo}\\ \mathrm{-lng}\end{bmatrix}} \underset{3}{\emptyset} \; / \; \_\_\;]_{\mathrm{V\ intr}}$$

[8]According to M. Moser (personal communication) the glide is non-nasal in casual speech and so the following vowels are non-nasal also.

I do not know of any evidence for interpreting <u>kw̃</u> as the unit <u>kʷ</u> as was done in Moser and Moser 1965.

[9]I am indebted to Bob Reed for making the suggestion that led to this analysis.

[10]A dental nasal becomes an alveolar before [ʂ̌] and [tʂ̌] according to Moser and Moser 1965:55. They do not say whether [ŋ] is backed somewhat before [χ] and [χʷ], but I expect that this is the case.

[11]Syncope (41) applies to the singular punctiliar form in the derived verb.

[12]The following verbs have similar meanings; all involve the idea of *think*, with slight differences perhaps: -imoʂ̌, (pl. -imWk); -Qimoʂ̌, (pl. -QimWk); -amoʂ̌, (pl. -amWk). They are obviously related to ʔ-ámoʂ̌ (pl. ʔ-ámWk) *heart*. I am not certain what the implications of these data are.

[13]There are a few unstressed words with long vowels that are exceptions to this generalization: kma:χ *now, then*, and ʔa: *there* are examples.

[14]I do not believe that it is a case of the <u>a</u> assimilating to the prefix vowel because the nominalized forms of the verb undergo deletion as described above, but not lengthening.

/ʔi-∅-ataχ/	→	ʔítaχ	*my departure*
1POSS-NOM-go			

In order to capture the systematic difference between what is happening in the verbal forms and the nominalized forms, I have chosen to analyze these data as examples of vowel deletion in both cases and vowel lengthening in the verbal forms.

[15]There is a tendency (which I have not studied extensively yet) for <u>o</u> to desyllabify before another vowel; if the <u>o</u> is stressed the stress is shifted to the following vowel.

k-óatWx → [kóatW] ~ [ko̯átW] *sweet (sg. punct., nom.)*

ʔánt	ʔíʂ̌-ak	iti	k-ói:	koi	→ [ʔànt ʔíʂ̌ak iti kói: koi] ~		*(they) who*
land	this	on	NOM-live	the	[ʔànt ʔíʂ̌ak iti ko̯í: ko̯i]		*live here*

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