

Round vowel and dorsal consonant epenthesis in Seri

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*Recent work on markedness has claimed that round vowels and dorsal consonants are never epenthesized. However, Seri seems to present exactly these types of epenthesis. Relevant data are presented and discussed, and it is claimed that these rules are valid counterexamples that need to be taken into consideration more seriously.**

1. Introduction to the issue

Two questions among many that can be posed as a result of a study of markedness and cross-linguistic surveys are the following, posed by de Lacy (2006). One, can a language have a rule (or process) inserting a round vowel? And two, can a language have a rule (or process) inserting a velar consonant? The answers to both of these questions are negative, according to de Lacy. Consider the following quotations:

Regarding round vowels:

... [round] vowels cannot be epenthetic (factoring out interfering processes like round harmony ...) (p. 6)

Putting aside interferences from processes like vowel harmony and dissimilation, epenthetic vowels are always [-round] and may all be [-back]. (p. 209)

... the emergent influence of *[+round] will always result in an epenthetic unround vowel. (p. 300)

Regarding dorsal consonants:

... there is no language in which [k] is epenthetic ... (p. 15)

However, while markedness hierarchies conflict to a small extent, they often agree. Consequently, no ranking will ever produce epenthetic consonants like [k] and [p]. (p. 109)

It is therefore of interest when putative counterexamples come to light. As a matter of fact, de Lacy mentions a few potential counterexamples that he has found, including one of each from Seri (based on

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Marlett 1981, 1988). However, *pace* the conclusion of one of the reviewers of de Lacy's book (Nevins and Plaster 2008), it does not seem to me that these particular counterexamples are handled well. Because of the potential importance of the Seri examples, and because the data presented about them in Marlett (1981) was quite limited, and also because nearly thirty years have passed since the data were first discussed, I use this opportunity to present more data and to discuss the facts more adequately.¹ My conclusion, however, is that these data *do* constitute important counterexamples to de Lacy's claims.

The examples all come from conjugations of the verb, for which various kinds of representative examples are given in Appendices 1-4. The relevant verb structure is shown in Table 1, while mood prefixes for finite verbs are given in Table 2 in their proposed underlying forms. The underlying forms for non-finite verb prefixes are given in Tables 3-5. For more details, see Marlett (1981) and Marlett (in preparation).

Table 1: Relevant prefixes

-6	-5	-4	-3	-2	-1		
Indirect/Oblique - Object	Direct - Object	Subject	Mood -	Negative -	Passive -	STEM	
-6	-5	Imperative		-2		STEM	
-6	-5	Infinitive			-1	STEM	
-6	-5	(Poss.) -	Nominalizer -	(Trans.) -	-2	-1	STEM
							<i>Finite verb</i>
							<i>Imperative</i>
							<i>Infinitive</i>
							<i>Nominalization</i>

Table 2: Mood prefixes

Realis	Dependent t-
	Proximal mi-
	Distal jo-
	Emphatic χo-
Irrealis	Independent si-
	Dependent po-
	Subjunctive tm-

Table 3: Imperative prefixes

k- before Negative
k- before short "low" vowels
Ablaut when non-low vowel and intransitive
?- elsewhere

¹ Seri is a language isolate traditionally linked with Hokan, spoken in northwestern Mexico. For some general facts, see Marlett (2005) and the bibliography available at http://www.lengamer.org/admin/language_folders/seri/user_uploaded_files/links/File/bibliografia_seri/Bienvenido.html (accessed 2 August 2010).

Table 4: Infinitive prefixes

ika-	if clause is intransitive
i?a-	(plus ablaut) if clause is transitive

Table 5: Nominalizer prefixes

k-, ?a-, i-, etc.	Subject-oriented
o-, etc.	Direct Object-oriented
∅-, etc.	Proposition/Indirect/Oblique-oriented

These underlying forms given here have seemed to be straightforward and uncontroversial to me during the past thirty years. They are of course entirely eligible for a different analysis under different assumptions, as may be required to preserve the claims that de Lacy is making. The prefixes that end in the vowel /i/ are the least obvious since this vowel deletes in many circumstances. In the appendices, the key columns to note in this regard are F and P since the roots beginning with a short low vowel (/a/ or /ε/) interact crucially with the prefix vowel. Other details of verb conjugations are discussed in Marlett (1981), Marlett (in preparation) and Stemberger and Marlett (1983).

2. Round vowel epenthesis

Since one topic of this paper is vowel epenthesis, I first point out that of the four vowels in Seri (with respect to quality — /i/, /ε/, /o/, and /a/), three of them are (putatively) epenthesized in different contexts. The vowel /a/ is inserted in two highly specialized contexts, and I do not talk about this more here (but see note 6). An epenthetic /ε/ appears in a limited context, like the /a/, but is evidently the result of harmonization with another /ε/ in the word. The vowel /i/ arguably is the “default” vowel that is inserted to permit the syllabification of a stray sonorant consonant — both lexically (in some contexts) and postlexically.²

The epenthesis of /i/ is illustrated in (1)-(2) as well as A5-E5, J8-O8 in the appendices. In these examples the /i/ of the (so-called) Proximal Realis prefix /mi-/ drops out (as is usual before consonants and most vowels), motivating the insertion of a vowel for syllabification purposes. A syllable onset in Seri cannot be *Nasal-Consonant, *Approximant-Consonant, or *Glottal.Stop-Consonant. Invoking some version of the Sonorant Sequencing Principle (Selkirk 1984), we can say that syllable onsets in Seri cannot drastically decrease in sonority as one moves toward the nucleus (Marlett 1988:251).³ An /i/ is inserted in (1a-c) word-internally before the nasal consonant. Likewise, an /i/ is *sometimes* inserted word-initially, as in (1a, c). It depends on whether there is a vowel in the preceding word that can syllabify with this word. If not, then the vowel /i/ is inserted — this is why this vowel is parenthesized.

² An /i/ is also inserted lexically after certain codas, appearing there even if a vowel-initial morpheme follows the coda. See Marlett (1988:272).

³ Actually, the rule is more phonologized since epenthesis is required when a nasal is followed by a the approximant /j/, as in C5 in Appendix 1. This shows that the epenthesis cannot be completely motivated by the Sonority Sequencing Principle.

(1)	Underlying	Broad	Narrow
a.	{ʔp-mi-panʃχ}	/iʔpim ¹ panʃχ/	[[iʔpim ¹ panʃχ]
	1Sg.Subject.Intransitive-Proximal-run		
b.	{m-mi-panʃχ}	/mim ¹ panʃχ/	[mim ¹ panʃχ]
	2Sg.Subject-Proximal-run		
c.	{mi-panʃχ}	/i)m ¹ panʃχ/	[[i)m ¹ panʃχ]
	Proximal-run (3Sg subject is unmarked)		

The data in (2) show similar facts using a transitive verb, but there are two things to notice. First, if there is a sequence of glottal stop followed by a nasal consonant, the word-medial epenthesis does not take place but rather the nasal is pronounced as a syllabic. Second, the initial /i/ in words like (2c) and (2f) are not epenthetic but rather an actual morpheme — the marker of third person subject acting on third person direct object.

(2)	Underlying	Broad	Narrow
a.	{ʔ-mi-pii}	/iʔm ¹ pii/	[[iʔm ¹ pii]
	1Sg.Subject.Transitive-Proximal-taste		
b.	{m-mi-pii}	/mim ¹ pii/	[mim ¹ pii]
	2Sg.Subject-Proximal-taste		
c.	{i-mi-pii}	/im ¹ pii/	[im ¹ pii]
	3:3-Proximal-taste [= J5]		
d.	{ʔ-mi-kaa}	/iʔm ¹ kaa/	[[iʔm ¹ kaa]
	1Sg.Subject.Transitive-Proximal-look.for		
e.	{m-mi-kaa}	/mim ¹ kaa/	[mim ¹ kaa]
	2Sg.Subject-Proximal-look.for		
f.	{i-mi-kaa}	/im ¹ kaa/	[im ¹ kaa]
	3:3-Proximal-look.for [= L5]		

With that background in place, I now turn to examples where I have claimed that an /o/ is epenthesis. One formulation of the rule is given in (3). I propose a slight simplification a bit later in this paper.

(3) o-Epenthesis:

C ¹	C	C	where C ¹ is not part of a person prefix
	[+son]		
↑			
o			

This formulation uses the feature [sonorant], which obviously suggests that the rule is also related to the Sonority Sequencing Principle. A sequence of obstruents in this position in a word does not trigger epenthesis, as shown by the data in (4). These data are relevant if one accepts the claim made in Marlett (1988:268) that the onset is maximized in a stressed syllable.

(4)	{i-t-ʃkoomt}	/i ¹ tʃkoomt/
	3:3-Dependent Realis-appreciate.PI	

As it turns out, the only consonant that appears in the sonorant position in (3) happens to be a nasal consonant, and it is usually a prefix, most commonly the negative prefix. See the data in (5) where an epenthetic /o/ appears before the negative prefix.

(5)	Underlying	Broad	Narrow
a.	{t-m-kap}	/tom ¹ kap/	[toŋ ¹ kap]
	Dependent.Realis-Negative-fly [= A15]		
b.	{si-m-kap}	/som ¹ kap/	[soŋ ¹ kap]
	Independent.Irrealis-Negative-fly [= A13]		
c.	{k-m-kap}	/kom ¹ kap/	[koŋ ¹ kap]
	Imperative-Negative-fly [= A17]		
d.	{si-m-p-aʔit}	/som ¹ paʔit/	[som ¹ paʔit]
	Independent.Irrealis-Negative-Passive-eat		

The data in (6) remind us of the fact and illustrate the fact that if there is no consonant before the nasal, epenthetic /i/ appears instead of an /o/.

(6)	{mi-kap}	/(i)m ¹ kap/	[(i)ŋ ¹ kap]
	Proximal.Realis-fly [= A5]		

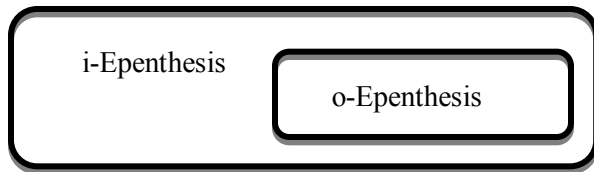
As shown in (7), the same epenthetic /o/ appears before the root √msisiin ‘pitiful, etc.’. The infinitive form in (7d) is crucial for showing that the root does not contain an /o/ — o-initial roots do not conjugate like this. One root begins with /m/ followed by a consonant: √msisiin ‘pitiful, pitiable, cute, adorable’. (Compare the causative stem: √a-msisiin ‘love’.)

(7)	Underlying	Broad	Narrow
a.	{t-msisiin}	/toms ¹ siin/	[toms ¹ siin]
	Dependent.Realis-pitiful		
b.	{po-msisiin}	/poms ¹ siin/	[poms ¹ siin]
	Dependent.Irrealis-pitiful		
c.	{si-msisiin}	/soms ¹ siin/	[soms ¹ siin]
	Independent.Irrealis-pitiful		
d.	{ika-msisiin}	/ikams ¹ siin/	[ikams ¹ siin]
	Infinitive.Intransitive-pitiful		
e.	{k-msisiin}	/koms ¹ siin/	[koms ¹ siin]
	Subject.Nominalizer-pitiful		

The examples in (8) illustrate the fact that if the first consonant of the three consonant sequence is a person prefix, we get an epenthetic /i/ (8a-b) or a syllabic nasal (8c-d) rather than an epenthetic /o/.

(8)	Underlying	Broad	Narrow
a.	{ʔp-mi-kap}	/(i)ʔpim ¹ kap/	[(i)ʔpiŋ ¹ kap]
	1Sg.Subject.Intransitive-Proximal-fly		
b.	{m-mi-kap}	/mim ¹ kap/	[miŋ ¹ kap]
	2Sg.Subject-Proximal-fly		
c.	{ʔ-mi-kaa}	/(i)ʔm ¹ kaa/	[(i)ʔŋ ¹ kaa]
	1Sg.Subject.Transitive-Proximal-look.for		
d.	{ʔ-mi-pii}	/(i)ʔm ¹ pii/	[(i)ʔm ¹ pii]
	1Sg.Subject.Transitive-Proximal-taste		

I suggest that the odd condition about the person marker might be better viewed as an indication of the domain of the rules in question — a case of layered morphology. Both rules are motivated by questions of sonority and syllabification and hence are both phonologically motivated. But the rule of o-Epenthesis pertains to the inner layer of morphology while the rule of i-Epenthesis pertains to the outer layer of morphology, as illustrated by Figure 1. (Person inflection would be outside of the domain of o-Epenthesis and thus invisible insofar as that process is involved. Note, however, that Imperative inflection is *inside* the domain of o-Epenthesis.) This permits the simpler formulation of the o-Epenthesis rule shown in (9).

Figure 1: Epenthesis rules constrained by domains

(9) o-Epenthesis:

$$\begin{array}{c} \text{C} \quad \text{C} \\ \uparrow \\ \text{[+son]} \\ \uparrow \\ \text{o} \end{array}$$

So what are the alternatives to this analysis in which an /o/ is epenthesized? First, one could simply claim that the /o/ is part of the underlying form of certain morphemes in some situations, and that these morphemes have suppletive or derived forms without /o/ in other situations. This is an alternative that would have to be worked out in detail, but it is hard to see any justification for the steps required to make it work.

Second, one might try to claim that the /o/ results from the insertion of the default vowel and then undergoes assimilation — perhaps because of proximity to the nasal consonant /m/. However, I do not see how this proposal can be made to work since assimilation does not happen in the larger (outermost) domain; see (8a-b).

Third, one can propose, as de Lacy mentions in passing as a possibility (p. 301), that the /o/ is part of the input as a semantically empty morpheme of some sort (p. 138),⁴ one that is eliminated in many contexts. It seems to me that this proposal would require somersaults to achieve, and has no motivation other than that of rescuing a proposal that says round vowels cannot be epenthesized.

3. Dorsal consonant epenthesis

In this section I discuss the circumstances under which a /k/ appears to be epenthesized, and that is what I argue actually happens. The rule is given in (10), which is slightly improved from the formulation found in Marlett (1981).

(10) k-Epenthesis:

$$\begin{array}{c} \text{X} \quad \text{C} \quad \quad \text{C} \quad + \\ \quad \quad \quad \uparrow \\ \quad \quad \quad \text{[+nasal]} \\ \quad \quad \quad \uparrow \\ \quad \quad \quad \text{k} \end{array} \quad \text{where X may be either a consonant or vowel}$$

The phonological motivation for this rule is unknown, and this point is relevant for de Lacy (see note 4). On the other hand, it is the most productive if not the only consonant epenthesis rule in the language.

All of the cases of k-Epenthesis are after a coronal consonant. But this fact does not require a stipulation in the formulation of the rule since no instances of labial, dorsal, or glottal consonants present

⁴ De Lacy states (p. 138), that “if the ‘epenthesis’ is limited to a particular morpheme or class of closely related morphemes, the ‘epenthetic segment’ is likely to be a morpheme. A convincing case of an epenthetic labial or dorsal would be one in which the epenthetic segment is inserted solely for prosodic reasons (e.g. to fill an onset, to make a stressed syllable heavy) and it is not morphosyntactically restricted (i.e. it must be able to appear anywhere in some phonologically definable domain).”

themselves in the relevant circumstances to know what really would happen with them. I therefore do not build an unnecessary complication into the formulation of the rule in (10).

The k-Epenthesis rule is illustrated by the data in (11). In (11a-e) we see the epenthesis of /k/, and sometimes the epenthesis of /i/ as well. In (11f-i) we see the epenthesis of /k/ and also the epenthesis of /o/.

(11)	Underlying	Broad	Narrow
a.	{i-t-m-aaɪ}	/i ¹ tkmaai/	[i ¹ tkw̃ããɪ]
	3:3-Dependent.Realis-Negative-make [= Q15]		
b.	{i-si-m-aaɪ}	/i ¹ skmaai/	[i ¹ skw̃ããɪ]
	3:3-Independent.Irrealis-Negative-make [= Q13]		
c.	{m-si-m-aaɪ}	/(i)n ¹ skmaai/	[(i)n ¹ skw̃ããɪ]
	2Sg.Subject-Independent.Irrealis-Negative-make		
d.	{ʔ-si-m-aaɪ}	/(i)ʔ ¹ skmaai/	[(i)ʔ ¹ skw̃ããɪ]
	1Sg.Subject.Transitive-Independent.Irrealis-Negative-make		
e.	{ma-t-m-aʔo}	/ma ¹ tkmaʔo/	[ma ¹ tkw̃ãʔo]
	2Sg.Direct.Object-Dependent Realis-Negative-see		
f.	{i-t-m-pii}	/itkom ¹ pii/	[itkom ¹ pii]
	3:3-Dependent.Realis-Negative-taste [= J15]		
g.	{i-si-m-pii}	/iskom ¹ pii/	[iskom ¹ pii]
	3:3-Independent.Irrealis-Negative-taste [= J13]		
h.	{m-t-m-pii}	/(i)ntkom ¹ pii/	[(i)ntkom ¹ pii]
	2Sg.Subject-Dependent.Realis-Negative-taste		
i.	{ʔ-t-m-pii}	/(i)ʔtkom ¹ pii/	[(i)ʔtkom ¹ pii]
	1Sg.Subject.Transitive-Dependent.Realis-Negative-taste		

The formulation of k-Epenthesis in (10) includes a morpheme boundary after the nasal. This is because no k-epenthesis takes place in examples where the /m/ is part of the root, as illustrated in (12).⁵

(12) a.	{i-si-mis}	/i ¹ smis/
	3:3-Independent.Irrealis-resemble [= M5]	
b.	{i-t-mis}	/i ¹ tmis/
	3:3-Dependent.Realis-resemble [= M6]	

As shown in (13), there must be something — whether a consonant or a vowel — at the beginning of the string.

(13) a.	{si-m-ataχ}	/ ¹ smataχ/
	Independent.Irrealis-Negative-go [= F13]	
b.	{t-m-ataχ}	/ ¹ tmataχ/
	Dependent.Irrealis-Negative-go [= F15]	

And finally, the indirect/oblique object prefixes and the directional morphemes are outside the domain of this rule since k-Epenthesis does not happen when they are added to a word, and one would think that they provide the first part of the rule's structural description (Marlett 1981:37, online version). See (14a-b) (updated with current glossing conventions).⁶

⁵ As I show in Marlett (2002), Seri has quite transparently reanalyzed the negative prefix to be part of the verb root in a small number of verbs. In those cases, the epenthesis of /k/ does not happen (see pp. 11-12).

⁶ Example (14b) is one of the highly irregular stress-retracting verbs in which a-Epenthesis takes place.

- (14) a. {ko-tm-aak^wtim} /^lk^wtmaak^wtim/
 3.Indirect.Object-Subjunctive-cover.oneself
 b. {ko-nt-mi-k-a} /kon^ltmaka/
 3.Indirect.Object-Away-Proximal.Realis-Unspecified.Subject-move

Those are the facts for k-Epenthesis. What are the alternatives? First, one might claim that the /k/ is just part of a set of suppletive allomorphs for the morphemes in question. Again, this is not likely of interest.

Second, one might claim that the underlying form for the negative prefix is {kom} and have the /k/ delete under certain conditions (as well as the /o/). All of the steps required for this analysis would need to be elaborated and justified. After that, the competing analyses can then be appropriately compared.

Second, one might claim that the /k/ is part of the input as a semantically empty morpheme of some sort — an idea suggested but not fully developed by de Lacy as preferable to positing epenthesis. As he writes (p. 137), “in short, Seri [k] does not act like an epenthetic element: its distribution may reasonably be called idiosyncratic, much like a morpheme’s.”

In the absence of a fully explicit proposal, however, it is difficult to argue that the “empty morpheme” analysis is in fact preferable except on very general grounds. While we know about empty morphemes of the type that are called theme vowels and linking morphemes in other languages, the distribution of these is unlike what we see here with the /k/. Language-internally, in the absence of any bias about what constitutes a proper epenthetic segment and also about what constitutes proper motivation for epenthesis, and motivated by productivity, k-Epenthesis seems to be the best analysis.

4. Conclusions

In conclusion, I believe that these examples in Seri are well-motivated instances of round vowel epenthesis and dorsal consonant epenthesis that need to be properly taken into consideration when cross-linguistic studies of these phenomena are done, despite being unusual. The round vowel epenthesis is not the default epenthesis at the word edges, but it is phonologically motivated and is the epenthesis that takes place “deeper” within the word. The dorsal consonant epenthesis does not take place for reasons that are obvious to us, but that does not mean that it is without phonological motivation. In both cases, the alternative analyses without epenthesis that have been hinted at really need to be fully developed in order to make comparison possible.

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Appendix 1: Intransitive verbs (third person subject when finite)⁷

		A	B	C	D	E	F	G	H	I
		√kap 'fly'	√mam 'ripe'	√jaai 'expensive'	√ʔak 'blind'	√Camx ^{w8} 'shiny'	√ataχ 'go'	√aanpχ 'return home'	√iin 'go away'	√oos 'sing'
1	Distal.Realis jo	jo- ^l kap	jo- ^l mam	jo- ^l jaai	jo- ^l ʔak	jo- ^l amx ^w	^l jootaχ	^l j-aanpχ	^l j-iin	^l jas
2	Dependent.Irrealis po	po- ^l kap	po- ^l mam	po- ^l jaai	po- ^l ʔak	po- ^l amx ^w	^l pootaχ	^l p-aanpχ	^l p-iin	^l pas
3	Emphatic.Realis χo	χo- ^l kap	χo- ^l mam	χo- ^l jaai	χo- ^l ʔak	χo- ^l amx ^w	^l χootaχ	^l χ-aanpχ	^l χ-iin	^l χ ^w as
4	Independent.Irrealis si	^l s-kap	^l s-mam	^l s-jaai	^l s-ʔak	^l s-samx ^w	^l siitaχ	^l s-aanpχ	^l s-iin	^l s-oos
5	Proximal.Realis mi	(i)m- ^l kap	(i)m- ^l mam	(i)n- ^l jaai	(i)m- ^l ʔak ⁹	(i)m- ^l mamx ^w	^l miitaχ	^l m-aanpχ	^l m-iin	^l m-oos
6	Dependent.Realis t	t- ^l kap	^l t-mam	^l t-jaai	^l t-ʔak	^l t-tamx ^w	^l t-ataχ	^l t-aanpχ	^l t-iin	^l t-oos
7	Infinitive ika	ika- ^l kap			ika- ^l ʔak		i ^l kaataχ	i ^l k-aanpχ	i ^l k-iin	i ^l k-oos
8	Imperative ʔ, k, ...	(i)ʔ- ^l kap					^l k-ataχ	^l ʔ-aanpχ	^l ʔ-iin	^l as
9	Subject.Nominalizer k	^l k-kap	^l k-mam	^l k-jaai	^l k-ʔak	^l k-kamx ^w	^l k-ataχ	^l k-aanpχ	^l k-iin	^l k-oos

⁷ All verbs are cited with singular subjects and in perfective aspect. Plurality of subject and imperfectivity are indicated by changes to the stem (including suffixes).

⁸ This column represents the small class of verbs that begin with the “empty” consonant (Stemberger and Marlett 1983).

⁹ All situations in the language in which a nasal is followed by a glottal stop, such as in this column, come out as if the sounds are metathesized. It is unclear whether this is an actual metathesis or a phonetic merger that gives that impression.

Appendix 2: Transitive verbs (third person subject and object when finite)

		J	K	L	M	N	O	P	Q	R	S
		√pii 'taste'	√tis 'point at'	√kaa 'look for'	√mis 'resemble'	√jaafi 'claim'	√Caχʃ ¹⁰ 'hit'	√am 'swallow'	√aai 'make'	√iχ ^w 'jump over'	√ookta 'look at'
1	Distal.Realis jo	i-jo- ^l pii	i-jo- ^l tis	i-jo- ^l kaa	i-jo- ^l mis	i-jo- ^l jaafi	i-jo- ^l aχʃ	i- ^l joom	i- ^l j-aai	i- ^l j-iχ ^w	i- ^l j-ookta
2	Dependent.Irrealis po	i-po- ^l pii	i-po- ^l tis	i-po- ^l kaa	i-po- ^l mis	i-po- ^l jaafi	i-po- ^l aχʃ	i- ^l poom	i- ^l p-aai	i- ^l p-iχ ^w	i- ^l p-ookta
3	Emphatic.Realis χo	i-χo- ^l pii	i-χo- ^l tis	i-χo- ^l kaa	i-χo- ^l mis	i-χo- ^l jaafi	i-χo- ^l aχʃ	i- ^l χoom	i- ^l χ-aai	i- ^l χ-iχ ^w	i- ^l χ-ookta
4	Independent.Irrealis si	i- ^l s-pii	i- ^l s-tis	i- ^l s-kaa	i- ^l s-mis	i- ^l s-jaafi	i- ^l s-saχʃ	i- ^l siim	i- ^l s-aai	i- ^l s-iχ ^w	i- ^l s-ookta
5	Proximal.Realis mi	i-m- ^l pii	i-n- ^l tis	i-m- ^l kaa ¹¹	i-m- ^l mis	i-n- ^l jaafi	i-m- ^l maχʃ	i- ^l miim	i- ^l m-aai	i- ^l m-iχ ^w	i- ^l m-ookta
6	Dependent.Realis t	i- ^l t-pii	i- ^l t-tis	i- ^l t-kaa	i- ^l t-mis	i- ^l t-jaafi	i- ^l t-taχʃ	i- ^l t-am	i- ^l t-aai	i- ^l t-iχ ^w	i- ^l t-ookta
7	Infinitive iʔa	iʔa- ^l pii	iʔa- ^l tis	iʔa- ^l kaa		iʔa- ^l jaafi	iʔa- ^l aχʃ	iʔaam	iʔa-aai	iʔεεχ ^w	iʔaakta
8	Imperative ʔ, k, Ablaut	(i)ʔ- ^l pii	(i)ʔ- ^l tis	(i)ʔ- ^l kaa		(i)ʔ- ^l jaafi	(i)- ^l ʔ-aχʃ	^l k-am	^l ʔ-aai	^l ʔ-iχ ^w	^l ʔ-ookta
9	Subject.Nominalizer k	^l k-pii	^l k-tis	^l k-kaa	^l k-mis	^l k-jaafi	^l k-kaχʃ	^l k-i-m ¹²	^l k-aai	^l k-i-iχ ^w ¹³	^l k-ookta

¹⁰ This column represents the small class of verbs that begin with the “empty” consonant (Stemberger and Marlett 1983).

¹¹ The /m/ is phonetically a velar nasal here (in an unstressed syllable preceding a velar consonant). The rule of nasal assimilation is general and attested elsewhere in row.

¹² Subject-Nominalizer-Transitive-root. The /i/ that appears here (as Transitive marker — see Table 1) correlates with the transitivity of the verb stem (which may be a derived intransitive, as in the case of the unspecified object construction). It deletes by the regular rules in almost all contexts except before roots beginning with a short low vowel or with a short /i/. It does not lengthen.

¹³ See note 4.

Appendix 3: Negative forms of the intransitive verbs in Table 1

		A	B	C	D	E	F	G	H	I
		√kap 'fly'	√mam 'ripe'	√jaai 'expensive'	√ʔak 'blind'	√Camx ^w 'shiny'	√ataχ 'go'	√aanpχ 'return home'	√iin 'go away'	√oos 'sing'
10	Distal.Realism-Negative	jo-m-'kap ¹⁴	jo-m-'mam	jo-n-'jaai	jo-m-'ʔak	jo-m-'mamx ^w	jo-'m-ataχ	jo-'m-aanpχ	jo-'m-iin	jo-'m-oos
11	Dependent.Irrealism-Negative	po-m-'kap	po-m-'mam	po-n-'jaai	po-m-'ʔak	po-m-'mamx ^w	po-'m-ataχ	po-'m-aanpχ	po-'m-iin	po-'m-oos
12	Emphatic.Realism-Negative	χo-m-'kap	χo-m-'mam	χo-n-'jaai	χo-m-'ʔak	χo-m-'mamx ^w	χo-'m-ataχ	χo-'m-aanpχ	χo-'m-iin	χo-'m-oos
13	Independent.Irrealism-Negative	s-om-'kap	s-om-'mam	s-on-'jaai	s-om-'ʔak	s-om-'mamx ^w	's-m-ataχ	's-m-aanpχ	's-m-iin	's-m-oos
14	(Proximal.Realism-Negative)	—	—	—	—	—	—	—	—	—
15	Dependent.Realism-Negative ¹⁵	t-om-'kap	t-om-'mam	t-on-'jaai	t-om-'ʔak	t-om-'mamx ^w	't-m-ataχ	't-m-aanpχ	't-m-iin	't-m-oos
16	(Infinitive-Negative)	—	—	—	—	—	—	—	—	—
17	Imperative-Negative	k-om-'kap					'k-m-ataχ	'k-m-aanpχ	'k-m-iin	'k-m-oos
18	Subject.Nominalizer-Negative	i-m-'kap		i-n-'jaai	i-m-'ʔak	i-m-'mamx ^w	i-'m-ataχ	i-'m-aanpχ	i-'m-iin	i-'m-oos

N.B.: Peach shading indicates where o-Epenthesis has applied.

¹⁴ The /m/ is phonetically a velar nasal here (in an unstressed syllable preceding a velar consonant). The rule of /m/ place-of-articulation assimilation is general and attested elsewhere in the paradigm, obviously.

¹⁵ The Subjunctive Irrealism form, using /tm-/, is identical phonetically.

Appendix 4: Negative forms of the transitive verbs in Table 2

		J	K	L	M	N	O	P	Q	R	S
		√pii 'taste'	√tis 'point at'	√kaa 'look for'	√mis 'resemble'	√jaaʃi 'claim'	√Caχʃ 'hit'	√am 'swallow'	√aai 'make'	√iχ ^w 'jump over'	√ookta 'look at'
10	Distal.Real- Negative	i-jo-m- ^l pii	i-jo-n- ^l tis	i-jo-m- ^l kaa ¹⁶	i-jo-m- ^l mis	i-jo-n- ^l jaaʃi	i-jo-m- ^l maχʃ	i-jo- ^l m-am	i-jo- ^l m-aai	i-jo- ^l m-iχ ^w	i-jo- ^l m-ookta
11	Dependent.Irrealis- Negative	i-po-m- ^l pii	i-po-n- ^l tis	i-po-m- ^l kaa	i-po-m- ^l mis	i-po-n- ^l jaaʃi	i-po-m- ^l maχʃ	i-po- ^l m-am	i-po- ^l m-aai	i-po- ^l m-iχ ^w	i-po- ^l m-ookta
12	Emphatic.Real- Negative	i-χo-m- ^l pii	i-χo-n- ^l tis	i-χo-m- ^l kaa	i-χo-m- ^l mis	i-χo-n- ^l jaaʃi	i-χo-m- ^l maχʃ	i-χo- ^l m-am	i-χo- ^l m-aai	i-χo- ^l m-iχ ^w	i-χo- ^l m-ookta
13	Independent.Irrealis- Neg.	i-s-kom- ^l pii	i-s-kon- ^l tis	i-s-kom- ^l kaa	i-s-kom- ^l mis	i-s-kon- ^l jaaʃi	i-s-kom- ^l maχʃ	i- ^l s-km-am	i- ^l s-km-aai	i- ^l s-km-iχ ^w	i- ^l s-km-ookta
14	(Proximal.Real- Negative)	—	—	—	—	—	—	—	—	—	—
15	Dependent.Real- Negative	i-t-kom- ^l pii	i-t-kon- ^l tis	i-t-kom- ^l kaa	i-t-kom- ^l mis	i-t-kon- ^l jaaʃi	i-t-kom- ^l maχʃ	i- ^l t-km-am	i- ^l t-km-aai	i- ^l t-km-iχ ^w	i- ^l t-km-ookta
16	(Infinitive-Negative)	—	—	—	—	—	—	—	—	—	—
17	Imperative- Negative	k-om- ^l pii	k-on- ^l tis	k-om- ^l kaa		k-on- ^l jaaʃi	k-om- ^l maχʃ	^l k-m-am	^l k-m-aai	^l k-m-iχ ^w	^l k-m-ookta
18	Subject.Nominalizer- Negative	i-m- ^l pii	i-n- ^l tis	i-m- ^l kaa	i-m- ^l mis	i-n- ^l jaaʃi	i-m- ^l maχʃ	i- ^l m-am	i-m-aai	i-m-iχ ^w	i- ^l m-ookta

N.B.: Peach shading indicates where o-Epenthesis has applied, blue shading indicates where k-Epenthesis has applied, and green shading indicates where both have applied in the same word.

¹⁶ The /m/ is phonetically a velar nasal here (unstressed syllable preceding a velar consonant) and similarly elsewhere in this column.