

ASPECT FORMATION OF SAN JERONIMO MAZATEC VERBS

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0. Introduction .

San Jerónimo Mazatec¹ (SJ) verbs are characterised by complex morphophonemics in certain aspects. This article demonstrates, however, that the majority of verb forms can be predicted by ordered generative rules².

First the rules for aspect prefixation will be presented, then phonological groupings of verb stems will be given, and it will be shown how the rules apply to each grouping. Irregularities of prefixation will then be discussed, and finally tone replacement in the incompletive aspect will be considered.

1. Aspect system .

Five aspects are marked in SJ: timeless, continuative, incompletive, recent completive, and distant completive.

Timeless aspect is marked by zero prefix and therefore identifies the basic stem.

Continuative is marked by prefix *ti*¹- and recent completive by prefix *ka*³-. Neither prefix has morphophonemic alternants.

Morphophonemic alternants of the incompletive and distant completive prefixes, however, are conditioned by the initial consonant of the stem, and in some instances by other factors such as stress and tone. The incompletive aspect is marked by tone change as well as by prefixation.

2. Prefixation.

Both incomplete and distant completive forms are treated simultaneously, since many of the generative rules apply to both derivations. The incomplete prefix is posited as *sk-* in the underlying form; *kɛ-* is posited for the distant completive.

17 rules are needed to predict morphophonemic changes in aspect prefixation. Of these the first 11 adjust nonpermissible consonant³ sequences to conform to the phonological patterns of SJ.

2.1. Ordered Rules.

Rule 1. Geminate reduction.

$$C_1 C_1 \Rightarrow C_1$$

This rule reduces geminate consonant clusters formed by prefixation of incomplete *sk-* to a *k-* initial stem; or distant completive *kɛ-* to a *ɛ-* initial stem.

Rule 2. k-deletion.

$$k \rightarrow \emptyset / \left. \begin{array}{l} \text{ɛ } \mathfrak{b} \\ \text{? } \left[\begin{array}{c} \text{C} \\ +\text{cor} \end{array} \right] \end{array} \right\} _$$

This rule deletes the first consonant of the distant completive prefix preceding a *ɛ-* initial stem; also the second consonant of the incomplete prefix preceding a ?n- or ?y- initial stem.

Rule 3. *ɛ*-deletion.

$$\mathfrak{b} \rightarrow \emptyset / \text{ɛ } (?) _$$

[tone 3]

This rule deletes the first consonant of a *ɛ-* initial stem following the distant completive prefix. This must follow the k-deletion rule, otherwise the environment for k-deletion would be removed.

ɛ-deletion only applies in a tone 3 syllable; elsewhere the consonant remains and epenthesis (rule 6) takes place.

Rule 4. ϕ -weakening.

$$\phi \rightarrow s / _ k$$

This rule weakens ϕ preceding k; it precedes ϕ -deletion (rule 5), bleeding the data.

Rule 5. ϕ -deletion.

$$\phi \rightarrow \emptyset / \left\{ \begin{array}{l} [+cons] - \left(\begin{array}{l} [-cons] \\ [-son] \end{array} \right) [+cons] \\ _ + h (?) v \end{array} \right\}$$

This rule deletes ϕ when preceded and followed by consonants. It also deletes ϕ (d.c. prefix) preceding h; this is the only instance as far as aspect prefixation is concerned of a rule which is not phonologically motivated - the cluster ϕh is a permissible and commonly occurring sequence in SJ.

ϕ -deletion must follow k-deletion, b-deletion and ϕ -weakening, all of which bleed the data before ϕ -deletion is applied.

Rule 6. Epenthesis.

$$\emptyset \rightarrow i / \# \begin{bmatrix} +cons \\ -cont \end{bmatrix} - [+cons]$$

This rule epenthesises a vowel between a word initial obstruent and a following consonant. The epenthesised vowel takes tone 3.

Epenthesis must follow k-deletion, b-deletion and ϕ -deletion.

Rule 7. Vowel harmony.

$$v \rightarrow \begin{bmatrix} \alpha \text{back} \\ +\text{high} \end{bmatrix} / [+cons] + - \begin{bmatrix} c \\ +\text{ant} \\ -\text{cor} \end{bmatrix} \begin{bmatrix} v \\ \alpha \text{back} \end{bmatrix}$$

This rule harmonises the epenthesised vowel with the following vowel, provided only a bilabial consonant intervenes. The

epenthesised vowel remains high. Non-epenthesised vowels do not harmonise, hence the necessity for writing the morpheme boundary into the rule.

Rule 8. s-deletion.

$$s \rightarrow \emptyset / _ [+cons] \left(\begin{array}{l} [-cons] \\ [-son] \end{array} \right) [+cons]$$

This rule deletes s preceeding two other consonants.

The ordering of s-deletion and epenthesis rules is significant, in that if s-deletion is applied first it will feed epenthesis. With most derivations epenthesis must be applied first, however with nasal initial stems the ordering of these two rules must be reversed⁴.

There are a few alveolar initial stems which derive the incompletive aspect in the same way as nasal initial stems; these are marked [+N] in the lexicon.

Rule 9. Syllabification.

$$\left[\begin{array}{l} C \\ +ant \\ -cor \\ y \end{array} \right] \rightarrow \left[\begin{array}{l} o \\ i \end{array} \right] / [+cons] (?) _$$

This rule syllabifies b, m and y following a consonant. It must follow the epenthesis rule.

Rule 10. n-deletion.

$$n \rightarrow \emptyset / [+cons] (?) _$$

This rule deletes n following a consonant.

Rule 11. k-weakening.

$$k \rightarrow h / _ \left[\begin{array}{l} C \\ +cor \end{array} \right]$$

This rule weakens k preceding a coronal consonant. It must follow s-deletion, otherwise the environment for s-deletion would be removed.

Rules 12 to 15 deal with laryngeal segments, adjusting sequences to conform to permissible phonological patterns, and deleting laryngeal elements in certain unstressed environments. All these rules are phonologically motivated?

Rules dealing with laryngeal elements must be ordered after those dealing with consonants, as the latter, especially ϕ -weakening and k-weakening rules, feed the h-deletion and laryngeal fronting rules below.

Three rules are given for h-deletion as they apply in quite distinct environments.

Rule 12. h-deletion 1.

$$h \rightarrow \phi / s k _$$

This rule deletes h following sk.

Rule 13. h-deletion 2.

$$h \rightarrow \phi / - \left\{ \begin{array}{l} C \\ [+strid] \\ [+cont] \\ C h \end{array} \right\}$$

This rule deletes h preceding a fricative, or consonant followed by h.

Rule 14. h-deletion 3.

$$h \rightarrow \phi / \# (b) _ i \\ [-stress]$$

This rule deletes h when it occurs as sole element of the consonant margin, or following b, preceding i, in unstressed position.

Rule 15. Laryngeal fronting.

$[+vcd]$	$[-cons]$	
	$[-son]$	
1	2	\Rightarrow
2	1	

Cond: syllable bound

This rule metathesises a laryngeal segment with any preceding voiced segment within the syllable^o.

The sequence hb is treated by this rule as a single voiceless segment (the sequence is realised phonologically by portmanteau phone β). Thus with sequence hb' metathesis does not apply.

The laryngeal fronting rule is repetitive, reading left to right, applying to both laryngeal segments if present. Thus $koh'i \rightarrow kh'oi$ "he will arrive".

This rule is fed by the syllabification rule, and it should be noted that although a syllable boundary normally occurs between a vowel and a following consonant, a vowel created by the syllabification rule never adds a syllable, but must be considered part of the following. Metathesis will thus take place between a laryngeal and a vowel created by syllabification, but not with any other.

Rules 16 and 17 adjust unstressed vowels and vowel sequences to conform to SJ phonological patterns.

Rule 16. o-modification.

$o \rightarrow a$	$/ \#$	h	$_{-}$
			$[-stress]$

This rule lowers o in unstressed position following word initial h . The vowel o never occurs in this environment.

Rule 17. o-deletion.

$$o \rightarrow \emptyset / - \left[\begin{array}{c} V \\ +high \end{array} \right] \\ [-stress]$$

This rule deletes o in unstressed position preceding another high vowel. (The sequence oo could be dealt with by geminate reduction, but o-deletion would still be required to eliminate oi sequences.)

2.2. Phonological groupings for aspect prefixation.

Verb stems may be grouped into phonological classes according to aspect formation derivations. These are considered below with sample derivations for each grouping. (Tone is only indicated where this is significant to aspect prefixation.)

2.2.1. Velar initial stems.

Velar initial stems make use of geminate reduction (R.1), and h-deletion 1 (R.12) in the incomplete; ʃ -weakening (R.4), epenthesis (R.6) and h-deletion 1 (R.12) in the distant completeive.

	"he waits"		"he seizes"	
	sk+koñą	kʃ+koñą	sk+khoe	kʃ+khoe
R.1	scoñą	-	skhoe	-
4	-	kscoñą	-	kskhoe
6	-	kiskoñą	-	kiskhoe
12	-	-	skoe	kiskoe

2.2.2. Alveolar and palatal initial stems.

Alveolar and palatal initial stems make use of s-deletion (R.8), k-weakening (R.11) and h-deletion 2 (R.13) in the incomplete; ʃ -deletion (R.5) and epenthesis (R.6) in the distant completeive.

		"you(sg) wait"		"you(sg) seize"	
		sk+čičiñi	kɛ+čičiñi	sk+čhoi	kɛ+čhoi
R.5	-		kčičiñi	-	kčhoi
6	-		kičičiñi	-	kičhoi
8	kčičiñi	-	-	kčhoi	-
11	hčičiñi	-	-	hčhoi	-
13	-	-	-	čhoi	-

2.2.3. Nasal initial stems and alveolar stems marked with morpheme feature [+N].

Nasal initial stems, and alveolar stems marked [+N] in the lexicon, make use of s-deletion (R.8), epenthesis (R.6) and vowel harmony (R.7) in the incomplete (note that s-deletion must precede epenthesis); ɛ-deletion (R.5), epenthesis (R.6) and vowel harmony (R.7) in the distant completive.

		"you(sg) kick"		"he is able"		"it burns"	
		sk+hno _i	kɛ+hno _i	sk+mą	kɛ+mą	sk+ti	[+N]
R.5	-		khno _i	-	kma	-	
8	khno _i	-	-	kma	-	kti	
6	kihno _i	kihno _i		kima	kima	kiti	
7	-	-	-	koma	koma	-	

It will be noted that both aspects produce the same surface forms as far as the segments are concerned, although they are distinguished by tone changes in the incomplete aspect. These tone changes are considered in section 3.

2.2.4. Bilabial initial stems.

Bilabial initial stems (other than m- initial considered above, and bh- initial below) make use of s-deletion (R.8), syllabification (R.9), laryngeal fronting (R.15) and o-deletion (R.17) in the

incompletive; k-deletion (R.2), b-deletion (R.3), epenthesis (R.6), vowel harmony (R.7) and laryngeal fronting (R.15) in the distant completive.

		"he marries"		"he sews on (lace)"	
		sk+bi ³ š ³	kɛ+bi ³ š ³	sk+bo ¹ tho ³	kɛ+bo ¹ tho ³
R.2	-		ɛbiš ³	-	ɛbotho
3	-		ɛiš ³	-	-
6	-		-	-	ɛibotho
7	-		-	-	ɛobotho
8	kbiš ³		-	kbotho	-
9	koiš ³		-	kootho	-
15	-		-	-	-
17	kiš ³		-	kotho	-
		"he carries"		"he puts"	
		sk+b [?] a ³	kɛ+b [?] a ³	sk+b [?] e ³¹	kɛ+b [?] e ³¹
R.2	-		ɛb [?] a	-	ɛb [?] e
3	-		ɛ [?] a	-	-
6	-		-	-	ɛib [?] e
7	-		-	-	-
8	kb [?] a		-	kb [?] e	-
9	ko [?] a		-	ko [?] e	-
15	k [?] oa		-	k [?] oe	ɛi [?] be
17	-		-	-	-

Laryngeal fronting (R.15) applies to timeless forms as well, thus "he carries" has surface form [?]ba³; "he puts" [?]be³¹.

Forms with underlying ?b- initial differ in derivation from those with underlying b? - initial, even though surface forms are identical (see 2.2.7.).

2.2.5. bh- initial stems.

bh- initial stems make use of s-deletion (R.8), syllabification (R.9), laryngeal fronting (R.15) and o-deletion (R.17) in the incomplete; k-deletion (R.2), b-deletion (R.3), ʃ -deletion (R.5), h-deletion 3 (R.14) and o-modification (R.16) in the distant complete.

	"he arrives"		"he leaves"	
	sk+bh?i	kʃ+bh?i	sk+bhito	kʃ+bhito
R.2	-	ʃbh?i	-	ʃbhito
3	-	ʃh?i	-	ʃhito
5	-	h?i	-	hito
8	kʰh?i	-	kʰhito	-
9	koh?i	-	kohito	-
14	-	-	-	ito
15	kh?oi	-	khoito	-
16	-	-	-	-
17	-	-	khito	-

		"he sews"		"it shines"	
		sk+bhañą	kɛ+bhañą	sk+bhote	kɛ+bhote
R.2	-		ɛbhañą	-	ɛbhote
3	-		ɛhañą	-	ɛhote
5	-		hañą	-	hote
8	kɔbhañą	-		kɔbhote	-
9	kohañą	-		kohote	-
14	-	-		-	-
15	khoañą	-		khoote	-
16	-	-		-	hate
17	-	-		khote	-

2.2.6. Glottal/alveolar initial stems.

Stems with ?n- and ?y- initial use k-deletion (R.2), syllabification (R.9) and n-deletion (R.10) in the incomplete; ɛ-deletion (R.5) and epenthesis (R.6) in the distant completeive.

		"you(sg) make"		"you(sg) drink"	
		sk+?ni	kɛ+?ni	sk+?yoi	kɛ+?yoi
R.2	s?ni	-		s?yoi	-
5	-		k?ni	-	k?yoi
6	-		ki?ni	-	ki?yoi
9	-	-		s?ioi	-
10	s?i	-		-	-

2.2.7. Glottal/vowel and ^ʔb- initial stems.

Stems with ^ʔV- or ^ʔb- initial make use of syllabification (R.9) in the incomplete; b-deletion (R.3) and epenthesis (R.6) in the distant complete.

		"he grinds"		"he drinks"	
		sk+ ^ʔ o	kɛ+ ^ʔ o	sk+ ^ʔ bi	kɛ+ ^ʔ bi
R.3	-	-	-	-	kɛ ^ʔ i
6	-		kiɛ ^ʔ o	-	kiɛ ^ʔ i
9	-		-	sk ^ʔ oi	-

2.3. Irregularities in aspect formation.

2.3.1. Suppletive verb stems in non-timeless aspects.

There are a significant number of verb stems which have an additional morpheme in the incomplete and complete aspects. Many of these instances can be attributed to semantic shifts; for example the morpheme ma³ "to become" is frequently found in this role.

e.g. ni³hñã¹ "he is sleepy"

ko⁴ni³hñã¹ (sk+ma³+ni³hñã¹) "he will be (become) sleepy"

Four verb stems have been found which have suppletive stems in one or more non-timeless aspect radically different from the timeless form:

"he owes"	thɛ ⁴	inc. ɛhɛ ¹	} sup. ɛhɛ ³
		d.c. ki ³ ɛhɛ ³	
"he sees"	be ³	d.c. ki ³ hɛe ³	sup. hɛe ³
"you see"	?yi ³	inc. hçi ⁴	} sup. hçi ³
		d.c. ki ³ hçi ³	

3rd person form of the paradigm:

3	be ³	inc.	skoe ⁴
1sg	ʔbe ³	inc.	skoe ³

3. Tone replacement in the incompletive aspect.

Three types of tone replacement pattern occur in the incompletive aspect. It is necessary to divide verb stems into morphological classes according to which tone pattern occurs. The largest class has a simple tone 4 replacement on the first syllable of the stem; the second has a tone 4 replacement over the whole verb stem; the third has a tone 1 replacement on the final syllable of the verb root⁷.

The whole stem tone 4 and tone 1 replacements are best considered as being superimposed on the first syllable tone 4 replacement. Thus we will give one major rule, applying first syllable tone 4 replacement to all verb stems, followed by two minor rules, describing the other two types of replacement, which only apply when so indicated in the lexicon.

There are two problems in writing the necessary generative rules for tone replacement. The first concerns the general problem of representing four tone levels, as well as glides, with binary features. The second problem is whether to treat tone glides as sequences of two tones, or as single units. As far as tone replacement is concerned it seems more economical to treat glides as single units. Only two glides occur in this context⁸; 31 and 42.

I have chosen, for this paper, to represent the four level tones by the features [low] and [modified]. A third feature [high] is used to indicate an upglide from a low to a higher tone level. A display of the tone features is given in Appendix A.

Rule 18. 1st syllable tone 4 replacement.

$$\left[\begin{array}{c} T \\ \alpha\text{high} \end{array} \right] \rightarrow \left[\begin{array}{c} +\text{low} \\ +\text{mod} \\ \alpha\text{high} \end{array} \right] / \# _ \quad \begin{array}{l} \text{Incompletive} \\ - \text{1sg trans} \end{array}$$

This rule lowers the tone of the first syllable of the verb word. As the rule is applied after prefixation rules, the affected syllable may be that formed by epenthesis, not necessarily the first syllable of the stem:

"you(sg) hold"	sk+nto ³ bi ² [+R.19]

R.6	ki ³ nto ³ bi ²
18	ki ⁴ nto ³ bi ²
19	ki ⁴ nto ⁴ bi ⁴

This is a minor rule, applying only to stems so marked in the lexicon.

Rule 20. Tone 1 replacement.

$$\left[\begin{array}{c} T \\ -\text{high} \end{array} \right] \rightarrow \left[\begin{array}{c} -\text{low} \\ -\text{mod} \end{array} \right] / \quad - \quad + \quad \begin{array}{l} \text{Incompletive} \\ -1\text{sg trans} \end{array}$$

[verb root]

This rule raises to tone 1 any level tone on the final syllable of the verb root: 42 glides with [+high] feature are not affected. Tone 1 replacement is superimposed on the 1st syllable tone 4 replacement, thus with a monosyllabic root the tone 4 will be deleted, but with a bisyllabic root the tone 4 will remain on the first syllable, the tone 1 replacement being applied to the second:

"he seizes"	"you(sg) cut"
sk+khoe ² [+R.20]	sk+bi ³ či ² [+R.20]
.....
R.12 skoe ²	R.17 ki ³ či ²
18 skoe ⁴	16 ki ⁴ či ²
20 skoe ¹	20 ki ⁴ či ¹

This is a minor rule, applying only to stems so marked in the lexicon.

When applying the above tone replacement rules the following general considerations should be born in mind:

- a. Tone change patterns apply to all persons within the verb paradigm, except for 1sg of transitive verbs, which is never affected.
- b. Suppletive stems must be classed independently for tone replacement.
- c. With tone 1 replacement it is necessary to isolate the verb root. A discussion of the morphology of the verb stem is outside the scope of this paper ; however morpheme boundaries are indicated in the verb paradigm information below, and the verb root may be presumed to be the first element within the verb stem (only two verb stems have been found in which the root is not the first element: these are not included in the table below).

The following paradigm information is arranged to show how tone replacement rules apply to incomplete forms of the verb. Stem change for person necessitates, generally, that three underlying forms be given; 3; 1sg; and 2sg, from which the plural forms of the verb are derived.

	minor rule application		basic stem	incomplete
"marry" (vi)	-	3	bi ³ š ³ ā ³	ki ⁴ š ³ ā ³
		1sg	bi ³ š ³ ā ³	ki ⁴ š ³ ā ³
		2sg	bi ³ š ³ ā ³ i ³	ki ⁴ š ³ ā ³ i ³
"sweep" (vt)	-	3	bo ³ ti ¹ č ³ a ³	ko ⁴ ti ¹ č ³ a ³
		1sg	bo ³ ti ¹ č ³ a ³	ko ³ ti ¹ č ³ a ³
		2sg	bo ³ ti ¹ č ³ i ³	ko ⁴ ti ¹ č ³ i ³
"burn" (vt)	-	3	bo ³ ka ¹	ko ⁴ ka ²
		1sg	bo ³ ka ³	ko ³ ka ³
		2sg	bo ³ kai ³	ko ⁴ kai ³

"sew" (vt)	-	3	bha ³ n̄a ³	khoa ⁴ n̄a ³
		1sg	bha ³ n̄a ³	khoa ³ n̄a ³
		2sg	čha ³ n̄i ³	čha ⁴ n̄i ³
"hold" (vt) [+R19]		3	ɬo ³ ba ²	hɬo ⁴ ba ⁴
		1sg	ɬo ³ ba ²	hɬo ³ ba ²
		2sg	nto ³ bi ²	ki ⁴ nto ⁴ bi ⁴
"write" (vt) [+R20]		3	khi ³	ski ¹
		1sg	khia ³	skia ³
		2sg	čhi ³	čhi ¹
"wait for" (vt) [+R20]		3	ko ³ +n̄a ³	ska ¹ +n̄a ³
		1sg	ko ³ +n̄a ³	ska ³ +n̄a ³
		2sg	či ³ +n̄i ³	hči ¹ +n̄i ³
"pass by" (vt) -		3	bh [?] a ³	kh [?] oa ⁴
		1sg	bh [?] a ⁴	kh [?] oa ⁴
		[+R20] // 2sg	bi ³ thi ³	ki ⁴ thi ¹
"cut" (vt) -		3	bo ³ te ³	ko ⁴ te ³
		1sg	bo ³ te ³	ko ³ te ³
		[+R20] // 2sg	bi ³ či ²	ki ⁴ či ¹
"dance" (vt) [+R20]		3	te ²	hte ¹
		1sg	te ²	hte ²
		- // 2sg	či ²	hči ⁴

// indicates suppletive stem

APPENDIX A Phoneme features.

	t	ʎ	č	č̣	k	ʔ	s	š	h	m	n	ñ	b	l	r	y	a	e	i	o
syll	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
cons	+	+	+	+	+	-	+	+	-	+	+	+	+	+	+	+	-	-	-	-
son	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
strid	-	+	+	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
cont	-	-	-	-	-	-	+	+	+	-	-	-	+	+	+	+	-	-	-	-
nasal	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-
back	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ant	+	+	-	-	-	-	+	-	-	+	+	-	+	+	+	+	-	-	-	-
cor	+	+	+	+	-	-	+	+	-	-	+	+	-	+	+	+	-	-	-	-
high																	-	-	+	+
back																	+	-	-	+

Note: **b** has rounded semivowel allophone [w] preceeding back vowels and frequently patterns with y.

Tone features.

	1	2	3	4	31	42
low	-	-	+	+	+	+
mod	-	+	-	+	-	+
high	-	-	-	-	+	+

APPENDIX B. Paradigmatic Data.

The table below includes examples of all regular stems in the same phonological groupings as are described in the paper, except that suppletive stems within the same verb are listed together. All irregularities of aspect formation found have been included, towards the end of the table.

	person	timeless stem	suppletive or underlying stem	incomplete	distant completive
1. wait	3	ko ³ ñã ³		sko ¹ ñã ³	ki ³ sko ³ ñã ³
	2sg	či ³ ñi ³		hči ¹ ñi ³	ki ³ či ³ ñi ³
2. fall	3	ka ² hnto ³		ska ⁴ hnto ³	ki ³ ska ² hnto ³
3. seize	3	khoe ²		skoe ¹	ki ³ skoe ²
	2sg	čhoi ²		čhoi ¹	ki ³ čhoi ²
4. write	3	khi ³		ski ¹	ki ³ ski ³
	2sg	čhi ³		čhi ¹	ki ³ čhi ³
5. dance	3	te ²		hte ¹	ki ³ te ²
	2sg	či ²		hči ⁴	ki ³ či ²
6. be born	3	łi ³		hłi ¹	ki ³ łi ³
7. sing	3	se ³		se ¹	ki ³ se ³
	2sg	hntai ³		ki ⁴ hntai ³	ki ³ hntai ³
8. kick	3	łho ²		łho ¹	ki ³ łho ²
	2sg	hno ² i ²		ki ⁴ hno ² i ¹	ki ³ hno ² i ²
9. burn	3	ti ²	[+N]	ki ⁴ ti ⁴	ki ³ ti ²

10. talk	3	čha ⁴	[+N]	ki ⁴ čha ⁴	ki ³ čha ⁴
	2sg	na ³ khoi ²		† ki ⁴ na ² khoi ⁴	ki ³ na ³ khoi ²
11. drip	3	hti ¹	[+N]	ki ⁴ hti ⁴	ki ³ hti ¹
12. be able	3	ma ³		ko ⁴ ma ³	ko ³ ma ³
13. marry	3	bi ³ ša ³		ki ⁴ ša ³	ɛi ³ ša ³
14. buy	3	bo ³ ɛe ³		ko ⁴ ɛe ³	ɛo ³ ɛe ³
	2sg	bi ³ ʔnti ³		ki ⁴ ʔnti ³	ɛi ³ ʔnti ³
15. wrap	3	bi ¹ hte ¹		† ki ⁴ hte ¹	ɛi ³ bi ¹ hte ¹
16. carry	3	ʔba ³	[bʔa ³]	kʔoa ⁴	ɛʔa ³
	2sg	čʔi ²		hčʔi ⁴	ki ³ čʔi ²
17. put	3	ʔbe ³¹	[bʔe ³¹]	kʔoe ⁴²	ɛi ³ ʔbe ³¹
18. go out	3	bi ³ tho ³	[bhi ³ tho ³]	khi ⁴ tho ³	i ³ tho ³
19. arrive	3	bi ³ hčo ¹	[bhi ³ hčo ¹]	khi ⁴ hčo ¹	i ³ hčo ¹
(there)					
20. shine	3	hbo ³ te ³	[bho ³ te ³]	kho ⁴ te ³	ha ³ te ³
21. smoke	3	hbo ³ ʔnti ³	[bho ³ ʔnti ³]	kho ⁴ ʔnti ³	ha ³ ʔnti ³
22. arrive	3	hbʔi ³	[bhʔi ³]	† khʔoi ⁴²	hʔi ³
(here)					
23. make	3	sʔi ¹		† sʔi ⁴²	† ki ³ sʔi ³
	2sg	ʔni ²		sʔi ⁴	ki ³ ʔni ²

24. drink	3	ʔbi ³		skʔoi ¹	ki ³ ʔʔi ³
	2sg	ʔyoi ²		sʔioi ⁴	ki ³ ʔyoi ²
25. grind	3	ʔo ³		skʔo ¹	ki ³ ʔʔo ³
	2sg	ʔyoi ³		sʔioi ¹	ki ³ ʔyoi ³
26. eat	3	khe ²	(bo ³ khe ²)	ko ⁴ khe ⁴	ʔo ³ khe ²
	2sg	bi ³ ʔci ³		ki ⁴ ʔci ³	ʔi ³ ʔci ³
27. owe	3	the ⁴	(ʔhe ³)	ʔhe ¹	ki ³ ʔhe ³
28. exist	3	ti ¹ hna ³	(bi ² hna ³)	ki ¹ hna ³	ʔi ³ bi ² hna ³
	1sg	ti ² hna ⁴	(bo ² ti ⁴ hna ³)	ko ² ti ⁴ hna ³	ʔo ³ bo ² ti ⁴ hna ³
	2sg	ti ³ hni ³	(bi ³ hni ³)	ki ⁴ hni ³	ʔi ³ vi ³ hni ³
	1pl	ti ³ ʔo ⁴ ba ⁴	(bi ³ ʔo ⁴ ba ⁴)	ki ⁴ ʔo ⁴ ba ⁴	ʔi ³ ʔo ⁴ ba ⁴
29. reach	3	ʔo ¹ thi ⁴ nki ³	(bi ³ ʔo ¹ thi ⁴ nki ³)		i ³ ʔo ¹ thi ⁴ nki ³
				khi ⁴ ʔo ¹ thi ⁴ nki ³	
30. live	3	na ³ ko ³	(bi ¹ na ³ ko ³)	ki ¹ na ³ ko ³	ʔi ³ bi ¹ na ³ ko ³
	1sg	na ⁴ koa ³	(bo ¹ ti ⁴ na ⁴ koa ³)	ko ¹ ti ⁴ na ⁴ koa ³	ʔo ³ bo ¹ ti ⁴ na ⁴ koa ³
	2sg	ʔo ³ koi ³	(bi ³ ʔo ⁴ koi ³)	ki ⁴ ʔo ⁴ koi ³	ʔi ³ ʔo ⁴ koi ³
31. need	3	ma ³ ʔche ²		ko ⁴ ʔche ²	* kho ³ ʔche ²
32. accustom	3	ma ³ nka ³		ko ⁴ nka ³	* kho ³ nka ³
33. be lazy	3	si ³	(ma ³ si ³)	ko ⁴ si ³	* kho ³ si ³
34. lie down	3	bo ¹ hna ³		* kho ¹ hna ³	ʔo ³ bo ¹ hna ³

35. accuse	3	bo ¹ nki ³		† ko ⁴ 2nki ³	ʒo ³ bo ¹ nki ³
	2sg	bo ³ nki ³		* kho ¹ nki ³	ʒo ³ bo ³ nki ³
36. die	3	bi ³ ya ³	[ʔmɛ ³]	ki ⁴ ya ³	* kʔɛ ³
37. finish	3	hbe ³		khoe ⁴	* hye ³
38. go	3	hbi ²	[bhi ²]	khoi ⁴	* ki ²
	1sg	hbia ³	[bhia ³]	* khia ¹	* kia ³
	2sg	ʔmi ³		* kʔqi ¹	* kʔi ³
	1pl	bo ³ nkia ²		ko ⁴ nkia ²	ʒo ³ nkia ²
39. see	3	be ³	(hʒe ³)	* skoe ⁴	ki ³ hʒe ³
	1sg	ʔbe ³	(hʒe ³)	* skoe ³	ki ³ hʒe ³
	2sg	ʔyi ³	(hči ³)	hči ⁴	ki ³ hči ³

[...] underlying stem

(...) suppletive stem

* irregularity of aspect prefixation

† tone change unexplained

Footnotes.

1 San Jerónimo Mazatec is a Popolocan language of the Otomanguean stock, spoken by about 2,000 inhabitants of San Jerónimo Tecoaatl, in the highland Mazatec area. San Jerónimo serves as a cultural, trade and linguistic center for a wide area to the north and north-west of the town itself, comprising some 40,000 people, however there are dialect variations which especially affect verb morphology, between individual townships. Hence the data in this paper is only applicable to that variant of Mazatec spoken in the town of San Jerónimo.

The data in this paper may be compared with Huautla Mazatec verb morphology as described by Kenneth L. Pike, Tone Languages, (Ann Arbor: University of Michigan Press, 1948) and Chiquihuitlán Mazatec morphophonemics as described by Carole A. Jamieson, "Chiquihuitlán Mazatec Verbs", S.I.L.-Mexico Workpapers 2 (1976): 85-107, and "Conflated Subsystems Marking Person and Aspect in Chiquihuitlán Mazatec Verbs" (unpublished).

2 The data for this paper included 120 full verb paradigms covering probably at least two thirds of the verb stems to be found in SJ. Within this body of data, the ordered rules failed to predict the correct aspect forms in about 10% of cases.

3 The term "consonant" is used here and subsequently in the paper to refer to segments marked with [+cons] feature, thus excluding laryngeals h and ʔ.

Only two classes of consonant sequences are found in SJ: an obstruent preceded by a nasal (nt, nč, nć, nç, nk); and a plosive (but not affricate) preceded by a fricative (st, št, šk).

4 I am following Stephen Anderson's solution to ordering paradoxes of this type (see Stephen R. Anderson, The Organisation of Phonology, Academic Press Inc., NY, 1974: Chapter 10). The alternative to reversing the rule order at this point would be to write two separate epenthesis rules.

5 Laryngeals h and ʔ occur as peripheral elements of consonant clusters. ʔ only occurs following a voiceless obstruent, or preceding a voiced continuant or a cluster of nasal and obstruent. h has a rather wider distribution, occurring also preceding voiceless obstruents. See Brian E. Bull, "San Jerónimo Mazatec Phonology" (unpublished).

6 The laryngeal fronting rule characterises one of the chief phonological differences between SJ and Huautla. Many of the underlying forms which are adjusted by the rule in SJ occur as surface forms in Huautla:

	H	SJ	
		under- lying	surface
"he carries"	bʔa ³	bʔa ³	ʔba ³
"he arrives"	bhʔi ³	bhʔi ³	hbʔi ³

7 The majority of verb stems in Mazatec are compounded from a verbal root plus one or more additional elements which may be verbal, nominal, adjectival or directional. In many cases the verbal root does not occur in isolation and has little semantic content. In this respect there is a high degree of correlation between SJ and Huautla verb stems, see Pike, op. cit.

8 Tone glides 31 and 42 are the only glides occurring on single morphemes in SJ. Other upglides (but no downglides) occur as a result of the fusion of two morphemes into a single syllable. See Pike, op. cit., and Jamieson, op. cit. for descriptions of fusion patterns between subject clitics and final stem vowel.