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INTRODUCTION

This volume of phonology papers, treating languages of the Otomanguean group, includes materials from three of its major families: Mixtecan, Popotecan, and Zapotecan.

The Mixtecan family is represented by two quite diverse approaches to Mixtec languages and a contrastive analysis of two Trique dialects. Daly provides an innovative and detailed discussion of a Mixtec tone problem for Peñoles Mixtec which challenges the kind of traditional interpretation that has dominated much of Mixtec phonological analysis. North and Shields, in contrast, present a traditional description, combining an analysis of segmental and tone phonemes with a few morphophonemic observations. Hollenbach takes a different tack altogether in her topological comparison of two Trique dialects by first inquiring into the details of the two phonological systems and then speculating upon the kinds of adjustments the speaker of one must make to understand a speaker of the other.

The Popotecan family is here represented by descriptions of both a Popolocan and a Mazatecan language. Stark and Machin highlight the roles of stress and tone in their description of the phonological word and phrase in a northern Popolocan language, while Jamieson provides a description--divided into two papers because of its thoroughness and careful attention to phonetic detail--of Chiquihuitlan Mazatec segments and tone.

Finally, the Zapotecan family is represented by two papers. Larry and Rosemary Lyman bring the fruits of several years of research to bear upon a hierarchical study of Coapan Zapotec phonology, dealing with phoneme through sentence levels, including a discussion of an extensive system of tone sandhi; and Jones collaborates with consultant Knudson to give us a first look at Guelavía Zapotec with a traditional analysis of segmental phonemes and tone, highlighting contrastive features and distribution.

Although two or three papers in this collection do address interesting theoretical questions or innovative approaches, the volume finds its major strength and usefulness in the presentation of a wide range of phonological facts which will stand us in good stead for many years to come as we seek a greater understanding of an important group of Meso-American languages.

William R. Merrifield

CHIQUIHUITLAN MAZATEC TONE

Allan R. Jamieson

1. Tones

Chiquihuitlán Mazatec[1] has four tones: high /¹/, mid /²/, low-mid /³/, and low /⁴/. Contrast among the four tones is demonstrated in one-syllable words in isolation (1) and (2), in one-syllable words preceding a constant frame (3), in the final syllable of two-syllable words (4), and in the initial syllable of two-syllable words (5).

(1) čha¹ *I talk*
čha² *difficult*
cha³ *his hand* A287[2]
čha⁴ *he talks* A303

(2) tä̈¹ *he dances* A569
tä̈² *wide* A572
tä̈³ *ten* A570
thä̈⁴ *seed* A385

(3) ho¹ siu² *there are two* A128
ya² siu² *there are trees* A661
rkI³ siu² *there are medicines* A415
cä̈⁴ siu² *there are guayavas (fruit)* A451

(4) ni⁴šu̱¹ *you (pl) will dry it*
kI⁴šu̱ *landslide* A553
kuI⁴šu̱³ *you (pl) will marry*
ki⁴šu̱⁴ *charcoal* A209

(5) cI¹thä̈¹ *I cough*
chu²ñI¹ *you (sg) lie down*

ci^{3}tä̈^{1} *I will spin it*

ci^{4}tä̈^{1} *he will spin it*

A syllable may be realized with any one of the four tones or with a cluster of two or three tones. The tone clusters occurring in ChM are /$_{14\ 24\ 34}$/, /$_{11\ 21\ 31\ 41}$/, /$_{114\ 214\ 314\ 414}$/, and /$_{42\ 424}$/. The single tones and the tone clusters which begin with the same tone are contrasted in (6) to (9).

(6) Tone /$_{1}$/ and clusters /$_{14\ 11}$/:[3]

ʔyɥ^{1} *you (pl) drink*

ʔyɻ^{14} *we (ex) drink*

ho^{1} ʔyɥ^{11} *we (in) drink two* A128

(7) Tone /$_{2}$/ and clusters /$_{24\ 21\ 214}$/:

ʔyɥ^{2} *we (in)/you (pl) grind*

ʔyɻ^{24} *we (ex) grind*

ʔyɻ^{21} *you (sg) do not know/grind*

ʔyɻ^{214} *we (ex) do not know/grind*

(8) Tone /$_{3}$/ and clusters /$_{34\ 31\ 314}$/:

ʔyɥ^{3} *you (pl) know*

ʔyɻ^{34} *we (ex) know*

ʔyɥ^{31} *we (in) drink*

čɻh^{314} *we (ex) get dressed*

(9) Tone /$_{4}$/ and clusters /$_{41\ 414\ 42\ 424}$/:

čhą^{4} *obo (fish)*

čhąl^{41} *he will not speak*

čɻ^{414} *we (ex) will not see/buy/carry*

čhɥ^{42} *woman* A86

čʉ^{4}cɻh^{424} *we (ex) will look*

The tone clusters which end with the same tone are compared in (10) to (12).

(10) Tone clusters /$_{14\ 24\ 34}$/:

ʔyɻ^{14} *we (ex) drink* ʔyɻ^{34} *we (ex) know*

ʔyɻ^{24} *we (ex) grind*

(11) Tone clusters /11 21 31 41/:

ho^{1} ʔyɥ^{11} *we (in) drink two*

ʔyɥ^{21} *you (pl) do not know*

ʔyɥ^{31} *we (in) drink*

ʔyɥ^{41} *we (in) do not drink*

(12) Tone clusters /214 314 414 424/:

čɭh^{214} *we (ex) do not get dressed*

čɭh^{314} *we (ex) get dressed*

čɭh^{414} *we (ex) will get dressed*

nɨ^{4}čɭh^{424} *we (ex) will rob (it)*

2. *Allophones*

The four single tones are normally realized as level tones, while clusters of two tones are realized as a step from the level of the first to the level of the second when on different syllables, with or without a word break.

Tone /1/ is normally a high level tone. It is initiated with a slight upglide levelling to a high level when utterance initial on the first syllable of a two-syllable word with the tone sequence /1:1/, and is a raised high level tone when it precedes a tone /4/ on the same syllable. This may be expressed by rule (13). Examples are given in (14).

(13) /1/ → { [↑1] / #__:1 ; [1+] / __4 ; [1] }

(14) te^{1}ncɥ^{1} [tɛ̌ⁿdz̄ɥ̄] *goat* A568

šnu^{14} [ʂnɥ̀] *squirrel* A56

thɥ^{1} [tʊ̄ɥ̄] *first* A587, S15^{4}

Tone /2/ is normally a level mid tone, but is realized as a slightly raised level mid tone when it precedes /3 34 4/ on the same syllable, or an upgliding cluster beginning with /4/ (i.e., /41 42 414 424/).

(15) /2/ → { [2+] / ___3(4), 4(T(4)) ; [2] }

(16) sɻ^{24} [sɻ̍] *we (ex) sing*
nʈu^{2} [ñg$^{\text{i}\hat{}}$ʉ] *cacao*

Tone /$_{3}$/ is normally a level low-mid pitch, but is realized as a slightly raised level low-mid tone when it precedes tone /$_{4}$/ on the same syllable or an upglide beginning with tone /$_{4}$/ (i.e., /$_{41\ 42\ 414\ 424}$/), and it may optionally be realized as a level raised mid tone when it occurs on a syllable interrupted by /ʔ h/ along with the cluster /$_{14}$/.

(17) /$_{3}$/ → { [$_{3+}$] / ___ $_{4}$(T($_{4}$)) ; ([$_{2+}$] / ʔ,h ___ $_{14}$) ; [$_{3}$] }

(18) čɻʔ^{34} [ʈšɻ̍ʔɻ] *we (ex) will buy*
čɻʔ$^{3\,14}$ [ʈšTʔɻ̍] *we (ex) buy*
čɻʔ^{3} [ʈšɻ̍ʔɻ] *flat*

Tone /$_{4}$/ is normally realized as a level low tone, but is a low falling tone when it is the only tone on a syllable which is utterance final, is realized as zero when it follows at least one other tone on the same syllable and precedes another syllable, and may optionally be realized as zero when it follows at least one other tone on the same syllable and is utterance final.

(19) /$_{4}$/ → { [$_{4+}$] / ___ # ; Ø / (T) T___:T(T)(T) ; (Ø / (T)T___#) ; [$_{4}$] }

(20) tɨ^{4} [tɨ̍] *fish* A485
rka^{14}ča^{4} [ř̍kā ʈšā] *he is blind* A622
rka^{14} [ř̍kā] *blind* A622
ntɨ^{4}ya^{2} [ndɨ$^{\text{i}\hat{}}$ā] *road* A392

The tone clusters are normally realized as glides between the levels that their constituent tones would have on single syllables. The cluster /$_{42}$/, however, has divergent realizations in two environments. It is a downglide beginning at [$_{1+}$] and gliding down to [$_{2-}$] with little or no upglide when it follows a syllable with the cluster /$_{14}$/, and is a downglide beginning at [$_{2+}$] and gliding down to [$_{2-}$] with little or no upglide when it follows a syllable with the cluster /$_{24}$/.

(21) $^{42} \rightarrow \begin{cases} [^{1+2-}] \ /^{14}:\_\_\_(^{4}) \\ [^{2+2-}] \ /^{24}:\_\_\_(^{4}) \end{cases}$

(22) nu^{14}hą^{42} [n̄y̧Aə̧͡\ ] *we (in) say* S10

kue^{14}cę^{42} nɨ^{24}ʔña^{42} [kᵘ̄ɛ^tsɛ̧͡·n̄ɨ̧ʔñ˩ą·] *we (in) will begin* S37

There is a tendency for a sequence of tones to drift downward in pitch. This affects the phonetics of tone in at least four ways.

The interval between the phonetic pitches of a downstepping sequence of tones is generally greater than that of its corresponding reverse upstepping sequence. The interval between a sequence of tones /^{1}:^{2}/, for example, is generally greater than that between a sequence /^{2}:^{1}/. Similarly, in successive occurrences of the same tone or tone cluster within a phrase, each successive occurrence of the tone is slightly lower in pitch than the preceding one. In (23), the second occurrence of /^{1}/ is slightly lower than the first occurrence of /^{1}/, the second occurrence of /^{14}/ is slightly lower than the first occurrence of /^{14}/, and the pitch of /^{2}/ at the end of the phrase is almost as low as that of /^{4}/ at the beginning of the phrase.

(23) sa^{4}ʔmi^{1} ču^{14} ho^{1} nti^{14}ya^{2} *the animal will make two trips* S31

Downdrift of two successive occurrences of the same tone or tone cluster generally occurs only if the second occurrence of the tone cluster is unchanged by tone sandhi rules. If, however, the tone of the second syllable is changed by one of the tone sandhi rules to become like the tone on the preceding syllable, then the second occurrence of the tone will generally take the same absolute pitch as the first occurrence. This feature seems to be most pronounced on level /^{1}/, less so on level /^{2}/, and very slight on level /^{3}/. It does not operate on level /^{4}/. At the end of an utterance, however, there is generally a step down in pitch between successive occurrences of the same tone or tone cluster in the last two or three syllables regardless of the occurrence of tone sandhi. In the final syllable of an utterance, a single tone may optionally terminate with a slight downglide. Tone /^{4}/ always has a downglide in this context as indicated in (19) above.

Downdrift occurs throughout an atterance until the speaker pauses, at which time he may shift the absolute pitch of his voice up to a higher range to compensate for the gradual drift down. Although pauses do not necessarily correspond with grammatical sentences, raises in pitch of this sort usually correspond with pauses at the boundaries of grammatical sentences.

3. Distribution

The four tones may occur singly, or in combinations of two or three on a single syllable. Of the 16 possible slusters of two tones, only eight occur within a single syllable. These are presented in matrix (24).

(24)

11			14
21			24
31			34
41	42		

The sequence /11/ ordinarily would be considered a single tone. Because of tone sandhi which will be discussed below, however, the sequence /31/ becomes /11/ in some context. In such instances, /11/ is treated as a cluster.

Of the four upglides, three end in /1/; of the three downglides, all end in /4/.

In addition, there are five glides composed of one of the four sequences of two tones ending in /1/ or /2/ plus a downglide to /4/, yielding /114 214 314 414 424/.

A voiced consonant in the syllable margin tends to carry the pitch of the initial tone of the syllable. An exception to this rule is that when a nasal consonant is followed by a plosive, with or without a preceding /ʔ/, the nasal is generally pronounced with the pitch of the preceding syllable, with any step up or down being realized between the nasal and its plosive. Voiceless consonants do not carry tone. In the case of one-syllable words spoken in isolation, any single tone or any tone cluster may occur with a single uninterrupted vowel, whether nasalized or not, with the following exceptions:

(a) Cluster /314/ only occurs on a syllable with an interrupted vowel, and

(b) clusters /21 214 414/ only occur with nasalized vowels.

On one-syllable words spoken in isolation, any single tone or tone cluster may occur on a syllable with an interrupted vowel, whether nasalized or not,with the following exceptions:

(c) Tones /1 14/ do not occur with interrupted vowels;

(d) cluster /24/ only occurs with a nasalized vowel when interrupted by /ʔ/, and never occurs with a vowel interrupted by /h/;

(e) the clusters /21 214 414/ only occur with nasalized vowels when interrupted by /h/, and never occur with vowels interrupted by /ʔ/; and

(f) the cluster /41/ occurs only with vowels interrupted by /h/, whether nasalized or not, and never with vowels interrupted by /ʔ/.

On one-syllable words spoken in isolation, any single tone or tone cluster may occur with a vowel onglide within the syllable, with the following exception:

(g) The clusters /14 24 34 414/ do not occur with a vowel onglide.

4. Tone Sandhi

Unlike Huautla Mazatec (K. Pike 1948:95), Chiquihuitlan Mazatec has both tone sandhi and some subclassification according to arbitrary tonomechanical differences. Another Mazatec dialect reported to have tone sandhi is the Soyaltepec dialect (E. Pike 1956).

The tone sandhi rules apply to tones on different syllables, but not to the relationship of two or three tones that may constitute a cluster on the same syllable. Rule 1 must precede Rule 6; Rule 4 must precede Rule 7; and Rule 5 must precede Rule 8.

The rules should be applied in succession, syllable by syllable, over an entire utterance. That is, Rule 1 should be applied, if applicable, to the first syllable of an utterance, then to the second, third, etc., until a phonological pause is reached, at which time return to syllable one again and apply Rule 2. Once a rule has been passed in the sequence of rules, it can no longer be applied out of order. In the case of a native speaker, of course, the procedure is obviously different. Whereas the recommended procedure here is for earlier rules to apply to the basic tones of a morpheme and then for subsequent rules to apply to the changed tones until all the rules have been applied, a native speaker presumably applies any and all applicable rules to each syllable, or perhaps to small groups of syllables that may operate together, as he goes along.

The basic tone of a morpheme is that which occurs with the morpheme when spoken in isolation. In the case of a bound morpheme, its basic tone can be determined by observing it when following a tone /4/, since a tone /4/ never causes a following tone to change. Otherwise, a bound morpheme may be observed in several different environments and its basic tone deduced from the way it changes in each context.

Grammatical tone on a verb, marking person and aspect (C. Jamieson 1974), and the tone of some compound nouns made up of a

noun plus an adjective, are considered basic.

The tone sandhi rules apply to the tones of successive syllables regardless of whether those syllables belong to nouns, verbs, particles, etc. They also apply to the tones of successive syllables regardless of morpheme or word boundaries, with a few exceptions which will be mentioned below, of certain two-syllable word groups which have a tone /$_3$/ or /$_4$/ on the first syllable.

Tone Sandhi Rules 1 through 5 are progressive in their application, causing a following tone to change. Tone Sandhi Rule 6 is regressive in its application, causing a preceding tone to change. Tone Sandhi Rules 7 and 8 are negative environment rules in which the tone changes occur everywhere except in the environments stated.

The tone sandhi rules generally apply throughout an utterance until a pause which coincides with the end of a grammatical sentence is reached. A speaker may choose, however, to stop applying the rules at a longer pause even if it is not at the end of a grammatical sentence, in which case he resumes speaking on the basic tone of the next word without regard to whether it would be changed by juxtaposition with the preceding word or not. The speaker may also choose to join two or more grammatical sentences into a single phonological sentence with no pause, and may or may not stop the continuous application of the tone sandhi rules at the end of the grammatical sentences within the phonological sentence.

In Tone Sandhi Rule 1, a /$_3$/ is realized as /$_1$/ following a syllable with a tone /^{1}/, whether the /$_1$/ of the environment is a single tone or the final tone of a cluster, and whether the underlying /$_3$/ is a single tone or the initial tone of a cluster.

(25) TONE SANDHI RULE 1.

$_3 \rightarrow {}_1$ / :(T)$_1$:___(T)

sua^1 *I give* + rkĭ^3 *medicine* → sua^1 rkĭ^1 A415

kĭh^{31} *went* + -nka^3 *again* + mu^{3}su^{34} *hired worker* → kĭh^{31}nka^1 mu^{1}su^{14} S13

In Tone Sandhi Rule 2, tone /$_3$/ is realized as /$_2$/ following a syllable with a tone /$_2$/ when the latter is a single tone or the final tone of a cluster, and when the underlying /$_3$/ is a single tone or the initial tone of a cluster of 2 or 3 tones within the syllable.

(26) TONE SANDHI RULE 2.

$_3 \rightarrow {}_2$ / :(T)$_2$:___(T)(T):

nku^{2}ʔñu^{2} *rapidly* + hbä^{3} *it finishes* → nku^{2}ʔñu^{2} hbä^{2} S22

nku^{2} *one* + nʇa^{3}ʔnka^{34} *corncrib* → nku^{2} nʇa^{2}ʔnka^{24} S37

There are two kinds of context in which these tone sandhi rules do not apply. First, Rule 1 does not apply to the /^{3}/ of the first syllable of a two-syllable word whose second syllable has tone sequence /^{14}/ or /^{314}/, or to the /^{3}/ of the second syllable of a three-syllable word whose third syllable has the tone sequence /^{14}/. Note, however, that in this last case, the /^{3}/ of a first syllable does become /^{1}/.

(27) khui^{1} *it is going* + ni^{3}sę^{14} *mouse* → khui^{1} ni^{3}sę^{14}

hyu^{31} *quiet* + ka^{3}hbeʔ^{314} *you (sg) arrived* → hyu^{31} ka^{3}hbeʔ^{314}

Secondly, Tone Sandhi Rules 1 and 2 do not apply to the /^{3}/ of the following list of words:

ta^{3} *(cause)* S2
koh^{3} *with* S1, A189
cih^{3} *yours (sg)* A39
cų^{3} *your (pl) brother*
če^{3} *you (sg) will buy*
nuh^{3} *your (pl) tongue*
khue^{3} *he will go away*
khuä^{3} *it will get used up* S18
nce^{3} *your (sg) hand*
nca^{3} *my hand*
ncų^{3} *your (pl) hand*
šte^{3} *you (sg) dance*
štä^{3} *I dance*
štę^{3} *my forehead*
štį^{3} *your (sg) forehead*
štų^{3} *your (pl) forehead/ you (pl) dance*
škų^{3} *my/your (pl) face*
škųi^{3} *your (sg) face*
rku^{3} *my head*
rkų^{3} *your (pl) head*
rkui^{3} *your (sg) head*
čäʔ^{3} *I am drunk*
čųʔ^{3} *you (pl) will buy/are drunk*
sįuʔ^{3} *you (pl) drink*
neh^{3} *my tongue*
nih^{3} *your (sg) tongue*
čiʔ^{3} *you (sg) are drunk*
štį^{34} *our (ex) forehead*
škųi^{34} *our (ex) face*
rkųi^{34} *our (ex) head*
cąʔ^{34} *mine*
cįh^{34} *ours (ex)*
čįʔ^{34} *we (ex) are drunk*
ncį^{34} *our (ex) hand*
seʔ^{34} *scarcely/just* S6
šįʔ^{34} *man* A522
naa^{34} *mother* A253
nih^{34} *our (ex) tongue*
nteh^{34} *sugar cane*
nkąʔ^{34} *I* S6, A693
-ʔą^{34} *I*

(28) kue^{4}hña^{2}ya^{1} *will wait* + ta^{3} *(cause)* → kue^{4}hña^{2}ya^{14} ta^{3} S15

ka^{3}ma^{1} *became* + nką?^{34} *I* → ka^{3}ma^{14} nką?^{34} S6

In Tone Sandhi Rule 3, a tone /4/ is realized as a cluster /14/ following a syllable with a tone /1/, whether the latter is a single tone or the member of a cluster of two or three tones.

(29) TONE SANDHI RULE 3.

4 → 14 / :(T)1(T):___:

ho^{1} *two* + khua^{4} *word* → ho^{1} khua^{14} S1

le^{4}?ba^{14} *hoe* + ne^{4} *uh* → le^{4}?ba^{14} ne^{14} S13

In Tone Sandhi Rule 4, a tone /4/ is realized as a cluster /24/ following a syllable in which two is the highest tone, whether the latter is a single tone or the member of a cluster with tone /4/.

(30) TONE SANDHI RULE 4.

4 → 24 / :(4)2(4):___:

nu^{2} *year* + ne^{4} *uh* → nu^{2} ne^{24} S3

kui?^{42} *will drink* + me^{4} *they* → kui?^{42} me^{24} S18

In Tone Sandhi Rule 5, a tone /4/ is realized as the cluster /34/ following a syllable whose highest tone is /3/, whether the latter is a single tone or a member of a cluster within the syllable.

(31) TONE SANDHI RULE 5.

4 → 34 / :3(4):___:

koh^{3} *with* + me^{4} *they* → koh^{3} me^{34} S5

šu^{3}ma^{34} *poor* + hnu^{4} *corn plant* → šu^{3}ma^{34} hnu^{34} S20

Rules 3 through 5 apply only to a single tone /4/. When this tone is the initial tone of a cluster, it does not change except in the bound morpheme -nuh^{41} *your (pl)*, which is pronounced with tone /3/ as its highest tone. Thus, rki^{3}nuh^{31} *your (pl) medicine*.

There are also a few arbitrary exceptions to Rule 5. It does not apply to the /4/ of the first syllable of a two-syllable word whose second syllable has /1 2 3 14 24 424/.

(32) ta^{3} *(cause)* + šku^{4}sų^{14} *custom* → ta^{3} šku^{4}sų^{14} S18

Speakers seem to apply Rule 5 only optionally to the /⁴/ of the first syllable of a two-syllable word whose second syllable has /³⁴ ⁴² ⁴¹/.

(33) khue⁴ *will go* + -sa³ *more* + nɪ⁴štɨ³⁴ *day* → khue⁴sa³ nɪ³⁴štɨ³⁴ ~ khue⁴sa³ nɪ⁴štɨ³⁴ S28

Tone Sandhi Rule 5 does apply to the /⁴/ of all one-syllable words and of the first syllable of the remaining two-syllable words whose second syllable has /⁴/ or /⁴¹⁴/.

(34) ʔo³ *oɪ* + sa³ šɪ³ *if* + cä?⁴ *its* + na⁴hñu⁴ *turkey* → ʔo³ sa³ šɪ³ cä?³⁴ na³⁴hñu³⁴ S17

In Tone Sandhi Rule 6, a tone /¹/ is realized as a cluster /¹⁴/ in a set of complex environments which are indicated in the rule by the variable *x* and explained in detail below.

First of all, the tone /¹/ which changes may be a single tone or the second member of a cluster. It may also be separated from the relevant context by any number of syllables with tone /¹/ intervening in unbroken sequence. In such cases, each occurrence of /¹/ in the sequence is realized as the cluster /¹⁴/.

In the rule, the variable *x* stands for four environments:

(a) a syllable with a basic tone cluster /¹⁴/ which has not resulted from the operation of tone sandhi upon it,

(b) any of the forms listed above as constituting exceptions to the application of Sandhi Rules 1 and 2,

(c) a syllable with a tone cluster whose first member is /⁴/, or

(d) the bound morpheme -rä⁴ *its* or its fused compounds -rą⁴ *her*, -ru⁴ *its (animal)*, or -ra² *his*. (These bound morphemes are the only constituents of Class E forms. Note that the tone /⁴/ of these morphemes is realized as a cluster /¹⁴/ when serving as the context for the change of Tone Sandhi Rule 6 because of Tone Sandhi Rule 3.)

(35) TONE SANDHI RULE 6.

$1 \rightarrow 14 \;/\; : (T)\_\_\_(:1)^{n} : x$

ku⁴ma³ *will be able* + ča²yąɪ²¹ *not noticeable* + -nah⁴² *to us (in)* → ku⁴ma³ ča²yąɪ²¹⁴nah⁴² S25

saɪʔmeɪyaɪ *I work in company* + koh³ *with* → sa¹⁴ʔme¹⁴ya¹⁴ koh³ S21

Notice that the only syllables with tone /3/ that may occur after a single tone /1/ are the /3/ of the cluster /314/ and the /3/ of the first syllable of two-syllable words whose second syllable has /14 314/ and the /3/ of the second syllable of three-syllable words whose third syllable has /14/.

As mentioned above, Tone Sandhi Rule 7 is a negative environment rule which applies everywhere except in the stated environments which are therefore marked by an *. The rule states that a tone cluster /24/ is realized as a single tone /2/ in all environments except following a tone /2/ in the preceding syllable (whether or not /24/ is preceded within the syllable by /4/), or preceding either pause or a /2/ in the following syllable. The rule applies to any number of syllables with /24/ occurring in unbroken sequence.

(36) TONE SANDHI RULE 7.

$$24 \rightarrow 2 \;/\; * \begin{cases} 2{:}(4)\_\_ \\ \_\_\#,{:}2 \end{cases}$$

ba^{3}nkɻ^{24} *we (ex) go* + šɨ^{3} *to* → ba^{3}nkɻ^{2} šɨ^{3} S16

kue^{4}cɻ?^{424} *they will begin* + ku^{4}ma^{3}sɨ^{3}ne^{1} *will become yellow* → kue^{4}cɻ?^{42} ku^{2}ma^{3}sɨ^{3}ne^{4} S25

But: kue^{4}cɻ?^{424} *they will begin* + ?ñu^{2} *strong* + ku^{4}ma^{3}sɨ^{3}ne^{1} *will become yellow* → kue^{4}cɻ?^{424} ?ñu^{2} ku^{24}ma^{3}sɨ^{3}ne^{1} S26

Tone Sandhi Rule 8 is also a negative environment rule, as indicated by the *. It states that sequence /34/ is realized as single tone /3/ in all environments except when following a /3/ or preceding pause or /3/. As in the case of Rule 7, Rule 8 applies to any number of syllables with cluster /34/ occurring in unbroken sequence.

(37) TONE SANDHI RULE 8.

$$34 \rightarrow 3 \;/\; * \begin{cases} 3{:}\_\_\_\_ \\ \_\_\_\#,{:}3 \end{cases}$$

se?^{34} *then* + kue^{14}cę^{42} *we (in) will begin* → se?^{3} kue^{14}cę^{42} S37

ka^{3}ma^{1} *became* + nką?^{34} *I* + šɻ?^{34} *man* + cä?^{4} *of (3p)* + khua^{4}ta^{3}kų^{14} *mind* → ka^{3}ma^{14} nką?^{3} šɻ?^{3} cä?^{3} khua^{4}ta^{3}kų^{14} S6

But: nke?^{34} *here* + kuɨ^{3}čha^{1} *I will say* → nke?^{34} kuɨ^{3}čha^{1} S1

Having stated the tone sandhi rules, it is now possible to summarize the occurrence of tone patterns across syllable boundaries. Matrix (38) indicates the privilege of occurrence of tone patterns in the case of two successive one-syllable words.

(38)	1	14	11	2	24	21	214	3	34	31	314	4	41	414	42	424
1	OK	Σ	Σ	OK	Σ			1 6	1 6	1		3	6	6	6	X
11	Σ	Σ						1 6	1 6	1		3	6	6	6	X
21		Σ		OK				1 6	1 6	1	Σ	3	6	6	6	X
31	OK	Σ		OK				1 6	1 6	1	OK	3	6	6	6	X
41		Σ	Σ	OK				1 6	1 6	1		3	6	6	6	X
2	OK	Σ	(	OK	Σ	Σ	Σ	OK	OK	2	2	4			OK	X
42			(	OK	Σ					2	2	4				X
3	OK	Σ	(	OK	OK	OK		OK	Σ	OK	OK	5			OK	X
4			(	OK	OK	OK		OK	OK	OK	Σ	OK	OK			X
14	Σ	Σ	(	Σ	Σ			Σ	Σ	Σ	Σ	3			Σ	X
214		Σ	(					Σ	Σ			3				X
314		Σ	(	OK				OK	Σ		OK	3	Σ			X
414			(									3				X
24	Σ		(	Σ	Σ			Σ	Σ	Σ	Σ	4				X
424	X	X	(	X	X	X	X	X	X	X	X	X	X	X	X	X
34			(	OK	Σ	Σ		OK	OK	OK	Σ	5	Σ	Σ	Σ	X

Each cell of matrix (38) is coded to indicate the status of occurrence of the sequence of one-syllable words whose first member has the tone indicated directly to the left of the cell in question and whose second member has the tone indicated directly above that cell.

Forty-one cells contain an X to identify the sequences not permitted due to the fact that the clusters /11 424/ never occur as basic clusters on monosyllabic words.

Forty-eight cells of the matrix occur with the number of one or two tone sandhi rules, indicating that these sequence do not occur because of the automatic operation of these rules.

Forty-six cells of the matrix are coded with Σ to indicate that they have been observed in a corpus of 765 lines of text as the result of the operation of a tone sandhi rule. Most of these sequences could have occurred as basic sequences apart from tone sandhi. The exceptions are: (T)1 + 14, (T)1 + 11, and 11 + T(T). The first of these sequences may not occur as a basic sequence because of the operation of Tone Sandhi Rule 6. It occurs as a derived sequence by the operation of Tone Sandhi Rules 1 or 3. The other two sequences may occur only as the result of the operation of Tone Sandhi Rule 1 because of the fact that cluster /11/ does not occur as a basic tone sequence on any one-syllable words.

Thirty-six cells of the matrix are coded by OK to indicate that those sequences have been observed to occur in the 765 line corpus referred to above. The remaining 85 unmarked cells represent sequences that are permissible but which were not found in the text material reviewed. Many of these sequences will presumably be found in other texts. Some of the tones and clusters in question, however, occur on very few words and will therefore be rare (e.g., /42 214 414/). Other tones occur on words that are restricted to one grammatical category (such as the tone cluster /21/ which occurs only on negative verbs), and it is unlikely that two such words would ever be juxtaposed in a sentence.

In summary, of the 256 theoretically possible sequences of tones on two successive monosyllabic words, 89 do not occur either because of the restricted distribution of the clusters or because of tone sandhi rules. This leaves 167 permitted sequences, of which 82 have so far been observed in about 765 lines of text.

Matrix (39) is coded to indicate the occurrence of sequences of tone within two-syllable words.

(39)

	1	14	11	2	24	21	214	3	34	31	314	4	41	414	42	424
1	OK	Σ	Σ	OK	Σ			1 6	1 6	1		3	6	6	6	6
11	σ			σ				1 6	1 6	1		3	6	6	6	6
21	OK							1 6	1 6	1		3	6	6	6	6
31	OK			*OK*				1 6	1 6	1		3	6	6	6	6
41	OK							1 6	1 6	1		3	6	6	6	6
2	OK	Σ *OK*	X	OK	OK	OK	Σ *OK*	*OK*	*OK*	2	2	4	OK	*OK*	*OK*	
42			X	*OK*		*OK*	σ	*OK*	*OK*	2	2	4	*OK*	σ	*OK*	
3	OK	OK	X	OK	OK			OK	OK	OK	OK	5			OK	
4	OK	OK	X	OK	*OK*			OK	OK			OK	OK	OK	OK	OK
14	Σ	OK	X	Σ *OK*	Σ *OK*			OK	Σ *OK*			3	OK	Σ	OK	Σ
214		OK	X	Σ *OK*				*OK*	*OK*			3	*OK*	σ	*OK*	
314		OK	X	*OK*				OK	*OK*			3	OK	σ	OK	
414		OK	X	*OK*				*OK*	*OK*			3	*OK*	σ	*OK*	
24	Σ	Σ	X	Σ *OK*	Σ			Σ	Σ			4	Σ	Σ	Σ	σ
424			X	*OK*								4				
34			X						OK			5	σ	σ	σ	

The cells of matrix (39) are coded to indicate the status of two-syllable words whose first syllable has the tone indicated immediately to the left of the cell and whose second syllable has the tone indicated immediately above the cell.

Eleven cells are coded by X to indicate the non-occurrence of those sequences because of the fact that the cluster /11/ never occurs as the basic tone of any syllable.

Fifty-four cells are coded with one or two numbers to indicate that the sequences in question do not occur because of the operation of particular tone sandhi rules.

Forty cells are coded by OK to indicate that those sequences have been observed in two-syllable words within the corpus of 765 lines of text reviewed. An additional 31 cells are coded by *OK* to indicate that these sequences have been observed in elicited material but not within the particular extended text material reviewed.

Twenty-one cells of the matrix are coded by Σ to indicate that the sequences of tone in question were observed in the text material reviewed, but only as a result of the operation of a tone sandhi rule. Seven of these 21 sequences have also been observed on two-syllable words which have been independently elicited apart from text material.

An additional 11 cells of the matrix are coded by σ to indicate that the sequences in question have been observed as a result of tone sandhi operations in independently elicited material apart from the corpus of text material.

The remaining 95 unmarked cells of the matrix represent sequences of tones that have not been observed on two-syllable words either in the corpus or in other elicited material.

In summary, of the 256 theoretically possible sequences of tones on two-syllable words, 160 have not been observed. Of the 96 occurring sequences, 71 occur as basic sequences and 25 as the result of tone sandhi.

Of the more than 4,000 theoretically possible sequences of tone on three-syllable words, only around 100 are known actually as basic sequences. Upgliding tone clusters are rare in first and second syllables. Downgliding tone clusters, except /14/, are extremely rare in first and second syllables. Any tone or tone cluster, except /11 424/, may occur in the third syllable.

5. Relation to Grammatical Forms

Each word in my corpus has been assigned to a class on the basis of its basic tone or tone sequence. For example, the basic tone /1/ class consists of all the one-syllable words that are pronounced in isolation with a tone /1/, and the basic tone se-

quence /2:21/ class consists of all the two-syllable words that are pronounced in isolation with that tone sequence. There is also a tone cluster class /11/, and several tone sequence classes that occur only as result of tone sandhi. Only basic tone classes will be discussed in this section, since all of them can be pronounced in isolation and are included in the basic classes.

The basic tone /1/ class consists of about thirty words. None are nouns, except for personal names, e.g., /hųą^{1}/ *Juan*. The basic tone /2/ class consists of over one hundred words of all grammatical types. The basic tone /3/ class consists of over seventy words of all grammatical types. The basic tone /4/ class consists of over fifty words. Only about six are verbs, eight are adjectives, and the rest are nouns.

The basic tone cluster /14/ class consists of about ten words from various grammatical types. The basic tone cluster /24/ class consists of about ten words from various grammatical types. The four nouns are all Spanish loans. The basic tone cluster /34/ class consists of about twenty-five words from various grammatical categories.

The basic tone cluster /21/ class consists of about seventy words; all are negative verbs except for the negative adjective ntąih^{21} *not good*. The basic tone cluster /31/ class consists of about fifty words, none of which are nouns. These are the same words that make up the tone cluster /11/ class in the environment following a tone /1/ because of Tone Sandhi Rule 1. The basic tone cluster /41/ class consists of about fifty words, all of which are verbs, mostly marked for incompletive aspect, except for the adjective cųh^{41} *yours (pl)*.

The basic tone cluster /42/ class consists of fewer than twenty words from various grammatical categories.

The basic tone cluster /214/ class consists of about twelve words, all of which are negative first person plural exclusive verbs ending with -ị, except for two words which are negative first person singular verbs.

The basic tone cluster /314/ class consists of about thirty words from various grammatical types. The basic tone cluster /414/ class consists of less than ten words, all of which are negative first person plural exclusive verbs.

Basic tone sequence classes of two-syllable words are referred to according to size in the following way: less-than-ten-words, small (10-50 words), medium (50-100 words), and large (over 100 words).

Some classes contain only verbs. The following four basic tone sequence classes each contain less than ten words, all of which are verbs: /4:424/ (all have interrupted final syllable),

/14:24/ (only one word), /31:2/, and /414:2/.

The basic tone sequence /4:24/ class is small, and all words are incompletive aspect first person plural exclusive or incompletive aspect third person verbs.

Six basic tone sequence classes contain only one-syllable verbs plus suffixes: /31:1/ (e.g., /meh^{31}na^{1} *I want*) and /41:1/ are both medium classes; /414:14/ is small, all forms ending in -rä^{4} *to him*, -rą^{4} *to her*, or -ru^{4} *to it (animal)*; /414:34/ is less than ten words, all ending in -nih^{34} *to us (ex)*; /414:41/ is less than ten words, all ending in -nuh^{41} *to you*; and /414:42/ is less than ten words, all ending in -nah^{42} *to us (in)*.

Three basic tone sequence classes contain only negative verbs: /2:214/ is small, all first person plural exclusive, ending in -į; /2:414/ is under ten words; /42:21/ is under ten words, all marked for incompletive aspect.

Eight basic tone sequence classes contain only one-syllable negative verbs plus suffixes: /21:1/ is large; /214:2/ is less than ten words, all ending in -ra^{2} *to him*; /214:3/ is small; /214:14/ is small, all ending in -rä^{4} *to it*, -rą^{4} *to her*, or -ru^{4} *to it (animal)*; /214:34/ is small, all ending in -nih^{34} *to us (ex)*; /214:41/ is less than ten words, all ending in -nah^{41} *to you (pl)*; /214:42/ is less than ten words, all ending in -nah^{42} *to us (in)*; /414:3/ is small.

Eleven basic tone sequence classes contain mostly verbs: /1:2/ is small; /2:1/ is small, the verbs all ending with a directional suffix; /2:21/ is large, about three hundred forms, the most common tone pattern for negative verbs; /3:1/ is large, including only fifteen non-verbs; /3:24/ is small, including a few Spanish loan nouns; /3:31/ is medium, all non-verbs being nouns ending in -nuh^{41} *your (pl)*; /3:314/ is small, including only three nouns; /4:1/ is medium, all the verbs being incompletive, imperative, or both, and only six of the forms being non-verbs; /4:414/ is small, including only two nouns; /14:3/ is medium, all the verbs being first or second person; /42:2/ is small, all forms being one-syllable plus a suffix.

Seven basic tone sequence classes contain verbs and nouns: /4:41/ is large, about half being negative verb forms, and all the nouns being one-syllable with tone /4/ plus -nuh^{41} *your (pl)*; /4:42/ is medium, nearly all words being first person plural inclusive forms, and the nouns being nearly all bound or fused possessive forms; /14:14/ is less than ten words, mostly one-syllable words with tone /1/ or cluster /14/ plus -rä^{4} *its*; /14:34/ is small, all words being first person plural exclusive forms, the verbs being all positive, the nouns being all one-syllable nouns with the cluster /14/ plus -nih^{34} *our (ex)*; /14:41/ is under ten words, both

verbs and nouns being one-syllable plus -nuh^{41} *you (pl)*; /$^{14:42}$/ is small, all words being first person plural exclusive forms, all the nouns one-syllable plus -nah^{42} *our (in)*; /$^{2:41}$/ is small, almost all the verbs being negative, and all the nouns being one-syllable with tone /^{2}/ plus -nuh^{41} *your (pl)*.

Five basic tone sequence classes are all one-syllable words plus suffixes: /$^{314:3}$/ is small; /$^{314:14}$/ is small, and most forms end in -rä^{4} *its*, -rą^{4} *her*, or -ru^{4} *its (animal)*; /$^{314:34}$/ is small, all words ending in -na?^{34} *my* or -nih^{34} *our (ex)*; /$^{314:41}$/ is small, all ending in -nuh^{41} *you (pl)*; /$^{314:42}$/ is small, all forms ending in -nah^{42} *our (in)*.

Nine basic tone sequence classes contain words from various grammatical categories, including adjectives, adverbs, etc.: /$^{1:1}$/ is medium, and includes many first person singular verbs; /$^{2:2}$/ is large; /$^{2:14}$/ is under ten words; /$^{2:24}$/ is large, many of the words being positive first person plural exclusive neutral aspect verbs ending in -ą; /$^{3:2}$/ is large; /$^{3:3}$/ is large; /$^{3:14}$/ is medium; /$^{4:2}$/ is large, all the verbs being incompletive, imperative, or both; /$^{4:3}$/ is large, all the non-compound verbs being incompletive, imperative, or both, and many of the nouns being obligatorily possessed, consisting of a body part and a fused person marker (cf. C. Jamieson, 1974:2f).

Ten basic tone sequence classes contain mostly nouns: /$^{3:34}$/ is large, including about thirty Spanish loan nouns; /$^{4:4}$/ is large, including only two verbs; /$^{4:14}$/ is small, with only seven verbs; /$^{4:34}$/ is medium, including only two verbs; /$^{14:2}$/ is under ten words, one form nti^{14}ll^{2} *little bell* probably being a Spanish loan, and the rest being all one-syllable words with tone /^{1}/ or cluster /^{14}/ plus -ra^{2} *his*; /$^{24:2}$/ is small, all words being one-syllable with tone /^{2}/ plus -ra^{2} *his*; /$^{2:3}$/ is small, all the nouns being bound or fused possessive forms, and the bound forms being all one-syllable with tone /^{2}/ plus -rih^{3} *your (sg)*; /$^{2:34}$/ is small, all the nouns being one-syllable with tone /^{2}/ plus -na?^{34} *my* or -nih^{34} *our (ex)*; /$^{2:42}$/ is small, all words being first person plural inclusive forms, mostly one-syllable with tone /^{2}/ plus -nah^{42} *our (in)*; /$^{314:2}$/ is less than ten words, mostly one-syllable nouns with the tone cluster /^{314}/ plus -ra^{2} *his*.

Four basic tone sequence classes contain less than ten words each, and all are one-syllable words with the cluster /^{42}/, mostly nouns, plus the suffixes indicated: /$^{424:2}$/ with -ra^{2} *his*; /$^{42:34}$/ with -na?^{34} *my* or -nih^{34} *our (ex)*; /$^{42:41}$/ with -nuh^{41} *your (pl)*; /$^{42:42}$/ with -nah^{42} *our (in)*.

Three basic tone sequence classes contain all one-syllable nouns plus the suffixes indicated: /$^{34:34}$/ is small, ending in -na?^{34} *my* or -nih^{34} *our (ex)*; /$^{3:42}$/ is small, ending in -nah^{42} *our (in)*; /$^{42:3}$/ is less than ten words, ending in -rih^{3} *your (sg)*.

6. Text

The following text was originally recorded in early 1970 by Mr. Ernesto Tejeda Salvador, in his mid-forties, a native and present resident of Chiquihuitlan. After transcribing the actual text from the tape, Mr. Tejeda did minor editing to remove pause forms, etc. Then, in 1974 he re-recorded it, reading from the edited text, which, incidentally, was written in the popular orthography in which tones are not written. In addition, he re-recorded the text by whistling it all the way through. In my judgment the only undersirable effect obtained by this procedure was that Mr. Tejeda interrupted the application of the tone sandhi rules by inserting more than the normal number of phonological pauses, since he was reading a script rather than just speaking extemporaneously. However, the slower speed of speech and the more frequent pauses greatly facilitated the checking of the tones. The correspondence between the tones of the spoken and the whistled versions confirms the accuracy of the transcription here presented.

Abbreviations used in the text are the following:

(def)	definite article
(ex)	exclusive
(in)	inclusive
(pl)	plural
(pp)	a phonological pause that broke the continued application of the tone sandhi rules
(3p)	3rd person
14*4	basic tone 4, as spoken in isolation, has changed to 14, and similarly for other tone changes
....	more than one Mazatec word the equivalent of one gloss

CHIQUIHUITLAN MAZATEC TEXT

1. nke?^{34} kuI^{3}ča^{14*1} koh^{3}nuh^{31} nku^{2} ho^{1} khua^{14*4} sa^{3}kua?^{34}
here will-say-I with-you-(pl) one two word like

I will tell you something about when I was growing up with

nI^{4}štį^{34}na?^{34} šI^{3} ka^{2}ma^{2}ča^{2} koh^{3} šu^{34*4}ta^{34*4}ča^{2}na?^{34} (pp)
day-my which became-mature with parent-my

my parents.

2. he^{14*1}mu^{14*1} ñtah^{114*31} ka^{14*3}ba^{14}thu^{3} ka^{3}ma^{14*1} ta^{3}
very good passed-I happened for

I had it pretty good, for they did not make me work too

ka^{3}cI^{3}he^{2}ntąI^{21}na^{1} me^{14*4} 3. ?I^{3}ska^{3} šI^{3} ka^{3}be^{14}ču^{3} ţhų?^{2}nku^{2}
did-not-tire-(3p)-me they until ... reached-I sixteen

hard. It was not until I reached

nu^{2} ne^{24*4} se?^{34} ka^{3}be^{14}thu^{3} skue^{3}la^{34} (pp) 4. pe^{4}ru^{4} sa^{3}kua?^{34}
year , then left-I school but like

sixteen years of age that I quit school. However, on

sa^{3}ba^{3}du^{34} koh^{3} do^{3}mI^{3}nkų^{34} šI^{3} cąIh^{31} kIa^{1*3}se^{14*34}
Saturday with Sunday which there-is-not class

Saturdays and Sundays, when there were not any classes, I would

ne^{14*4} hbä^{2} koh^{3} šu^{34*4}ta^{34*4}ča^{2}na?^{34} nkI^{3}hña^{2} 5. me^{2} ša^{2}
, *go-I with parent-my field what work*

go to the fields with parents. I was already

šI^{2*3} sa^{2*3}?mI^{1} me^{24*4} ne^{24*4} (pp) ?a^{4} tI^{3}hba?^{31}kue^{14}nta^{3}
which do-(3p) they , already am-taking-notice-I

taking notice of all the various jobs they would do.

yäh^{3}nI^{2} koh^{3} me^{34*4} 6. ka^{3}be^{3}ču^{1} nu^{2} šI^{2*3} ka^{2*3}ma^{14*1}
everything with them arrived-(3p) year which became

The year that I reached manhood, then

nką?^{3*34} šį?^{3*14} cä?^{3*4} khua^{4}ta^{3}kų^{14} ne^{14*4} se?^{34} ka^{3}be^{14}cę?^{3}
I man of-(3p) mind , then began-I

I began to work just like my parents.

ne^{34*4} ?a^{2}ku^{2}thį^{2} ša^{2} šI^{2*3} sa^{2*3}?mI^{2} šu^{24*4}ta^{24*4}ča^{2}na?^{34} ne^{34*4}
, *how work which do-(3p) parent-my* ,

(pp) ʔa⁴kua⁴thɭ² ka²*³sa¹ʔme¹ (pp) 7. šį³ thų¹thų¹
just-like-that did-I *which first-first*

First of all, I would

ne¹⁴*⁴ ka³mu¹sų¹ (pp) 8. ka³hbä³ ne³⁴*⁴ se?³⁴
, *cleared-I* *was-finished-(3p)* , *then*

clear the land. *After that, then one would*

ʔį³skę¹⁴ šį³ na³nkį³⁴šta¹⁴ ne¹⁴*⁴ ka³bį³nčį³se¹⁴rä¹⁴ nʇah¹⁴*⁴
where .... ground-smooth , *were-looked-for-(3p) cattle*

look for oxen to plow where the ground was smooth (i.e., not

ka³ba³khę² ču²⁴*⁴ 9. ʔį³skę¹⁴ šį³ na⁴šį⁴nʇa³45 ne³⁴*⁴ koh³
broke-(3p) animal *where .... bouldery* , *with*

covered with boulders). *Where there were lots of boulders,*

ɭe⁴ʔba¹⁴ ka³ba²khɭ²⁴ (pp) 10. ʔa⁴kų¹⁴¹ hį²nku²hyä²
hoe broke-we-(ex) *not everywhere*

we would break up the ground with hoes. *We do not say that*

šį²*³ nu¹⁴hę⁴² šį²*³ su²*³ba¹ nʇah¹⁴*⁴ ka³ba³khę² ču²⁴*⁴ (pp)
that say-we-(in) that only cattle broke-(3p) animal

the oxen alone plowed everywhere.

11. ʔa⁴ču⁴ koh³ šu³⁴*⁴ta³⁴*⁴ ka³ba³khę² me²⁴*⁴ koh³ ɭe⁴ʔba¹⁴ ta³
still with person broke-(3p) they with hoe for

People still had to break up the ground with hoes, because

cä?³⁴*⁴ šį³ ʔį³skę¹⁴ na¹⁴*⁴šį¹⁴*⁴nʇa³⁴ ne³⁴*⁴ maɭh³¹ ba¹*³khę²
because ... where bouldery , *cannot break-(3p)*

the oxen cannot plow where there are a lot of boulders.

nʇah²⁴*⁴ 12. šį³ ka²hne²ta?² ka²*³ba²*³khę²*³rä²⁴*³⁴ ne²⁴*⁴
cattle when ended-(3p) was-broken-it ,

After the plowing was done, the plowed ground would

ka³hba³ña³ he³?ntu³ ʔį³skę¹⁴ ka³ba³khę³rä³⁴ hę² 13. nku² ho¹
lay-(3p) rotting where was-broken-it (def) one two

lie fallow. *For several*

nį¹⁴*⁴štɭ³⁴ ne³⁴*⁴ ?ya³ šį³ ka²ma²tį²ña² nį²⁴*⁴štɭ³⁴ šį³
day , *when.... became-near day which*

days, when the time to plant was near, then the oxen and the

šɪ^{4}nča^{1} thä^{14*4} ne^{14*4} se?^{34} ka^{3}bu^{3}ya^{2} klh^{21*31}nka^{1}
will-be-put-in-(3p) seed , then returned-(3p) went-(3p)-again

hired workers with hoes would go back again to replow.

nʇah^{14*4} ne^{14*4} klh^{31}nka^{1} mu^{1*3}su^{14*34} koh^{3} le^{4}?ba^{14} ne^{14*4}
cattle , went-(3p)-again hired-worker with hoe ,

šɪ^{3} khuɪ^{4}nɪ^{3}ya^{1} (pp) 14. ?a^{4} šky^{4} šɪ^{3} ka^{3}hbä^{3}
so will-be-moved when ..... was-finished-(3p)

When the replowing was finished,

ka^{3}hbɪ^{3}nɪ^{3}ya^{1} re^{14*4} se?^{3*34} kue^{4}hña^{2}ya^{14}rä^{14} cɪ^{2} šɪ^{2*3}
was-moved , then will-be-awaited-(3p) rain which

then one would wait for the rain.

kua?^{2*3} (pp) 15. pe^{4}ru^{4} sa^{3} šɪ^{3} nta^{1}hyɪ?^{1} nu^{2} ne^{24*4}
will-rain-(3p) but if.... good-looks year ,

But if it is a good year, one does not

(pp) ?a^{4} ?ɪ^{3}ska^{3} ?a^{4}kyɪ^{41} kue^{14*4}hña^{2}ya^{14*1} ta^{3} tu^{4}nku^{2}
even not will-be-awaited-(3p) for as-soon-as

even wait, for as soon as one finishes replowing, one plants,

kuɪ^{24*4}hne^{3}ta?^{2} khuɪ^{24*4}nɪ^{3}ya^{1} ne^{14*4} (pp) ?a^{4} nku^{3}thę^{34}nɪ^{2}
will-end-(3p) will-be-moved , right-away

for in a good year, it rains early.

šɪ^{24*4}nča^{1} thä^{14*4} ta^{3} ?ya^{3} šɪ^{3} nta^{1}hyɪ?^{1} nu^{2} ne^{24*4}
will-be-put-in-(3p) seed for when.... good-looks year ,

he^{1}mu^{1} thy^{1} ba?^{1*3} cɪ^{2} (pp) 16. ?ya^{3} šɪ^{3} ba^{3}nkɻ^{2*24}
very first rains-(3p) rain when.... go-we-(ex)

When we go to plant,

šɪ^{3} šɪ^{4}nča^{1} thä^{14*4} (pp) ?a^{4}kua?^{4} ma^{1} nku^{2}
so will-be-put-in-(3p) seed also happens one

there is a little matter (to be taken care of).

khua^{24*4}nʇa^{34} lɪ^{3}?ntɪ^{14} 17. ma^{1} nta^{2}hña^{24} ša^{24*4}?nta^{24*4}
bother little is-made <u>mole</u>-sauce chicken

One makes chicken <u>mole</u>, or else

ʔo^{3} sa^{3} šɨ^{3} cä?^{34*4} na^{34*4}hñu^{34*4} šɨ^{3} khue^{34*4} šɨ^{3}
or else... of-(3p) turkey which will-go-(3p) which

turkey <u>*mole*</u>[fn]*, to send out for the planters to eat.*

sɨ^{34*4}ne^{34*4} čа^{2} šɨ^{2*3} bɨ^{2*3}nča^{2} thä^{24*4} 18. šɨ^{3}
will-eat-(3p) they who put-in-(3p) seed when

After

khuä^{3} šɨ^{4}nča^{1} thä^{14*4} ne^{14*4} (pp)
will-be-finished-(3p) will-be-put-in-(3p) seed ,

finishing planting, all the helpers would go to my house,

khue^{4} yäh^{3}nɨ^{2} ko^{2*3}mpa^{2*3}ñe^{2*3}ru^{24*34} ta?^{2} nɨa^{24*4}na?^{34}
will-go-(3p) all companion to house-my

because the custom is to have a drink.

ta^{3} šku^{4}sų^{14} šɨ^{3} ta^{2}kų^{2} ne^{24*4} (pp) sa^{4}ku^{1} nku^{2}
for custom which is , will-be-found one

tra^{2*3}gu^{24*34} kuɨ?^{42} me^{24*4} (pp) 19. ʔa^{4}kųɨ^{41}
drink will-drink-(3p) they not

Not for them

ʔɨ^{1*3}ska^{1*3}šɨ^{1*3} ku^{14*4}ma^{3}čɨ?^{34} me^{34*4} ta^{3} ʔa^{2}ku^{2}thɭ^{2} šɨ^{2*3}
until ..... will-become-drunk-(3p) they but how .....

to get drunk, but just to take away their tiredness.

khua?^{42}ta?^{214}nɨ^{14}rä^{14} šɨ^{3} hbe^{3}nta^{3}rä^{34} me^{34*4}
will-be-taken-away-(3p) that are-tired-(3p) they

20. ka^{3}be^{3}ču^{1} nku^{2} nɨ^{2}štɭ^{2} šɨ^{2*3} ka^{2*3}be^{2*3}cɭ?^{24} ka^{2}ma^{2}thąɨ^{2}
arrived-(3p) one day that began-(3p) became-over-grown

When the poor cornfield became overgrown, one would

šu^{2*3}ma^{24*34} hnu^{24*4} ne^{24*4} ka^{3}be^{3}cɭ?^{2*24} ka^{3}thu^{3}nčɨ^{3}rä^{34} (pp)
poor corn-plant , began-(3p) was-weeded-(3p)

begin weeding it.

21. ʔa^{4}kua^{4}thɭ^{2} ka^{2}ma^{2}ta^{24}nkų^{2} nka^{24*4}yɭ^{34} (pp) me^{4} šɨ^{3}
like-that became-together we-(ex) they who

[fn] <u>Mole</u> is a type of sauce used with meats.

So then we would get together, those who were hired, and those

koh^{3} čhɩ^{2}rä^{24} (pp) me^{4} šɩ^{3} sa^{14*1}ʔme^{14*1}ya^{14*1} koh^{3}
with pay-(3p) *they who exchange-work-I* *with*

with whom I exchanged work.

22. nku^{2}ʔñu^{2} ɬbä^{2*3} thu^{2*3}nčɩ^{2*3}rä^{24*34} šɩ^{3} kua^{4}thɩ^{2}
quickly is-finished-(3p) is-weeded-(3p) *when like-that*

In that way one finishes the weeding quickly.

(pp) 23. kue^{4}cɩ$^{?42*424}$ ku^{2*4}ma^{3}thąɩ^{4}nka^{2}
will-begin-(3p) will-become-overgrown-again

When the weeds begin to overgrow (the field) again,

nkɩ^{2*3}hña^{2}nkɩ^{2}rä^{24} (pp) ʔa^{4}ču^{4}ba^{4} bä$^{?3*34}$nɩ^{2} ku^{24*4}ma^{3}
brush-its *way* *that-just* *will-be-done*

one does that same thing.

24. nku^{2}ʔñu^{2} ɬhuä^{3} ku^{4}ma^{3}rka^{3} (pp)
quickly will-be-finished-(3p) will-become-cleaned

It is quickly weeded.

25. ʔa^{4} bä$^{?34}$ hɩ^{3}ma^{3} ne^{34*4} kue^{4}cɩ$^{?42*424}$
that is-being-done , will-begin-(3p)

While that is being done, it begins to produce the

ku^{2*4}ma^{3}nta^{2}tɩ^{4} (pp) kue^{4}cɩ$^{?42*424}$ ku^{2*4}ma^{3}hyä$^{?34}$
will-produce-corn-flower *will-begin-(3p)* *will-produce-small-ear*

corn flower; it begins to produce small ears;

kue^{4}cɩ$^{?42*424}$ ku^{2*4} ma^{3}nču^{34}tɩ^{34} ʔɩ^{3}ska^{3}
will-begin-(3p) *will-produce-tender-ear* *even*

it begins to produce tender ears; even before we notice it,

ku^{4}ma^{3}ča^{2}yąɩ^{214}nah^{42} nɩ^{24*4}štɩ^{34} ne^{34*4}
will-become-not-noticeable-to-us-(in) day ,

the mature ears will begin to turn yellow.

kue^{4}cɩ$^{?42*424}$ ku^{2*4}ma^{3}sɩ^{3}ne^{1} nɨh^{14*4} 26. ʔya^{3} šɩ^{3}
will-begin-(3p) *will-become-yellow* *mature-ear* *when ....*

When the

kue^{4}cɩ$^{?424}$ ʔñu^{2} ku^{24*4}ma^{3}sɩ^{3}ne^{1} nɨh^{14*4} ne^{14*4}
will-begin-(3p) *strong will-become-yellow mature-ear ,*

mature ears would really begin to turn yellow,

sa^{3}kua?^{34} šku^{4}sɥ^{14} šɨ^{3} ta^{2}kɥ^{2} ne^{24*4} (pp) khue^{4}
like custom which is , will-go-(3p)

the custom was to go pick a few to make corn gruel.

čha?^{414}rä^{14} nku^{2} štɻ^{2} ku^{24*4}ma^{3}nčah^{2} (pp)
will-be-taken-away-(3p) one little-bit will-be-made-corn-gruel

27. ?ya^{3} šɨ^{3} škuɥ^{2}nɨ^{2}bä^{24} šɨ^{3} ntah^{31} ?yu^{1}
when.... unripe-just-that when good drinkable

When those are sill just unripe, (that's when) the corn gruel

nčah^{2}rä^{24} (pp) 28. tu^{4}ñɨ?^{3} ta^{3} (pp) khue^{4}sa^{3}
corn-gruel-its as-soon-as.... will-go-(3p)-more

tastes real good. Later on, (the mature ears) would

nɨ^{4}štɻ^{34} ne^{34*4} khuä^{3} šɨ^{34*4}
day will-be-finished-(3p) will-dry-(3p)

all become dry.

29. tu^{4}ñɨ?^{3} ta^{3} ka^{3}hbä^{3} ka^{3}šɨ^{1} ne^{14*4} (pp)
as-soon-as.... was-finished-(3p) dried-(3p) ,

As soon as it would all dry up,

kue^{4}cɻ?^{424} kuɨ^{24*4}nčɨ^{2}rä^{24} mu^{3}su^{34} šɨ^{3} khue^{34*4}
will-begin-(3p) will-be-looked-for hired-worker who will-go-(3p)

one would begin to look for hired workers to go harvest.

khua^{4}nka^{1} (pp) 30. kuɨ^{4}nčɨ^{2}rä^{24} na^{24*4}šɻ^{2} šɨ^{2*3}
will-harvest-(3p) will-be-looked-for horse/mule which

One would look for mules

kua^{24*4}nɨh^{41} ču^{14*4} 31. ?ɨ^{3}skɥ^{14} šɨ^{3} tɨ^{2}ña^{2} ne^{24*4} (pp)
will-carry-(3p) animal where .... near ,

to transport it. Where it was close,

sa^{4}?mɨ^{1} ču^{14*4} ho^{1} ntɨ^{14*4}ya^{2} (pp) 32. ?ɨ^{3}skɥ^{14} šɨ^{3} khɻ^{2}
makes-(3p) animal two time where .... far

the animals would make two trips. Where it was far,

ne^{24*4} nku^{2} nɨ^{2}ya^{2}nɨ^{2} (pp) 33. ʔɨ^{3}ska^{3} šɨ^{3} ku^{4}ma^{3}nki^{3}šų^{1}
, *one time-just* *until .... will-become-night*

just one trip. *They would barely be on their*

ne^{14*4} se$^{?34}$ bɨ^{3}ntu^{3}ba^{2}rä^{24} (pp) 34. tu^{4}ñi$^{?3}$ ta^{3} ka^{3}hbä^{3}
, *barely is-coming-(3p)* *as-soon-as.... was-finished-(3p)*

way back at nightfall. *As soon as one*

ka^{3}cɨ^{3}ñah^{3}rä^{34} ne^{34*4} (pp) ʔa^{4}kua$^{?4}$ ka^{2}ma^{2}nku^{2}ta^{2}kų^{214*21}
was-carried-(3p) , *also* *became-relieved-we-(in)*

finished transporting it, one would be relieved,

ta^{3} thɨ^{2} ka^{24*4}ʔntä^{3*34} ne^{3*4} he^{1}mu^{1} thɨ^{2} ču^{24*4} šta^{3}ña^{34}
for there-is place , *very* *there-is animal pest*

because there are some places where there are a lot of pests.

35. maih^{31} bɨ^{1*3}yuh^{2}ta$^{?21}$ hnu^{14*4} šɨ^{3} ba^{3}thu^{3} nɨ^{4}štɨ^{34}
cannot stay-(3p) *corn-plant when passes-(3p)* *day*

The cornfield cannot just stay out there day after day.

36. tu^{4}ñi$^{?3}$ ta^{3} ka^{3}hbä^{3} ka^{3}thu^{3}nka^{14}rä^{14} ne^{14*4} (pp)
as-soon-as.... was-finished-(3p) *was-harvested* ,

As soon as one finished harvesting,

ʔa^{4}kua$^{?4}$ ka^{2}ma^{2}nku^{2}ta^{2}kų^{21} (pp) 37. ʔa^{4}ne^{4} se$^{?3*34}$
also *became-relieved-we-(in)* *and* *then*

one was relieved. *And then*

kue^{14}cę^{42} nɨ^{24*4}ʔña^{42} nku^{2} nʈa^{2*3}ʔnka^{24*34} šɨ^{3}
will-begin-we-in *will-make-we-in* *one* *corncrib* *which*

one would begin to make a corncrib to store it in,

šɨ^{4}nča^{1} (pp) sa^{3} šɨ^{3} cęh^{2} ta^{3} khɨ^{1} ma^{1} (pp)
will-be-put-in-(3p) *if .... is-seen-(3p)* *that much is*

if it looks like there is a lot.

38. sa^{3} šɨ^{3} ʔa^{4}kųɨ^{41} khɨ^{1} ne^{14*4} (pp) ʔa^{4} nta^{2}sa^{1}
if .... not *much* , *although*

If it is not a lot, then even though it is

ka^{14*4}ʔncua^{14*4} ntɨ^{3}ʔya^{34}nɨ^{2} ku^{24*4}ma^{3}ntah^{31} ka^{14*4}ʔntä^{34}rä^{34}
inside *house-just* *can-be-fixed-up* *place-its*

just inside the house, one can fix up a place for it,

ne^{34*4} (pp) nkąh^{2}ni^{2} šį^{2*3}nčа^{2}ntah^{21} (pp) 39. ?ya^{3} šį^{3}
, *there-just is-put-away-(3p)* *when....*

and store it right there. *When one*

ka^{3}hbä^{3} ka^{3}šį^{3}nčа^{2}ntah^{21} ne^{14*4} ka^{2}ma^{2}nku^{2}ta^{2}kų^{21} (pp)
was-finished was-put-away-(3p) , *became-relieved-we-(in)*

finishes storing it away, one would be relieved.

40. sa^{3} šį^{3} čhą?^{31}nka^{1} nku^{2} ša^{2} ni^{24*4}?ña^{42} ne^{24*4}
if .... take-we-(in)-again one work will-do-we-(in) ,

If one takes up another job, one does it some other day.

(pp) pe^{4}ru^{4} ?a^{4}nku^{2} ni^{2}štį^{2} bä?^{24*34} 41. nta^{3}stu^{14} šį^{3}
but another day that *at-least which*

At least the

meh^{31} ša^{1}tį^{2} ne^{24*4} ka^{2}hne^{2}ta?^{2} (pp) 42. kua^{4}thį^{2}
is-needed fast , *ended-(3p)* *like-that*

important thing is done. *That is*

ka^{2*3}ntu^{2*3}ba^{2} ni^{24*4}štį^{34} bä?^{34}
came-(3p) *day* *that*

what those days were like.

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NOTES

1

The data presented in this paper were gathered during the years 1969 through 1973, under the auspices of the Summer Institute of Linguistics, from speakers of the Mazatec language as spoken in Chiquihuitlan de Juárez, District of Cuicatlan, in the extreme northern part of the State of Oaxaca in Mexico. The analysis is based mainly on the pronunciation of Mr. Ernesto Tejeda Salvador, in his mid-forties, a native-born Chiquihuitecan of native-born parents. There are now about 6000 inhabitants of Chiquihuitlan, about 90% of whom speak the Mazatec language.

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2

Numbers preceded by 'A' refer to cognate sets in Kirk (1966).

3

Cluster /^{114}/ is not included in this discussion because it occurs only rarely and in a complicated environment.

4

Numbers precede by 'S' refer to sentences in the text appended to this paper.

5

According to Tone Sandhi Rule 5, this word should have tone pattern ^{34}:^{34}:^{34}.