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DOWNSTEPPING TERRACE TONE IN COATZOSPAN MIXTEC

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1. Introduction

There are four especially interesting features of the Coatzospan dialect[1] of Mixtec: (1) Within the tonal system there is a process phoneme such that when certain classes of words are in sequence, there is downstepping terrace tone. (2) The process phoneme is the key to the tone sandhi changes. That is, changes which appeared to be arbitrary are in fact regular once the presence of the process phoneme is recognized. (3) There are contrastive nuclei of the phonological word-phrase: those marked by glottal stop, and those marked by a lengthened vowel. The distribution of both consonants and vowels varies in accordance with these contrastive nuclei. (4) There are oral word-phrases versus nasal word-phrases. The nasal word-phrase always has the component of second person singular familiar, and the extent of the nasalization within the word-phrase is predictable.

[1] Coatzospan Mixtec is spoken by roughly 2,000 Mixtec Indians living in the municipality of San Juan Coatzospan in the district of Teotitlán del Camino in northern Oaxaca, Mexico. The municipality is comprised of the head town, San Juan Coatzospan, plus three surrounding villages: San Isidro Coatzospan, Agua Español and Loma de la Plaza, all within a three mile radius. There is a sharp linguistic division between Coatzospan and the surrounding towns, which speak dialects of Mazatec and Cuicatec. The nearest Mixtec town, Santa Ana Cuahtemoc, is separated from Coatzospan by a river canyon and a day's journey on foot.

The principal informant used for this analysis was 13-year-old Joaquin Mancera Castillo. Additional help was given by 23-year-old Dolores Acosta Campos. For the most part, Priscilla Small is responsible for the analysis of the segmental phonemes and for the vocabulary. Eunice V. Pike is responsible for the tone analysis and the presentation of the material.

2. Downstepping terrace tone

In all dialects of Mixtec thus far described, there have been tones that contrast in a paradigmatic situation. The Coatzospan dialect of Mixtec, however, has, in addition to the usual high versus low tones, a tone which is a process phoneme[2]. The type of system of which this process phoneme is a part has been called "terrace tone" and has usually been reported in Africa (Welmers, 1959; Schachter, 1961; and Stewart, 1964).

This process phoneme has no specific phonetic content, but it exerts a lowering influence on a following high tone and causes a change of key in the sequence between that point and pause, or between that point and another process phoneme. This lowering influence and subsequent change of key may occur more than once within the same pause group, but even though there is a change of key, the lowered high continues to function as high, since a high following it is level with it and a contrast between the high and low tone is still maintained.

It is the lowering influence of the process phoneme (written in this paper as /!/) which causes the downstepping terrace tone[3].

Because the process phoneme causes a high tone to lower, a contrast does, in fact, occur between three levels of tone: high, lowered high, and low. This three-way contrast never occurs postpause, however, nor following a low tone, since it occurs only as a result of a preceding /!/. The contrast is best seen in a sequence of at least three morphemes, since the process phoneme is recognizable only when morphemes occur in sequence. One of the morphemes should be an unchanging frame.

Contrast between the high, lowered high, and low can be demonstrated in the following examples. In examples (1b), (2b), (3b), (4b) and (5b), the high tone following the process phoneme /!/ has been lowered, producing the contrast between high, lowered high, and low.

[2] We have based our theory of the process phoneme on that set forth by K. Pike (1967 and 1970, pp. 93–98).

[3] Less than a hundred miles away, upstepping terrace tone occurs in the Acatlán dialect of Mixtec (see ch. 7, of this volume). The discription of that dialect, however, has a different theoretical base. Instead of a process phoneme, a step-up tone is described as always higher than any contiguously preceding syllable, and as having extremely limited distribution – it occurs only following high or another step-up tone.

Perhaps Mixtec of Santa María Peñoles is a second dialect with downstepping terrace tone. John Daly's description of it (manuscript in preparation) uses the transformational model.

In this contrastive set there is contrast of three tones on the next to the last syllable:

(1a) kú?cį́ ka?ní-ǒ[4] 'we will kill a pig'
(1b) kú?cį́ lú?!kú-kǒ 'our crazy pig'
(1c) kú?cį́ kú?sì-ǒ 'we will bury a pig'

In sets (2) and (3) note the contrast of three tones on the third from the last syllable:

(2a) kú?cį́ kú?sì-ǒ 'we will bury a pig'
(2b) tú?tú! kú?sì-ǒ 'we will bury paper'
(2c) tú?tú kà?mì-ǒ 'we will burn paper'
(3a) dío-ñą́ cá?kà-kǒ 'they want our fish'
(3b) dío-kó! cá?kà-kǒ 'I want our fish'
(3c) dío-kó gà?cì-kǒ 'I want our blanket'

In the following two sets the last two syllables are: high-high, mid-mid, low-low.

(4a) cùmę̀ vìdí ká?mí 'burn sweet candles'
(4b) cùmę̀ kʷì?sí! kí?ní! 'tie up white candles'
(4c) cùmę̀ kʷì?sí kà?mì 'burn white candles'
(5a) ñą́túvì ɗù?nú dá?ví! 'there are no poor shirts'
(5b) ñą́túvì tù?tú! ví̱dí̱ 'there is no sweet paper'
(5c) ñą́túvì tù?tú cùɗè 'there is no ragged paper'

The following sentences show how the process phoneme, together with tone sandhi (see 5), cause sentences to have various contours:

Level pitch: dío-ñą́ kú?cį́ kání 'They want a long pig.'
One downstep: dío-kó! kú?cį́ kání 'I want a long pig.'
Two downsteps: dío-kó! tú?tú! lú?kú 'I want crazy paper.'
Three downsteps: dío-kó! tú?tú! ví?sí! lú?kú 'I want crazy cold paper.'
Downstep after the first word only: dío-kó! ɗú?nú̱ kání 'I want a long shirt.'
A drop from high to low: dío-kó! tú?tú kàní 'I want a long paper.'
The last three words with low tone: dío-kó šɨ?kɨ̀ kàní kà?nù 'I want a big long squash.'
Mostly high: dì?kó-ñą́ šɨ́?kɨ́ kání ká?nú 'They ground a big long squash.'
Low in the center: dío-kó gà?cì dívú 'I want an ancient blanket.'
Low, high, low: gà?cì kání kú?šì-ñą̀ 'They will bury a long blanket.'
Couplet-medial downstep: lú?kú tú?!tú! dío-kó! 'The paper I want is crazy.'

[4] The hyphen separates the nucleus of the phonological word-phrase from the margin (see 5).

Two couplet-medial downsteps: lú?kú kú?!cꜜ dí!ó-kó! 'The pig I want is crazy.'

Alternating tones: kɨ́mꜛ cá?kà nꜜàníꜜ kú?šì-ð 'We will bury four long fish.'

In a sequence in which the high tones have been lowered once or twice, the pitch interval between a high-high and a low-low is narrow and difficult to hear when prepause. Sometimes it is easier to determine the emic tone by listening for relaxed downdrift, indicating emic low-low (see 4), versus sustained pitch, indicating emic high-high:

ká?dé! tú?tú kànꜛ 'cut long paper' vs.
ká?dé! ɖú?nú̱ !díví 'cut an ancient shirt';
ká?dé šɨ́?kꜜ kànꜛ 'cut a long squash' vs.
ká?dé! šɨ́?kꜜ díví 'cut an ancient squash'.

The basic form of certain morphemes includes a final /!/; for example: tú?tú! 'paper', ñúú! 'town', kʷì?šꜜ! 'white'.

The basic form of certain couplets includes an initial /!/; for example: !štéʔnú 'tom turkey', !rkú?ú 'deer', !díví 'ancient'. (Most of the words which have an initial /!/ appear to be a fusion of three or more syllables into two. For example, !štéʔnú 'tom turkey' is perhaps derived from cúu̱ 'turkey' + téʔnu̱ 'male', !rkúʔú 'deer' from ídú! 'horse' + kùʔú! 'wild', and !díví 'ancient' from the three-syllable Spanish word: antiguo.)

A few morphemes both begin and end with /!/; for example: !skʷîdú! 'spotted', !îʔcí! 'dry'.

A process phoneme occurs couplet-medially only when a morpheme of class ´´ or !´´ precedes a morpheme of class ´´ or ´´! (see 5.1, rule 12e): kúʔcꜜ víꜜ!ɖíꜜ 'a sweet (candy) pig'.

Some enclitic variants also end with /!/: gàʔcì-kó! kúʔšì 'bury my blanket'.

In order to know that a couplet has an initial process phoneme, we must know that it is lowered when following a high tone. Likewise, in order to know that a couplet, or enclitic, has a final process phoneme, we must know that a high tone is lowered when following it.

The process phoneme has phonetic actualization only when occurring between two high tones. We have written it, however, prepause and postpause, since the tone sandhi rules are more apparent to the reader when he is aware of the process phoneme potential. Therefore, when a couplet-initial or couplet-final /!/ is written on a variant contiguous to pause, we are asserting that we know how that couplet would affect or be affected by a preceding or following high tone.

3. Tone contrasts

In Coatzospan Mixtec there are tones (high and low, and tone clusters high-low and low-high) which are phonemes of relation, that is, they are recognizable by paradigmatic contrast within a frame. In addition to these, there is the process phoneme, /!/, which is recognizable only in sequence (see 2).

Contrast between high and low tone can be seen in the following examples: tú?tú-kǒ 'our paper', cà?ká-kǒ 'our fish'; šɨ̌?kꜜ-kǒ 'our squash', ɖú?nù̱-kǒ 'our shirt'.

Contrast between high, low, and high-low tone cluster occurs: cà?ká! ví?sꜜ-kò 'my cold fish', cà?ká dà?ví-kò 'my poor fish', cà?ká! skʷîdú-kò 'my spotted fish'.

Contrast between high, low, and low-high cluster occurs: cà?ká dà?ví! 'poor fish', cà?ká kànì 'long fish', cà?ká vìdě 'wet fish'.

The low-high tone cluster occurs only when preceding pause: gà?cǐ 'blanket', but gà?cì kànꜛ 'long blanket'; whereas the high-low tone cluster occurs only in the first syllable of a couplet: šɨ́?kꜜ skʷîdú kànꜛ 'a long spotted squash', ɖú?nú̱ vî?tá-kò 'my soft shirt'.

In isolation a couplet may have one of the following tone patterns: ´´, `´, `` , ´`, ´ˇ, as in: šú?vé 'thread', è?mꜜ 'burned', ɖà?mą̀ 'skirt', vá?ă 'good', cùmę̀ 'candle'.

The pattern ´` may occur when following ´, as in: !dívú ví?ì 'the house is ancient' (see 5.1, chart 1, 7D).

When those with initial or final /!/ are included, five more patterns are added: ´´!, !´`, !´´!, `´!, !^´!. For example: ídú! 'horse', !skʷílú 'buzzard', !skʷíí! 'pinto', kùnú̱! 'deep', !îʔcí! 'dry'.

The pattern !´` and !´ˇ may occur when following ´, as in: !dívú !kɨ́ɖɨ́ 'the pot is ancient', šú?vé !é?mꜛ '(someone) burned thread'.

The following examples show tone contrast on otherwise homophonous words: làà 'flower', làá! 'bird'; láá-kó! 'my flower', làà-kǒ 'our flower', làá-kò 'my bird', làá-kǒ 'our bird'; ñú̱?ú̱ 'fire', ñú̱?ú̱! 'earth'; vɨ́ɖɨ̌ 'sweet' !vɨ̂ɖɨ́! 'warm'; tà?šì 'give', tà?ší 'gave'; nę̀?šꜜ-ñą́! 'they will sweep', nę́?šꜜ ñą́! 'they swept'; kó?ó-tú̱! 'she will drink', kó?ò-tú̱! 'her dish'.

4. Tone variants

The highest allotone of high which occurs is the first high between lows, or the first high after a sequence of lows: cà?ká-kò 'my fish', cà?ká kànɨ̀ 'long fish', gà?cì-kó! 'my blanket', cùmɛ̨̀ tá?šì '(someone) gave candles', gà?cì-kǒ 'our blanket'.

An allotone not quite as high occurs between a high and a low. That is, in tú?tú-kò 'my paper' and tú?tú kànɨ̀ 'long paper', the second syllable is higher than the first, but not as high as ká in cà?ká-kò 'my fish'. The last syllable of a sequence low-low-high, for example: gà?cì-kó! 'my blanket', is higher than the last syllable of the sequence high-low-high: ɗú?nɨ̀-kó! 'my shirt'. The low-high cluster glides to a higher pitch in gà?cì-kǒ 'our blanket' than it does in ɗú?nɨ̀-kǒ 'our shirt'.

High tone, when in the first syllable of a nonglottalized couplet in the nucleus of a word-phrase (see 6), has a downgliding allotone when preceding low or a lowered high. The second from the last syllable has a downglide in each of the following examples: ñą́ñą̌ 'lion', kú?cɨ́ šú!šú 'glass pig', cùmɛ̨̀ ɨ́ɗò '(someone) carried candles'. This glide is not as deep nor as long as the emic high-low glide which actualizes the high-low tone cluster: !vɨ̂ɗɨ́! 'warm'. The downglide does not occur when high tone precedes low between word-phrases: nɛ̨̀?šɨ́ vì?ì 'to sweep the house', or between the nucleus and the margin: cà?ká-ñą̀ 'their fish'.

The first syllable of the glottalized couplet has an interrupted vowel. When that first syllable has high tone while the second has low tone or a lowered high tone, the vocoid following the glottal stop is lower than that preceding it: ví?šɨ̀ 'cold', kú?cɨ́ lú?!kú 'crazy pig'. The vocoid following the glottal stop is not as low, however, as the vocoid which occurs as part of the high-low tone cluster: ɗú?nú̱ vɪ̂?tá! 'soft shirt'.

A low tone has a slight downglide when preceding a voiced consonant while in the first syllable of a prepause couplet: gà?cì vìɗě 'wet blanket', kɨ́mɨ̀ šǎvɪ̌ 'four holes', cùmɛ̨̀ kànɨ́ 'long candle'.

If a prepause syllable has low tone and a voiceless consonant, it may fluctuate to voicelessness, especially after high: ká?nɨ́ tù̱ 'she will kill', tú?tú-kò 'my paper'.

There is a slight downdrift in a sequence of low tones occurring prepause: kú?šì-tú̱ šɪ̀?kɨ̀ kànɨ̀ 'she will bury (plant) a long squash'.

In isolation a sequence of highs with no contrasting low tone is lowered, whereas a sequence of low tones with no contrasting highs is raised. Therefore in isolation the two sequences, dío-ñą́ tú?tú! 'they want paper' and šɪ̀?kɨ̀ kànɨ̀ 'a long squash', have approximately the same pitch.

Perhaps it could be said that all sentences start on approximately the same pitch and that the emic tones of the initial syllables are indeterminate until a contrasting tone occurs. That is, the etic pitch of šɪ̀?kɨ̀ 'squash' is perceptually the same in the following two utterances: šɪ́?kɨ́ vɨ̂ɗɨ́-kò 'my sweet squash' versus šɪ̀?kɨ̀ vìɗè-kó! 'my wet squash'. (The morpheme šɪ̀?kɨ̀ 'squash' was raised in the first utterance by regressive perturbation (3J, see rule 13).) If, however, the two sentences are repeated several times, and the informant knows that the contrastive utterances are being alternated, he may start one lower than the other:

šì?kɨ̀ kànɨ̀ kà?mɨ̀-ñą̀ 'they will burn a long squash'
šɪ́?kɨ́ kánɨ́ ká?mɨ́-tú̱! 'she will burn a long squash'.

5. Tone sandhi

Tone sandhi is so extensive that three classes or subclasses of couplets each have five sets of variants differentiated by the tone-process phoneme pattern, and eight other classes or subclasses each have three or four sets of variants differentiated by the tone-process phoneme pattern.

The classes with their variants are:

Class ˋˋ: ˋˋ, ˋˊ, ˊˊ, ˊˋ (noun), ˊˇ (noun or adjective)
Class ˋˇ: ˋˇ, ˋ , ˋˋ, ˊˇ, ˊˊ! (verb), ˊ ˊ (noun or adjective)
Class ˊˋ: ˊˋ, ˋˊ, ˊˇ
Class ˊˊ: ˊˊ, ˊ!ˊ, ˋˊ
  Subclass of ˊˊ: ˊˊ, ˊˇ, ˊ!ˊ, ˋˊ, ˊˋ
Class ˊˊ!: ˊˊ!, ˋˊ!, ˊ!ˊ! (noun)
  Subclass of ˊˊ!: ˊˊ!, ˊˇ, ˋˊ!, ˊˋ (adjective)
Class !ˊˊ: !ˊˊ
  Subclass of !ˊˊ: !ˊˊ, ˊˇ, ˊˋ
Class !ˊˋ: !ˊˋ, ˋˊ, ˋˋ
Class !ˊˇ: !ˊˇ, ˋˊ!, !ˊˋ
Class ˋˊ!: ˋˊ!, ˊˊ!, ˆˊ!, ˋˋ
Class !ˆˊ!: !ˆˊ!, !ˆˋ
Class !ˊˊ!: !ˊˊ!

5.1. *Tone sandhi between couplets*

In order to predict the tone sandhi between two couplets[5], it is nec-

[5] For footnote, see next page.

essary to know five things[6]: (1) the presence versus absence of a process phoneme in the isolation variant and the basic form; (2) the tones of the basic form of the second couplet, that is, the tones which occur between /!/ and pause; (3) the tones of the first couplet as it occurs in isolation, that is, the tones of the isolation variant; (4) the grammatical category (noun, adjective or verb) of the second couplet; (5) the grammatical category (noun, adjective or verb) of the first couplet if the isolation variant is ˊˇ.

The tones of the basic form of a couplet are those which occur between /!/ and pause. That is, it is the post /!/ variant. The basic form whose first tone is high has an initial /!/ if it is lowered after class ˊˊ (or when following any high tone). For example: !díví !kídɨ́ 'the pot is ancient'. The couplet !kídɨ́ 'pot' has an initial /!/ because it is lowered after !díví 'ancient'.

A basic form whose last tone is high is followed by /!/ if class ˊˊ (or any morpheme with an initial high tone) is lowered when following it. For example: tú?tú! lú?kú 'crazy paper'. The couplet tú?tú! 'paper' has a final /!/ because lú?kú 'crazy' is lowered when following it.

A class of morphemes consists of those morphemes which have the same tone-process phoneme pattern when between /!/ and pause. Most classes have the same variant when in isolation as they do when between /!/ and pause. Three classes, however, have an isolation variant which differs from that of the post /!/ variant. They are (the post /!/ variant is listed first): ˊˋ ~ ˊˇ, !ˊˇ ~ ˋˊ!, !ˊˋ ~ ˋˊ.

Three classes are subdivided since some members of the class have the same variant when post /!/ as when in isolation whereas some members of that same class have ˊˇ as an isolation variant. The classes which are subdivided are: !ˊˊ, ˊˊ! and ˊˊ.

There is a restriction in the grammatical categories which occur in the various tone classes. All three categories occur with ˋˇ and ˋˋ; only verbs occur with ˊˋ; only past tense verbs occur with !ˊˋ; only nouns occur with !ˊˇ; only adjectives occur with !^ˊ!; only adjectives occur with the subclass of ˊˊ! whose isolation variant is ˊˇ, whereas nouns and verbs occur with the other subclass of ˊˊ!; verbs and adjectives occur

[5] Tone sandhi changes which occur between proclitics or prefixes and a following couplet need further study and have not been described in this paper.

[6] For the description of a Mixtec dialect in which the tone sandhi changes are in relation to a word-final glottal stop, see Pankratz and Pike, 1967: 295–298.

with ˋˊ!; nouns and adjectives occur with both subclasses of ˊˊ; nouns occur with the subclass of !ˊˊ which has the isolation variant ˊˇ, while nouns and adjectives occur with the other subclass.

The tone sandhi changes which occur between classes of couplets is shown on chart 1, together with the interaction between the process phoneme and the tones. Phrase-final and phrase-initial process phonemes have been written on the chart even though a sequence of tones ending in /!/ and the same sequence of tones without a final /!/ are etically the same. We have included the phrase-final and phrase-initial process phonemes since occasionally a couplet with a final /!/ is changed in a different way than a couplet without a final /!/ would be in that environment (see 2E versus 3D, and 2K versus 3J).

The row across the top of chart 1 includes all of the basic forms (the post /!/ variant)[7] of all classes of couplets, but five classes occur under the column "Initial !". They are: !ˊˊ, !ˊˊ!, !^ˊ!, !ˊˇ, !ˊˆ.

The column at the left consists, not only of the isolation variants, but also of those which may occur initial and those which may occur non-initial in a sequence.

The row "Final ˊ!" includes classes: ˊˊ!, ˋˊ!, !^ˊ!, !ˊˊ!. It also includes a nonbasic variant ˊ!ˊ!, and an enclitic variant with ˊ! could also be included here.

The row "Final ˊˊ" includes classes ˊˊ, !ˊˊ. It also includes their nonbasic variants ˊ!ˊ and ˋˊ, (but not the ˋˇ or ˊˊ variants of class ˋˋ; see rule 16).

The only sequences of two couplets not included on the chart are those in which classes ˋˇ or ˋˊ! would follow ˋˋ (7B, 7G, 7H, 7I, see rule 15), and those in which classes ˋˋ, ˊˊ, or ˊˊ! would follow ˊˊ (7C) or ˋˊ (7B, 7G, 7H, 7I) which are variants of class ˋˋ (see rule 16).

Rules are given below describing the tone sandhi changes between two couplets. Each rule is in cross reference to a column, row or box in chart 1. Examples demonstrating the rules are listed together in one section, and they are cross-referenced both to the rule involved and the chart. For the sake of simplicity, the same morphemes have been used again and again in the examples but we have added additional words grouped by their classes. A reader may change the examples by substi-

[7] There is one word: !lú?dǐ 'small', which has alternating post /!/ variants: ˊˊ ~ ˊˇ. Following ˊ there are three variants: ˊˊ ~ ˊˇ ~ !ˊˇ: kú?cɨ́ lú?dí ~ kú?cɨ́ lú?dǐ ~ kú?cɨ́ !lú?dǐ 'small pig'.

Chart 1
Tone sandhi between couplets.

Post /ˀ/ variant	1	2	3	4	5	6	7	
Any variant:	Initial		noun, adj.	verb	verb, adj.			A
Final ˀ								
noun								B
Final´		verb		verb	verb, adj.	verb	verb, adj.	C
(nonclass ˋˋ)		noun	noun, adj.			noun, adj.	noun	D
		adj.						E
noun					adj.	noun, adj.	noun, adj.	F
~					verb	verb	verb	G
verb. adj,								H
~								I
		verb, noun						J
(class ˋˋ)		adj.						K

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tuting any word for any other word of the same class – provided the grammatical categories are the same, of course.

Rule 1. The basic tones of a couplet are those which occur between /ˀ/ and pause (row A).

Rule 2. A process phoneme /ˀ/ is lost when contiguous to ˋ (5A, 6A, 7A, 1B, 1G, 1H, 1I).

Rule 3. The second in a sequence of two contiguous process phonemes is lost (1A).

Rule 4. There is a change to a lower key whenever /ˀ/ is contiguously followed by ´ (1A, 2A, 3A, 4A, 1D, 2D, 3D).

Rule 5. The tones of any couplet whose basic form includes an initial /ˀ/ remain unchanged when it occurs second in a sequence of two couplets (col. 1).

Rule 6. Basic tones occur when following class ˀ´ˇ (row B), except that class ˋˋ becomes ˋˇ (7B).

Rule 7. In a sequence of two couplets not separated by /ˀ/, the two middle syllables have like tones (cols. 2–7, rows C–K), except when following class ˀ´ˇ (see rule 6, row B).

Rule 8. The upgliding tone cluster ˇ occurs only when prepause. When ˇ occurs at the end of the first couplet, it is changed to ˋ (rows B, G, H, I).

Rule 9. All couplets but class ˋˇ, and those beginning with /ˀ/, become ˋˇ when following ˋˋ of class ˋˇ (row I) and when following the sequence´ˋ (rows G, H) which is a variant of some class other than class ˀ´ˇ (row B).

Rule 10. When prepause, a class ˋˇ couplet retains its basic tones (col. 6), except that when following a ´ it alternates from ´´ to ´ˇ (see rules 11, 12; 6C, 6D, 6F).

Rule 11. When an adjective or noun whose basic form begins with ˋ (cols. 5, 6, 7) follows a noun of subclass ´´ ~ ´ˇ (row F), the first couplet becomes ´´ (5F, 6F, 7F) whereas the second couplet, if it is class ˋˇ, alternates between ´´ and ´ˇ (6F); if it is class ˋˋ, it becomes ´ˇ (7F). If the second couplet is class ˋˀ´ (col. 5), it becomes^´´! (5F).

Rule 12. When the first couplet of a sequence ends with ´, it remains unchanged (rows C, D, E). The second couplet changes in accordance with its class (its basic form) and its grammatical category:

(a) Verbs or adjectives, class ˇˀ!, alternate from ´´! to ^´´! (5C).

(b) Verbs, class ˋˇ, alternate from ´´! to ´ˇ (6C), whereas nouns and adjectives, class ˋˇ, alternate from ´´ to ´ˇ (6D).

(c) Verbs or adjectives, class ˋˋ, become ´´ (7C), but a noun, class ˋˋ, becomes ´ˋ (7D).

(d) Nouns, class ´´!, become ´!´! (2D), but adjectives become ´ˋ (2E).

(e) Couplets of class ´´ become ´!´ (3D).

(f) Verbs, class ´´! and ´ˋ, remain the same (2C, 4C).

Rule 13. When a morpheme of class ˋˋ precedes ´, the ˋˋ is changed to ´´ (2J, 3J, 4J), except that when a ˋˋ precedes an adjective of class ´´!, the resultant sequence is ˋˋ ˊˊ ! (2K). When class ˋˋ precedes a ˋ, there is no change (5J, 6J, 7J).

Rule 14. When !´ follows a couplet with basic ˋˋ, first the process phoneme /!/ is lost (rule 2), then the ˋˋ is changed to ´´ (rule 13). The result is that ˋˋ + ´´ (3J) and ˋˋ + !´´ (1J) are actualized as the same phonetic and phonemic tone sequence.

Rule 15. A couplet of class ˋˋ becomes ˋˊ (see rule 9) when following any low which is non-class ˋˋ, or when following an enclitic which is not class ˋ (7B, 7G, 7H, 7I). The ˋˊ variant of class ˋˋ is, however, changed back to ˋˋ when it in turn is followed by class ˋᵛ or class ˋˊ!: gà?cǐ 'blanket' + kànį̀ 'long' > gà?cì kànį́ 'long blanket'; gà?cì kànį́ + tɨ̀?vǐ 'push' > gà?cì kànį̀ tɨ̀?vǐ 'push a long blanket'; gà?cì kànį́ + nɛ̀?sɨ̀! 'sweep' > gà?cì kànį̀ nɛ̀?sɨ̀! 'sweep a long blanket'.

Rule 16. Class ˋˋ becomes ´´ when following the ˋˊ or ´´ variants of class ˋˋ (but see rule 12(c)); classes ´´ and ´´! remain the same (but see rule 12(d), (e)): gà?cǐ 'blanket' + kànį̀ 'long' + kà?mį̀-ñą̀ 'burn-they' > gà?cì kànį́ ką́?mį́-ñą́ 'they will burn a long blanket'; kú?cį́ 'pig' + kànį̀ 'long' + kà?mį̀ ñą̀ 'burn-they' > kú?cį́ kánį́ ká?mį́-ñá 'they will burn a long pig'.

Rule 17. The class of verbs !´ˋ has an isolation variant ˋˊ. When that isolation variant occurs initial in a sequence, it has the same tone changes as a class ˋˋ that is preceded by class ˋᵛ (see rules 2, 14, 15):

è?mį́ kú?cį́ '(someone) burned a pig',
è?mį́ šté?nú́ '(someone) burned a turkey',
è?mį̀ gà?cǐ '(someone) burned a blanket'.

Rule 18. When class ˋˋ follows /!/ while preceding ´, the ˋˋ is raised to the height of the following ´ (rule 13); then the sequence is lowered because of the preceding /!/ (rule 4): tú?tú! paper' + kànį̀ 'long' + ká?dé! 'cut' tú?tú! kánį́ ká?dé! 'to cut long paper'.

Following is a list of examples. They are cross-referenced to chart 1 and to the rules.

1A	tú?tú!	dívú	'ancient paper'	Rules 1, 3, 4, 5
2A	tú?tú!	tú?tú!	'paper paper'	1, 4
3A	tú?tú!	lú?kú	'crazy paper'	1, 4
4A	tú?tú!	kú?sì	'bury paper'	1, 4
5A	tú?tú	dà?ví!	'poor paper'	1, 2
6A	tú?tú	vɨ̀dɛ̌	'wet paper'	1, 2
7A	tú?tú	kànį̀	'long paper'	1, 2
1B	!cá?kà	dívú	'ancient fish'	5, 6, 8
2B	!cá?kà	tú?tú!	'paper fish'	6, 8
3B	!cá?kà	lú?kú	'crazy fish'	6, 8
4B	!cá?kà	kú?sì	'bury fish'	6, 8
5B	!cá?kà	dà?ví!	'poor fish'	6, 8
6B	!cá?kà	vɨ̀dɛ̌	'wet fish'	6, 8
7B	!cá?kà	kànį́	'long fish'	6, 8, 15
1D	kú?cį́	!dívú	'ancient pig'	5
2C	kú?cį́	ká?nį́!	'kill pig'	12(f)
2D	kú?cį́	tú?!tú!	'paper pig'	12(d)
2E	kú?cį́	ví?sɨ̀	'cold pig'	12(d)
3D	kú?cį́	lú?!kú	'crazy pig'	12(e)
4C	kú?cį́	kú?sì	'bury pig'	12(f)
5C	kú?cį́	dá?ví!	'poor pig'	12(a)
or	kú?cį́	dâ?ví!	'poor pig'	12(a)
6C	kú?cį́	tɨ́?ví!	'push pig'	10, 12(b)
or	kú?cį́	tɨ̀?vǐ	'push pig'	10, 12(b)
6D	kú?cį́	vídé	'wet pig'	10, 12(b)
or	kú?cį́	vídɛ̌	'wet pig'	10, 12(b)
7C	kú?cį́	kánį́	'long pig'	12(c)
7D	kú?cį́	šɨ́?kɨ́	'squash pig'	12(c)
5F	dú?nú	dâ?ví!	'poor shirt'	11
6F	dú?nú	vídé	'wet shirt'	10, 11
or	dú?nú	vídɛ̌	'wet shirt'	10, 11
7F	dú?nú	kánɨ́	'long shirt'	11
1G	dú?nù	dívú	'ancient shirt'	5, 8
2G	dú?nù	tù?tú!	'paper shirt'	8, 9
3G	dú?nù	lù?kú	'crazy shirt'	8, 9
4G	dú?nù	kù?ší	'bury shirt'	8, 9
5G	dú?nù	nɛ̀?sɨ́!	'sweep shirt'	8, 9

6G	dú?nù	tɨ?vǐ	'push shirt'	8
7G	dú?nù	kà?mɨ́	'burn shirt'	8, 9, 15
1H	kú?sì	šté?nú	'bury turkey'	5, 8
2H	kú?sì	tù?tú!	'bury paper'	8, 9
3H	kú?sì	kù?cɨ́	'bury pig'	8, 9
4H	kú?sì	kù?šǐ	'bury bury'	8, 9
5H	kú?sì	dà?ví!	'bury poor'	8, 9
6H	kú?sì	gà?cǐ	'bury blanket'	8
7H	kú?sì	šɨ?kɨ́	'bury squash'	8, 9, 15
1I	gà?cì	dívú	'ancient blanket'	5, 8
2I	gà?cì	tù?tú!	'paper blanket'	8, 9
3I	gà?cì	lù?kú	'crazy blanket'	8, 9
4I	gà?cì	kù?sí	'bury blanket'	8, 9
5I	gà?cì	dà?ví!	'poor blanket'	8, 9
6I	gà?cì	vìɗě	'wet blanket'	8
7I	gà?cì	kànɨ́	'long blanket'	8, 9, 15
1J	šɨ́?kɨ́	dívú	'ancient squash'	5, 14
2J	šɨ́?kɨ́	tú?tú!	'paper squash'	13
2K	šɨ?kɨ̀	vì?šɨ́!	'cold squash'	13
3J	šɨ́?kɨ́	lú?kú	'crazy squash'	13
4J	šɨ́?kɨ́	kú?sî	'bury squash'	13
5J	šɨ?kɨ̀	dà?ví!	'poor squash'	13
6J	šɨ?kɨ̀	vìɗě	'wet squash'	13
7J	šɨ?kɨ̀	kànɨ̀	'long squash'	13

Following is a list of words arranged by classes. Any word within the class (or subclass) may be substituted for any other word within the class. When two variants are listed, the first is the post /!/ variant and the second is the isolation variant:

Class ˋˋ: šɨ?kɨ̀ 'squash' dù?cì beans', ɗà?mà 'skirt, vì?ì 'house', làà 'flower'; kànɨ̀ 'long', kà?nù 'big', rà?và 'pot-bellied', dù?ù 'fat', cùɗè 'ragged'; kà?mɨ̀ 'burn', kà?cɨ̀ 'cut', dì?kò 'grind', kò?ò 'drink', kʷɨ̀ 'buy'.

Class ˋˇ: gà?cǐ 'blanket', ǰà?ǎ 'broth', cùmɛ̌ 'candle', rkùnǔ 'board'; vìɗě 'wet', à?tǎ 'old', lò?ǒ 'deaf'; tɨ?vǐ 'push'.

Class ˊˋ ~ ˊˇ: kú?sì 'bury', kɨ́?kù 'sew', kʷé?è 'give'.

Class ˊˊ: kú?cɨ́ 'pig', šú?vé 'thread'; lú?kú 'crazy'.

Subclass ˊˊ ~ ˊˇ: ɗú?nú shirt', é?tú 'box', kó?ó 'dish' šúmɛ́ 'wax'; víɗí 'sweet', ɗɨ́ɨ́ 'fierce'.

Class ˊˊ!: tú?tú! 'paper', í?šá! 'child', íɗú! 'horse', ñúú! 'town', ká?nɨ́! 'kill', kí?nɨ́! 'tie' ká?dé! 'cut'.

Subclass ˊˊ! ~ ˊˇ: ví?šɨ́! 'cold', vá?á! 'good', víí! 'heavy', šéé! 'new'.

Class !ˊˊ: !šté?nú 'tom turkey', !nɗí?ú 'goat', !rkú?ú 'deer', !rkʷéɨ́ 'ladder', !skʷílú 'buzzard'; !dívú 'ancient'.

Subclass !ˊˊ ~ ˊˇ: !čó?ó 'medicine', !ɗʸú?ú 'money'.

Class !ˊˋ ~ ˋˊ: !dí?kò 'ground (v)', !ká?cɨ̀ 'cut', !é?mɨ̀ 'burned', !ší?ì 'drank', !ñɨ̂ɨ̀ 'bought'.

Class !ˊˇ ~ ˋˊ!: !cá?kǎ 'fish', !lá?pǐ 'pencil', !kɨ́dɨ̌ 'pot', !tínɨ̨ 'dog', !láǎ 'bird'.

Class ˋˊ!: dà?ví! 'poor', vì?tá! 'soft', kʷì?šɨ́! 'white', kʷɨ̀ɨ́! 'yellow', ìá! 'sour'; nè?šɨ́! sweep', nɛ̀?kɨ́! 'comb (v)'.

Class !ˆˊ!: !skʷîdú! spotted', !vɨ̂dɨ́! 'warm', !ɨ̂?cí! 'dry'.

Class !ˊˊ!: !skʷíí! 'pinto'.

5.2. *Tone sandhi between couplet and enclitic*

There are more than 20 enclitics, but they all fall into one of three classes: ˊ!, ˋ, ˇ.

Class ˊ!: Enclitics of class ˊ!, for example: -tɨ́! ~ -tù 'she, her' and -kó! ~ -kò 'me, my', have the opposite tone of the last syllable of the couplet or other enclitic which precedes them (chart 2, col. 8). According to that rule, the variant ˊ! is used following ˋˋ or ˋ. Then, however, the ˋˋ or ˋ is raised to ˊˊ (rule 13), so that the resulting sequence is ˊˊˊ! (8Q):

kà?mɨ̀ burn' + tɨ́! 'she' > ká?mɨ́-tɨ́! 'she will burn';
ká?nɨ́! 'kill' + tɨ́! 'she' > ká?nɨ́-tù 'she will kill';
ká?nɨ́-tù 'kill-she' + kó! 'me' > ká?nɨ́!-tɨ́kó! 'she will kill me' (rule 18).

Classes ˋ and ˇ: The enclitics of classes ˋ and ˇ both have four variants: ˋ, ˇ, ˊ, ˊ!. An example of class ˋ is -ñɨ̨ ~ -ñɨ́ ~ -ñɨ́! ~ -ñɨ̨́ 'they, them, their'[8]. Examples of class ˇ are: -kǒ ~ -kó ~ -kó! ~ -kò 'us, our (incl.)' and -ǒ ~ -ó ~ -ó! ~ -ò 'we (incl.)'.

Both classes have high variants following ˊ (cols. 9, 10, row O), except that the ˊ! variant occurs following a ˊ!ˊ variant: kú?cɨ́ 'pig' + lú?kú 'crazy' + kǒ our' + ká?nɨ́! 'kill' + ñɨ̨ 'they' > kú?cɨ́ lú?!kú-kó! ká?nɨ́-ñɨ̨ 'they will kill our crazy pig'.

[8] The question marker -dù is also class ˋ, but the couplet to which the -dù is added has the same variant as it would have if following class ˋˇ. Notice the following sets of examples: ví?šɨ́ 'cold', gà?cì vì?šɨ́! 'cold blanket' vì?šɨ́-dù 'is it cold?'; kànɨ̀ 'long', gà?cì kànɨ́ 'long blanket' kànɨ́-dú 'is it long?'.

The basic forms (ˋ and ˇ) occur following ˋ (9Q, 10Q) and following ´! (9L, 10L), except that when following classes ˋ´! and !ˆ´! both classes of enclitics use the ´! variant, and the preceding couplet is changed. The resultant sequences are ˋˋ ´! (9M, 10M) and !ˆˋ ´! (9N, 10N).

Class ˋ has ˋ when following ˋ (9Q).

Class ˇ has ˇ when following ˋ (10Q), and when following ˇ (10P). Class ˋ, however, has the ˇ variant only when following a syllable which would have the ˇ cluster if the enclitic were removed (9Q versus 9P).

A ˋ variant which is derived from ˇ does not become ´ when preceding ´. This differs from other ˋ variants which do become ´ when preceding ´ (see rule 13). Note the contrasting examples:

ká?nį́-ǒ 'kill-we' + -tų́! 'her' > ká?nį́-òtų́!
'we will kill her' versus
ká?nį́-ñą̀ 'kill-they' + -tų́! 'her' > ká?nį́!-ñą́tų́!
'they will kill her';
ká?nį́-ñą̀ 'kill-they' + !cá?kǎ 'fish' > ká?nį́!-ñą́ cá?kǎ
'they will kill fish' versus
tɨ̀?vì-ñą̌ 'push-they' + !cá?kǎ 'fish' > tɨ̀?vì-ñą̀ cá?kǎ
'they will push fish'.

When an enclitic follows another enclitic, the changes are the same as when following a couplet (see chart 2):

tɨ̀?vì-ñą̌ 'push-they' + tų́! 'her' > tì?vì-ñą̀tų́!
'they will push her' (8P),
tɨ̀?vì-tų́! 'push-she' + ñą̀ 'them' > tɨ̀?vì-tų́ñą̀
'she will push them' (9L);
ká?nį́-ñą̀ 'kill-they' + tų́! 'her' > ká?nį́!-ñą́tų́!
'they will kill her' (8Q),
ká?nį́-tų̀ 'kill-she' + ñą̀ 'them' > ká?nį́-tų̀ñą̀
'she will kill them' (9Q);
kà?mį̀-ǒ 'burn-we' + tų́! 'her' > kà?mį̀-òtų́!
'we will burn her' (8P),
ká?mį́-tų́! 'burn-she' + kǒ 'us' > ká?mį́-tų́kǒ
'she will burn us' (10L).

An enclitic causes the same changes in a following couplet as another couplet would cause (see 5.1). That is, class ˋ acts like class ˋˋ, class ˇ acts like class ˋˇ, class ´! acts like a final ´!, and a ´ variant acts like a raised class ˋˋ:

Chart 2
Tone sandhi between couplet and enclitic.

	Class of enclitic:						
Any variant:	Class ´!		Class ˋ		Class ˇ		
Final ´!*	´	ˋ	´	ˋ	´	ˇ	L
verb, adj. ˋ´!	ˋˋ´	ˋ	ˋˋ	´!	ˋˋ	´!	M
!ˆ´!	!ˆ´	ˋ	!ˆˋ	´!	!ˆˋ	´!	N
Final ´	´	ˋ	´	´	´	´	O
Final ˇ	ˋ	´!	ˋ	ˇ	ˋ	ˇ	P
Final ˋ	´	´!	ˋ	ˋ	ˋ	ˇ	Q
	8		9		10		

* This includes class ´´! and nouns with the ˋ´! variant.

ká?nį́-ñą̀ 'kill-they' + !šté?nų́ 'turkey' > ká?nį́!-ñą́ šté?nų́
'they will kill a turkey' (rule 18);
ká?dé-ñą̀ 'cut-they' + šɨ̀?kį̀ 'squash' > ká?dé-ñą̀ šɨ̀?kį̀
'they will cut squash' (rule 13);
kà?mį̀-ǒ 'burn-we' + tú?tú! 'paper' > kà?mį̀-ò tù?tú!
'we will burn paper' (rules 8, 9);
ká?mį́-tų́! 'burn-she' + tú?tú! 'paper' > ká?mį́-tų́! tú?tú!
'she will burn paper' (rule 4);
ká?mį́-tų́! 'burn-she' + sɨ̀?kį̀ 'squash' > ká?mį́-tų́ šɨ̀?kį̀
'she will burn squash' (rules 1, 2);
è?mį́-ñą́ 'burned-they' + šɨ̀?kį̀ 'squash' > è?mį́-ñą́ šɨ̀?kį́
'they burned squash' (rules 15, 16).

Following is a list of examples cross-referenced to chart 2:

8L	tú?tú-tų̀	'her paper'
9L	tú?tú-nà	'their paper'
10L	tú?tú-kǒ	'our paper'
8M	nɛ̀?šį́-tų̀	'she will sweep'
9M	nɛ̀?šį̀-ñą́!	'they will sweep'
10M	nɛ̀?šį̀-ó!	'we will sweep'

8N	!vi̱dí̱-tù	'she is warm'
9N	!vi̱dì̱-ñą́!	'they are warm'
10N	!vi̱dì̱-ó!	'we are warm'
8O	kú?cí̱-tù	'her pig'
9O	kú?cí̱-ñą́	'their pig'
10O	kú?cí̱-kó	'our pig'
8P	gà?cì-tú̱!	'her blanket'
9P	gà?cì-ñą̌	'their blanket'
10P	gà?cì-kŏ	'our blanket'
8Q	šɨ́?kɨ́-tú!	'her squash'
9Q	šɨ̀?kɨ̀-ñą̀	'their squash'
10Q	šɨ̀?kɨ̀-kŏ	'our squash'

Following is a list of enclitics arranged according to classes:

Class ˊ!: -tú̱! 'she, her (familiar)', -kó! 'me, my', -ú! 'I', -dɨ́! 'we (excl.)', -čí! 'he, him, his (fam., women's speech)'.

Class ˋ: -ñą̀ 'they, them, their (polite)', -nà 'he, him, his (fam., men's speech)', -ò 'you (object), your (fam.)', -dò 'you, your (polite)', -tɨ̀ 'it, its (animal, fruit)', -ì (indefinite person); -dù (question marker).

Class ˇ: -ǒ 'we (incl.)', -kǒ 'us, our (incl.)'.

6. Phonological word-phrases

Word-phrases in Coatzospan Mixtec are strikingly different from words or phrases in other Mixtec languages in that Coatzospan word-phrases have contrastive nuclei – glottalized versus nonglottalized. In addition, the word-phrases themselves contrast – oral versus nasal.

We hesitated to call the units of this level "words", since they may include a noun plus one or two modifiers. Yet we hesitated to call them "phrases" since many of them consist of single morphemes. In addition, there is considerable fluctuation in the pronounciation of a word-phrase. In normal speech a sequence of several morphemes may be fused together into one word-phrase. It is identified as one word-phrase since it includes only one glottalized syllable (if it is a glottalized word-phrase), or only one lengthened syllable (if it is a nonglottalized word-phrase). In slower, slightly emphasized speech, the same sequence of morphemes may separate into a sequence of two or more word-phrases. That is, it may have two or more glottalized or lengthened syllables.

For the most part the morphemes which fuse into one word-phrase are made up of noun plus one or two modifiers, or noun plus noun, as in the following examples: vì?ì 'house' + šúǔ 'stone' > víšúú 'house of stone'; ɗú?nǔ̱ 'shirt' + kʷì?šɨ́! 'white' > ɗúnú̱kʷɨ̄?šɨ́! 'white shirt'; kóð 'snake' + ñú̱?ú̱! 'earth' + tè?ú! 'rotten' > kóñú̱tè?ú! 'fer de lance'.

Sequences of morphemes which seldom fuse are made up of numeral plus noun, noun plus verb, or adjective plus noun: vìɗè ɗù?nú̱ 'the shirt is wet', ká?ní̱! kú?cí̱ 'kill a pig', í?šá šì?ì 'a child died', úvì cá?kǎ 'two fish'.

A minimal word-phrase consists of the nucleus which is the couplet. The couplet may be preceded or followed by one-syllable morphemes which even in slow speech do not become a separate word-phrase. The following examples show contrastive placement of the couplet in relation to some of these one-syllable morphemes. (Throughout this paper the couplet either precedes word space or hyphen. If there is no hyphen in the word-phrase, the couplet consists of the two syllables preceding word space.) Some examples are: kɨ̀dɨ́-kò 'my cooking pot', cík̀àñą́ 'rattle', kú?cí̱-ñą́ 'their pig', dàá-tú̱nɨ̀kó! 'she told me', kʷè?è-kádòvènɨ̀ 'okay, go along now', nąkùcídú?té-ñą́tú̱! 'he will baptize her', kànɨ̀štívà?à-ñą́! 'they are putting it away'.

6.1. *Nonglottalized couplet*

In a nonglottalized couplet the first vowel of the couplet is usually lengthened: d[i·]vú 'ancient', š[ò·]ɗò 'valley', d[ù·]ɗí̱! 'honey'. The exceptions are: (1) When /i/ is the first vowel preceding a diverse vowel with the same tone, then that /i/ is not lengthened: díó-kó! 'I want', kúcíú 'knife'. (2) When the first vowel of the couplet has a low tone, it is not as long as an upgliding prepause vowel: cùmɛ̌ 'candle', rkùnǔ̱ 'board', ɗèdǔ 'dirty'.

When a morpheme moves from the nucleus of a word-phrase to the margin, the vowel length is lost: ɗávĭ 'rain', dávíšúǔ 'hail'; cídĭ 'earrings', !cídínąnɨ̀ 'long earrings'.

Except for /š/, only voiced consonants occur medially in a nonglottalized couplet: kànɨ̀ 'long', lùzĭ 'top', ìšŭ 'empty'.

6.2. *Glottalized couplet*

In a glottalized couplet with a medial consonant, the first vowel is in-

terrupted by a glottal stop: d[íʔⁱ]šę̌ 'sandal', r[àʔᵃ]và 'pot-bellied', g[àʔᵃ]cǐ 'blanket', m[ę́ʔᵉ]ñų̌ 'center'.

Either a voiced or a voiceless consonant may occur medially in a glottalized couplet – except that /ɗ/ does not occur in that environment: túʔtú! 'paper', ɗúʔnų̌ 'shirt', l̰ʔšǘ! 'rooster', ɗúʔmę̌ 'tail', !lúʔdǐ 'small', càʔvá! 'frog'.

The following word-phrases show contrast between a glottalized couplet versus a nonglottalized couplet: úvǐ 'two', úʔvǐ 'it hurts; dl̰šǘ! 'corpse', dl̰ʔšǘ! 'sores'; kínį́-ñà 'they will see', kíʔnį́-ñà 'they will tie'.

In a glottalized couplet without a medial consonant, the first syllable ends in a glottal stop, or, optionally, the glottal stop is followed by a vocoid which echoes the first vowel: t[è?/èʔᵋ]u! 'rotten' ɗíʔí 'ring', ɗìʔá! 'comadre', váʔă 'good'.

The glottal stop is more fortis in a glottalized couplet without a medial consonant than it is when in a couplet with a medial consonant: kóʔkó! 'it will burn' versus kóʔò-kó! 'my dish'.

When a morpheme moves from the nucleus of a word-phrase to the margin, the glottal stop is lost. Glottalized couplets which were in contrast with nonglottalized couplets in isolation may become homophonous when in the margin of a word-phrase:

šíʔšǘ 'mushroom'	šíšl̰kʷíʔšǘ! 'white mushroom';
šíšǘ 'badger',	šišl̰kʷíʔšǘ! 'white badger';
kóʔǒ 'dish',	kóvíɗě 'wet dish';
kóǒ 'snake',	kóvíɗě 'wet snake'.

6.3. *Nasal word-phrase*

Nasal word-phrases contrast with oral word-phrases. The nasal word-phrase (identified in this paper by a final 'n') has a contrastive feature of nasalization which starts at the end of the word-phrase and continues regressively, nasalizing each vowel until it reaches either the beginning of the word-phrase or a voiceless consonant. (The nasalization will also pass through /š/ when it is medial in a nonglottalized couplet, but not when it is medial in a glottalized couplet: kùšŭ 'diligent', kùšŭn [kṵ̀šṵ̆·] 'you (fam.) are diligent'; but, kóʔšǒ 'to fall', kóʔšǒn [kóʔᵒšǒ·] 'you (fam.) will fall'.)

A nasal word-phrase always has the second person familiar as one of its components of meaning[9]:

[9] For footnote, see next page.

kàʔtà 'sing', kàʔtàn [kàʔᵃtą̀] 'you (fam.) will sing';
kàʔnį́! 'kill', káʔnín! [ką́ʔᵃnį́] 'you (fam.) will kill';
kl̰ʔvǐ 'be drunk', kl̰ʔvĭn [kl̰̀ʔⁱvį̰̀] 'you (fam.) will get drunk';
kúɗį̰́ 'get angry', kúɗíín [kúɗį̰́ĭ́] 'you (fam.) will get angry';
káɗáší 'diet', káɗášín [kąɗą́·šį́] 'you (fam.) will diet';
kótódéé 'examine', kótódéén [kótǫ̰ⁿdę́ę́] 'you (fam.) will examine';
cíkʷéʔcì 'complain', cíkʷéʔcìn [tsíkʷɛ́ʔᵋtsį̀] 'you (fam.) will complain'.

An oral word-phrase with nasal vowels can be homophonous with a nasal word-phrase: cį̰̀ 'fingernail', cį̰̀n [tsį̰̀] 'you (fam.) will get wet'.

The nasal vowels in an oral word-phrase are perceptually the same as nasalized vowels in a nasal word-phrase, but we have chosen to treat the nasalization on two different levels of the phonological hierarchy.

There are various reasons for treating nasalization in two parts of the hierarchy:

(1) A morpheme which has a vowel which is nasalized on the phoneme level, /į, ę, ą, į̱, ų/, remains nasalized in all environments (dę̀ʔę́! 'grease', ɗę́!kúʔcį́ 'lard'; tą̀ʔą̀ 'cousin', tą̀ʔò 'your cousin', tą̀ìiʔkà-ó 'your distant cousin'), whereas a morpheme which has nasalized vowels because it is a part of a nasal word loses that nasalization in other environments: íšá!váʔán [íšą́!bą́ʔą́] 'you (fam.) are a good child', íʔšá! [íʔⁱšá] 'child'.

(2) There is no phoneme */ǫ/, but /o/ can become nasalized in a nasal word: kòʔtò 'to look', kòʔtòn 'you (fam.) will look'; kòʔò 'drink', kòʔòn 'you (fam.) will drink'.

(3) There is a limited distribution of /į, ę, ą, į̱, ų/ in that (a) they do not follow /b, z, g, gʷ/ in nonglottalized couplets, (b) they do not follow voiced consonants (except for /m, n, ñ/) in glottalized couplets. When in a nasal word-phrase, however, vowels can become nasalized even if they are following those consonants: káʔdén 'you (fam.) will cut', kl̰ʔvĭn 'you (fam.) are drunk', zòʔón! 'you (fam.) are a hummingbird', càʔbàn 'you (fam.) are fat',ràʔgʷàn 'you (fam.) are huge', nàgàván 'you (fam.) let it loose'.

(4) The distribution of /į, ę, ą, į̱, ų/ in an oral word-phrase is different from that of the distribution of nasalized vowels in a nasal word-phrase.

[9] In Tereno of Mato Grosso, Brazil, the category of first person is linked with nasalization: "The phonetic actualization is as follows: (a) the nasalization of all vowels and semi-vowels in the word up to the first stop or fricative. In words without stops or fricatives all vowels and semi-vowels are nasalized, together with (b) a nasalized consonantal sequence replacing the first stop or fricative ..." (Bendor-Samuel 1960:350). Bendor-Samuel has chosen to interpret this part of the system as "a prosody of nasalization" (p. 353).

Specifically, in an oral word-phrase the last vowel may be oral while the next to the last vowel is nasal (kę̀ɖé-ù 'I sneezed'). In a nasal word-phrase however, the last vowel is always nasalized.

7. Syllable

The nucleus of a syllable consists of one vowel (1) preceded, or not preceded, by one or two consonants, (2) with one tone, or with a cluster of two tones. That is, the segmental combinations CCV, CV, V occur with a high or low tone, or with the clusters high-low or low-high.

In the following examples the syllables have been separated by a dot. Examples of syllables in nonglottalized word-phrases: šk̀ì.nì 'last night', dè.ě 'black', ì.ǎ 'sour' šú.mę̌ wax', !vi̯.ɖí̯! 'warm'.

Examples of syllables in glottalized word-phrases: !šté?nú 'tom turkey', ɖú?.nŭ 'shirt', vá?.ǎ 'good' á?.vĭ 'expensive', !štâ?.mą́! 'squatty', dù?.tè 'water', kʷì?.sí̯! 'white'.

8. Consonant contrasts

There are twenty-two consonant phonemes in native Mixtec words. (For additional phonemes introduced through Spanish loans, see 14.) There is a set of voiceless stops and affricates /p (rare), t, c, č, k, kʷ/ paralleled by a set of prenasalized voiced stops and affricates /b (rare), d, z, ǰ g, gʷ/. There are voiceless and voiced fricatives /s, š, v, ɖ, ɖʸ/, nasals /m, n, ñ/, a lateral /l/ and a flap /r/.

Bilabials /p, b, v, m/: pà?á! 'baby', vá?ǎ 'good'; vì?ì 'house', mi̯?i̯ 'where'; cà?bà 'fat', cà?vá! 'frog', ɖà?mą̀ 'dress'.

Dentals /t, d, ɖ/: tá?kǎ nest', dà?kà to leave', ɖá?ká 'to be mixed'.

Alveolars /c, z, s, n, l, r/: có?ó 'flea', zó?ò! 'hummingbird'; cà?á! gourd', sá?ǎ 'this', ną̀?ą̀ 'a long time', là?à 'knot', rà?và 'pot-bellied'.

Alveopalatals /č, ǰ, š, ñ/ and palatalized dental /ɖʸ/: čó?ǒ 'medicine', ǰò?kǒ 'sultry', šò?kò 'steam', ɖʸú?nŭ money', ñú?nŭ 'fire'. (See 13 regarding palatalization in women's speech.)

Contrasting /t c, č, d, z, ǰ/: tò?ó! 'owner', có?ó 'flea', čó?ǒ 'medicine', dò?ó! 'adobe', zò?ó! hummingbird', tèǰò?ǒ 'Puebla'.

Contrasting /s/ and /š/: sá?ǎ 'this', šà?à 'chili'.

Contrasting /ɖ/ and /l/: ɖá?ká 'to be mixed', lá?ká 'scarecrow'; ɨɖú 'horse', cílú 'dragonfly'. In some morphemes /ɖ/ and /l/ alternate: ɖèdŭ ~ lèdŭ 'dirty', ɖi̯?i̯ ~ li̯?i̯ 'mother', ɖà?ki̯ ~ là?ki̯ 'rough'.

Contrasting /n, ñ, d, ǰ/: nu̯?ú̯! 'tooth', ñú?nŭ 'fire', dù?ù 'fat', ǰú̯?ú̯ 'doctrine', ǰú?vé 'hammock'.

Since nasals /m, n, ñ/ are followed only by nasal vowels, and since /v, ɖ, ɖʸ, l, d, ǰ/ occur with a following nasal vowel in only a few morphemes, we have listed these contrasts: mì̯ní̯! 'lake', ví̯ɖǐ̯ 'sweet', di̯ɖì̯ 'handle'; nà?ą̌ 'a long time', ɖą̀?ą́ 'Mazatec'; nù?ú! 'tooth', lù?ú! 'road-runner'; ñú?nŭ 'fire', ɖʸú?nŭ 'money', ǰú̯?ú̯ 'doctrine'; kámą́n 'you (fam.) hurry up', kàvàn 'you (fam.) go to bed'.

Velars /k, kʷ, g, gʷ/: kàá! 'metal', kʷàá! 'late'; ká?cí 'cotton', gà?cĭ 'blanket'; kʷì̯i̯ 'green', gʷí̯i̯ 'the rest'.

Contrasting /kʷ/ and /ku/: kʷàá! 'late', kùǎ (kùvì 'become' + ìǎ 'sour') 'to get sour'.

Prenasalized stops and affricates are considered to be unit phonemes, (1) because only consonant clusters of two consonants occur couplet initially (/st, št, rt/), and [sⁿd] and [šⁿd] also occur there: sdàá! 'white hair', !šdó?ó 'spider'; (2) because only single consonants occur medially in a couplet; [ᵐb], [ⁿd], [ⁿdz], and [ᵑgʷ] also occur couplet medially: cà?bà 'fat', cídĭ 'earring', lùzĭ 'top', rà?gʷà 'huge'.

In contrast, [nɖ] occurs as a cluster of two consonant phonemes in !nɖí?ú 'goat'. It contrasts with [ⁿd] in dì?ù 'shut'.

9. Consonant variants

The prenasalized dental stop /d/ has a palatalized allophone [dʸ] when preceding /i̯, u, u̯/ (no example has been found of /d/ preceding /i̯/): [ⁿdʸ]i̯?i̯! 'all', [ⁿdʸ]ù?ù 'fat', ù?[ⁿdʸ]ŭ 'short', [ⁿdʸ]u̯ɖí̯! 'honey'. The nonpalatalized allophone occurs elsewhere: [ⁿd]èě 'black', [ⁿd]à?à 'hand', [ⁿd]ą̀ɖǔ̯ 'brittle', [ⁿd]ìɖì 'handle', !lú?[ⁿd]ĭ 'small', [ⁿd]ò?ó! 'adobe'.

The voiceless dental stop /t/ likewise has a palatalized allophone [tʸ] when preceding /i̯, í̯/ and /u/, but not when preceding /u̯/: tʸ i̯?[tʸ]í̯! 'many', [tʸ]ú?[tʸ]ú! 'paper', but [tʸ]ù?[t]u̯ 'firewood', [t]u̯?ú̯! 'word'. The nonpalatalized allophone occurs elsewhere: [t]ìną́! 'dog', [tʸ]ú?[t]é 'gruel', [t]à?[t]ą̌ 'witch-doctor', [t]ò?ó! 'owner'.

The palatalized allophone of /t/ occurs preceding /u/, even when it is allophonically nasalized as part of a nasal word-phrase: kù[tʸ]ùví 'to sit

down', kù[tʸù]vín 'you (fam.) sit down'; cì⁹[tʸù]-[tú]! 'she is swollen', cí⁹[tʸù]-[ⁿdʸŭ] 'is it swollen?, cí⁹[tʸù]-[ⁿdʸŭ]n 'are you (fam.) swollen?'.

In postcouplet syllables when preceding a nasal vowel, the voiceless velar stop /k/ occasionally varies to a lenis voiced velar fricative [ɡ], while the alveolar fricative phoneme /s/ varies to [h]: kʷíá dɨ⁹ɨ̀-kò[k/ɡ]ą̀ 'last year'; nį́nù-[s/h]ą́ 'up here', ñà⁹á-nì[s/h]á (emphatic negative).

The alveopalatal fricative /š/ fluctuates from retroflexed to nonretroflexed. For the most part, the retroflexed allophone precedes /ɨ/ and /u/, and the nonretroflexed allophone is more frequent preceding /i/ and /e/: šɨšɨ́ 'badget', ìšŭ 'empty', è⁹šį̀ 'bowl', ší⁹ǐ 'door', šéě 'new', šòɖò 'valley' šà⁹à 'chili'.

The alveopalatal fricative /š/ also fluctuates from voiceless [š] to voiced [ž] when it occurs medially in a nonglottalized couplet or between vowels in a word-phrase margin: šú[š/ž]ú 'glass', lɨ⁹[š]ɨ́! 'rooster', lɨ́[š/ž]ɨ́kà⁹nù 'big rooster'.

The dental fricative phoneme /ɖ/ has a voiceless allophone when in a cluster following /t/: ɖú⁹mę̌ 'tail', t[ɵ]ú⁹mę́ 'scorpion'.

The alveolar flap phoneme /r/ has a voiceless allophone when in a cluster preceding a voiceless consonant: [ɾ̌]kìmą̌ 'hoe', ![ɾ̥]kʷéɨ́ 'ladder'. Elsewhere it is voiced: [ɾ̌]à⁹và 'pot-bellied', tɨ́[ɾ̌]à⁹ú! 'peanut', t[ɾ̌]ì⁹tá! 'woodpecker'.

The alveopalatal nasal phoneme /ñ/ varies to a palatal nasalized nonsyllabic vocoid [ɣ̃] medially in a word-phrase: [ñ]ą̀⁹ą̀ 'people', mę́?[ñ/ɣ̃]ų̌ 'center', kù[ñ/ɣ̃]ú! 'meat', ɖìvì-[ñ/ɣ̃]ą́! 'his name'.

10. Vowel contrasts

There are six oral vowels /i, e, a, o, u, ɨ/ but only five nasal vowels /į, ę, ą, ų, ɨ̨/.

The oral vowels contrast: ší⁹ǐ 'door', šé⁹ě 'gave', šà⁹à 'chili', šò⁹ò 'rope', šù⁹ù 'mouth', šɨ⁹ɨ̌ 'raw'.

The nasal vowels contrast: tį̋į̋ 'perspiration', štę́ę́ 'forehead', tą́ą̌ 'earthquake', tų́ų̌ 'charcoal', tį̀į̀ 'to grasp'.

The front vowels /i, į, e, ę/ contrast: kʷì̀ 'green', kʷį̀į̀ 'to buy', kʷè⁹é! 'red', kʷę́⁹ę́ 'to go'.

The central vowels /ɨ, ɨ̨, a, ą/ contrast: á⁹kɨ̌ 'burnt', kà⁹kɨ̨́ 'to be hungry', kà⁹kà 'to walk', ká⁹ką̌ 'to beg'.

The back vowels /u, ų, o/ contrast: cù⁹ú! 'gopher', cù⁹ų́! 'chicken', có⁹ó 'flea'.

The high vowels /i, į, ɨ, ɨ̨, u, ų/ contrast: kì⁹ì 'to take', kį̀⁹į̀ 'several', nákɨ́?ɨ 'to be inserted', kɨ̨́⁹ɨ̨̌ 'to go', kù⁹ú! 'herb', kų̀⁹ų̀ 'to be put in'.

The low vowels /e, ę, a, ą, o/ contrast: kʷè⁹é! 'red', kʷę̀⁹ę́ 'to go', kʷàá! 'late', kʷą̀ą́! 'yellow'; kàá! 'metal', kóǒ 'snake'.

11. Vowel variants

Vowels are lengthened in the first syllable of the nonglottalized couplet: š[á·]vǐ 'hole', [í·]ɖú! 'horse', k[ù·]nú! 'deep', š[ɨ́·]šɨ́ 'badger'. Vowels carrying tone clusters are also lengthened: !skʷ[î·]dú! 'spotted', v[ì·]ɖ[ɛ̀·] 'wet', kó⁹š[ǒ·] 'it fell'.

The high vowels /i/ and /u/ are generally shorter than the other vowels when they are followed by diverse vowels having the same tone: kʷíǎ 'year', !rkʷéɨ́ 'ladder', šùà 'Compadre (vocative)', mą́ų́ 'aide', kàdìò 'is needed', kàdèɨ̀ 'is upside down'.

The vowel /e/ is open [ɛ] and varies to a slightly raised [æ] when in a nonglottalized couplet preceding /n/, /ñ/ or /d/: l[ɛ́?ɛ́] 'circle', ɖù?š[ɛ́] 'gum', [è⁹ᴱ]d[ɛ́] 'cut', [ɛ́·/ǽ·]nį́! 'brother', n[ɛ̀·/æ̀·]ñų̀ 'blackberry', ɖ[è·/æ·]dŭ 'dirty'.

The vowel /o/ [o] is likewise open and varies to a raised [ɔ] in the word-phrase margin prepause: kó⁹ò-k[ó/ɔ́] 'my dish', kɨ́⁹[ǒ·/ɔ̌·] 'let's go', dì[ǒ·/ɔ̌·] 'let's go out'.

The nasalization of a vowel is heavier when the vowel is contiguous to another nasal vowel: ñų́ų́ 'town', versus ñų́⁹tɨ́ 'sand', cìñù 'work'. The degree of nasalization is also related to vowel quality: the high vowels, and particularly /ų/, are more heavily nasalized than the lower vowels, with /ą/ being the least nasalized: ñų́⁹ų̌ 'fire', dɨ̨⁹ɨ̨́! 'leg', cį̀į̀ 'fingernail', tą̀⁹ą̀ 'sister', mą́⁹ną́ 'sleep'.

There is no noticeable difference in the degree of nasalization of nasal vowels following nasal consonants versus nasal vowels following nonnasal consonants: nų́ų́ 'face', cų́ų̌ 'turkey hen'; nų̀⁹ų́! 'tooth', tų̀⁹ų́! 'word'; neither is there any difference in the nasalization of a nasal vowel and the nasalization which an oral vowel receives when it is nasalized in a nasal word: kį̀⁹į̀ 'several', kì⁹ìn 'you (fam.) take it'; kį̀ɖɨ̨́ 'sticky', kíɖĭn 'you (fam.) slept'.

12. Distribution of phonemes

Phoneme distribution in Coatzospan Mixtec is here presented in relation to the couplet, which is the most pertinent unit of description. The data included here are restricted to phonemes found in native Mixtec words.

12.1. *Consonants*

Any consonant may occur initially in the couplet. Three consonants /s, ɗʸ, r/ do not occur in the second syllable of the couplet except in Spanish loans: aʔsu 'garlic (Sp. ajo)', raɗʸu 'radio', vuru 'burro'. The alveopalatal affricates /č/ and /ǰ/ occur in the second syllable only in women's speech (see 13).

In addition to the above restrictions, the dental fricative /ɗ/ does not occur in the second syllable of glottalized couplets, and the alveopalatal fricative /š/ is the only voiceless consonant that may occur medially in a nonglottalized couplet: šúšŭ 'glass', ìšŭ 'empty'.

12.2. *Consonant clusters*

Consonant clusters may occur initially in a couplet but not medially except in cases of fusion of two morphemes.

Where initial clusters occur, the first member of the cluster may be one of the following consonants: /t, s, š, n, r/. The dental stop /t/ occurs followed by /ɗ/ and /r/: !tɗúʔmę́ 'scorpion', tràná! 'tomato'; /s/ is followed by /k/, /d/ and /m/: !skúdí 'cricket', sdàá 'white hair', smi̱í! 'bumble bee'; /š/ is followed by /t, k, kʷ, d, n/: !štéʔnú 'tom turkey', škìnì̱ 'last night', škʷíʔnǎ (derogatory term), !šdóʔó 'spider', šnu̱nú! 'toad'; /n/ is followed by /ɗ/ in only one word: !nɗíʔú 'goat'; and /r/ is followed only by velar stops /k, kʷ/: rkìmǎ 'hoe', rkʷàʔdí! 'rainbow'. (For additional clusters introduced through Spanish loans, see 14.)

Clusters containing /š/ plus /t, k, d, n/ occur at morpheme junctures where a vowel /i/ has been dropped: káʔštú! (káʔší-tu̱) 'she will eat', káʔšdó (káʔší-dò) 'you will eat', úškɨ́mi̱ (úʔši 'ten' + kɨ́mi̱ 'four') 'fourteen', dúšnu̱ú (duʔci 'bean' + nuu 'face') 'eye'.

12.3. *Vowels following consonants*

All oral vowels have been found to occur following /t, c, č, k, d, s, ɗ, l/. Vowels /o, u, ɨ/ do not occur following labials /p, b, v, m, kʷ, gʷ/. Front vowels /i, e/ do not follow /g/ nor (except in women's speech) /ǰ/. Vowels /e, ɨ/ do not occur following /s/; /ɗʸ/ may be followed by any vowel except /i/, and /r/ is followed by any vowel except /e/. The rare occurrence of /p/, /b/, and /z/, each in less than five morphemes, probably accounts for their limited distribution: /p/ occurs before /a/, /b/ before /e/ and /a/, and /z/ only before /i/ and /o/.

Nasal vowels may occur following any consonant except the prenasalized stops /b, z, g, gʷ/. They do, however, occur following two prenasalized stops, /d/ and /ǰ/: di̱ɗi̱ 'handle', ǰú̱ʔú̱ 'doctrine'. Only nasal vowels occur following nasal consonants /m, n, ñ/.

12.4. *Vowels preceding consonants*

Within a couplet, the vowel /o/ has the most restricted distribution with reference to following consonants. It does not occur preceding labials, nasals, prenasalized stops, nor before /c/. The distribution of the other vowels before consonants is not noticeably restricted, though not all possible combinations have been found to occur.

12.5. *Vowel distribution within the couplet*

In monomorphemic couplets of canonical pattern CVV, CVʔV, and CVCV, if nasal vowels occur, they occur in both syllables: cu̱ú̱ 'turkey hen', ɗę̱ʔę́! 'grease', vi̱ɗi̱ 'sweet'. In a glottalized couplet with a medial consonant, the second vowel may be nasal if the consonant is voiceless: ɗíʔci̱ 'nose', díʔšę̱ 'sandal'. Nasal vowels occur only in those glottalized couplets which either have no medial consonant or whose medial consonant is either voiceless or nasal /m, n, ñ/: tu̱ʔú! 'word', mi̱ʔi̱ 'where', mą̱ʔną́ 'sleep', ñú̱ʔtɨ́ 'sand', mi̱ʔdé 'prickly pear', ɗúʔnu̱ 'shirt', mi̱ʔci̱! 'fan'.

When nasal vowels are contiguous in the couplet, they are normally identical: ɗi̱i̱ 'fierce', tą̱ʔą̱ 'sister'. Only a few examples of CVV/CVʔV couplets containing diverse nasal vowels have been found, and these are usually morphemically complex: láták^{w}ą́ú̱ 'marigold', šę́u̱ 'other one', šę́ʔu̱ (úʔši 'ten' + ú̱ʔu̱ 'five') 'fifteen'.

When /o/ is present as the first vowel of a monomorphemic couplet, it is usually repeated in the second syllable: kó$^{?}$ǒ 'dish', ǰò$^{?}$kǒ 'sultry', šòɗò 'valley'. There are at least three exceptions to this rule: rói 'you there (vocative)', tèkò$^{?}$ɨ́ (name of a spring in San Juan), ɗò$^{?}$tá 'tortilla cloth' (probably a fusion of ɗóǒ 'cloth' and í$^{?}$tă 'tortilla'). When /o/ is the second vowel in a couplet, it is commonly preceded by /i/ and rarely by /e/ and /u/: cìɗó! 'rabbit', šàlè$^{?}$dò (kind of chili), ɗókúdó 'Tuxtepec'.

The other oral vowels occur preceding and following each other in all possible combinations in couplets in which they are separated by a consonant.

12.6. *Vowel clusters*

In CV$^{?}$V couplets the two vowels are usually identical, but where diverse vowels appear, /i/ may be followed by /a, o, u/: ɗì$^{?}$á! 'comadre', cí$^{?}$ǒ 'cooked', ɗí$^{?}$ǔ 'beard'; /e/ may be followed by /a, u/: dé$^{?}$ă 'peach', tè$^{?}$ú! 'rotten'; and /a/ may be followed by /u/: tà$^{?}$ǔ 'tight'. The vowels /u/ and /ɨ/ are followed only by identical vowels: dù$^{?}$ù 'fat', dɨ$^{?}$ɨ 'mother'.

Where vowels are contiguous in CVV couplets, geminate clusters are most frequent: šíĩ 'delicate', šéě 'new', šáă 'ashes', šóǒ 'moon', šúǔ 'stone', šɨ̀ɨ 'husband'. However, in clusters of diverse vowels, /i/ may be followed by /a, o/: ìă 'sour', šíǒ 'comal'; /e/ may be followed by /u, ɨ/: dèù 'gravy', ɗèɨ 'noose'; /a/ may be followed by /u, ɨ/: cau 'cough', rkaɨ 'burnt'; and /u/ by /a/: šùà 'compadre (vocative)'. The vowel /ɨ/ is followed only by itself.

Since there is frequent vowel loss or change when vowel clusters occur across morpheme borders, the above restrictions are not pertinent to bimorphemic clusters.

13. Women's speech

In women's speech the dental stops /t/ and /d/ never occur before front vowels /i/ and /e/. They are replaced by the alveopalatal affricates /č/ and /ǰ/ respectively. In the following pairs of words, the first of the pair is men's speech and the second is women's speech: tìnɻ́! ~ čìnɻ́! 'dog', dù$^{?}$tè ~ dù$^{?}$čè 'water', !lú$^{?}$dĭ ~ !lú$^{?}$ǰĭ 'small', dèě ~ ǰèě 'black'.

When preceding other vowels the phonemes /t, č/ and /d, ǰ/ contrast in both men's and women's speech: tò$^{?}$ó! 'owner', čó$^{?}$ǒ 'medicine', dà$^{?}$à 'hand', ǰà$^{?}$ă 'broth'.

The sequences /či/ and /če/ do occur in men's speech, but only rarely: číí! 'rifle', čè$^{?}$tu̯ 'cedar'.

14. Spanish loans

In addition to the 22 consonant phonemes described in 8, there are 17 more consonants which occur only in Spanish loans. These are fricatives /f, x, ɡ/: fò$^{?}$kó 'lightbulb (foco)', spé$^{?}$xú 'mirror (espejo)', ɡá$^{?}$stú 'expense (gasto)'; labialized phonemes /x^{w}, ɗ^{w}, ɡ^{w}, m^{w}, n^{w}, l^{w}, r^{w}/: x^{w}ą́ą́ 'Juan', ɗ^{w}árɗú 'Eduardo', ɡ^{w}érŭ 'pale (güero)', sám^{w}éé 'Samuel', mą́n^{w}éé 'Manuel', l^{w}íĩ 'Luis', r^{w}íĩ 'Ruiz'; palatalized phonemes /s^{y}, x^{y}, v^{y}, m^{y}, l^{y}, r^{y}/: s^{y}édú 'hundred (ciento)', lò$^{?}$x^{y}ú 'Elogio', v^{y}érnɻ́ 'Friday (viernes)', m^{y}ą̀nú! 'Maximillano', xúl^{y}á 'Julia', kùr^{y}á! 'Gregoria'; and the palatal phoneme /y/: ɡáyé$^{?}$tá 'cookie (galleta)'.

A number of consonant clusters occur in Spanish loans which are not found in native words (see 12.2). The majority of these involve /s/ plus a stop or nasal consonant: sk^{w}élá 'school (escuela)', óví$^{?}$skú 'bishop (obispo)', snɻ́dɻ́ 'soldier (soldado)'; or some combination involving /r/, either preceding or following another consonant: préférú 'February (febrero)', ságrí$^{?}$stá 'sacristan', k^{w}é$^{?}$rká 'filthy pig (puerco)', vártúmɻ́ 'steward (Mayordomo)'. The lateral /l/ does not occur in native Mixtec clusters and is generally replaced by /r/ when loan words are assimilated: vró$^{?}$sá 'bag (bolsa)', àrmɻ́! 'soul (alma)'.

A cluster of three consonants /str/ has been found to occur both initially and medially in Spanish loans: stramɻ́dú 'sacrament (sacramento)', pú$^{?}$strú 'apostle (apóstol)'.

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