PHONOLOGY AND MORPHOPHONEMICS OF THE MIXTEC OF ALACATLAZALA, GUERRERO

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0. Introduction
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0. The Alacatlazala Mixtec language (AM) is like most of the other Mixtec languages thus far studied in that it has three phonemic tones and the couplet is the nucleus of the phonological word.[1] It differs from other Mixtec languages because of the absence of extensive tone sandhi, not even the downstep terrace tone described for Coatzospan Mixtec (Pike and Small 1974) and Peñoles Mixtec (Daly 1977).[2] There is no tone sandhi between words; that is, there are no sets of words that undergo or cause tone change when they appear next to certain other words. Negative morphemes in prefixes and pronominal enclitics are the only morphemes which undergo or cause changes in tone. Thus, all tone sandhi is within the word only.

The first part of this paper describes the phonemes and tonemes of AM with reference to the couplet and the phonological word. The latter part of the paper describes the tone morphophonemics, principally that which involves the pronominal postclitics.

1. There are four syllable types: CV, V, CV?, and ?V. These syllables form the following couplet patterns: VCV as in inᵹ "dog", CVCV sìtà "tortilla", CVV ndeé "strong", CV?CV ñáᵹ?noᵹ "piece", and CV?V yu?ù "mouth". Most word stems are dissyllabic in form. There are no closed syllables except those ending in glottal stop; no words end in a consonant (glottal stop does not occur word finally). Syllable type ?V occurs only as the second syllable of a couplet.

Although the norm is the two-syllable stem, there are words whose stem is comprised of three syllables. These three-syllable stems include both nouns and verbs, but verbs comprise by far the majority of

this word shape. It is probable that such stems are compounds of some kind. For example, tìsú?ù "goat" may come from ti- "animal" and sú?ù "beard", i.e., "bearded animal"; and čindeé "to help" means literally "to put strength." With many other three-syllable words, however, the component morphemes are not so readily identifiable. For example, ndiva?yí "coyote" and saną́?ą "to teach" cannot be broken down into constituent morphemes.

The phonological word is composed of a stem (two or three syllables) and its prefixes, suffixes and enclitics. It is defined as a sequence of syllables which can be spoken in isolation and which has only one stress. Stress falls on the initial syllable of the couplet except for the stress shift to the second syllable of the couplet when followed by the first person postclitic -ì (5.2).[3] Stress falls on the penultimate syllable of a three-syllable stem. In AM a phonological word may consist of from one to seven syllables, although two or three syllable words are the most common. An example of a one syllable word is če "look". Except for interjections, one-syllable words do not occur. The maximum seven-syllable word occurs but rarely, and is always the result of a verb stem's taking on affixes or enclitics. For example, a three-syllable transitive verb stem may occur with as many as two aspect prefixes and both subject and object enclitics, as in the word šìnàsa'ná?aràą́á "already he taught her." Stress (') falls on the penultimate syllable of the stem sa'ná?a.

Single-syllable particles such as či "because", nda "from, until", and ta "and" are always attached phonologically to what follows, and may or may not receive stress depending on what word shape follows. For example, in the sequence ta'saá "and thus", the ta is unstressed because three-syllable words are within the allowable limits. However, when ta occurs in front of the maximum seven-syllable word it becomes the stressed syllable of a sequence of two phonological words: 'tašl nàsa'ná?aràą́á "and already he taught her." If a string introduced by a particle contains seven syllables, then it may constitute one phonological word or it may divide into two phonological words with stress on the introductory particle. For example, one might say činàči

'ndeéñándó "because she helped you all" or 'činà či'ndeéñándó. Another possibility is to use the dissyllabic form of the second pronominal enclitic and let it form a separate phonological word: činàči'ndeéñá 'ndó?ó. The tendency for most speakers is to keep phonological words to no more than five syllables.

2. The consonant phonemes are: voiceless stops p,t,k and ?; labialized stop kw; prenasalized voiced stops mb, nd, ŋg; nasals m, n, ñ; fricative v; lateral l; semiconsonant y; grooved fricatives s, š; affricate č; alveolar flap ř; and spirant h.

The phoneme p occurs only in loan words and has thus far been found only word initially: panélá "brown sugar"; pátó "duck", pósó "spring" (Sp. pozo), permísó "permission", and puércó "pig". (Spelling of loan words retains Spanish orthography except where pronunciation is altered.)

The phoneme t, a dental stop, is very frequent and occurs with all vowels, oral and nasalized. It occurs both in couplet initial and couplet medial position: taši "give", te?è "vine", tl̥í̥ "mouse", tòmi̥ "feather", kòtó (Sp.) "shirt", sùtù "priest", and viti̥ "now".

The phoneme k occurs before all vowels in couplet initial position and before all vowels except e̥ in couplet medial position: kamḁ "fast", kitl̀ "animal", kò̥?ò̥ "will go", šáku "is crying", k^{w}l̀kà "comb" and sakeè "will harvest corn". In post-couplet unstressed position k has the allophone g: for example, the morpheme -ka "more" in kúni̥kàrà sl̀tà "he wants more tortillas", which is phonetically kúni̥gàrà sl̀tà.

The phoneme k^{w} occurs widely in both couplet initial and couplet medial position, although it never occurs before rounded vowels: k^{w}á?á "red", k^{w}è?è "fierce", k^{w}l̥nò̥ "tobacco", ñò̥k^{w}ii "fox", yak^{w}á "crooked". Several pairs of words demonstrate the contrast between kw and k: k^{w}ḁ̀?ḁ̀ "to be going", kḁ̀?ḁ "said"; kwéé "slowly", kèe "went out"; kì̥?i̥ "bought", k^{w}í̥l̥ "spotted".

The phoneme ? occurs couplet medially, either between vowels or preceding a voiced consonant. It is the only consonant that can occur syllable final, as in CV?CV stems. Examples of ? are: ndà?a "hand",

si?í "mother", tǫ̀?ǫ "word", kʷá?á "red", kò?ò "plate", ndá?ví "poor", tá?yá "hard", and ñl̀?mà "smoke".

Glottal stop contrasts with its absence in stem medial position, as in the following examples: šà?à "foot", šaá "new"; ndi?i "all", ndii "clean"; tǫ̀?ǫ̀ "word", tǫ́ǫ́ "black"; kʷà?a "going", kʷáá "yellow".

The phoneme mb is rare and occurs in loan words only. Examples are mbíǫ́ "airplane" (Sp. avión), mbí?la "lizard", and combádí "godfather" (Sp. compadre).

The phoneme nd never occurs before nasalized vowels. It occurs both in couplet initial and in couplet medial position: ndà?a "hand", ndò?o "adobe", ndìvì "egg", šá?nda "is cutting", and kándó "broth".

The phoneme ŋg occurs in one morpheme only: iŋgà "other", which is interesting because this same word is present in nearly all other Mixtec languages where the phoneme ŋg is otherwise absent.[4]

The phoneme m is widely distributed in both couplet initial and couplet medial positions. It never occurs before a non-nasalized vowel; in borrowed words it nasalizes the following vowel. In native words it occurs only before a and i; in loan words it also occurs before e and o; it never occurs before u: míštó "cat" (Old Spanish through Aztec mistu), mači "spot", mì?í "trash", níma "heart" (Sp. ánima), kama "fast", and mésá "table" (Sp. mesa).

The phoneme n never occurs before non-nasalized vowels, nor does it occur before u or e: naa "dark", nìvi "people", nánì "long" (plural), and nìnǫ̀ "below".

The phoneme ñ occurs frequently in both couplet initial and couplet medial positions. Couplet medially before i the ñ fluctuates with y (which does not otherwise occur before nasalized vowels). The ñ does not occur before e. For example: ñǫ̀ñù "honey", íñǫ́ "thorn", ñì?mà "smoke", naña "will fall", ñàñi or ñàyi "peeled".

The phoneme v has an allophone w before the vowel a and is realized as ʙ elsewhere. It does not occur before rounded or nasalized vowels, nor before e in the second syllable of a couplet. Examples are: và?a "good", kìvì "day", vìko "fiesta", ve?e "house", and yì?và "thread".

The phoneme l, an alveolar lateral flap, like the other voiced non-nasal consonants, does not occur before nasalized vowels.[5] Neither does l occur before u. For example: lekó "sack", láà "tongue", livi "pretty", válí "little" (plural), lólo "straight up", and tišélé "scissors".

The phoneme y occurs before all the oral vowels and in both couplet initial and couplet medial positions: yavì "hole", yúyú "deserted", yó?o "here", yé?é "door" and tayì "chair".

The phoneme s occurs frequently in couplet initial and couplet medial positions, but infrequently before nasalized vowels. For example: sà?a̱ "lard", sò?o "ear", sínì "hat", yàsì "tasty", yòsó "metate", yusu "deer", and se?è "ring".

The phoneme š occurs in couplet initial and couplet medial position and before both oral and nasalized vowels, but not before o or o̱: šìtà̱ "grandmother", vìǐi "cold", šutu "will weed", šà̱?à̱ "went", ší̱?í̱ "with", tišélé "scissors", ndušú "chicken" and šúšá "lazy".

The phoneme č occurs in both couplet initial and couplet medial positions. It is infrequent before nasalized vowels; it does not occur before e in couplet medial position. Examples are: čiño̱ "work", čéè "large", čó?o "over here", čútú "full", yáčá "axe" (Sp. hacha), yìčí "dry".

The phoneme ř in words of Mixtec origin is restricted to two pronominal enclitics -řa "third person masculine" and -ři "third person animal". It occurs in loan words such as mo̱rá "shoulder bag" (Sp. moral) and corrá "corral" (where the trilled r is considered a cluster of two r's).

The phoneme h is a rare phoneme, found so far in only two morphemes: hàà "inanimate pronoun" and k^{w}íhé "lizard".

The phoneme cluster tn is the only cluster other than rr, described above.[5] This sequence appears to be dying out in AM: it is not the preferred pronunciation by anyone under 20, although it is commonly used by older persons. Representative words of this class are listed below with the alternate pronunciations.

old	new	meaning
vitnị	vitị	"now"
yitnọ	yitọ	"tree"
tnị́	tị́	"mouse"
šɨtnà	šɨtà	"grandmother"
tnò?o	tò?o	"word(s)"
katnɨ	ka?nɨ	"fever"
šatnɨ	ša?nɨ	"kill"

The sequence tnV is most often being replaced by tV, but in a few cases is replaced by ?nV.

3. The vowel phonemes include oral and nasalized counterparts for all points of articulation: high front vowels i, ị; high back vowels u, ụ; mid front vowels e, ẹ; mid back vowels o, ọ; and low vowels a, ạ. Examples of contrast are:

Ší?i "is drinking", Šị?ị́ "with"; yutu "cornfield", yutụ "your cornfield"; ve?e "house", mẹ́sá "table"; kò?ò "plate", kọ̀?ọ̀ "go"; ká?à "bottom", ká?ạ "is speaking".

The contrast between e and i is shown in words like se?è "ring", si?í "mother"; čéè "big, old", číì "fingernail"; ndeé "strong", ndii "clean"; yé?é "door", yì?ì "I, me".

The vowel e is not very frequent, and when it does occur it is usually in couplets of the pattern CV?V or CVV where the vowels are identical: ve?e "house", k^{w}è?è "sickness", k^{w}éé "slowly", ndeé "strong". It also occurs in the first syllable only of couplets of the pattern CVCV: kèta "go out".

The contrast between o and u is shown in words like šáko "opposum", šáku "is crying"; yòò "month, moon", yùù "rock"; ndò'o "adobe", ndu?ú "thick".

There is neutralization of the contrast between o and u after k and before n or ñ. The neutralized phone that occurs in this environment is somewhere between o and u; it is analyzed as an archiphoneme and is arbitrarily written u, as in kùñọ "meat", kúnị "want", and kunị "yesterday".[6]

There is complementary or noncontrastive distribution of oral and nasalized vowels with the certain sets of consonants: only oral vowels with mb, nd, ng, v, l, and y (except where it fluctuates with ñ before i̤); only nasalized vowels with tn, m, n, and ñ. On the basis of this noncontrastive distribution it would be possible to consider m, n, and ñ as allophones of v, l, and y (or vice-versa), and perhaps to consider nd and tn as allophones of the same consonant phoneme. (The consonants mb and ŋg are rare and marginal to the phonemic system of AM.) The author chooses not to group the nasal consonants and the oral resonants into unit phonemes on the grounds that such a grouping is psychologically unreal.

Nasalization of vowels extends throughout couplets of the form CVV and CV?V where the vowels are identical. When the vowels in a CVV couplet are not identical the first vowel may be oral and the second vowel may be nasalized: tl̀ṳ́ "turkey". Couplets that have a medial consonant other than glottal stop may have a nasalized vowel in either the first or second syllable of the couplet. Examples are: ñǫ̨ǫ́ "night", tǫ̀ǫ́ "black"; ní?i̤ "steam bath", ti̤?í̤ "skunk"; nl̀vi̤ "people", kl̀mi̤ "star".

The second person pronominal enclitic -ṳ́, when added to a couplet, nasalizes the preceding vowel. See Morphophonemic rule 7 (5.2). Examples are:

> ve?é "house", ve?e̤ṳ́ or ve?ṳ́ "your house"; yòsó "metate", yòsǫ́ṳ́ or yòsǫ́ "your metate"; sl̀tà "tortilla", sl̀tà̤ṳ̀ "your tortilla".

The nasalized vowels e̤ and ṳ are marginal to the phonemic system of AM. Nasalized e̤ occurs only after a nasal consonant in loan words: mé̤sá "table". Nasalized ṳ occurs only in connection with the enclitic -ṳ́ "second person sg." In morpheme couplets, excluding loan words and the influence of the enclitic -ṳ́, the nasalized vowels are limited to i̤, a̤, and ǫ̨. This is not surprising since a number of languages have fewer contrasts in nasalized vowels than in oral vowels.

Vowel sequences within the couplet are predominantly identical

vowels: láà "tongue", kòò "snake", ndeé "strong". Each vowel is a separate syllable and carries its own tone. There are a few compound stems where there is a sequence of unlike vowels: tiáká "fish", tlú "turkey", where the ti- is probably an animal classifier. There is also a vowel sequence in the contraction kiá "it is".

There are several vowel sequences when a vowel initial postclitic (-ì "first person", -ú "second person") is added to the couplet: kìsi "cooking pot", kì'sìì "my cooking pot", kìsiú "your cooking pot"; ve'e "house", ve'?éì or ve'?ì "my house", ve?éú or ve?ú "your house"; ndu?ú "stout", ndu'?úì "I'm stout", ndu?ú "you're stout"; tàmá "cañuela", tà'máì "my cañuela", tàmáú "your cañuela"; nduču "beans" ndu'čuì "my beans", nduču "your beans"; nọọ "face", nọ'oì "my face", nọọù or nọọ "your face"; yòsó "metate", yò'sóì "my metate", yòsóú or yòsó "your metate".

Vowel sequences which never occur are: *ae, *ea, *ao, *ue, *ie, *uo, *eo, and *oe and their nasal counterparts.

4. There are three tonemes: high, mid, and low. In the Mixtec words used as examples high tone is written with the acute accent (´) over the vowel; mid tone is unmarked; and low tone is written with a grave accent (`) over the vowel. In the morphophonemic rules tones are referred to by capital letters: H for high, M for mid, and L for low.

4.1 The three tonemes contrast with each other in the couplets, combining with each other to produce all of the nine possible combinations HH, HM, HL; MH, MM, ML; LH, LM, LL. The examples which follow were calibrated in a controlled context (frame) in which the tones of the substitution item could be compared with the mid tones in the preceding word and in the following word. The frame used was ii --- livi "one --- pretty".

The three tones contrast in the second syllable of the couplet after a high tone in the first syllable: yé?e "clear", yé?é "door", čéè "big".

The three tones contrast in the first syllable of the couplet

before a high tone in the second syllable: yáčá "axe", yatá "old", là?lá "mucous".

Contrasts in the second syllable of the couplet after a mid tone in the first syllable are: ñǫǫ "town", ñǫǫ́ "night", ñǫ?ǫ̀ "fire".

Contrasts in the first syllable of the couplet before a mid tone in the second syllable are: sisi "aunt", číči "ripe, mature", vìši "cold".

The three tones contrast in the second syllable of the couplet after a low tone in the first syllable: šìyò "comal", sìyo "dress", tìkǫ́ "mosquito".

The three tones contrast in the first syllable of the couplet before a low tone in the second syllable of the couplet: sàvì "rain", yavì "hole", kánì "long".

4.2 The allophones of the tonemes are relatively minor.

Before low tone, a mid tone is realized as a level tone between mid and high pitch; That is, the mid tone is raised slightly creating a more noticeable gap between it and the following low tone. In the frame mentioned above the mid tone of yikì "squash" is phonetically a bit higher than the mid tone of the preceding word ii "one": ii yikì livi "one nice squash" would have a pitch line like this, ii yiki livi.

Low tone drops down to extra-low when it occurs word final pre-pause. For example, if the word sàvì "rain" occurs utterance final its pitch line would be sàvì.

Following pause and before another low tone, a low tone is slightly raised: nąšà?à "went" in utterance initial position has the pitch line ~~nąš~~a?a.

5. The morphophonemic processes that affect the word in AM involve the negative prefixes and the pronominal postclitics. These processes are described by rules of the generative phonology sort, though distinctive features are seldom employed. The three tones are referred to by capital letters: H for high tone, M for mid tone, and L for low tone. The arrow → indicates the structural change. The

slant line / introduces the structural description of the environment where the change takes place. The clitic boundary is symbolized by #. The curly bracket } groups items which behave alike. The large square bracket] introduces a syntactic label for the constituent. C_o means an optional consonant. V stands for a vowel. Features abbreviated in the rules are nasal [nas], stress [str], high tongue position [hi], and syllabic [syl]. The double shafted arrow indicates a reordering transformational rule. Numbers in such rules refer to constituents for the reordering.

The rules are ordered such that a given rule applies to the output of previous rules as well as to underlying forms. Each rule is numbered and given a label which summarizes the process involved. The label is followed by a statement of the rule in prose and in formula. Examples are given for each rule with the input to the rule between slant lines followed by a colon to introduce the output of the rule and its gloss. Morphemes in question are separated by a hyphen.

Following the set of rules are two derivational displays of the application of the rules to the combinations of stems and postclitics.

5.1 There are certain negative prefixes which raise the tone of the following stem initial syllable to high. These prefixes are the negative completive marker nà- or nì- (nà- being the most common form) and the negative potential marker à- or àù- (à- being most common). The positive completive marker is the same shape as the negative completive marker, but does not perturb the following syllable to high tone.[7]

Prefix Rule. Raising of stem initial tone.

$$\left.\begin{matrix} M \\ L \end{matrix}\right\} \rightarrow H \Big/ \left.\begin{matrix} nà- \\ à- \end{matrix}\right\} + \underline{\quad}_{neg.}$$

A stem initial mid or low tone is raised to high following either of two negative morphemes, symbolized as nà- and à-.

/nà-kunaará/: nà-kúnaara "he didn't rest."
Compare nà-kunaará "he rested", with no raising of stem initial tone.

/nà̰-ši?ira/: nà̰-ší?ira "he didn't drink."
Compare nà̰-ši?ira "he drank"
/à-kušura/: à-kúšura "he will not eat"
Compare kušura "he will eat"

The morpheme that negates continual aspect, vása, does not cause any tone change in the verb stem. For example, vása šíšira "he is not eating" as compared with šíšira "he is eating."

Adjectives may be modified by negation using either vása or à-/àṵ̀-, without any difference in aspect. Vása is more common and does not affect the following tone. When à-/àṵ̀- is used the tone of the following syllable is raised to high.

/àṵ̀-và?a/: àṵ̀-vá?a "not good"
Compare vása và?a "not good"
/àṵ̀-ndii/: àṵ̀-ndíi "not clean"
Compare vása ndii "not clean"

In some cases the àṵ̀ is omitted and the raised tone on the stem initial syllable preserves the negative meaning: vá?a "not good".

Nouns are negated by a special verb sìví "is not", which has no effect on the tones of the noun stem.[8]

Thus: ve?e "house", sìví ve?e "is not a house";
kò?ò "dish", sìví kò?ò "is not a dish".

5.2 There are twelve rules which apply to the addition of pronominal postclitics to the stem. Rules 1 - 6 describe the tone adjustments on the postclitic. Rules 7 to 12 describe the particular adjustments in either stem or postclitic when a vowel initial postclitic is added.

Rule 1. Lowering of Mid Tone. -A

A mid tone enclitic becomes low following a mid tone subject postclitic if the verb stem ends in a high or mid tone.

$$M \rightarrow L \Big/ \left\{ \begin{matrix} H \\ M \end{matrix} \right\}_{verb} \neq M \neq \_\_\_$$

/ndíso-ra-nạ/: ndíso-ra-nà̰ "he is carrying them"
/kátó-ra-nạ/: kátó-ra-nà̰* "he is tying them up"

Rule 2. Raising of mid tone.

A mid tone on a pronominal enclitic becomes high following the high tone of a stem or of a subject clitic. (This rule also applies to the output of rule 1.)

$$M \rightarrow H \,/\, H \neq \text{——}$$

/kátó-ra-nà̰*/: kátó-rá-nà̰ "he is tying them up"
/kátó-ndó-nạ/: kátó-ndó-ná̰ "you (pl) are tying them up"
/sàní?ì-ndó-nạ/: sàní?ì-ndó-ná̰ "you (pl) gave it to them"
/sàní?ì-ṵ́-nạ/: sàní?ì-ṵ́-ná̰ "you (sg) gave it to them"
/kišá?á-nạ/: kišá?á-ná̰ "they will start"
/kátó-ra/: kátó-rá "he is tying up"

Rule 3. Lowering of Mid tone. -B.

A mid tone clitic becomes low after a verb stem ending in low tone.

$$M \rightarrow L \,/\, L \,]_{\text{verb}} \neq \text{——}$$

/čìkaà-ra/: čìkaàrà "he put into"
/sàní?ì-ra/: sàní?ì-rà "he gave (a gift)"

Rule 4. Lowering of high tone.

A high tone on a clitic becomes low following a low tone on a stem.

$$H \rightarrow L \,/\, L \,]_{\text{stem}} \neq \text{——}$$

/sàní?ì-ndó/: sàní?ì-ndò "you (pl) gave"
/sàní?ì-ṵ́/: sàní?ì-ṵ̀* "you (sg) gave"
/sìtà-ñá̰/: sìtà-ñà̰ "her tortilla"
/sìtà-ndó/: sìtà-ndò "your (pl) tortilla"
/sìtà-yó/: sìtà-yò "our (incl) tortilla"
/sìtà-rí/: sìtà-rì "its (animal) tortilla"

/nɔ̰ɔ̰-ndó/: nɔ̰ɔ̰-ndɔ̀ "your (pl) face"
/nɔ̰ɔ̰-ú/: nɔ̰ɔ̰-ù* "your (sg) face"
/ndučṵ-ndó/: ndučṵ-ndɔ̀ "your (pl) black beans"
/ndučṵ-ú/: ndučṵ-ù* "your (sg) black beans"

Rule 5. Raising of mid or low tone after noun or pronoun.

A mid tone or a low tone in a clitic beginning with a consonant is raised to high after a noun stem or a pronominal enclitic. The second low tone of the enclitic -ndìì is not affected. The rule also excludes -ì, the single vowel enclitic which is not raised to high in this environment.

$$\left.\begin{matrix}M\\L\end{matrix}\right\} \rightarrow H \;/\; L \;\Big]_{\substack{\neq \text{ noun or} \\ \text{pronoun}}} C\_\_\_$$

/ndučṵ-ra/: ndučṵ-rá "his black beans"
/ndíso-ndìì-na̰/: ndíso-ndìì-ná̰ "we (excl) are carrying them"
/ndučṵ-ndìì/: ndučṵ-ndíì "our (excl) beans"
/sàní?ì-ì-ndìì/: sàní?ì-ì-ndíì* "I gave it to us (excl)"

Rule 6. Optional lowering of high tone.

A high tone clitic beginning with a consonant optionally is lowered to low tone following a noun or adjective stem ending in high tone.

$$H \underset{\text{OPT}}{\longrightarrow} L \;/\; H \;\Big]_{\substack{\neq \text{ noun or} \\ \text{adjective}}} C\_\_\_$$

/yɔ̀só-ndó/: yɔ̀só-ndɔ̀ "your (pl) metate"
/tàmá̰-ndó/: tàmá̰-ndɔ̀ "your (pl) cañuela" (little cane-bamboo-reed)
/ndeé-ñá̰/: ndeé-ñà̰ "she is strong"
/ndeé-ndó/: ndeé-ndɔ̀ "you (pl) are strong"
/ndeé-yó/: ndeé-yɔ̀ "we (incl) are strong"
/ndeé-rí/: ndeé-rì "it (animal) is strong"
/ndeé-nɔ̰́/: ndeé-nɔ̰̀ "it (metal, wood) is strong"
/síkó-ñá̰/: síkó-ñà̰ "she is tall"

Rule 7. Nasalization.

When the second person singular postclitic -ụ́ is added to a stem the preceding stem final vowel is nasalized.

$$V \rightarrow [+nas] \,/\, \_\_\_\_ \neq ụ́$$

/ve?e-ụ́/: ve?ẹ-ụ́* "your (sg) house"
/sìtà-ụ́/: sìtạ̀-ụ́* "your (sg) tortilla"
/yòso-ụ́/: yòsọ-ụ́* "your (sg) metate"
/ndíśó-ụ́/: ndíśǫ́-ụ́* "you (sg) are carrying"
/nduč̀ù-ụ̀/: nduč̀ụ̀-ụ̀* "your (sg) black beans"

Rule 8. Geminate reduction.

When the second person singular clitic -ụ́ is added to a stem ending in u, the stem vowel becomes nasalized and the clitic is deleted.

u ≠ ụ́
1 2 3
⇒ 1 2 ∅

/ndu?ụ́-ụ́/: ndu?ụ́ "you (sg) are stout"
/nduč̀ụ̀-ụ̀/: nduč̀ụ̀ "your (sg) black beans"

Rule 9. Stress Shift.

When the first person singular clitic -ì is added to a stem the stress shifts to the last syllable of the stem.

C_o V C_o V ≠ ì
1 2 3 4 5 6
⇒ 1 2 3 4 5 6
[-Str][+Str]

/kìsi-ì/: kì'si-ì "my cooking pot"
/ve?e-ì/: ve'?e-ì "my house"
/tàmą́-ì/: tà'mą́-ì "my cañuela"
/nduč̀ù-ì/: ndu'č̀ù-ì* "my black beans"
/nǫ̀ǫ̀-ì/: nǫ̀'ǫ̀-ì "my face"

Rule 10. Raising of stem final tone.

10a. Raising of stem final low to mid.

A stem final low tone is raised to mid before the low tone clitic -ì.

$$L \rightarrow M \,/\, \text{——} \neq \text{-ì}$$

/ndu'čù-ì*/: ndu'ču-ì "my black beans"
/nọ̀'ọ̀-ì*/: nọ̀'ọ-ì "my face"
/čìka'à-ì*/: čìka'a-ì "I put into"
/sàní'ʔì-ì*/: sàní'ʔi-ì "I gave (a gift)"

10b. Raising of stem final mid to high, A.

The mid tone of a stem final ʔV syllable is raised to high before clitics -ì or -ú.

$$M \rightarrow H \,/\, \text{ʔ——} \neq V$$

/ve'ʔe-ì*/: ve'ʔé-ì* "my house"
/veʔe-ú*/: veʔé-ú* "your house"

10c. Raising of stem final mid to high, B.

The mid tone of a stem final CV syllable is raised to high before the clitic -ú.

$$M \rightarrow H \,/\, C \text{——} \neq \text{ú}$$

/ndíso-ú/: ndísó-ú "you (sg) are carrying"
/kaní-ú/: kaní-ú "you (sg) will hit"

Rule 11. Reduction of vowel sequences.

11a. Optional loss of u after o.

The clitic vowel -u may be optionally deleted after the stem vowel o.

$$u \xrightarrow[OPT]{} \emptyset \,/\, o \neq \text{——}$$

/nọ̀ọ̀-ù/: nọ̀ọ̀ "your (sg) face"
/yòsǫ́-ú/: yòsǫ́ "your (sg) metate"

11b. Optional loss of i̱ or e̱ before -ú̱.
Stem final i̱ or e̱ of a ?V syllable may be optionally deleted before the clitic -ú̱.

$$\left.\begin{matrix} i̱ \\ e̱ \end{matrix}\right\} \xrightarrow{OPT} \emptyset \;/\; ? \_\_\_\_ \neq ú̱$$

/sànḭ?ì-ù̱/: sàní?ù̱ "you (sg) gave (a gift)"
/ve?é̱-ú̱/: ve?ú̱ "your (sg) house"
/mì?í̱-ú̱/: mì?ú̱ "your trash"

11c. Optional loss of stem final e before -ì.
The stem final e of a ?V syllable may be optionally deleted before the clitic -ì.

$$e \xrightarrow{OPT} \emptyset \;/\; ? \_\_\_\_ \neq ì$$

/ve?é-ì/: ve?ì "my house"

Rule 12. Phonetic desyllabification.
12a. Desyllabification of the first of two high vowels.
The first of two high vowels in a sequence following a consonant other than glottal stop is phonetically desyllabified. It retains its tone, but its timing is significantly reduced to give the effect of forming a dipthong with the following vowel.

$$\begin{matrix} V \\ [+hi] \end{matrix} \longrightarrow [-syl] \;/\; C \_\_\_\_ \begin{matrix} V \\ [+hi] \end{matrix}$$

/kìsi-ú̱/: kìsyú̱ "your (sg) cooking pot"
/nduč̀ù-ì/: nduč̀wì "my black beans"

12b. Desyllabification of clitic vowel
The high vowel of the vowel clitics -ì or -ú̱ is desyllabified phonetically after a nonhigh stem final vowel, or a high stem vowel which follows a glottal stop.

$$\begin{matrix} V \\ [+hi] \end{matrix} \longrightarrow [-syl] \;/\; \left.\begin{matrix} V \\ [-hi] \\ ?V \\ [+hi] \end{matrix}\right\} \_\_\_\_$$

/ve'ʔé-ì/: ve'ʔéỳ	"my house"
/veʔé̱-ú̱/: veʔé̱ẃ	"your (sg) house"
/tà'mą́-ì/: tà'mą́ỳ	"my cañuela"
/tàmą́-ú̱/: tàmą́ẃ	"your (sg) cañuela"
/nɔ̀'o-ì/: nɔ̀'o̱ỳ	"my face"
/nɔ̀ɔ̀-ù̱/: nɔ̀ɔ̀ẁ	"your (sg) face"
/ndu'ʔú-ì/: ndu'ʔúỳ	"I am stout"
/mì'ʔí-ì/: mì'ʔíỳ	"my trash"
/mìʔí̱-ú̱/: mìʔí̱ẃ	"your trash

5.3 The application of the rules to the range of combinations of stems and postclitics is presented in two derivational displays. Display I shows the combination of pronominal postclitics to noun, adjective and verb stems. Display II shows the combination of object postclitics to verbs which already have subject postclitics. Display II assumes the results of the derivations in Display I, except in the case of the application of rule 1, which makes reference to the underlying mid tone of the subject postclitic.

Derivational Display I

Pronominal postclitics added to noun, adjective and verb stems.

Stems	-ra 3 sg. masc.	-ndó 2 pl	-ú̩ 2 sg.	-ì 1 sg.	-ndìì 1 pl excl
kìsi "cooking pot" [noun]	kìsi-ra	kìsi-ndó	Rule 12a: kìsy-ú̩	Rule 9: kì'si-ì	kìsi-ndìì
ve?e "house" [noun]	ve?e-ra	ve?e-ndó	Rule 7 ve?ę-ú̩ Rule 10b: ve?é-ú̩ Rule 11b opt: ve?ú̩ Rule 12b: ve?é-ẃ	Rule 9: ve'?e-ì Rule 10b: ve'?é-ì Rule 11b: ve'?ì Rule 12b: ve'?é-ỳ	ve?e-ndìì
ndu?ú "stout" [adjective]	Rule 2: ndu?ú-rá	ndu?ú-ndó Rule 6 opt: ndu?ú-ndò	Rule 8: ndu?ú̩	Rule 9: ndu'?ú-ì Rule 12b: ndu'?ú-ỳ	ndu?ú-ndìì
tàmą́ "cañuela" [noun]	Rule 2: tàmą́-rá	tàmą́-ndó Rule 6 opt: tàmą́-ndò	Rule 12b: tàmą́-ẃ	Rule 9: tà'mą́-ì Rule 12b: tà'mą́-ỳ	tàmą́-ndìì
nduč̀ù "black beans" [noun]	Rule 5: nduč̀ù-rá	Rule 4: nduč̀ù-ndò	Rule 4: nduč̀ù̩-ù̩ Rule 8: nduč̀ù̩	Rule 9: ndu'č̀ù-ì Rule 10a: ndu'č̀u-ì Rule 12a: ndu'č̀wì	Rule 5: nduč̀ù-ndíì

Derivational Display I, continued.

Stems	3 sg -ra masc.	-ndó 2 pl	-ú 2 sg	-ì 1 sg	-ndìì 1 pl excl
nò̰ò̰ "face" [noun]	Rule 5: nò̰ò̰-rá	Rule 4: nò̰ò̰-ndò	Rule 4: nò̰ò̰-ṵ̀ Rule 11a Opt: nò̰ò̰ Rule 12b: nò̰ò̰ŵ	Rule 9: nò̰'ò̰-ì Rule 10a: nò'o-ì Rule 12b: nò̰'o̰ỳ	Rule 5: nò̰ò̰-ndíì
ndíso "is carrying" [verb]	ndíso-ra	ndíso-ndó	Rule 7: ndíso̰-ṵ́ Rule 10c: ndísó-ṵ́ Rule 11a Opt: ndísó Rule 12b: ndísó-ẃ	Rule 9: ndí'so-ì Rule 12b: ndí'so-ỳ	ndíso-ndìì
kanḭ "will hit" [verb]	kanḭ-ra	kanḭ-ndó	Rule 12a: kany̰-ṵ́	Rule 9: ka'nḭ́-ì	kanḭ-ndìì
čìkaà "put into" [verb]	Rule 3: čìkaà-rà	Rule 4: čìkaà-ndò	Rule 4: čìkaà-ṵ̀ Rule 7: čìkaà̰-ṵ̀ Rule 12b: čìkaà̰-ẁ	Rule 9: čìka'à-ì Rule 10a: čìka'a-ì Rule 12b: čìka'a-ỳ	čìkaà-ndìì
sànḭ́ʔḭ̀ "gave (a gift)" [verb]	Rule 3: sànḭ́ʔḭ̀-rà	Rule 3: sànḭ́ʔḭ̀-ndò	Rule 3: sànḭ́ʔḭ̀-ṵ̀ Rule 11b Opt: sànḭ́ʔṵ̀	Rule 9: sànḭ́'ʔḭ̀-ì Rule 10a: sànḭ́ʔḭ-ì	sànḭ́ʔḭ̀-ndìì
kátó "is tying up" [verb]	Rule 2: kátó-rá	kátó-ndó	Rule 7: kátó̰-ṵ́ Rule 11a Opt: kátó̰ Rule 12b: kátó̰-ẃ	Rule 9: ká'tó-ì Rule 12b: ká'tó-ỳ	kátó-ndìì

Derivational Display II

Object postclitics added to verbs which have subject postclitics.

Verb plus Subject	-na 3 pl	-ña 3 pl fem	-ndìì 1 pl excl
ndíso-ra "he is carrying"	Rule 1: ndíso-ra-nà	ndíso-ra-ñá	ndíso-ra-ndìì
ndíso-ndó "you (pl) are carrying"	Rule 2: ndíso-ndó-ná	ndíso-ndó-ñá	ndíso-ndó-ndìì
ndísǫ́-ẃ "you (sg) are carrying"	Rule 2" ndísǫ́-ẃ-ná	ndísǫ́ ẃ-ñá	ndísǫ́-ẃ-ndìì
ndí'so-ỳ "I am carrying"	Rule 5: ndí'so-ỳ-ná	ndí'so-ỳ-ñá	Rule 4: ndí'so-ỳ-ndíì
ndíso-ndìì "we (excl) are carrying"	Rule 5: ndíso-ndìì-ná	ndíso-ndìì-ñá	
sàní?ì-rà "he gave"	Rule 5: sàní?ì-rà-ná	sàní?ì-rà-ñá	Rule 5: sàní?ì-rà-ndíì
sàní?ì ndò "you (pl) gave"	Rule 4: sàní?ì-ndò-na Rule 5: sàní?ì-ndò-ná	Rule 4: sàní?ì-ndò-ñá	Rule 4: sàní?ì-ndò-ndìì Rule 5: sàní?ì-ndò-ndíì
sàní?ù "you (sg) gave"	Rule 5: sàní?ù-ná	sàní?ù-ñá	Rule 5: sàní?ù-ndíì
sàní'?iì "I gave"	Rule 5: sàní'?iì-ná	sàni'?iì-ñá	Rule 5: sàní'?iì-ndíì
sàní?ì-ndìì "We (excl) gave"	Rule 5: sàní?ìndìì-ná	sàní?ìndìì-ñá	

Derivational Display II, continued

Verb plus Subject	-nạ 3 pl	-ñá 3 pl fem	-ndìì 1 pl excl
kátó-rá "he is tying up"	Rule 1: kátó-ra-nà Rule 2 (to subject): kátó-rá-nà	kátó-rá-ñá	kátó-rá-ndìì
kátó-ndó "you (pl) are tying up"	Rule 2: kátó-ndó-ná	kátó-ndó-ñá	kátó-ndó-ndìì
kátó-ẃ "you (sg) are tying up"	Rule 2: kátó-ẃ-ná	kátó-ẃ-ñá	kátó-ẃ-ndìì
ká'tó-ỳ "I am tying up"	Rule 5: ká'tó-ỳ-ná	ká'tó-ỳ-ñá	Rule 5: ká'tó-ỳ-ndíì
kátó-ndìì "We (excl) are tying up"	Rule 5: kátó-ndìì-ná	kátó-ndìì-ñá	

Rule 1. Lowering of mid tone, A.

$$M \rightarrow L / \left.\begin{matrix} H \\ M \end{matrix}\right\}\Big]_{verb} \neq M \neq \text{——}$$

Rule 2. Raising of mid tone.

$$M \rightarrow H / \; H \neq \text{——}$$

Rule 3. Lowering of mid tone, B.

$$M \rightarrow L / \; L\Big]_{verb} \neq \text{——}$$

Rule 4. Lowering of high tone.

$$H \rightarrow L / \; L\Big]_{stem} \neq \text{——}$$

Rule 5. Raising of mid or low tone.

$$\left.\begin{matrix} M \\ L \end{matrix}\right\} \rightarrow H \; / \; L \underset{\text{noun or pronoun}}{} \neq C \text{——}$$

Rule 6. Optional lowering of high tone.

$$H \underset{opt}{\rightarrow} L / \; H\Big]_{\text{noun or adjective}} \neq C \text{——}$$

Rule 7. Nasalization

$$V \rightarrow [+ \text{nas}] \; / \; \text{——} \neq \acute{u}$$

Rule 8. Geminate reduction

$$\begin{matrix} u \neq u \\ 1 \; 2 \; 3 \end{matrix}$$
$$\Rightarrow 1 \; 2 \; \emptyset$$

Rule 9. Stress shift

$$\begin{matrix} C_o & V & C_o & V & \neq & \grave{\imath} \\ 1 & 2 & 3 & 4 & 5 & 6 \end{matrix}$$
$$\Rightarrow 1 \; [\text{-str}] \; 3 \; [\text{+str}] \; 5 \; 6$$

Rule 10. Raising of stem final tone

10a. $L \rightarrow M \; / \; \text{——} \neq \grave{\imath}$

10b. $M \rightarrow H \; / \; ? \; \text{——} \neq V$

10c. $M \rightarrow H \; / \; C \; \text{——} \neq \acute{u}$

Rule 11. Reduction of vowel sequence

11a. $u \underset{opt}{\rightarrow} \emptyset \; / \; o \neq \text{——}$

11b. $i, e \underset{opt}{\rightarrow} \emptyset \; / \; ? \; \text{——} \neq \acute{u}$

11c. $e \underset{opt}{\rightarrow} \emptyset \; / \; ? \; \text{——} \neq \grave{\imath}$

Rule 12. Phonetic desyllabification

12a. $V_{[+hi]} \rightarrow [\text{-syl}] \quad C \; \text{——} \; V_{[+hi]}$

12b. $V_{[+hi]} \rightarrow [\text{-syl}] \; / \left\{\begin{matrix} V_{[-hi]} \\ ?V_{[+hi]} \end{matrix}\right\} \text{——}$

FOOTNOTES

[1]The Mixtec town of Alacatlazala is located in the highlands of Guerrero, about 170 miles south and slightly east of Mexico City near the Oaxaca border. It is in the Municipio of Malinaltepec. Inhabitants of the town number about 800, although the estimated speakers of the dialect number 10,000. This dialect is largely mutually unintelligible with that spoken in the vicinity of Metlatonoc, Guerrero (Overholt 1961). Mixtec data were supplied by Juan Galindo Cano, 17, a native of Alacatlazala.

The term couplet refers to the fact that all Mixtec morphemes are basically dissyllabic when found in isolation (K. L. Pike 1948:79).

For further information on other Mixtec languages citing three tones and having the couplet as the basic unit see References, especially Bradley 1970, Hunter and Pike 1969, Overholt 1961, Pankratz and Pike 1967, Pike and Ibach 1978, K. L. Pike 1948, and Shields and North 1977. See map for relative geography of the dialect areas.

[2]Mixtec languages that cite extensive tone sandhi are described in Daly 1977, Hunter and Pike 1969, Mak 1958, Overholt 1961, Pike and Small 1974, Pike and Wistrand 1970, K. L. Pike 1948.

[3]It is difficult to hear any stress differentiation on couplets in isolation. Couplets of the CV?V pattern appear to have extra force on the syllable beginning with glottal stop. Couplets of the other CV patterns appear to have equal stress on each syllable. The stress on the first syllable of the couplet is more prominent phonetically when the couplet is surrounded by prefixes and/or postclitics. The addition of the postclitic -ɨ is accompanied by a shift of the stress to the second syllable of the couplet. The stressed syllable is quite prominent in such cases. Because of the behavior of stress in the longer words it is reasonable to assume that the lexical stress is on the first syllable of the couplet. A further argument for underlying stress is the fact that when the second person sg.

postclitic -ú is added to a stem the vowel of the second syllable of the couplet optionally drops out, as might be expected if the vowel were unstressed. In contrast, when the first person sg. postclitic -ì is added to the stem and the stress shifts to the second syllable of the couplet, the vowel of the second syllable does not drop, except in the unstable cluster of two front vowels ei.

[4]There are at least two other Mixteco languages, however where the phoneme ŋg is present in other words beside iŋga. These are Molinos Mixtec (Hunter and Pike, 1969), and Silacayoapan Mixtec (Shields and North, 1977).

In Alacatlazala Mixtec, one could eliminate this phoneme by considering iŋga a collapsed form of i̱i̱ "one" and -ka "more", and allophonic rules that cause i̱ to become iŋ before k, and k to become voiced after ŋ.

[5]A palatalized consonant, when it occurs, is considered as a segment resulting from a morphophonemic process. For a discussion of tn in Proto-Mixtec see Mak and Longacre 1960.

[6]For a fuller discussion of <u>archiphoneme</u> as it is used here see K. L. Pike 1967:300-1.

[7]No verbs have a basic stem beginning with high tone, so there is no confusion (for the native speaker) between the completive aspect and the negation of the completive aspect.

[8]sìví is itself a derived morpheme. The basic form sivi means "is" in terms of identification: sivi si'ɪ̀ "she is my mother." This morpheme is interesting in that its negative form, the first syllable has been perturbed downward instead of upward as we would have expected, and that both tones of the stem have changed instead of just the first. The negative form sìví "is not" has an alternate àù̱ sìví.

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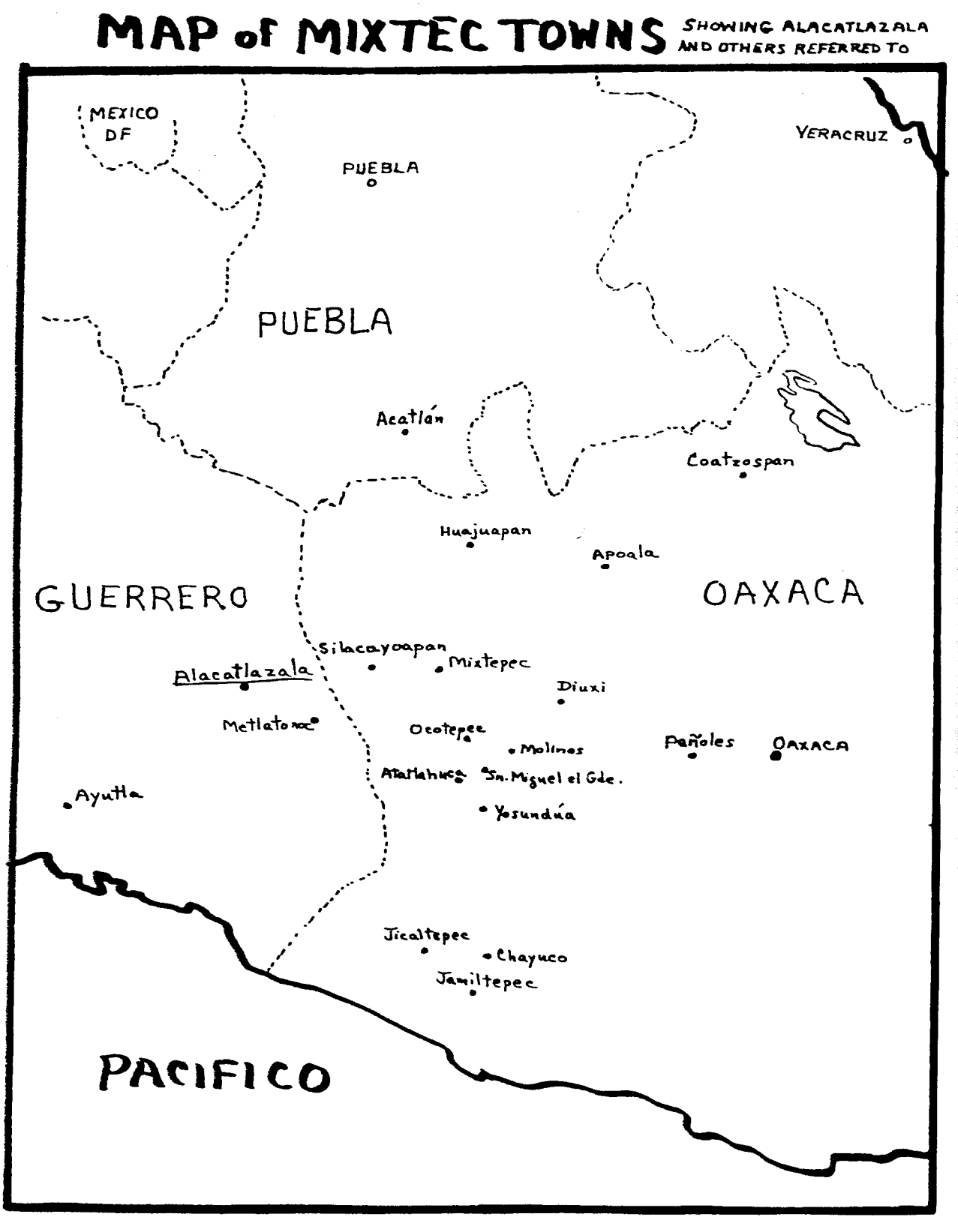

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