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# AN ACCENTUAL ANALYSIS OF TONE IN CHALCATONGO MIXTEC

Leanne Hinton

## 1. Introduction

The tone system in Mixtec as found in Chalcatongo, San Miguel, Peñoles, and other closely related varieties, display peculiar patterns of distribution and sandhi that bring up complex problems for linguistic analysis<sup>1</sup>. Using data from Chalcatongo Mixtec (henceforth CM), and building on the work of others, I will make three main claims in this paper about the nature of Mixtec tone:

(1) There is an underlying accentual system in Mixtec, where an accent on a mora is signalled phonetically by a low tone and an unaccented mora by a mid tone.

(2) The high tone placement rules account for all high tones (H) in CM. Thus in all words, H either comes from a morpheme to the left of the morpheme which bears it, or in those cases where H is associated with the morpheme bearing it, the tone should still be represented as originating to the left of the segmental tier.

(3) It will further be demonstrated that CM derives from a system where H is not part of the lexical representation of any monomorphemic native form. High tone always comes from outside the morpheme.

I will end the paper with an examination of the only large body of words which must be represented as having a high tone associated with them: Spanish loan words. I will try to explain why high tone is associated with these words and why high tone is placed where it is.

## 2. Background

Daly (1973) analyzed Peñoles Mixtec as a two-tone system (with the tones labelled as "high" and "low"), and an extra "modifying feature" that produces an extra-high tone as well as new lows. Daly's "high" and "low" are what I suggest be represented underlyingly as

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<sup>1</sup>This analysis was worked out to a large extent in our Field Methods class on Mixtec, together with Gene Buckley, Marv Kramer and Michael Meacham. I am indebted to them, and also to Monica Macaulay, Rich Rhodes and Larry Hyman for e-mail and hallway discussions that have helped me develop these ideas. Special thanks are due to our patient Mixtec language consultant, Luciano Cortes Nicolas.

absence or presence of accent; and Daly himself has also been thinking along these lines.

### 3. Arguments that H is not part of the lexical representation of native forms.

To show that H is not part of the lexical representation of native forms, I will make the following arguments:

(1) There are gaps in the tone patterns of native words. H on underived roots is at first glance statistically rare, and with the exception of LH and HH, all roots with H follow the Floating High Association rule (henceforth FHA; see Hinton et al, this volume). The rarest tone patterns -- MH, HL and HM -- probably all descend from multimorphemic words.

(2) LH occurs on words where the second vowel is underlyingly glottalized, and that the form should be reanalyzed as LM, with glottalization blocking the low-spreading rule.

(3) HH appears almost exclusively on adjectives, and so HH roots derive from other tone patterns onto which the Adjectival High rule was applied (see Hinton et al, this volume).

These three arguments allow us to come to a conclusion that with a small amount of internal reconstruction, we can arrive at a system where all H is morpheme-external.

**3.1. Gaps in underived native forms.** Many morphemes are "perturbers", using Pike's term; thus high tones are quite common in multimorphemic words. But a frequency count of underived monomorphemic words, shown in Figure 1, has some interesting biases and gaps<sup>2</sup>.

First note that there are no HL forms with the shape of (C)VCV, and no MH forms with the shape of (C)VV or (C)V<sup>?</sup>V. This is in keeping with FHA. FHA, then, reflects an absolute constraint in the language against HL in (C)VCV forms and MH in (C)V<sup>(?)</sup>V forms.

The most noteworthy point about this chart is that there is a virtually complete absence of MH pattern in monomorphemic forms. (The only native word in our data with a melody of MH is *tiñí* 'mouse', reconstructible as a unit for Proto-Mixtecan (Josserand, 1983); but this almost certainly derives from a form bearing the

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<sup>2</sup> This table is based on a word list from our elicitations, prepared by Michael Meacham.

	cvcv	cvv	cv <sup>?</sup> v	cv <sup>?</sup> cv	TOTAL
hh	19	11	15	4	49
hl	0	6	5	3	14
hm	4	2	2	1	9
lh	4	2	8	1	15
ll	18	12	11	1	42
mh	1	0	0	0	1
ml	49	31	25	7	112
mm	40	22	21	3	86
TOTAL	135	86	87	20	328

Figure 1: Frequency of tone patterns in monomorphemic doublets

clitic *ti-* for animal names, which is a perturber. Thus even this word is reconstructible as a bimorphemic form, meaning that there are no monomorphemic native MH forms at all.

There is also a very low incidence of HM, HL, and LH. The tone patterns MH, HM and HL are probably all the results of the application of the H-placement rule; the few forms that remain could probably also be explained away by closer investigation. Several of the HL forms, for example, are kin terms. As mentioned in Hinton et al (this volume), one of the functions of the H-placement rule is a naming or vocative function; it could well be that this is the origin of the H in these kin terms. The CVV-HL template for kin terms is productive enough so that even a Spanish loan word was incorporated into it: *páà* from 'compadre'.

*máà* 'mother'  
*táà* 'father'  
*páà* 'compadre'

Whether or not we can find an extramorphemic source for every high tone in HM, HL and MH, the location of the H in all cases obeys FHA, so that H is always represented as floating to the left of the morpheme.

**3.2. Explanation of LH forms.** LH is a special pattern that cannot be created by application of FHA. LH is further distinguished by being the only doublet with H that is perturbed the application of



We must also note that glottalization on a morpheme-final vowel does not surface.

Interestingly, LM and "LH" are phonetically distinct in San Miguel, where low-spreading does not exist. I have not heard these forms in San Miguel; either "LH" really has a high tone there, or else the M in LM forms has been phonetically lowered to some degree. I would predict that the latter is the case.

Reanalyzing "LH" as instead being an unlowered LM also solves some other problems in the CM data. One involves the lack of MH forms in the monomorphemic vocabulary. One would expect to find underlying ML<sup>?</sup> and MM<sup>?</sup> as well as LM<sup>?</sup>. If final glottalized vowels raise, we should find MH forms surfacing, deriving from MM<sup>?</sup>, but we do not. As we have seen, there are no MH monomorphemic native forms in Mixtec. This would be a puzzling gap if we maintained the original analysis that glottalization raises the tone of the vowel. But under the new analysis, the lack of MH forms is no longer a problem. Instead, underlying MM<sup>?</sup> simply becomes MM, indistinguishable from other MM forms.

This also provides a partial explanation for the patterning of demonstratives, which are LH in word form, but HM as postclitics (as demonstrated in Hinton et al, this volume). If we reconstruct them as LM with final <sup>?</sup>, these become LH in word form; but clitics always reduce; so the postclitic form could be analyzed as lacking final glottalization, therefore keeping the M tone from rising; and it undergoes H linking like any other LM form. The only unexplained irregularity, then, is that the demonstrative always gets a high tone when it is a postclitic.

**3.3. HH forms and the Adjectival High Rule.** Referring back to Figure 1, HH is the only melody bearing high tones that is fairly common in Mixtec. Much of the HH patterning is elucidated by studying the distribution of tone types across parts of speech. Figure 2 displays the patterning for the most common parts of speech: nouns, verbs, and adjectives; and I have also included loan words from Spanish as a separate column, which we will discuss below.

Note that 29 out of 38, or 76%, of all HH doublets are adjectives. HH is rare in nouns and verbs. We showed in Hinton et al that adjectives are derived from nouns by the "across-the-board-high" rule. Although we have not run across the nominal origins of all the HH adjectives, it would not be unreasonable to say that this is the origin of most or all HH in adjectival forms. When the adjectives are

	n	v	adj	l	TOTAL
hh	4	5	29	0	38
hl	7	0	2	1	10
hm	0	2	4	0	6
lh	8	3	1	0	12
ll	26	7	4	0	37
mh	1	0	0	17	18
ml	61	24	11	0	96
mm	38	38	4	0	80
TOTAL	145	79	55	18	297

Figure 2: Melody and word category

removed from consideration, this makes HH another of the very rare patterns in the basic monomorphemic vocabulary, rare enough so that one suspects that a little further probing might show that all HH's even in nouns and verbs are derived.

**3.4. Mixtec as an accentual system.** The end result of this analysis is that we can construct a model of Mixtec which has no high tones at all that are linked to vowels on the lexical level. It has been argued by Buckley (this volume) that M is the "default tone" or "non-tone" in Mixtec; it is represented as the absence of tone. Thus we can suggest that all possible lexical melodies are the ones shown in Figure 3 below.

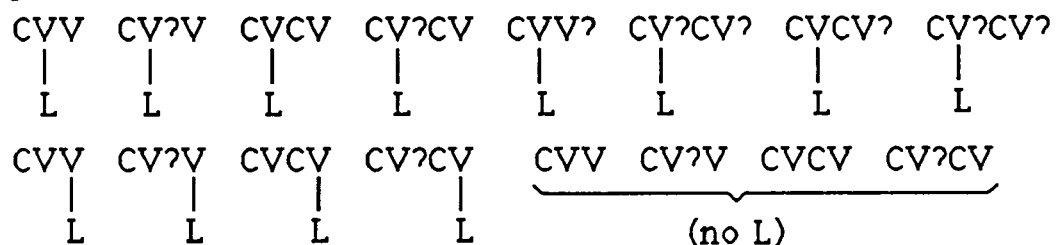


Figure 3. Lexical melodies

The absence in San Miguel and Chalcatongo of underlying LL sequences is neatly represented by a constraint that says that each lexical item bears a maximum of one low tone before further rules apply. We can also state with some confidence that all forms containing H are derived, either as word-final expression of

glottalization, from the Adjectival High Rule, or by FHA, where the H, as we have seen, either constitutes a separate morpheme or is from a perturbing morpheme to the right of the affected morpheme. All those forms which we said earlier are not subject to perturbation are in fact already perturbed. To explain why some tonal patterns in Mixtec are not perturbed by perturbing morphemes, we only need to recognize a constraint that allows floating H to operate only once (or else to say that if there are two floating H's next to each other in a structure, one is deleted before FHA applies).

If there is a maximum of one L per morpheme, which is linked at the lexical level, it begins to look much like an accentual system. Marvin Kramer (ms) argues independently that syllables in CM bearing high or low tone behave like heavy syllables; since the notion of syllable weight is a metrical notion, this argument too suggests the possibility that we are talking about a metrical, or accentual, phenomenon. One way of approaching this, then, is to suggest that Mixtec is an accentual system (besides being a tone language), with tones being drawn to the accented syllable. This makes mid and low both default tones, with mid being the default tone of an unaccented syllable, and low the default tone of an accented syllable.

#### 4.. Behavior of Spanish loans

An examination of the prosody of loan words from Spanish brings out some very interesting features of H placement. While MH in underived native forms is virtually absent, it is the predominant tonal pattern of loans. As shown in Figure 4, two-syllable Spanish words ending in vowel are MH; these all have stress on the first syllable in Spanish. Two-syllable words ending in a consonant are MHL; these have final stress in Spanish; and three-syllable words with penultimate stress in Spanish are MMH in Mixtec, while three-syllable words with stress on the first syllable are MHL in Mixtec.

Nonfinal stress in Spanish corresponds to an H on the syllable following the stress; final stress in Spanish corresponds to HL on the final syllable. Possessed forms of the loans show the same patterning of suffix tone lowering as in the native words:

mesá-rì 'my table'



MH; Sp. C <sub>0</sub> V'C <sub>0</sub> V	MHL; Sp. C <sub>0</sub> VC <sub>0</sub> V'C	MMH; Sp. C <sub>0</sub> VC <sub>0</sub> V'C <sub>0</sub> V	MHL; Sp. C <sub>0</sub> V'C <sub>0</sub> VC <sub>0</sub> V
ahú 'garlic'	asú`l 'blue' <sup>3</sup>	kaswelá 'stew pot'	mehíkò 'Mexico'
basté 'enough'	limó`n 'lime'	domingú 'Sunday'	
pedrú 'Pedro'	korá`l 'corral'	luserú 'light'	

Figure 4: prosody of Spanish loans

For the Spanish loans with penultimate stress, then, they are treated in Mixtec as ML forms with FHA.

We might ask why it is that FHA is applied to Spanish loans at all. Why not just treat "mesa" as an ML form rather than submit it to FHA? In most of the forms treated above, the H is morphological in nature (such as the continuative aspect or the vocative), or else derives phonologically from syllable loss (as in the reduction of the causative *sá?a*), glottal-stop deletion (as in the LH forms) or perturbation, where the H is a feature of the preceding word. Where, then, does the H come from in the Spanish loans? And in particular, if we really want to suggest that Low tone is associated with accented syllables and Mid tone with unaccented syllables, why would a Mixtec speaker reanalyze Spanish words as having the accent on the syllable following the Spanish stress?

It appears that Mixtec speakers are interpreting Spanish stress as high tone; and then that high tone must then be subjected to FHA. Spanish-language phonetician Mariscela Amador (p.c.) tells me that pitch is not the most important component of Spanish stress; instead the major difference between a stressed and unstressed syllable is found in amplitude. She informally estimates that on the average, the difference in fundamental frequency between a stressed and an unstressed syllable in Spanish would be of the order of 25 Hz or so, which is less than the difference between a mid and low tone. But the amplitude difference is very great, perhaps 60 db. Amplitude differences don't play an important role in Mixtec, according to the measurements made by Meacham; is it possible that high amplitude is reinterpreted as high tone by Mixtec speakers? It would be

<sup>3</sup> The sequence *ú`* means the vowel carries a high falling tone.

interesting to do some perceptual experiments with Mixtec speakers to study this problem further.

Recall that we postulated rules of FHA based on syllable weight: H is placed on the first heavy syllable of a doublet if there is one; and otherwise it is placed on the second syllable. All syllable weight in Mixtec is based on features linking to vowels: glottalization, and perhaps as Kramer (ms) has suggested even the presence of tone can be analyzed as making a syllable heavy. But in no case does Mixtec define a syllable as heavy by the presence of a syllable-final consonant. In fact, Mixtec doesn't have syllable-final consonants, especially given that ? is not defined as a consonant. It is interesting to note that among the Spanish loans, in words like *pedrú* and *basté*, if our analysis of high tone placement is correctly formulated, it is necessary to say that the first syllable in these words is not heavy. There is evidence that in fact Mixtec speakers conceive of the syllable boundary as preceding the consonant cluster. I can mention in support of this idea that *st* is in fact a valid native cluster in Mixtec, and it only occurs syllable-initially. Furthermore, *nd* in Chalcatongo is a single C, a prenasalized stop; *mb* also occurs rarely; in neighboring San Miguel, the loanword 'compadre' was actually borrowed as *mbàà*, suggesting that the *mp* was interpreted by Mixtec speakers as a syllable initial unit. Only when a consonant is word final, must it then be interpreted as belonging to the syllable on its left; and in those cases, that syllable is treated as heavy in Mixtec.

**5. Conclusion.** Based on the above arguments, we can conclude that a minimum of internal reconstruction leads us to a system in CM where we must either say that low tones are assigned to vowels at the lexical level, a maximum of one low tone per morpheme, or that there is accent at the lexical level with L being the default tone on accented syllables; and high tones have no assignment at the lexical level. High tone is always floating, at the lexical level; it is generally represented lexically as being the final element of a morpheme, and always attaches by rule to the next morpheme to its right. In the few cases where no extra-morphemic origin of a high tone can be discovered, we must represent it synchronically at the lexical level as being the left-most member of a morpheme, still attaching to the right by the same rule that attaches extra-morphemic H. Larry Hyman has pointed out to me that there is a problem in the formal representation of a floating tone as having a particular location. Formally, a floating tone has no location by definition. If we

represent tone as being on a separate tier, but unassociated with a syllable, how can we say that it is located at the right or left edge of a morpheme? The most obvious solution to this problem is to think of the high tone as actually being located in linear order with relation to the segments. Historically this would make sense, since Mixtec scholars believe that high tones may well derive from loss of segments or syllables. Thus high tone might be viewed as associated to a 0-element on the segmental tier.

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