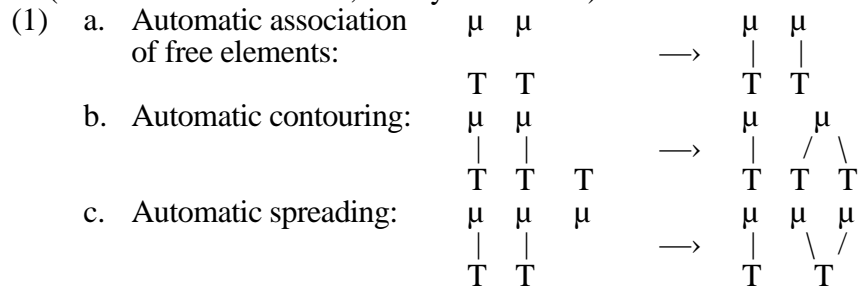


ON THE STATUS OF UNIVERSAL ASSOCIATION CONVENTIONS:
EVIDENCE FROM MIXTECO

BERNARD TRANEL
University of California, Irvine

1. INTRODUCTION. Two recent studies (Archangeli & Pulleyblank 1994: Chapter 4; Hyman & Ngunga 1994) have independently questioned the existence of the universal association convention (Goldsmith 1976) automatically linking together free elements from different autosegmental tiers, as in the case of floating tones and free tone-bearing units illustrated in (1a) (see also Odden 1995: 459-460). The gist of Archangeli & Pulleyblank's argument is that there is no reason to privilege the linking of free elements, because it actually exhibits the same sort of parametric variation as spreading. In complementary fashion, Hyman & Ngunga argue that floating high tones in the Bantu language Ciyao are never automatically associated to a free mora; rather, they are either linked by means of language-specific morphological and phonological rules or else stray erased, even if free tone-bearing units are available. Thus, instead of automatic association for free elements, both studies defend association by language-specific rules, just as the once presumed automatic tonal contouring and spreading illustrated in (1b-c) have been argued to be governed by language-specific options rather than universal principles (Clements & Ford 1979; Pulleyblank 1986).

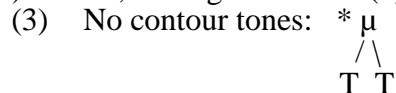


In this paper, I present concurring evidence from Mixteco, a tone language of southern Mexico studied by Pike in the 1930's and 40's (see References). I will argue that, as in Ciyao, the purported universal convention governing the association of free elements must in fact not apply in this language, despite excellent opportunities. This situation seems to indicate that Universal Grammar should not include such a convention. Alternatively, if this convention is nevertheless held to be part of Universal Grammar, then the grammar of Mixteco must somehow encode that it plays second fiddle to all other tone-assignment rules in the language, including the process assigning a default mid tone to toneless vowels; one encoding possibility for this property would be to assign to the so-called convention the status of a parameter, which would happen to be set to 'off' in Mixteco.

2. BACKGROUND ON MIXTECO. Lexical words in Mixteco are bimoraic, typically of the shapes shown in (2).¹

- (2) a. CVV
b. CVCV

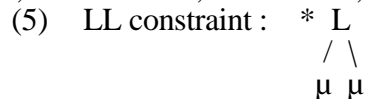
Each mora can bear one, and only one, of three level tones: High (H), Mid (M), or Low (L).² Thus, as diagrammed in (3), contour tones do not occur.



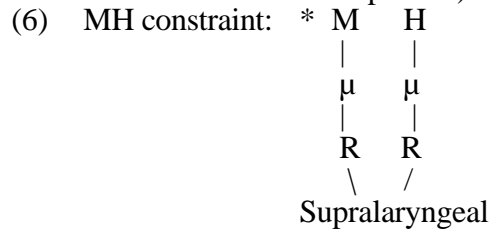
The distribution of the three level tones over the two moras of a lexical word is almost free. Out of the nine logically possible tonal patterns tabulated in (4), there are only two restrictions, having to do with the italicized MH and LL patterns.

(4)	HH	<i>MH</i>	LH
	HM	MM	LM
	HL	ML	<i>LL</i>

One restriction, explicitly noted by Pike (1944: 124; 1948: 57) and diagrammed in (5), is that the LL pattern does not occur at all (by contrast, the other two double patterns, HH and MM, are attested, as in sáná 'turkey' and bina 'today').



The second tonal gap, not mentioned by Pike, but of significance for our purposes, concerns the MH pattern.³ This pattern apparently fails to occur over words of the shape CVV and CV?V, when the two vowels are the same (i.e. in the case of CVV words, when the word contains a long vowel). The constraint in (6) conveniently conflates the two contexts (this formulation assumes two separate root nodes to express vowel length (Selkirk 1990) and a Supralaryngeal node dominating Place and Height (Goad 1993), and it takes advantage of the lack of a Supralaryngeal node for laryngeal consonants (cf. Steriade 1987). Nothing in my analysis will actually hinge on the specific formulation of this constraint; only the fact that the restriction exists in some form is important).⁴



3. FLOATING HIGH TONES AND THEIR ASSOCIATION. The phenomenon of interest for this paper is that morphemes in Mixteco may include a final floating high tone, which manifests itself exclusively by, roughly speaking, replacing the first tone on the next morpheme, provided no pause intervenes.⁵ The minimal pair in (7) shows the effect of one of these so-called 'perturbing' words, in contrast with a 'non-perturbing' word (Pike 1948: 80). In (7a), the floating high tone of the perturbing word for 'to eat' replaces the initial low tone of the word for 'child', while in (7b), the homophonous but non-perturbing word for 'to go away' has no effect on the word for 'child' (I represent floating high tones with a parenthesized H).⁶

- (7) a. kee (H) 'to eat' + sùc&í 'child' → kee sùc&í 'the child will eat'
 b. kee 'to go away' + sùc&í 'child' → kee sùc&í 'the child will go away'

Floating high tones also occur as part of what Pike (1948: 82) terms 'zero words' or 'ghost words', that is, morphemes without any independent phonetic realization. Thus, the continuative morpheme is a prefixed floating high tone functioning like the final floating high tone illustrated in (7a). In the example in (8a), we can see it replace the initial low tone in the verb for 'to sew'. (8b) shows the underlying LM tonal pattern of this verb surfacing.⁷

- (8) a. Continuative: (H) + kiku 'to sew' + ná 'I' → kíku-ná 'I am sewing'

b. Potential: kiku 'to sew' + ná 'I' → kiku-ná 'I will sew'

A floating high tone is also part of the consonantal causative morpheme s, as shown by the examples in (9), which reprise the verbs used in (7), but this time as targets of a floating high tone (Pike 1948: 90-91). We see that the floating high tone of the causative docks into initial moraic position in the two verbs for 'to eat' and 'to go away', changing their surface tonal patterns from MM to HM.

- (9) a. s (H) 'causative' + kee (H) 'to eat' → skée 'to feed'
 b. s (H) 'causative' + kee 'to go away' → skée 'to cause to go away'

According to Pike (1948: 80), lexical words with the tonal patterns HL, MH, and LM 'never cause any perturbations'. Translated into our terms, lexical words with these tonal patterns can never include a final floating high tone. I list in (10) the apparently proscribed underlying patterns. These gaps remain to be explained.

- (10) Restrictions on the occurrence of final floating high tones:
 *HL(H), *MH(H), *LM(H)

Pike (1944: 123; 1946: 23-24, note 2; 1948: 79-81) also draws the conclusion that lexical words with the tonal patterns given in (11) may not be perturbed, since they remain unchanged when preceded by an otherwise perturbing morpheme.

- (11) Unchanged when preceded by a floating high tone:
 a. HH, HM, HL
 b. MH

As I will now argue, Pike's restriction is actually unnecessary: the tonal patterns in (11) can be shown to be fully regular with respect to the attachment of a preceding floating high tone. For the three tonal patterns in (11a), which all begin in a high tone, a preceding floating high tone can simply be taken to attach to a mora that is already high-toned, resulting in no perceptible change.⁸ These patterns are thus not exceptions to perturbation by a preceding floating high tone; it is merely that the perturbation in these cases is of necessity invisible. With respect to floating high tone association, words with an initial high tone are therefore entirely parallel to words with an initial low tone, whose behavior is again illustrated in (12), with underlying LH and LM examples repeated from (7a) and (8a) above.⁹

(12) kee (H) 'to eat' + sùc&í 'child' → kee sùc&í 'the child will eat' [= 7a]

(H) + kiku 'to sew' + ná 'I' → kíkú-ná 'I am sewing' [= 8a]

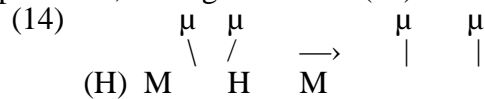
The parallelism is diagrammed in (13).

- (13) a. $\begin{array}{ccc} \mu & \mu & \\ | & | & \\ \text{(H)} & \text{L} & \text{T} \end{array} \rightarrow \begin{array}{ccc} \mu & & \mu \\ | & | & \\ \text{H} & \text{L} & \text{T} \end{array}$
 b. $\begin{array}{ccc} \mu & \mu & \\ | & | & \\ \text{(H)} & \text{H} & \text{T} \end{array} \rightarrow \begin{array}{ccc} \mu & & \mu \\ | & | & \\ \text{H} & & \text{T} \end{array}$

In both cases, the floating high tone can be described as attaching to the first tone-bearing unit in the following morpheme. The association of the floating high tone to a low-tone vowel causes the low tone to delink, since contour tones are barred in Mixteco (see Constraint 3 above), and the attachment of the floating high tone to an already high-tone vowel simply results in a high-tone vowel.

The case of the unchanging tonal pattern MH in (11b) presents a more challenging problem, which brings us more generally to the group of lexical words beginning in a mid tone. Given the just observed effect of a floating high tone on a following CVCV word with an initial low or high tone, CVCV words with an initial mid tone might be expected to surface with an initial high tone when preceded by a

floating high tone. Indeed, quite generally, words with a MM tonal pattern fulfill this expectation, as diagrammed in (14).



The examples in (15), repeated from (9) above, illustrate this type of change with CVV words, and the examples in (16) with CVCV words. In (16a), the underlying MM pattern of the word for 'today' is changed to HM under the influence of the final floating high tone of the word for 'mountain' (Pike 1948: 77), and in (16b), the word for 'mountain' is itself subject to a change from MM to HM because of a preceding floating high tone (Pike 1946a: 23, note 2).

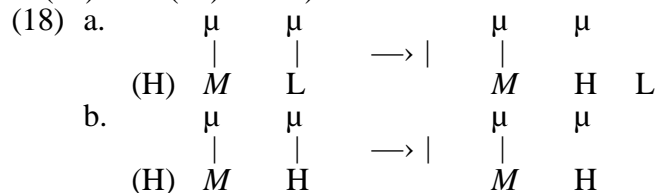
- (15) a. s (H) 'causative' + kee (H) 'to eat' → skée 'to feed'
 b. s (H) 'causative' + kee 'to go away' → skée 'to cause to go away'

- (16) a. kiʔin-ná + z&uku (H) + bina → kiʔin-ná
 z&uku bína
 'I'm going' 'mountain' 'today' 'I'm going to the mountain today'
 b. hà (H) 'that' + z&uku (H) 'mountain' → hà-z&úku 'that
 mountain'

Yet, as Pike noted, words with a MH tonal pattern (e.g. kuc&í 'pig') are apparently not affected by a preceding floating high tone, that is, they don't change to a HH pattern. The absence of this change does not seem reducible to an OCP effect, since as illustrated in (7a) above, words with a LH pattern do change to HH when preceded by a floating high tone, thereby demonstrating that a floating high tone can link to a vowel immediately preceding a high-tone syllable in the same morpheme. The answer to the puzzle comes from the behavior of CVCV words with a ML pattern. Preceded by a floating high tone, these words do not change their tonal pattern to HL, but rather to MH, as illustrated in (17) with the words for 'branch' (Pike 1946a: 24, note 3), 'priest' (Pike 1945a: 131), and 'to scrape' (Pike 1948: 92).¹⁰

- (17) a. hà (H) 'that' + z&ukù 'branch' → hà-z&ukú 'that
 branch'
 b. nuù (H) 'to' + sutù 'priest' → nuù sutú 'to the priest'
 c. mà (H) + tuhì (H)¹¹ + rì → mà-tuhí-rí 'I will not scrape'
 'not' 'to scrape' 'I'

These examples show two important things. First, in a ML pattern, the mid tone is transparent to the association of a floating high tone. Secondly, if we generalize this transparency property to the MH pattern, then this pattern becomes regular with respect to the association of a floating high tone. As shown in (18), in both ML and MH cases, the floating high tone bypasses the italicized initial mid-tone vowel and anchors itself to the word's second low-tone or high-tone vowel, with exactly the same effects that it had when it docked onto an initial low-tone or high-tone vowel (compare (18) with (13) above).



What needs to be captured formally now is first, the transparency of the mid tones in ML and MH patterns, and secondly, the process whereby a floating high tone gets anchored. With regard to the transparency question, I suggest as an answer that mid-tone vowels are underlyingly toneless, in other words that the mid tone is the default tone in Mixteco, as is commonly proposed for other languages with the three level tones High, Low, and Mid (see for instance Pulleyblank 1986).¹²

$$(19) \text{ M-Default: } \mu \longrightarrow \begin{array}{c} \mu \\ | \\ M \end{array}$$

Regarding the anchoring of the floating high tone, I suggest the two rules sketched in (20).

$$(20) \text{ (H)-Association:}$$

a. $\begin{array}{c} \mu \\ | \\ \text{(H)] T} \end{array} \longrightarrow \begin{array}{c} \mu \\ / \quad \backslash \\ \text{H} \quad \text{T} \end{array}$

b. $\begin{array}{c} \mu \\ | \\ \text{(H)]} \end{array} \longrightarrow \begin{array}{c} \mu \\ | \\ \text{H} \end{array}$

Part (a) of (20) states that a final floating high tone targets the first toned mora in the next morpheme and anchors to it. As already mentioned, everything else in this situation results from independent operations. Thus, if T is a low tone, it is automatically delinked, since Mixteco does not allow contour tones (see Constraint 3 above), and if T is a high tone, the outcome is simply a high-tone vowel. Part (b) of (20) states that in case the floating high tone does not find a toned mora in the next morpheme, then it anchors to the first toneless mora in that morpheme.¹³ If neither (20a) nor (20b) can apply, that is, if the floating high tone occurs before a pause, then nothing may save it: it remains unanchored and is consequently not realized phonetically.

To summarize so far, Rule (20a) accounts for all of the patterns in (21a), and rule (20b) accounts for the single pattern in (21b).

$$(21) \text{ a. } \text{HH} \longrightarrow \text{HH}, \text{HM} \longrightarrow \text{HM}, \text{HL} \longrightarrow \text{HL}$$

$$\text{MH} \longrightarrow \text{MH}, \text{ML} \longrightarrow \text{MH}$$

$$\text{LH} \longrightarrow \text{HH}, \text{LM} \longrightarrow \text{HM}^{14}$$

b. $\text{MM} \longrightarrow \text{HM}$

Rule (20b) might appear to account for relatively little, but in fact it accounts for more than meets the eye in (21b). The analysis so far has essentially ignored both CVV and CV?V words where the vowels share the same melody, that is, words where Constraint (6) banning the MH tonal pattern is in effect. When preceded by a floating high tone, such words behave as schematized in (22).

$$(22) \text{ CVV and CV?V words with a single vowel melody}$$

a. $\text{HH} \longrightarrow \text{HH}, \text{HM} \longrightarrow \text{HM}, \text{HL} \longrightarrow \text{HL}$

$$\text{LH} \longrightarrow \text{HH}, \text{LM} \longrightarrow \text{HM}$$

b. $\text{MM} \longrightarrow \text{HM}, \text{ML} \longrightarrow \text{HL}$

I provide in (23) examples for the cases where the first mora of the word does not carry an underlying high tone, that is, when the effects of a preceding floating high tone are visible. I show here only the presence of a preceding floating high tone, without specifying its morphological source. For each tonal pattern, CVV words are illustrated in (i) and CV?V words in (ii).

$$(23) \text{ a. } \text{LH} \longrightarrow \text{HH}$$

1948)¹⁵ (i) (H) + kWáán 'yellow' → kWáán (Pike 1945b,

(ii) (H) + dè?é 'to look at' → dé?é (Pike 1948: 94)
LM → HM

(i) (H) + c&i 'beneath' → c&i (Pike 1948: 94)

(ii) (H) + hà?a 'to give' → há?a (Pike 1945a: 131)

b. MM → HM

(i) (H) + kee 'to go away' → kée (Pike 1948: 78-79)¹⁶

(ii) (H) + be?e 'house' → bé?e (Pike 1948: 79, 80)

ML → HL

(i) (H) + koð 'snake' → kóð (Pike 1948: 79)

(ii) (H) + ka?àn 'to speak' → ká?àn (Pike 1944: 124)

A comparison of the tables in (21) and (22) reveals two differences, highlighted by the italics on the tonal patterns beginning in a mid tone. First, CVV and CV?V words with a single vowel melody don't show instantiations of an unchanging MH pattern; this gap is simply due to the lack of an underlying MH pattern to begin with (see Constraint 6 above). Secondly, when underlyingly ML, these word types derive a HL pattern instead of a MH pattern, thus revealing another application of Rule (20b). What needs to be explained now is why Rule (20a) does not apply in these cases, since it is supposed to take precedence over Rule (20b).

As illustrated in (24), CVV words with a long vowel contrast minimally with CVV words containing two different vowels, the latter behaving like CVCV words and changing their ML pattern to MH.

(24) a. ML → HL (H) + koð 'snake' → kóð [repeated from 23]

b. ML → MH (H) + z&àu 'hole' → z&áu [repeated from note

10]

This contrast can be explained by Constraint (6), which bans the MH pattern on CVV words with a long vowel. Because of the constraint, the floating high tone cannot successfully aim for what would otherwise be its normal target, i.e. the first toned mora in the next morpheme (Rule 20a). It must therefore settle for the first available toneless mora (Rule 20b), and the outcome is a HL pattern rather than a MH pattern. The latter pattern does obtain with CVV words containing different vowels, because these words are not subject to Constraint (6).

The situation is slightly different with CV?V words (Pike 1944: 124; 1948: 81). Here, as shown in (25), words with an underlying ML pattern change to HL, whether or not they contain identical vowels.

(25) a. ML → HL (H) + ka?àn 'to speak' → ká?àn [repeated from 23]

b. ML → HL (H) + ta?ù 'to beat' → tá?ù (Pike 1945b: 219,

221)

Furthermore, as shown in (26), words of the shape CV?CV also behave in this fashion.

(26) ML → HL (H) + ka?nù 'to walk' → há?nù (Pike 1945a: 135)¹⁷

The descriptive generalization here is that toneless vowels are not transparent to (H)-Association exactly when a glottal stop intervenes.¹⁸ I will therefore assume that a word-medial glottal stop constitutes a barrier to (H)-Association (Rule 20a), perhaps because its featural specification and that of a high tone share a tier, and

that linking a high tone across a glottal stop would result in a line-crossing violation.¹⁹ Under this view, Constraint (27) would be nothing more than an instantiation of Goldsmith's line-crossing constraint (1976).

(27) High tone - Glottal stop constraint: No crossing over

At any rate, the effect observed in (25a), (25b), and (26) is that a floating high tone is unable to target the toned vowel in the second syllable of the next morpheme (Rule 20a), and must again settle for the toneless vowel in the first syllable (Rule 20b); hence the change from ML to HL instead of MH.²⁰

In summary, the main elements of the proposed analysis for the association of floating high tones in Mixteco can be itemized as follows:

(28) Summary of analysis

- (i) Mid-tone vowels are underlyingly toneless (the mid tone is the default tone).
- (ii) A floating high tone's domain does not extend beyond the next morpheme.
- (iii) Its preferred target is the first lexically toned vowel (Rule 20a).
- (iv) If a toned vowel is unavailable, it targets the first toneless vowel (Rule 20b).
- (v) It is otherwise unrealized because unanchored.
- (vi) The availability of a toned vowel as an anchor is determined by three factors:
 - a. Whether the following morpheme has a lexically toned vowel.
 - b. Whether the output would violate a restriction on tonal patterns (Constraint 6).
 - c. Whether the association would create a line-crossing violation (Constraint 27).

4. THEORETICAL IMPLICATIONS. The view that mid-tone vowels are lexically toneless provides an appealing explanation for their transparency to the association of floating high tones. It also constitutes an attractive alternative to Goldsmith's proposal (1990: 24-26) that a floating high tone metathesizes with a following morpheme-initial mid tone in CVCV words where the medial consonant is not a glottal stop. However, the analysis leads to serious descriptive problems if there is a universal convention automatically associating floating tones to free vowels.

Under perturbation by a preceding floating high tone, we saw earlier (see (8a) above) that words with a LM tonal pattern change to HM. This is again illustrated in (29a-b) with the word for 'puddle' (Pike 1948: 79). As already mentioned, the linking of the floating high tone to the low-tone vowel (Rule 20a) causes the low tone to delink, since contour tones are banned in the language (Constraint 3).

(29) a. [m i n i] b. m i n i c. * m i n i
 | → | → | |
 (H)] L (20a) H L UAC H L

But if the second vowel in the word is lexically toneless, the universal association convention (UAC) predicts that the delinked low tone should attach to it, incorrectly yielding the HL pattern in (29c).

Another problematic case arises with perturbing words whose last vowel is mid toned. Consider for instance the word for 'mountain', z&uku (H), a noun with mid tones which was shown earlier (see (16a) above) to have a final floating high tone. Under our analysis, its lexical representation is as in (30a).

(30) a. z& u k u b. * z& u k u c. * z& u k u d. z& u k u
 (H) | | \ /
 H H M

Assuming that the UAC applies whenever it can, one would expect such words not to exist in the language, for if they did, they would be immediately restructured by the automatic linking of the floating tone to one of the two free vowels, as in (30b)

or (30c).²¹ Alternatively, one could assume on a principled basis that the UAC is preempted by more specific language-particular rules such as (20a) and (20b).²² This approach would correctly allow the floating high tone to link to a following morpheme, as exemplified in (16a) above. But the problem would remain when our example in (30a) is used before a pause. Again, the UAC predicts that the floating high tone should link to one of the two free vowels. It does not: M-Default (19) applies instead, yielding the phonetic representation in (30d).

In both (29) and (30), then, M-Default must preempt the universal convention linking floating tones to free vowels; but there is no rational basis for such precedence relation, since default rules are by definition principles of last resort. One possibility of course would be to assume that a language-specific rule deletes floating tones in Mixteco just in case other language-specific rules fail to assign them to a mora; however, since the lack of phonetic realization of such floating tones can be more simply attributed to their unanchored status, their language-specific deletion looks like a devious way to bar the application of the UAC.

To conclude, the purported universal convention automatically associating a floating tone to a free tone-bearing unit must not apply in Mixteco, despite excellent opportunities. Unless one resorts to the suspicious language-specific deletion of floating tones, the implication of this situation for phonological theory is as follows. Either (i) the convention in question is not in fact part of Universal Grammar, as argued independently by Archangeli & Pulleyblank (1994) and by Hyman & Ngunga (1994), or (ii) it must be assigned the status of a parameter, which would happen to be set to 'off' in Mixteco.²³

APPENDIX I: ON THE MH GAP

Words of the general shape CVV fall into two groups, depending on whether the sequence VV corresponds to a single melody (i.e. a long vowel) or two distinct melodies. Vocally bimelodic CVV words are apparently rather rare. In combing through Pike (1948: Chapter VII), I found only half a dozen such items, compared to more than 40 vocally monomelodic CVV words. In addition to lacking the LL pattern, as do all lexical words, words with a long vowel do not occur with the MH pattern. I checked all of Pike's writings and Mixteco texts listed in the references and could not locate a single counterexample to this generalization. It is unlikely that the absence of the MH pattern on long vowels in the available data is due to chance, since I found in Pike (1948: Chapter VII) at least two examples for each of the other seven tonal patterns; additionally, I did find the MH pattern as one possible tonal pattern on three of the few words with contiguous but melodically different vowels (siá 'to loosen'; z&au 'cave, hole'; tiú 'uncle').²⁴

In parallel with the case of CVV words, the great majority of CV?V words have identical vowels in both syllables; thus, in Pike (1948: Chapter VII), out of more than 20 words of the shape CV?V, I found only three with different vowels (dá?ú 'to be poor', bá?ù 'coyote', ?i?à 'sacred personage'). For the CV?V words containing identical vowels, I found at least one example for each logically possible tonal pattern, except for the generally banned LL pattern and the MH pattern also absent in words with a long vowel. Although I found no occurrence of a MH pattern on CV?V word with different vowels either, I surmise that this gap, at least as an underlying gap, is not real, but rather due to the paucity of available tokens. As examples (24b) and (25b) above illustrate, what can be established for certain

from the available data is that as opposed to CVV words with different vowels, CV?V words with different vowels do not allow the derived MH pattern.

It is worth noting that as formulated, Constraint (6) does not differentiate between the two laryngeals [h] and [ʔ].²⁵ Therefore the same kind of split with words containing a medial [h] is predicted, namely, no MH pattern if the two vowels are the same, but no such restriction if they are different. I was unable to find any CVhV example with the same vowel in both syllables,²⁶ so the first half of this prediction remains to be tested. Regarding the second half of the prediction, one of the two CVhV words with different vowels which I found in Pike (1948: Chapter VII) does occur with the MH pattern (tuhí 'to scrape').²⁷

It should finally be noted that in general, by contrast with CV?V words, CVCV words with a medial consonant other than [ʔ] appear to have different vowels in their two syllables more often than not, an expected asymmetry assuming chance distribution of vowel quality. The MH pattern is clearly attested in either case, in particular when the two vowels happen to be identical:²⁸ e.g. ?iní [from ?inì 'insides'], hiní [from kunì 'to know'], kis&í [from kusù 'to sleep'], hac&á 'to throw away', to_dó 'much', kutú [from kutù 'nose'], sutú [from sutù 'priest'], z&ukú [from z&ukù 'brush'].

APPENDIX II: ON CVV WORDS AND RELATED MATTERS

CVV words with a long vowel and a MM tonal pattern, that is, in our terms, CVV words with an underlyingly toneless long vowel, may optionally change to HH, instead of HM, when preceded by a floating high tone (e.g. kée ~ kéé; Pike 1944: 123-124, 1945b: 220, 1948: 80-81). I assume that Rule (20b), which links a floating high tone to a following toneless mora, may iterate and link the high tone to the next mora, just in case the two moras form a toneless long vowel. Pike's descriptions indicate that the extra linking is strictly limited to this context (a floating high tone and a toneless long vowel). Thus, he does not mention that the phenomenon occurs with any other closely related configurations, such as CVV words with a long vowel and an underlying LM pattern, or CV?V words with the same vowel and either a MM or LM pattern. Also, CVV words with a long vowel and an underlying HM pattern do not appear to have an optional pronunciation with a HH pattern.

Pike (1945a: 135; 1948: 80, note 5, 86) does mention two examples, shown in (i) below, where z&uù 'rock' surfaces as z&úú, and which Goldsmith (1990: 25) interprets as illustrations of the possible total propagation of a preceding floating high tone onto a CVV word with a long vowel and an underlying ML pattern (although dez&u 'food' demonstrably has a final floating high tone, as shown in (ii) below, there is actually no independent evidence that di, a form not found by Pike (1945a: 135) anywhere else, does).

- (i) a. di - z&úú 'gizzard'
- b. dez&u z&úú 'rock-like food', i.e. 'thick or solid food'

In fact, the derived HH pattern observed here on the word for 'rock' has nothing to do with the presence of a preceding floating high tone of the sort discussed in this paper. Rather it is a tonal template commonly used in Mixteco to derive noun or verb modifiers (Pike 1944: 117, 135; 1945a: 133, 135; 1948: 82-87), especially when the modifier takes on a figurative meaning, as is clearly the case in the phrases in (i). Thus, (ib) can be contrasted with (ii), where the word for 'rock' has

a literal meaning and where the final floating high tone of the word for 'food' links to the word for 'rock' in predicted fashion (Rule 20b).

(ii) $dez\&u$ (H) 'food' + $z\&u\grave{u}$ 'rock' \rightarrow $dez\&u\ z\&u\acute{u}$ 'food made out of rocks'

As illustrated in (iii), the HH template at work in (i) seems to apply regardless of the segmental or tonal make-up of words.

(iii) $kW\grave{a}$ go 'crooked' \rightarrow $kW\acute{a}$ gó 'crookedness'
 $s\&\grave{a}\&\grave{i}\grave{n}\grave{i}$ 'head' \rightarrow $s\&\acute{5}\acute{i}\acute{n}\acute{i}$ 'in vague relationship to the head'
 $s\grave{u}\&\acute{c}\&\acute{i}$ 'child' \rightarrow $s\acute{u}\&\acute{c}\&\acute{i}$ 'young'
 $t\acute{a}\acute{?}an$ 'comrade' \rightarrow $t\acute{a}\acute{?}án$ 'togetherness'

On the basis of the examples in (iv) also involving the word for 'rock', Goldsmith (1990: 25) additionally argues that a floating high tone may link if and only if it is preceded by an anchored tone. He thus explains why the word for 'rock', itself endowed with a final floating high tone, as shown in (iva) by its action on the underlying enclitic $-de$ 'his', fails to be perturbing in its $z\&u\acute{u}$ garb, as shown in (ivb) (Pike 1948: 80, note 5): the floating high tone is preceded by a delinked low tone.

(iv) a. $z\&u\grave{u}$ - $d\acute{e}$ 'his rock'
 b. $d\grave{i}$ - $z\&u\acute{u}$ - $d\acute{e}$ 'his gizzard'

But it is not true that a floating high tone needs to be preceded by an anchored tone in order to be able to associate to a mora, witness the continuative morpheme illustrated in (8a) above, which is not in the least incapacitated when phrase-initial. The explanation for why $z\&u\acute{u}$ does not perturb the enclitic $-de$ is more likely related to the fact that mid-tone enclitics are quite generally not affected by a preceding otherwise perturbing word with a HH (or HL) tonal pattern (Pike 1948: 91). Note also that one could not argue that the HH template replaces all of a word's underlying tonal pattern, including a final floating high tone (for example, that $z\&u\grave{u}$ (H) is changed to $z\&u\acute{u}$ rather than $z\&u\acute{u}$ (H)), since, as shown in (vi), the word $s\grave{u}\&\acute{c}\&\acute{i}$ (H) continues to be perturbing when endowed with such a pattern (Pike 1948: 87).

(v) Underlying morphemes: $n\&\$an\grave{i}$ 'brother', $s\grave{u}\&\acute{c}\&\acute{i}$ (H) 'child', $\acute{u}n$ 'that'
 a. $n\&\$an\grave{i}$ + $s\grave{u}\&\acute{c}\&\acute{i}$ (H) + $\acute{u}n$ \rightarrow $n\&\$an\grave{i}$ $s\grave{u}\&\acute{c}\&\acute{i}\text{-}\acute{u}n$ 'that younger brother'
 b. $n\&\$an\grave{i}$ + $s\grave{u}\&\acute{c}\&\acute{i}$ (H) + $\acute{u}n$ \rightarrow $n\&\$an\grave{i}$ $s\grave{u}\&\acute{c}\&\acute{i}\text{-}\acute{u}n$ 'the brother (of) that child'

(vi) a. $[[n\&\$an\grave{i}$ + $s\grave{u}\&\acute{c}\&\acute{i}$ (H)] + [$s\grave{u}\&\acute{c}\&\acute{i}$ (H) + $s\grave{u}\&\acute{c}\&\acute{i}$ (H) + $\acute{u}n$]]
 'the younger brother' (of) 'that young child'
 b. $n\&\$an\grave{i}$ $s\grave{u}\&\acute{c}\&\acute{i}$ $s\grave{u}\&\acute{c}\&\acute{i}$ $s\grave{u}\&\acute{c}\&\acute{i}\text{-}\acute{u}n$
 c. $n\&\$an\grave{i}$ $s\grave{u}\&\acute{c}\&\acute{i}$ // $s\grave{u}\&\acute{c}\&\acute{i}$ $s\grave{u}\&\acute{c}\&\acute{i}\text{-}\acute{u}n$

In contrast to (vb), (va) illustrates the use of the HH template on the word for 'child' used as an adjectival modifier for the word for 'brother'. Since the word for 'that' is high toned underlyingly, whether a floating high tone actually precedes it or not is immaterial. The larger construction in (via) is analogous to (vb), with its two main constituents each analogous to (va). Its two possible pronunciations in (vib-c) show that even with its HH pattern, the first occurrence of the word for 'child' is perturbing in the usual way when no pause intervenes.

For the sake of completeness, I note finally in (viia) an isolated case where the continuative morpheme changes a verb's ML pattern to HH. Pike described this

change as a 'unique perturbation'; it is actually also found in the verb's reduced form in (viib), although not in its cognate in (viic), which undergoes the expected perturbation to MH (Pike 1944: 134, 137).

- (vii) a. (H) + ?ac&ì 'to say' → ?ác&í
- b. (H) + ?àà 'to say' → ?áá
- c. (H) + kac&ì 'to inform, to say' → kac&í

NOTES

¹ There are in addition a few words of the shape CV?CV, which, as we will see, exhibit some of the special properties of CV?V words (see (26) below). Interjections (e.g. bidáà 'indeed'; Pike 1948: 88) and Spanish borrowings (e.g. fabóòr 'favor'; Pike 1948: 93) may also have a more complex structure. Finally, [s] can be found word-initially before voiceless stops (the first two examples might be bimorphemic, with [s] the causative prefix; cf. (9) below): e.g. stá?àn 'to light', 'to show', 'to insult' (Pike 1945a: 129), ská da 'to toss' (Pike 1945a: 133), staà 'tortilla' (Pike 1945a: 137), stoò 'uncle' (Pike 1945b: 220).

² Following Pike's practice in his IJAL articles, I represent high tones with an acute accent and low tones with a grave accent, mid tones being left unmarked (Pike 1948 marks these with a macron).

³ For details, see Appendix I.

⁴ CVV and CV?V words containing identical vowel melodies share another distinctive property. Reduction to CV is frequent in them, especially in proclisis. Such shortening is very rare in other word types, and when it does occur, it is the first syllable, rather than the second, which tends to be lost (Pike 1944: 128, 131, 132; 1945b: 223; 1948: 10, note 18). For examples of the latter type of abbreviation, see Pike 1945a: 133; 1945b: 223). There is another parallel among the words affected by Constraint (6), albeit this time with the added participation of analogous words with different vowel melodies. Pike (1944: 115; 1948: 10, note 18) observes that vowel nasality affects both vowels of a word if 'the medial consonant is zero, or [h], or [?]'. In other words, laryngeal consonants are transparent to nasality. Caveat: my classification of Mixteco [h] as a laryngeal consonant is based on the generally accepted phonetic value for the symbol 'h', but it might actually represent a velar approximant or fricative in Pike's notation: '[h] varies from little to considerable friction on the velum' (Pike 1944: 115).

⁵ I will not seek to account for the behavior of enclitics here, as a number of them seem to exhibit idiosyncratic properties in terms of the ways in which they are perturbed and in turn cause perturbations (Pike 1948: 89-92).

⁶ sùc&í actually has a final floating high tone underlyingly (Pike 1948: 87), but I suppress it here, since it has no phonetic consequences, being phrase-final (but see (vi) in Appendix II).

⁷ The continuative morpheme may also have a palatalizing influence (e.g. (H) + kaka 'to walk' yields híka), which Pike (1944: 123; 1948: 94, note 10) transcribed with a small raised 'y' clearly prefiguring today's notion of floating element. Pike (1944: 130) pointed out the existence of another floating morpheme (which he transcribed with a small raised 'n'), one with a coronal and nasal influence on verb stems and the semantic value of implying 'resultant duration of action'. For instance, thus prefixed, the verb k'~t' 'to enter' becomes d'~t' 'to enter and remain'. Although the floating continuative and resultant morphemes occupy

different preverbal slots, they may under the right circumstances have cumulative effects on a following verb stem, yielding in this case nd'!t' 'to enter continuously or repeatedly and stay there hiding'. Surprisingly, Pike did not use a similar notation to express the concept of the floating high tone, resorting instead to the abstract symbols '+' (in Pike 1944) or '(b)' (in Pike 1948) to mark the 'raising influence' of tonally perturbing morphemes.

⁸ A more neutral way of putting it would be to say that the surfacing of the tonal patterns in (11a) concurrently satisfies the realization of the underlying tonal patterns of the words themselves and the realization of the floating high tone.

⁹ Recall that there are no lexical words with the LL tonal pattern (see Constraint 5 above).

¹⁰ As shown in (i), CVV words with different vowels behave in the same way.

(i) ... (H) + z&au 'hole' → z&au (Pike 1944: 116; 1948: 81)

¹¹ The word for 'to scrape' itself has a final floating high tone that affects the following clitic, changing its low tone to high.

¹² Viewing mid-tone vowels as underlyingly toneless might seem to breathe new life into an OCP account of why the MH pattern remains unchanged following a floating high tone. One could now argue that in the case of the change from LH to HH (e.g. súc&í → súc&í), the delinked low tone acts as an insulator on the tonal tier between the two anchored high tones, whereas in the case of MH remaining MH (e.g. kuc&í), there would be no intermediate tonal element between the two high tones. While this account would make it possible to extend the range of cases where the target of a floating high tone is the initial vowel of the next morpheme, it would still leave unresolved the case of CVCV words with a ML pattern, where the second vowel is targeted (ML → MH). What makes an OCP account additionally doubtful is that words with the HH or LH tonal patterns may be perturbing, that is, include a floating high tone right after another (anchored) high tone; such configurations indicate that in Mixteco, floating tones must apparently be ignored in the computation of OCP violations.

¹³ The following example (Pike 1948: 82) shows that floating high tones only have access to the first morpheme on their right (the floating high tone here is the continuative morpheme; see (8a) above).

(i) (H) + na + kiku + ná → ná - kiku - ná , * na - kiku - ná
're' 'to sew' 'I' 'I am re-sewing'

In (i), (20b) applies rather than (20a), even though on a purely phonological basis, one might have expected the floating high tone to skip the toneless vowel of na and anchor to the first vowel of kiku. The reason it does not skip the toneless vowel is that it does not have scope beyond the first morpheme to its right.

¹⁴ Again, recall that there is no LL tonal pattern (see Constraint 5 above).

¹⁵ The final 'n' here and elsewhere (see other examples in (23) and (25), in notes 19 and 26, and in Appendix II) denotes nasality on the preceding two vowels (see note 4 above and Pike 1944: 115; 1945a: 129, note 1; 1948: 10, note 18).

Although reproducing the canonical form expected from Pike's descriptions, the actual example used here (kWàán → kWáán) may be questionable. It relies on an analysis of the word for 'yellow' which is different than that proposed in Pike (1948: 86). Following Pike (1945b: 222), I have assumed that the underlying form for this adjective is kWáán and that the form kWáán found in k't' kWáán 'a yellow

animal' (Pike 1948: 86) is due to the fact that k't' contains a final floating high tone (Pike 1944: 129, 132). The LH tonal pattern apparently occurs very rarely on Mixteco long vowels; in all of Pike's publications listed in the references, I was able to find it in only one other item, the onomatopoeia pàáN (Pike 1948: 93).

¹⁶ On the alternative pronunciation kéé and related matters, see Appendix II.

¹⁷ Pike does not actually provide a translation for the verb ka?nù itself, but its combination with the form hít' 'shin bone' is given the meaning 'to walk with the knees bending slightly, or giving under one, at each step'. Note that the continuative morpheme responsible for the tone change here (cf. (8a) above) exhibits an additional, spirantization, effect on the verb, with the initial [k] turning into [h] (see note 7 above and Pike 1944: 123).

¹⁸ Recall that the other laryngeal consonant [h] (but see caveat in note 4 above) does not prohibit a floating high tone from attaching to a following low-tone vowel (see example (17c) above).

¹⁹ As shown in (i) (Pike 1948: 78), an initial glottal stop does not prevent the attachment of a preceding floating high tone.

(i) kee (H) 'to eat' + ?isò 'rabbit' → kee ?isó 'the rabbit will eat'

I presume that as opposed to medial glottal stops, initial glottal stops are not contrastive and therefore not present underlyingly. They simply occur on the surface as a default onset consonant. Cf. the borrowing ?orá from Spanish hora [ora] 'hour' (Pike 1944: 116) and also the fact that in Pike's transcriptions, an initial glottal stop is not consistently present at least in the case of the morpheme for 'one': 'n vs. ?n; see for instance Pike (1945a: 133; 1948: 80 vs. 1944: 118; 1945a: 131; 1945b: 219; 1946a: 22).

²⁰ According to the present analysis, there is then a double reason why CV?V words with identical vowels change from ML to HL rather than MH when preceded by a floating high tone: Constraint (6) and Constraint (27). Regarding the fate of an underlying MH pattern in CV?V words with different vowels and in CV?CV words (should such a tonal pattern turn out to exist on these words; see Appendix I), the analysis predicts that a preceding floating high tone should trigger a change to HH.

²¹ Which vowel would receive the floating tone would depend on whether the left-to-right or the right-to-left option is selected for the universal association convention.

²² Cf. Koutsoudas, Sanders, & Noll's 'Principle of Proper Inclusion Precedence' (1974) and Kiparsky's 'Elsewhere Condition' (1973). For specific applications of such ordering principles to tonal rules and universal conventions, see for instance Clements & Ford 1979 and Pulleyblank 1986.

²³ I view neither of these implications as a positive outcome for phonology: (i) the UAC under fire has served insightful purposes in countless analyses, and (ii) the 'parameterization of universal conventions' is a contradiction in terms indicating that there are in fact no universal conventions. However, since my discussion of the Mixteco data has been conducted within a rule-based framework (with a sprinkle of constraints added on), these implications only affect this particular theoretical approach. I provide in Tranel 1995 an alternative analysis within Optimality Theory which yields a preferable account of the data without parallel theoretical drawbacks.

²⁴ siá also occurs as sîà, in a rare case of free alternation (Pike 1948: 27); z&áu is derived from underlying z&àù (see note 10 and example (24b) above); and tiú is

also attested as tíù (Pike 1948: 94), with the general direct address HL tonal pattern (Pike 1948: 87).

²⁵ See caveat in note 4 above regarding the classification of [h] as a laryngeal consonant.

²⁶ The word tù?un 'word' (Pike 1945b: 221; 1946a: 22) occurs in a related usage as tùhún in a song (Pike 1946b: 131), but still without illustrating the MH pattern.

²⁷ This MH pattern is actually derived from underlying ML (see example (17c) above). The other word is kahi 'to eat', also attested with the (derived) pattern HM in Pike (1944: 119).

²⁸ Underlying forms are provided here within the square brackets if I know them to differ from the phonetic forms used as illustrations. These data were culled from Pike (1944; 1945a,b; 1948), including the Mixteco texts found in these references.

REFERENCES

- ARCHANGELL, DIANA, and DOUGLAS PULLEYBLANK. 1994. *Grounded Phonology*. Cambridge, MA: MIT Press.
- CLEMENTS, G. N., and KEVIN C. FORD. 1979. Kikuyu tone shift and its synchronic consequences. *Linguistic Inquiry* 10.179-210.
- GOAD, HEATHER. 1993. Where is height and what's it like? Proceedings of the 1993 Annual Conference of the Canadian Linguistic Association, 261-277. Toronto: Toronto Working Papers in Linguistics, Department of Linguistics, University of Toronto.
- GOLDSMITH, JOHN. 1976. *Autosegmental Phonology*. Cambridge, MA: MIT dissertation.
- GOLDSMITH, JOHN A. 1990. *Autosegmental and Metrical Phonology*. Oxford and Cambridge, MA: Blackwell.
- HYMAN, LARRY M., and ARMINDO NGUNGA. 1994. On the non-universality of tonal association 'conventions': Evidence from Ciyao. *Phonology* 11.25-68.
- KIPARSKY, PAUL. 1973. 'Elsewhere' in phonology. A Festschrift for Morris Halle, ed. by Stephen R. Anderson and Paul Kiparsky, 93-106. New York: Holt, Rinehart and Winston.
- KOUTSOUDAS, ANDREAS, GERALD SANDERS, and CRAIG NOLL. 1974. On the application of phonological rules. *Language* 50.1-28.
- ODDEN, DAVID. 1995. Tone: African languages. *The Handbook of Phonological Theory*, ed. by John A. Goldsmith, 444-475. Oxford and Cambridge, MA: Blackwell.
- PIKE, KENNETH L. 1944. Analysis of a Mixteco text. *International Journal of American Linguistics* 10.113-138.
- PIKE, KENNETH L. 1945a. Tone puns in Mixteco. *International Journal of American Linguistics* 11.129-139.
- PIKE, KENNETH L. 1945b. Mock Spanish of a Mixteco Indian. *International Journal of American Linguistics* 11.219-224.
- PIKE, KENNETH L. 1946a. Another Mixteco tone pun. *International Journal of American Linguistics* 12.22-24.
- PIKE, KENNETH L. 1946b. The Flea: Melody types and perturbations in a Mixtec song. *Tlalocan* 2.128-133.
- PIKE, KENNETH L. 1948. *Tone Languages*. Ann Arbor: University of Michigan Press.

- PULLEYBLANK, DOUGLAS. 1986. *Tone in Lexical Phonology*. Dordrecht: Reidel.
- SELKIRK, ELISABETH. 1990. A two-root theory of length. *University of Massachusetts Occasional Papers in Linguistics* 14.123-171.
- STERIADE, DONCA. 1987. Locality conditions and feature geometry. *Proceedings of the 17th Meeting of the North East Linguistic Society*, 595-618. Amherst: Graduate Linguistic Student Association, Department of Linguistics, University of Massachusetts.
- TRANEL, BERNARD. 1995. Rules vs. constraints: A case study. *Colloque de Phonologie on Current Trends in Phonology*, Royaumont, France, June 19-21, 1995.