H-tone is not always H-tone
A register tone account of Macuiltianguis Zapotec

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Theoretical background: tonal features

(1) Tonal features (Yip, 1989; Snider, 1990; Hyman, 1992)

<table>
<thead>
<tr>
<th>Extra high</th>
<th>High</th>
<th>Mid</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>+f</td>
<td>- f</td>
<td>+f</td>
<td>- f</td>
</tr>
<tr>
<td>+ U</td>
<td>+ U</td>
<td>- U</td>
<td>- U</td>
</tr>
</tbody>
</table>

* register [+Upper] divides pitch range of voice in half; [+raised] subdivides register (Yip, 1980; Pulleyblank, 1986)

* arguments:
  * restrictions for contour tones (e.g. only contours in one [+U register])
  * process between non-contiguous tones possible (e.g. Ewe: [−U,+h] becomes [+U,+h] after [+U,−h]; (Odden, 1995))

* same surface tones may have different underlying representation (e.g. Snider, 1998; Picanço, 2005)

Structure of the talk

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   1.2 Potential high tone
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Macuiltianguis Zapotec (=MZ)

* an Otomanguean language spoken in Oaxaca, Mexico
* data based on Broadwell and Zhang (1999); Broadwell (2000); Foreman (2006), and especially Broadwell et al. (2011)

(2) State of Oaxaca (Wikimedia, 07/01/16)

Morphological H-association I: Potential prefix

* the prefix /gú-/ potential causes an additional H on the following TBU (4)
* taken to be morpheme-specific

(4) Potential (Broadwell et al., 2011, 4-8)

<table>
<thead>
<tr>
<th>UNDERLining</th>
<th>SURFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. gú-di-billá-ná-ná</td>
<td>gú-di-billá-ná-ná</td>
</tr>
<tr>
<td>b. gú-sí-gá?-ná-ná</td>
<td>gú-sí-gá?-ná-ná</td>
</tr>
<tr>
<td>c. gú-tú-bí-já-ná</td>
<td>gú-tú-bí-já-ná</td>
</tr>
<tr>
<td>d. gú-láp-á-ná-ná</td>
<td>gú-láp-á-ná-ná</td>
</tr>
</tbody>
</table>

Tone in Macuiltianguis Zapotec (=MZ)

* three level tones high (=H, á), mid (=M, a), and low (=L, à), and a downstepped H (=á)
* tone sequences HL and LH on long vowels; TBU=μ

(3) Tone in MZ (Foreman, 2006, 40)

<table>
<thead>
<tr>
<th>iñá</th>
<th>‘rock’</th>
<th>iñá</th>
<th>‘rain’</th>
</tr>
</thead>
<tbody>
<tr>
<td>bélá</td>
<td>‘fish’</td>
<td>bélá</td>
<td>‘snake’</td>
</tr>
<tr>
<td>bèlia</td>
<td>‘cave’</td>
<td>bèlia</td>
<td>‘star’</td>
</tr>
<tr>
<td>dát</td>
<td>‘bean’</td>
<td>dát</td>
<td>‘lard’</td>
</tr>
</tbody>
</table>
Morphological H-association II: 1.Sg formation

- an additional H is realized on the verb base:
  - on a vowel followed by /l/,
    - be-tisgâ?-jâ-nâ
    - be-tisgâ?-jâ-nâ
    - Cow get dirty-15sC-3ScO ‘I dripped it’
  - on the leftmost L-toned TBU if there is no such vowel,
    - be-bîlîa-jâ-nâ
    - be-bîlîa-jâ-nâ
    - Cow wet-15sC-3ScO ‘I wetted it’
  - and on the rightmost M-toned TBU if there is no L-toned TBU,
    - be-fattâ-jâ-nâ
    - be-fattâ-jâ-nâ
    - Cow iron-15sC-3ScO ‘I ironed it’

Abstract Summary

- To glottalized V
  a. LL?M? → LLH?
  b. Else to leftmost L
     - L.M → HM
     - M.L → MH
     - LL.M → HH.M
     - LL.L → HL.L
  c. Else to rightmost M
     - M.M → MH

Two different High tones?

- the Pot-H and 1Sc-H apparently show an asymmetry in the locality of their association and their choice of TBU

Theoretical background: Coloured Containment-based OT

- Containment (Prince and Smolensky, 1993/2004)
  - Every element of the phonological input representation is contained in the output.
  - 1. No deletion: unrealized elements are not integrated under the highest prosodic node (e.g., TBU) if there is no such vowel, unassociated high has no effect on adjacent tones (in the languages under discussion); unassociated low may cause downstep

- Marking conventions: phonetically unrealized elements
  - Phonological structure
  - Phonetic interpretation
Theoretical background: Coloured Containment-based OT

2. No deletion of association lines: they can only be marked as ‘phonetically invisible’ (=not interpreted)

3. All morphemes have a ‘colour’ (=affiliation); epenthetic elements are colourless

Tonal overwriting in containment

- in correspondence-theoretic OT, realization of underlying unassociated elements ensured by, for example, *float (Wolf, 2007)
- in containment-theory, constraints like (16-a) ensure that all elements are integrated into the prosodic structure (via some association line)

a. \( \pm U \) to \( \mu \)
   Assign a violation mark for every \( \pm U \) that is not associated to a \( \mu \).

b. \( \pm U \mu \)
   Assign a violation mark for every \( \mu \) that is phonetically visibly associated to more than one feature \( \pm U \).

c. Max[\( \pm U \)]
   Assign a violation mark for every phonetically invisible \( \pm U \).

Preferred realization site for a high tone

- the 1.5c-H showed a preference for being realized on a vowel followed by /ʔ/.
- a standard case of consonant-tone interaction (Lee, 2008; Tang, 2008)

\( ^c-cc/H \)
Assign a violation mark for every phonetically visible vowel not followed by a \( [+c] \)-sound that is associated to \( [+r] \).

No non-local realization (=line-crossing) for the Pot-H

- the preference for a /Vʔ/ landing site for H’s has no effect for the Pot-H since *Cross[U–\( \mu \)] is high-ranked

a. *Cross[U–\( \mu \)]
Assign a violation mark for every instance of crossing association lines linking features \( \pm U \) with \( \mu \)’s.
Assign a violation mark for every pair of features \( U_1 \) followed by \( U_2 \) on tier \( \pm \)Upper if \( U_2 \) is associated to \( \mu_2 \) and \( U_2 \) to \( \mu_1 \) if \( \mu_1 \) precedes \( \mu_2 \) on the moraic tier.

Only local realization for the Por-H

- Overwriting: Por-H

- Theoretical background: Locality of association under containment

- phonetically visible association lines can not cross (Goldsmith, 1976); but a phonetically invisible one might be ‘crossed’
- penalized by a markedness constraint *Cross (20-a) ensures preference for local association
- the ‘crossed’ element remains invisible: a violation of Have-

- Overwriting: Por-H

- Theoretical background: Locality of association under containment

- Only local realization for the Por-H
Non-local realization possible for the 1.Sc-H

- the 1.Sc-H, however, is only a [+r] and since *Cross[r–U] is lower-ranked, the preference for /V/ is visible on the surface

(22) a. *Cross[r–U]
   Assign a violation mark for every instance of crossing association lines linking features [+r] with features [+U].
   [±r] to [±U]
   Assign a violation mark for every [±r] that is not associated to a [±U].

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Non-local association of the 1.Sc-H II: preference for overwriting an L

- if [+r] overwrites an underlying low tone, a change of the [-U] to [+U] is implied (+[+r–+U]) which is an illicit feature combination in MZ
- this implies a violation of Dep[±U] but allows to avoid a violation of DepAL(U–μ) (24-b) that only penalizes epenthetic associations between underlying elements (+avoidable if [+r] is realized on a mid tone)

(24) a. Dep[±U]
   Assign a violation mark for every colourless [±U].
   b. DepAL(U–μ)
   Assign a violation mark for every colourless association line between a morphologically coloured [±U] and a morphologically coloured μ.

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Non-local association of the 1.Sc-H III: rightmost M

- that the second M is overwritten in MM bases follows from ALIGN constraint preferring M’s in initial position

(26) IntM
   Assign a violation mark for every phonetically visible M (+U,–r) that is not associated to the leftmost vowel of the stem.

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The V: asymmetry between 1.Sc-H and Pot-H

- two tones on a single V are dispreferred (28)
- the two moras of a long V are associated to a single feature [±U]

1.Scg association of a new [+r] changes the tone specification for both TBU’s
- Pot association of a new [+U–+r] changes only the first tone of a long V since it associates to a TBU on its own

(28) *CONT
   Assign a violation mark for every phonetically visible V associated to two different tones.

(29) Association of the floating H-tones to M: TBU-asymmetry

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The V: asymmetry between 1.Sc-H and Pot-H

- for L-tones, the asymmetry mainly follows from DepAL(U–μ): if [+r] is realized, an epenthetic [+U] needs to be inserted and the constraint is irrelevant; a contour can hence be avoided

(30) DepAL(U–μ)
   Assign a violation mark for every colourless association line between a morphologically coloured [±U] and a morphologically coloured μ.
A tone feature analysis for Sierra Juárez Zapotec

V-Asymmetry: Contour creation for the Pot-H

(31)

<table>
<thead>
<tr>
<th>L</th>
<th>M</th>
<th>H</th>
<th>MH</th>
<th>HM</th>
</tr>
</thead>
<tbody>
<tr>
<td>-U</td>
<td>or</td>
<td>-U</td>
<td>or</td>
<td>+U</td>
</tr>
</tbody>
</table>

(32)

(33)

Further implications

A tone feature analysis for Sierra Juárez Zapotec

(35)

<p>| Tones in SJZ |</p>
<table>
<thead>
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- only the contours MH and HM are attested: only [+U] (associated V) may have two tonal features

- the 1.5c is a floating [+r] that associates to non-local TBU’s under pressure of “-RAISED/Ho” (cf. “L/Ho in de Lacy, 2002)

Non-local association of H in Sierra Juárez Zapotec

Bickmore and Broadwell (1998), Tejada (2012)

- difference to MZ: 1.Ps-H realized on stressed syllable (usually initially)
- in incorporated N-V structures, the H surfaces on the first (34-c), the second (34-d), or both stems (34-e)

(34) 1.S intransitive H-tone (Bickmore and Broadwell, 1998, 50,52,57)

a. gu-fu’ni’lu’ ‘I will wrinkle’
b. gu-defu’ ‘(S)he will fold’
c. gu-kak-lo ‘I will stick out his/her head’
d. e-dakca-latsi ‘(S)he will be happy’
e. gu-ni-latsi ‘(S)he will seem to be’

Locality asymmetry of tone-demanding suffixes in Bora

(Seifart, 2005; Thiesen and Weber, 2012; Roe, 2014)

- Wittoto language, spoken in Northern Peru
- two tone levels H and L; H is assumed to be the default
- some suffixes impose L: on the final or penultimate TBU of their base

OCP: no realization of an additional L if two adjacent L’s would result

(36) Suffixes imposing L on final or penultimate TBU 

a. o ma’g’-o-l’-za ‘I eat go do’

b. annu-kpa’-ma ‘amni-kpa-ma’

c. mas’-ma ‘i-wa’

d. imi’p’-a-1me ‘they fix An-pl’

Further implications

Further implications
### Locality asymmetry for tone-demanding suffixes in Bora

- there is a preference for L-tones to be realized on the penultimate TBU of the base (Ascon(L,L), stress (*~U,~H,~H)* (de Lacy, 2002), (?)
- some floating L’s ([L,~U]) can reach this preferred position and others ([L,~L]) not
  (implicit: default H already assigned to tone-less TBU’s of the base (Stratal OT Trommer, 2011; Bermúdez-Otero, in preparation))
  
  
  
- the asymmetric behaviour of different morphological H-tones in MZ follows under the assumption of tonal features and underspecification
- non-local association of (non-complex) floating tone features under the pressure of higher-ranked markedness constraints is possible in a containment-based system
- extends the argument that phonetically identical tones may have different phonological specification in a tone feature account
  - two different M’s in Bimoba (Snider, 1998): downstepped H vs. underlying M
  - two different L’s in Munduruku (Picanço, 2005)
  - two different H-tones in MZ

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### Summary

- the asymmetric behaviour of different morphological H-tones in MZ follows under the assumption of tonal features and underspecification
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  - two different L’s in Munduruku (Picanço, 2005)
  - two different H-tones in MZ

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### References


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