Tone features and underspecification

Morphological H-tones in Macuilitianguis Zapotec

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the assumption of (sub-)tonal features predicts that the same surface tones may have different (underspecified) phonological representations

the asymmetric behaviour of H-tones in Macuiltianguis Zapotec follows under such an account:

- more complex [+Upper,+raised] can only associate locally and to a single TBU
- underspecified [+raised] can associate non-locally and changes the tone of all TBU’s associated to one vowel
Structure of the talk

1. Data: Tones in Macuiltianguis Zapotec
   1.1 Background on MacZ
   1.2 Different high tones in MacZ

2. An account for MacZ in terms of (sub)tonal features
   2.1 Tone features in MacZ
   2.2 Theoretical background: Coloured Containment-based OT
   2.3 OT-Analysis for H-tones in MacZap
   2.4 Summary

3. Further implications

4. Summary
Data: Tones in Macuiltianguis Zapotec
Macuiltianguis Zapotec (=MacZ)

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

(1) **State of Oaxaca (Wikimedia, 07/01/16)**
Tone in Macuiltianguis Zapotec (=MacZ)

- three level tones high (=H, á), mid (=M, a), and low (=L, ã), and a downstepped H (=íá)
- tone sequences HL and LH on long vowels; \text{TBU=µ}

(2) \textit{Tone in MacZ} (Foreman, 2006, 40)

- íj:á ‘rock’  ij:a ‘rain’
- bél:á ‘fish’  bèl:à ‘snake’
- be:lia ‘cave’  bè:lia ‘star’
- dà: ‘bean’  dâ: ‘lard’
Spreading of stem-final H and M

- root-final H and M spread one TBU to the right (3-a+b)
- spreading is blocked by /ʔ/ (3-c)

(3)  **Spreading of root-final H/M** (Broadwell et al., 2011, 3)

<table>
<thead>
<tr>
<th>UNDERLYING</th>
<th>SURFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. be-là:lja-nà-nà</td>
<td>be-là:lja-na-nà</td>
</tr>
<tr>
<td>Com-spill-3SgS-3SgO</td>
<td>‘S/he spilled it’</td>
</tr>
<tr>
<td>b. be-làp:á-nà-nà</td>
<td>be-làp:á-ná-ná</td>
</tr>
<tr>
<td>Com-clean.up-3SgS-3SgO</td>
<td>‘S/he cleaned it up’</td>
</tr>
<tr>
<td>c. be-sì:gá?-nà-nà</td>
<td>be-sì:gá?-nà-nà</td>
</tr>
<tr>
<td>Com- push-3SgS-3SgO</td>
<td>‘S/he pushed it’</td>
</tr>
</tbody>
</table>
Spreading of H from the potential prefix

- the H-toned prefix /gú–/ POTENTIAL causes an **additional H** on the following TBU

(4)  **Potential** (Broadwell et al., 2011, 4+8)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>a. gú-di-bìθ:à-nà-nà</td>
<td>gú-dí-bìθ:à-nà-nà</td>
</tr>
<tr>
<td>Pot-CAUS-wet-3SgS-3SgO</td>
<td>‘S/he will wet it’</td>
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<tr>
<td>b. gú-sì:gá?-nà-nà</td>
<td>gú-sî:gá?-nà-nà</td>
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<tr>
<td>Pot-push-3SgS-3SgO</td>
<td>‘S/he will push it’</td>
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<tr>
<td>c. gú-tù: bí-já-nà</td>
<td>gú-tû: bí-já-nà</td>
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<tr>
<td>Pot-roll-1SgS-3SgO</td>
<td>‘I will roll it’</td>
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<tr>
<td>d. gú-làp:á-nà-nà</td>
<td>gú-láp:׳á-ná-nà</td>
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<tr>
<td>Pot-clean.up-3SgS-3SgO</td>
<td>‘S/he will clean it up’</td>
</tr>
</tbody>
</table>
Different tone spreading operations?

- no spread from M-toned prefixes (e.g. Compl /be-/ or HAB /ru-/)

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<td>‘S/he spilled it’</td>
</tr>
<tr>
<td>b. be-là:p:á-nà-nà</td>
<td>be-là:p:á-ná-nà</td>
</tr>
<tr>
<td>Com-clean.up-3SgS-3SgO</td>
<td>‘S/he cleaned it up’</td>
</tr>
</tbody>
</table>

→ since /gu–/ is the only H-toned prefix in MacZ, the additional H in this context is taken to be **morpheme-specific** (=bound to the presence of this affix)
H-tone in the 1.Sg formation

◆ an additional H is realized on the verb base:

• on a **vowel followed by** /ʔ/,
  
  be-tsiːɡaʔ-jà-nà  
  Com-get.dirty-1ScS-3ScO  ‘I dirtied it’

• on the **leftmost L-toned** TBU if there is no such vowel,
  
  be-biʔːà-jà-nà  
  Com-wet-1ScS-3ScO  ‘I wetted it’

• and on the **rightmost M-toned** TBU if there is no L-toned TBU.
  
  be-ʃatta-jà-nà  
  Com-iron-1ScS-3ScO  ‘I ironed it’

(Different generalization based on a preference for the tone to reach the stressed position in Foreman (2006) or Broadwell and Zhang (1999))
H-tone in the 1.Sg formation

(5) Abstract Summary

a. To glottalized V
   LL.M? → LL.H?
   LL.H? → LL.H?
   M?.H → H?.H

b. Else to leftmost L
   L.M → H.M
   M.L → M.H
   L.L → H.L
   LL.M → HH.M
   LL.H → HH.'H

b. Else to rightmost M
   M.M → M.H
**Two different morphological H-tones?**

<table>
<thead>
<tr>
<th>Root</th>
<th>1.Sg</th>
<th>Ṣot (after /gu−/)</th>
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</thead>
<tbody>
<tr>
<td>tū:bí</td>
<td>tū:ˈbí</td>
<td>tū:bi</td>
</tr>
<tr>
<td>sì:ɡáʔ</td>
<td>sì:ɡáʔ</td>
<td>sî:ɡáʔ</td>
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**The asymmetry**

<table>
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<tr>
<th>Locality</th>
<th>1.Sg</th>
<th>Ṣot</th>
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<tbody>
<tr>
<td>Effect for ˈVː</td>
<td>on 1. or 2. syllable</td>
<td>always on TBU after /gu-/</td>
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<tr>
<td>Overwriting: ́Vː</td>
<td>Contour tone: ˆVː</td>
<td></td>
</tr>
</tbody>
</table>
The challenge for an account where tones are primitives

\[ (6) \quad \textit{Phonological H-spread from stem-final TBU} \]

\[
\begin{array}{ccc}
\text{L} & \text{H} & \text{L} \\
\mu & \mu & \mu \\
\mu & \mu & \mu \\
\text{t} & \mu & \mu \\
\text{u} & \mu & \mu \\
\text{b} & \mu & \mu \\
\text{i} & \mu & \mu \\
\text{s} & \mu & \mu \\
\text{i} & \mu & \mu \\
\text{g} & \mu & \mu \\
\text{a} & \mu & \mu \\
\text{a} & \mu & \mu \\
\end{array}
\]

\[ \text{POT and 1SG are instances of morphological H-tones: (floating) tones present in certain morpho-syntactic configurations} \]

\[ (7) \quad \textit{Two types of morphological tones} \]

\[
\begin{array}{ccc|ccc|ccc}
\text{1.SG} & \text{POT} \\
\text{H} & \text{L} & \text{M} & \text{L} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\
\mu & \mu & \mu & \mu & \mu & \mu & \mu & \mu & \mu \\
\text{t} & \text{u} & \text{b} & \text{i} & \text{s} & \text{i} & \text{g} & \text{a} & \text{a} \\
\end{array}
\]
An account for MacZ in terms of (sub)tonal features
Assumption: tonal features (Yip, 1989; Snider, 1990; Hyman, 1992)

- register $[\pm \text{Upper}]$ divides pitch range of voice in half; $[\pm \text{raised}]$ subdivides register (Yip, 1980; Pulleyblank, 1986)
- three tones specified with two tone features $[\pm \text{Upper}]$ and $[\pm \text{raised}]$
- underspecified tones (8-b) interpreted with a default $[-\text{raised}]$ value

(8) **Tone in MacZ**

<table>
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<tr>
<th></th>
<th>L</th>
<th>M</th>
<th>H</th>
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<tbody>
<tr>
<td>a. $-U$</td>
<td>$-r$</td>
<td>$-r$</td>
<td>$+r$</td>
</tr>
<tr>
<td>b. $-U$</td>
<td>$+U$</td>
<td>$+U$</td>
<td></td>
</tr>
</tbody>
</table>

Eva Zimmermann  (Leipzig University)  Tone features and underspecification  CLS52, 21.04.2016
I. H and M are a natural class

Predicts that H and M spread from stem-final TBU’s.

(9)

<table>
<thead>
<tr>
<th>Stem-final M</th>
<th>Stem-final H</th>
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<tr>
<td><strong>Underlying</strong></td>
<td><strong>Surface</strong></td>
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<tr>
<td>-r</td>
<td>-r</td>
</tr>
<tr>
<td>+U</td>
<td>-U</td>
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<tr>
<td>μ</td>
<td>μ</td>
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<tr>
<td>j: a]St n a</td>
<td>j: a]St n a</td>
</tr>
<tr>
<td>/a/</td>
<td>/à/</td>
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</tbody>
</table>

Underlying notation:
- U: Underlying tone
- μ: Toneless
- -r: Low tone
- +r: High tone

Surface notation:
- U: Surface tone
- μ: Surface toneless
- -r: Surface low tone
- +r: Surface high tone
### II. Different H-tones

Addition of floating [+r] and [+U,+r] has in principle the **same surface effect**: realization of a H-tone instead of the underlying tone (=overwriting).

\[(10)\]

<table>
<thead>
<tr>
<th>Floating [+U,+r]</th>
<th>Floating [+r]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Underlying</strong></td>
<td><strong>Surface</strong></td>
</tr>
<tr>
<td>(+r)</td>
<td>(-r)</td>
</tr>
<tr>
<td>(+U)</td>
<td>(+U)</td>
</tr>
<tr>
<td>(\mu)</td>
<td>(\mu)</td>
</tr>
<tr>
<td>(d\ u)</td>
<td>(d\ u)</td>
</tr>
<tr>
<td>/u/</td>
<td>[ú]</td>
</tr>
</tbody>
</table>
Theoretical background: Coloured Containment-based OT
(van Oostendorp, 2006; Trommer, 2011; Zimmermann, 2014; Trommer and Zimmermann, 2014)

(11)  
\textit{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 (=Stray Erasure, McCarthy, 1979; Steriade, 1982; Itô, 1988)

   for tone: unassociated high has no effect on adjacent tones (in the languages under discussion); unassociated low may cause downstep

(12)  
\textit{Marking conventions: phonetically unrealized elements}

<table>
<thead>
<tr>
<th>Phonological structure</th>
<th>Phonetic interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{H \ L \ M}</td>
<td>[tù\textipa{bī}]</td>
</tr>
<tr>
<td>\hspace{0.5em}</td>
<td></td>
</tr>
<tr>
<td>\texttt{t \ u \ b \ i }</td>
<td></td>
</tr>
</tbody>
</table>
2. **No deletion of association lines**: they can only be marked as ‘phonetically invisible’ (=not interpreted)

(13) **Marking conventions: different types of association lines**

<table>
<thead>
<tr>
<th>Morphological association lines</th>
<th>Epenthetic association lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>phonetically visible:</td>
<td>phonetically invisible:</td>
</tr>
<tr>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
</tr>
</tbody>
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(14) **Marking conventions: phonetically unrealized elements II**

Constraints: sensitive to only the phonetically visible or all structure (=‘constraint cloning’ Trommer, 2011; Trommer and Zimmermann, 2014)
3. All morphemes have a ‘**colour**’ (=affiliation); epenthetic elements are colourless

(15)  **Marking conventions: morphological colours**

<table>
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<th></th>
<th>L</th>
<th>M</th>
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<tbody>
<tr>
<td>a.</td>
<td>u</td>
<td>u</td>
</tr>
<tr>
<td>t</td>
<td>u</td>
<td>b</td>
</tr>
</tbody>
</table>

→ two underlying tones  
→ insertion of an epenthetic M
Locality of association under containment

- phonetically visible association lines can not cross (Goldsmith, 1976)
- a phonetically invisible association line might be ‘crossed’, under violation of *Cross
- ‘crossed’ elements remain invisible under violation of Max and HAVE

(16)

<table>
<thead>
<tr>
<th></th>
<th>*CROSS</th>
<th>HAVE-.management</th>
<th>Max-.management</th>
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<tbody>
<tr>
<td>a.</td>
<td><img src="image-url" alt="Diagram" /></td>
<td><img src="image-url" alt="Diagram" /></td>
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<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
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<td></td>
<td>*1</td>
<td>*2</td>
<td>*3</td>
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<td>b.</td>
<td><img src="image-url" alt="Diagram" /></td>
<td><img src="image-url" alt="Diagram" /></td>
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<td>c.</td>
<td><img src="image-url" alt="Diagram" /></td>
<td><img src="image-url" alt="Diagram" /></td>
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Note: The diagrams illustrate different association scenarios under containment.
Non-local association: general predictions

(17) Non-local overwriting: ‘Simple’ structure

(18) Non-local overwriting: ‘Complex’ structure

- non-local association of a more complex superset-structure implies non-realization of a superset of structure
  ➞ ‘smaller’ things can more easily reach a non-local position

- the ‘crossed’ elements are neutralized to default structure or take the value of the ‘crossing’ element (=spreading)
Assumption: Representation of floating High tones

(19) *Two different morphological (floating) H-tones*

\[\text{Pot} \leftrightarrow \text{g} \uparrow \mu \downarrow \text{u} \uparrow \text{g} \uparrow \text{u} \uparrow +r \uparrow +U \uparrow \mu \downarrow \text{g} \uparrow \text{u} \uparrow +r \uparrow +U \uparrow \mu \downarrow \text{g} \uparrow \text{u} \uparrow +r \uparrow -U \uparrow \mu \downarrow \text{g} \uparrow \text{u} \uparrow 1.\text{Sg} \leftrightarrow \text{a} \uparrow \jmath \downarrow \text{a} \uparrow \text{a} \uparrow \text{a} \uparrow -r \uparrow -U \uparrow \mu \downarrow \text{j} \uparrow \text{a} \uparrow \text{j} \uparrow \text{a} \uparrow -r \uparrow -U \uparrow \mu \downarrow \text{j} \uparrow \text{a} \uparrow \text{j} \uparrow \text{a} \uparrow 1.\text{Sg} \leftrightarrow \text{a} \circumfix; \text{the suffixed segmental portion is not relevant in the following}
Overwriting in containment: Constraints

(20) a. \( \text{R-TO-U} \)
Assign a violation mark for every \([\pm r]\) that is not associated to a \([\pm U]\).

b. \( \text{*R}^R \text{U}^R \)
Assign a violation mark for every \([\pm U]\) that is phonetically visibly associated to more than one feature \([\pm r]\).

c. \( \text{MAX}[^R] \)
Assign a violation mark for every phonetically invisible \([\pm r]\).
Overwriting: 1Sc-H

(21)

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<tr>
<th>+r</th>
<th>-r</th>
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<td>+U</td>
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<th>r-To-U</th>
<th>*RUr</th>
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<td>MAX[r]</td>
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### Overwriting: Pot-H

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<th>U-Tο-μ</th>
<th>MAX[μ]</th>
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<td>g</td>
<td>μ u</td>
<td>+ 1</td>
<td>a p: a ?</td>
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<td>a p: a ?</td>
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Asymmetry 1: Locality

- **1SG [+r]** realized non-locally (on first or second syllable of stem)

- **POT [+U,+r]** realized only locally (on the first TBU following /gu–/)

Preferred realization site for a high tone

- the preference for being realized on a vowel followed by /ʔ/ is taken to be standard case of **consonant-tone interaction** (Lee, 2008; Tang, 2008, cf. also the blocking of H/M-spread across /ʔ/)

(23) \[ ^{*-\text{cg}/H} \]
Assign a violation mark for every phonetically visible vowel that is associated to [+r] but not followed by a [+cg]-sound.

(the additional preferences triggering non-local H-realization (cf. slide 10) follow from faithfulness preserving M-tones and a preference for M-tones on the initial TBU)
Additional constraints

(24)  a. \textbf{HAVE[U]}
Assign a violation mark for every phonetically visible \( \mu \) that is not associated to a \([\pm U]\) in a phonetically visible way.

b. \textbf{HAVE[R]}
Assign a violation mark for every phonetically visible \([\pm U]\) that is not associated to a \([\pm r]\) in a phonetically visible way.

c. \textbf{*CROSS}
Assign a violation mark for every instance of crossing association lines.

(=for every pair of features \( A_1 \) followed by \( A_2 \) on tier \( n \) if \( A_1 \) is associated to \( B_2 \) and \( A_2 \) to \( B_1 \) if \( B_1 \) precedes \( B_2 \) on tier \( n-1 \))
Non-local realization possible for the 1.Sg-H

(25)

<table>
<thead>
<tr>
<th>+r</th>
<th>-r</th>
<th>-r</th>
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<tbody>
<tr>
<td></td>
<td>-U</td>
<td>+U</td>
</tr>
<tr>
<td>μ</td>
<td>μ</td>
<td>μ</td>
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<tr>
<td>ts</td>
<td>i:</td>
<td>g</td>
</tr>
<tr>
<td>/LL/</td>
<td>/M/</td>
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<th>U-TO-U</th>
<th>*-CG/H</th>
<th>HAVE[r]</th>
<th>* CROSS</th>
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a. +r

<table>
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<td>+U</td>
</tr>
<tr>
<td>μ</td>
<td>μ</td>
<td>μ</td>
</tr>
<tr>
<td>ts</td>
<td>i:</td>
<td>g</td>
</tr>
<tr>
<td>![&lt;MM&gt;]</td>
<td>![H]</td>
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b. +r

<table>
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<tbody>
<tr>
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<td>+U</td>
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<tr>
<td>μ</td>
<td>μ</td>
<td>μ</td>
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<tr>
<td>ts</td>
<td>i:</td>
<td>g</td>
</tr>
<tr>
<td>![LL]</td>
<td>![H]</td>
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Non-local realization impossible for the Pot-H

(26)

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<tr>
<td>μ</td>
<td>μ</td>
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<td>μ</td>
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</table>

\[ g \, u \, l \, a \, p : \, a \, ? \]

\[ /H/ \, /L/ \, /H/ \]

<table>
<thead>
<tr>
<th>HAVE[U]</th>
<th>r-TO-U</th>
<th>U-TO-μ</th>
<th>*-CG/H</th>
<th>HAVE[r]</th>
<th>*CROSS</th>
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\[ a \]

\[ g \, u \, l \, a \, p : \, a \, ? \]

\[ /H/ \, /H/ \]

\[ \mu \, μ \, μ \, μ \]

<table>
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<th>U-TO-μ</th>
<th>*-CG/H</th>
<th>HAVE[r]</th>
<th>*CROSS</th>
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</table>

\[ b \]

\[ g \, u \, l \, a \, p : \, a \, ? \]

\[ /H/ \, /H/ \]

\[ \mu \, μ \, μ \, μ \]

<table>
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<tr>
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<th>U-TO-μ</th>
<th>*-CG/H</th>
<th>HAVE[r]</th>
<th>*CROSS</th>
</tr>
</thead>
</table>
Asymmetry 2: Effect for V:

- **1SG [+r]** overwrites \( \hat{V} \) to \( \hat{\n} \)

- **POT [+U,+r]** creates rising contour \( \hat{\n} \)
Avant propos: [+r] ‘overwrites’ an L-tone

◆ since there are no [–U,+r] tones in MacZ, realization of [+r] implies insertion of an epenthetic [+U]

(27)  \([+r]\) realized on an underlying L-toned TBU
(28)  

a.  \( \text{\textit{*}CONT}_V \)  
Assign a violation mark for every phonetically visible V associated to two different tones in a phonetically visible way.

b.  \( \text{DEP}\text{AL}(U\!-\!\text{\textmu}) \)  
Assign a violation mark for every colourless association line between a morphologically coloured \([\pm U]\) and a morphologically coloured \(\text{\textmu} \).  
(Trommer and Zimmermann, 2014)
V:\-Asymmetry: Contour creation for the Pot-H

(29)

<table>
<thead>
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<th>r</th>
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<th>s</th>
<th>i</th>
<th>g</th>
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<th>DEPAL(U→µ)</th>
<th>*Conty</th>
<th>DEP[U]</th>
<th>MAX[U]</th>
<th>MAX[r]</th>
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\[\text{a.} \]

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<tr>
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<th>u</th>
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<td>[H]</td>
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\[\text{b.} \]

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<th>s</th>
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\[\text{Eva Zimmermann (Leipzig University)} \]

Tone features and underspecification

### V:-Asymmetry: Complete overwriting for the 1.Sc-H

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<tbody>
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<td>(\mu) (\mu) (\mu)</td>
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<tr>
<td>/L/</td>
<td>/M/</td>
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<thead>
<tr>
<th>r-To-U</th>
<th>U-To-(\mu)</th>
<th>DEP((U-\mu))</th>
<th>*\text{CONTY}</th>
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<th>Max[U]</th>
<th>Max[r]</th>
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<td>+U</td>
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<th>b.</th>
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Asymmetry of 1.Sg-H and PoT-H follows from their different specification:

- less complex [+r] can associate ‘across’ other [+±r] specifications to reach a preferred TBU;
  the more complex [+U,+r] cannot since (the ‘crossed’) µ’s would remain without an overt specification for [+±U]

- overwriting of an underlying L-tone implies insertion of an epenthetic [+U] for [+r] – additional association lines to avoid a contour tone are less costly than they are for associating [+U,+r]
Summary: The ranking for MacZ

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(tested with the help of OTHelp (Staubs et al., 2010))
Further implications
Locality asymmetry of tone-demanding suffixes in Bora
(Seifart, 2005; Thiesen and Weber, 2012; Roe, 2014)

- Witotoan 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 penult TBU** of their base

(32) **Suffixes imposing L on final or penult base σ**

a. o ma$^x$tf$^h$o-$^L$th$^h$ε-?i  ó má$^x$tf$^h$ò-$^h$é-?i  (Thiesen and Weber, 2012, 77)
   *I go to eat*

b. aːnû-kpa-$^L$ma  áːnû-kpa-à-mà  (Roe, 2014, 92)
   *with a cassava.shoot for planting*

c. ma$^x$tf$^h$o-$^L$ø me ø  mà$^x$tf$^h$ó-mè  (Thiesen and Weber, 2012, 77)
   *they ate*

d. imipa$^x$tf$^h$o-$^L$ø me ø  ímípà$^x$tf$^h$ó-mè  (Thiesen and Weber, 2012, 77)
   *they fix*
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 – due to ALIGN(L;L) or a preference for stressed position:
*−U,−R/NHD (de Lacy, 2002)

◆ some floating L’s ([−U,−r]) can reach this preferred position and others ([−r]) not
### Further implications

#### Locality asymmetry of tone-demanding suffixes in Bora

**Local association: \(-L^t \varepsilon/\)**

\[
\begin{array}{c}
\begin{array}{ccc}
+ r & + r & - r \\
+ U & + U & - U \\
\mu & \mu & \mu \\
\end{array}
\end{array}
\]

\[
\begin{array}{c}
m \ a^x \ t_j^h \ o + \ t^h \ \varepsilon
\end{array}
\]

\[
\begin{array}{c}
\text{HAVE}[U] \\
* \ - U, - R/ NHD \\
* \ \text{Cross}
\end{array}
\]

**Non-local association: \(-L^\varnothing \varepsilon/\)**

\[
\begin{array}{c}
\begin{array}{ccc}
+ r & + r & - r \\
+ U & + U & - U \\
\mu & \mu & \mu \\
\end{array}
\end{array}
\]

\[
\begin{array}{c}
m \ a^x \ t_j^h \ o + \ m \ \varepsilon
\end{array}
\]

\[
\begin{array}{c}
\text{HAVE}[U] \\
* \ - U, - R/ NHD \\
* \ \text{Cross}
\end{array}
\]

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Eva Zimmermann (Leipzig University)

Tone features and underspecification
Summary
Summary

- the asymmetric behaviour of different morphological H-tones in MacZ 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 Mundurukú (Picanço, 2005)
  - two different H-tones in MacZ
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## Appendix

### A1: More examples for the 1.Sg formation

(35) 1.**Singular** *(Broadwell et al., 2011, 6+7)*

<table>
<thead>
<tr>
<th>Underlying</th>
<th>Surface</th>
</tr>
</thead>
</table>
| a. be-tsì:gaʔ-jà-nà  
Com-get.dirty-1SgS-3ScO | be-tsì:gaʔ-jà-nà  
‘I dirtied it’ |
| be-ʃuʔní-jà-nà  
Com-wrinkle-1SgS-3ScO | be-ʃuʔní-jà-nà  
‘I wrinkled it’ |
| b. be-biθ:à-jà-nà  
Com-wet-1SgS-3ScO | be-biθ:à-jà-nà  
‘I wetted it’ |
| be-di-gà:si-jà-nà  
Com-CAUS-be.scared-1SgS-3ScO | be-di-gà:si-ja-nà  
‘I scared it’ |
| be-detʃ:ù-jà-nà  
Com-fold-1SgS-3ScO | be-detʃ:ú-jà-nà  
‘I folded it’ |
| be-tù:bí-jà-nà  
Com-roll-1SgS-3ScO | be-tú:bí-jà-nà  
‘I rolled it’ |
| c. be-ʃat:a-jà-nà  
Com-iron-1SgS-3ScO | be-ʃat:a-jà-nà  
‘I ironed it’ |
| be-ne:si-jà-nà  
Com-submerge-1SgS-3ScO | be-ne:si-jà-nà  
‘I submerged it’ |