Allomorphy between tone and segments in Yucunany Mixtepec
An optimality-theoretic account

Eva Zimmermann (Leipzig University)

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P&P 10, Konstanz
Phonologically conditioned suppletive allomorphy (PCSA)

(1) **PCSA** (cf., for example, Paster 2006)
The surface representation/effect of one morpheme $M$ is different depending on the phonological context and this difference cannot be attributed to phonological changes independently expected in this context.
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<tr>
<th>BASE</th>
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</tr>
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<tbody>
<tr>
<td>a. jafu</td>
<td>jafuh</td>
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</tr>
<tr>
<td>b. ktab</td>
<td>ktabu</td>
<td>‘book’ 3.Sg.M ↔ /u/ /C__</td>
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→ poly-representational analysis
Non-concatenative ‘PCSA’

- non-concatenative ‘PCSA’: in (3), different operations (gemination, vowel lengthening) apply
- both operations can be analysed in autosegmental phonology as addition of a µ
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<tr>
<th>Base</th>
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</tr>
</thead>
<tbody>
<tr>
<td>a. tɔ</td>
<td>tɔː</td>
<td>μ + μ</td>
</tr>
<tr>
<td>dane</td>
<td>daneː</td>
<td>μ μ μ μ μ</td>
</tr>
<tr>
<td>b. nom</td>
<td>nomː</td>
<td>μ + μ μ μ μ μ μ μ μ</td>
</tr>
<tr>
<td>ɔpameː</td>
<td>ɔpamː</td>
<td>μ μ μ μ μ μ μ μ</td>
</tr>
</tbody>
</table>

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Non-concatenative ‘PCSA’

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<th>Past (+Obj)</th>
<th>Possible analysis:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. tɔ ‘to buy’</td>
<td>tɔːː</td>
<td>μ + μ</td>
</tr>
<tr>
<td>dane ‘to turn’</td>
<td>daneː</td>
<td>μ</td>
</tr>
<tr>
<td>b. nom ‘to drink’</td>
<td>nomː</td>
<td>μ + μ</td>
</tr>
<tr>
<td>ṣpameː ‘s/he sewed (it)’</td>
<td>ṣpamː</td>
<td>μ</td>
</tr>
</tbody>
</table>

→ mono-representational analysis
Main Claim

- propose an analysis for a phonologically predictable allomorphy in Yucunany Mixtepec Mixtec (=YM)
  - a morphological low tone with different surface effects, or
  - the realization of additional segments
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- propose an analysis for a phonologically predictable allomorphy in Yucunany Mixtepec Mixtec (=YM)
  - a morphological low tone with different surface effects, or
  - the realization of additional segments

- an argument for **contrastive prosodic specification in the underlying form**:
  
  different underlying syllable structures = different surface effects

  ➞ a prediction of OT and Richness of the Base
1. Introduction

2. Allomorphy in Yucunany Mixtepec

3. A monorepresentational analysis for YM

4. Implications and further prediction

5. Summary and Conclusion
Allomorphy in Yucunany Mixtepec
Mixtec languages

- indigenous languages, spoken in southern Mexico (Otomanguean)
- most communities have less than 50,000 speakers (McKendry 2013)

(4) State of Oaxaca

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Background on Yucunany Mixtepec Mixtec (YM)
(Pike & Ibach 1978, Paster & Beam 2004a,b, Paster 2007, 2012)

- no codas, restricted set of initial onset clusters
- three tones: H (=\=\acute{V}), M (=\acute{V}), L (=\grave{V}), and contour tones
- vowel length is not contrastive – default assumption: TBU=\sigma
  (‘VV(VV)’ notated to have enough space for contour tones!)
- underlined V’s=nasalized V’s
1. Sg formation in YM

- a low tone is added and creates a contour on the final σ (5-a)
- a low tone overwrites a base tone on the final σ (5-b)
- a segmental allomorph /–yù/ surfaces (5-c)

(5) **Tonal allomorphy in Yucunany Mixtepec (Paster&Beam 2004:3-4)**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>nàmá</td>
<td>‘soap’</td>
<td>nàmáà</td>
</tr>
<tr>
<td></td>
<td>tìtzi</td>
<td>‘stomach’</td>
<td>tìtziì</td>
</tr>
<tr>
<td>b.</td>
<td>la’la</td>
<td>‘mucus’</td>
<td>la’là</td>
</tr>
<tr>
<td></td>
<td>xá’nù</td>
<td>‘cigarette’</td>
<td>xá’nù</td>
</tr>
<tr>
<td>c.</td>
<td>sòkò</td>
<td>‘shoulder’</td>
<td>sòkòyù</td>
</tr>
<tr>
<td></td>
<td>tutù</td>
<td>‘paper’</td>
<td>tutùyù</td>
</tr>
</tbody>
</table>
1. Sg formation in YM: context generalizations

A. a low tone is added and **creates a contour** for H-final stems

(6) nàmá ‘soap’ nàmáà ‘my soap’ L H → L HL
    xínìí ‘hat’ xínìī ‘my hat’ H LH → H LHL
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   (7) la'la 'mucus' la'là 'my mucus' M M → M L
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→ if this would not create an LH L sequence

(8) yùúti ‘sand’ yùútiì ‘my sand’ LH M → LH ML
    yòóso ‘metate’ yòósoò ‘my metate’ LH M → LH ML
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   (9) tìtzi ‘stomach’ tìtziì ‘my stomach’  L M  →  L ML
   kwà’a ‘man’s sister’ kwà’aà ‘my man’s sister’  L M  →  LML
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C. a segmental allomorph **/–yù/ surfaces** if the stem ends in an L-toned σ
   (10) sòkò ‘shoulder’ sòkòyù ‘my shoulder’ L L → L L yù
       tutù ‘paper’ tutùyù ‘my paper’ M L → M L yù
1. Sg is ‘marked by a floating L tone that associates to the end of the root’ (p.71)
1. Scg is ‘marked by a floating L tone that associates to the end of the root’ (p.71)

- a different allomorph /yù/ for bases ending in L

→ homophony avoidance
Theoretical question

Is a monorepresentational analysis possible?

Why does an additional low tone sometimes create a new contour tone and sometimes overwrite an underlying base tone?

How can the addition of a tone and the realization of a segmental string follow from a single underlying representation?
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A monorepresentational analysis for YM
A monorepresentational analysis:

A segmental /yu/ + L; the former only realized as last resort

\[ 1.\text{Sg} \leftrightarrow \text{yu} /\#__ \]
1 Non-realization of /yu/

- the /yu/ underlyingly lacks a \( \sigma \) node and since \( \text{DEP-}\sigma \) (11-a) is higher ranked than \( \text{MAX-S} \) (11-b), the morpheme is preferably not realized (\( \Rightarrow \) morphemes that are realized in all contexts have an underlying \( \sigma \))
- the L must be realized due to undominated \( \text{MAX-L} \) (11-c)

\[(11)\]

\begin{align*}
\text{a. DEP} & \quad \text{Assign a violation mark for every output } \sigma \text{ without an input correspondent.} \\
\text{DEP} & \quad \sigma \\
\text{b. MAX} & \quad \text{Assign a violation mark for every input segment without an output correspondent.} \\
\text{MAX} & \quad S \\
\text{c. MAX} & \quad \text{Assign a violation mark for every input L-tone without an output correspondent.} \\
\text{MAX} & \quad L
\end{align*}
A monorepresentational analysis for YM

Preference for not realizing the /yu/ but realization of the L-tone ▶(6)

<table>
<thead>
<tr>
<th></th>
<th>L₁</th>
<th>H₂</th>
<th>Lₐ</th>
<th></th>
<th>Max</th>
<th>Dep</th>
<th>Max</th>
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<tbody>
<tr>
<td></td>
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<td>σ₂</td>
<td>σ₃</td>
<td></td>
<td></td>
<td>σ</td>
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<td>ma</td>
<td>yu</td>
<td></td>
<td></td>
<td>Max</td>
<td>Dep</td>
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- **b.**
  
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<td>ma</td>
<td>yu</td>
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<td></td>
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<td>σ</td>
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<td></td>
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Contour creation vs. overwriting

- contour tones are penalized by $^*\text{CONTOUR}_\sigma$ ($=^*\text{CNT}_\sigma$) (13-a)
- a contour is created with base-final H’s since $\text{MAX-H}$ (13-b) and $\text{MAX-L}$ dominate $^*\text{CNT}_\sigma$
- overwriting is predicted since $^*\text{CNT}_\sigma$ dominates $\text{MAX-M}$ (13-c)

(13)  

a. $^*\text{CNT}_\sigma$ Assign a violation mark for every $\sigma$ that is associated to more than one tone. (Yip 2002:80)

b. $\text{MAX}_H$ Assign a violation mark for every input H-tone without an output correspondent.

c. $\text{MAX}_M$ Assign a violation mark for every input M-tone without an output correspondent.
(14) **Floating L creates a contour with a base-final H 𝛾(6)**

<table>
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<tr>
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<th>L₁</th>
<th>H₂</th>
<th>Lₐ</th>
<th>MAX L</th>
<th>MAX H</th>
<th>DEP σ</th>
<th>*CNT_σ</th>
<th>MAX M</th>
<th>MAX S</th>
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<tbody>
<tr>
<td>a</td>
<td>na</td>
<td>ma</td>
<td>yu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>na</td>
<td>ma</td>
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**Diagram:**

- A monorepresentational analysis for YM

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Allomorphy in Yucunany Mixtepec  
P&P 10, Konstanz
A monorepresentational analysis for YM

Floating L overwrites a base-final M ➔(7)

<table>
<thead>
<tr>
<th></th>
<th>M₁</th>
<th>M₂</th>
<th>L_a</th>
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<th>Max</th>
<th>Dep</th>
<th>*CNTσ</th>
<th>Max</th>
<th>Max</th>
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<tbody>
<tr>
<td>a</td>
<td>σᵢ</td>
<td>σᵢᵢ</td>
<td>la’</td>
<td>L_a</td>
<td>Max</td>
<td>H</td>
<td>σ</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b</td>
<td>σᵢ</td>
<td>σᵢᵢ</td>
<td>la’</td>
<td>L_a</td>
<td>Max</td>
<td></td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
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Eva Zimmermann (Leipzig U)
Allomorphy in Yucunany Mixtepec
P&P 10, Konstanz
No adjacent L-initial syllables

- no overwriting of M if two adjacent σ’s both associated with an L at their left edge would result
- a positional, non-local OCP (16) banning two adjacent σ’s starting both with an L

![Equation]

Assign a violation mark for every pair of adjacent σ’s that are associated with an initial L.
(17)  *No adjacent L-initial $\sigma$: Contour creation for M-final bases I*(8)*

<table>
<thead>
<tr>
<th>$L_1$</th>
<th>$H_2$</th>
<th>$M_3$</th>
<th>$L_a$</th>
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<th>$^*$</th>
<th>$\text{Max}$</th>
<th>$\text{Max}$</th>
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<tbody>
<tr>
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<td></td>
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<td>$\text{Max}$</td>
<td>$^*$</td>
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<td>$\sigma_1$</td>
<td>$\sigma_{ii}$</td>
<td>$\sigma_i$</td>
<td>$\sigma_{ii}$</td>
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<td>$\text{Max}$</td>
</tr>
<tr>
<td>$yu$</td>
<td>$ti$</td>
<td>$yu$</td>
<td></td>
<td>$\text{Max}$</td>
<td>$^*$</td>
<td>$\text{Max}$</td>
<td>$\text{Max}$</td>
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</table>

- **a.**

- **b.**
No adjacent L-initial $\sigma$: Contour creation for M-final bases II  

<table>
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<tr>
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<th>$\text{Max}$</th>
<th>$M$</th>
<th>$\text{Max}$</th>
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<tr>
<td></td>
<td>$\sigma_i$</td>
<td>$\sigma_{ii}$</td>
<td>$yu$</td>
<td>$\text{Max}$</td>
<td>$L_{\sigma_l} L_{\sigma}$</td>
<td>$\text{Max}$</td>
<td>$M$</td>
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<td>$S$</td>
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</table>
Realization of /yu/ as last resort

- association of L to bases ending in an L is excluded by *[TT]: contour tones (adjacent tones associated to the same TBU) must be different
- realization of /yu/ as last resort to satisfy MAX-L becomes optimal

(19)  *[TT]  Assign a violation mark for every pair of adjacent identical tones that are associated to one TBU.
(20) *No adjacent L’s: realization of /–yù/ (10)*

<table>
<thead>
<tr>
<th></th>
<th>M_1</th>
<th>L_2</th>
<th>L_a</th>
<th>*[TT]</th>
<th>M_{AX}</th>
<th>D_{EP}</th>
<th>*L_{σ}L_{σ}</th>
<th>M_{AX}</th>
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<tr>
<td>a.</td>
<td>M_1</td>
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<td>L_a</td>
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<td></td>
<td>σ_i</td>
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<tr>
<td>b.</td>
<td>M_1</td>
<td>L_a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>σ_i</td>
<td>σ_{ii}</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>tu</td>
<td>tu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>M_1</td>
<td>L_2</td>
<td>L_a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>σ_i</td>
<td>σ_{ii}</td>
<td>σ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>tu</td>
<td>tu</td>
<td>yu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(21)

YM: complete ranking

\[
\text{MAX-L} \rightarrow *[TT] \\
\text{MAX-H} \rightarrow \text{DEP-} \sigma \rightarrow *_{\sigma} L_{\sigma} L_{\sigma} \\
\rightarrow *_{\sigma} \text{CNT}_{\sigma} \\
\rightarrow \text{MAX-M} \\
\rightarrow \text{MAX-S}
\]
Summary

- a monorepresentational analysis:
  - a floating tone and
  - a segmental string that is only realized as last resort
Summary

- A monorepresentational analysis:
  - a floating tone and
  - a segmental string that is only realized as last resort

- The learner is faced with an instance of incomplete neutralization: in 3 of 4 possible (phonological) contexts, she is only provided with a subset of evidence for the complete representation (only the tone, not the segmental content)
Implications and further prediction
(22-a) and (22-b) are both possible input representations in OT

(22)  

\[ \begin{array}{c} \sigma \\ yu \end{array} \]  

\( \triangleright \) realized in all contexts  

\( \triangleright \) realized as a last resort
Implications and further prediction

Richness of the base and underlying contrast

- (22-a) and (22-b) are both possible input representations in OT

\[(22) \quad \begin{align*}
\text{a.} & \quad \sigma \\
\text{b.} & \quad \text{yu}
\end{align*}\]

- realized in all contexts  
- realized as a last resort

- the analysis based on $\text{DEP-}^{\sigma}$ implies that this difference between underlying forms has a crucial surface effect
Implications and further prediction

Richness of the base and underlying contrast

- (22-a) and (22-b) are both possible input representations in OT

\[(22) \quad \sigma \quad yu\]

\(\text{a. } \sigma \quad yu\)  \(\implies \text{realized in all contexts}\)

\(\text{b. } yu\)  \(\implies \text{realized as a last resort}\)

- the analysis based on DEP-σ implies that this difference between underlying forms has a crucial surface effect

- independent arguments for contrastive syllabification in, for example, Elfner (2006), Iosad (2013), or Vaux (2013)

\(\implies \text{an economy argument: a lexical contrast is reduced to a difference in underlying prosodic structure}\)
morphemes triggering lengthening of a preceding vowel in La Paz Aymara (Andes, spoken in Bolivia and Peru)

(23) Vowel lengthening in the future (Briggs 1976, Hardman 2001)

<table>
<thead>
<tr>
<th>Base</th>
<th>Future</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sara</td>
<td>saraː</td>
<td>B265+266</td>
</tr>
<tr>
<td>‘go’</td>
<td>‘(l) will go’</td>
<td></td>
</tr>
<tr>
<td>b. apa</td>
<td>apaːtam</td>
<td>H211</td>
</tr>
<tr>
<td>‘bring, have’</td>
<td>‘he will bring’</td>
<td></td>
</tr>
<tr>
<td>c. alja</td>
<td>aljaːma</td>
<td>H211</td>
</tr>
<tr>
<td>‘sell’</td>
<td>‘I will sell’</td>
<td></td>
</tr>
</tbody>
</table>
More allomorphy involving defective segmental morphemes: Aymara

- whenever double-lengthening is expected, /-jaː/ surfaces
- no superlong vowels: alternative repair to realize both ‘lengthenings’

(24) **Allomorphy between i- and ja (Beesley 2000)**

a. warmi-ːːi-
   - women-Vb-1>3.Fut
   - ‘I will be a women’
   
   warmija: *warmiːːi-

b. quljqi-ni-ːːi-ta
   - money-possessor-Vb-1>3.Fut-FS
   - ‘You will have money’
   
   quljqinijaːta *quljqiniːːi-ta
/ja/ underlyingly lacks a σ and is not realized if lengthening possible:
-ja/ underlyingly lacks a $\sigma$ and is not realized if lengthening possible:
  - realization of /ja/ implies a violation of DEP-\(\sigma\) and is dispreferred
  - MAX-\(\mu\) demands that its \(\mu\) must be realized: lengthening of preceding V
Aymara: monorepresentational analysis

- /-ja/ underlyingly lacks a σ and is not realized if lengthening possible:
  - realization of /ja/ implies a violation of DEP-σ and is dispreferred
  - Max-µ demands that its µ must be realized: lengthening of preceding V

→ realization of /-ja/ as last resort to realize the µ
(25) **Autosegmental analysis of Aymara**

<table>
<thead>
<tr>
<th>Underlying:</th>
<th>Allomorph 1: V-lengthening</th>
<th>Allomorph 2: Realization of /ja/</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>Input:</td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>Output:</td>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Underlying:**

- **Input:** ...
- **Output:** ...

**Allomorph 1:** V-lengthening

- **Input:** ...
- **Output:** ...

**Allomorph 2:** Realization of /ja/

- **Input:** ...
- **Output:** ...

**Annotations:**

- **Dep-σ ≫ *V♭, Max-S**
- **Max-μ, *V♭: ≫ Dep-σ**

**Notes:**

- Eva Zimmermann (Leipzig U)
- Allomorphy in Yucunany Mixtepec
- P&P 10, Konstanz
Summary and Conclusion
A monorepresentational account of allomorphy

- for an account of allomorphy in YM where realization of only an additional tone alternates with realization of segments
A monorepresentational account of allomorphy

- For an account of allomorphy in YM where realization of only an additional tone alternates with realization of segments

  → crucial assumption: **prosodically defective segments are only realized as a last resort**
A monorepresentational account of allomorphy

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- extension of this account to Aymara where a non-concatenative allomorph alternates with a segmental allomorph as well
A monorepresentational account of allomorphy

- for an account of allomorphy in YM where realization of only an additional tone alternates with realization of segments

  ➔ crucial assumption: **prosodically defective segments are only realized as a last resort**

- extension of this account to Aymara where a non-concatenative allomorph alternates with a segmental allomorph as well

- prosodically defective morphemes are independently predicted in OT: an economy argument if they can account for apparently lexical contrasts/allomorphy pattern