What is ‘phantom structure’?

Nicholas Rolle (ZAS, Berlin)

University of Santa Cruz, California – Phlunch

2021 Jan 28
Long distance effects in phonology

• Vowel harmony (Tutrugbu – Kwa, Ghana)
  ◦ “Left-to-right” agreement for [ROUND] harmony (root excluded)
  ◦ Right-to-left agreement for [ATR] harmony
    ◦ [+R] → ɔ- kaá- ba- wu → o-koó-bo-wu ‘2S-still-VENT-climb’
    ◦ [+ATR] → [+ATR]

• Other
  ◦ Phonotactics
  ◦ Consonant harmony (features)
  ◦ Consonant harmony (major place)

• Tone

Long distance effects in phonology

• Tone can spread **and wipe out** tone of neighbors:
  ◦ Orungu (Bantu)
  ◦ A radical case

  a. **Negative past**
     
     \[
     /\text{à-é-rè-riy}^{\text{H}}-è \text{ àwánà áŋkà yó ìŋkòlò}/ \\
     [\text{èré}'tìy àwán }'\text{áŋkà yó }'\text{ŋkòlò}]
     
     ‘s/he did not leave the children alone tonight’

  b. **Negative present**
     
     \[
     /\text{à-é-rè- }^{\text{L}}-\text{riy}^{\text{H}}-\text{a àwánà áŋkà yó ìŋkòlò}/ \\
     [\text{èré}'\text{tìy àwàn }'\text{áŋkà yó }'\text{ŋkòlò}]
     
     ‘s/he does not leave the children alone tonight’

  c. **Negative subjunctive**
     
     \[
     /\text{à-á }^{\text{H}}-\text{lwàn-ày-a yó ídyànjà kwángá òywèrà néngénénéngé}/ \\
     [\text{àlwànàyá ý ídyànjà kwáng òywèrà néngénénéngé}]
     
     ‘that s/he usually do not stay late at work’
Floating tone
Today – Floating tone effects

• Zilacayotitlán Tlapanec
  ◦ a.k.a. Me’phaa
  ◦ (Oto-Manguean)

‘y’all caress’

<table>
<thead>
<tr>
<th>input: /ni^{H}-xtāā/</th>
<th>*FLOAT(H)</th>
<th>MAX-T(final)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) nixtāā</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>L^{H} MM</td>
<td></td>
</tr>
<tr>
<td>(b) nīxtāā</td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td></td>
<td>L^{H} MM</td>
<td></td>
</tr>
</tbody>
</table>

Three types of floating tone

- **Adjacent** association” → associates to TBU immediately before/after the sponsor
- **Phonological** association” → associates to phonologically-prominent/default position
- **Targeted** association” → some n\textsuperscript{th} TBU within a string, with respect to a morpho-prosodic edge
Adjacent association

• Chichewa (Bantu)
  ◦ Floating H – **Post-sponsor** docking
    ◦ Recent past:
      ◦ mu-na^H^-sokonez-a → mu-na-sókonez-a [mu-na-sókóneez-a]
      ◦ you-T-root-FV ‘you messed up (recently)’
  ◦ Floating H – **Pre-sponsor** docking
    ◦ Remote past:
      ◦ mu-H-naa-sokonez-a → mú-naa-sokonez-a [mú-náa-sokonéez-a]
      ◦ you-T-root-FV ‘you messed up’
  ◦ Floating H’s – **Pre- & post-sponsor** docking
    ◦ Sequential perfect:
      ◦ you-T-root-FV ‘after you had turned over’

Downing & Mtenje 2017
Phonological association

• Lambda (Bantu): Floating H to 1\textsuperscript{st} μ of stress-D

a. \[H\]
   \(tu-[lúku-leemb-a]\text{STRESS DOMAIN}\)
   \(we-PROG\_1\text{-write-FV}\)
   ‘we are writing’

b. \[H\]
   \(ta-tu-[ká-kom-a]\text{STRESS DOMAIN}\)
   \(NEG-we-FUT-hurt-FV\)
   ‘we will not hurt’

Bickmore 1995
Phonological association

• Tone system – Makonde (Bantu): Penultimate σ word
  ◦ Penultimate lengthening
    ◦ /kú-lúmúl-a/ → [kúlúmúlà] ‘cut’
    ◦ /kú-lúmúl-áng-a/ → [kúlúmuláángà] ‘cut into small pieces’

• Makonde grammatical tone melodies
  ◦ H consecutive/potential ni-ka-takatuk[ií]la ‘and/if I stood up’
  ◦ L non-past negative a-ngu-takatuk[iì]la ‘I do/will not stand up’
  ◦ LH imperative takatuk[ií]la ‘stand up!’
  ◦ LHL remote past ní-ndí-takatuk[iï]la ‘I stood up’
Phonological association

- Standard in intonational systems
Targeted association

- Kuria (Bantu)
  - (a): PAST PROGRESSIVE has several co-exponents
    - the prefix oka- PST.PROG
    - the perfective suffix -ey PFV
    - the shape of the final vowel -e FV
    - a floating H which targets the second mora (TBU) of the macro-stem
  - (b): REMOTE FUTURE – the H sub-exponent targets the third mora
  - (c): INCEPTIVE – the H targets the fourth mora

\[
\begin{align*}
\text{a.} & \quad \text{H} \\
& \quad \text{n-to-oka-[hoótoote-ey-e]_MS} \\
& \quad \text{FOC-we-PST.PROG-reassure-PFV-FV} \\
& \quad \text{‘we have been reassuring’}
\end{align*}
\]

\[
\begin{align*}
\text{b.} & \quad \text{H} \\
& \quad \text{n-to-re-[hootóoter-a]_MS} \\
& \quad \text{FOC-we-REM.FUT-reassure-FV} \\
& \quad \text{‘we will reassure’}
\end{align*}
\]

\[
\begin{align*}
\text{c.} & \quad \text{H} \\
& \quad \text{to-ra-[hootóoter-a]_MS} \\
& \quad \text{we-INCEP-reassure-FV} \\
& \quad \text{‘we are about to reassure’}
\end{align*}
\]
Targeted association

- Kuria (Bantu)
  - If not enough moras in target domain (the M-stem), goes into next word

\[ \mu4 \text{ melody: Inceptive ‘we are about to…’ (1pl-tns-[root-fv])} \]

| a. to-ra-[karaŋg-á] eyëtōıkẹ | ‘fry a banana’ |
| b. to-ra-[sukur-a] eyëtōıkẹ   | ‘rub a banana’ |
|     to-ra-[terɛk-a] eyëtōıkẹ   | ‘brew a banana’ |
| c. to-ra-[rom-a] eyëtōıkẹ      | ‘bite a banana’ |
|     to-ra-[bun-a] eyëtōıkẹ     | ‘break a banana’ |
| d. to-ra-[ry-a] eyëtōıkẹ       | ‘eat a banana’ |

Odden, 1987; Cammenga, 2004; Mwita, 2008; Marlo et al., 2015; Paster, 2019
Issue 1 – Counting in grammar

• Many claims that human grammar cannot count, based on a variety of data and arguments

• Smith & Tsimpli (1995:312ff.)
  ◦ An emphatic element would be positioned “arithmetically rather than structurally” after the third (orthographic) word in a clause
  ◦ Pattern not learned in an artificial language setting
    ◦ neither by a polyglot savant “Christopher”,
    ◦ nor by the control group (undergraduate students of linguistics)

• Do we/you know of any counter-examples?
Issue 2 – Why not ‘float away’?

- Why do floating tones not always simply ‘float away’?
  - Zilacayotitlán Tlapanec: $\text{nì}^{\text{H}}$-xtāā → nì-xtáā ‘CMP.2PL-caress’
Issue 2 – Why not ‘float away’?

• Why do floating tones not always simply ‘float away’?
  ◦ Cf. Chichewa: mu-na$^h$-sokonez-a → mu-na-sókoneez-a

Downing & Mtenje 2017
Issue 3 – Treatment as markedness?

- Japanese **antepenultimate accent principle (AAP)**
  - H to head μ of σ (HtoSHd)
  - H to Rmost in max-ω (Align-RH)
  - *H to non-head final μ in max-ω (NonFinTM)
  - *H to non-head final σ in max-ω (NonFinTS)

<table>
<thead>
<tr>
<th></th>
<th>input</th>
<th>output</th>
<th>opt</th>
<th>HtoSHd</th>
<th>MaxT</th>
<th>NonFinTM</th>
<th>NoContM</th>
<th>Align-RH</th>
<th>NonFinTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>poteto</td>
<td>[PO-te]-to</td>
<td>WINS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td>po-[Te]-to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td>po-[TE-to]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Issue 3 – Treatment as markedness?

• Japanese -zu suffix (from English plural –s)

(5) Documented [-zu]-forms showing initial-accenting in popular media

[awá] ‘bubble’ → [áwaa-zu]
(SUNTORY TV commercial, January 2008)

[heppoko] ‘weak’ → [héppokoo-zu]
(Sword World drama CD, published by Frontier Works, July 2007)

[boŋkura] ‘a blockhead’ → [bóŋkuraa-zu]
(Azumanga Daioh, 13th story, J.C. Staff, Terebi Tokyo, 2002)

[gintama] (name of a comic book) → [géntamaa-zu]
(Gintama, second series 1st story, Sunrise, Terebi Tokyo, 2007)
Issue 3 – Treatment as markedness?

• Japanese -zu suffix
  ◦ Align(accent, L, PrWd, L)-zu:
  ◦ (a) The left edge of every accent must coincide with the left edge of some prosodic word.
  ◦ (b) Assign one violation mark for every accent belonging to the morpheme [-zu] for which (a) is not true.

<table>
<thead>
<tr>
<th>/sakuragi-’ zu/</th>
<th>ALIGN(accent,L,PrWd,L)-zu</th>
<th>ANTEPENULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>→ [(sáku)ra(gii)-zu]</td>
<td>W₁</td>
<td>1</td>
</tr>
<tr>
<td>~ a. [(saku)ra(gii)-zu]</td>
<td>W₁</td>
<td>L</td>
</tr>
</tbody>
</table>
Issue 3 – Treatment as markedness?

• What is a permissible constraint?
  ◦ What we need is a comprehensive theory of constraints

• “$\mu_4$: Assign one violation for each floating tone that does not surface four moras from its input location.” (underlining mine)

<table>
<thead>
<tr>
<th>/to-ra$^H$-[ø roma] [ø eyetőőkɛ]/</th>
<th>$\mu_4$</th>
<th>H, R</th>
<th>ID-T</th>
<th>H</th>
<th>Obs</th>
<th>Pred</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [[ø toraroma] [ø eyetőőkɛ]]</td>
<td>1</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>b. [ø [ø toraroma] [ø eyetőőkɛ]]</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Issue 3 – Treatment as markedness?

- Kuria: $\text{to-ra}^H\text{-hootooter-a} \rightarrow \text{to-ra-hootoóter-a}$
Issue 3 – Treatment as markedness?

- Kuria: to-\(\text{ra}^H\)-hootooter-a → to-\(\text{ra}\)-hootootér-a
Issue 3 – Treatment as markedness?

- Kuria: to-ra$^\text{H}$-hootooter-a $\rightarrow$ to-ra-hootoóter-a
Phantom structure
An account: Phantom structure

• Components of phantom structure (Rolle & Lionnet 2020):
  ◦ Phonological units of contrast (segments, features, tones, etc.) on a SUBSTANTIVE PLANE
  ◦ Counterpart units of contrast which exist on a (parallel) PHANTOM PLANE
    ◦ “Phantom structure is phonological structure that is needed for the full realization of the lexical entry, but which the lexical entry cannot provide itself – it is a ‘desire’ for missing structure, so to speak.”
  ◦ Trans-planar linear precedence relations, trans-planar links, and trans-planar constituents
Phantom structure

• Kuria: $\text{to-ra}^H$-hootooter-a $\rightarrow$ $\text{to-ra}$-hootoóter-a

25
Phantom structure

- Kuria: $\text{to-ra}^H$-hootooter-a $\rightarrow$ $\text{to-ra}$-hootooter-a

\[ \text{Input} \quad \overset{\text{Substantive}}{\text{ho} \, \text{o} \, \text{to} \, \text{to} \, \text{o} \, \text{te} \, \text{r} \, \text{a}_a} \quad \overset{\text{Phantom}}{\text{to}_1 \, \text{ra}_2} \quad \text{Output} \quad \overset{\text{H}}{\text{to}_1 \, \text{ra}_2 \, [\text{ho}_3, \text{a}_4, \text{b}_5, \text{c}_6, \text{d}_7, \text{r}_a]}_{\text{MS}} \]
Multiple correspondence (competing faithfulness)

• Standard Input-Output Correspondence (IO-Corr) [McCarthy & Prince 1995]
• Base-Reduplicant Correspondence (BR-Corr) [McCarthy & Prince 1995, Ussishkin 1999]
• Agreement By Correspondence (ABC) [Rose & Walker 2004]
• Aggressive reduplication [Zuraw 2002]
• Output-Output Correspondence (OO-Corr) [Benua 1997, Alderete 2001a, 2001b, Rolle 2018a,b]
• Matrix-Basemap Correspondence (Mx-Bm-C) [Rolle 2018c]
• Sympathy Theory (Candidate–Candidate Correspondence) [McCarthy 1999]
• Output-Variant Correspondence [Kawahara 2002]
• Template-Text Correspondence [Blumenfeld 2015]
• Output-Underlying representation correspondence [Hauser & Hughto 2020]
Phantom structure – Targeted Assoc.

<table>
<thead>
<tr>
<th>/t₀₁-ra₂-</th>
<th>{ [ \tau_a \bullet \tau_b \bullet \tau_c \bullet \tau_d ] MS } /ho₃O₄to₅O₆te₇ra₈</th>
<th>ID-PHO(τ)</th>
<th>INTEGR-PHO(τ)</th>
<th>UNIF-PHO(τ)</th>
<th>*FLOAT</th>
<th>MAX(τ)</th>
<th>H/Hd</th>
<th>ID-SUBO(τ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.  to₁-ra₂-[ho₃,a₀₄,bto₅,c₀₆,dte₇ra₈] MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b.  to₁-ra₂-[ho₃,a₀₄,bto₅,c₀₆,dte₇ra₈] MS</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>c.  to₁-ra₂-[ho₃,a₀₄,bto₅,c₀₆,dte₇ra₈] MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.  to₁-rₐ₂-[ho₃,a₀₄,bto₅,c₀₆,dte₇ra₈] MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>e.  to₁-ra₂-[ho₃,a₀₄,bto₅,c₀₆,dte₇ra₈] MS</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>f.  to₁-ra₂-[ho₃,a₀₄,bto₅,c₀₆,dte₇ra₈] MS</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g.  to₁-ra₂-[ho₃,a₀₄,atto₅,b₀₆,c₇dte₇ra₈] MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>h.  to₁-ra₂-[ho₃,a₀₄,bto₅,d₀₆te₇ra₈] MS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
Default assoc. – (no phantom struct.)

<table>
<thead>
<tr>
<th>/\text{ta}^{\text{H}}_{1-\text{tu}_2-[\text{ka}_3-\text{ko}_4\text{ma}<em>5]</em>{\text{STRESS}}}/</th>
<th>\text{ID-PHO}(\tau)</th>
<th>\text{*FLOAT}</th>
<th>\text{MAX}(T)</th>
<th>\text{H/Hd}</th>
<th>\text{ID-SUBO}(\tau)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. \text{tá}_1-\text{tu}_2-[\text{ka}_3-\text{ko}_4\text{ma}<em>5]</em>{\text{STRESS}}</td>
<td>*</td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>b. \text{ta}_1-\text{tú}_2-[\text{ka}_3-\text{ko}_4\text{ma}<em>5]</em>{\text{STRESS}}</td>
<td>*</td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>c. \text{ta}_1-\text{tu}_2-[\text{ká}_3-\text{ko}_4\text{ma}<em>5]</em>{\text{STRESS}}</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>d. \text{ta}_1-\text{tu}_2-[\text{ka}_3-\text{kó}_4\text{ma}<em>5]</em>{\text{STRESS}}</td>
<td>*</td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>e. \text{ta}_1-\text{tu}_2-[\text{ka}_3-\text{ko}_4\text{ma}<em>5]</em>{\text{STRESS}}^{\text{H}}</td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>f. \text{ta}_1-\text{tu}_2-[\text{ka}_3-\text{ko}_4\text{ma}<em>5]</em>{\text{STRESS}}</td>
<td>*</td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
</tr>
</tbody>
</table>
Extensions of phantom structure
Japanese accent-shifters

- Accent-shifters
  - “This suffix does not carry accent of its own, but if a root comes with accent, it attracts that accent immediately to its left. In other words, this suffix can shift already-existing accent, but it cannot insert new accent, unlike other pre-accenting suffixes.” (K 15)

Accent-shifting Suffix -mono ‘thing’

| a.   | /káki + mono/    | →  kakí-mono | ‘scroll’ |
|      | yómi + mono/    | →  yomí-mono | ‘reading matter’ |

| b.   | /nori + mono/   | →  nori-mono | ‘vehicle’ |
|      | /wasure + mono/ | →  wasure-mono | ‘forgotten item’ |

Poser 1984:50; Alderete 1999:228-229; Kawahara 2015:469
Japanese accent-usurpers

• Accent-usurpers
  ◦ Suffix does not carry accent of its own
  ◦ If a root comes with accent, it attracts that accent onto itself
    ◦ i.e. it **usurps** accent from its environment, but does not contribute one itself

Agentive Suffix -te (Poser 1984: 50)

a. /káki + te/ → kaki-te  ‘writer’
   /yómi + te/ → yomi-te  ‘reader’

b. /katari + te/ → katari-te  ‘narrator’
   /kiki + te/ → kiki-te  ‘hearer’

Poser 1984:50; Alderete 1999:228-229; Kawahara 2015:469
Phantom floating tone

• Cf. to Kuria phantom structure

Accent-shifting Suffix -mono ‘thing’

a. /káki + mono/ → kakí-mono ‘scroll’

Poser 1984:50; Alderete 1999:228-229; Kawahara 2015:469
Phantom floating tone

- Cf. to Kuria phantom structure

Agentive Suffix -te (Poser 1984: 50)

a. */káki + te/* → kaki-té ‘writer’

Poser 1984:50; Alderete 1999:228-229; Kawahara 2015:469
Second positionhood (& infixation)

- Certain morphs need to be either (i) adjacent to a particular prosodic constituent, or (ii) part of a particular prosodic constituent
  - Latin \(=que\) must be right-adjacent to a p-word (\(\circ\))
  - E.g. diu \(=\text{que}\) noctu \(\rightarrow\) diu noctuque 'by day and by night'

Prosodic subcategorization – Zec, 2005; Bennett et al., 2018; Rolle and Hyman, 2019; Tyler, 2019
Morphotactics & phantom structure

- **Tiwa /âŋ/ [1SG]** (Clem, Rolle, & Dawson *under review*)
  - /lí-ya-Ø-ng/  
    go-NEG-NPST-1SG  
    → lí-ya-ng  
    ‘I will not go’
  - /lí-ya-m-âng/  
    go-NEG-PST-1SG  
    → lí-ya-m-âng  
    ‘I did not go’
  - /lí-w-m-âng-bo/  
    go-ASP-PAST-1SG-FOC  
    → lí-w-m-âng-bo  
    ‘I would have gone.’ [Default]
  - /lí-w-m-bo-âng/  
    go-ASP-PAST-FOC-1SG  
    → lí-w-bo-m-âng  
    ‘I would have gone.’ [Inversion]
  - /lí-w-m-bo-âng/  
    go-ASP-PAST-FOC-1SG  
    → lí-w-m-bo-m-âng  
    ‘I would have gone.’ [Doubling]
Morphotactics & phantom structure

• Tiwa /âŋ/ [1SG](Clem, Rolle, & Dawson under review)

‘(S)he would have gone.’

a. /root-NEUT-PST-FOC/
   /lî-w-m-bo/
   \[lîmbo\]

b. /root-NEUT-PST-FOC/
   /lî-w-m-bo/ → *lî-w-bo-m
   \*[lîwbo\text{m}]

c. /root-NEUT-PST-FOC/
   /lî-w-m-bo/ → *lî-w-m-bo-m
   \*[lîmbom]
### Morphotactics & phantom structure

#### Table: Correspondence of Morphs

<table>
<thead>
<tr>
<th>Input: /lfₐ-yaₜ-mₚ-lₜ₀-d-ângₑ_/</th>
<th>POS-OV</th>
<th>ANCH-IO</th>
<th>LIN-IO</th>
<th>INT-IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. fully faithful</td>
<td></td>
<td>![checkmark]</td>
<td></td>
<td>![checkmark]</td>
</tr>
<tr>
<td>lfₐ-yaₜ-mₚ₁-lₜ₀-d-ângₑ₂</td>
<td></td>
<td>![checkmark]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. -m inversion</td>
<td></td>
<td>![checkmark]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lfₐ-yaₜ-lₜ₀-d-mₚ₁-ângₑ₂</td>
<td>![checkmark]</td>
<td></td>
<td>![checkmark]</td>
<td></td>
</tr>
<tr>
<td>c. -m doubling</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lfₐ-yaₜ-mₚ₁-lₜ₀-d-mₚ₁-ângₑ₂</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td></td>
</tr>
<tr>
<td>d. -âng doubling</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td></td>
</tr>
<tr>
<td>lfₐ-yaₜ-mₚ₁-ângₑ₂-lₜ₀-d-ângₑ₂</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
</tr>
<tr>
<td>e. -âng inversion</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
</tr>
<tr>
<td>lfₐ-yaₜ-mₚ₁-ângₑ₂-lₜ₀</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
<td>![checkmark]</td>
</tr>
</tbody>
</table>

- **SC**
  - mᵢ
  - âng₂
- **UR**
  - [T:PST]
  - [ϕ: I SG]

#### Notes:

- **POSITION-OV(MORPH):** For a morph mₒ in an output candidate (O) in correspondence with a morph mᵣ in its Vocabulary Item (V), the position of mₒ in a string of morphs is identical to the position of mᵣ in its string of morphs (i.e. the string consisting of the UR and the SC).

- **R-ANCHOR-IO(MORPH):** A morph at the right edge of a word in the input (I) corresponds to a morph at the right edge in the output (O).

- **LINEARITY-IO(MORPH):** The precedence structure of the morphs in the input (I) is preserved in the output (O).

- **INTEGRITY-IO(MORPH):** No morph in the input (I) has multiple correspondents in the output (O).

---

**Morphological doubling and templatic effects (Hyman 2003 – Bantu CARP template); Non-transitivity in bigrams (Ryan 2010, 2019)**
End

• References: https://nicholasrolle.com/output