Phantom structure: A representational account of floating tone association

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A micro-typology of floating tone
Three types of floating tone (FT)

1. “Phonological association” → associates to phonologically-prominent/default position

2. “Adjacent association” → associates to TBU immediately before/after the sponsor

3. “Targeted association” → some n\textsuperscript{th} TBU within a string, with respect to a morpho-prosodic edge
Phonological association

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

• Makonde grammatical tone melodies
  ◦ ⨁ CONSECUTIVE/POTENTIAL ni-ka-takatuk[ií]la ‘and/if I stood up’
  ◦ ⌒ NON-PAST NEGATIVE a-ngu-takatuk[iì]la ‘I do/will not stand up’
  ◦ ⌒⨁ IMPERATIVE takatuk[ií]la ‘stand up!’
  ◦ ⌒⨁⨁REMOTE PAST ní-ndí-takatuk[ií]la ‘I stood up’
Phonological association

- Standard in intonational systems

Gussenhoven 2004:23
Adjacent association

• Chichewa (Bantu)
  ◦ Floating ⵜ – **Post-sponsor** docking
    ◦ Recent past:
      ◦ mu-na⩬-sokonez-a → mu-na-sókonez-a [mu-na-sókóoneez-a]
      ◦ you-T-root-FV ‘you messed up (recently)’
  ◦ Floating ⵜ – **Pre-sponsor** docking
    ◦ Remote past:
      ◦ mu-⪞naa-sokonez-a → mú-naa-sokonez-a [mú-náa-sokonéez-a]
      ◦ you-T-root-FV ‘you messed up’
  ◦ Floating ⵜ’s – **Pre- & post-sponsor** docking simultaneously
    ◦ Sequential perfect:
      ◦ mu-⪞ta⪞tembenuz-a → mú-ta-témbenuz-a [mú-tá-témbénuuz-a]
      ◦ you-T-root-FV ‘after you had turned over’

Downing & Mtenje 2017
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 $\hat{H}$ 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

Odden, 1987; Cammenga, 2004; Mwita, 2008; Marlo et al., 2015; Paster, 2019
Why isn’t FT always phonological association?
(Or, what prevents floating tones from simply ‘floating away’?)

• Floating tones are often bounded on both sides
  ◦ Zilacayotitlán Tlapanec: \text{nì}^\text{H}-\text{xtāa} \rightarrow \text{nì}-\text{xtāa} \ ‘\text{CMP.2PL-caress’}
Why isn’t FT always phonological association?
(Or, what prevents floating tones from simply ‘floating away’?)

- Cf. Chichewa: mu-na\(\text{\textcircled{H}}\)-sokonez-a $\rightarrow$ mu-na-sókoneez-a
  - What prevents the floating tone to going to least marked position? (→ TETU)
  - If the floating tone is unassociated in the input, it is not subject to faithfulness
Phantom structure
Components of 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**

Image: Andy Fulcher, Solid Solutions Management Ltd (https://www.solidsolutions.co.uk/blog/2014/05/creating-multiple-angular-planes-as-reference-geometry-in-SOLIDWORKS/#.YFMHB51Kjb0)
Components of phantom structure

• Kuria:
  ◦ **HORTATORY IMPERATIVE**: pre-associated
    a-tá-βereker-a → [a-tá-βereker-a]
    ‘let him call’
  ◦ **REMOTE FUTURE**: third mora
    n-to-reوها-hootooter-a → [n-to-re-hootőoter-a]
    ‘we will reassure’
  ◦ **INCEPTIVE**: fourth mora
    to-raوها-hootooter-a → [to-ra-hootőter-a]
    ‘we are about to reassure’
Components of phantom structure

• The 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.” (Rolle & Lionnet 2020)
  ◦ Transplanar linear precedence relations, transplanar links, and transplanar constituents
Components of phantom structure

• Kuria:
  ◦ INCEPTIVE: fourth mora
io-\textsuperscript{®}-hootooter-a → [to-ra-hooto\textsuperscript{ô}ter-a]
  ‘we are about to reassure’
Components of phantom structure

- Kuria:
  - **Inceptive:**
    - to-ra®-hootooter-a → [to-ra-hootoóter-a]
    - ‘we are about to reassure’

transplanar association
Phantom structure in context

- Kuria: to-ra\textsuperscript{H}-hootoster-a $\rightarrow$ to-ra-hooto\text{t}er-a (4\textsuperscript{th} mora)

- Standard concatenation of phonological substance
Phantom structure in context

- Kuria: to-ra\(^\text{H}\) - hootooter-a $\rightarrow$ to-ra-hootoo\(\text{ö}\)ter-a (4\(^{\text{th}}\) mora)
- Underlying representations of morphs (SUBSTANTIVE + PHANTOM)
Phantom structure in context

- Multiplane concatenation
Phantom structure in context

- Multiplane correspondence strings
Phantom structure in context

- Kuria: to-ra\(\text{H}\)-hootooter-a \(\rightarrow\) to-ra-hootoóter-a (4\(^{th}\) mora)
Targeted association via phantom structure

|   | Id-PHO(μ) | INTEG-PHO(μ) | UNIF-PHO(μ) | *FLOAT | MAX(T) | H/Hd | Id-SUBO(μ) |
|---|-----------|--------------|-------------|--------|--------|------|-------------|
| a. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | * | | | * | *
| b. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | *! | | * | * | *
| c. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | *! | | * | | *
| d. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | *! | | * | * | *
| e. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} (H) | | | | *! | | | * | *
| f. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | *! | | * | | *
| g. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | *! | | * | | *
| h. to_{1,a-ra_{2,b}} [ho_{3,0,4,0,5,0,6,0,7,0,8}]_{MS} | | | | *! | | * | * | *
### Targeted association via phantom structure

|   | /to\textsubscript{1,a}-ra\textsubscript{2,b} · $\{[\mu\text{c} \mu\text{d} \mu\text{e} \mu\text{f}]_{\text{MS}}\}$ ho\textsubscript{3}o\textsubscript{4}to\textsubscript{5}o\textsubscript{6}te\textsubscript{7}ra\textsubscript{8} | Id-PHO($\mu$) | INTEG-PHO($\mu$) | UNIF-PHO($\mu$) | *FLOAT | MAX(T) | H/HD | Id-SUBO($\mu$) |
|---|---|---|---|---|---|---|---|---|
| a. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3}c,o\textsubscript{4},d,to\textsubscript{5},e,o\textsubscript{6},fte7,ra\textsubscript{8}]_{\text{MS}} |  |  |  |  |  |  |  |
| b. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,o\textsubscript{4},d,to\textsubscript{5},e,o\textsubscript{6},fte7,ra\textsubscript{8}]_{\text{MS}} | *! |  |  |  |  |  |  |
| c. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,o\textsubscript{4},d,to\textsubscript{5},e,o\textsubscript{6},fte7,ra\textsubscript{8}]_{\text{MS}} | *! |  |  |  |  |  |  |
| d. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,o\textsubscript{4},d,to\textsubscript{5},e,o\textsubscript{6},fte7,ra\textsubscript{8}]_{\text{MS}} | *! |  |  |  |  |  |  |
| e. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,o\textsubscript{4},d,to\textsubscript{5},e,o\textsubscript{6},fte7,ra\textsubscript{8}]_{\text{MS}} (H) | *! |  |  |  |  |  |  |
| f. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,o\textsubscript{4},d,to\textsubscript{5},e,o\textsubscript{6},fte7,ra\textsubscript{8}]_{\text{MS}} | *! |  |  |  |  |  |  |
| g. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,o\textsubscript{4},e,to\textsubscript{5},d,o\textsubscript{6},te7,ra\textsubscript{8}]_{\text{MS}} | *! |  |  |  |  |  |  |
| h. | to\textsubscript{1,a}-ra\textsubscript{2,b} · [ho\textsubscript{3},c,d,o\textsubscript{4},e,to\textsubscript{5},d,o\textsubscript{6},te7,ra\textsubscript{8}]_{\text{MS}} |  |  |  |  |  |  |  |
Targeted association via phantom structure

- **IDENT-SUBO(μ)**

Corresponding TBUs in the substantive plane (of the input) and output have identical tonal associations

(≈ Ident-IO (μ))

| Case | Input | Output | Id-PHO(μ) | INTEG-PHO(μ) | UNIF-PHO(μ) | *FLOAT | MAX(T) | H/HD | ID-SUBO(μ) |
|------|-------|--------|------------|--------------|-------------|--------|--------|------|------------|
| a.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | to1a-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *          | *            | *            | *      | *      | *    | *          |
| b.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
| c.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
| d.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
| e.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
| f.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
| g.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
| h.   | to1-ra2,b-[ho3,co4,td5,ce6,te7,ra8] | *        | *            | *            | *            |        |        |      | *          |
Targeted association via phantom structure

- **IDENT-PHO(μ)**

  Corresponding TBUs in the **phantom plane** (of the input) and output have identical tonal associations.

|   | /to1, a-ra2,b/ [μ_c μ_d μ_e μ_f] MS \{ho₃o₄to₅o₆te₇ra₈\} / | H | Id-PHO(μ) | UNIF-PHO(μ) | *FLOAT | MAX(T) | H/Hd | Id-SUBO(μ) |
|---|---|---|---|---|---|---|---|---|
| a. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS | H | | | | | | |
| b. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS | *! | | | | | | |
| c. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS | *! | | | | | | |
| d. | to₁ a-rá₂ b [ho₃o₄to₅o₆te₇ra₈] MS | *! | | | | | | |
| e. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS (H) | *! | | | | | | |
| f. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS | *! | | | | | | |
| g. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS | *! | | | | | | |
| h. | to₁ a-ra₂ b [ho₃o₄to₅o₆te₇ra₈] MS | *! | | | | | | |
Targeted association via phantom structure

- **IDENT-SUBO(µ)**

Tone mismatch between output µ and corresponding substantive µ

- Violation
Targeted association via phantom structure

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| /to₁,a-ra₂,b-{[µₚ µ_d µ_e µ_f]_MS} ho₃o₄to₅o₆te₇ra₈\{H |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |

- **IDENT-SUBO(µ)**

No mismatch
- No violation
Targeted association via phantom structure

- **IDENT-PHO(μ)**

Tone mismatch between an input phantom $\mu$ and a corresponding output $\mu$

- Violation
Targeted association via phantom structure

| Case | Expression | ID-PHO(μ) | INTEG-PHO(μ) | UNIF-PHO(μ) | *FLOAT | MAX(T) | H/Hd | ID-SUBO(μ) |
|------|------------|-----------|--------------|-------------|--------|--------|------|-----------|
| a.   | /to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS / |           |              |             |        |        |      |           |
| b.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS | *!        |              |             |        |        |      |           |
| c.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS | *!        |              |             |        |        |      |           |
| d.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS | *!        |              |             |        |        |      |           |
| e.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS (H) | *!        |              |             |        |        |      |           |
| f.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS | *!        |              |             |        |        |      |           |
| g.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS | *!        |              |             |        |        |      |           |
| h.   | to₁,a-ra₂,b-[ho₃,œ₄,œ₅,œ₆,œ₇,œ₈]MS | *!        |              |             |        |        |      |           |

- **IDENT-PHO(μ)**
- No mismatch
- No violation

\[ \text{TARGETED ASSOCIATION VIA PHANTOM STRUCTURE} \]

\[ /to₁,a-ra₂,b-\{[μ_e \, μ_d \, μ_e \, μ_d]_{MS} \} / \]
Targeted association via phantom structure

- **INTEGRITY-PHO(μ)**

No TBU in the phantom plane has multiple correspondents in the output

(no splitting)
Targeted association via phantom structure

| /to\textsubscript{1,a}-ra\textsubscript{2,b} \{ [\mu\textsubscript{c}, \mu\textsubscript{d}, \mu\textsubscript{e}, \mu\textsubscript{f}] \textsubscript{MS} \} /ho\textsubscript{03}o\textsubscript{04}to\textsubscript{05}o\textsubscript{06}te\textsubscript{07}ra\textsubscript{08} | ID-PHO(\mu) | INTEG-PHO(\mu) | UNIF-PHO(\mu) | *FLOAT | MAX(T) | H/Hd | ID-SUBQ(\mu) |
|---|---|---|---|---|---|---|---|
| a. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} | | | | | | | |
| b. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} | *! | | | | | | |
| c. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} | *! | | | | | | |
| d. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} | *! | | | | | | |
| e. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} (H) | *! | | | | | | |
| f. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} | *! | | | | | | |
| g. to\textsubscript{1,a}-ra\textsubscript{2,b}^{-}[ho\textsubscript{03}o\textsubscript{04},dto\textsubscript{05}o\textsubscript{06},fte\textsubscript{07}ra\textsubscript{08}]\textsubscript{MS} | | | | | | | *

- **INTEGRITY-PHO(\mu)**

No TBU in the phantom plane has multiple correspondents in the output (no splitting)
Targeted association via phantom structure

| \( \text{to}_{1,a}-\text{ra}_{2,b} \cdot \) \[ \{ \text{ho}_{5,04t05,06t7,08} \} \] | H | \( \text{Id-PHO}(\mu) \) | \( \text{INTEG-PHO}(\mu) \) | \( \text{UNIF-PHO}(\mu) \) |实习生 | \( \text{H/HD} \) | \( \text{H-QN} \) |
|---|---|---|---|---|---|---|---|
| a. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | | | | * | * | |
| b. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | *! | | | * | * | *|
| c. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | *! | | | * | * | |
| d. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | *! | | | * | * | |
| e. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | | *! | * | | |
| f. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | | *! | | * | |
| g. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | | *! | | * | |
| h. | to\( _{1,a}-\text{ra}_{2,b} \cdot [\text{ho}_{3,04t05,06t7,08}]_{\text{MS}} \) | | | | *! | * | |

- **Uniformity-** \( \text{PHO}(\mu) \)

No TBU in the output has multiple correspondents in the phantom plane (no merging/coalescing)
Targeted association via phantom structure

| Step | Formula | Id-PHO(μ) | Integ-PHO(μ) | UNIF-PHO(μ) | FLOAT | MAX(T) | H/Hd | Id-SUBO(μ) |
|------|---------|------------|--------------|-------------|-------|--------|------|------------|
| a.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| b.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| c.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| d.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| e.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| f.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| g.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
| h.   | to_{1,a} - ra_{2,b} - [ho_{3,co_{4,dto_{5,co_{6,fe_{7,te_{8}r_{a}}}}]}_{MS} | *           |              |             |       |        |      |            |
Phonological association if no phantom struct.

- **Example** (based on Lamba)

|     | /ta₁-ᵣ₁₂-[ka₃-k₀₄m₅]ₚₛₜṛss/ | ID-PhO(τ) | FLOAT | MAX(T) | H/Hd | ID-SUBO(τ) |
|-----|-----------------------------|-----------|-------|--------|------|------------|
| a.  | tá₁-tu₂-[ka₃-k₀₄m₅]ₚₛₜṛss  |           |       |        | *!   | *          |
| b.  | ta₁-tú₂-[ka₃-k₀₄m₅]ₚₛₜṛss  |           |       |        | *!   | *          |
| c.  | ta₁-tu₂-[ká₃-k₀₄m₅]ₚₛₜṛss  |           |       |        | *!   | *          |
| d.  | ta₁-tu₂-[ka₃-kó₄m₅]ₚₛₜṛss  |           |       |        | *!   | *          |
| e.  | ta₁-tu₂-[ka₃-k₀₄m₅]ₚₛₜṛss  |           |       |        | *!   | *          |
| f.  | ta₁-tu₂-[ka₃-k₀₄m₅]ₚₛₜṛss  |           |       |        | *!   | *          |
## Phonological association if no phantom struct.

- **Example** (based on Lamba)

| ID-PhO(τ) | FLOAT | MAX(T) | H/Hd | ID-SUBO(τ) |
|-----------|-------|-------|------|------------|
| /ta₁-tu₂-[ka₃-k₀₄ma₅]STR| | | | |
| a. tá₁-tu₂-[ka₃-k₀₄ma₅]STR | | | * ! | * |
| b. ta₁-tú₂-[ka₃-k₀₄ma₅]STR | | | * ! | * |
| c. ta₁-tu₂-[ká₃-k₀₄ma₅]STR | | | * ! | * |
| d. ta₁-tu₂-[ka₃-k₀₄ma₅]STR | | | * ! | * |
| e. ta₁-tu₂-[ka₃-k₀₄ma₅]STR | | | * ! | * |
| f. ta₁-tu₂-[ka₃-k₀₄ma₅]STR | | | * ! | * |

Bickmore 1995
Phonological association if no phantom struct.

- **Example** (based on Lamba)

|   | ID-PhO(τ) | MAX(T) | H/Hd | ID-SUBO(τ) |
|---|-----------|--------|------|------------|
| a. tá₁-tu₂-[ka₃-kO₄ma₅]STRESS |           |        |      |            |
| b. ta₁-tú₂-[ka₃-kO₄ma₅]STRESS |           |        |      |            |
| c. ta₁-tu₂-[ká₃-kO₄ma₅]STRESS |           |        | *!   | *          |
| d. ta₁-tu₂-[ka₃-kó₄ma₅]STRESS |           |        |      |            |
| e. ta₁-tu₂-[ka₃-kO₄ma₅]STRESS |           |        |      |            |
| f. ta₁-tu₂-[ka₃-kO₄ma₅]STRESS |           |        |      | *!         |

Bickmore 1995
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]
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Alternatives to phantom structure
Targeted association via a counting constraint

• A new possibility: are constraints with counting also permissible?
  ◦ [ASIDE: What we need is a comprehensive theory of constraints]
• “μ4: Assign one violation for each floating tone that does not surface four moras from its input location.”
  (a ‘counting constraint’)
(Sande, Jenks, Inkelas 2020 – underlining ours)

| /to-ra\textsuperscript{H}-[\textomega \text{roma}] [\textomega \text{eyetők̈e}] | μ4 | H, R | ID-T | H | Obs | Pred |
|---|---|---|---|---|---|---|
| | 9 | 9 | 1 | 9 | 0 | 0 |
| a. [([\textomega \text{toraroma}] [\textomega \text{eyetők̈e}]]) | 1 | | | | | |
| b. \textup{\textcircled{f}} [([\textomega \text{toraroma}] [\textomega \text{eyetők̈e}]]) | 1 | 1 | 1 | 1 | | |
Targeted association via a counting constraint

- Floating tone has **no input position** relative to mora/segmental tier
- Kuria: to-\textsuperscript{H}-ra-hootooter-a $\rightarrow$ to-ra-hooto\text{ö}ter-a
Targeted association via a counting constraint

- Floating tone has **no input position** relative to mora/segmental tier
- Kuria: to-ra\(\text{H}\)-hootooter-a \(\rightarrow\) to-ra-hootoóter-a
Targeted association via a counting constraint

• Could we state instead that “...each floating tone that does not surface four moras from its sponsor.” (still a ‘counting constraint’)
Proper anchoring in phantom structure

- Phantom substance must be properly anchored
Proper anchoring in phantom structure

- Phantom substance must be properly anchored

- “Adjacent association”: associates to TBU immediately before/after the sponsor

  vs.

- “Targeted association”: some $n^{th}$ TBU within a string, with respect to a morpho-prosodic edge
Proper anchoring in phantom structure

- Phantom substance must be properly anchored

- A major typological gap: there are no floating tones which (unambiguously) use their sponsor as their anchor, outside of immediate adjacency

- This doesn’t exist (unambiguously):
  - “Place a H two mora away from some prefix’s final mora” (or three, or four, ...)

**Diagram:** Sponsor anchoring
Counting in grammar generally

• Moreover, many claims that human grammar cannot count, based on a variety of data and arguments (however, cf. Paster 2019)

• 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)

• Based on Paster (2019), the best case thus far for this kind of counting in grammar is actually Kuria floating tone!

Grammar can’t count: Kenstowicz 1994:372; Smith & Tsimpli 1995; Hayes 1995:307; Counting falls under “Structure Independent Operations” – Chomsky 2006:54; Isac & Reiss 2008:65; Graf 2017; Cf. Paster 2019 (many more references found therein, as well)
Counting in grammar generally

- Phantom structure does **not** involve counting

cf. itʃiimbáɣo ‘hedges’ – H on 4th mora

Mwita 2008:29
Targeted association via hidden structure

- to-ra®-hootooter-a \(\rightarrow\) to-ra-hootoóter-a

Hidden structure alternative:
ra\(®\)

Cammenga 2004, Trommer 2019
Targeted association via hidden structure

- Argument against $\underbrace{\text{LLLH}}$ (Marlo et al. 2015)
  - Additional H tone spreading operations would spread into this hypothetical $\underbrace{\text{LLLH}}$ sequence.
  - Expect spreading here to be blocked if there were bona fide L tones in the representation.

(12) $/\text{o-}\text{yo-tó-ko}^\text{H}_2^\text{H}_2^-[\text{βereker-a}]_\text{MS}/ \rightarrow \text{o-}\text{yo-tó-kó-[βéreker-á]}_\text{MS} \quad \text{‘to not call’}
Targeted association via hidden structure

• One possibility (suggested by J. Trommer): Add floating ➊ at one stratum, but delete L’s at later stratum (Duke-of-York, A→B→A)

• Evidence against this:
  ◦ There may exist a few grammatical tone melodies which have real floating ➊
  ◦ *These* do not delete at the later stratum where H-tone spread happens
Targeted association via hidden structure

• Behavior of these (potential) L differs from “LLLLHH” alternative

• **First data point:** These other L’s block regular rightward H-spreading rule (cf. previous slide)
  - HORTATORY IMPERATIVE TYPE 1 (H tone on prefix)
  - [a-tá-βereker-a] (*[a-tá-βérēkēr-a]) ‘let him call’
  - [a-tá-ry-a] ‘let him eat’

Marlo et al. 2014:287
Targeted association via hidden structure

• Behavior of these (potential) ⬤ differs from “钆钆钆钆” alternative

• **Second data point:** if there are a sub-minimal number of target moras, tone on the final mora is L, not H
  - HORTATORY IMPERATIVE TYPE 2 (H tone on first mora)
  - [ta-βérèker-a] ‘call!’
  - [tá-ry-à] ‘eat!’

Marlo et al. 2014:280,287; ⬤ to first mora of stem in ntoo-ryá ‘indeed, we have already eaten’ (Untimed past anterior focused)
Targeted association via hidden structure

- Behavior of these (potential) \( \L \) differs from “\( \L \L \L \H \)” alternative

- **Third data point:** With sub-minimal number of target moras, final tone can be either H or L
  - MANDATORY IMPERATIVE (H tone on third mora)
  - \[turuúngàn-a\] ‘welcome!’
  - \[ry-à\] ‘eat!’

Marlo et al. 2014:288-289
Targeted association via hidden structure

• Behavior of these (potential) \( \square \) differs from “\( \square \square \square \square \square \)” alternative

• **Third data point**: With sub-minimal number of target moras, final tone can be either H or L (variation)
  - MANDATORY IMPERATIVE (H tone on third mora)
  - \([\text{tɛrɛká}]\) ‘brew!’ ~ \([\text{tɛrɛkà}]\)

\[\text{Cf. } \square \text{ alone} \]
\[\text{[ntore-tɛrɛká] only}\]

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Marlo *et al.* 2014:282,288; \( \square \) to third mora of stem in *ntore-tɛrɛká* ‘we will brew (then)’ (Remote future focused)
Conclusion

1. **Issue**: ‘Targeted association’, where floating tone must associate to some $n^{th}$ TBU within a string, w.r.t. a morpho-prosodic edge (i.e. place a H tone on 4$^{th}$ mora of stem)

2. Initially, suggests a role for counting / counting constraints in grammar

3. **Our counter-proposal**: a representation ‘Phantom Structure’ – splits an input into a substantive plane and a phantom plane

4. Floating tone is associated to a phantom mora on the phantom plane (called ‘transplanar association’)

5. Association to 4$^{th}$ mora in output is due to faithfulness to the association on the phantom plane, via \textsc{ID-PHO}(\mu)

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• References: [https://nicholasrolle.com/output](https://nicholasrolle.com/output)