Phantom Structure: Tone association via 3D phonology

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Starting point: Is TONE different?

• **Tone: Is it Different?** (Hyman 2011)
  • “Tone is like segmental phonology in every way—only more so” (p. 214)
    ◦ **Quantitatively**: Tone does certain things more frequently, to a greater extent, or more obviously than segmental phonology
    ◦ **Qualitatively**: Tone can do everything segments and non-tonal prosodies can do, but segments and non-tonal prosodies cannot do everything tone can do
  • For most sub-topics, remains to be answered adequately

TONE and long-distance effects

- **Focus today**: Multiple types of long-distance phenomenon involving the association of floating tones
  - i.e. tones which appear undocked to a vowel (or similar tone-bearing unit) in the input, but appear at some distance away from their sponsor in the output
- Examining a ‘counting effect’ in some types of floating tone association, e.g. dock to 4th mora of stem
- Input: `to-ra HeaderComponent-kirigii-t-a` → Output: `to-ra-ki1ri2gi3í4t-a5`

Kuria data: Marlo, Mwita & Paster 2015
Proposal: PHANTOM STRUCTURE

• Novel type structure within three-dimensional phonology (3DΦ) called Phantom Structure

• Input: to-raربية-kirigiit-a

• The counting effect – Deconstructed as faithfulness to an abstract position

• Not literal counting
Roadmap

1. **Big picture**: What are the components of phonological theory?

2. **Focus**: Long-distance floating tone association, in the Bantu languages of East Africa

3. **Proposal**: Phantom Structure within 3DΦ

4. **Zooming out**: A bird’s eye view of tone and phonological theory
Phonology

What and whither
What is PHONOLOGY?

• A modular perspective
  ◦ What happens in the **syntactic module**?
  ◦ What happens in the **phonological module**?
  ◦ What happens at **spell-out**, the interface between the two?
What is PHONOLOGY?

**Representation:** What are the contents of each individual state, i.e. the inputs and outputs?

**Computation:** How are states mapped from one to another, i.e. the input-output procedure?

Whither PHONOLOGY?

- **Optimality Theory** set the agenda for studying the **Computation** for decades
- A collective return to **Representation**
- What are the **primitives of phonological representation**?
  - Phonemes, Segments, Tones, Features, Stress marks, Gestures, etc.
- What are the **external relations** among these primitives?
  - Prosodic **constituency** (*à la* Prosodic hierarchy)
  - **Association** across tiers (in Autosegmental Phonology)
Enter a world of (floating) tone

The intersection of tone, theory, and representation
Enter a world of TONE

• What is a **tone language**?
  ◦ Languages where pitch is part of the underlying representation of at least some morphemes

• Tonal vs. non-tonal languages
  ◦ When casting the widest possible net, liberal estimations of how many languages are tonal go as high as 70%
  ◦ A more conservative estimate is about 40%

• Mandarin lexical tone contrasts

Definition: Welmers 1959, 1973, Hyman 2006; 70% figure: Yip 2002; Downing & Rialland 2016; 40% figure extrapolated from Maddieson 2013 (WALS survey)
Enter a world of TONE

A less storied *ma* comes from Ebira (Niger-Congo):

- **Grammatical tone** contrasts in auxiliaries *(Rolle to appear)*
  - ML  *māà ṣe* 'I am coming'
  - HM  *máā ṣe* 'I came'
  - HH  *máá ṣe* 'did/do I come?'
  - LH  *màá ṣe* 'if I come'
  - MM  *māā ṣe* '(that) I should be coming'
  - LSM *màąā ṣe* 'if I am coming'
  - LHM *màáá ṣe* 'if I usually come'
  - HHM *mááá ṣe* 'should I be coming?'

Data from Scholz 1976:53-54,65-66,107
Empirical focus: Tone in Africa

Bantu map: R. Blench
Empirical focus: Tone in Africa

Bantu map: R. Blench; Codes: Personal fieldwork in blue; Collaboration with fieldworker/native speaker-linguist in orange; Work from available literature in red.
**Floating Tone (T)**

• Autosegmental revolution (Goldsmith 1975)

• Autosegmental diagram of /búlù/:
  
  \[
  \begin{array}{c}
  \text{segmental tier:} \\
  b \quad u \quad l \quad u \\
  \text{tonal tier:} \\
  H \quad L
  \end{array}
  \]

• Segments can exist without tones, and tones without segments – known as the ‘stability’ of tone

• Associated: \(T\) \quad Unspecified: \(V\) \quad Floating: \(T\)

Floating 섭 association

• Three types of association patterns of floating tones (逨)
  ◦ Local
  ◦ Long distance I – Phonologically-driven
  ◦ Long distance II – Targeted association
Floating 𡆖 association

• **Local association**: Floating tones often dock directly adjacent to sponsor

• **Bantu case study 1 – Chichewa**
  
  ◦ Permissive – No tone
    
    
    
    \[
    \text{/mu-n̄a-menye/} \rightarrow [\text{mu-n̄a-meeny-e}] \quad \text{you can hit}
    \]
  
  ◦ Simple past – Lexical H
    
    
    
    \[
    \text{/mu-n̄a-menye/} \rightarrow [\text{mu-ná-meeny-e}] \quad \text{you hit}
    \]
  
  ◦ Recent past – Floating  crossorigin
    
    
    
    \[
    \text{/mu-naまして-menye/} \rightarrow [\text{mu-na-méeny-e}] \quad \text{you hit (recently)}
    \]
Floating ㅏ association

• **Two types** of long-distance floating tone association

• **I Phonologically-driven association**: Floating tone docks to a phonologically-prominent/default position
  ◦ E.g. prosodic edge/stressed position/lengthened position/etc.

• **II Targeted association**: Floating tone docks to some numerically-defined position within a string
  ◦ E.g. first/second/third/fourth/antepenult/penult/ultima/etc.
I Phonologically-driven ⓖ association

- Bantu case study 2 – Makonde
- Penultimate lengthening (Rolle & Hyman 2019)
  - /kú-lúmúl-a/ → kúlúmúúlâ ‘cut’
  - /kú-lúmúl-áng-a/ → kúlúmúláángâ ‘cut into small pieces’
- The hypothetical affirmative – No tone on verb
  - káléká ngu-takatuk[ii]le ‘if I stood up’
- Makonde grammatical melodies attracted to penult
  - ⓖ consecutive ni-ka-takatuk[íí]la ‘and/if I stood up’
  - ⓖ octave future ni-nda-takatuk[íí]la ‘I will stand up’
  - ⓖ octave remote past ní-ndí-takatuk[íí]la ‘I stood up’

Makonde data: Manus 2014
I Phonologically-driven folio association

- Standard in intonational systems – Attraction to phonologically-prominent positions

Gussenhoven 2004:23
II Targeted \(\textcircled{T}\) association

- **Bantu case study 3 – Kuria** (Mwita 2008) – /kirigiit/ ‘scrub’ (4 moras)
  - Hortatory imperative:
    - to-tá- [kirigiit-a] ‘let us scrub’
  - Habitual past (focused):
    - n-to-ogá- [kírigiit-ire] ‘we used to scrub (then)’
  - Past progressive (focused):
    - n-to-oga- [kírigiit-ire] ‘(indeed) we have scrubbed (today)’
  - Remote future (focused):
    - n-to-re- [kírigíit-a] ‘we will scrub (then)’
  - Inceptive:
    - to-ra- [kirigiít-a] ‘we are about to scrub’
  - Narrative past:
    - to-gá- [kírigít-a] ‘(and) we scrubbed’

Data from Mwita 2008; See also Odden 1987, Cammenga 2004, Marlo, Mwita, & Paster 2014, 2015, Paster 2019, Sande, Jenks, & Inkelas 2020, Rolle & Lionnet 2020
## Targeted ⊇ association

<table>
<thead>
<tr>
<th>TAM set</th>
<th>Prefixes</th>
<th>Stem + Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stem tone</td>
<td>PFX&lt;sub&gt;0&lt;/sub&gt;</td>
<td>[μ&lt;sub&gt;1&lt;/sub&gt; μ&lt;sub&gt;2&lt;/sub&gt; μ&lt;sub&gt;3&lt;/sub&gt; μ&lt;sub&gt;4&lt;/sub&gt; μ*]</td>
</tr>
<tr>
<td>Tone to mora 1</td>
<td>PFX&lt;sub&gt;1&lt;/sub&gt;</td>
<td>[μ&lt;sub&gt;1&lt;/sub&gt; μ'&lt;sub&gt;2&lt;/sub&gt; μ&lt;sub&gt;3&lt;/sub&gt; μ&lt;sub&gt;4&lt;/sub&gt; μ*]</td>
</tr>
<tr>
<td>Tone to mora 2</td>
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<td>[μ&lt;sub&gt;1&lt;/sub&gt; μ&lt;sub&gt;2&lt;/sub&gt; μ&lt;sub&gt;3&lt;/sub&gt; μ&lt;sub&gt;4&lt;/sub&gt; μ*]</td>
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<tr>
<td>Tone to mora 3</td>
<td>PFX&lt;sub&gt;3&lt;/sub&gt;</td>
<td>[μ&lt;sub&gt;1&lt;/sub&gt; μ&lt;sub&gt;2&lt;/sub&gt; μ'&lt;sub&gt;3&lt;/sub&gt; μ&lt;sub&gt;4&lt;/sub&gt; μ*]</td>
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<tr>
<td>Tone to mora 4</td>
<td>PFX&lt;sub&gt;4&lt;/sub&gt;</td>
<td>[μ&lt;sub&gt;1&lt;/sub&gt; μ&lt;sub&gt;2&lt;/sub&gt; μ&lt;sub&gt;3&lt;/sub&gt; μ'&lt;sub&gt;4&lt;/sub&gt; μ*]</td>
</tr>
<tr>
<td>Tone to mora 1 and 4</td>
<td>PFX&lt;sub&gt;1+4&lt;/sub&gt;</td>
<td>[μ&lt;sub&gt;1&lt;/sub&gt; μ&lt;sub&gt;2&lt;/sub&gt; μ&lt;sub&gt;3&lt;/sub&gt; μ'&lt;sub&gt;4&lt;/sub&gt; μ*]</td>
</tr>
</tbody>
</table>
An oft-ignored counting effect

- Many claims that human grammar cannot count, based on a variety of data and arguments
  - [https://twitter.com/RobertaArielli/status/1482992930751135745?s=20](https://twitter.com/RobertaArielli/status/1482992930751135745?s=20)
Interim summary

• Our two cases of long-distance association of floating tones
  
• Phonologically-driven association:
  ◦ Does not vary by morpheme
  ◦ Associates to an unmarked position (e.g. stress/boundaries/prominence)
  ◦ Due to markedness constraints

• Targeted association:
  ◦ Varies by morpheme
  ◦ Greater range of positions, (including multiple simultaneously)
  ◦ Not exclusive to unmarked positions
  ◦ Due to ?? ...

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFX_a</td>
<td>$[\sigma_1 \sigma^* \delta_p \sigma_U]$</td>
</tr>
<tr>
<td>PFX_b</td>
<td>$[\sigma_1 \sigma^* \delta_p \sigma_U]$</td>
</tr>
<tr>
<td>PFX_c</td>
<td>$[\sigma_1 \sigma^* \delta_p \sigma_U]$</td>
</tr>
<tr>
<td>PFX_d</td>
<td>$[\sigma_1 \sigma^* \delta_p \sigma_U]$</td>
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</table>

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFX_2</td>
<td>$[\mu_1 \tilde{\mu}_2 \mu_3 \mu_4 \mu^*]$</td>
</tr>
<tr>
<td>PFX_3</td>
<td>$[\mu_1 \mu_2 \tilde{\mu}_3 \mu_4 \mu^*]$</td>
</tr>
<tr>
<td>PFX_4</td>
<td>$[\mu_1 \mu_2 \mu_3 \tilde{\mu}_4 \mu^*]$</td>
</tr>
<tr>
<td>PFX_{1+4}</td>
<td>$[\tilde{\mu}_1 \mu_2 \mu_3 \tilde{\mu}_4 \mu^*]$</td>
</tr>
</tbody>
</table>

For overview of positions in targeted association across Bantu, see Odden & Bickmore 2014
An account via Phantom Structure

A new kind of three-dimensional representation
Targeted association ...

- Input: to-\textsuperscript{H}ra-kirigiit-a $\rightarrow$ Output: to-ra-kirigiit-a
Targeted association ...

- Input: $\text{to-ra}^{\mathbb{H}}\text{-kirigiit-a} \rightarrow \text{Output: to-ra-kirigiit-a}$
... via Phantom Structure

- **Phantom Structure**: A multi-planar representation (*Rolle & Lionnet 2020*)
- “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.”
... via Phantom Structure

- Input: to-ra©-kirigiit-a

SUBSTANTIVE
PLANE

PHANTOM
PLANE

transplanar
pre-association

phantom
moras
3DΦ: Beyond ‘flat’ relations

- Two-dimensional phonology: **Linearity** (horizontal relations) and **association** (vertical relations)

- Phantom Structure as **three-dimensional phonology** (3DΦ – Halle & Vergnaud 1980)

3DΦ: Beyond ‘flat’ relations

- Prosodic Morphology as 3DΦ

- √KTB (√WRITE)
  k-t-atab
  ‘was registered’

Vocalic melody tier

t-morpheme tier

Prosodic template tier

Root tier

Plane conflation

Phantom: Illustrated

- Input: \textit{to-ra}\textsuperscript{®}-kirigiit-a
Phantom: Illustrated

- Input: $\text{to-ra}^\mathbb{H}-\text{kirigiit-a}$
Phantom: Illustrated

- Input: \( \text{to-ra}^\text{H} \)-\( \text{kirigiit-a} \)
- Two phonological strings
Phantom: Illustrated

- Input: to-ra$^H$-kirigiit-a
- Output: to-ra-kirigiit-a
- Plane conflation:
Faithfulness competition

- Phantom Structure: Deconstructs this into two biplanar strings
  - **Phantom-Output Correspondence** (the phantom plane)
  - **Substance-Output Correspondence** (the substantive plane)

<table>
<thead>
<tr>
<th>/to_{α,a-ra_{β,b}}</th>
<th>ID-PHO(μ)</th>
<th>MAX(T)</th>
<th>H/HEAD</th>
<th>ID-SUBO(μ)</th>
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<tbody>
<tr>
<td>(μ_c, μ_d, μ_e, μ_f, μ_g^*) Stem</td>
<td>ki_γ, ri_δ, gi_ε, i_ζ, ta_η</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. to_{α,a-ra_{β,b}}-(ki_γ, c ri_δ, d gi_ε, e i_ζ, f ta_η,g) Stem</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. to_{α,a-ra_{β,b}}-(ki_γ, c ri_δ, d gi_ε, e i_ζ, f ta_η,g) Stem</td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. to_{α,a-ra_{β,b}}-(ki_γ, c ri_δ, d gi_ε, e i_ζ, f ta_η,g) Stem</td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
Faithfulness competition

• Complex surface patterns are not (solely) the result of resolving pressures from Faithfulness vs. Markedness, but from Faithfulness vs. other Faithfulness

• Part of a long history of multiple faithfulness relations in competition, where IO-Corr co-occurs with:
  ◦ Base-Reduplicant Correspondence (BR-Corr)
  ◦ Agreement By Correspondence (ABC)
  ◦ Output-Output Correspondence (OO-Corr)
  ◦ Sympathy Theory (Candidate–Candidate Correspondence)
  ◦ Output-Underlying Representation Correspondence (O-UR-Corr)
Reimagining the ‘counting’ effect

- **Not literal counting**: ‘Counting’ as pre-specification
  - /itsiimbáyo/ ‘hedges’ $\approx$ /ra$^\oplus$/ INCEPTIVE (‘about to’)

Mwita 2008: 29
Roles of faithfulness vs. markedness

- Standard markedness constraints derive phonologically-driven association
- Default Japanese tone – **Antepenultimate accent principle** (AAP)
  - Deconstructed via markedness constraints
  - **T/Head**: Tone to prosodic heads (e.g. stress)
  - **AlignFt-L ∼ AlignFt-R**: Alignment of tones to prosodic edges
  - **Non-initiality ∼ Non-finality**: Accounting for edge-based extra-tonality
- These cannot be used directly to capture T to 4th mora
  - No language where tone aligns to the 4th mora, or 1st and 4th simultaneously
- Matches the typology of stress windows: No default 4th position stress

AAP: Ito & Mester 2018; Stress Windows: Kager 2012
Roles of faithfulness vs. markedness

- Markedness accounts must appeal to *ad hoc* constraints
  - $\mu 4$: “Assign one violation for each floating tone that does not surface four moras from its input location”

<table>
<thead>
<tr>
<th>/to-ra$^H_{-}[\omega \text{ roma}] [\omega \text{ eyet-\text{o-k}\text{e}}]/</th>
<th>4</th>
<th>H, R</th>
<th>ID-T</th>
<th>H</th>
<th>Obs</th>
<th>Pred</th>
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<tr>
<td>a. [[\omega \text{ toraroma}] [\omega \text{ eyet-\text{o-k}\text{e}}]]</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>b. \text{[}\omega \text{ toraroma} [\omega \text{ eyet-\text{o-k}\text{e}}]\text{]}</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

- In a theory of constraints, do we capture counting literally?
Extensions of Phantom Structure

• Neutralization from dominant tone
  ◦ In Kalabari, all nouns neutralized to [LH] in context of a demonstrative
  ◦ No trace of lexical tone contrast

• Tone-usurpers in Japanese
  ◦ If a root has a H tone, certain affixes will ‘usurp’ it, pulling it onto itself
  ◦ No effect if the root is toneless

• Morphological extensions
  ◦ Subcategorization generally (Kalin & Rolle *in press*)
  ◦ Infixation, 2nd position clitics, Morphotactics/Bigram effects

Wrapping up

A return to our question: Is tone different?
Summary

1. Starting point: Tension between representation (content and their geometric relations) and computation (input-output mapping)

2. Our case study was tone – Specifically the association of floating tone, which appear unanchored in the input

3. Examined two long-distance patterns
   a) Phonologically-driven Association – i.e. floating tone goes to a prominent position
   b) Targeted Association – i.e. tone to a numerically defined position, a counting effect
Summary

4. Phonologically-driven Association – Standard markedness constraints

5. Targeted Association – Posited new kind of three-dimensional representation called Phantom Structure, involving parallel substantive plane and phantom plane

6. Targeted Association emerges when 2 planes must be conflated, and Faithfulness to the position in the phantom plane is highly ranked → Competing Faithfulness
**TONE: How different?**

- **Our original question:** *How different is tone?*
  - No comparable counting effects in umlaut, stress, etc.

- **Combating segmental bias**
  - Incorporation of tone into linguistic theory outside of phonology proper sorely lags behind segmental counterparts

- ...tone has long been ignored in morphology textbooks...

- ...is only marginally discussed in morphology handbooks and overviews...

- ...and there is limited discussion of grammatical tone patterns akin to Kuria even in books dedicated to tone

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TONE: How different?

• Important to acknowledge that current sample of human language suffers from under-description:
  ◦ “Not more than 10-15 per cent of languages have been described comprehensively” (Comrie et al. 2005:3)

• The state of prosodic description and documentation (which includes tone) is much, much worse!
**TONE: How different?**

WALS map: Maddieson 2013; Data: Hammarström 2014:16 – See also Glottoscope on glottolog.org

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<td>Nigeria</td>
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<td>Bhutan</td>
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<td>Papua New Guinea</td>
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<td>Indonesia (Papua)</td>
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<td>Viet Nam</td>
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<td>Philippines</td>
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Thanks for listening!

References:
https://nicholasrolle.com/output

Acknowledgments: Thanks to Larry Hyman, Myriam Lapierre, Florian Lionnet, Dasha Kavitskaya, Hannah Sande, Jack Merrill, Sharon Inkelas, Laura Kalin, Zach O’Hagan, Ginny Dawson, and UCL linguistics for their invitation
Appendix 1: Extensions of Phantom Structure
Neutralization from Dominant tone

- **Dominant tone** in Ijoid family, e.g. Izon (Rolle 2021) and Kalabari (Harry & Hyman 2014)

- In Kalabari: All nouns neutralized to [LH] in context of a demonstrative – No trace of lexical tone contrast

<p>| | | | | | | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>a.</td>
<td>námá</td>
<td>‘meat’</td>
<td>H-H</td>
<td>→</td>
<td>mí námá</td>
<td>‘this animal’</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>pulo</td>
<td>‘oil’</td>
<td>L-L</td>
<td>→</td>
<td>mí pùló</td>
<td>‘this oil’</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>béle</td>
<td>‘light’</td>
<td>H-L</td>
<td>→</td>
<td>mí bèlé</td>
<td>‘this light’</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>garí</td>
<td>‘garri’</td>
<td>L-H</td>
<td>→</td>
<td>mí gàrí</td>
<td>‘this garri’</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>bà́ rá</td>
<td>‘hand’</td>
<td>H- H</td>
<td>→</td>
<td>mí bàrá</td>
<td>‘this hand’</td>
<td></td>
</tr>
</tbody>
</table>

Data from Harry & Hyman 2014; Dominance: Kiparsky & Halle 1977, Kiparsky 1984, Inkelas 1998; Dominant tone also called ‘Replacive Tone’ in Africanist literature -- Welmers 1973
Phantom structure extension I

- **Dominant tone** in Ijoid family, e.g. Izon (Rolle 2021) and Kalabari (Harry & Hyman 2014)

- In Kalabari: All nouns neutralized to [LH] in context of a demonstrative – No trace of lexical tone contrast

Data from Harry & Hyman 2014; Dominance: Kiparsky & Halle 1977, Kiparsky 1984, Inkelas 1998; Dominant tone also called ‘Replacive Tone’ in Africanist literature -- Welmers 1973
Japanese tone-usurpers

- **Tone-usurpers** in Japanese

- If a root has a H tone, certain affixes will ‘usurp’ it, pulling it onto itself – No effect if the root is toneless

Agentive Suffix *-te* (Poser 1984: 50)

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

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

Poser 1984:50; For related Japanese data, see Alderete 1999:228-229, Kawahara 2015:469
Phantom structure extension II

• Phantom floating tone counterpart
  ◦ Kuria patterns: Substantive tone to phantom mora
  ◦ Japanese tone-usurpers: Phantom tone to substantive mora
Phantom structure extension II

- H-toned stem
  - Input: káki-te  →  Output: kaki-té
Phantom structure extension II

- Toneless stem
  - Input: kiki-te → Output: kiki-te
Other extensions

• **Tone exchange rules** in Khoekhoe (‘Khoisan’)
  ◦ Causative causes tone values to switch (note: S=super high)
  ◦ /L/ → [LM] but /LM/ → [L]
  ◦ /M/ → [H] but /H/ → [M]
  ◦ /MS/ → [S] but /S/ → [MS]

• **Interwoven tones** in Kifuliiru (Bantu)
  ◦ $[\mu_1 \mu_2 \ldots \mu_P \mu_U] + [\mu_1 \mu_2 \mu^* \mu_P \mu_U] \rightarrow [\mu_1 \mu_2 \ldots \mu_P \mu_U]$ 

• **Morphological extensions**
  ◦ Morphological and prosodic subcategorization generally (Kalin & Rolle in press)
    ◦ (Infixation, 2nd position clitics, etc.)
  ◦ Morphotactics/Bigram effects

---

PS and subcategorization

• One prominent account of second position clitics is via prosodic subcategorization

• Latin $=que$ must be right-adjacent to a p-word ($\infty$)

  \[
  \text{diu} = \text{que} \quad \text{noctu} \quad \rightarrow \quad \text{diu noctuque}
  \]
  
  ‘by day and by night’

**PS and morphotactics**

- **Morphotactics**: The CARP template of Chichewa (Hyman 2003)
  - Linear order: [CAUS][APPL][RECIP][PASSIVE]
  - Scope: APPL > RECIP
    - mang-an-il- → mang-an-il-an-
    - tie-RECIP-APPL-tie-RECIP-APPL-RECIP
    - ‘tie each other for/at’ (*tie for each other)

- Extension to other templatic/bigram effects (Clem, Rolle, & Dawson *under revision*)
  - Phantom Structure predicts that it is always the **phantom morpheme which doubles**
Appendix 2:

Alternative representational account of Kuria
Against floating tone sequences

- \textit{to-ra^{\textcircled{H}}\text{-hootooter-a}} / \\
  \text{[ to-ra-hooto\text{o\text{\text{\text{\text{t}}}er-a} ]}

\begin{align*}
\mu & | \\
\bullet & | \\
\bullet & | \\
ra & |
\end{align*}

\begin{align*}
(\mu\mu\mu\mu\mu^* )_{\text{MS}}
\end{align*}

Hidden structure alternative:

\textit{ra^{LLLLH}}

\begin{align*}
\mu & | \\
\bullet & | \\
\bullet & | \\
ra & |
\end{align*}

\begin{align*}
(LLLH)
\end{align*}

Cammenga 2004, Trommer 2019
Against floating tone sequences

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

\[
\begin{align*}
\text{(12)} & \quad /o-\text{y}o-t\ddot{o}-k\ddot{o}^{H_2} - [\text{beregker-a}]_{MS}/ \quad \rightarrow \quad o-\text{y}o-t\ddot{o}-k\ddot{o} - [\text{beregker-\text{a}}]_{MS} \quad \text{‘to not call’}
\end{align*}
\]
Against floating tone sequences

• One possibility (suggested by J. Trommer): Add floating \( \text{L} \) 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 \( \text{L} \)
  ◦ *These* do not delete at the later stratum where H-tone spread happens
Against floating tone sequences

• Behavior of these (potential) \( \text{L} \) differs from “\( \text{L} \text{L} \text{L} \text{H} \)” alternative

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

Marlo et al. 2014:287
Against floating tone sequences

- Behavior of these (potential) \(\text{L}\) differs from “\(\text{L} \text{L} \text{L} \text{H}\)” 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)
  - \([\text{ta-βेrerэker-a}]\) ‘call!’ \([\text{tá-ry-à}]\) ‘eat!’

---

Marlo et al. 2014:280,287; \(\text{H}\) to first mora of stem in \(\text{ntoo-ryá}\) ‘indeed, we have already eaten’ (Untimed past anterior focused)
Against floating tone sequences

- Behavior of these (potential) \( L \) differs from “\( LLLLLH \)” 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)
  - \([\text{turuúngàn-a}]\) ‘welcome!’  \([\text{ry-à}]\) ‘eat!’

Marlo et al. 2014:288-289
Against floating tone sequences

- Behavior of these (potential) \( \text{L} \) differs from “\( \text{L} \text{L} \text{L} \text{H} \)” 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}]

Cf. \( \text{H} \) alone
[ntore-tɛrɛká] **only**

---

Marlo et al. 2014:282,288; \( \text{H} \) to third mora of stem in ntore-tɛrɛká ‘we will brew (then)’ (Remote future focused)
Appendix 3:

Miscellaneous
Whence comes PHONOLOGY?

(MORPHO-)SYNTAX:
word formation & phrase formation
(“syntax all the way down”)

Feature Lexicon
√101,√102,√103,…
[+a],[+b],[+c],…

Operations
Merge
Move
Agree
...

What happens if word is too short?

• If not enough moras in target domain, it goes into next word within the phonological phrase (φ)

• Inceptive – H to mora 4 – ‘we are about to _ a banana’
  ◦ to-ra-[karaaŋ-á] eyetőɔe → (torakaraaŋgá eyetóɔkɛ)φ ‘…fry…’
  ◦ to-ra-[sukur-a]  eyetőɔe → (torasukura eyetóɔkɛ)φ ‘…rub…’
  ◦ to-ra-[rom-a]  eyetőɔkɛ → (toraroma eyetóɔkɛ)φ ‘…bite…’
  ◦ to-ra-[ry-a]  eyetóɔkɛ → (torarya eyetóɔkɛ)φ ‘…eat…’
Feature geometries

- Feature Geometries as $3D\Phi$
- $/t\theta/ \rightarrow [\ddot{t}\ddot{\theta}]$

Clements 1985: 237; See also Sagey 1986, Cole 2018 [1991]
Phantom $\neq$ ghost segments

• Ghost/Latent segments refer to features which are unassociated to a root node in a representation.

• “The only thing that distinguishes latent segments from floating features in their realization then is that conventional floating features associate to an existing root node while latent segments associate to an epenthetic root node inserted only in certain phonological contexts” (Zoll 1996:34)

• What is distinct about phantom structure is that:
  ◦ It specifically does not emerge in all cases where it would be decrease markedness.
  ◦ It is not the first to delete to avoid markedness violations, as it literally never appears in any output.
3DΦ: Upper limits of representation

• “Single Melody Theory” of reduplication: Base and its reduplicant are underlyingly in parallel, not in sequence

• Tagalog CV reduplication:
  ◦ la-la:kad ‘walking’

Mester 1988:171ff. (see within for extensive references on similar ideas); Raimy 2000, Raimy & Cairns 2009