Locality and linguistic theory: The crucial role of African tone languages

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What makes human language HUMAN?

• **Received wisdom**: Capacity for language is unique to our species

• **Closing the species gap**: At this time, however, the communication practices of other species are becoming less exotic

• **Linguistics as a whetstone**: Linguistics is in a unique position for stating sharply and precisely which properties human languages share and which they lack
What makes human language *HUMAN*?

- **Architecture**: How is language structured?
- **Function**: How is language used?
- **Diversification**: How does language change over space and time?

Compare also Hockett’s design features of human language and the quest for universals (Hockett 1963, *inter alia*).
Architectural property: LOCALITY

• **Locality**: Consider a string (a b c d e)
  ◦ In many components of linguistic architecture: **Strictly local interactions**
  ◦ Essentially only between adjacent elements (e.g. a & b, or c & d, etc.)
• **Today**: Cases of non-local **long-distance interactions**
• Case study 1 – **Direct** long-distance effect:
  ◦ **Allomorphy** selection, i.e. (a b c d e) → (a b c d e)
• Case study 2 – **Indirect** long-distance effect:
  ◦ Unbounded modification, i.e. (a b c d e) → (a b' c' d' e')
Architectural property: LOCALITY

• Evidence:
  ◦ Linguistic tone, i.e. the use of pitch (high vs. low) to indicate distinct lexical and grammatical meanings
  ◦ Drawing from African tone languages

• Tone as special:
  ◦ Tone shows *looser locality restrictions*, and thus indispensable for theories of universal linguistic architecture

All languages in Africa: GlottoScope (https://glottolog.org/langdoc/status)
Roadmap

• **Part I: The theoretical backdrop** – The interface of syntax, morphology, and phonology

• **Part II: The empirical backdrop** – Tone systems in Sub-Saharan Africa

• **Part III: Tone meets theory** – Two case studies of long-distance effects

• **Part IV: Summary and discussion**
Part I: The theoretical backdrop

How do syntax, morphology, and phonology fit together in a unified model of linguistic architecture?
An intuitive idea: Collective bundles

- She was talking.

Early lexicalist work and various "incremental theories" (Lieber 1992; Stump 2001 for terminology); As well as several current theories, e.g. ‘Consolidated Morphology’ (Bruening 2017), ‘Contiguity Theory’ (Richards 2016), *inter alia*. 

- **Phonological features**
- **Syntactic features**
An intuitive idea: Collective bundles

• *She was talking.*

WARNING! Simplified tree

Early lexicalist work and various "incremental theories" (Lieber 1992; Stump 2001 for terminology); As well as several current theories, e.g. ‘Consolidated Morphology’ (Bruening 2017), ‘Contiguity Theory’ (Richards 2016), *inter alia*
Modular architecture

- In contrast: **Modular theories** of linguistic architecture
  - E.g. the **Y-model** (at right)
- Each **module** has its own **alphabet** (i.e. non-decomposable primitives) and **rules** for structure-building/structure-changing

Modular architecture

Syntax

SUBJECT
[prom.3.sg.fem]

TENSE
[BE.past.3.sg]

VERB
[VTALK]

ASPECT
[prog]

Phonology

/si/ /wʌz/ /tæk/ /-ŋ/

RQ1: How are syntactic features mapped to phonological exponents? What restrictions are there? E.g. why *she were* and not *her were*?
RQ2: What governs the linear order of these phonological exponents? What restrictions are there? E.g. why *talk-ing and not talk-*ing?
**RQ3: Grouping and constituency**

RQ3: What kinds of constituents do the exponents form? What restrictions are there?  
E.g. why \((\text{was})\) \((\text{talk-ing})\), not \(*(\text{was-talk})\) \((\text{ing})\)?
RQ4: Within phonology itself, which kinds of **phonological processes** are possible? What restrictions are imposed on these processes from syntax?

```plaintext
[pron.3.sg.fem]  [BE.past.3.sg]  [√TALK]  [prog]
```

```
/ʃi/ /wɔz/ /tak/ /-η/
```

```
[((ʃʷi)ə (wɔzə)ə (tʰaɾkəŋ)ə)]
```
Part II: The empirical backdrop

The rich world of pitch and tone in sub-Saharan Africa
The Story of Pitch

• Our primary vehicle for communication:
  ◦ Segments (consonants and vowels)

• Writing systems the world over are grounded by their underlying segmental systems
  ◦ Latin (alphabet): ka ki ku ke ko
  ◦ Tamil (abugida): கா கி கு கெ கொ
  ◦ Japanese (syllabary): か き く け こ

https://opentextbc.ca/psyclanguage/chapter/writing-systems/
The Story of Pitch

- A less storied protagonist of spoken communication: **Pitch**
  - “the *rate of vibration* of the *vocal cords* during voice production”
  - **Lower pitch**: slower and less stretched vocal cords (a.k.a. vocal folds)
  - **Higher pitch**: faster and more stretched vocal cords

Definition from Ohala 1978:6; Diagram from [https://www.uvmhealth.org/healthwise/topic/zm6118](https://www.uvmhealth.org/healthwise/topic/zm6118), (c) 2021 Healthwise
The Story of Pitch

• The linguistically structured manipulation of pitch is a true linguistic universal

• Two broad types: non-tonal languages vs. tone languages

• Non-tonal languages prototypically use pitch for emphasis (types of focus and topic), and to indicate sentence-level meaning (e.g. statements vs. questions)

• Intonation in English
  ◦ Anna (question) vs. Anna (answer) vs. Anna (calling) vs. Anna (continuation) vs. ...
The Story of TONE

• In contrast, approximately half the world’s languages are **tone languages**, which use pitch to distinguish individual words and morphemes

• **Pitch**: Measurable and independent of grammar
  ◦ Phonetic, physiological, acoustic, gradient

• **Tone**: An instantiation of pitch within grammar
  ◦ Phonological, meaningful, relative, categorical

The Story of TONE

• Perhaps the most famous example is Mandarin Chinese
• Tone contrasts with identical syllable ma
  ◦ High [5] mā ‘mother’
  ◦ Mid-Rise [35] má ‘hemp’
  ◦ Dip-Rise [214] mǎ ‘horse’
  ◦ Sharp fall [51] mà ‘scold’
The Story of TONE

WALS tone map: https://wals.info/feature/13A#2/19.3/152.9 (Maddieson 2013)
The Story of TONE

- Cilungu lexical tone
  - H kál- ‘cut skin’
  - L kàl- ‘buy’
  - H lúk- ‘vomit’
  - L lùk- ‘weave’
  - H súl- ‘forge’
  - L sùl- ‘break wind’
  - H léng- ‘beg’
  - L lèng- ‘draw’
  - H ómb- ‘work’
  - L òmb- ‘get wet’ etc.

- Cilungu grammatical tone with verb sukïlîl- ‘accompany’
  - ‘and then they started to accompany’
    H-H-HHH-L [yá-á-súkïlîl-à]
  - ‘they have just accompanied’
    H-H-HLL-H [yá-á-súkîlîl-á]
  - ‘they have already accompanied’
    H-H-LHH-H [yá-á-sûkîlîl-á]
  - ‘let them start accompanying’
    H-L-LLL-L [yá-à-sûkîlîl-à]

Cilungu data from Bickmore 2007, 2014
A personal journey through tone

• Virtually all African tone languages exhibit some grammatical tone (Hyman, Sande, Lionnet, Rolle, & Clem 2021)

• Rolle (to appear [2025]): First dedicated book on grammatical tone
A personal journey through tone

Wamey (Rolle & Merrill 2023)
Limba (Rolle, Hyman, Mansaray, & Kamara in prep.)
Esan (Rolle 2010, 2012, in prep.)
Urhobo (Rolle 2013)
Izon (Rolle 2018, 2021)
Degema (Rolle & Kari 2016, Rolle 2020, Rolle & Kari 2022)
Kalabari (Rolle & Harry 2024 [forthcoming])

Blue = my original fieldwork
Orange = collaboration with language specialists
Red = using existing materials

- Ebira (Rolle 2022)
- Ghomala’ (Rolle 2024 [forthcoming])
- Kuria (Rolle & Lionnet 2020)
- Makonde (Rolle & Hyman 2019)
- Cilungu (Rolle & Bickmore 2022)
- Khoekhoe (Rolle in prep.)

Map from GlottoScope (https://glottolog.org/langdoc/status)
Part III: Tone meets theory

Two cases studies of long-distance effects in tone languages
Case study I: Long-distance morphology involving tone
Allomorphy and locality

- A morpheme may have multiple allomorphs
  - Items with the exact same meaning but different forms
  - Indefinite marker *a* /ə/ (e.g. *a bird*) vs. *an* /ən/ (e.g. *an eagle*)
- What factors condition which form gets inserted?
  - Much linguistic theory has shown that locality relations play a crucial role in constraining possible allomorphic patterns
Allomorphy and locality

- [d] [f] [ʧ] [k]
  A { dog, fish, cheetah, crazed elephant, ... }

- [æ] [ɛ] [aʊ] [ɪ]
  An { axe, elephant, hour, illustrious fish, ... }

- * [ɡ] [ʃ] [s]
  A { dog, fish, affix, ... }

- * [ə] [ɔ] [i]
  An { cheetah, mango, doggy, ... }
Enter Cilungu

• African tone languages show just such a case, involving non-local tonal allomorphy

• Enter Cilungu [mgr] – Bantu language, Zambia and Tanzania (Bantu Zone M14)

• Analysis is from Rolle & Bickmore (2022)
Cilungu tonal inflection

- Cilungu grammatical tone with verb sukilil ‘accompany’
  - Past inceptive: ‘and then they started to accompany’
  - H-H-HHH-L [yá-á-súkílíl-à]
  
  - Recent perfect: ‘they have just accompanied’
  - H-H-HLL-H [yá-á-súkílíl-á]
  - Remote perfect: ‘they have already accompanied’
  - H-H-LHH-H [yá-á-súkílíl-á]
  - Hortative: ‘let them start accompanying’
  - H-L-LLL-L [yá-à-súkílíl-à]

Data from Bickmore 2014
Cilungu tonal inflection

- Tense/Aspect/Mood (TAM) inflection

Remote Perfect TAM: [yá-á-sùkílíl-á] ‘they have already accompanied’
Cilungu tonal inflection

- Tense/Aspect/Mood (TAM) inflection

Remote Perfect TAM: [yá-á-sùkílíl-á] ‘they have already accompanied’
Cilungu tonal inflection

- **Tense/Aspect/Mood (TAM) inflection**
  - ❶ Prefixes before the root, but after AGREEMENT (AGR)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yá-</td>
</tr>
<tr>
<td>[VERB</td>
<td>AGR-</td>
</tr>
<tr>
<td>they</td>
<td>already</td>
</tr>
</tbody>
</table>

Remote Perfect TAM: [yá-á-sùkílíl-á] ‘they have already accompanied’
Cilungu tonal inflection

- **Tense/Aspect/Mood (TAM) inflection**
  - 1 - Prefixes before the root, but after AGREEMENT (AGR)
  - 2 - Suffixes after the root

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td></td>
<td>yá-</td>
<td>a-</td>
</tr>
<tr>
<td>[VERB</td>
<td>AGR-</td>
<td>TAM-</td>
</tr>
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<td></td>
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Remote Perfect TAM: [yá-á-sùkílíl-á] ‘they have already accompanied’
### Cilungu tonal inflection

**Tense/Aspect/Mood (TAM) inflection**

1. Prefixes before the root, but after AGREEMENT (AGR)
2. Suffixes after the root
3. Grammatical tone (GT) targeting a position in the STEM

### Table

<table>
<thead>
<tr>
<th>[VERB]</th>
<th>[AGR]</th>
<th>[TAM]</th>
<th>[STEM]</th>
<th>[ROOT]</th>
<th>[TAM]</th>
<th>[GT]</th>
</tr>
</thead>
<tbody>
<tr>
<td>they</td>
<td>already</td>
<td>accompany</td>
<td>already</td>
<td>already</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remote Perfect TAM: `[yá-á-sùkílíl-á]` ‘they have already accompanied’
# Cilungu tonal inflection

- All inflections have **1 of 4 Grammatical Tone ‘melodies’**

<table>
<thead>
<tr>
<th>GT</th>
<th>Representative</th>
<th>Description</th>
<th>Example Stem Inflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT-0</td>
<td>Ø</td>
<td>No grammatical tone</td>
<td>V [STEM V V V V ]</td>
</tr>
<tr>
<td>GT-1</td>
<td>Ⓜ</td>
<td>High on final vowel of stem</td>
<td>V [STEM V V V ́ ]</td>
</tr>
<tr>
<td>GT-2</td>
<td>Ⓜ</td>
<td>High on 2nd vowel of stem</td>
<td>V [STEM ́ V V V ]</td>
</tr>
<tr>
<td>GT-3</td>
<td>Ⓜ</td>
<td>High from 2nd to final vowel</td>
<td>V [STEM ́ V ́ V ́ ]</td>
</tr>
</tbody>
</table>

- While exotic, think of different GTs like inflectional suffixes
  - GT-0 Ø ≈ “-a”
  - GT-1 Ⓜ ≈ “-e”
  - GT-2 Ⓜ ≈ “-i”
  - GT-3 Ⓜ ≈ “-o”
GT allomorphy

- Most TAM inflections show consistent GT in all contexts...
  - i.e. **no allomorphy**

<table>
<thead>
<tr>
<th>TAM name</th>
<th>Prefixes</th>
<th>... Suffixes</th>
<th>GT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past Inceptive</td>
<td>aa-</td>
<td>...</td>
<td>-a</td>
</tr>
<tr>
<td>Contrastive Habitual</td>
<td>ma-áa-</td>
<td>...</td>
<td>-a</td>
</tr>
<tr>
<td>Potential</td>
<td>Ø ngá-</td>
<td>...</td>
<td>-a</td>
</tr>
<tr>
<td>Far Past</td>
<td>a-</td>
<td>... -il -e</td>
<td>$\mathbb{H}^{2-F}$</td>
</tr>
<tr>
<td>Far Past Progressive</td>
<td>a-</td>
<td>... -ang -a</td>
<td>$\mathbb{H}^{2-F}$</td>
</tr>
</tbody>
</table>
GT allomorphy

...but a small number show contextual GT allomorphy

- Comparable to the *a/an* allomorphy of English

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<th>...</th>
<th>Suffixes</th>
<th>GT</th>
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<tr>
<td><em>Past Inceptive</em></td>
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<td>...</td>
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<td>...</td>
<td>-a</td>
<td>ÔF</td>
</tr>
<tr>
<td><em>Far Past</em></td>
<td>a-</td>
<td>...</td>
<td>-il -e</td>
<td>Ô2-F</td>
</tr>
<tr>
<td><em>Far Past Progressive</em></td>
<td>a-</td>
<td>...</td>
<td>-ang -a</td>
<td>Ô2-F</td>
</tr>
<tr>
<td><em>Perfect</em></td>
<td></td>
<td>-il</td>
<td>-e</td>
<td>Ô2-F / Ô2</td>
</tr>
<tr>
<td><em>Yesterday Past</em></td>
<td>á-</td>
<td>...</td>
<td>-il -e</td>
<td>ÔF / Ø</td>
</tr>
<tr>
<td><em>Recent Past</em></td>
<td>á-cí-</td>
<td>...</td>
<td>-il -e</td>
<td>ÔF / Ô2</td>
</tr>
</tbody>
</table>

GT allomorphy exemplified

• Recent past ‘_ed recently’: á- + cí- + -il + -e + \( \overline{F} / \overline{2} \) (GT-1 / -2)

• High-toned agreement markers condition one GT allomorph
  ◦ \( \text{tu}-\text{á-cí-sópolol-il-e} \) \( \overline{F} \rightarrow \text{tu}-\text{á-cí-[sópolol-il-é]} \)
  ◦ \( \text{AGR-TAM-recent-untie-TAM-TAM} \) GT ‘we recently untied’

• Toneless agreement marker condition another GT allomorph
  ◦ \( \text{u}-\text{á-cí-sópolol-il-e} \) \( \overline{2} \rightarrow \text{u}-\text{á-cí-[sópolol-il-e]} \)
  ◦ \( \text{AGR-TAM-recent-untie-TAM-TAM} \) GT ‘he/she recently untied’
Non-locality between trigger & target

- Recent past ‘-ed recently’
  - \(H \ H \ H \ H \ \{HF\}^F\)
  - \(tú-á-cí-sópolol-il-é\) ‘we recently untied’
  - \(H \ H \ H \ \{H\}^2\)
  - \(u-á-cí-sópolol-il-e\) ‘he/she recently untied’

- Non-local when measured in terms of segments or tones!
Recall RQ1

- **First Research Question (RQ1):**
  - How are syntactic bundles mapped to phonological *exponents*? And what restrictions are there?
  - E.g. in *she was talking*, why *she was* and not *her were*?

- Current morphological theory (e.g. Embick 2015)
  - **Vocabulary Pairings (or Vocabulary Items):** “phonological exponents ... are paired with conditions on insertion, stated in terms of [syntactic] features.”

Quote from Embick 2015
Allomorphy and vocabulary pairings

- English indefinite *a/an*, again
Allomorphy and vocabulary pairings

- English indefinite *a/an*, again

```
[indef] ↔ an / _V
[indef] ↔ o
```

Syntax → Phonology

Spell-out
Allomorphy and vocabulary pairings

- Recent past ‘-ed recently’: á- + cí- + -il + -e + \( \hat{H}^F / \hat{H}^2 \)

Vocabulary pairings

\[
\begin{align*}
\text{recent.past} & \quad \leftrightarrow \quad \hat{H}^F / (H \ldots \_ )\omega \\
\text{recent.past} & \quad \leftrightarrow \quad \hat{H}^2 \\
\ldots & \quad \leftrightarrow \quad \\end{align*}
\]

Syntax

Phonology

Spell-out
Case study I: Interim summary

• This first case study involved **long-distance allomorphy**
• Cases of allomorphy typically involve **strict adjacency** between target and trigger (e.g. *a/an* conditioned by adjacent segment)
• However, my research shows evidence from an African tone language **Cilungu** that this is **too restrictive** as a universal principle
• In Cilungu, tone value at **beginning** of word (the **trigger**) may dictate grammatical tone allomorph at **end** of word (the **target**)
• Allomorphy is still **restricted** to the **word-domain** ( )
• **Implication for linguistic theory**: Locality domains still exist, but are not necessarily based on strict adjacency (e.g. here, word-based)
Case study II: Long-distance phonology involving tone
Long-distance phonology

• Hungarian Front/Back Vowel Harmony
  ◦ A partial paradigm of the **present conditional**

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<td>várnátok</td>
<td>várnának</td>
</tr>
<tr>
<td>/vaːr/</td>
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<td>[vaːr-naː-tok]</td>
<td>[vaːr-naː-nɔk]</td>
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<tr>
<td>tör</td>
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Data from Törkenczy 2011 (these forms are also ‘indefinite’)


Long-distance phonology

- Hungarian Front/Back Vowel Harmony
  - A partial paradigm of the present conditional

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Data from Törkenczy 2011 (these forms are also ‘indefinite’)
Long-distance phonology

• Hungarian Front/Back Vowel Harmony: **Word-bound**
  ◦ *tőlük még várnának* néhány megnyugtató mondatot és gesztust a jövőben arról
  ◦ “they would still expect some reassuring words and gestures from them about it in the future”
• […*vaːr-naː-nɔk neːʃaːŋ meɡ-nuktɔtɔ: mondɔtɔt eʃ gestustɔ tɔ jøvɔːben ɔɾːɔ]:]
Long-distance phonology

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  - tőlük még *várnának* néhány megnyugtató mondatot és gesztust a jövőben arról
  - “*they would still expect* some reassuring words and gestures from them about it in the future”

- [*... vaːr-nəː-ːnk neʃɑːɲ meɡ-ɲuktɔtɔː: mondɔtɔt eːʃ gestuʃt c jøvøːben ɔɾːɔːl]*

- [*... vaːr-nəː-ːnk naʃɑːɲ meɡ-ɲuktɔtɔː: mondɔtɔt aːʃ gestuʃt c jøvøːben ɔɾːɔːl]*
Unlike vowels, exactly such sentence-level effects are **found for tone**.

Consider the Orungu dialect of Myeni (spoken in Gabon).

**Local effect:** The imperative – ‘Leave the children alone tonight!’
- \[ \text{V O Adv Adv} \]
- \[ \text{ɾìɣà-} \]
- \[ \text{áwáná áŋkà yó Ŭŋkólo} \]
- leave\(\text{\text{INFL-}GT}\) children alone tonight
- \[ \text{→ [ɾìɣ áwán áŋkà yó Ŭŋkólo]} \]

**Long-distance:** Neg. imp. – ‘Do not leave the children alone tonight!’
- \[ \text{V O Adv Adv} \]
- \[ \text{à-} \]
- \[ \text{ɾìɣà} \]
- \[ \text{áwáná áŋkà yó Ŭŋkólo} \]
- NEG-\(\text{\text{GT-}}\)leave\(\text{\text{INFL}}\) children alone tonight
- \[ \text{→ [à-ɾìɣ áwán áŋkà yó Ŭŋkólo]} \]
Fieldwork on Ijoid

- Ijoid language family of southern Nigeria
  - Often referred to simply as “Ijaw”/“Ijo”

- Located throughout the mangroves of the rich Niger Delta region

- Isolate family: Not demonstrably related to any other language family
Fieldwork on Ijoid

- Collaboration on Kalabari language [ijn] with Prof. Otelemate Harry (The University of the West Indies, Mona, Jamaica)
  - Rolle & Harry forthcoming [2024]

- Original fieldwork on Izon language [ijc] (Gbarain dialect), collaborating with Mr. Jumbo Gift (University of Port Harcourt)
  - Rolle 2018, Rolle 2021

- Despite large speaker populations (500,000 to 1,000,000 each), the languages are definitely endangered due to a shift to Nigerian Pidgin English and Standard English
Dominant vs. non-dominant tone

• Data from Kalabari

(1) Dominant: .sprite 'this'  

(2) Non-dominant:  sprite IMPERATIVE
Dominant vs. non-dominant tone

- Data from Kalabari

(1) Dominant: ℹ️ʜ ℎ ‘this’

(2) Non-dominant: ʜ ℹ️ IMPERATIVE

<table>
<thead>
<tr>
<th>HH</th>
<th>námá ‘meat’</th>
<th>kúró ‘fall’</th>
</tr>
</thead>
<tbody>
<tr>
<td>LL</td>
<td>pùlò ‘oil’</td>
<td>lègì ‘sit’</td>
</tr>
<tr>
<td>HL</td>
<td>bélé ‘light’</td>
<td>bámà ‘punish’</td>
</tr>
<tr>
<td>LH</td>
<td>gàrì ‘garri’</td>
<td>dùkó ‘tell’</td>
</tr>
<tr>
<td>H+H</td>
<td>bá‘rá ‘hand’</td>
<td>ɔ́ló ‘hold’</td>
</tr>
</tbody>
</table>

Data: Harry & Hyman 2014
Dominant vs. non-dominant tone

- Data from Kalabari

<table>
<thead>
<tr>
<th>Dominant: △○</th>
<th>Non-dominant: ○△</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH</td>
<td>námá ‘meat’ → mí nàmá ‘this meat’</td>
</tr>
<tr>
<td>LL</td>
<td>pùlò ‘oil’ → mí pùló ‘this oil’</td>
</tr>
<tr>
<td>HL</td>
<td>bèlè ‘light’ → mí bèlé ‘this light’</td>
</tr>
<tr>
<td>LH</td>
<td>gàrì ‘garri’ → mí gàrì ‘this garri’</td>
</tr>
<tr>
<td>H'H</td>
<td>bá’rá ‘hand’ → mí bàrá ‘this hand’</td>
</tr>
</tbody>
</table>

Data: Harry & Hyman 2014
# Dominant vs. non-dominant tone

- Data from Kalabari

<table>
<thead>
<tr>
<th>(1) Dominant: [Henry] ‘this’</th>
<th>(2) Non-dominant: [Henry] IMPERATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacive/Neutralizing</td>
<td>(Can show long-distance effects)</td>
</tr>
<tr>
<td>HH  námá ‘meat’ → mí nàmá ‘this meat’</td>
<td>kúró ‘fall’</td>
</tr>
<tr>
<td>LL  pùlò ‘oil’ → mí pùló ‘this oil’</td>
<td>lègì ‘sit’</td>
</tr>
<tr>
<td>HL  bèlè ‘light’ → mí bèlé ‘this light’</td>
<td>bámà ‘punish’</td>
</tr>
<tr>
<td>LH  gàrì ‘garri’ → mí gàrì ‘this garri’</td>
<td>dùkó ‘tell’</td>
</tr>
<tr>
<td>H+H bá‘rá ‘hand’ → mí bàrá ‘this hand’</td>
<td>ọ́ló ‘hold’</td>
</tr>
</tbody>
</table>

Data: Harry & Hyman 2014
Dominant vs. non-dominant tone

- Data from Kalabari

<table>
<thead>
<tr>
<th>Dominant: ⓐ�фессионаl ‘this’</th>
<th>Non-dominant: ⓐ�شهاد IMPERATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Dominant</td>
<td>(2) Non-dominant</td>
</tr>
<tr>
<td>Replacive/Neutralizing</td>
<td>(Can show long-distance effects)</td>
</tr>
</tbody>
</table>

| HH | námá ‘meat’ → mí nàmá ‘this meat’ | kúró ‘fall’ → kúrô ‘fall!’ |
| LL | pùlò ‘oil’ → mí pùló ‘this oil’ | lègì ‘sit’ → lègî ‘sit!’ |
| HL | bélè ‘light’ → mí bèlé ‘this light’ | bámà ‘punish’ → bá’mâ ‘punish!’ |
| LH | gàrí ‘garri’ → mí gàrì ‘this garri’ | dùkó ‘tell’ → dûkô ‘tell!’ |
| H'H | bá‘rá ‘hand’ → mí bàrá ‘this hand’ | ɔ́l ‘hold’ → ɔ́l ‘hold!’ |
Dominant vs. non-dominant tone

- Data from Kalabari

<table>
<thead>
<tr>
<th></th>
<th>Dominant: ⬃⃝ ⬇ ⬃ ⬇</th>
<th>Non-dominant: ⬇ ⬃ ⬇ ⬇</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacive/Neutralizing</td>
<td>Concatenative/Non-neutralizing</td>
<td></td>
</tr>
<tr>
<td>(Can show long-distance effects)</td>
<td>(Show only local effects)</td>
<td></td>
</tr>
<tr>
<td>HH</td>
<td>námá ‘meat’ → mí nàmá ‘this meat’</td>
<td>kúró ‘fall’ → kúrô ‘fall!’</td>
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<td>pùlò ‘oil’ → mí pùló ‘this oil’</td>
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</tr>
<tr>
<td>HL</td>
<td>bèlé ‘light’ → mí bèlé ‘this light’</td>
<td>bámà ‘punish’ → bá⁺mâ ‘punish!’</td>
</tr>
<tr>
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<td>gàrí ‘garri’ → mí gàrá ‘this garri’</td>
<td>dùkó ‘tell’ → dùkô ‘tell!’</td>
</tr>
<tr>
<td>H⁺H</td>
<td>bá’rá ‘hand’ → mí bàrá ‘this hand’</td>
<td>ốló ‘hold’ → ốlô ‘hold!’</td>
</tr>
</tbody>
</table>

Data: Harry & Hyman 2014
Dominant tone long-distance effects

- **Izon (Rolle 2021)** – Modifier inè.CreateInstance(1,0) ‘my’ triggers tone replacement
  - inè.CreateInstance(1,0) námá → inè námá ‘my meat’
  - inè.CreateInstance(1,0) bùrù → inè bùrú ‘my yam’
  - inè.CreateInstance(1,0) ínkì → inè ínkí ‘my ink’
  - inè.CreateInstance(1,0) íngó → inè íngó ‘my fish trap’
- Target is head noun and anything between trigger (i.e. inè ‘my’) and head noun
  - inè.CreateInstance(1,0) gbèèkì bùrù → inè gbèèkì bùrú ‘my short yam’
  - inè.CreateInstance(1,0) tārà dìbà bùrù → inè tārà dìbá bùrú ‘my three big yams’
  - inè.CreateInstance(1,0) tārà dìbà kúlúkúlú bùrù → inè tārà dìbá kúlúkúlú bùrú ‘my three big black yams’
Dominant tone long-distance effects

• The A class – Sponsors .ListBox
  ◦ đìbàListBox námá k<ul>ú</ul> k<ul>ú</ul> k<ul>ú</ul> t<ul>bì</ul> → [đìbà nâmà k<ul>ú</ul> k<u>ú</u> k<ul>ú</ul> tìbì] ‘a big animal’s black head’
  ◦ big animal black head

• The B class – Sponsors ListBox
  ◦ k<ul>ú</ul> k<ul>ú</ul> k<ul>ú</ul> obòrì pìná tìbì → [k<ul>ú</ul> k<ul>ú</ul> k<ul>ú</ul> obòrì pìná tìbì] ‘a black goat’s white head’
  ◦ black goat white head

• The C class – Sponsors ListBox
  ◦ pìnáListBox obòrì k<ul>ú</ul> k<ul>ú</ul> k<ul>ú</ul> tìbì → [pìná obòrì k<ul>ú</ul> k<ul>ú</ul> k<ul>ú</ul> tìbì] ‘a white goat’s black head’
  ◦ white goat black head
Recall RQ4

• Fourth Research Question (RQ4):
  ◦ Within the phonological module, which kinds of phonological processes are possible? And what restrictions are there, especially those imposed from syntax?

• One major restriction on long-distance tone effects in Izon and Kalabari:
  ◦ It cannot replace any tones after the lexical head
Restrictions on long-distance tone

• Pre-modifiers in Izon
  ◦ Mod1    Mod2    Noun
  ◦ ìnèclarations tárà società → ìnè tárà società
  ◦ my      three    yam          ‘my three yams’

• Post-modifiers in Izon
  ◦ Mod1    Noun    Mod2
  ◦ ìnèclarations società bì       → ìnè società bì         (Cf. * ìnè società bì)
  ◦ my      yam      the          ‘the yam of mine’
Dominance tracks syntactic hierarchy

• Mod1  Mod2 Noun
  • my  three  yam

• Mod1  Noun  Mod2
  • my  yam  the
Dominance tracks syntactic hierarchy

- Mod1 Mod2 Noun
- my three yam

- Mod1 Noun Mod2
- my yam the
The Dominant Tone Asymmetry

• The Dominant Tone Asymmetry (Rolle 2018)

° Non-dominant tone can affect in any direction
° Dominant tone can only affect morphosyntactic lower constituents

Case study II: Interim summary

- This second case study involved **long-distance phonology**
- **Most cases** of long-distance phonology are **word-bound**, e.g. vowel harmony in Hungarian
- However, based in part of original **fieldwork on Ijoid** family in Nigeria, **dominant grammatical tone** patterns show spreading which go beyond the word (replicated across African languages)
- A major restriction on this spreading: ‘**Dominant Tone Asymmetry**’
  - These long-distance phonological patterns are unbounded going **down** the syntactic tree, but it is restricted from going **up** the syntactic tree
- **Implication for linguistic theory**: Underlying syntax constrains the kinds of phonological patterns seen in natural language
Part IV: Summary and discussion
General summary

- We examined the issue of **locality** within linguistic patterns
  - In a string \((a\ b\ c\ d\ e)\), interactions of \(a\ &\ b\) are local but \(a\ &\ c\) are non-local
- We examined two cases of non-local **long-distance interactions**
  - Case study 1 – **Direct** long-distance effect within **morphology**:
    Allomorphy selection, i.e. \((a\ b\ c\ d\ e)\rightarrow(a\ b\ c\ d\ e)\)
  - Case study 2 – **Indirect** long-distance effect within **phonology**:
    Unbounded modification, i.e. \((a\ b\ c\ d\ e)\rightarrow(a\ b'\ c'\ d'\ e')\)
- Our evidence came from linguistic **tone**, as it is used to **express grammatical meanings** on par with prefixes and suffixes in other languages
- We showed that **tone is special**: Tone shows **looser locality restrictions**, and is thus indispensable for theories of universal linguistic architecture
  - **Why is tone special?** Ask me during the question period**
Discussion point: The ‘Scientific Dance’

• Restrictive *theories* make empirical *predictions* about what is possible in language, which require rigorous empirical testing

• Novel empirical *findings* cause us to retract, adjust, and/or expand the restrictiveness of our theories
Discussion point: The ‘Scientific Dance’

- These research projects establish **two hypotheses** for future work
  - 1) Phonologically-conditioned non-local allomorphy is word-bound (i.e. the relevant locality domain is the word)
  - 2) Long-distance dominant grammatical tone cannot replace tone of elements in positions ‘upward’ in the syntactic tree
- Both of these hypotheses are **testable** and **falsifiable**
Discussion point: Linguistic ‘myopia’

- **Linguistic myopia:**
  - Grammatical tone can only affect the **edge** of that structure which is syntactically higher
  - It is **never dominant upward** (i.e. never unboundedly replacive)
  - Thus, its **upward view is myopic** – Can only ‘see’ what is adjacent

- We can see linguistic myopia in **morphological patterns** as well

Discussion point: Linguistic ‘myopia’

• We saw phonologically-conditioned non-local allomorphy in Cilungu

  ◦ u-á-cí-sópolol-il-e  \( \Upsilon^2 \) → u-á-cí-sópolol-il-e
  ◦ AGR-TAM-recent-untie-TAM-TAM  GT  ‘he/she recently untied’

• Syntactic locality requirement

  ◦ Allomorphy is blocked when negation syntactically intervenes between the trigger (agreement) and the target (tense/aspect)

  ◦ * a-tá-á-cí-sópolol-il-e  \( \Upsilon^2 \)
  ◦ AGR-NEG-TAM-recent-untie-TAM-TAM  GT  ‘he/she didn’t recently untie’

• Instead, different GT allomorphy is conditioned by negation
Discussion point: Linguistic ‘myopia’

- Theoretical literature suggests a syntactic hierarchy:
  - AGR > NEG > TENSE > ASPECT

- Morpho-syntactic myopia:
  - Thus it appears that a syntactic element intervening may disrupt phonologically-conditioned non-local allomorphy
  - I.e. TENSE and ASPECT cannot access beyond the local head NEG to the non-local head AGR

A unified theory of locality must involve restricted access at spell-out
- Access to anything downward
- But only one element upward

This restriction dictates:
- What the triggers of allomorphy can be (involved in non-local morphology)
- What phonological domains can be formed (resulting in long-distance grammatical tone effects)

Cf. Božič 2018, 2019, which argues for less restricted access upward
Finally, much to discover yet …

• Regardless of theoretical challenges, two things remain true
  ◦ Tone is unique in showing the ‘outer limits’ of what is possible in phonology and its interfaces with other parts of grammar
  ◦ Low-resource minority languages continue to play an outsized role in our theoretically-oriented pursuits

• Important note: Our current sample of human language suffers tremendously from under-description and under-documentation, especially of tone languages and the tone systems contained within

• “Not more than 10-15% of languages have been described comprehensively”, most of which are not tone languages

Quote: Comrie et al. 2005:3
Finally, much to discover yet ...
Thank you for listening!

References:
www.nicholasrolle.com