Logoori verb tones
and the role of morphophonology

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Overview

- Logoori has two verb classes, distinguished by tone melodies throughout the TMA paradigm:

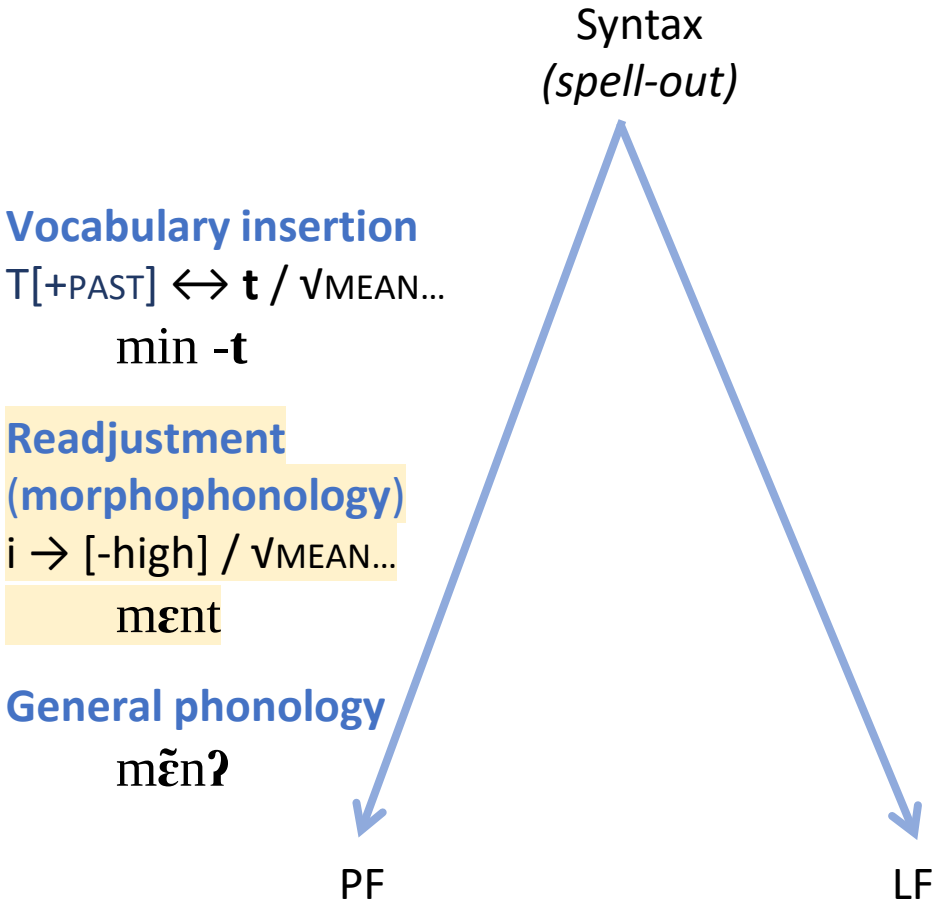
		‘fly’		‘take’	
a.	infinitive	-bʊrʊk-a	LLL	-vʊ́gʊr-a	HLL
b.	imperative	bʊrʊk-a	LLL	vʊgʊ́r-á	LHH
c.	consecutive	-bʊ́rʊ́k-a	HHL	-vʊgʊ́r-á	LHH
d.	neg. subjunctive	-bʊ́rʊ́k-a	HHL	-vʊgʊr-a	LLL
e.	middle future	-bʊ́rʊ́k-í	HHH	-vʊ́gʊ́r-í	HHH
f.	remote past	-bʊ́rʊk-a	HLL	-vʊ́gʊr-a	HLL

- We’ll see that we can analyze this pattern in a primarily **piece-based** way…
- Do we also need to invoke morpheme-specific phonology (**morphophonology**)?

Overview

- I'll be assuming a Distributed Morphology architecture and rule-based phonology (Halle & Marantz 1993, etc.)
- But my question transcends many theories + models…

> Can a **morpheme** induce a **phonological** change?
>
> Can **phonology** be conditioned by morphosyntactic information?

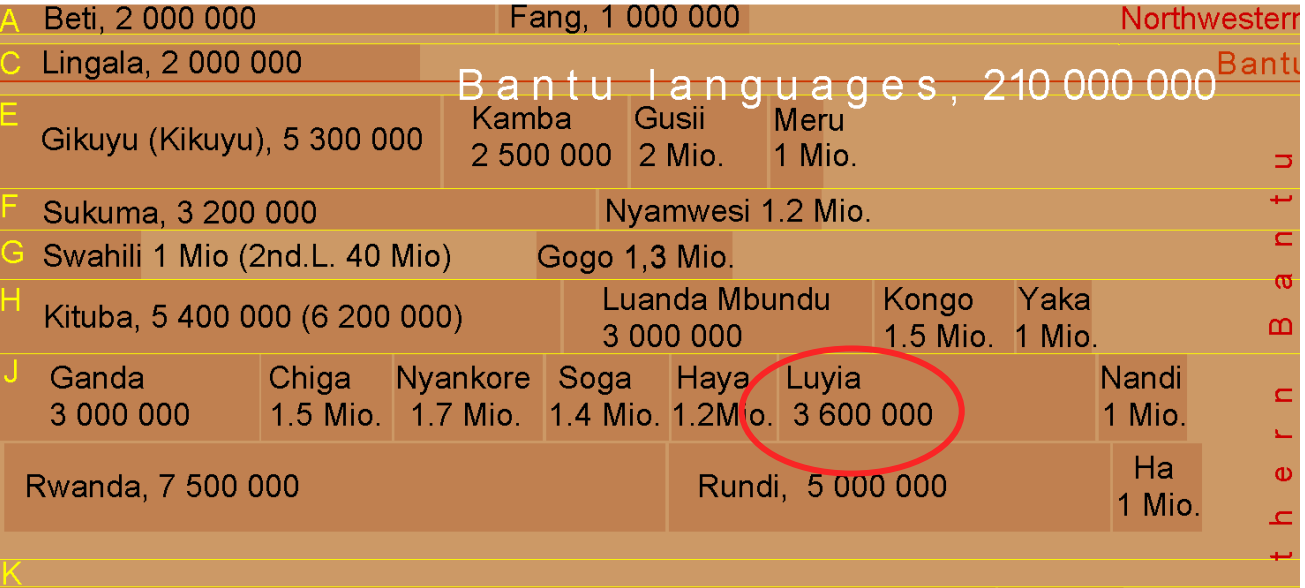


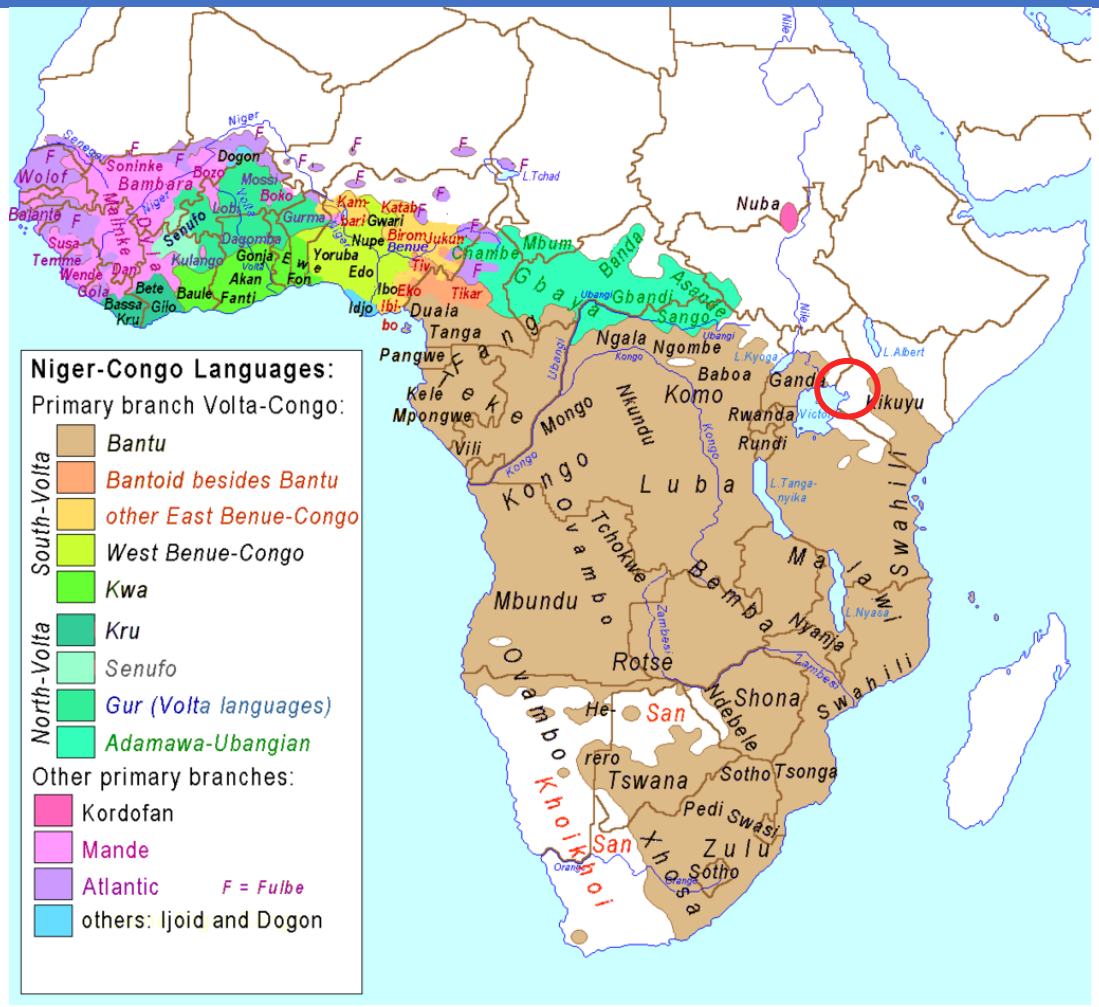
Roadmap

1. Logoori background
2. Previous analyses with morphophonological H—> L
3. Thoughts on morphophonology
4. Reanalysis without H—> L
5. Exceptional verb melodies
6. Concluding thoughts

‘fly’		‘take’	
-bʊrʊk-a	LLL	-vʊ́gʊr-a	HLL
bʊrʊk-a	LLL	vʊgʊ́r-á	LHH
-bʊ́rʊ́k-a	HHL	-vʊgʊ́r-á	LHH
-bʊ́rʊ́k-a	HHL	-vʊgʊr-a	LLL
-bʊ́rʊ́k-í	HHH	-vʊ́gʊ́r-í	HHH
-bʊ́rʊk-a	HLL	-vʊ́gʊr-a	HLL

- Lulogooli, Maragoli, Llogoori, pop. ~300K
- Bantu > Luyia (Lacustrine)
- previous work by Leung 1986; Goldsmith 1991; recent NSF-funded work on Luyia (Marlo, Odden, Carstens, Green, Diercks, Ebarb, Paster, etc.)
  - many examples here are from Odden (2018), 'Tonal melodies on the Logoori verb'





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https://en.wikipedia.org/wiki/Niger%E2%80%93Congo_languages#/media/File:Niger-Congo_speakers.png

General tonology (Odden 2018:73, Marlo 2009, Goldsmith 1991, etc.)

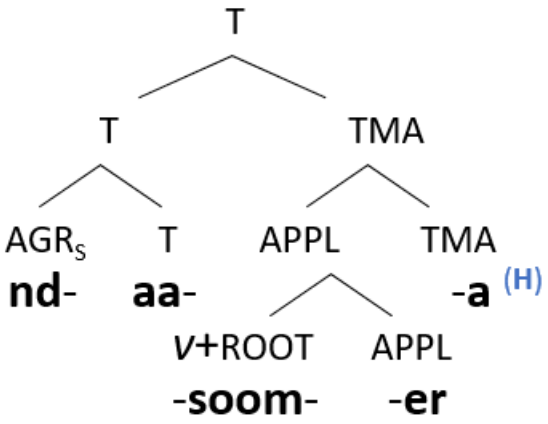
- **H-spread**: H spreads **leftward** onto toneless vowels
- **Downstep:** HH → H!H

kʊ́vʊ́gʊra	**mácúunga**	**kʊ́vʊ́!gʊ́rá mácúunga**
'to take'	'oranges'	'to take oranges'

Morphosyntax

- rich tense-mood-aspect (**TMA**) system, marked by segmental affixes and tones
- verb root + suffixes corresponds to a phonological domain (cf. Nurse 2008:2.5)

(see Pak 2019, Odden 2018 for more on object prefix)



nd-áá-va-!**sóóm-er-a** (H)

SBJ-TMA-OBJ-read-APPL-FV

'I read to them.' [REM. PAST]

'they read'

va-ra-ka-**soom**-e	*remote future*
va-ra-**soom**-a	*hodiernal future*
va-ri-**sóóm**-a	*indefinite future*
va-**sóóm**-aa	*present continuous*
v-aa-**sóóm**-i	*hesternal perfective*
v-aa-ka-**soom**-a	*recent past*
v-áá-**sóóm**-a	*remote past*

Two verb classes, with different tones throughout the TMA paradigm

- Class assignment isn't predictable by phonology, semantics, etc.
- In INFINITIVE, Class A is all L, while Class B has **H** on first vowel of root (Class A and B are called 'toneless' and 'H-verbs' (rsp.) in Odden 2018)

Class A	*Class B*
kʊ-**bʊrʊk**-a 'to fly'	kʊ́-**vʊ́gʊr**-a 'to take'
kʊ-**zaazaam**-a 'to taste'	kʊ́-**háándiik**-a 'to write'
ko-**soom**-a 'to read'	kʊ́-**káraang**-a 'to fry'
kʊ-**variz**-a 'to count'	kʊ́-**fʊ́nyiriiz**-a 'to smell'

In previous work, this H is **underlying** on Class B verbs.

Other melodies are derived by H-lowering, affixation, etc.

Class B has underlying **H** on first vowel in infinitive…

How do you derive the other TMA melodies?

	Class A ‘fly/taste’	**Class B** ‘take/write’
infinitive	kʊ-bʊrʊk-a kʊ-zaazaam-a	kʊ́-vʊ́gʊr-a kʊ́-hᵘáándiik-a
consecutive	vá-ˡbʊ́rʊ́k-a vá-ˡzᵘáázaam-a	vá-vʊgʊ́r-á vá-haandíík-á

To derive the Consecutive…

(Goldsmith 1991, Odden 2018, Leung 1991)

- [CONSECUTIVE] triggers **H → L** on verb
- [CONSECUTIVE] inserts a floating (H) suffix, which docks on accented σ (Goldsmith 1991)
  - metrical grid: a single iambic foot is built at the left edge of the root
    - tone confers weight, so V́ in class B → foot
  - tone-to-accent attraction: floating (H) docks on closest accented σ that doesn't already have tone, else closest σ
  - Leftward H-spread (general phonology)

	Class A 'fly/taste'	**Class B** 'take/write'
infinitive	kʊ-bʊrʊk-a kʊ-zaazaam-a	kʊ́-vʊ́gʊr-a kʊ́-hᵃáándiik-a
consecutive	vá-ˡbʊ́rʊ́k-a (H) (x x) x x	L vá-vʊgʊ́r-á (H) (x) x x x
	vá-ˡzᵃáázaam-a (H) (x) x x x	L vá-haandíík-á (H) (x) x x x

- Lots of historical/comparative precedent for underlying H in Class B
  (see Ebarb et al. 2014, Goldsmith 1991, etc.)
- BUT this analysis relies on a **morphophonological** rule (MPR): **H → L**
  - **H → L** is triggered by specific TMAs
  - not phonological *HH repair
    (cf. negative subjunctive)
- So… how bad is this **H → L** ?

	Class A 'fly/read'	**Class B** 'take/write'
infinitive, remote future, recent past, etc.	-bʊrʊk-a -soom-a	-vʊ́gʊr-a -háándiik-a
imperative	bʊrʊk-a soom-a	vʊgʊ́r-á haandíík-á
consecutive, indef. future, persistive, etc.	-bʊ́rʊ́k-a -sóóm-a	-vʊgʊ́r-á -haandíík-á
neg. subjunct., rec. perfective	-bʊ́rʊ́k-a -sóóm-a	-vʊgʊr-a -haandiik-a

(see Odden 2018)

- A question of economy. The grammar already includes these two steps:

feature/tone affixation
addition of phonological content as morpheme exponence (vocabulary insertion)

+

regular phonology
grammar/rules that determine where and how these features and tones are ultimately realized

- Morphophonology represents an additional intermediate step:

morphophonology
phonological changes triggered by / restricted to specific morphemes

- Some models are fine with limited morpheme-specific phonology, e.g. **Readjustment Rules** in classic Distributed Morphology (Halle & Marantz 1993)

1.	Add the [+PAST] suffix	klin + **d**	kip + **d**
2.	Readjustment (MPR)	---	k**ɛ**p + d
3.	Regular phonology	[k^hlĩnd] it, [k^hlĩm] my car	[k^hɛpt] it, [k^hɛp] seeing

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		(H)	H (H)
1.	Add the [TMA] suffix	bʊrʊk + **a**	vʊ̲gʊr + **a**
			L (H)
2.	Readjustment (MPR)	---------	v**ʊ̲**gʊr + **a**
		(H)	L (H)
3.	Regular phonology	bʊrʊk + **a**	vʊ̲gʊr + **a**

- Of course, Readjustment Rules aren't pretty…

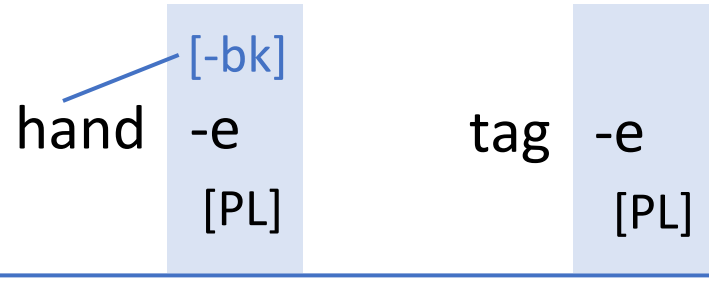
  i → [**-high**] / $_{X}$___ [+PAST], iff X = MEET, FEED, KEEP, MEAN, FEEL…

- At best, they represent something more that has to be learned about a morpheme (beyond its exponence)
  - 'All other things being equal, a[n exclusively] piece-based analysis is preferred to a Readjustment Rule analysis.' (Embick & Halle 2005)
  - And deciding when 'all other things' are equal can be tricky.

German umlaut (H**a**nd~H**ä**nde 'hand/s') as a readjustment rule:

V → [-bk] /$_{X}$___ [PL],
X = HAND, SAFT, HUHN…

Feature-affixation analysis requires more allomorph storage but no MPR:



(Lieber 1992, Embick & Shwayder 2018)

- Welmers (1973:132) recognized that Jukun replacive tone could be analyzed as tone-affixation (with allomorphy) (cf. Rolle 2018)
- He raises still-relevant questions:
  - Does morphology allow for processes as well as pieces?
  - How much listing of allomorphs is too much?
  - (How much of this is personal aesthetics?)

nouns. The first syllable in each phrase on the right is taken to be the pronoun plus a morpheme defined as "high replacing stem tone" and having the meaning "hortative." The past construction is simply pronoun plus verb stem, with no additional morpheme having "past" significance. Thus:

m̀ ya	'I went'	ḿ ya?	'Should I go?'
ù ya	'you (sg.) went'	ú ya	'Go (sg.).'
ku ya	'he went'	kú ya	'have him go'
i ya	'we went'	í ya	'let's go'
ni ya	'you (pl.) went'	ní ya	'Go (pl.).'
be ya	'they went'	bé ya	'they should go'

For those who dislike the concept of "replacives", perhaps because it smacks too much of "process" description, there is another technique available to account for such data. Each pronoun could be described as having two allomorphs: one with low or mid tone as the case may be, and another with no tone. The allomorph with no tone occurs in the environment of an accompanying morpheme which consists of tone only. The result is obviously the same. With the latter analysis, however, it would be necessary in a rigidly formal lexicon to list two allomorphs for a number of morphemes—only six in Jukun, but virtually every morpheme in the lexicon in some other languages. The importance of this cavil may be minimal, but I personally find it more elegant to incorporate more in the definition of a replacive, which occurs with (or operates on) whole classes of morphemes.

- Some theories reject morphophonology outright, maintaining instead a strict separation of phonology and morphosyntax,
  e.g. Bermúdez-Otero 2012:

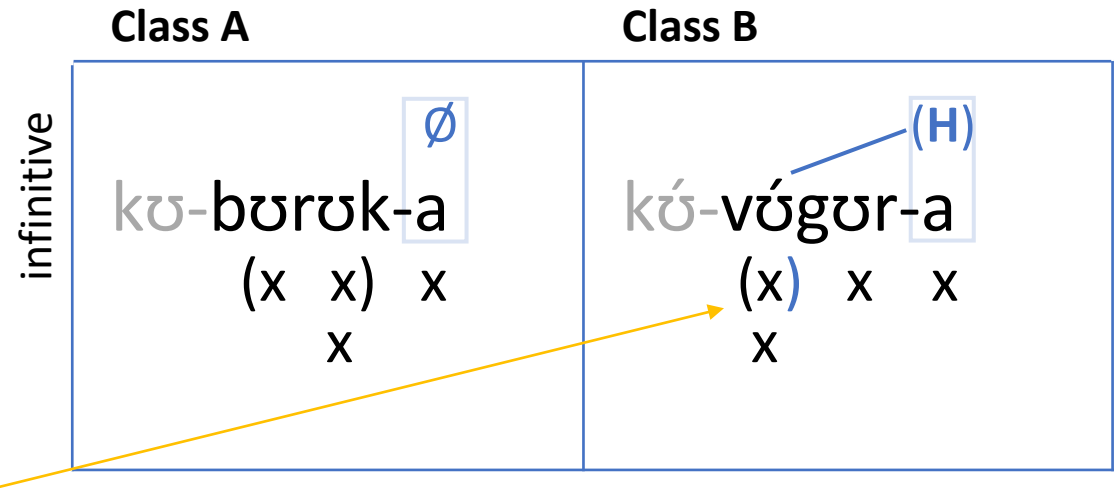
  - Morph integrity hypothesis:
    Morphology is not allowed to operate directly upon elements of phonological representation; morphological operations do not alter phonological content of morphs.

  - Indirect reference:
    Phonology cannot refer to syntactic, morphological or lexical information (except for prosodic-unit alignment).

- In such theories, any apparent case of morpheme-specific phonology **must** be analyzed some other way.

(see also Haugen 2015, Perry & Vaux 2018, among others, for discussion)

- Can we analyze Logoori tone melodies with just two steps, and no morphophonological **H → L** ?
- Yes, up to a point. The alternative is to treat **all** verb tones as TMA exponents
- No underlying H on Class B. Instead, class B has underlying **accent** on σ1.
- Allomorphy: [INFINITIVE] inserts no tone in class A, (H) in class B.



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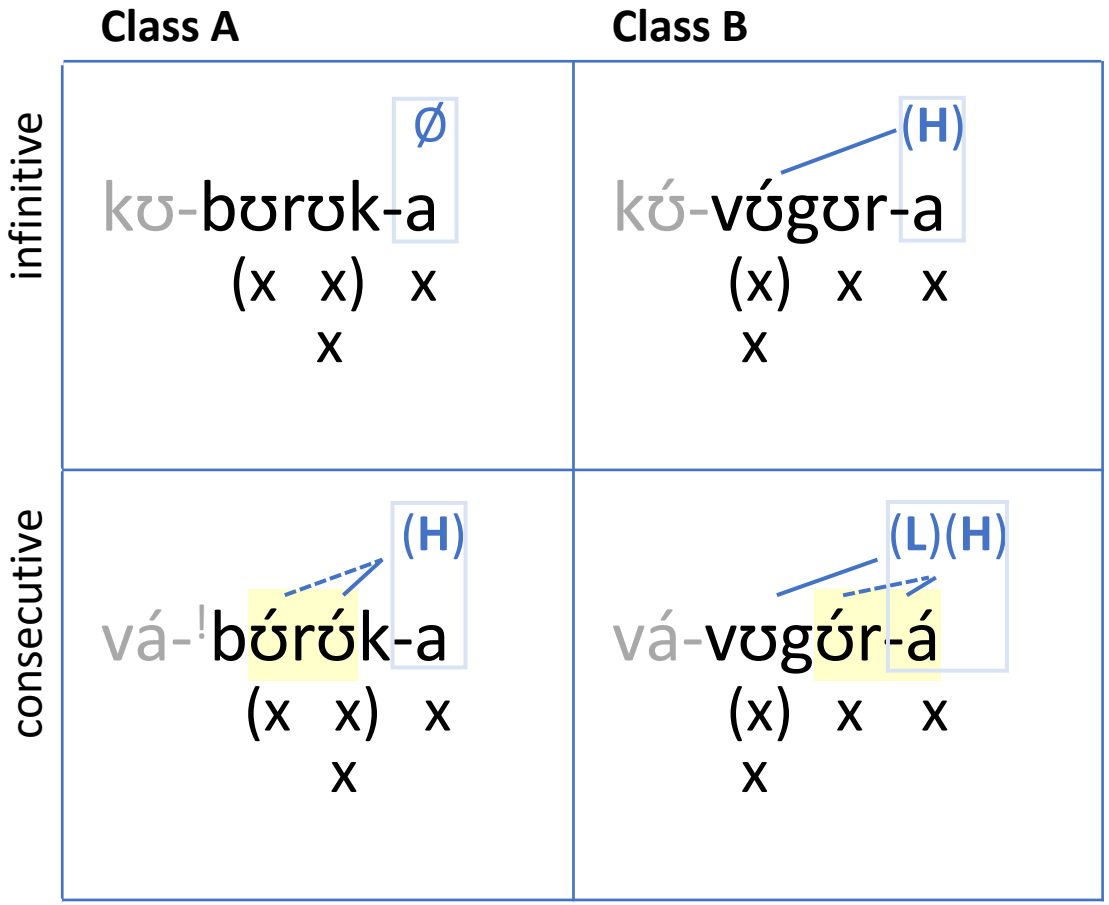
- No underlying H on Class B. Instead, class B has underlying **accent** on σ1.
- Allomorphy: [INFINITIVE] inserts no tone in class A, (H) in class B.
- Some Class B allomorphs (e.g. CONSECUTIVE) add **two** tones: (T_1) docks on accented σ1, (T_2) on final vowel.



Observations

- Logoori is now characterized as a break from Luyia relatives (no underlying H in class B)
- Reanalysis features more allomorphy. (Original had some; now it's in every TMA.)
- **L** is phonemic in the reanalysis… opening the door for very different melodies to develop.
- The metrical grid plays the same role in both analyses, so the same general 'shape' of melodies is expected.
- **BUT** a few TMAs deviate from this shape.

	Class A 'fly/read'	**Class B** 'take/write'
infinitive, remote future, rec. past, etc.	Ø -bʊrʊk-a -soom-a	(H) -vʊ́gʊr-a -hᵃáándiik-a
imperative	Ø bʊrʊk-a soom-a	(L)(H) vʊgʊ́r-á haandíík-á
consecutive, indef. future, persistive, etc.	(H) -bʊ́rʊ́k-a -sóóm-a	(L)(H) -vʊgʊ́r-á -haandíík-á
neg. subjunct., rec. perfective	(H) -bʊ́rʊ́k-a -sóóm-a	Ø/(L) -vʊgʊr-a -haandiik-a

Exceptional melodies

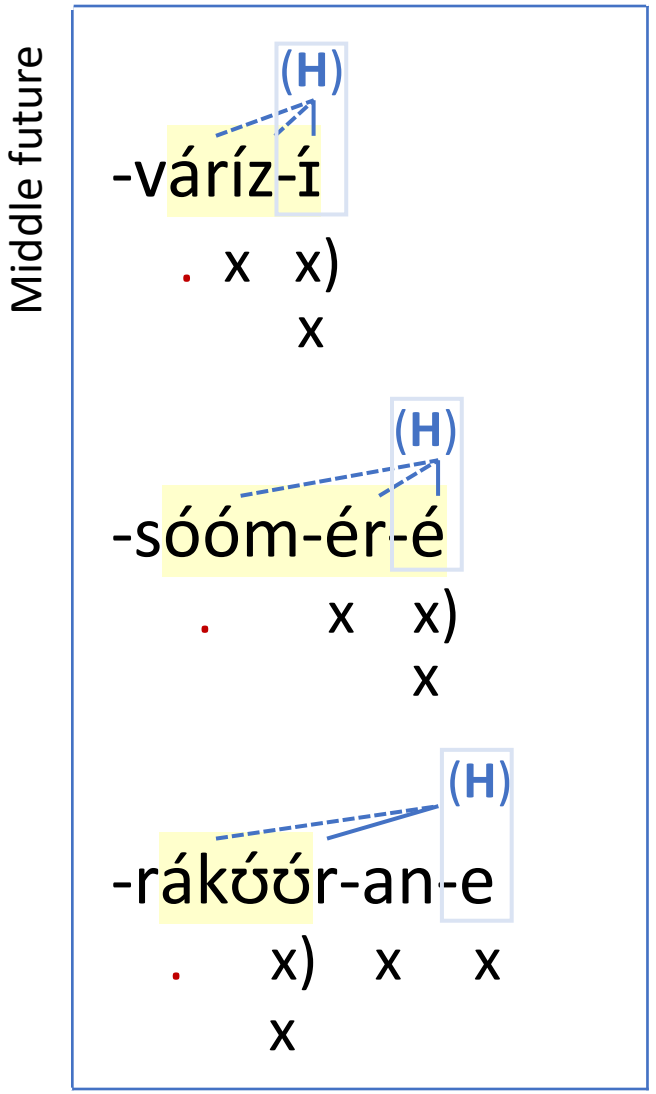
- [MIDDLE FUTURE]:
  (H) docks on σ2 or σ3, depending on weight of σ2, in both verb classes.
- Goldsmith (1991):
  σ1 is extrametrical in [MIDDLE FUTURE].

	Class A	Class B
Middle future	na va- 'they will…' -váríz-í 'count' -véénzégér-e 'belch' -rákʊ́ʊ́r-an-e 'release e.o.'	na va- 'they will…' -nágʊ́r-í 'run' -kárááng-ɪr-an-e 'fry for e.o.' -vég-án-ír-an-e 'shave for e.o.'

- In our original analysis with MPR, exceptional melodies can be derived by tweaking the metrical grid.
- [MIDDLE FUTURE] triggers a MPR making σ1 **extrametrical**

  [x → [. (cf. Noyer 2013)

- Class B σ1 loses its underlying H, either automatically or due to another MPR: **H → Ø**
- Then regular phonology kicks in *(repeated)*:
  - a single iambic foot is built at the left edge unless there's already a foot
  - (H) suffix docks on closest accented σ, then spreads left (general phonology)



- In our reanalysis without MPR, it isn't clear what to do about Logoori [MIDDLE FUTURE]. This case **can't** easily be reduced to

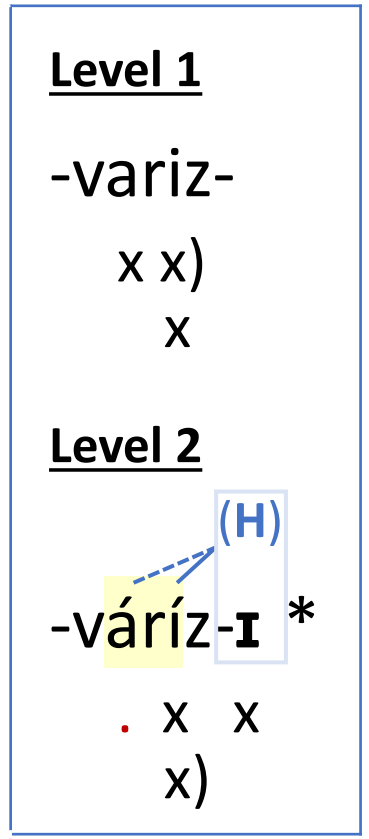
  feature/tone affixation + regular phonology

  …because here, the tone-alignment principles vary in morpheme-specific ways.

- To save our MPR-free reanalysis, we'd need something that adds accent to σ2 if heavy, else to σ3. But how do we achieve this without invoking morpheme-specific phonology?
  - levels (i.e. cycles, phases, strata)?
  - phantom structures? (Rolle & Lionnet 2020, 2021!)
  - other possibilities?

One idea: Levels/cycles

- Metrical grid is built progressively as each cycle is spelled out; grid-construction procedures can vary by cycle.
  - [MIDDLE FUT.] is spelled out on a later (or earlier) cycle than [CONSECUTIVE] etc., thus has different metrical properties.
- Paradox:
  - If [MIDDLE FUTURE] is spelled out earlier than other TMAs: σ1 would be extrametrical on *all* verbs.
  - If [MIDDLE FUTURE] is spelled out later than other TMAs: roots with two light initial σs, like *-variz-,* would get accent on σ2 at early level, yielding ***váriz-ɪ*** instead of ***váriz-í***



More questions to think about…

- I mentioned several kinds of readjustment/MPRs.
  But are all these the same **kind** of morphophonology?

  1) English: **i** → [**-high**] / $_{X}$ ___ [+PAST], X = MEET, FEED, KEEP…

  2) German: **V** → [-back] {various triggers, listed targets}

  3) Logoori: **H → L** in [CONSECUTIVE], [IMPERATIVE], etc.

  4) Logoori: **[x → [.** in [MIDDLE FUTURE]

- (3)-(4) don't require listing of individual targets

- (4) doesn't change *articulatory* features of other morphs; arguably, morph integrity is upheld

There may be finer-grained distinctions to be made than whether morpheme-specific phonology is allowed or banned.

Tone is the most autosegmental: As was seen in Section 3, tone is THE autosegmental property par excellence. Compared to segmental features, tone is far more likely to float as a lexical or grammatical tone, to show stability effects, to undergo dislocation, or to interact with like features at a distance.

Concluding thoughts

- As Hyman (2011:238) reminds us, one of the remarkable properties of tone is the degree to which it showcases the autonomy of phonological tiers.
- We've seen that not only tones themselves, but also the rules/grammars that determine their placement, can vary in morpheme-specific ways…
- …allowing us to shed new light on longstanding questions about the role of morpheme-specific phonology in the grammar.

Wrap-up

- **Thanks for listening!**

  Also thanks to audiences at LSA 2019, FLYM 2019, Emory Linguistics Faculty Colloquium 2020, reviewers for the *Handbook of Distributed Morphology* (CUP, to appear), Dave Embick, Yun Kim, Michael Marlo, Dave Odden, and my generous Logoori speaker consultant.

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