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The importance of language documentation and description for phonological theory

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Documentation and description of indigenous languages can be mutually beneficial for the community of speakers and for the academic linguistics community.

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For speaker groups,

- Linguistic research can inform creation of language resources and orthographies.

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For speaker groups,

- Linguistic research can inform creation of language resources and orthographies.
- Publishing and archiving language data can legitimize and valorize the language, and can influence language policy decisions.

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For speaker groups,

- Linguistic research can inform creation of language resources and orthographies.
- Publishing and archiving language data can legitimize and valorize the language, and can influence language policy decisions.
- Interest from academics in a language and speaker group can increase language attitudes and encourage speakers to continue using their indigenous languages

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For speaker groups,

- Linguistic research can inform creation of language resources and orthographies.
- Publishing and archiving language data can legitimize and valorize the language, and can influence language policy decisions.
- Interest from academics in a language and speaker group can increase language attitudes and encourage speakers to continue using their indigenous languages
- Collaboration with speakers can result in minority populations being involved in the research process, publishing, and becoming academics.

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- Generative linguistics aims to develop a model to generate all and only the possible grammars of human languages.

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- Generative linguistics aims to develop a model to generate all and only the possible grammars of human languages.
- In order to do this accurately and successfully, we need to know as much about how human language systems work as possible.

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- Generative linguistics aims to develop a model to generate all and only the possible grammars of human languages.
- In order to do this accurately and successfully, we need to know as much about how human language systems work as possible.
- Incorporating data from understudied minority and indigenous languages into theoretical conversations is crucial to building an informed linguistic model.

Goals of this talk

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- In this talk I show how data from Guébie, an endangered Kru language of Côte d'Ivoire, has informed our models of the morphology/phonology interface.

Case studies

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1. Morpheme-specific scalar tone shift

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1. Morpheme-specific scalar tone shift
2. Phonologically determined nominal concord

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1. Morpheme-specific scalar tone shift
2. Phonologically determined nominal concord
3. Doubly morphologically conditioned vowel harmony

Preview of what we have learned

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The grammar of Guébie has implications for the following theoretical linguistics questions:

- What kinds of information can phonological rules or constraints be sensitive to?
- Are all morphemes associated with an underlying phonological representation? In other words, is all morphology concatenative?
- What is the architecture of a generative grammar? Does phonology apply before, after, or alongside morphology and syntax?
- How can we distinguish between competing formal models of language?

Overview

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4 Phonologically determined concord

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Language Background

The Guébie language

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- Guébie is an endangered Kru language spoken in southwest Côte d'Ivoire.
- The data presented here comes from original fieldwork on Guébie over the past 5+ years.
- Before I started working on Guébie in 2013, there was no extant documentation or description of the language.
- The Kru family in general is drastically understudied,
  - but there are lots of fascinating grammatical patterns of interest to the theoretical literature,
  - and many Kru languages are endangered, so time is of the essence in documentation.

Where is Guébie spoken?

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Where is Guébie spoken?

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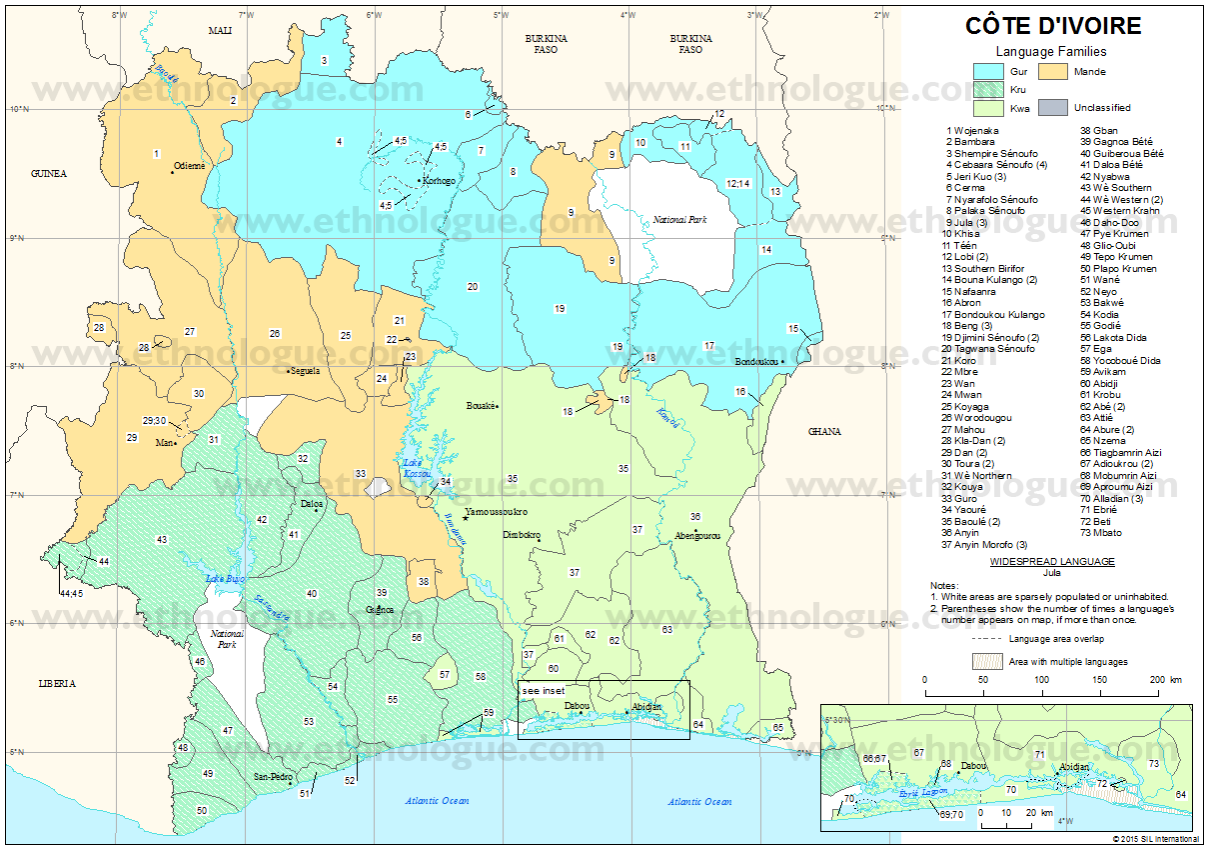

Gnagbodougnoa

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Field elicitation

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Collaborative data collection

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Language background: Consonants

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(1) **Consonant inventory**

	Bilabial		Labiodent.		Alveopal.		Palatal		Velar		Labiovelar	
Plosive	p	b			t	d	c	ɟ	k	g	kp	gb
Nasal		m				n		ɲ		ŋ		
Fricative			f	v	s							
Approx		ɓ				l		j				w

Language background: Vowels

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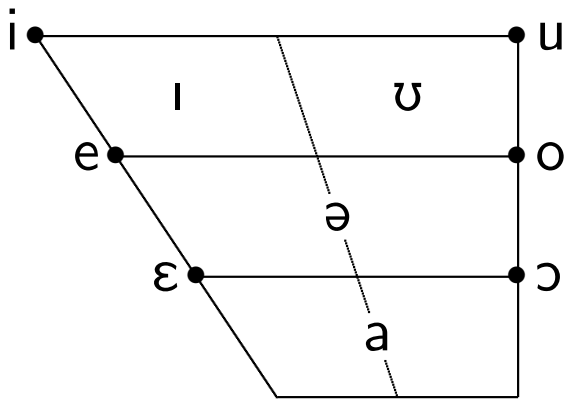
(2) **Vowel inventory**



Language background: Tone

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- Guébie is a tonal language, with four distinct underlying tone heights (here labeled 1-4, where 4 is high).
- There are five distinct heights on the surface, 1-5, where 5 is super high.

Language background: Syllables

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- Syllables are maximally CV, and words tend to be monosyllabic.
  - Ex: li^{3} ‘eat’, no^{4} ‘mother’
- Though there are also a number of disyllabic roots.
  - Ex: bala$^{3.3}$ ‘hit’, ɲɔkpɔ$^{3.1}$ ‘person’

Language background: Word order

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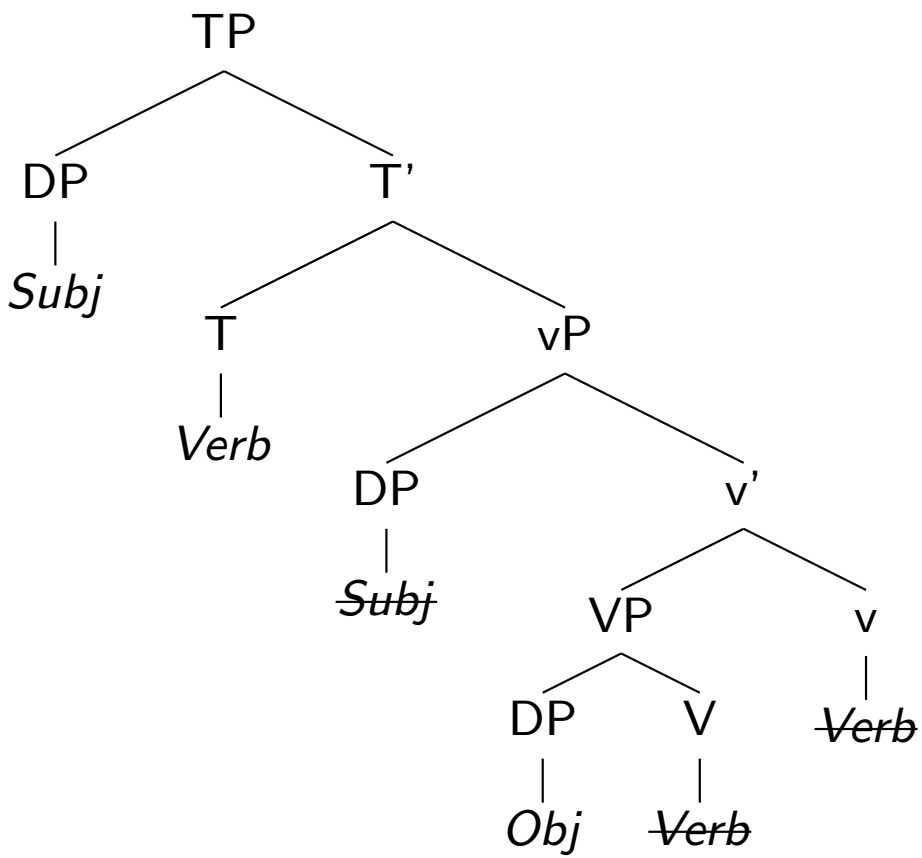
- Word order alternates between SAuxOV and SVO.
  - When there is no auxiliary, the verb undergoes V-to-T movement, surfacing in the inflectional position (Sande, In Press).

(3)



Language background: Morphology

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- While there are a few inflectional suffixes, and a number of derivational affixes, most morphology is non-concatenative:
  - Tone shift
  - Tone replacement
  - Vowel replacement
  - Phonologically determined agreement

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Scalar tone shift

Scalar tone shift in Guébie

- A given verb shows the same tone melody in most contexts, (4).

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(4) a. *SAuxOV*

e^{4} ji^{3} ɟa^{31} li^{3}

1SG.NOM FUT coconuts eat

'I will eat a coconut.'

b. *Imperative*

li^{3}

eat.IMP

'Eat!'

c. *Perfective*

e^{4} li^{3} ɟa-ɓe$^{3.1}$ kubə$^{3.1}$

1SG.NOM eat.PFV coconuts-SG yesterday

'I ate a coconut yesterday.' (syl_20131024)

Tone on verbs lowers one step in the imperfective

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- In the imperfective (SVO), the tone on the verb is one step lower than elsewhere.
- The only exponent of imperfective aspect in Guébie is a shift in surface tone.

(5) *Imperfective*

e^{4}	li^{2}	ɲa^{31}	koko$^{4.4}$
1SG.NOM	eat.IPFV	coconuts	every.day

'I eat coconuts everyday.' (syl_20131024)

Scalar tone shift minimal pair

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(6) a. *Perfective*

e^{4} li^{3} ɲa^{31}

1SG.NOM eat.PFV coconuts

'I ate coconuts.'

b. *Imperfective*

e^{4} li^{2} ɲa^{31}

1SG.NOM eat.IPFV coconuts

'I eat coconuts.' (oli_20160801)

Scalar tone shift minimal pair

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(7) a. *Imperfective*

ɔ^{3} liɓe$^{1.3}$

3SG.NOM dine.IPFV

'I am dining'

b. *Perfective*

ɔ^{3} liɓe$^{2.3}$

3SG.NOM dine.PFV

'I dined' (oli_20160801)

Audio

Scalar lowering of the first verbal tone level

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(8) a. ju^{4} gbala$^{3.4}$ si^{3}
boy climb.PFV trees
'A boy climbed trees'

b. ju^{4} gbala$^{2.4}$ si^{3}
boy climb.IPFV trees
'A boy climbs trees'

Scalar lowering of the first verbal tone level

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(8) a. ju^{4} gbala$^{3.4}$ si^{3}
boy climb.PFV trees
'A boy climbed trees'

b. ju^{4} gbala$^{2.4}$ si^{3}
boy climb.IPFV trees
'A boy climbs trees'

c. e^{4} na^{42}
1SG.NOM say.PFV
'I said'

d. e^{4} na^{32}
1SG.NOM say.IPFV
'I say' (syl_20140314)

Tone lowering summary

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- The first tone level of a verbal tone melody surfaces one step lower in imperfective contexts than other contexts.

(9)

Default tone	≫	**Imperfective tone**
4		3
3		2
2		1
1		1

Scalar shift for low-toned verbs

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- When the tone of a verb is already low we do not see lowering to super low (tone 0).

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- When the tone of a verb is already low we do not see lowering to super low (tone 0).
- But we also do not see neutralization between perfective and imperfective contexts.

Scalar shift for low-toned verbs

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- When the tone of a verb is already low we do not see lowering to super low (tone 0).
- But we also do not see neutralization between perfective and imperfective contexts.
- Instead, the scalar tone shift affects the final tone of the **subject**!

Subject tone raising

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(10)

a. ɛ^{3} ɓɔ^{1}
3SG.NOM wither.PFV
'It withered'

b. ɛ^{4} ɓɔ^{1}
3SG.NOM wither.IPFV
'It withers'

c. ɟaci$^{23.1}$ pa^{1}
Djatchi run.PFV
'Djatchi ran'

d. ɟaci$^{23.2}$ pa^{1}
Djatchi run.IPFV
'Djatchi runs' (oli_20160801)

pfv ipfv

Super high tones

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- Subject tone raising before low-toned verbs occurs even when the result is a super high tone.

Super high tones

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- Subject tone raising before low-toned verbs occurs even when the result is a super high tone.

(11) a. $\underline{\text{e}^{4}}$ pa^{1}
1SG.NOM run.PFV
'I ran'

b. $\underline{\text{e}^{5}}$ pa^{1}
1SG.NOM run.IPFV
'I run' (syl_20140314)

Super high tones

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- Subject tone raising before low-toned verbs occurs even when the result is a super high tone.

(11) a. $\underline{\text{e}^{4}}$ pa^{1}
1SG.NOM run.PFV
'I ran'

b. $\underline{\text{e}^{5}}$ pa^{1}
1SG.NOM run.IPFV
'I run' (syl_20140314)

- Super high tones are not found anywhere else in the language.

Subject raising

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Default subject tone	≫	**Raised subject tone**
4		5
3		4
2		3
1		2

Scalar tone shift summary

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- This tonal shift affects the difference in tone height between the subject and verb.

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- This tonal shift affects the difference in tone height between the subject and verb.
- The first tone height of a verb surfaces one step lower in the imperfective than elsewhere, unless the verb is already low, in which case the final subject tone raises one step in the imperfective.

Scalar tone shift summary

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- This tonal shift affects the difference in tone height between the subject and verb.
- The first tone height of a verb surfaces one step lower in the imperfective than elsewhere, unless the verb is already low, in which case the final subject tone raises one step in the imperfective.
- A scalar shift affecting multiple words, like this one, is otherwise unattested cross-linguistically (Mortensen, 2006).

Theoretical consequences

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Theoretical consequences

- The item versus process debate (Hockett, 1954; Anderson, 1992):
  - Does all morphology involve concatenation of underlying phonological forms, or can morphemes trigger phonological processes without themselves having a phonological form?

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Theoretical consequences

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- The item versus process debate (Hockett, 1954; Anderson, 1992):
  - Does all morphology involve concatenation of underlying phonological forms, or can morphemes trigger phonological processes without themselves having a phonological form?
- In analyzing the imperfective scalar tone shift, we might start by asking: "What is the underlying phonological representation of the imperfective morpheme in Guébie?"

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- The item versus process debate (Hockett, 1954; Anderson, 1992):
  - Does all morphology involve concatenation of underlying phonological forms, or can morphemes trigger phonological processes without themselves having a phonological form?
- In analyzing the imperfective scalar tone shift, we might start by asking: "What is the underlying phonological representation of the imperfective morpheme in Guébie?"
- **Short answer:** There isn't one.

Theoretical consequences

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- The item versus process debate (Hockett, 1954; Anderson, 1992):
  - Does all morphology involve concatenation of underlying phonological forms, or can morphemes trigger phonological processes without themselves having a phonological form?
- In analyzing the imperfective scalar tone shift, we might start by asking: "What is the underlying phonological representation of the imperfective morpheme in Guébie?"
- **Short answer:** There isn't one.
- **Problem:** No matter what featural affix or floating tone we posit as the underlying representation of the imperfective morpheme, we must still state the following process in terms of rules or constraints (Sande, 2018a):
  - The first tone of a verb lowers one step, unless it is already low, in which case the final tone of the subject raises one step.

Attempting a UR analysis: Floating tones

- A reasonable candidate for the underlying form of the imperfective is a 41 floating tone.

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Attempting a UR analysis: Floating tones

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- A reasonable candidate for the underlying form of the imperfective is a 41 floating tone.
- The low second portion could have a lowering effect, while the high initial portion could have a raising effect.

Attempting a UR analysis: Floating tones

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- A reasonable candidate for the underlying form of the imperfective is a 41 floating tone.
- The low second portion could have a lowering effect, while the high initial portion could have a raising effect.
- We must still explain the following:
  - Why we get verb tone lowering in the default case.
  - Why the verb doesn't lower to super low.
  - When the subject raises.
  - Why 41 has a scalar effect in imperfective contexts, but not elsewhere.

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- A reasonable candidate for the underlying form of the imperfective is a 41 floating tone.
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- We must still explain the following:
  - Why we get verb tone lowering in the default case.
  - Why the verb doesn't lower to super low.
  - When the subject raises.
  - Why 41 has a scalar effect in imperfective contexts, but not elsewhere.
- If the imperfective UR was any other tone, our constraints or rules would look the same as for the 41 analysis.

Attempting a UR analysis: Floating tones

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- A reasonable candidate for the underlying form of the imperfective is a 41 floating tone.
- The low second portion could have a lowering effect, while the high initial portion could have a raising effect.
- We must still explain the following:
  - Why we get verb tone lowering in the default case.
  - Why the verb doesn't lower to super low.
  - When the subject raises.
  - Why 41 has a scalar effect in imperfective contexts, but not elsewhere.
- If the imperfective UR was any other tone, our constraints or rules would look the same as for the 41 analysis.
- **Problem:** No single UR better predicts when and where these scalar effects occur than any other UR.

Attempting a UR analysis: Floating features

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(13) **Proposed features for 4-tone systems**

a.

Yip (1980); Pulleyblank (1986)	4	3	2	1
Upper	+	+	-	-
High/Raised	+	-	+	-

b.

Clements (1983); Snider (1999)	4	3	2	1
Feature 1	H	H	L	L
Feature 2	H	L	H	L

c.

Bao (1999)	4	3	2	1
Stiff	+	+	-	-
Slack	-	+	-	+

- No single feature change results in scalar lowering.

Proposal

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- **Proposal:** An analysis that need not stipulate an underlying phonological form for the imperfective is preferable. We avoid an extra layer of unnecessary and arbitrarily chosen abstraction.

Proposal

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- **Proposal:** An analysis that need not stipulate an underlying phonological form for the imperfective is preferable. We avoid an extra layer of unnecessary and arbitrarily chosen abstraction.
- Instead, a phonological constraint ranking (or weighting) specific to the imperfective context can derive the scalar tone shift (Sande, 2018a).

Imperfective constraint ranking

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(14) **Imperfective constraint ranking**

/[$_\phi$[$_\omega$ e^4]] [$_\phi$[$_\omega$ li^3][$_\omega$ ɬa^{31}]]/	*0 3	PDrop 4	Id-T(R, ϕ) 2	Id-T 1.5	**H**
a. [$_\phi$ [$_\omega$ e^4]][$_\phi$ [$_\omega$ li^3][$_\omega$ ɬa^{31}]]		1			4
b. ☞[$_\phi$ [$_\omega$ e^4]][$_\phi$ [$_\omega$ li^2][$_\omega$ ɬa^{31}]]				1	2
c. [$_\phi$ [$_\omega$ e^5]][$_\phi$ [$_\omega$ li^3][$_\omega$ ɬa^{31}]]			1	1	3
d. [$_\phi$ [$_\omega$ e^4]][$_\phi$ [$_\omega$ li^0][$_\omega$ ɬa^{31}]]				2	3

Imperfective evaluation of low-toned verb

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(15) **Imperfective constraint ranking for low-toned verb**

/[$_\phi$[$_\omega$ e^4]] [$_\phi$[$_\omega$ pa^1]]/	*0 3	PDrop 4	Id-T(R, ϕ) 2	Id-T 1.5	**H**
a. [$_\phi$ [$_\omega$ e^4]][$_\phi$ [$_\omega$ pa^1]]		1			4
b. [$_\phi$ [$_\omega$ e^4]][$_\phi$ [$_\omega$ pa^0]]	1			1	4.5
c. ☞[$_\phi$ [$_\omega$ e^5]][$_\phi$[$_\omega$ pa^1]]			1	1	3.5

Non-imperfective constraint ranking

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- In the elsewhere grammar, which applies in perfective and all other non-imperfective contexts, faithfulness outranks markedness:

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- In the elsewhere grammar, which applies in perfective and all other non-imperfective contexts, faithfulness outranks markedness:

(16)

IDENT
|
*0, PITCHDROP

Non-imperfective constraint ranking

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- In the elsewhere grammar, which applies in perfective and all other non-imperfective contexts, faithfulness outranks markedness:

(16)

$$\textsc{Ident}$$
$$|$$
$$*0,\ \textsc{PitchDrop}$$

- This ranking results in the faithful candidate always surfacing as optimal in all contexts outside of the imperfective.

Theoretical Consequences

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1. Typologically, the Guébie scalar tone shift is unique among scalar shifts in affecting multiple words (Mortensen, 2006).
2. The imperfective scalar tone shift in Guébie can be modeled without underlying representations.

Theoretical Consequences

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1. Typologically, the Guébie scalar tone shift is unique among scalar shifts in affecting multiple words (Mortensen, 2006).
2. The imperfective scalar tone shift in Guébie can be modeled without underlying representations.
   - Using underlying representations complicates the grammar, because we need both an abstract representation *and* a morpheme-specific constraint ranking or set of rules to get a pitch drop in the right place.
   - This bears on the item vs. process debate in morphophonology, demonstrating that not all morphology involves underlying phonological representations (items).

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Phonologically determined concord

Phonologically determined agreement

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- Pronouns and adjectives agree with nouns in Guébie.

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- Pronouns and adjectives agree with nouns in Guébie.
- Non-human pronouns and adjective agreement are not determined by semantics, but by phonological features of the noun.

Phonologically determined agreement

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- Pronouns and adjectives agree with nouns in Guébie.
- Non-human pronouns and adjective agreement are not determined by semantics, but by phonological features of the noun.
- We will see that phonologically determined nominal concord has consequences for the architecture of grammar.

Pronoun forms

- Guébie subject pronouns occur immediately before the auxiliary or inflected verb.

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- Guébie subject pronouns occur immediately before the auxiliary or inflected verb.
- Object pronouns have the same segmental form as subject pronouns, with tone one step lower than their subject counterparts.

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- Guébie subject pronouns occur immediately before the auxiliary or inflected verb.
- Object pronouns have the same segmental form as subject pronouns, with tone one step lower than their subject counterparts.

(17) **Human and non-human subject pronouns**

	Human		**Non-human**		
	Singular	**Plural**		**Singular**	**Plural**
1st	e^4	a^3	**1st**	–	–
2nd	e^2	a^2	**2nd**	–	–
3rd	$ɔ^3$	wa^3	**3rd**	e^3,$ə^3$,u^3	i^3,wa^3

Human pronouns

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- Human pronouns always surface as [ɔ^3], singular, and [wa^3], plural.

(18) **Human third-person pronouns**

a. ŋudi-ja$^{3.1.3}$ **ɔ^3** wa^2 jɛrɛ-lili$^{3.2.2.2}$
man-DEF 3SG.NOM like.IPFV spice-food
'As for the man, he likes spicy food.'

b. # ŋudi-ja$^{3.1.3}$ **e^3** wa^2 jɛrɛ-lili$^{3.2.2.2}$
man-DEF 3SG.NOM like.IPFV spice-food
Intended: 'As for the man, he likes spicy food.'
(syl_20151113)

Non-human pronouns

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(19) **Phonologically determined object pronoun agreement** (syl_20140130)

Noun	**Gloss**	**Object pronoun**	**Gloss**
a. ɟie$^{2.2}$	'a prison'	e-^{4} ni-^{4} **e**^{2} ji^{3}	'I saw it (prison)'
b. k^{w}ala$^{4.2}$	'a farm'	e-^{4} ni-^{4} **ə**^{2} ji^{3}	'I saw it (farm)
c. to^{3}	'battle'	e-^{4} ni-^{4} **u**^{2} ji^{3}	'I saw it (battle)'

Noun to pronoun mapping

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- The backness of the noun determines its corresponding pronoun vowel.

(20) **Mapping of Guébie stem-final vowels to pronoun vowels**

Final vowel		3.SG pronoun	Plural suffix		3.PL pronoun
i, ɪ, e, ɛ	→	e	-i	→	i
ə, a	→	ə	-a	→	wa
u, ʊ, o, ɔ	→	u			

Lack of semantic coherence for a given vowel

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(21) **Words that take the front vowel pronoun, /e/**

$k^{w}əli^{2.4}$	'face'	$dʒɔk^{w}ɪ^{2.3}$	'bird'
$ŋəte^{3.1}$	'yam'	$gbele^{3.2}$	'cola nut'
$nove^{2.3}$	'bee'	$nove^{2.4}$-kpe^{2}	'honey'
$dʒe^{2}$	'leopard'	$tɛlɛ^{3.2}$	'snake'
$dʒak^{w}ɛlɛ^{2.3.2}$	'small spider'	$pɔpɛ^{2.3}$	'leaf'

Lack of semantic coherence for a given vowel

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(22) **Words that take the central vowel pronoun, /ə/**

gama$^{2.2}$	'big spider'	ma^{1}	'butt'
tak^{w}a$^{3.2}$	'basket'	nove$^{2.4}$-guɓə$^{3.1}$	'bee hive'
dʒaɓə$^{3.1}$	'coconut'	dʒukpə$^{3.1}$	'bracelet'
ɓitə$^{2.3}$	'house'	uɓə$^{3.1}$	'head'

Lack of semantic coherence for a given vowel

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(23) **Words that take the back vowel pronoun, /u/**

nukpu$^{4.4}$	'quill (pen)'	kasu$^{3.2}$	'fire'
sabu$^{3.2}$	'night'	nɔpɔpʊ$^{2.4.3}$	'palmwine'
sio$^{2.2}$	'snail'	gbo^{2}	'dispute'
go^{3}	'abdomen'	takpɔ$^{2.3}$	'cheek'

Noun class agreement is phonologically determined

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(24) **Phonological agreement in loan words from English/French**

a. sukulu$^{1.1.3}$ kɔda.$^{3.21}$ e-^{4} ni-^{4}
school exist.IPFV 1SG.NOM see.PFV
u^{2} ji^{3}
3SG.ACC see
'There is a school. I saw it (the school).'

b. barazɛ$^{2.3.2}$ kɔda.$^{3.21}$ e-^{4} ni-^{4}
dam exist.IPFV 1SG.NOM see.PFV
e^{2} ji^{3}
3SG.ACC see
'There is a dam. I saw it (the dam)'
(syl_20140130)

Noun class agreement is phonologically determined

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- Further evidence that agreement in Guébie is phonologically determined comes from suffixed nouns.

Noun class agreement is phonologically determined

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- Further evidence that agreement in Guébie is phonologically determined comes from suffixed nouns.
- Besides the plural suffix there is one other nominal suffix: the definite marker.

Noun class agreement is phonologically determined

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- Further evidence that agreement in Guébie is phonologically determined comes from suffixed nouns.
- Besides the plural suffix there is one other nominal suffix: the definite marker.

(25)

a.	sukulu$^{1.1.3}$	'school'
b.	sukulu-a$^{1.1.3.3}$	'the school'

Noun class agreement is phonologically determined

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- Further evidence that agreement in Guébie is phonologically determined comes from suffixed nouns.
- Besides the plural suffix there is one other nominal suffix: the definite marker.

(25)

a.	sukulu$^{1.1.3}$	'school'
b.	sukulu-a$^{1.1.3.3}$	'the school'

- The definite marker is used in a narrower set of contexts in Guébie than, for example, in English.
- However, when referring to a noun that would take the definite marker, the central vowel pronoun must be used: ə, #e, #u

Noun class agreement throughout the noun phrase

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- Adjectives also agree phonologically with nouns.

(26) **Noun-modifier phonological agreement** (syl_20151117)

a. bitə$^{2.3}$ lelə$^{1.2}$ ɟɛlə$^{1.1}$
house new red
'A new red house'

b. fu^{3} lelo$^{1.2}$ ɟɛlɔ$^{1.1}$
sponge new red
'A new red sponge'

Noun phrase agreement summary

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(27) **Pronoun features and realization**

Human	Nonhuman
[+HUMAN]	[-HUMAN]
/ɔ, wa/	/e, ə, u, i, wa/
semantically determined	phonologically determined

Theoretical consequences

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- While this could be the vestige of a historically semantically-determined noun class system, synchronically, nominal concord with non-human nouns in Guébie is phonologically predictable.

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- While this could be the vestige of a historically semantically-determined noun class system, synchronically, nominal concord with non-human nouns in Guébie is phonologically predictable.
- Phonologically determined concord has consequences for our presumed order of grammatical modules, and for the timing of nominal concord in the derivation.

The Y-model

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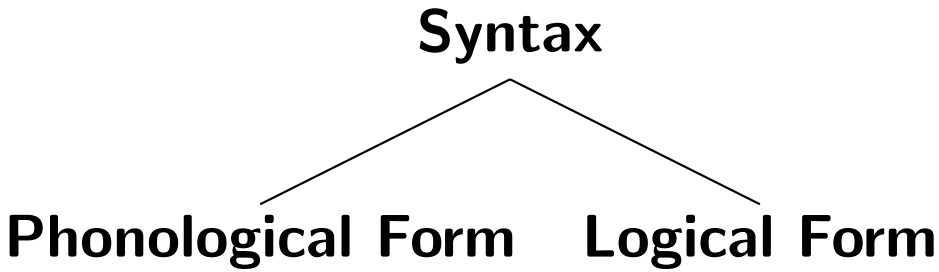
Most generative frameworks assume the Y-model of grammar, where syntactic operations occur before morphology and phonology:

(28) **The Y-model of grammar**



The Y-model

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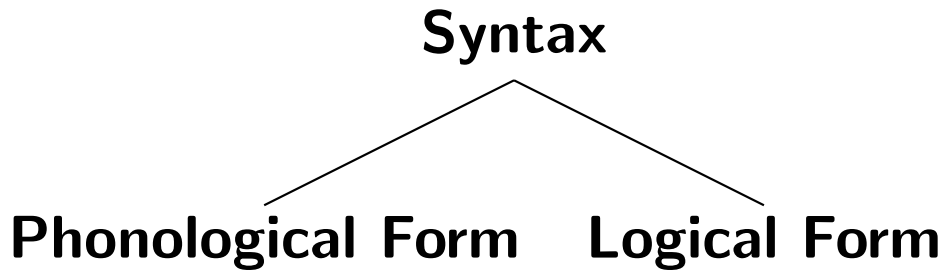

- An analysis where phonological features are present during the syntactic module makes pathological predictions (Pullum and Zwicky, 1988, 1986).
  - Ex: We would expect word orders and other syntactic properties to be sensitive to segmental properties.

Theoretical consequences

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- Because nominal concord is phonologically determined in Guébie, we know that either
  1. Syntactic operations have access to phonological information, OR

Theoretical consequences

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- Because nominal concord is phonologically determined in Guébie, we know that either
  1. Syntactic operations have access to phonological information, OR
  2. The operation that results in nominal concord occurs late in the derivation, after phonological information is available (e.g. after Insertion of Vocabulary Items applies in Distributed Morphology (Halle and Marantz, 1994)).

A possible analysis

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One possible analysis is to say that nominal concord is a post-syntactic operation (Kramer, 2010; Norris, 2014; Baier, 2015; Sande, 2018b).

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One possible analysis is to say that nominal concord is a post-syntactic operation (Kramer, 2010; Norris, 2014; Baier, 2015; Sande, 2018b).

- Post-syntactically, AGR-nodes are inserted into the structure.

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- Post-syntactically, AGR-nodes are inserted into the structure.
- AGR vocabulary items are inserted into the AGR-nodes.

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- Post-syntactically, AGR-nodes are inserted into the structure.
- AGR vocabulary items are inserted into the AGR-nodes.

For pronouns and adjectives in Guébie, the AGR vocabulary items for non-human nouns have the shape /V/ (Sande, 2018b).

A possible analysis

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- Post-syntactically, AGR-nodes are inserted into the structure.
- AGR vocabulary items are inserted into the AGR-nodes.

For pronouns and adjectives in Guébie, the AGR vocabulary items for non-human nouns have the shape /V/ (Sande, 2018b).

- During phonological evaluation, features of the V are filled in from the nearby Noun vowel.

Cross-linguistic findings

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In looking across languages, we see that nominal concord in a number of other languages seems to be entirely or partially phonologically determined:

- Other Kru languages (Marchese, 1979; Kaye, 1981; Bing, 1987; Marchese, 1986, 1988; Corbett, 1991).
- Bainuk (Atlantic; Senegal and Guinea) (Sauvageot, 1967)
- Abuq/Abu' (Arapesh; Papua New Guinea) (Nekitel, 1986; Aronoff, 1992; Dobrin, 1995)

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- Other Kru languages (Marchese, 1979; Kaye, 1981; Bing, 1987; Marchese, 1986, 1988; Corbett, 1991).
- Bainuk (Atlantic; Senegal and Guinea) (Sauvageot, 1967)
- Abuq/Abu' (Arapesh; Papua New Guinea) (Nekitel, 1986; Aronoff, 1992; Dobrin, 1995)

The analysis just presented can also account for phonologically determined agreement in these languages, and could potentially account for the partially phonologically determined concord systems in more widely represented languages such as Spanish and French.

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Doubly conditioned harmony

Doubly conditioned phenomena

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- Not all phonological alternations occur across the board in a language.
- Phonological processes can be sensitive to grammatical morpheme, lexical item, and syntactic domain.

Doubly conditioned phenomena

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- Not all phonological alternations occur across the board in a language.
- Phonological processes can be sensitive to grammatical morpheme, lexical item, and syntactic domain.
- Various theoretical frameworks have been developed to account for morphologically conditioned phonology.

Doubly conditioned phenomena

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- Not all phonological alternations occur across the board in a language.
- Phonological processes can be sensitive to grammatical morpheme, lexical item, and syntactic domain.
- Various theoretical frameworks have been developed to account for morphologically conditioned phonology.
- In Guébie we will see that there are phonological processes that require *two* simultaneous morphological or lexical triggers in order to surface.

Doubly conditioned phonology

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There is a phonological process in Guébie which only surfaces in the environment of both 1) a subset of affixes, and 2) a subset of lexical items.

Affix-controlled vowel harmony

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- A subset of morphemes, namely object-marking enclitics and plural suffixes, trigger full vowel harmony on roots.

Affix-controlled vowel harmony

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- A subset of morphemes, namely object-marking enclitics and plural suffixes, trigger full vowel harmony on roots.

(29) **Full vowel harmony**

a. ɔ^{3} bala$^{3.3}$
3SG.NOM hit.PFV
'He hit'

b. ɔ^{3} bɔl=ɔ$^{3.2}$
3SG.NOM hit.PFV-3SG.ACC
'He hit him'

Morphemes that trigger full vowel harmony

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- All third-person object-marking enclitics trigger full vowel harmony.

(30) **Guébie object markers**

	Human		**Non-human**	
	Singular	**Plural**	**Singular**	**Plural**
1st	e^{3}, ∅	a^{1}, $aɲɛ^{1.1}$	–	–
2nd	e^{1}, $mɛ^{2}$	a^{2}, $aɲɛ^{2.2}$	–	–
3rd	$ɔ^{2}$	wa^{2}	$ɛ^{2}$,a^{2},$ʊ^{2}$	$ɪ^{2}$,wa^{2}

Morphemes that trigger full vowel harmony

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- All third-person object-marking enclitics trigger full vowel harmony.

(31) **Guébie object markers**

	Human		**Non-human**	
	Singular	**Plural**	**Singular**	**Plural**
1st	e^{3}, ∅	a^{1}, $aɲɛ^{1.1}$	–	–
2nd	e^{1}, $mɛ^{2}$	a^{2}, $aɲɛ^{2.2}$	–	–
3rd	$ɔ^{2}$	$\mathbf{wa}^{2}$	$\mathbf{ɛ}^{2}$,$\mathbf{a}^{2}$,$\mathbf{ʊ}^{2}$	$\mathbf{ɪ}^{2}$,$\mathbf{wa}^{2}$

Object markers trigger full harmony

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	Verb	**Object**	**Verb+Obj**	**Gloss**
a.	jili$^{2.3}$	=ɔ^{2}	jɔl=ɔ$^{2.32}$, *jil=ɔ$^{2.32}$	'steal him'
b.	jili$^{2.3}$	=ɛ^{2}	jɛl=ɛ$^{2.32}$, *jil=ɛ$^{2.32}$	'steal it'
c.	jili$^{2.3}$	=ɪ^{2}	jɪl=ɪ$^{2.32}$, *jil=ɪ$^{2.32}$	'steal them'
d.	jɪla$^{3.2}$	=ɔ^{2}	jɔl=ɔ$^{3.2}$, *jɪl=ɔ$^{3.2}$	'ask him'
e.	jɪla$^{3.2}$	=ɛ^{2}	jɛl=ɛ$^{3.2}$, *jɪl=ɛ$^{3.2}$	'ask it'
f.	jɪla$^{3.2}$	=ɪ^{2}	jɪl=ɪ$^{3.2}$, *jɪl=ɪ$^{3.2}$	'ask them'
g.	bala$^{3.3}$	=ɔ^{2}	bɔl=ɔ$^{3.2}$, *bal=ɔ$^{3.2}$	'hit him'
h.	bala$^{3.3}$	=ɛ^{2}	bɛl=ɛ$^{3.2}$, *bal=ɛ$^{3.2}$	'hit it'
i.	bala$^{3.3}$	=ɪ^{2}	bɪl=ɪ$^{3.2}$, *bal=ɪ$^{3.2}$	'hit them'

Morphemes that trigger full vowel harmony

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- Additionally, there are two plural suffixes, /-i, -a/, which both trigger full vowel harmony.

(32) **Full harmony in plural contexts**

	Singular	**Plural**	**Gloss**
a.	ɓele$^{2.2}$	ɓil-i$^{2.2}$	'cow'
b.	mɛnɛ$^{3.3}$	man-a$^{3.2}$	'animal'

Morphemes that trigger full vowel harmony

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- There are other enclitics and suffixes that are phonologically identical to object enclitics or plural suffixes, but do *not* trigger full harmony.

Morphemes that trigger full vowel harmony

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- There are other enclitics and suffixes that are phonologically identical to object enclitics or plural suffixes, but do *not* trigger full harmony.
- Recall that the shape of the 3SG.HUM object enclitic is [ɔ^2].

Morphemes that trigger full vowel harmony

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- There are other enclitics and suffixes that are phonologically identical to object enclitics or plural suffixes, but do *not* trigger full harmony.
- Recall that the shape of the 3SG.HUM object enclitic is [ɔ^{2}].
- The passive suffix, which is phonologically identical, does not trigger harmony.

(33) **No harmony in passive contexts**

	Verb	**Verb+Pass**	**Gloss**
a.	bala$^{3.3}$	bal-ɔ$^{3.2}$, *bɔl-ɔ$^{3.2}$	'be hit'
b.	jɪla$^{3.2}$	jɪl-ɔ$^{3.2}$, *jɔl-ɔ$^{3.2}$	'be asked'

Outer morphemes

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Additionally, morphemes that attach outside the object enclitic or plural suffix fail to undergo harmony:

(34) **Root+Obj+Nominalizer**

	Root	=3SG.ACC	=NMLZ	*Gloss*
a.	bala$^{3.3}$	bɔl=ɔ$^{3.2}$	bɔl=ɔ=li$^{3.2.2}$	'hit'
b.	tulu$^{4.4}$	tɔl=ɔ$^{4.2}$	tɔl=ɔ=li$^{4.2.2}$	'chase'
c.	jɪla$^{3.2}$	jɔl=ɔ$^{3.2}$	jɔl=ɔ=li$^{3.2.2}$	'ask'

Outer morphemes

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Additionally, morphemes that attach outside the object enclitic or plural suffix fail to undergo harmony:

(34) **Root+Obj+Nominalizer**

	Root	=3SG.ACC	=NMLZ	*Gloss*
a.	bala$^{3.3}$	bɔl=ɔ$^{3.2}$	bɔl=ɔ=li$^{3.2.2}$	'hit'
b.	tulu$^{4.4}$	tɔl=ɔ$^{4.2}$	tɔl=ɔ=li$^{4.2.2}$	'chase'
c.	jɪla$^{3.2}$	jɔl=ɔ$^{3.2}$	jɔl=ɔ=li$^{3.2.2}$	'ask'

(35) **Root+Pl+Definite**

	Singular	*Plural*	*-Def*	*Gloss*
a.	ɓele$^{2.2}$	ɓil-i$^{2.2}$	ɓil-i-a$^{2.2.2}$	'cow'
b.	mɛnɛ$^{3.3}$	man-a$^{3.2}$	man-a-a$^{3.2.2}$	'animal'

Lexically specific, suffix-controlled vowel harmony

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- This full vowel harmony process only applies to a subset of Guébie roots.
  - About 33.5%, based on a corpus of 1839 disyllabic roots, where 614 of them are subject to full vowel harmony.

Roots affected by full vowel harmony

- The subset of roots affected by full vowel harmony does not form a semantic or phonological natural class.

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Roots affected by full vowel harmony

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- The subset of roots affected by full vowel harmony does not form a semantic or phonological natural class.
  - *Phonologically,* there is a tendency for roots that undergo full harmony to be of the shape CVCV, where the second C is /I/, and where the two vowels are identical.
  - However, no set of phonological traits exhaustively and exclusively picks out the correct set of roots.
    - For example, there are minimal pairs like jili$^{2.2}$ 'be fat', which undergoes harmony, and jili$^{2.2}$, 'fish', which does not.

Roots affected by full vowel harmony

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- The subset of roots affected by full vowel harmony does not form a semantic or phonological natural class.
  - *Phonologically,* there is a tendency for roots that undergo full harmony to be of the shape CVCV, where the second C is /l/, and where the two vowels are identical.
  - However, no set of phonological traits exhaustively and exclusively picks out the correct set of roots.
    - For example, there are minimal pairs like jili$^{2.2}$ 'be fat', which undergoes harmony, and jili$^{2.2}$, 'fish', which does not.
  - *Semantically,* there is no coherent feature of verbal or nominal roots that picks out all and only the roots that alternate.
    - For example, ŋ^{w}ɔnɔ$^{4.4}$, 'woman', and ɲɔkpɔ$^{3.1}$ 'person', undergo full harmony, while ŋudi$^{3.1}$, 'man', does not.

Full harmony data summary

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- Certain morphemes (object enclitics and plural suffixes) condition full vowel harmony on roots.
- However, only 33.5% of roots in the language are affected by the process.
- Both the triggering morpheme and alternating lexical item must be present for harmony to surface.

Distribution of harmony

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	Object enclitic	**Passive**
Alternating rt	Harmony	No harmony
Non-alternating rt	No harmony	No harmony

Doubly conditioned phonology as a cross-linguistic phenomena

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This doubly morphologically conditioned harmony in Guébie prompted me to look for similar cases in other languages.

Doubly conditioned phonology as a cross-linguistic phenomena

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This doubly morphologically conditioned harmony in Guébie prompted me to look for similar cases in other languages.

- **Vowel lengthening in Sacapultec:** Final vowels lengthen in a subset of lexical items, only in the presence of possessive prefixes, but not other prefixes.
- **Ablaut in Siouan languages:** Vowel ablaut applies only for certain lexical items, and only in the presence of certain affixes.

Double morphological conditioning seems to be a fairly widespread phenomenon that has not been previously characterized as such.

- We want our theoretical frameworks to be able to account for it.

Theoretical consequences

- Phonological alternations can target constructions where multiple specific morphemes are present.
- Numerous frameworks model morphologically conditioned phonology:

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  - Exception features (Chomsky and Halle, 1968)
  - Lexical Morphology and Phonology, Stratal OT (Kiparsky et al., 1982; Bermúdez-Otero, 1999; Kiparsky, 2000, 2008)
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  - Cophonology Theory (Orgun, 1996; Inkelas et al., 1997; Inkelas and Zoll, 2005)
  - Cophonologies by Phase (Sande and Jenks, 2018; Sande et al., Submitted)
  - Generalized Non-linear Affixation (and other representational accounts) Bermúdez-Otero (2012); Zimmermann (2013)

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- Only a few of these can pair phonological alternations with constructions of more than one specific morpheme.

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Documentation and description of indigenous languages is useful for many purposes:

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Documentation and description of indigenous languages is useful for many purposes:

- Creating language pedagogy resources
- Language maintenance and revitalization
- Typological understanding of possible grammars

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Documentation and description of indigenous languages is useful for many purposes:

- Creating language pedagogy resources
- Language maintenance and revitalization
- Typological understanding of possible grammars
- **Informing theoretical models of human language.**

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Documentation and description of the Guébie language has informed phonological and morphological theory:

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Documentation and description of the Guébie language has informed phonological and morphological theory:

- Scalar tone shift:
  - Phonology must be able to refer to abstract scales.
  - Phonology must evaluate more than one word at a time.
  - Not all morphemes are associated with underlying representations.

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- Phonologically determined nominal concord:
  - Syntax must be able to reference phonological features,
  - OR, nominal concord is a post-syntactic phenomenon.

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- Phonologically determined nominal concord:
  - Syntax must be able to reference phonological features,
  - OR, nominal concord is a post-syntactic phenomenon.
- Doubly morphologically conditioned phonology:
  - Phonological alternations can apply in the context of pairs of morphemes, helping to distinguish between competing frameworks.

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How you can help incorporate a diverse range of languages in theoretical linguistic discussions.

- Language documentation in a fieldwork setting.

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How you can help incorporate a diverse range of languages in theoretical linguistic discussions.

- Language documentation in a fieldwork setting.
- In-situ work with underrepresented languages. Most cities in the US have large refugee and immigrant communities.

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How you can help incorporate a diverse range of languages in theoretical linguistic discussions.

- Language documentation in a fieldwork setting.
- In-situ work with underrepresented languages. Most cities in the US have large refugee and immigrant communities.
- There are lots of great documentary and descriptive resources out there in language grammars and archives that have not yet been connected to the theoretical linguistics literature.

Knowledge of indigenous language grammars is necessary for improving our theoretical models, so **I encourage you all to find a way to incorporate data from a lesser studied language into your work!**

Thank you!

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References I

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References

Anderson, Stephen R. 1992. *A-morphous morphology*. Cambridge: Cambridge University Press.

Aronoff, Mark. 1992. Noun classes in Arapesh. In *Yearbook of morphology 1991*, 21–32. Springer.

Baier, Nicholas. 2015. Adjective agreement in Noon: Evidence for a split theory of noun-modifier concord. In *LSA annual meeting extended abstracts*, volume 6, 1–1.

Bao, Zhiming. 1999. *The structure of tone*. Oxford University Press.

Bermúdez-Otero, Ricardo. 1999. *Constraint interaction in language change: quantity in English and Germanic*. University of Manchester.

Bermúdez-Otero, Ricardo. 2012. The architecture of grammar and the division of labour in exponence. In *The morphology and phonology of exponence*, ed. Jochen Trommer, volume 41, 8–83. Oxford University Press, Oxford.

References II

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Bing, Janet. 1987. Phonologically conditioned agreement: Evidence from Krahn. *Current approaches to African linguistics* 4.

Chomsky, Noam, and Morris Halle. 1968. *The sound pattern of English*. Harper & Row.

Clements, George N. 1983. The hierarchical representation of tone features. *Current approaches to African linguistics* 1:145–176.

Corbett, Greville. 1991. *Gender*. Cambridge: Cambridge.

Dobrin, Lise M. 1995. Theoretical consequences of literal alliterative concord. In *The Proceedings of the 31st Regional Meeting of the Chicago Linguistic Society*, volume 1, 127–142.

Halle, Morris, and Alec Marantz. 1994. Some key features of Distributed Morphology. *MIT working papers in linguistics* 21:88.

Hockett, Charles F. 1954. Two models of grammatical description. *Word* 10:210–234.

References III

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Inkelas, Sharon, Orhan Orgun, and Cheryl Zoll. 1997. The implications of lexical exceptions for the nature of grammar. In *Optimality theory in phonology: A reader*, ed. J. J. McCarthy, 542–551. Oxford: Blackwell.

Inkelas, Sharon, and Cheryl Zoll. 2005. *Reduplication: Doubling in morphology*, volume 106. Cambridge University Press.

Itô, Junko, and Armin Mester. 1995. Japanese phonology. In *The handbook of phonological theory*, ed. John Goldsmith, 816–838. Oxford: Blackwell.

Kaye, Jonathan D. 1981. La sélection des formes pronominales en vata. *Revue québecoise de linguistique* 11:117–135.

Kiparsky, Paul. 2000. Opacity and cyclicity. *The linguistic review* 17:351–367.

Kiparsky, Paul. 2008. Fenno-Swedish quantity: Contrast in Stratal OT. In *Rules, constraints, and phonological phenomena*, ed. Bert Vaux and Andrew Nevins. Oxford: Oxford University Press.

References IV

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Kiparsky, Paul, et al. 1982. From cyclic phonology to lexical phonology. *The structure of phonological representations* 1:131–175.

Kramer, Ruth. 2010. The Amharic definite marker and the syntax–morphology interface. *Syntax* 13:196–240.

Marchese, Lynell. 1979. *Atlas linguistique kru*. Abidjan: ILA.

Marchese, Lynell. 1986. *Tense/aspect and the development of auxiliaries in Kru languages*. Summer Institute of Linguistics.

Marchese, Lynell. 1988. Noun classes and agreement systems in Kru: A historical approach. In *Agreement in natural language: Approach, theories and descriptions*, ed. Barlow and Ferguson. Stanford University Press.

Mortensen, David Roland. 2006. Logical and substantive scales in phonology. Doctoral Dissertation, University of California, Berkeley.

References V

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Nekitel, Otto. 1986. A sketch of nominal concord in Abu' (an Arapesh language). *Papers in New Guinea Linguistics No. 24, Pacific Linguistics A70* .

Norris, Mark. 2014. A theory of nominal concord. Doctoral Dissertation, UC Santa Cruz.

Orgun, Cemil. 1996. Sign-based morphology and phonology with special attention to Optimality Theory. Unpublished dissertation, UC Berkeley.

Pater, Joe. 2010. Morpheme-specific phonology: Constraint indexation and inconsistency resolution. In *Phonological argumentation: Essays on evidence and motivation*, ed. Steve Parker, 123–154. London: Equinox.

Pulleyblank, Douglas. 1986. *Tone in lexical phonology*, volume 4. Springer Science & Business Media.

References VI

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Pullum, Geoffrey, and Arnold Zwicky. 1988. The syntax-phonology interface. In *Linguistics: The Cambridge survey*, ed. Newmeyer, 255–280. New York: The Cambridge University Press.

Pullum, Geoffrey K, and Arnold M Zwicky. 1986. Phonological resolution of syntactic feature conflict. *Language* 751–773.

Sande, Hannah. 2018a. Cross-word morphologically conditioned scalar tone shift in Guébie. *Morphology* 28:253–295.

Sande, Hannah. 2018b. Phonologically determined nominal concord as post-syntactic: Evidence from Guébie. *Journal of Linguistics* 1–48.

Sande, Hannah. In Press. Verb movement and Lowering in Guébie .

Sande, Hannah, and Peter Jenks. 2018. Cophonologies by phase. *NELS 48 Proceedings* .

Sande, Hannah, Peter Jenks, and Sharon Inkelas. Submitted. Cophonologies by ph(r)ase .

References VII

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Sauvageot, Serge. 1967. *Note sur la classification nominale en bainouk*. Ed. du Centre National de la Recherche Scientifique.

Snider, Keith. 1999. The geometry and features of tone. *Dallas: Summer Institute of Linguistics* .

Yip, Moira Jean. 1980. The tonal phonology of Chinese. Doctoral Dissertation, Massachusetts Institute of Technology.

Zimmermann, Eva. 2013. Non-concatenative allomorphy is generalized prosodic affixation: The case of Upriver Halkomelem. *Lingua* 134:1–26.