Discontinuous harmony is movement after local phonology

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- The Atchan community of Abidjan, Côte d'Ivoire

Introduction

Introduction

- This talk introduces a phenomenon I call *discontinuous harmony*.
  - I define *discontinuous harmony* as one element triggering harmony on a non-local element (word), while intervening elements (words) fail to harmonize.
  - I show that discontinuous harmony is found in at least three West African languages.

What is harmony?

- *Harmony* is when the features of one speech sound (such as tongue height, rounding, or nasality) spread to and affect the production of the features of nearby sounds.
  - It is often argued to be motivated by *coarticulation*, where the speech gestures used to produce one sound are activated early or deactivated late, influencing nearby sounds (Ohala, 1994, p. 491).

Harmony is predicted to be local

- Because harmony is said to be due to co-articulation, it is predicted to be local: We would not expect the properties of the first vowel in a word to affect the third vowel without also affecting the second one: *A B C.
- We certainly would not predict that the properties of vowels in a word at the end of sentence would affect the production of vowels in the first word of the sentence unless they also affect all intervening vowels.
  - However, we'll see a case of exactly this kind of non-local, discontinuous harmony in Guébie.

Goals

The goals of this talk are the following:

- Describe the discontinuous vowel harmony patterns in Guébie predicate fronting constructions.
- Show why discontinuous harmony poses a challenge for existing phonological models of harmony.
- Sketch an analysis that accounts for the Guébie facts which makes predictions about which syntactic constructions might show discontinuous harmony across languages.
- Briefly show that the predictions are borne out in two more West African languages that also display discontinuous harmony patterns: Wolof (Atlantic) and Atchan (Kwa).

Overview

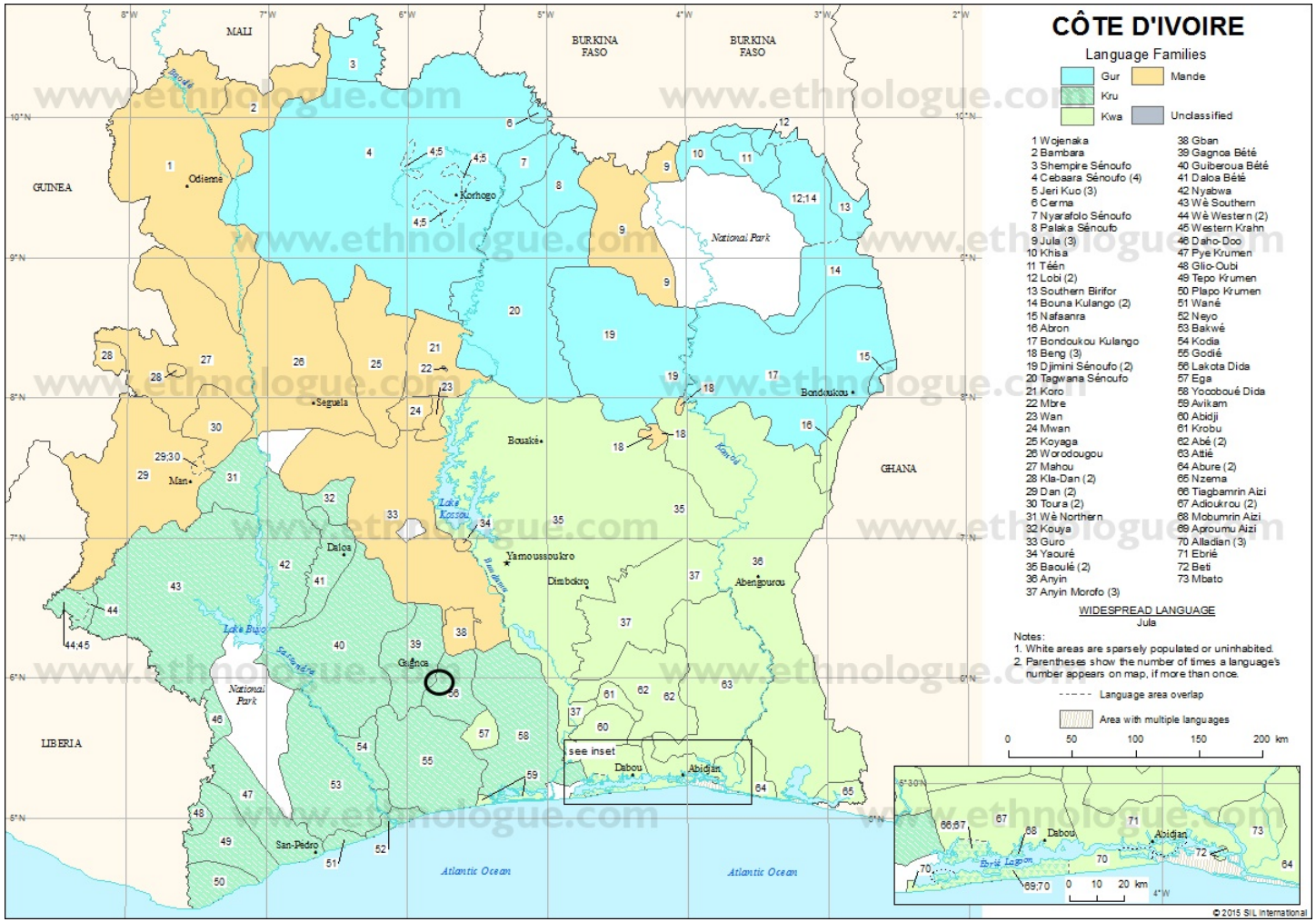
The Guébie language

The Guébie people

Guébie (also sometimes written Guébié or Gaɓogbo) is an Eastern Kru language spoken in southwest Côte d'Ivoire.

- Here I focus on the Guébie spoken in the Gagnoa region (7,000 speakers), and specifically in the rapidly growing village of Gnagbodougnoa.
- The data presented here was collected between 2013-2022, primarily in the largest Guébie village of Gnagbodougnoa.

Languages of Côte d'Ivoire



Phonological background

- Guébie is a tonal language with four contrastive tone heights, marked here with numerals 1-4, where 4 is high. Tone distinguishes words (lexical items) and marks grammatical categories such as tense/aspect, case, and negation.
- There are ten contrastive vowels in the language, which fall into two categories based on the position of the tongue root when pronouncing them:
  - [+ATR] or advanced tongue root vowels: /i, e, u, o, ə/
  - [-ATR] or retracted tongue root vowels: /ɪ, ɛ, ʊ, ɔ, a/
  - Any given word contains only +ATR or only -ATR vowels, a process which we call *vowel harmony*.

Basic word order

Basic word order is SAuxOV when an auxiliary is present (1a), or SVO when there is no auxiliary (1b). Auxiliaries mark mood and negation.

(1) **Basic word order: SAuxOV or SVO**

a. ɟaci$^{23.1}$ ji^{3} su=a$^{2.2}$ gbala$^{2.4}$
Djatchi FUT tree=DEF climb
'Djatchi will climb the tree.'

b. ɟaci$^{23.1}$ gbala$^{2.4}$ su=a$^{2.2}$
Djatchi climb.PFV tree=DEF
'Djatchi climbed the tree.'

Local harmony

Word-internal harmony

With the exception of a few 'outer' suffixes and clitics, vowels within a word in Guébie agree in ATR quality.

- Within roots (with the exception of a few loans), all vowels are either -ATR or +ATR.
- +ATR roots trigger +ATR affixes.
- -ATR roots trigger -ATR affixes.

(2) **Causative harmony alternations**

a. pɔ-a$^{3.2}$
shine-CAUS
'cause to shine' (oli_20210603)

b. bido-ə$^{3.1.2}$
wash.IPFV-CAUS
'cause to wash' (oli_20160716)

c. *pɔ-ə$^{3.2}$, *bido-a$^{3.1.2}$

Particle verbs

There is a class of particle verbs, which involve a verbal element and a prefixing particle that together act as a phrasal idiom. That is, the meaning of the verb and particle is unpredictable, similar to particle verbs in a number of Germanic languages (Booij, 2002) (e.g., English 'throw out').

(3) **Sample list of particle verbs**

	/mɛ^{3}/	'in'
a.	mɛ-tɛ$^{3.2}$	'be strong'
b.	mɛ-para$^{3.3.3}$	'enter'
c.	mɛ-salɪ$^{3.2.3}$	'tell'
	/kɔ^{3}/	'at/to'
d.	ko-silije$^{3.3.3.1}$	'straighten'
e.	kɔ-trɔ$^{3.4}$	'be tall'
f.	kɔ-ɟɛ$^{3.1}$	'take'

Syntactic distribution of particles

- In SAuxOV contexts, particles surface as prefixes on the clause-final verb, (4a).
- In SVO contexts, the verb surfaces immediately after the subject; particles surface clause finally, forming a prosodic word unto themselves, (4b).

(4) **Particle verbs in SAuxOV and SVO contexts**

a. e^{4} ji^{3} ʄaci$^{23.1}$ **jokuni**$^{2.3.4}$
I FUT Djatchi see
'I will see Djatchi.'

b. e^{4} **ni**^{4} ʄaci$^{23.1}$ **jɔkʊ**$^{2.3}$
I see.PFV Djatchi PART
'I saw Djatchi.'

c. * e^{4} **jokuni**$^{2.3.4}$ ʄaci$^{23.1}$
I see.PFV Djatchi
intended: 'I saw Djatchi.'

Harmony in particle verbs in SAuxOV clauses

In SAuxOV contexts when particles surface as verbal prefixes, they are subject to ATR vowel harmony controlled by the verb root.

- In (5), we see the same particle surfacing on two different verbs, one with +ATR vowels, (5a), and another with -ATR vowels, (5b).

(5) **Particles harmonize in SAuxOV contexts**

a. e^{4} ji^{3} ɟaci$^{23.1}$ **joku-**ni$^{2.3.4}$
I FUT Djatchi PART-see
'I will see Djatchi.'

b. ɟaci$^{23.1}$ ji^{3} ɔnɛ$^{3.3}$ gbɔgɔ$^{2.2}$
Djatchi FUT 3SG.POSS leg
jɔkʊ-ŋ^{w}ɔsa$^{2.3.3.1}$
PART-scrape
'Djatchi will scrape his leg.'

No harmony in particle verbs in SVO clauses

In SVO contexts, when the verb surfaces immediately after the subject and the particle remains clause-final, there is no vowel harmony between verb and particle. The particle surfaces with its default vowel quality (-ATR in (6)), no matter the vowels of the verb root.

(6) **No vowel harmony between verb and particle in SVO order**

a. e^{4} $\underline{\text{ni}^{4}}$ $\text{ɟaci}^{23.1}$ $\mathbf{\text{jɔkʊ}}^{2.3}$
I see.PFV Djatchi PART
'I saw Djatchi.'

b. $\text{ɟaci}^{23.1}$ $\underline{\text{ŋ}^{\text{w}}\text{ɔsa}^{3.1}}$ $\text{ɔnɛ}^{3.3}$ $\text{gbɔgɔ}^{2.2}$ $\mathbf{\text{jɔkʊ}}^{2.3}$
Djatchi scrape.PFV 3SG.POSS leg PART
'Djatchi scraped his leg.'

Local harmony

So far, we have seen local harmony. When the particle and verb both surface clause-finally within the same phonological word, the particle shows ATR harmony alternations, conditioned by the nearby vowels in the verb root.

Accounting for local harmony

In previous work (Sande, 2019) I've shown that ATR harmony applies within certain syntactic domains in Guébie, such as the Voice phase.

- Within this domain, rules or constraints operate over underlying forms to result in surface ATR harmony.
- When there is no auxliary, verbs move to the immediately post-subject position (let's call it T) and are not spelled out in the Voice domain.
- When auxiliaries are present, verbs are spelled out within Voice, and trigger harmony on the particle.

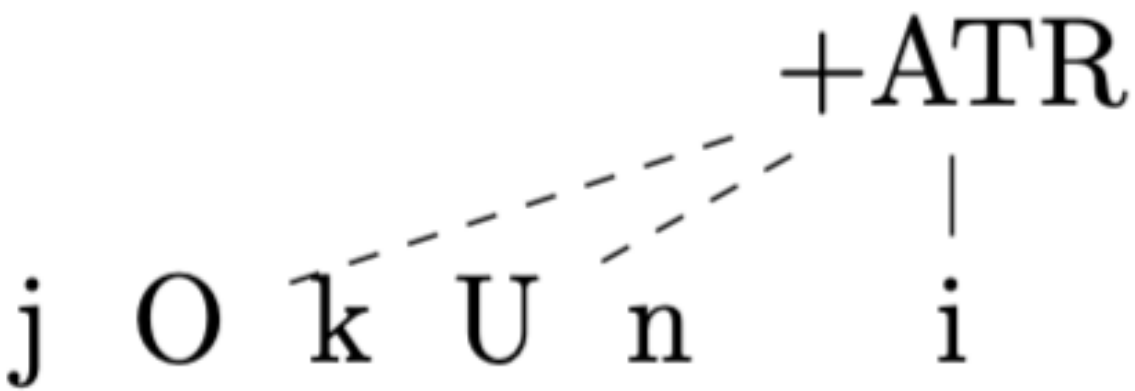
Mechanisms of deriving local harmony

There are many possible analyses of local harmony, including the following:

- Autosegmental spreading (Clements and Sezer, 1982; Steriade, 1987)
- Coarticulation in Articulatory Phonology (Gafos, 1998, 2014)
- Agreement by Correspondence (Hansson, 2001; Rose and Walker, 2004)

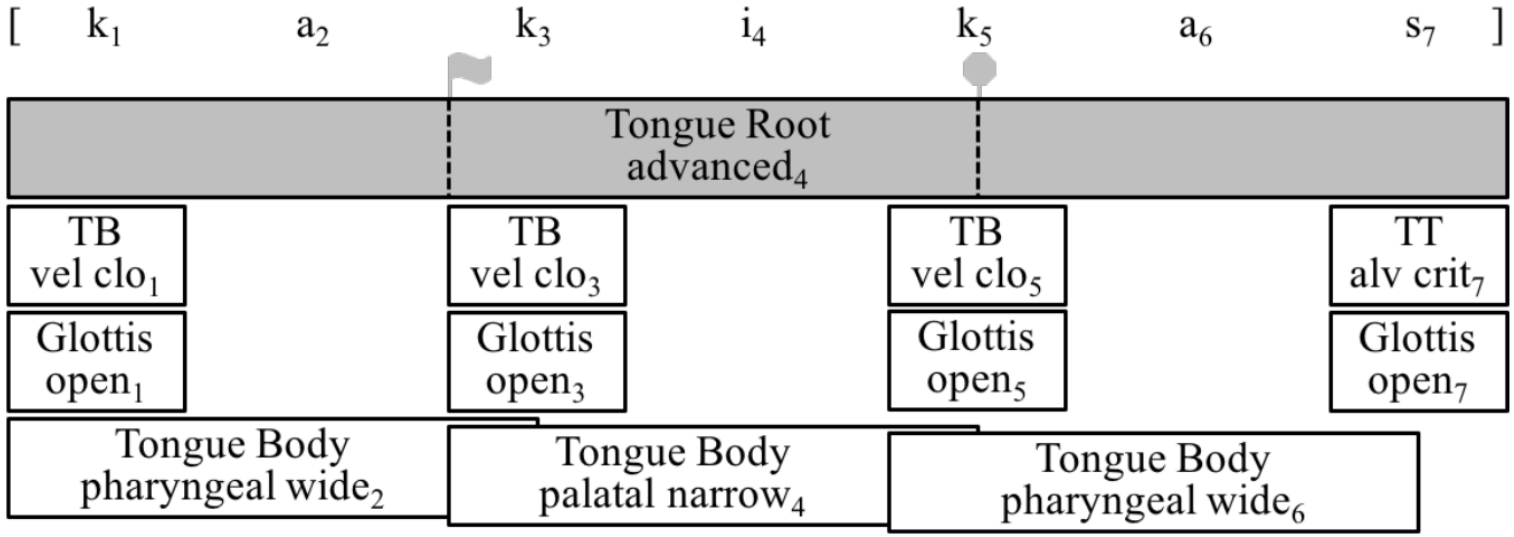
Autosegmental spreading

In an autosegmental account, one associated ATR feature can spread to other eligible segments resulting in harmony:



Coarticulation in Articulatory Phonology

In a co-articulation account in Articulatory (Gestural) Phonology, a tongue root gesture may begin earlier or persist later than its target, resulting in harmony, as with the +ATR gesture of the [i] vowel in Nandi (Smith, 2018).



Agreement by Correspondence

In Agreement by Correspondence, CORRESPONDENCE constraints ensure that segments that are similar, share some feature, are in a correspondence relation:

ABC configuration

$$\begin{array}{cccc} C_x & V & C_x & V \\ | & & | & \\ [\alpha F] & & [\alpha F] & \end{array}$$

IDENTITY constraints ensure that corresponding segments are identical (in some feature).

- For ATR harmony, then, vowels within a word or spell-out domain could be in correspondence and an ID-CORR(ATR) constraint could ensure identity of ATR features among corresponding vowels.

Summarizing local harmony

Guébie shows local harmony within words, or more specifically, within certain syntactic domains that correspond to spell-out domains.

- Crucially for our purposes, when they surface within the same word, verbs trigger ATR harmony on particles. But when the don't surface locally, verbs and particles do not harmonize.
- Autosegmental spreading, gestural spreading, and Agreement by Correspondence can all account for local harmony within a particular domain.
- The goal here is not to distinguish between these three frameworks, but rather to determine whether any of these frameworks can account for the *discontinuous harmony* we will soon see.

Discontinuous harmony

Focus fronting

There is a clause-initial focus position in Guébie, (7). Subjects, objects, postpositional phrases, and adverbs can fill the focus position.

(7) **Clause-initial focus**

a. sɔkɔ$^{4.2}$ mɛ^{3} ɔ^{3} pa=a$^{3.2}$
hole in 3SG.NOM throw.PFV=3SG.ACC
'INTO A HOLE, she threw it!'

b. e^{4} jisa$^{2.3}$ [gba^{1} ɟaci$^{23.1}$ ɔ^{3}
1SG.NOM know.IPFV that Djatchi 3SG
ni^{4} k^{w}ala$^{4.2}$ me^{3} ji^{3}]
see.PFV farm on PART
'I know that he saw DJATCHI on the farm.'

Verb doubling for focus

Verbs can also be focused, in which case the verb surfaces twice, once at the left edge of the clause, and once in its position within the SVO or SAuxOV clause, (8).

(8) **Verb doubling focus construction**

a. $\underline{\text{gbala}^{2.4}}$ ɔ^{3} $*(\text{gbala}^{2.4})$ su^{2}
climb 3SG.NOM climb tree
'He CLIMBED the tree.'

b. $\underline{\text{gbala}^{2.4}}$ ɔ^{3} ji^{3} su^{3} $*(\text{gbala}^{2.4})$
climb 3SG.NOM FUT tree climb
'He will CLIMB the tree.'

Verb doubling is also described for nearby Vata (Koopman, 1997).

Particle verb focus

We do not see verb doubling for focus of particle verbs.

- Instead the particle surfaces in the focus position and the verb surfaces in a lower position in the clause (9a).
- The verb and particle cannot both surface in the focus position, and verb doubling is impossible if a particle is present.
- The particle never appears twice.

(9) **Particle verb focus**

jɔkʊ$^{2.3}$	ɔ^{3}	ni=ɔ$^{4.2}$
PART	3SG.NOM	see.PFV=3SG.ACC

'He SAW him.'

Particle fronting has not been reported for Vata or other related languages.

Particle verb focus, cont.

In both SVO and SAuxOV clauses with particle verb focus, the particle alone surfaces clause-initially.

(10) **Particle verb focus in SVO clauses**

jɔkʊ$^{2.3}$	ɔ^{3}	ni=ɔ$^{4.2}$
PART	3SG.NOM	see.PFV=3SG.ACC

'He SAW him.'

(11) **Particle verb focus in SAuxOV clauses**

joku$^{2.3}$	ɔ^{3}	ji^{3}	ɟaci$^{23.1}$	ni^{4}
PART	3SG.NOM	FUT	Djatchi	see

'He will SEE Djatchi.'

Harmony in particle verb focus

There is no vowel harmony between particle and verb in SVO focus constructions, (12a). However, quite unexpectedly, the particle in SAuxOV focus constructions still shows harmony with the verb, despite the intervening subject, auxiliary, and object, (12b).

(12) **Particles harmonize with verbs in PartSAuxOV clauses**

a. jɔkʊ$^{2.3}$ ɔ^{3} ni^{4}=ɔ^{2}
PART 3SG.NOM see.PFV=3SG.ACC
'He SAW him.' (cf. ɔ^{3} ni^{4}=ɔ^{2} jɔkʊ$^{2.3}$)

b. joku$^{2.3}$/*jɔkʊ$^{2.3}$ ɔ^{3} ji^{3} ɟaci$^{23.1}$ ni^{4}
PART 3SG.NOM FUT Djatchi see
'He will SEE Djatchi.'
(cf. ɔ^{3} ji^{3} ɟaci$^{23.1}$ joku$^{2.3}$-ni^{4})

Data summary

To summarize, in verb focus constructions without a particle, we see verb doubling:

a. VSAuxOV
b. VSVO

In particle verb constructions, particles harmonize with verbs in SAuxOV but not SVO clauses, both when there is no focused element and when the particle surfaces at the left edge:

a. SAuxOPartV
b. PartSAuxOV
c. SVOPart
d. PartSVO

Harmony in particle verb focus constructions is non-local and discontinuous

This is a rare case of *discontinuous harmony*, where intervening material is unaffected: Part_{target} Subj Aux O $\text{Verb}_{trigger}$

- Existing syntactic accounts of predicate doubling cannot account for the harmony facts.
- Existing phonological accounts predict that harmony should be local, not discontinuous.
- I provide an account that relies on interleaving between syntax and phonology.

Syntactic accounts

Accounts of predicate fronting

There are two primary types of syntactic account of verb doubling in predicate fronting:

- Base generation of the focused element in the focus position (cf. Cable (2004))
- Syntactic movement resulting in multiple movement chains, with the head of each chain being pronounced (cf. Koopman (1997); Landau (2006))

There is evidence (that I will not talk about here) that verb focus in Guébie involves movement, so I will only consider a movement-based account.

- This section represents joint work with Emily Clem (UCSD).

Remnant movement

- Koopman (1997) presents an analysis of verb doubling in Vata, which resembles the verb doubling pattern in Guébie, as involving remnant VP movement.
  - Crucially, particle verb focus in Vata does not result in particle fronting, which differentiates it from the Guébie pattern.

Vata fronting analysis

Basics of the analysis

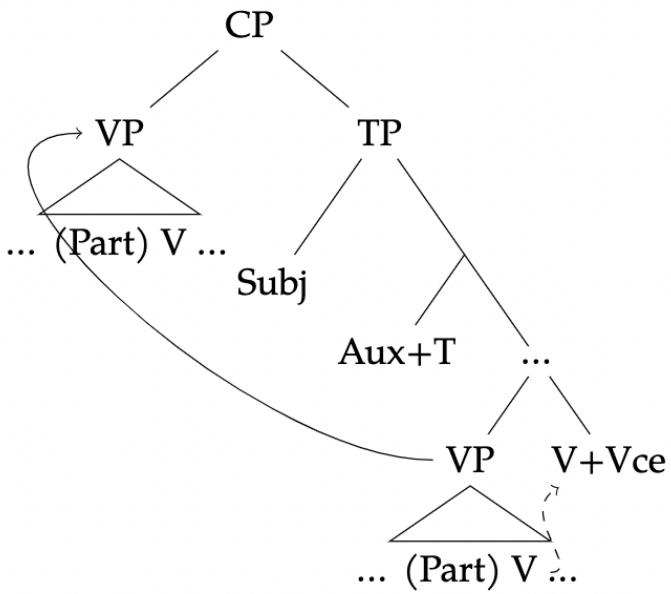
- Koopman argues that objects are required to vacate the VP.
- The verb head-moves to T in SVO contexts.
- The remnant VP moves to Spec,FocP.
- The copy of V in T is pronounced as the head of a movement chain.
- The verb in Spec,FocP is also pronounced in order for focus movement to be recoverable.

Extending the analysis to Guébie

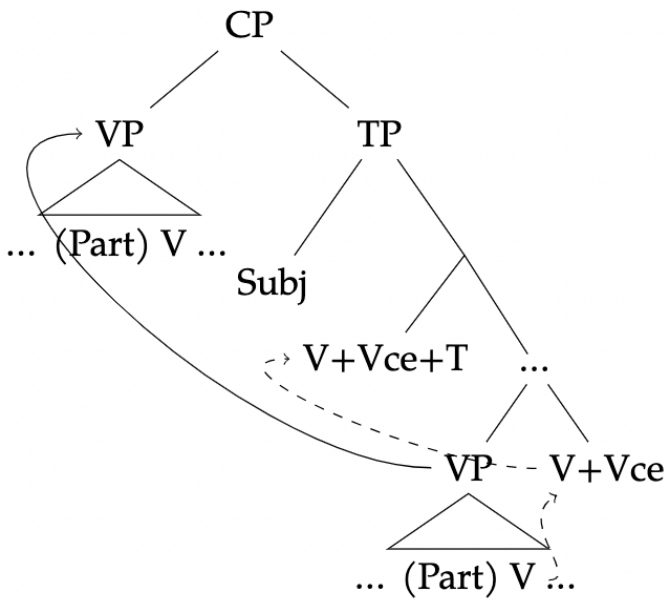
- If we assume that the verb head-moves to Voice (v) even in SAuxOV contexts, then verb focus in both SAuxOV and SVO contexts involves two movement chains, allowing for double pronunciation.
- In verb doubling contexts, as in Vata, the higher copy of the verb would be pronounced for recoverability reasons.
- Under simple economy principles, since the particle never leaves the VP, when a particle is present in VP focus constructions, it will be pronounced in Spec,FocP and the verb will not double.
- On this account, the correct elements can be derived as surfacing in the correct positions in each of the four relevant cases:
  1. VSVO
  2. VSAuxOV
  3. PartSVO
  4. PartSAuxOV

Extending the analysis to Guébie, cont.

a. VSAuxOV/PartSAuxOV



b. VSVO/PartSVO



Problems for the analysis

The major problem for a Koopman-style analysis is that it cannot derive the harmony facts: We see harmony in PartSAuxOV but not PartSVO contexts.

- Harmony between the fronted particle and verb cannot be local, between the particle and silent V, because this overpredicts that harmony should also appear in PartSVO contexts.
- There is no way to get a silent fronted V in PartSAuxOV but not PartSVO contexts without disrupting the analysis of verb doubling.

Note that a similar account presented by Landau (2006) for Hebrew runs into the same set of problems, as well as additional problems.

Summarizing the problems with existing accounts

- Verb phrase movement can derive the correct surface positions of the particle and verb in focus and non-focus constructions, but do not account for harmony.
- Deriving particle harmony in PartSAuxOV contexts through a silent copy of the fronted verb over-predicts harmony in PartSVO contexts.

Interim conclusion: Harmony in PartSAuxOV but not PartSVO constructions cannot be due to a syntactic difference (such as whether there is a silent copy of the verb present in the focused constituent).

Phonological accounts

Phonological accounts of local harmony

There are many purely phonological analyses of (local) harmony, as we saw previously:

- Autosegmental spreading (Clements and Sezer, 1982; Steriade, 1987)
- Coarticulation in Articulatory Phonology (Gafos, 1998, 2014)
- Agreement by Correspondence (Hansson, 2001; Rose and Walker, 2004)

This section considers whether any of them can be extended to account for discontinuous harmony:
Part_{target} Subj Aux O $\text{Verb}_{trigger}$.

Locality predictions

- Autosegmental spreading: Feature spreading is predicted to be local on a tier, unless their are *transparent segments*.
- Coarticulation in Articulatory Phonology: Gestural overlap is strictly local. Some segments may transparently undergo harmony with little to no phonetic effect (like the consonants in Nandi ATR harmony).
- Agreement by Correspondence: All corresponding segments within a domain are expected to harmonize in the same way. Perhaps a lack of correspondence could result in intervening segments being transparent to harmony.

Only consecutive segments (on some tier) are expected to participate in harmony, unless exceptions are made for intervening phonologically transparent segments.

Transparent segments

Some segments are described as *transparent* to harmony, meaning that they do not participate in harmony nor do they block features from spreading past them.

- For example, /i,e/ do not participate in backness harmony in Finnish, but backness harmony can apply across intervening /i,e,/ (van der Hulst and van de Weijer, 1995; Ringen and Heinämäki, 1999):

(13) Finnish /i,e/ are transparent to backness harmony

a.	pøytæ-næ	table-ESSIVE
b.	pouta-na	fine.weather-ESSIVE
c.	koti-na, *koti-næ	home-ESSIVE

Accounting for transparent vowels

- One solution for Finnish transparent vowels is to prohibit a +back feature from spreading to a -round vowel (Ringen and Heinämäki, 1999).
- Or, one could say that phonologically, transparent vowels *do* undergo harmony, but with no phonetic effect (Finley, 2008; Jurgec, 2011).

Both approaches predict that vowels intervening between a trigger and target that are eligible to harmonize will harmonize.

Guébie intervening vowels are not 'transparent'

- All ten vowels in Guébie participate in ATR harmony (+ATR /i, e, u, o, ə/, -ATR /ɪ, ɛ, ʊ, ɔ, a/).
  - That is, all vowels are eligible to harmonize.
- Some affixes and clitics alternate in ATR quality depending on the vowels in the word they attach to (they are demonstrably eligible to harmonize), but they do not agree in ATR quality with the verb in PartSAuxOV contexts (14).

(14) joku$^{2.3}$ ɔ^{3} ka^{3} ɟɔkʷɪ-a$^{2.3.2}$ ni^{4}
PART 3SG.NOM PROSP bird-PL see
'He will SEE birds.' (cf. [grimi-ə$^{2.3.2}$] agouti-PL 'agoutis')

Guébie intervening vowels are not 'transparent'

Intervening vowels between the verb and particle in Guébie PartSAuxOV clauses are not *transparent*, at least in the traditional sense:

- Vowels of the same quality are subject to harmony in other morphosyntactic contexts.
- The same intervening morphemes are subject to harmony and in fact undergo word-internal harmony even in PartSAuxOV clauses.
- Yet, vowels of the subject, auxiliary, object, and other intervening material do not participate in harmony triggered by the clause-final verb, even though the clause-initial particle does.

Interim summary

- Purely phonological accounts of harmony fail to account for the discontinuous harmony in Guébie particle verb focus constructions.
- I propose an that interface-based account, which relies on the crucial timing of interleaving between syntax and phonology, is preferable to a purely syntactic or purely phonological account.

Proposed analysis

An interleaving analysis

Here I sketch an analysis that builds on my previous work on Cophonologies by Phase (CbP) (Sande, 2019; Sande et al., 2020; Sande, 2020).

- Details the interface between syntax and phonology.
- Assumes phonology applies cyclically at syntactic phase boundaries.
- Assumes that morphemes can introduce morpheme-specific phonological grammars (not crucial for our purposes today).

An interleaving analysis

The basic idea:

- The particle harmonizes with the verb while both are low: SAuxOPartV
- Focus movement takes place after harmony: PartSAuxOV, cf. PartSVO from SVOPart

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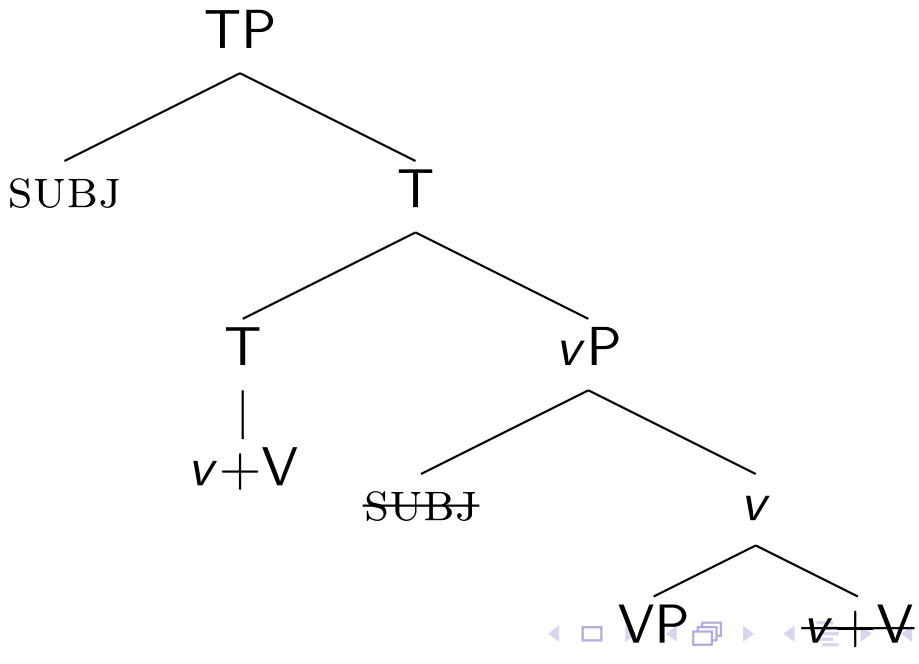
Required assumptions:

- Spell-out, including phonology, applies at syntactic phase boundaries.
- The particle and verb are spelled out simultaneously in SAuxOPartV clauses.
- Syntactic movement (at least A'-movement) can target subsets of previously spelled out material (contra the strict PIC (Chomsky, 2000, 2001), but compatible with modular PIC (d'Alessandro and Scheer, 2015)).

SVO vs SAuxOV clauses

- Phonology applies within the VoiceP domain.
- If an auxiliary is present, the verb and particle are both within the Voice domain and harmonize: SAuxOPartV
- When there is no auxiliary the verb moves out of the Voice domain. It is never spelled out together with the particle, so the two do not harmonize: SVOPart.

(15) **Structure of SVO sentences in Guébie**



Particle verbs in verb focus constructions

In verb focus constructions, when the focus C head is merged, if there is a particle verb, the particle moves to spec-C.

- Note that I'm giving you an oversimplified view of the syntax here; that's a separate talk!

Because the particle has already been phonologized in the Voice phrase, it surfaces with the same vowel quality as it would in non-focus constructions:

- No harmony: SVOPart and PartSVO
- Harmony: SAuxOPartV and PartSAuxOV

When there is no particle, a copy of the verb moves in focus constructions and both copies are spelled out (cf. Koopman (1997) on verb doubling in Vata).

Summarizing key aspects of the account

- Vowel harmony applies at certain syntactic phase boundaries, including the VoiceP.
  - If the verb head-moves out of the Voice phase, it is not spelled out together with the particle, so harmony is not triggered (SVOPart, PartSVO).
  - If an auxiliary is present and the verb stays low (in Voice), it is spelled out with the particle and triggers harmony: (SVOPartV).

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  - If an auxiliary is present and the verb stays low (in Voice), it is spelled out with the particle and triggers harmony: (SVOPartV).
- Focus movement applies after the Voice domain has already been spelled out.
- Focused verbs and particles are spelled-out as they would be in their non-focused positions because they have already undergone spell-out.

Interleaving

The proposed model relies on interleaving syntactic and phonological operations.

- Any local harmony mechanism can be adopted in the phonology.
- Crucially, phonology must apply to a sub-part of syntactic structure before further syntactic operations apply (namely, focus movement).

Typological predictions for discontinuous harmony

Predictions:

1. The target and trigger of harmony must be local at some point in the derivation.
2. The target and trigger of harmony are spelled out locally within a syntactic spell-out domain (phase).
3. Discontinuous harmony only arises in cases of syntactic movement of the target or trigger of harmony, resulting in apparent non-local harmony.

Other cases of discontinuous harmony

Wolof language background

- Wolof is the most widely spoken language in Senegal.
- It is said to be an Atlantic language, though there is debate about whether there is evidence for an Atlantic language family at all.
- Urban and rural varieties of Wolof vary quite drastically.
- The data presented here represents rural Wolof. It comes from Sy (2005) and was confirmed by Wolof speaker and teacher Paap Sow in joint work with Maks Dabkowski.

ATR harmony in Wolof

Mid and low vowels agree in ATR harmony in Wolof. Within relative clauses, all words can agree in ATR harmony as below.

(16) Wolof ATR harmony

a. xaj b-u weex b-ale
dog CL-REL be.white CL-DEM.DIST
'that white dog'

b. béy wu réy wëlé
goat CL-REL be.big CL-DEM.DIST
'that big goat'

Discontinuous ATR harmony in Wolof

Or, within relative clauses, the noun and demonstrative can agree in ATR harmony, while intervening material does not harmonize.

(17) Wolof discontinuous ATR harmony

a. xaj b-u **réy** b-ale
dog CL-REL be.big CL-DEM.DIST
'that big dog'

b. **béy** w-u weex **w-ëlé**
goat CL-REL be.white CL-DEM.DIST
'that white goat'

+ATR vowels are in bold and -ATR vowels are underlined.

Movement in relative clauses

Relative clauses in Wolof are said to involve movement of the head noun (Torrence, 2005).

- The head noun originates locally to the demonstrative.
- In a Noun Demonstrative construction like ‘that goat’, the two surface locally.
- However, when there is a relative clause, the noun moves to the left edge of the relative clause.
- Like focus movement in Guébie, relative clauses involve syntactic movement of the target or trigger of harmony away from the other.

Atchan language background

- Atchan (also called Ebrié or Cama/Caman/Tchaman) is a Kwa language that was spoken in Abidjan before Abidjan become a metropolis.
- Certain neighborhoods of Abidjan today (such as Anono) are considered Atchan villages.
- There are approximately 76,000 ethnic Tchaman people in and around Abidjan, though not all of them speak the language.
- The data presented here comes from Katherine Russell's ongoing work with Atchan speakers in Abidjan.

Nasal harmony in Atchan

In Atchan, when a nasal pronoun (1SG or 3SG) is present, auxiliaries and verbs surface as nasal.

(18) Nasal harmony in Atchan

a. aká ɓa lé wá
Aka FUT NEG run
'Aka will not run'

b. ã̲ mã̲ nɛ̲̃́ ŋʷá̲
3SG.NOM FUT NEG run
'He will not run'

- Note that the consonants and vowels of the future and negative auxiliaries nasalize, while only the consonant of the verb nasalizes.
- This harmony can be analyzed as long-distance but local.

Verb focus in Atchan

Verbs double in verb focus contexts, much like in Guébie.

(19) wá lep^{h}ã wá
run person run
'A/the person is RUNNING'

Discontinuous nasal harmony in Atchan

When the verb nasalizes, it also surfaces as nasal in its doubled, fronted position in focus constructions

(20)

ŋ̃ʷá	ã		ŋ̃ʷá
run	3SG.NOM		run

'He is RUNNING'

Note that nasal harmony never (otherwise) spreads right-to-left in Atchan, and also that the vowel of the verb is oral in the fronted context, just as in the clause-final form.

- This is not right-to-left local spreading of nasalization, but a copy of the right-side verb moving to the left after nasalization has applied.

Discontinuous nasal harmony in Atchan, cont.

Further evidence for discontinuous harmony in Atchan focus constructions comes from verb focus in embedded clauses.

(21) a. mɛ̃ mú sale ŋʷá ã ŋʷá
1SG.NOM think that run 3SG.NOM run
'I think he's RUNNING'

b. ŋʷá mɛ̃ mú sale ã ŋʷá
run 1SG.NOM think that 3SG.NOM run
'I think he's RUNNING'

c. ŋʷá ɛ ɓú sale ã ŋʷá
run 2SG.NOM think that 3SG.NOM run
'You think that he's RUNNING'

These examples show that nasalization does not normally spread leftwards (e.g., from the embedded subject to the complementizer in (21b,c)). Additionally, (21c)) shows a very clear case of non-local discontinuous nasal harmony.

Atchan discontinuous harmony involves movement

The Atchan discontinuous harmony is slightly different than the Wolof and Guébie cases, since it involves multiple copies of the harmony target both being spelled out, and both showing effects of harmony. However, the predictions of where we expect to find discontinuous harmony are still met:

- At some point in the derivation, the trigger and target are local (local nasalization of the verb after the nasal subject pronoun).
- The verb and subject are spelled out within the same syntactic phase (C).
- The target of harmony (the verb) A'-moves to the left edge.

In all attested cases of discontinuous harmony, there is clear syntactic movement of the target away from the trigger, matching the predictions of the proposed analysis.

Word-internal non-local harmony

There are a few reported instances of certain morphemes within a word being transparent to word-internal harmony.

- For example, Kazakh shows backness harmony. The interrogative /-ba/ surfaces with an [a] after back vowels and [e] after front vowels. However, the instrumental case suffix /-men/ does not alternate and can intervene between the trigger and target:

(22) Kazakh apparent non-local harmony

a. bʊl ʃal nan-men-ba
this old.man bread-INSTR-Q
'Is this an old man with some bread?'

b. bʊl ʃal bøbek-men-be
this old.man baby-INSTR-Q
'Is this an old man with a baby?'

Analyzing word-internal non-local harmony

Much like the analysis presented here for discontinuous harmony across entire clauses, Gleim et al. (2022) propose that apparent non-local phonology within words is in fact due to local phonology at some stage in the derivation.

- Gleim et al. adopt Harmonic Serialism.
- At one stage of evaluation the interrogative suffix is local to the stem and harmony applies.
- At a later stage the instrumental suffix infixes into the harmony domain, separating the interrogative harmony target from the triggering stem.

I leave as a question for future work whether these word-internal instances of non-local harmony could be modeled using the same post-phonological movement operations as cross-word discontinuous harmony.

Conclusion

Summarizing the findings

- Finding 1: Discontinuous harmony exists.
  - We have seen three cases of discontinuous harmony in West African languages.
- Finding 2: All attested cases of discontinuous harmony involve elements that are adjacent in related constructions, and arguably at earlier stages of derivation in the relevant discontinuous harmony constructions.
- Finding 3: All attested cases of discontinuous harmony involve syntactic (A') movement of the target morpheme away from the trigger of harmony (in relative clauses and focus constructions).
- Finding 4: If we adopt a cyclic architecture of grammar where some syntactic structure is built, then phonology applies, then further syntactic operations such as A'-movement apply and the target of harmony moves away from the trigger, we can derive discontinuous harmony.

Implications for the syntax/phonology interface

- Syntax and phonology are interleaved, such that certain syntactic domains are phonologized before the rest of the syntactic structure is built (cyclic spell-out).
- The Phase Impenetrability Condition must be violable, such that a sub-part of a spelled-out constituent is later movable by the syntax (this is compatible with the Modular PIC of d'Alessandro and Scheer (2015)).
- Elements moved after spell-out retain properties of their originally phonologized forms, which can result in discontinuous phonological interactions like discontinuous harmony.

Predictions

This analysis predicts that all discontinuous harmony will involve (A'-)movement of the target or trigger of harmony.

- We've seen examples of discontinuous harmony in focus constructions and relative clauses. A'-movement also applies in Wh-questions, so we should also look for cases of discontinuous harmony in Wh-questions.

The proposed model also predicts that we might find other cases of discontinuous phonology, not just harmony, in similar types of constructions.

- Open question: Do we find any such cases?

Benefits of language documentation for linguistic analysis

Without careful documentation of the three languages presented here, we as linguists would not know about discontinuous harmony as a phenomenon. Additionally, without encountering discontinuous harmony in multiple languages, we would not be able to generalize, so we would not know that discontinuous harmony only appears in cases of syntactic movement of the target or trigger.

Thanks!

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Successive cyclicity

Verb focus shows evidence for successive cyclicity, which is expected if verb focus involves movement, but not if it involves base generation of the focused verb.

(23) *Successive cyclic movement in verb doubling*

a. e^{2} wa=sɛ$^{2.4}$ gba^{1} li^{2}
2SG.NOM want.IPFV=PQ that eat.IPFV
ɔ^{3} li^{2}
3SG.NOM eat.IPFV
'Do you want him to EAT?'

b. li^{2} e^{2} wa=sɛ$^{2.4}$ gba^{1}
eat.IPFV 2SG.NOM want.IPFV=PQ that
(li^{2}) ɔ^{3} li^{2}
eat.IPFV 3SG.NOM eat.IPFV
'Do you want him to EAT?'

Successive cyclic movement in particle verb focus

(24) *Successive cyclic movement in particle fronting*

a. e^4 wa^2 gba^1 $\underline{joku^{2.3}}$ e^4
1SG.NOM want.IPFV that PART 1SG.NOM
ka^3 $ɟaci^{23.1}$ ni^4
IRR Djatchi see
'I want to SEE Djatchi.'

b. $\underline{joku^{2.3}}$ e^4 wa^2 gba^1 $(\underline{joku^{2.3}})$
PART 1SG.NOM want.IPFV that PART
e^4 ka^3 $ɟaci^{23.1}$ ni^4
1SG.NOM IRR Djatchi see
'I want to SEE Djatchi.'

Verb focus movement is island sensitive

(25) *Verb doubling is island sensitive*

a. e^{4} $\text{jɛra}^{2.3}$ gba^{1} $\text{ɟaci}^{23.1}$ $\text{li=se}^{3.4}$
1SG.NOM ask.PFV that Djatchi eat.PFV=PQ
bɛ^{2}
thing
'I asked whether Djatchi ate.'

b. ?? li^{3} e^{4} $\text{jɛra}^{2.3}$ gba^{1} $\text{ɟaci}^{23.1}$
eat.PFV 1SG.NOM ask.PFV that Djatchi
$\text{li=se}^{3.4}$
eat.PFV=PQ
Intended: 'I asked whether it's eating that Djatchi did.'

Particle verb focus is island sensitive

(26) *Particle fronting is island sensitive*

a. ɟaci$^{23.1}$ jɛra$^{2.3}$ ɔ-ji$^{2.3}$ gba^{1}
Djtachi ask.PFV 3SG.POSS-BODY that
touri$^{1.1.3}$ ni=ɔ$^{4.2}$ jɔkʊ$^{2.3}$
Touri see.PFV=3SG.ACC PART
'Djatchi wonders whether Touri saw him.'

b. * jɔkʊ$^{2.3}$ ɟaci$^{23.1}$ jɛra$^{2.3}$ ɔ-ji$^{2.3}$ gba^{1}
PART Djtachi ask.PFV 3SG.POSS-BODY that
(jɔkʊ$^{2.3}$) touri$^{1.1.3}$ ni=ɔ$^{4.2}$
(PART) Touri see.PFV=3SG.ACC
Intended: 'Djatchi wonders whether Touri SAW him.'

Verb doubling creates an island

(27) *Verb doubling creates an island for movement*

a. bɛba$^{3.1}{}_{i}$ e^{2} ji=se$^{2.4}$ [gba^{1}
what 2SG.NOM know.IPFV=PQ that
touri$^{1.1.3}$ li^{3} t$_{i}$] na^{2}
Touri eat.PFV Q
'What do you know that Touri ate?'

b. * bɛba$^{3.1}{}_{i}$ e^{2} ji=se$^{2.4}$ [gba^{1}
what 2SG.NOM know.IPFV=PQ that
li^{3} touri$^{1.1.3}$ li^{3} t$_{i}$] na^{2}
eat.PFV Touri eat.PFV Q
Intended: 'What do you know that Touri ATE?'

Particle fronting creates an island

(28) *Particle fronting creates an island for movement*

a. bɛba$^{3.1}$$_i$ e^{2} ji=se$^{2.4}$ [gba^{1}
what 2SG.NOM know.IPFV=PQ that
touri$^{1.1.3}$ ni^{4} t$_i$ jɔkʊ$^{2.3}$] na^{2}
Touri see.PFV PART Q
'What do you know that Touri saw?'

b. * bɛba$^{3.1}$$_i$ e^{2} ji=se$^{2.4}$ [gba^{1}
what 2SG.NOM know.IPFV=PQ that
jɔkʊ$^{2.3}$ touri$^{1.1.3}$ ni^{4} t$_i$] na^{2}
PART Touri see.PFV Q
Intended: 'What do you know that Touri SAW?'

Verb focus in Guébie involves syntactic movement

To summarize, verb focus, both verb doubling and particle fronting, show evidence of the following three properties:

- Successive cyclic movement
- Island sensitivity
- Creating an island for further movement

In work with Emily Clem, we argue based on these facts that predicate fronting in Guébie involves syntactic movement rather than base generation.

Landau-style predicate doubling

Landau (2006) presents a similar analysis of verb doubling in Hebrew, which runs into the same problems (we cannot both account for fronting the correct elements and for harmony), as well as additional issues relating to the conditions on multiple spell-out.

- Landau relies on the lower copy of the verb being pronounced in order to host inflection; however, in Guébie, the same inflectional morphology surfaces on both copies of the verb in verb doubling contexts.

(29) a. $\underline{\text{gbala}^{1.4}}$ ɔ^{3} $\underline{\text{gbala}^{1.4}}$
climb.IPFV 3SG climb.IPFV
"He is CLIMBING."

b. $\underline{\text{gbala}^{2.4}}$ ɔ^{3} $\underline{\text{gbala}^{2.4}}$ su^{2}
climb 3SG climb tree
"He CLIMBED the tree."

VP vs V focus

An additional problem for the Koopman and Landau accounts is that they involve VP focus.

- The verb doubling and particle fronting constructions in Guébie are interpreted as verb but not verb phrase focus.
- Verb phrase focus involves a distinct construction, with a fronted nominalized verb and do-support.

(30) *"Do-support" with* no^{2}

li=li$^{3.2}$ bɛ^{2} ɟaci$^{23.1}$ n=ɔ^{2} gba^{1}
eat=NMLZ thing Djatchi say.PFV=3SG.ACC that
ɔ^{3} no^{2}
3SG.NOM do.PFV
'It's EATING SOMETHING that Djatchi told him that he did.'

Thus, an analysis with verb, rather than VP movement, better matches the semantics.

Semantic evidence for Verb focus

(31) *Particle fronting yields verb focus interpretation*

a^{24}	**mɛ-tɛ**$^{3.2}$	me^{4}	<u>mɛ^{3}</u>	a^{3}
3SG.NOM.NEG	PART-be.strong	but	PART	3SG.NOM

<u>trɔ^{2}</u>
be.long

'It's not solid, but it's LONG.'

Here the same particle is used in the particle verb constructions in the first clause (bold) and second clause (underlined). However, in the second clause, the particle is fronted to indicate contrastive focus on the entire particle+verb construction.

Semantic evidence for Verb (not VP) focus

(32) *Particle fronting yields verb focus (not VP focus) interpretation*

ɟaci$^{23.1}$ ɔ^{24} nunə=a$^{2.2.2}$ **mɛ-ɟɛlɛ**$^{3.2.2}$
Djatchi 3SG.HUM.NOM.NEG story=DEF PART-read
me^{4} mɛ^{3} ɔ^{3} salɪ=a$^{2.3.2}$
but PART 3SG.NOM tell.PFV=3SG.ACC
'Djatchi didn't read the story, but he TOLD it.'