

Discontinuous harmony in Guébie: Consequences for cyclic spell out

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October 18, 2024

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Acknowledgements

This presentation is based on collaborative work with Emily Clem (UCSD) and Maksymilian Dabkowski (UC Berkeley).

Thanks, also, to...

- Katherine Russell (UC Berkeley)
- Wolof speaker and teacher Paap Alsaan Sow
- The Guébie community of Gnagbodougnoa, Côte d'Ivoire
- The Atchan community of Abidjan, Côte d'Ivoire
- Audiences at AMP 2022 and OCP 2023 and the Stanford and Berkeley linguistics departments for comments on earlier versions of this work.

This work is funded by NSF-CAREER grant #2236768.

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- This talk introduces a phenomenon I call *discontinuous harmony*.
 - I define *discontinuous harmony* as a configuration where the trigger and target of harmony are separated by intervening, non-harmonizing words.
 - I show that discontinuous harmony exists in Guébie (Kru) and at least two other languages, and I discuss the challenges it poses for our understanding of the syntax/phonology interface.

What is harmony?

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- *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

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- Because harmony is said to be due to co-articulation, it is predicted to be local:

(1) *A B C.

- However, we'll see that in a particular morphosyntactic context, harmony in Guébie (Kru) is non-local and discontinuous.

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.
- Show that the syntax of predicate fronting constructions in Guébie does not (on its own) help explain the harmony patterns.
- Sketch an analysis—which relies on cyclic interleaving of syntax and phonology—that accounts for the Guébie facts and lay out its predictions.
- 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).

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The Guébie language

Language background

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 2013-2024, primarily in the largest Guébie village of Gnagbodougnoa.
- Data is available in the California Language Archive (Bodji and Sande, 2024).

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Languages of Côte d'Ivoire

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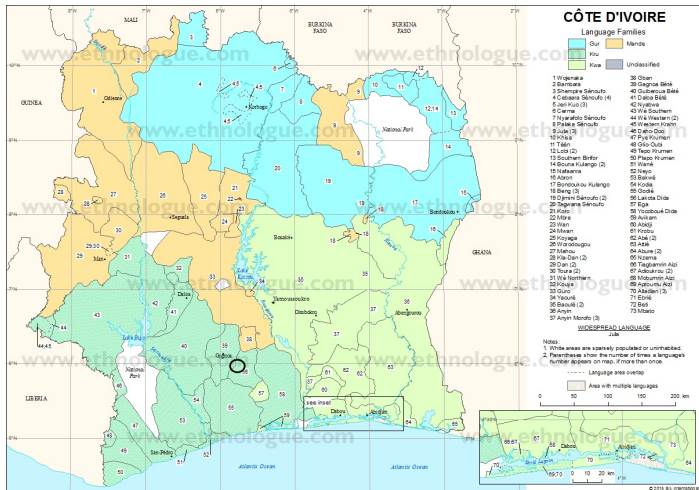
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- Guébie is a tonal language with four contrastive tone heights, marked here with numerals 1-4, where 4 is high.
 - Tone distinguishes words (lexical items) and marks grammatical categories such as tense/aspect, case, and negation.
- There are ten 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/

Basic word order

Basic word order is SAuxOV when an auxiliary is present (2a), or SVO when there is no auxiliary (2b). Auxiliaries mark mood, future, and negation.

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

a. jaci^{23.1} ji³ su=a^{2.2} gbala^{2.4}

Djatchi FUT tree=DEF climb

'Djatchi will climb the tree.'

b. jaci^{23.1} gbala^{2.4} su=a^{2.2}

Djatchi climb.PFV tree=DEF

'Djatchi climbed the tree.'

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Word-internal harmony

With the exception of a few clitics, loan words, and proper names, vowels within a word agree in ATR, controlled by the root.

- Within roots, vowels are either all -ATR or all +ATR.
- +ATR roots trigger +ATR affixes.
- -ATR roots trigger -ATR affixes.

(3) Causative harmony alternations

- $p\text{ɔ}-a^{3.2}$
shine-CAUS
'cause to shine' (oli_20210603)
- $bido-\text{ə}^{3.1.2}$
wash.IPFV-CAUS
'cause to wash' (oli_20160716)
- $*p\text{ɔ}-\text{ə}^{3.2}$, $*bido-a^{3.1.2}$

See Sande (2019) for an analysis of local harmony in Guébie.

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. Particles are synonymous with postpositions but show distinct syntactic and phonological behavior.

(4) Sample list of particle verbs

	<u>/mɛ³/</u>	'in'
a.	mɛ-tɛ ^{3.2}	'be strong'
b.	mɛ-para ^{3.3.3}	'enter'
c.	mɛ-sali ^{3.2.3}	'tell'
	<u>/kɔ³/</u>	'at/to'
d.	ko-silije ^{3.3.3.1}	'straighten'
e.	kɔ-trɔ ^{3.4}	'be tall'
f.	kɔ-ʃɛ ^{3.1}	'take'

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Syntactic distribution of particles

- In SAuxOV contexts, particles surface as prefixes on the clause-final verb, (5a).
- In SVO contexts, the verb surfaces immediately after the subject; particles surface clause finally, forming a prosodic word unto themselves, (5b).

(5) Particle verbs in SAuxOV and SVO contexts

- a. e⁴ ji³ ʃaci^{23.1} **joku-ni**^{2.3.4}
1SG.NOM FUT Djatchi PART-see
'I will see Djatchi.'
- b. e⁴ ni⁴ ʃaci^{23.1} **jɔku**^{2.3}
1SG.NOM see.PFV Djatchi PART
'I saw Djatchi.'
- c. * e⁴ **joku-ni**^{2.3.4} ʃaci^{23.1}
1SG.NOM PART-see.PFV Djatchi
Intended: 'I saw Djatchi.'

Harmony in particle verbs in SAuxOV clauses

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

- In (6), we see the same particle surfacing on two different verbs, one with +ATR vowels, (6a), and another with -ATR vowels, (6b).

(6) Particles harmonize in SAuxOV contexts

- a. e⁴ ji³ ʃaci^{23.1} **joku-ni**^{2.3.4}
I FUT Djatchi PART-see
'I will see Djatchi.'
- b. ʃaci^{23.1} ji³ ɔnɛ^{3.3} gbɔgɔ^{2.2}
Djatchi FUT 3SG.POSS leg
jɔku-nɪ^wɔsa^{2.3.3.1}
PART-scrape
'Djatchi will scrape his leg.'

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No harmony in particle verbs in SVO clauses

In SVO contexts there is no vowel harmony between verb and particle. The particle surfaces with its default vowel quality (-ATR in (7)), no matter the vowels of the verb root.

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

a. e⁴ ni⁴ ʃaci^{23.1} jɔku^{2.3}
 I see.PFV Djatchi PART
 'I saw Djatchi.'

b. ʃaci^{23.1} ŋ^wɔsa^{3.1} ɔnɛ^{3.3} gbɔgɔ^{2.2} jɔku^{2.3}
 Djatchi scrape.PFV 3SG.POSS leg PART
 'Djatchi scraped his leg.'

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So far, we have seen local harmony.

- When the particle and verb both surface clause-finally within the same phonological domain, the particle shows ATR harmony conditioned by the vowels in the verb root.
- When the verb moves away from the particle, the two do not harmonize.

Mechanisms of deriving local harmony

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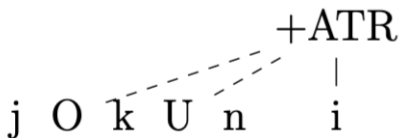
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In previous work (Sande, 2019) I've argued that ATR harmony applies at certain syntactic domains in Guébie, such as the vP .

- 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:



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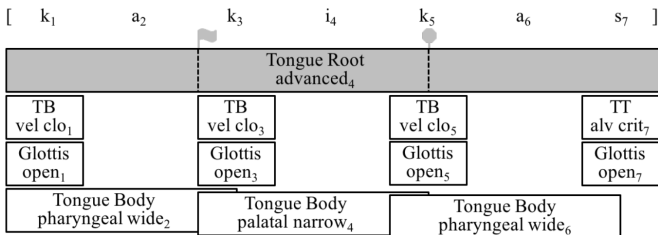
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Coarticulation in Articulatory Phonology

In a co-articulation account in Articulatory or 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).



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Agreement by Correspondence

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

ABC configuration

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

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.

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Any of these phonological accounts of harmony can adequately capture the local harmony facts in Guébie.

- The goal here is not to distinguish between these approaches to local harmony, but rather to determine whether any of these frameworks can account for the *discontinuous harmony* we will soon see.

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Focus fronting

There is a clause-initial focus position (8), where subjects, objects, postpositional phrases, and adverbs can surface.

(8) **Clause-initial focus**

- a. sɔkɔ^{4.2} mɛ³ ɔ³ pa=a^{3.2}
 hole in 3SG.NOM throw.PFV=3SG.ACC
 'INTO A HOLE, she threw it!'
- b. e⁴ jisa^{2.3} [gba¹ jaci^{23.1} ɔ³
 1SG.NOM know.IPFV that Djatchi 3SG
 ni⁴ k^wala^{4.2} me³ ji³]
 see.PFV farm on PART
 'I know that he saw DJATCHI on the farm.'

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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, (9).

(9) **Verb doubling focus construction**

a. gbala^{2.4} ɔ³ *(gbala^{2.4}) su²
climb 3SG.NOM climb tree
'He CLIMBED the tree.'

b. gbala^{2.4} ɔ³ ji³ su² *(gbala^{2.4})
climb 3SG.NOM FUT tree climb
'He will CLIMB the tree.'

Verb doubling is also described for the nearby and closely related language Vata (Koopman, 1997).

Particle verb focus

When the focused verb is a particle verb, there is no verb doubling.

- Instead, the particle surfaces in the focus position and the verb surfaces in its lower position in the clause (10).
- The verb and particle cannot both surface in the focus position.
- Nothing doubles.

(10) $\underline{j\text{ɔ}k\text{v}^{2.3}}$ ɔ^3 $\text{ni}=\text{ɔ}^{4.2}$
PART 3SG.NOM see.PFV=3SG.ACC
'He SAW him.'

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

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Particle verb focus, cont.

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

(11) Particle verb focus in SVO clauses

jɔkʊ^{2.3} ɔ³ ni=ɔ^{4.2}
PART 3SG.NOM see.PFV=3SG.ACC

'He SAW him.'

(12) Particle verb focus in SAuxOV clauses

joku^{2.3} ɔ³ ji³ ʃaci^{23.1} ni⁴
PART 3SG.NOM FUT Djatchi see

'He will SEE Djatchi.'

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Harmony in particle verb focus

- There is no vowel harmony between particle and verb in SVO particle-fronting constructions, (13a).
- However, quite unexpectedly, the particle in SAuxOV focus constructions still shows harmony with the verb, despite the intervening subject, auxiliary, and object, (13b).

(13) Particles harmonize with verbs in PartSAuxOV clauses

- a. jɔkv^{2.3} ɔ³ ni⁴=ɔ²
PART 3SG.NOM see.PFV=3SG.ACC
'He SAW him.' (cf. ɔ³ ni⁴=ɔ² jɔkv^{2.3})
- b. joku^{2.3}/*jɔkv^{2.3} ɔ³ ji³ jaci^{23.1} ni⁴
PART 3SG.NOM FUT Djatchi see
'He will SEE Djatchi.'
(cf. ɔ³ ji³ jaci^{23.1} joku^{2.3}-ni⁴)

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Data summary

To summarize, in verb focus constructions without a particle, we see verb doubling (a common pattern in predicate fronting contexts in W. Africa):

- 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

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(14) The distribution of harmony within particle verb constructions

	Auxiliary	No Auxiliary
No Verb focus	✓ (local)	–
Verb focus	✓ (discontinuous)	–

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

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Harmony on the clause-initial particle, triggered by the clause-final verb, is *discontinuous harmony*.

- Part Subj Aux O Verb

Puzzle (and preview of what's to come):

- Phonological models of harmony predict that harmony should be local, not discontinuous.
- Syntactic accounts of the predicate doubling facts do not help to account for the harmony pattern.
- I provide an account that relies on interleaving between syntax and phonology.

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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 Verb_{trigger}.

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Locality predictions

- Autosegmental spreading: Feature spreading is predicted to be local on a tier, unless there 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.

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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):

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

- | | | |
|-------|-------------------|---------------------|
| a. | pøytæ-næ | table-ESSIVE |
| b. | pouta-na | fine.weather-ESSIVE |
| <hr/> | | |
| c. | koti-na, *koti-næ | home-ESSIVE |

Accounting for transparent vowels

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- 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 (16).

(16) **joku^{2.3}** **ɔ³** **ka³** **ʃɔk^wɪ-a^{2.3.2}** **ni⁴**
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.

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- Purely phonological accounts of harmony fail to account for the discontinuous harmony in Guébie particle verb focus constructions.
- In order to be consistent with previous phonological approaches to harmony, we would have to derive harmony between the particle and verb locally.

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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.

A syntactic movement account

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- Setting aside the issue of vowel harmony in predicate fronting constructions for now...
- I first show that we can derive the correct surface distribution of syntactic elements in both verb doubling and particle fronting contexts.
- The syntactic analysis presented here draws heavily on Koopman's 1997 analysis of verb doubling in Vata.

Vata fronting analysis

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Basics of the analysis of Vata verb doubling (Koopman, 1997):

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

Extending the analysis to Guébie verb doubling

Koopman's analysis can be adopted almost wholesale to account for verb doubling in Guébie.

- There is evidence that, like in Vata, objects vacate the VP.
- In VSVO contexts, just as in Vata, the verb head-moves to T and the remnant VP moves to the left edge, the specifier of C.
- In VSAuxOV contexts, the verb also leaves the VP, moving to Voice (*v*). Again, the remnant VP moves to Spec,CP.
- The verb in *v* or T is pronounced as the head of its movement chain.
- The higher copy of the verb is pronounced for recoverability.

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Particle verb contexts

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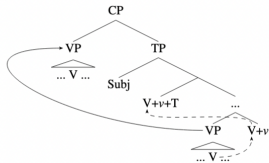
This analysis is easily extended to account for particle verb focus.

- In PartSVO and PartSAuxOV clauses, the verb leaves the VP (landing in T and v , respectively).
- The remnant VP moves to Spec,CP in verb focus contexts.
- Since the particle never leaves the VP, when a particle is present in VP focus constructions, it is pronounced in Spec,CP.
- Because the particle is pronounced at the left edge, there is no reason to double the verb for recoverability.

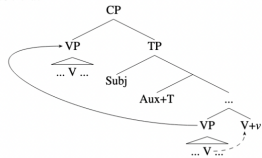
The syntax of Guébie verb focus

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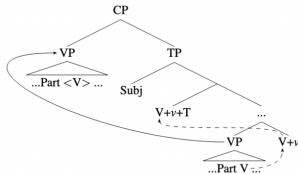
VSVO order



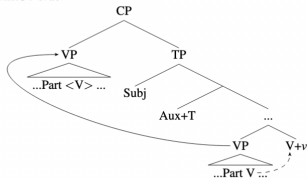
VS AuxOV order



PartSVO order



PartSAuxOV order



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In this way, the correct elements can be derived as surfacing in the correct positions in each of the four relevant focus constructions:

1. VSVO
2. VSAuxOV
3. PartSVO
4. PartSAuxOV

Returning to the harmony puzzle

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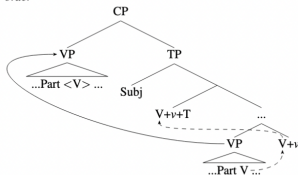
- Phonological accounts of harmony require locality between the target and trigger.
- **Question:** Is there a point in the syntactic derivation of harmonizing verbs and particles (but non non-harmonizing ones) where they are local?

Can syntax help explain the harmony facts?

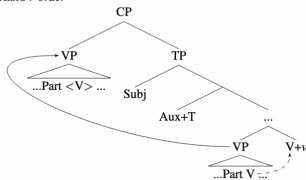
Option 1: The silent copy of the verb in the fronted VP is able to trigger harmony on the particle.

- **Problem:** This over-predicts that the particle should always harmonize with the verb (even in PartSVO contexts).

PartSVO order



PartSAuxOV order



Can syntax help explain the harmony facts?

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The problems for Options 1 and 2 suggest that the source of harmony cannot be the high copy of the verb.

- **Option 3:** It is the position of the low copy of the verb that determines whether harmony applies to the particle.
 - I adopt Option 3 in an account that relies on crucial timing of interleaving between syntax and phonology.

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Recalling the harmony pattern

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Recall the contexts where verbs trigger harmony on particles:

(17) **The distribution of harmony within particle verb constructions**

	Auxiliary	No Auxiliary
No Verb focus	✓ (local)	–
Verb focus	✓ (discontinuous)	–

What unifies these contexts is that the verb never moves to T, so perhaps harmony applies between the *low* copy of the verb and the particle.

An interleaving analysis: The main idea

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Harmony applies before focus movement.

An interleaving analysis: The basics

- Spell-out, including phonology, applies at syntactic phase boundaries.
- The particle and verb are spelled out simultaneously within the vP phase in $SAuxO\underline{PartV}$ (but not $SVOPart$) clauses).
- The particle harmonizes with the verb while both are low, during vP spellout: $SAuxO\underline{PartV}$
- The remnant VP moves to Spec,CP in verb focus contexts.
- When the fronted particle is pronounced, it retains the ATR value that was determined upon spellout.
- Part and V are not sufficiently local in $SVOPart$ (or $PartSVO$) clauses at the point when harmony applies for the verb to trigger harmony on the particle.

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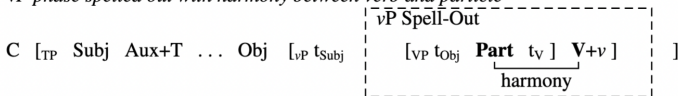
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Particle verb constructions with an auxiliary

- If an auxiliary is present, the verb stays within the vP (doesn't move to T).
- When the vP is spelled out, the particle and verb are spelled out together within the same domain.
- Harmony applies during spellout: SAuxO**Part**V

(18)

vP phase spelled out with harmony between verb and particle



- In verb focus, the VP (a sub-part of the spelled-out constituent) moves to spec,CP, where the particle is pronounced with its previously determined ATR value.

Particle verbs constructions with no auxiliary

- When there is no auxiliary the verb moves to T before vP is phonologized.
- The verb is never spelled out together with the particle, so the two do not harmonize: **SVOPart**.

(19)

vP phase spelled out with no harmony

C [TP Subj V+v+T ... Obj [vP t_{Subj}

vP Spell-Out
[vP t_{Obj} **Part** t_v] t_v]
no harmony

- In verb focus constructions, the VP moves to spec,CP, where the particle is pronounced with its previously determined ATR value (in this case, its default ATR quality).

Cyclic interleaving

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The proposed model relies on interleaving syntactic and phonological operations: Syntax \rightarrow Phonology \rightarrow Syntax.

Syntactic manipulation after spellout

- The vP is the domain of spellout.
 - It is a phase.
 - It is the domain of harmony (cf. Sande (2019)).
- The VP, a subpart of the vP , is the target of focus fronting.
 - It is the smallest constituent that contains (only) Part and V, the only elements that surface at the left edge in verb focus constructions.
 - There is a distinct vP focus construction that involves nominalization and a different interpretation.
 - Verbal morphology introduced at vP or higher does not appear on the focused copy of the verb.

This means that syntax must be able to manipulate sub-parts of previously spelled out material.

Phonological implications

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On the phonology side...

- We maintain that harmony applies locally. (Any local harmony mechanism can be adopted.)
- Phonology must apply to chunks of syntactic structure, smaller than an utterance, in turn.
- Phonology must be interleaved with syntax. In Guébie, harmony within the vP must apply before focus movement.

Syntactic implications

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On the syntax side...

- Material that has already been spelled out must remain accessible to further syntactic operations.
- This poses a challenge for approaches that assume that spellout corresponds with the deletion of (morpho)syntactic information:
 - The Lexical Integrity Hypothesis
 - Bracket Erasure
 - Discharge or rewrite of morphosyntactic features during vocabulary insertion in DM
 - The Phase Impenetrability Condition

The PIC

The Phase Impenetrability Condition, which says that spellout freezes the material in a phase, making it inaccessible to further syntactic manipulation (Chomsky, 2000, 2001), is critiqued in a growing body of work.

- Some argue the PIC should be parameterized, weakened, or obviated in some way:
 - d'Alessandro and Scheer 2015; Agarwal 2022; Lee and Yip 2024, among others
- Others argue against the PIC altogether:
 - Fox and Pesetsky 2005; Truswell 2005; Newell 2017; Branan and Davis 2019; Halpert 2019; Halpert and Zeijlstra 2024, among others

The discontinuous harmony facts in Guébie present a new argument that the strong PIC cannot hold.

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Benefits of an interleaving analysis

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The interleaving account proposed here has the following desirable properties:

- It allows us to maintain that phonological harmony applies locally.
- It unifies the cases where the verb triggers harmony on the particle by applying harmony within the vP .
- It unifies the account of Part-V harmony with the analysis of “regular” harmony in the language (Sande, 2019).

Typological predictions for discontinuous harmony

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The proposed analysis makes the following predictions about where we might expect to find other instances of discontinuous harmony across languages:

1. The target and trigger of harmony must be local at some point in the derivation.
2. The target and trigger of harmony must be spelled out locally within a phase.
3. The target or trigger of harmony must be subject to syntactic movement to a position outside of its original phase.

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- 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, including across certain word boundaries such as on a demonstrative, triggered by a noun.

(20) *Harmony in Wolof Noun Demonstrative constructions*
(Sy, 2005, : 97)

- a. fas w-ale
horse CL-DEM.DIST
'that horse'
- b. **béy** **w-élé**
goat CL-DEM.DIST
'that goat'

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Discontinuous ATR harmony in Wolof

Within relative clauses, the noun and demonstrative appear at a distance, but they display ATR harmony despite intervening material not harmonizing.

(21) 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-élé**
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.

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- 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.

(22) Nasal harmony in Atchan

a. aká ba lé wá

Aka FUT NEG run

'Aka will not run'

b. ã mã ně ŋ^wá

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.

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Verb focus in Atchan

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

(23) wá lep^hã 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

(24) $\frac{\eta^w \acute{a}}{\text{run}}$ $\frac{\tilde{a}}{\text{3SG.NOM}}$ $\frac{\eta^w \acute{a}}{\text{run}}$
'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.

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Discontinuous nasal harmony in Atchan, cont.

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

- (25) a. $m\tilde{\epsilon}$ mú sale $\eta^w\acute{a}$ \tilde{a} $\eta^w\acute{a}$
1SG.NOM think that run 3SG.NOM run
'I think he's RUNNING'
- b. $\eta^w\acute{a}$ $m\tilde{\epsilon}$ mú sale \tilde{a} $\eta^w\acute{a}$
run 1SG.NOM think that 3SG.NOM run
'I think he's RUNNING'
- c. $\eta^w\acute{a}$ ϵ bú sale \tilde{a} $\eta^w\acute{a}$
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 (25b,c)). Additionally, (25c) 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) moves to the left edge of the clause.

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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 at earlier stages in the relevant derivation.
- Finding 3: All attested cases of discontinuous harmony involve syntactic movement of the target or trigger of harmony away from the other.
- Finding 4: If we adopt a cyclic architecture of grammar where syntax and phonology are interleaved, we can derive discontinuous harmony while maintaining that harmony is phonologically local.

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- Syntax and phonology must be interleaved.
- The Phase Impenetrability Condition must be violable, such that a sub-part of a spelled-out constituent is later movable by the syntax.
- Elements moved after spell-out retain properties of their originally phonologized forms, which can result in discontinuous phonology.

Discontinuous phonology

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

- Ongoing research: Do we find any such cases?

Thanks! Ayoka!



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Successive cyclic movement in particle verb focus

(27) *Successive cyclic movement in particle fronting*

- a. e⁴ wa² gba¹ joku^{2.3} e⁴
1SG.NOM want.IPFV that PART 1SG.NOM
ka³ jaci^{23.1} ni⁴
IRR Djatchi see
'I want to SEE Djatchi.'
- b. joku^{2.3} e⁴ wa² gba¹ (joku^{2.3})
PART 1SG.NOM want.IPFV that PART
e⁴ ka³ jaci^{23.1} ni⁴
1SG.NOM IRR Djatchi see
'I want to SEE Djatchi.'

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Particle fronting creates an island

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

a. $b\epsilon ba^{3.1}$; e^2 $ji=se^{2.4}$ [gba^1
what 2SG.NOM know.IPFV=PQ that
 $touri^{1.1.3}$ ni^4 $t_i j\acute{o}k\upsilon^{2.3}$] na^2
Touri see.PFV PART Q

‘What do you know that Touri saw?’

b. * $b\epsilon ba^{3.1}$; e^2 $ji=se^{2.4}$ [gba^1
what 2SG.NOM know.IPFV=PQ that
 $j\acute{o}k\upsilon^{2.3}$ $touri^{1.1.3}$ ni^4 t_i] na^2
PART Touri see.PFV Q

Intended: ‘What do you know that Touri SAW?’

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Verb focus in Guébie involves syntactic movement

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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 an analysis of verb doubling in Hebrew, which runs into the same problems as the analysis presented (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.

- (32) a. gbala^{1.4} ɔ³ gbala^{1.4}
climb.IPFV 3SG climb.IPFV
“He is CLIMBING.”
- b. gbala^{2.4} ɔ³ gbala^{2.4} su²
climb 3SG climb tree
“He CLIMBED the tree.”

Semantic evidence for Verb focus

(34) *Particle fronting yields verb focus interpretation*

a²⁴ **mɛ-tɛ**^{3.2} me⁴ mɛ³ a³
3SG.NOM.NEG PART-be.strong but PART 3SG.NOM
trɔ²
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.

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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.

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