Backness harmony in (ci)Fungwa

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Introduction

- **Minimality constraint** (McCarthy and Prince 1993; Downing 1999)
  - Many languages impose requirement on the minimal size of a word

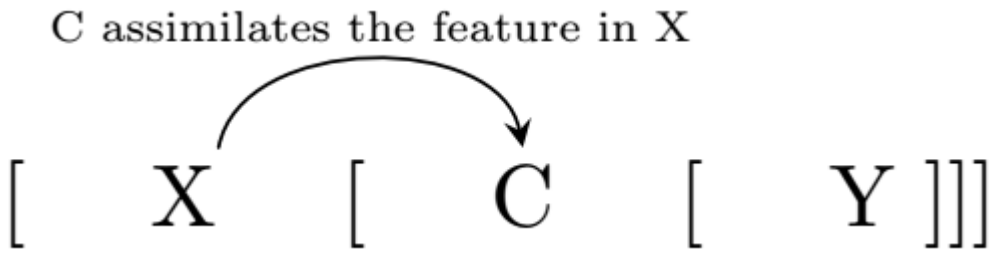
- **Onset condition** (Ito & Mester, 2009)
  - A syllable must have an onset in a prosodic word .

- **Prosodic word (PWd)** (Hall,1999)
  - Domain of minimality constraint
  - Domain of onset condition
  - Domain of phonological rules (i.e vowel harmony).

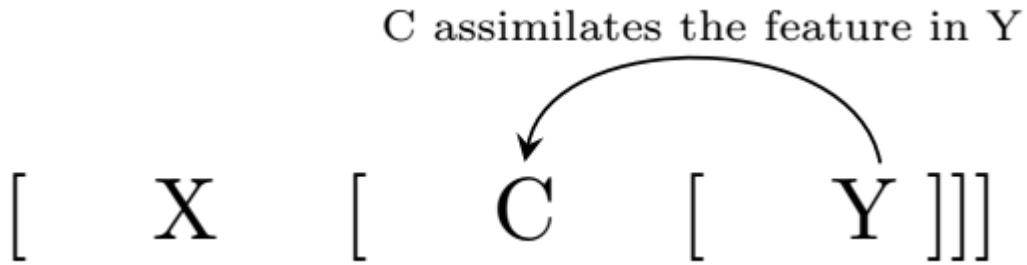
Introduction

- **PROBLEM:** Vowel harmony in Fungwa (Kainji, Benue-Congo)

- (a)



- (b)



- **C** can assimilate the feature of the preceding or following segment.

Background

- **QUESTION**
  - What determines the integration of the target of harmony into the preceding or the following domain of harmony?

- **ARGUMENT:**
  - Minimality constraint triggers the integration of the target into the preceding or the following domain of harmony.

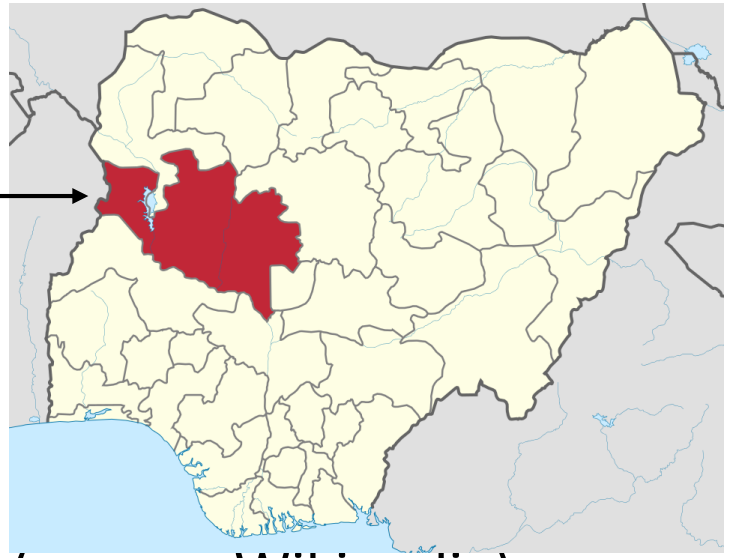
  - This integration is also constrained by onset condition on the domain of harmony.

Outline

- Fungwa sound inventory
- Basic harmony
- Prosodic misalignment
- Prosodic integration of harmonic targets
- Conclusion

Language background

- Fungwa
  - Population: around 1000 speakers (Lewis, 2009).
  - Location: Niger State, Nigeria



(source: Wikipedia)

- Data: From 36 participants in 6 villages.
  - Elicited between 2015-2018

Fungwa vowels

- There are seven oral vowels in Fungwa

- The vowels are phonologically grouped into front and back

[-back]:	i e ɛ
[+back]:	u o ɔ a

- Two tones: H(igh) [bú] ‘you’; L(ow) [bù] ‘(s)he’

Basic vowel harmony: CV prefix

- The vowels in Fungwa are implicated in vowel harmony:
  - the obligatory agreement of vowels in adjacent syllables in a particular phonological feature within a specified domain (Archangeli & Pulleyblank, 2007; Rose & Walker, 2011).

- Vowel harmony in Fungwa involves the feature [αback].

Basic vowel harmony in Fungwa: CV prefix

	C12-root		**C12**-root	
a.	**bí**-gígézè	‘bone’	**bú**-gúlù	‘bellow’
b.	**bí**-jégè	‘fish’	**bú**-dógù	‘meat’
c.	**bí**-lɛ́pɛ̀	‘skin’	**bú**-bá?à	‘child’

- The vowel of the CV prefix consistently assimilates the [αback] feature value of the following root vowel.
  - Clements (1981) refers to this as root-controlled harmony.
- Assumption:
  - Constraint on harmony operates in a domain which includes prefix and root

Span Theory (McCarthy, 2004) account of Fungwa harmony

- **Constraint on harmony**
  - ***A-SPAN(αBack)** (O'Keefe's, 2007; Akinlabi, 2009)**:**
    No adjacent [αback] feature spans for vowels in PWd
  - PWd is the domain of harmony.

- **Faithfulness to input back feature**
  - **FTHDSP(αback) (**McCarthy, 2004**):**

    If an input vowel x_I is [αback] and it has an output correspondent x_o, then x_o is the head of a [αback] span.

- **Faithfulness to back feature in root**
  - **ID-RT(αback)** (Beckman, 1998)**:**

    Let α be an input vowel contained in a root, and β the output correspondent of α. If α is [γback], then β must be [γback].

Span Theory (McCarthy, 2004) account of Fungwa harmony

- NOTATION:
  - Harmonic span is enclosed in parentheses; the head of the Span is underlined; the root is indicated with " √ "

/bi- ʔô/ → [búʔô] 'woman'

bi- √ʔô		id-rt[bk]	*a-span(αbk)	fthdsp(αbk)
a.	(bí̲)(ʔô̲)		*!	
b.	(bí̲)(ʔê̲)	*!	*	*
c.	(bí̲ʔê)	*!		*
d. ☞	(búʔô̲)			*

Span Theory analysis of Fungwa harmony

- Regardless of the underlying form of the affix vowel, the correct output wins

/bu- gétɛ̀/ → [bígétɛ̀] 'heart'

bu- √bígétɛ̀		id-rt[bk]	*a-span(αbk)	fthdsp(αbk)
a.	(bú)(gétɛ̀)		*!	
b.	(bú)(gátà)	*!	*	**
c.	(búgátà)	*!*		*
d. ☞	(bígétɛ̀)			*

- Overall, *A-SPAN(αback) rules out adjacent back spans, and ID-RT(αback) ensures the feature [back] in root is not changed.

Prosodic misalignment: vowel-initial prefix

- Vowel-initial prefix is crucial to the understanding of the condition of the domain of harmony.
- Consider the C20 singular prefix below:

	C20-root		**C20**-root	
a.	**í**-jíjɛ̀	'goat'	**í́**-wúlɛ̀	'compound'
b.	**í**-tʃínɛ̃̀	'forehead'	**í**-hũ̀dʒílè	'yesterday'
c.	**í́**-píhĩ̀	'goat'	**í́**-túmã̀	'farming'
d.	**í́**-kédʒì	'cage'	**í́**-kókójũ̀	'rooster'
e.	**í**-rèkè	'sugar cane'	**í́**-dʒógálà	'moringa leaf'

- The vowel of C20 prefix does not harmonise with the root vowel
  - This is a general property of vowel-initial prefixes
- Given the harmonic prefix is onsetful, the disharmony of the vowel-initial prefix is due to being onsetless.

Prosodic misalignment: vowel-initial prefix

- Our previous constraint set fails to predict the correct output (indicated with '☹') as the optimal candidate.

/í- dógú/ → [ídógù] 'meat'

	í √dógù	id-rt[bk]	*a-span(αbk)	fthdsp(αbk)
a. ☹	(í̲)(dó̲gù)		*!	
b.	(í̲) (dé̲gì)	*!*	*	**
c.	(ídégí)	*!*		**
d. ☞	(údó̲gú)			*

- Reason for the failure:
  - The constraint on harmony cannot nor should it presumably differentiate between CV and V targets.

Prosodic misalignment: vowel-initial prefix

- To understand disharmony of the onsetless prefix, the syllable structure of 634 root morphemes in Fungwa is observed.

Syllable structure of 634 roots morphemes

σ	**cv**	**cv.cv**	**cv.cv.cv**	**cv.cv.cv.cv**	**v.cv.cv**
counts	58	443	113	18	2
%	9.15%	69.87%	17.82%	2.83%	0.32%

- All the root morphemes are onsetful and mostly bisyllabic
  - The two vowel-initial words, **[ɛ́lɛ́dɛ̀] 'pig'** and **[ágógó́]** 'bell', seem like loan-words from Hausa. So, they are considered outliers

- PWd in Fungwa is onsetful and bisyllabic

Prosodic misalignment: vowel-initial prefix

- **Constraint on onsetfulness**
  - ONSET(PWd) (Ito & Mester, 2009)

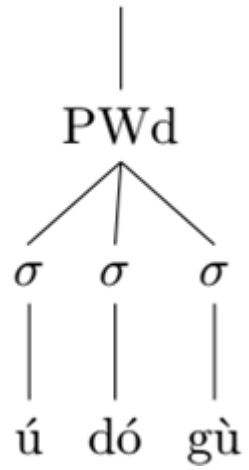
    A syllable must have an onset in a PWd

- **Constraint epenthesis:**
  - DEP (McCarthy & Prince 1993): No epenthesis

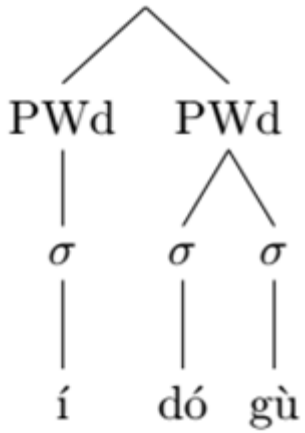
- **Strict layering (McCarthy & Prince 1993; Selkirk, 1996):**
  - PARSE-σ-PWd: all σ must be parsed by PWd

Prosodic misalignment: vowel-initial prefix

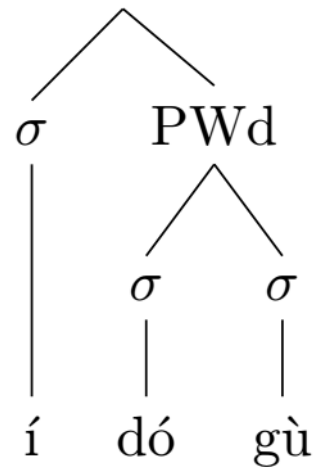
a. *PPhrase



b. *PPhrase



c. PPhrase



ONSET$_{(PWd)}$:	x	x	✓
PARSE-σ-PWd:	✓	✓	x

- (c) = Disharmony of vowel-initial prefix is due misalignment with PWd
- ONSET$_{(PWd)}$>>Parseσ-PWd

Prosodic misalignment: vowel-initial prefix

/í-dógù/ → [ídógù] 'meat'

	í-√dógù	dep	onset$_{(pwd)}$	id-rt[bk]	parseσ-pwd	*a-span(αbk)	fthdsp(αbk)
a.	[(i̲)(dò̲gù)]		*!			*	
b.	[(údò̲gù)]		*!				*
c.	[(ʔúdò̲gù)]	*!					*
d. ☞	(i̲)[(dò̲gù)]				*		
e.	(ú̲)[(dò̲gù)]				*		*!

- ONSET$_{(PWd)}$ rules out onsetless syllable (i.e. vowel-initial prefix) from PWd

Prosodic integration into PWd: Revisiting CV prefix

- The vowel of CV prefix harmonises with the root vowel.
  - **e.g.** **[bí**gɛ́tɛ̀] ‘heart’ [**bú**bá?à] ‘child’

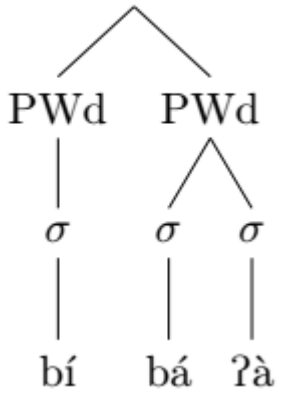
- **Questions**:
  - Why is the CV prefix not misaligned with PWd, the domain of harmony?
  - What motivates the integration of the CV prefix into the domain of harmony?
- **For solution**:
  - Refer to PWd in Fungwa which is also minimally bisyllabic.

Prosodic integration into PWd: Revisiting CV prefix

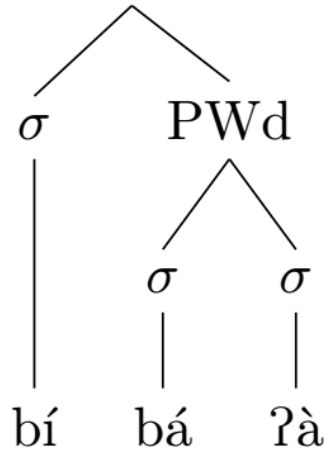
- **Bisyllabicity constraint**
  - Minimality (Downing, 1999): PWd can be no smaller than 2 syllables.

- /bi báʔà/→[búbáʔà] ‘child’ *[bíbáʔa]

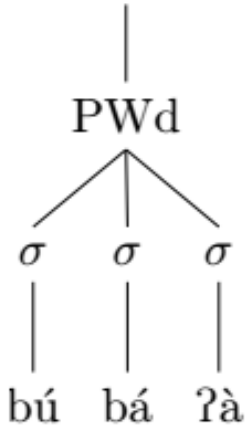
a. * PPhrase



b. *PPhrase



c. PPhrase



• PARSE-σ-PWd:	✓	x	✓
• PWd Minimality:	x	✓	✓

Prosodic integration into PWd: Revisiting CV prefix

/bi-bá?à/ → [búbá?à] 'child'

bí-√bá?à		dep	onset$_{(PWd)}$	id-rt[bk]	parseσ-pwd	min	*a-span(αbk)	fthdsp(αbk)
a.	[(bi̱)][(bá̱?à)]					*!		
b.	[(bi̱)(bá̱?à)]						*!	
c.	[(bi̱bɛ́?ɛ̀)]			*!*				**
d. ☞	[(búbá̱?à))]							*
e.	(bi̱) [(bá̱?à)]				*!			

- PARSE-σ-PWd rules out CV prefix not parsed by PWd.
- Minimality prevents a CV prefix from becoming a PWd on its own.

Prosodic integration into PWd: complementiser

- Associative constructions in Fungwa contain two noun phrases (NP) and a complementizer.
- NP1 = the possessum and NP2= the possessor.
- The complementiser occurs between the NPs

- Structure of AC: [**NP** [CP [Li[**C** [TP[**NP**...i.]

(Akinbo 2017)

Associative construction(AC)

a. bà?à nấ vátù
child.L C person
'the child of the man'

b. bà?à nấ vátú lâ
child.L C person DIST.DEM.AUG
'a child of that man'

c. bà?à lá nấ vátù
child.L DIST.DEM.AUG C person
'this child of the man'

Prosodic integration into PWd: complementiser

- The vowel of the complementiser is subjected to vowel harmony

		INPUT	**OUPUT**	
		NP + C + NP→	NP.L C NP	Gloss
1	a.	nɛ́ʔɛ̀ + **nā́** + báʔà	nɛ̀ʔɛ̀ **nā́**=báʔà	'the cow of a child'
		gépɛ̀ + **nā́** + kókójɔ̀	gèpɛ̀ **nā́**=kókójɔ̀	'the cassava of a rooster'
	b.	bú-kā̂ + **nā́** + kéléʔè	bàʔà=**nā́** kéléʔè	'the child of a sheep'
		báʔà + **nā́** + nɛ́ʔɛ̀	bàʔà=**nā́** nɛ́ʔɛ̀	'the child of a cow'
2	a.	báʔà + **nā́** + nɛ́ʔɛ̀	bàʔà **nɛ́**=nɛ́ʔɛ̀	'the child of a cow'
		báʔà + **nā́** + jíjè	bàʔà **nɛ́**=jíjè	'the child of a goat'
	b.	gépɛ̀ + **nā́** + kókójɔ̀	gèpɛ̀=**nɛ́** kókójɔ̀	'the cassava of a rooster'
		sélɛ̀ + **nā́** + dádà	sèlɛ̀=**nɛ́** dádà	'the money of father'

- The vowel of the complementiser can be nā́ when the following or preceding root vowel is [+back],
- … but nɛ́ when the following or preceding root vowel is [-back].
  - **IMPOSSIBLE**: front + nā́ + front; back + nɛ́ + back
- The vowel of complementizer can harmonise with the preceding or following root vowel

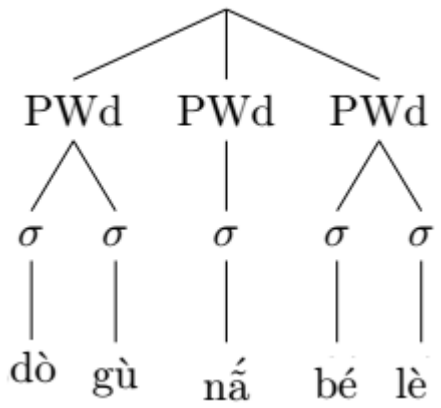
Prosodic integration into PWd: complementiser

- Question:
  - What determiners the attachment of the complementiser to the left or right?

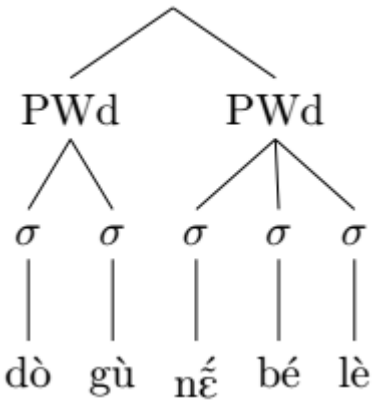
- Solution:
  - Not syntax (since the syntactic structure is the same in left or right attachment)
  - The result in half the cases is a syntax-phonology mismatch(Selkirk 2011).
  - But, Minimality and PARSE-σ-PWd can account for the left or right attachment

Prosodic integration into PWd: complementiser

a. * PPhrase



b. PPhrase



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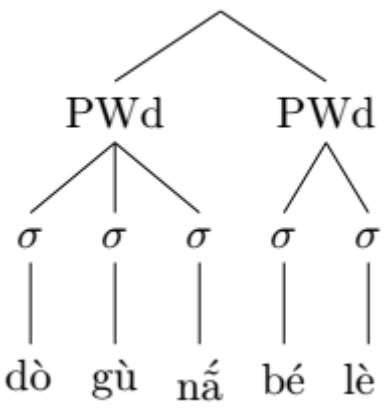


- PWd Minimality: x ✓ ✓

Prosodic integration: complementiser

/dógù + nā́ + bélè/ →[dògù=ná bélè]/[dògù nɛ́=bélè]
'a/the stomach meat'

√dógù nā́ √bélè	dep	onset$_{(pwd)}$	id-rt[bk]	parseσ-pWd	min	*a-span(αbk)	fthdsp(αbk)
a. [(dò̲gù)] [(nā̲)] [(bé̲lè)]					*!		
b. [(dò̲gù)(nā̲)] [(bé̲lè)]						*!	
c. [(dò̲gù)] [(nā̲bólò)]			*!*				**
d. ☞ [(dò̲gù)] [(nɛ́bé̲lè)]							*
e. ☞ [(dò̲gùnā́)] [(bé̲lè)]							*
f. [(dò̲gù)] (nā̲) [(bé̲lè)]				*!			

- PARSE-σ-PWd restricts the complementiser from not being parsed by PWd.
- Minimality triggers the integration of the complementiser into PWd with the preceding or following bisyllabic noun.

Minimality constraint on target of harmony

- **PROBLEM**

Although attachment can be in either direction with bisyllabic nouns, monosyllabic nouns force unidirectional attachment

- INPUT OUTPUT

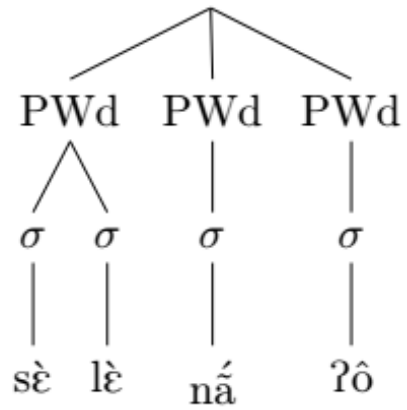
	NP + C + NP→	NP.L C NP	Gloss
a.	vű + **nǻ** + kɛ́sù	vǔ̃=**nǻ** kɛ́sù (∗vǔ̃ **nɛ̋**=kɛ́sù)	'the hole of buttock'
	dɛ̀nı̋ + **nǻ** + kẫ	dɛ̀nı̃̀ **nǻ**=kẫ (∗dɛ̀nı̃̀=**nɛ̋** kẫ)	'the fence of a killer'
b.	vátú + **nǻ** + ʃɛ̂̃	vàtù **nɛ̋**=ʃɛ̂̃ (∗vàtù=**nǻ** ʃɛ̂̃)	'a butcher'
	vɛ̂ + **nǻ** + bá?à	vɛ̀=**nɛ̋** bá?à (*vɛ̀ **nǻ**=bá?à)	'the finger of a child'

- Why does the complementiser unidirectionally attach to monosyllabic noun?

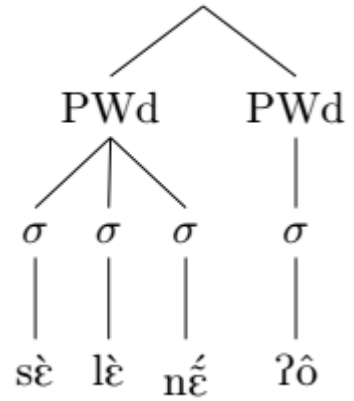
Minimality constraint on target of harmony

- **Solution:**
  - /sɛ́lɛ̀ + ná + ʔô/ →[sèlɛ̀ ná ʔô] ‘the money of the woman’

a. * PPhrase



b. * PPhrase



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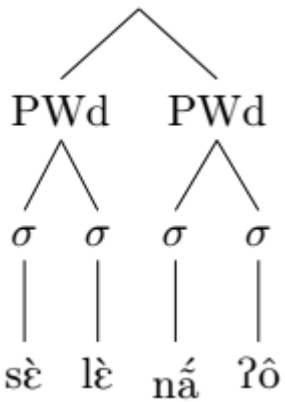

PWd Minimality: xx x ✓

- Minimality also integrates the complementiser into PWd with the monosyllabic noun.

Minimality constraint on target of harmony

/sɛ́lɛ̀ + nɑ̃́ + ʔô/ →[sɛ̀lɛ̀ nɑ̃́=ʔô] ‘the money of the woman’

√sɛ́lɛ̀ nɑ̃́ √ʔô	dep	onset$_{(pwd)}$	id-rt[bk]	parseσ-pwd	min	*a-span(αbk)	fthdsp(αbk)
a. [(sɛ̲̀lɛ̀)] [(nɑ̲̃́)] [(ʔô̲)]					*!*		
b. [(sɛ̲̀lɛ̀) (nɑ̲̃́) (ʔô̲)]						*!*	
c. [(sɛ̲̀lɛ̀ nɛ̃́)] [(ʔô̲)]					*!		*
d. [(sɛ̲̀lɛ̀)] [(nɑ̲̃́) (ʔô̲)]						*!	
e. ☞ [(sɛ̲̀lɛ̀)] [(nɑ̃́ʔô̲)]							*
f. [(sɛ̲̀lɛ̀)] (nɑ̲̃́) [(ʔô̲)]				*!			

- Minimality integrates the complementiser into PWd with the monosyllabic root

Conclusion

- Domain of harmony in Fungwa is PWd, with conditions of onsetfulness and bisyllabicity.
  - Harmony is enforced by *A-SPAN(αback) and invariance of root vowel is enforced by ID-RT (αback).
- To fulfil onsetfulness, the vowel-initial prefixes are misaligned with PWd.
  - The disharmony of vowel-initial is a diagnosis for misalignment
- To fulfill bisyllabicity, the prefix and the complementiser are integrated into PWd, the domain of harmony.
  - The vowels of the prefix/complementiser harmonising with an adjacent root vowel is a diagnosis for harmony

[ń gó:dʒǐ]
Thank you!

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