

An interface model of phonologically determined agreement

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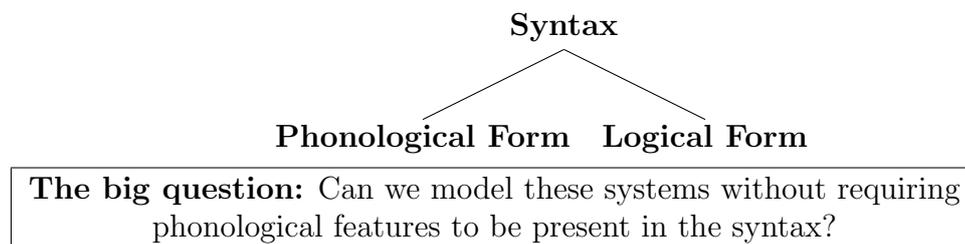
March 29, 2015

1 Introduction

Goals:

1. Describe the typologically remarkable phonologically determined agreement system of Guébie, an undescribed Kru language (Niger-Congo) spoken in Côte d'Ivoire.
2. Determine an ideal model to account for this and other cases of phonologically determined agreement.

Phonologically determined agreement systems challenge our assumption that syntax cannot access phonological features (cf. Pullum and Zwicky 1986, 1988).



The data:

- The data here comes from original work with Guébie speakers in Berkeley and Gnagbodougnoa, Côte d'Ivoire from September 2013 through July 2014.
 - Six speakers, ages 19-76
 - One woman, five men
 - Combination of text and elicitation

2 Phonological agreement in Guébie

2.1 Phonological agreement between pronouns and antecedent nominals

- Human third person pronouns take the form /ɔ³/, singular, and /wa³/, plural.
- Non-human third person pronouns agree with their nominal antecedent not in semantic class, but in *phonological features*.

- The final vowel of the noun stem determines the vowel of the pronoun.

(1) Mapping of Guébie root-final vowels to pronoun vowels

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

- The complete personal pronoun chart is given in (2).

(2) Human and non-human subject pronouns

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

- Non-human pronouns are always phonologically determined by their antecedents.

(3) Phonological agreement of pronouns with antecedents

Noun	Gloss	Object	Gloss	Subject	Gloss
a. <u>ji</u> e ^{2.2}	‘a prison’	e ⁻⁴ ni ⁻⁴ <u>e</u> ² ji ³	‘I see it (prison)’	<u>e</u> ⁻³ kadε ^{3.2}	‘It (prison) is big.’
b. k ^w al <u>a</u> ^{4.2}	‘a farm’	e ⁻⁴ ni ⁻⁴ <u>ə</u> ² ji ³	‘I saw it (farm)’	<u>ə</u> ⁻³ kadε ^{3.2}	‘It (farm) is big.’
c. t <u>o</u> ³	‘battle’	e ⁻⁴ ni ⁻⁴ <u>u</u> ² ji ³	‘I saw it (battle)’	<u>u</u> ⁻³ kadε ^{3.2}	‘It (battle) is big.’

- This process is completely productive and without exception.

- It holds in loan words and nonce words.

(4) Phonological agreement in loan words from English/French

- a. sukulu^{1.1.3} kɔda.^{3.21} e⁻⁴ ni⁻⁴ u² ji³
 school exist. I see it(school).ACC see
 ‘There is a school. I saw it(the school).’
- b. baraʒe^{2.3.2} kɔda.^{3.21} e⁻⁴ ni⁻⁴ e² ji³
 dam exist. I see it(dam).ACC see
 ‘There is a dam. I saw it(the dam).’

(5) Phonological agreement in nonce words

- a. fo² kɔda.^{3.21} e⁻⁴ ni⁻⁴ u² ji³
 Nonce-word exist. I see it(nonce).ACC see
 ‘There is a NONCEWORD. I saw it(the NONCEWORD).’
- b. gbele^{4.3} kɔda.^{3.21} e⁻⁴ ni⁻⁴ e² ji³
 Nonce-word exist. I see it(nonce).ACC see
 ‘There is a NONCEWORD. I saw it(the NONCEWORD).’

- The antecedent does not have to be in the same utterance, nor nearby in the discourse for this agreement to hold.

2.2 Phonological agreement between nouns and modifiers

- The same kind of agreement pattern holds between nouns and the final vowel of adjectives that directly modify them (6).

(6) **Noun-modifier phonological agreement**¹

a.	bitə ^{2,3}	lelə ^{1,2}	ʃɛlə ^{1,1}	b.	fɪ ³	lelə ^{1,2}	ʃɛlə ^{1,1}
	house	new	red		sponge	new	red
	‘A new red house’				‘A new red sponge’		

- I return to noun-modifier agreement in Section 5.2

3 Unsatisfying possible analyses

- A purely phonological analysis would involve stipulating that the pronoun and its nominal antecedent are in correspondence, and ensure identity between the two corresponding items (Sande, 2014).
 - A phonological account alone won’t work because the nominal antecedent does not have to appear within the same utterance, nor nearby in the discourse for the phonological agreement to hold.
- A purely syntactic account could take one of two forms:
 1. Phonological features are present in the syntax and available for copying during morphosyntactic agreement processes.
 2. Final vowels on nouns, and their agreeing pronoun vowels, are simply arbitrary noun classes that coincidentally surface as entirely phonologically predictable.
- Option one defies accepted theoretical claims that syntax does not have access to phonological information (Pullum and Zwicky, 1986, 1988).
- Option two predicts exceptions to the phonological predictability, and might predict a default noun class for loan words or certain semantic categories.
 - Since we find no exceptions and all pronoun agreement is predictable based on the phonological features of the noun, this analysis fails to capture the generalization that all noun-pronoun agreement is phonologically predictable.

4 An interface model of phonologically determined agreement

- I propose a new approach to phonologically determined agreement that relies on specific interactions between morphology and its interfaces.
- To account for the data, I propose a novel model of how ellipsis occurs at PF.

¹Word-internal ATR harmony influences the quality of the final vowel of the adjectives; however the backness and rounding values of the final vowel are determined by the final vowel of the noun.

• **The analysis in summary:**

1. The agreement-controlling noun is present in the syntax, even when it does not surface.
 - * Pronouns in Guébie are in complementary distribution with the definite marker, /-wa/, (7e).
 - * Like the definite marker, pronouns can occur with an overt noun, like the ‘we linguists’ construction in English, (7c).
 - * They can also license ellipsis of their nominal complement, (7d).
 - The noun-pronoun construction differs from topic, focus, and definiteness in Guébie.

(7) **Distribution of definite markers and pronouns**²

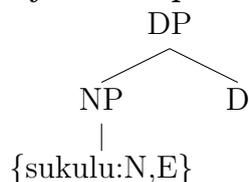
a.	sukulu ^{1.1.3}	‘school’	d.	u ³	‘it’ (the school)
b.	sukulu-wa ^{1.1.3.3}	‘the school’	e.	*sukulu-wa ^{1.1.3.3} u ³	‘it the school’
c.	sukulu ^{1.1.3} u ³	‘it school’	f.	*wa	‘the (one/school)’

2. The morphology inserts an Agr(eement) node on the pronoun, and features of the noun are copied to it.
3. The phonology, which applies at phase boundaries, can see the morphosyntactic features of the heads within that phase.
4. Phonological identity ensures that agreeing heads are phonologically similar.
5. Ellipsis of the noun occurs at PF and is licensed by overt phonological agreement between the noun and the pronoun.

4.1 The analysis: Syntactic structure to morphology

- **The syntactic structure:** The nominal antecedent of a pronoun is always present in the syntax as complement to the pronoun D (cf. Elbourne 2001).

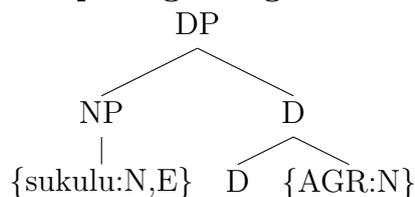
(8) **Syntax of pronoun DPs in Guébie**



- The structure in (8) is identical to the structure of a definite DP. This follows Postal (1966); Elbourne (2005); and Arkoh and Matthewson (2013) in unifying determiners with pronouns.
- Morphology and phonology apply cyclically by phase (Marvin, 2002), and DP is a phase (Svenonius, 2004).
- **The morphological structure:** An AGR-node is inserted on D, and the N feature is copied to it from the noun (cf. Halle and Marantz 1994).

²There are four contrastive tone heights in Guébie, marked here with numbers 1-4 where 4 is high.

(9) **Morphological agreement**



4.2 The analysis: From morphology to phonology

- **The phonological application:** The morphological structure in (9) is linearized via Distributed Morphology Linearization mechanisms (as laid out in Embick 2010).
- The morphological features associated with terminal nodes are preserved through morphology and are available to phonology.
- I adapt a constraint-based approach, combining Agreement-by-Correspondence (Rose and Walker 2004) with paradigm output-output faithfulness (Burzio 1994, Benua 1997, Kager 1999).
- The following widely used constraints accurately select the correct noun-pronoun structures in Guébie: [sukulu u], not *[sukulu e], *[sukule e].
 - IDENT-OO(N) (Benua, 1997): Heads that Agree in N must be phonologically identical.
 - * This constraint is a stand-in for the combination of a CORRESPONDENCE constraint (Hansson, 2001; Rose and Walker, 2004) and an IDENT constraint.
 - ANCHOR-R (McCarthy and Prince, 1993): Segments at the right edge of agreeing heads correspond.
 - REALIZEMORPH(EME) (Kurusu, 2001): Each morpheme has segmental content.
 - *STRUC(TURE) (Prince and Smolensky, 1993): Assign one violation for each output segment.
 - IDENT-IO (Prince and Smolensky, 1993): Assign one violation for each output segment whose features differ from the corresponding input segment.
 - Additional constraints (PERIPHVOWEL, *I) account for the reduced number of pronoun vowels compared to the full Guébie vowel inventory.

(10) **Ranking:** IDENT-OO(N), ANCHOR-R, IDENT-IO, REALIZEMORPH \gg *STRUC

- For cases where a pronoun surface without a nominal complement, I posit that the noun is present in the syntax but is elided at PF, [sukulṳ u] (cf. Merchant 2001; Lasnik 2007).
- Constituents that can optionally be elided are marked with a feature E in the syntax (Merchant, 2001).
- I propose a new model of ellipsis where the phonology has access to the E feature of the noun, and the option of eliding the noun is determined via constraints.

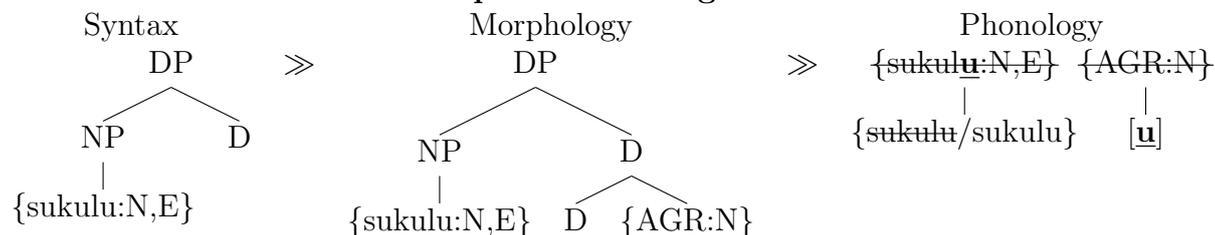
- FAITH-NOELIDE: For each form in an ellipsis paradigm, assign one violation for each output segment whose features differ from corresponding output segments across the paradigm.
 - * This output-output paradigm correspondence constraint ensures that the phrase containing the elided element be as similar to the non-elided output as possible.
 - * For example, the elided form [sukulu u] must be faithful to the non-elided [sukulu u].

(11) **A constraint-based approach to ellipsis**

{sukulu:N,E} {D:N}	FAITH-NOE	Id-IO	Id-OO(N)	ANCHOR	REALIZE	MAX	*STRUC
a. sukulu u, u					*	6	8
b. sukulu u, Ø					**!	6	7
c. sukulu s, s				*!	*	6	8
d. sukulu e, e			*!		*	6	8
e. sukule e, e		*!			*	6	8
f. sukulu u, e	*!				*	6	8

- This analysis forces phonological agreement and provides the option of ellipsis at PF simultaneously via constraints.

(12) **An interface model of Guébie pronoun DP agreement**



5 Extending the model to account for the entire Guébie agreement system

5.1 Extending the model to human pronouns in Guébie

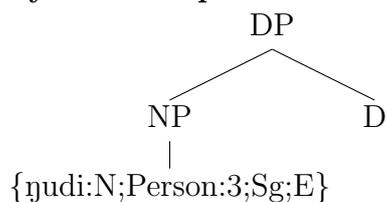
- Human pronouns in Guébie do not follow the phonological agreement pattern that all other nouns follow.
- They predictably take the forms /ɔ/, singular, and /wa/, plural.
- I repeat the pronoun chart for Guébie from (2) in (13) below.

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

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

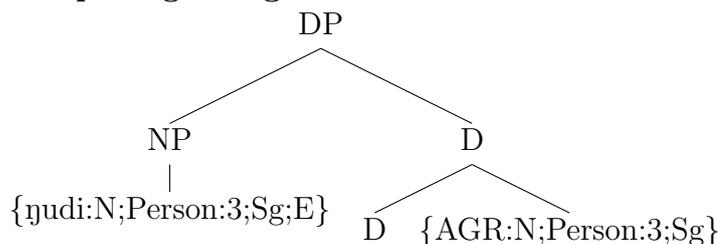
- The model described in Section (4) need be modified only slightly to account for human pronouns in Guébie.
- We saw that nouns are present in the syntax as complement to the pronoun, and their features are copied to the pronoun via a morphological Agr node.
- Human nouns not only have a Noun feature which is copied to the pronoun, they also have a [PERSON] feature (Richards, 2008; Van der Wal, 2015), as in *ɲudi* ‘man,’ (14).

(14) **Syntactic representation of human pronouns**



- When features are copied from a human noun to the Agr node on the pronoun D, Person, Number features are copied along with the Noun feature.

(15) **Morphological agreement between human nouns and pronouns**



- During Vocabulary Insertion, this bundle of features is spelled out as [ɔ], as in (13).

(16) **Phonological representation of human pronouns**



- We see that if certain semantic features of the noun (human) are copied to the pronoun D via morphological agreement mechanisms, the pronoun is not subject to phonological identity.
- Phonological identity is a last resort agreement strategy.
- This follows from Corbett (1991)’s generalization that when semantic and phonological criteria for determining noun class are at odds, the semantics takes precedence.

5.2 Extending the model to Guébie adjectives

- We saw that adjectives agree in final vowel with the nouns that they modify.

(17) **Noun-modifier phonological agreement**

a.	bitə ^{2.3}	lelə ^{1.2}	ɟɛla ^{1.1}	b.	fɯ ³	lelə ^{1.2}	ɟɛlə ^{1.1}
	house	new	red		sponge	new	red
	‘A new red house’				‘A new red sponge’		

- We can derive this agreement in the same way as noun-pronoun agreement.
- Syntactically, nouns and the adjectives that directly modify them are present in the same syntactic phase (DP).
- An AGR node is inserted on the adjective by the morphology.
- Features of the noun are copied to the adjective so that the adjective and noun are in morphosyntactic agreement.
- The phonology ensures that agreeing heads (the noun and its adjectival modifiers) are phonologically similar via the constraints discussed in Section 4.
 - In the same way that pronouns license ellipsis of their nominal complement (7d), adjectives agree with the head noun and license ellipsis of that noun.

(18) **Overt agreement on adjectives licenses ellipsis of the noun**

a.	lel _ə ^{1.2} jɛla _a ^{1.1}	b.	lel _o ^{1.2} jɛlo _a ^{1.1}
	new red		new red
	‘A new red one’ (house)		‘A new red one’ (sponge)

- Just like optional nominal ellipsis in noun-pronoun constructions, candidates are evaluated in paradigms, with two forms in each paradigm: one where the noun is elided and one where it is overt.
- A FAITH-NOELIDE constraint ensures output-output paradigm faithfulness so that the adjective agrees phonologically with the noun even when the noun is elided.

6 Extending the model to other phonologically determined agreement systems

6.1 Typological predictions

- The constraints presented in Section 4 account for the Guébie data.
- They also predict the existence of phonologically determined agreement systems slightly distinct from the one found in Guébie.
- **Predictions:**
 - A. Any two elements within the same syntactic phase could surface in phonological agreement.
 - B. Phonologically corresponding segments will be edge-based or surface within some prominent position in a word.
 - C. Any edge-aligned or prominent segment or suprasegmental can control agreement.
- Very few languages outside of Kru have described phonologically determined agreement systems; however, we see the above predictions born out in phonological agreement systems crosslinguistically.

6.2 Other Kru languages

- A similar phonologically determined agreement system is present in related Kru languages:
 - Krahn, a Western Kru language (Bing, 1987)
 - Godié, an Eastern Kru language (Marchese, 1986, 1988)
 - Vata, an Eastern Kru language (Kaye, 1981; Marchese, 1979; Corbett, 1991)

(19) Phonological agreement across Kru

	Guébie	Krahn	Godié	Vata
Number of Agreeing Vowels	3	3	3	5
(Non-human) Pronoun-Noun	Yes	Yes	Yes	Yes
Adjective-Noun	Yes	No	Yes	No
Demonstrative-Noun	N/A	No	Yes	No
Definite-Noun	No	No	Yes	No
Relative Pronoun-Noun	No	No	No	Yes

- The phonologically determined agreement systems in Krahn, Godié, and Vata all closely resemble the Guébie system except that a different set of elements agrees with the noun in each language.
- Because all of the agreeing elements occur within the DP phase, each system above is predicted by the proposed analysis (cf. Prediction A)

6.3 Bainuk

- Bainuk is a Western Atlantic language spoken in Senegal and Guinea (Sauvageot, 1967).
- Most nouns in Bainuk take one of 18 fixed noun class prefixes; however, there is a class of prefixless nouns that triggers phonologically determined agreement.
- The first syllable of a prefixless noun, no matter its shape, surfaces as the agreement marker on demonstratives, numerals, Wh-words, adjectives, and pronouns.

(20) Bainuk prefixless noun agreement

a.	kata:ma-ã	<u>ka</u> -nak-ã	b.	dapɔn	<u>da</u> -wuri
	river	two		grass	long
	‘two rivers’			‘long grass’	

- Left-anchored correspondence as in Bainuk is predicted by the proposed analysis (cf. Prediction B).

6.4 Abuq

- Abuq is a dialect of Arapesh spoken in Papua New Guinea (Nekitel, 1986).
- The final consonant of a noun triggers phonological agreement on demonstratives, adjectives, and verbs in Abuq (Dobrin, 1995).

(21) **Abuq phonological agreement** (Nekitel 1986 cited in Dobrin 1995)

- a. aleman afu-neri n-ahe'
man good went
'a good man went'
- b. almil aful-li l-ahe'
bird good went
'a good bird went.'
- c. ihiaburuh afu-hi h-ahe'
butterfly good went
'a good butterfly went.'

- Traditionally there are 13 possible final consonants. Since contact with Tok Pisin and other languages, words have been borrowed with other final consonants.
- Even in borrowed words with non-native segments, the final consonant of the noun triggers agreement. This is clearly a phonologically-determined system.

(22) **Borrowed words undergo phonological agreement**

- a. pater ara
priest this
'This priest'
- b. paip apa
pipe this
'This pipe'

- The analysis proposed for Guébie predicts a system like Abuq where edge-aligned consonants (as opposed to vowels) control agreement (cf. Prediction C).

7 Conclusion

- Here I provide an initial description of the phonologically determined agreement system of Guébie (Kru, Niger-Congo).
- I provide an interface analysis where agreement arises through phonological identity to output forms via morphological agreement mechanisms.
- The analysis includes a formal account of ellipsis via constraints at PF.
- I have shown that the proposed analysis predicts the attested cross-linguistic phonologically determined agreement systems (Corbett, 1991; Dobrin, 1995).
 - I leave as a question for further research whether the proposed analysis could serve as a model of gender and noun class systems more generally.
- I demonstrate that phonologically determined agreement systems can be modeled without requiring phonological features to be present in syntax. Thus, I conclude **we can maintain that syntax is not sensitive to phonological features.**

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