

# An Interface Model of Phonologically Determined Agreement

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## 1. Introduction

It is an assumption of most models of syntax that phonological features are not present during syntactic derivations, thus cannot influence syntactic structure (cf. Pullum & Zwicky 1986, 1988 ). A process that might challenge such an assumption is phonologically determined agreement, where phonological and not syntactic or semantic features agree across elements in a clause or discourse. Such a system exists in Guébie and other Kru languages, where nominal concord markers are determined not by semantic class but by the phonological form of the agreement-controlling noun.

Here I describe the typologically remarkable phonologically determined agreement system of Guébie, an undescribed Kru language (Niger-Congo) spoken in Côte d'Ivoire, with the goal of determining an ideal model to account for this and other cases of phonologically determined agreement. I demonstrate here that phonologically determined agreement systems can be modeled without requiring syntactic processes to be sensitive to phonological features. That is, we can maintain syntax as phonology free.

Guébie is spoken by approximately 7000 people in seven villages in southwest Côte d'Ivoire. Note that this is not the information provided in *Ethnologue* (Lewis et al., 2013), where Guébie is listed twice, once as a dialect of Bété-Gagnoa, a nearby cluster of Kru languages, and once as an alternative name for Dida-Lakota. Based on my own findings in the field, Guébie is not mutually intelligible with Bété-Gagnoa, and though it is closely related to Dida-Lakota, there are many phonological and syntactic differences which lead me (and speakers) to consider Guébie a distinct language.

The data here comes from original work with Guébie speakers in Berkeley, California and Gnagbodougnoa, Côte d'Ivoire from September 2013 through June 2015. The majority of the data comes from two speakers, a 28-year-old male and a 76-year-old male. Three other male speakers ages 35-52 and two female speakers ages 19 and 30 were also consulted. Data was collected in the form of text and elicitation.

In section 2 of this paper I present the facts of phonologically determined agreement in Guébie. In section 3 I argue that neither a purely phonological nor a purely syntactic approach to modeling phonological agreement is satisfying, and in section 4 I propose an interface analysis of phonological agreement that relies on morphological agreement mechanisms and the details of the interactions of morphology with syntax and phonology. In section 5 I extend the model to account for all agreement in Guébie, and in section 6 I show that the predictions of the proposed model account for the other few but existing instances of phonologically determined agreement in the world's languages.

## 2. Phonological agreement in Guébie

The basic word order for Guébie alternates between S AUX O V and SVO, where when there is no overt auxiliary, the verb moves to T (Sande, Submitted). Like other Kru languages Marchese (1979), Guébie is highly tonal, with four distinct lexical tone heights and a number of contour tones Gnahore (2006). Tone is marked throughout this paper with numbers 1-4, where 4 is high. Syllables are

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maximally C(l)V, and words must be at least CV. Pronouns take the form of a single vowel and are part of the phonological word of the verb, subject pronouns as proclitics and object pronouns as enclitics. This section details the phonologically determined agreement system of Guébie, demonstrating that pronouns and adjectives agree with nouns not in semantic class but in phonological features.

### 2.1. Phonological agreement between pronouns and antecedent nominals

Human pronouns in Guébie always take set forms. Specifically, third person pronouns take the form /ɔ<sup>3</sup>/, singular, and /wa<sup>3</sup>/, plural. Non-human third person pronouns agree with their nominal antecedent not in semantic class, but in *phonological features*, where the final vowel of the noun stem determines the vowel of the pronoun.

There are ten vowels in Guébie, and all words end in a vowel. To mark plurality on nouns, there are two possible plural suffixes, /-i/ and /-wa/, and it is not predictable which noun will take which suffix. The final vowel of a noun stem (which includes the plural suffix when present) determines the vowel of the pronoun used to replace that noun, according to the chart in (1).

#### (1) Mapping of Guébie stem-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			

Above are the non-human pronouns. The complete personal pronoun chart is given in (2). All pronouns below are shown in their nominative (subject pronoun) form. Segmentally, object pronouns are identical to subject ones, though tonally object pronouns are each one step lower on the 4-tone scale than the corresponding subject pronoun.

#### (2) Human and non-human subject pronouns

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

Human pronouns take set forms, while non-human pronouns are always phonologically determined by their antecedents. As far as I know, this is exceptionless. Unlike Godié (?), a neighboring Eastern Kru language, there is no default pronoun. The choice of non-human pronoun in Guébie must always agree phonologically with the contextually relevant noun<sup>1</sup>.

In 3 I show examples of this phonologically predictable agreement, where the noun in the left column determines the form of the object pronoun in the center column and the subject pronoun in the rightmost column.

#### (3) Phonological agreement of pronouns with antecedents

Noun	Gloss	Object	Gloss	Subject	Gloss
a. <u>ji</u> e <sup>2.2</sup>	‘a prison’	e <sup>-4</sup> ni <sup>-4</sup> <u>e</u> <sup>2</sup> ji <sup>3</sup>	‘I see it (prison)’	<u>e</u> <sup>-3</sup> kade <sup>3.2</sup>	‘It (prison) is big.’
b. k <sup>w</sup> ala <sup>4.2</sup>	‘a farm’	e <sup>-4</sup> ni <sup>-4</sup> <u>ə</u> <sup>2</sup> ji <sup>3</sup>	‘I saw it (farm)’	<u>ə</u> <sup>-3</sup> kade <sup>3.2</sup>	‘It (farm) is big.’
c. <u>t</u> ɔ <sup>3</sup>	‘battle’	e <sup>-4</sup> ni <sup>-4</sup> <u>u</u> <sup>2</sup> ji <sup>3</sup>	‘I saw it (battle)’	<u>u</u> <sup>-3</sup> kade <sup>3.2</sup>	‘It (battle) is big.’

<sup>1</sup> When a Guébie speaker asks about an unknown object, like “What is that?”, he/she uses the front-vowel pronoun, /e/ which is the same pronoun used to replace the word /be<sup>3</sup>/, ‘thing’. Thus, this is not a default pronoun, but rather the speaker is asking something like “What is that thing?”

This process is not only predictable for Guébie lexical items, but also for loan words (4) and nonce words (5).

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

- a. sukulu<sup>1.1.3</sup> kɔda.<sup>3.21</sup> e-<sup>4</sup> ni-<sup>4</sup> u<sup>2</sup> ji<sup>3</sup>  
 school exist. I see it(school).ACC see  
 ‘There is a school. I saw it(the school).’
- b. baraʒɛ<sup>2.3.2</sup> kɔda.<sup>3.21</sup> e-<sup>4</sup> ni-<sup>4</sup> e<sup>2</sup> ji<sup>3</sup>  
 dam exist. I see it(dam).ACC see  
 ‘There is a dam. I saw it(the dam).’

(5) **Phonological agreement in nonce words**

- a. fo<sup>2</sup> kɔda.<sup>3.21</sup> e-<sup>4</sup> ni-<sup>4</sup> u<sup>2</sup> ji<sup>3</sup>  
 Nonce-word exist. I see it(nonce).ACC see  
 ‘There is a NONCEWORD. I saw it(the NONCEWORD).’
- b. gbele<sup>4.3</sup> kɔda.<sup>3.21</sup> e-<sup>4</sup> ni-<sup>4</sup> e<sup>2</sup> ji<sup>3</sup>  
 Nonce-word exist. I see it(nonce).ACC see  
 ‘There is a NONCEWORD. I saw it(the NONCEWORD).’

As above, the antecedent does not have to be in the same utterance, nor nearby in the discourse for this agreement to hold. Additionally, the nouns that take a given pronoun vowel do not form a coherent semantic class. For example, there are animals in each of the three ‘classes’: /tɛle<sup>3.3</sup>/ >> /e/, ‘snake’, /ɔ<sup>3</sup>/ >> /u/, ‘elephant’. There are examples of liquids, large things, small things, round things, environmental things, animates, and inanimates in each of the three non-human ‘classes’; which shows that this is not a semantically coherent noun class system like in other Niger-Congo languages. It is likely, though, that this system in Guébie stems from a semantically determined Proto-Kru noun class system (Marchese Zogbo, 2012). Some Kru languages show tendencies for like-things to have the same final vowel, Godié (?), though others, like Guébie, classes show no semantic coherence but are phonologically predictable, Krahn (Bing, 1987). It seems that in Guébie and Krahn, at least, the Proto-Kru noun class system has been reanalyzed as a phonologically determined agreement system.

2.2. *Phonological agreement between nouns and modifiers*

The same agreement pattern found in noun/pronoun agreement in Guébie also holds between nouns and the final vowel of adjectives that directly modify them (6).

(6) **Noun-modifier phonological agreement<sup>2</sup>**

- |  |  |
|--|--|
| a. bitə <sup>2.3</sup> lelə <sup>1.2</sup> jɛla <sup>1.1</sup> | b. fu <sup>3</sup> lelo <sup>1.2</sup> jɛlo <sup>1.1</sup> |
| house new red  | sponge new red   |
| ‘A new red house’  | ‘A new red sponge’   |

Adjectives surface after nouns and before numerals within a noun phrase. There are only six adjectives that can directly modify nouns in Guébie, while other modifiers are predicative, surfacing with verbal morphology. Those adjectives that can surface within a noun phrase include ‘big, small, new, red, black, white’.

I return to noun-modifier agreement in more detail in Section 5.2.

<sup>2</sup> Word-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.

### 3. Unsatisfying possible analyses

Based on the facts in section 2, one might consider pursuing a purely phonological analysis in accounting for the Guébie data. This could take the form of an Agreement-By-Correspondence (ABC) (Rose & Walker, 2004) analysis stipulating that the pronoun and its antecedent are in correspondence and requiring phonological identity between the two. However, because Guébie nominal agreement is non-local, and the head noun need not be in the same utterance or even in the same discourse for agreement to hold, a purely phonological analysis will not suffice (Sande, 2014).

Alternatively, a purely syntactic account could take one of two forms<sup>3</sup>:

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.

I will consider option one above as a last-resort strategy, because it requires defying accepted theoretical claims that syntax does not have access to phonological information (Pullum & Zwicky, 1986, 1988).

Option two above is entirely arbitrary, where all lexical items are indexed for noun class, and the fact that the phonological form of the pronoun is predictable given the form of the noun is just a coincidence. This analysis predicts exceptions to the phonological predictability of the Guébie agreement system, and it might also predict a default noun class for loan words or certain semantic categories. Because we find no exceptions and all pronoun agreement is predictable based on the phonological features of the noun, this analysis is unsatisfying. It fails to capture the generalization that all noun-pronoun agreement is phonologically predictable. A better analysis would predict this agreement, rather than claim it is coincidental.

### 4. An interface model of phonologically determined agreement

Here I propose a novel model of phonologically determined agreement which relies on specific interactions between morphology and its interfaces. Unlike those analyses presented in section 3, the model proposed here predicts the phonological determinedness of the Guébie system, and it does not require that syntax be sensitive to phonological features. This model, in addition to accounting for phonologically determined agreement in a manner coherent with extant current linguistic theories, also involves explicitly details how ellipsis occurs at PF.

In summary, in noun phrases, or rather DPs, involving phonologically determined agreement in Guébie, the agreement-controlling noun must be present. This includes the case of pronouns, where nouns are not actually pronounced, but pronouns agree with them. During the morphological component, an Agr(reement) node is inserted on the pronoun, and features of the noun are copied to it. The phonology, which applies at phase boundaries, has access to the morphosyntactic features of heads within that phase, and phonological constraints ensure phonological identity between those heads in the DP which agree in specific features. Ellipsis of the noun optionally occurs at PF, licensed by overt phonological agreement between the noun and the pronoun. Such an analysis is detailed in the remainder of this section.

#### 4.1. The syntactic structure

Each instance of phonologically determined agreement, or nominal concord, in Guébie, requires that the agreement-controlling noun be present in the DP in which agreement takes place, at least at the syntactic level. We know that pronouns and adjectives agree with nouns in Guébie. I will focus here on deriving pronoun agreement and will turn to adjectives in section 5.2.

<sup>3</sup> There is a third possible syntactic analysis, which is proposed by Dimitriadis (1997). He claims that phonological agreement, or *nominal concord* is the result of multiple copies of the noun present in the syntax. I set this analysis aside because it is uneconomical compared to alternative analyses. In a Guébie sentence like (6), it would require three copies of the noun to be present in the syntactic structure, though there is no motivation for such redundancy here.

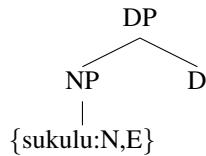
Pronouns in Guébie are in complementary distribution with the definite marker, /-wa/, (7e). This is evidence that pronouns are D-heads. This is consistent with analyses that liken the structure of third-person pronouns with definite markers (Postal, 1966; Elbourne, 2005); and Arkoh & Matthewson (2013). Like the definite marker, pronouns can occur with an overt noun, like the ‘we linguists’ construction in English, (7c). This is distinct from topic, focus, and definiteness in Guébie. Pronouns also license ellipsis of their nominal complement, (7d).

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

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

A DP containing a pronouns can surface either as [[Noun] Pronoun] or [[~~Noun~~] Pronoun]. Either way, I claim that the syntactic structure is as shown in (8). This follows from Elbourne (2001)’s analysis of e-type pronouns, which says that the nominal antecedent of a pronouns is always present in the syntax as complement to the pronoun D.

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

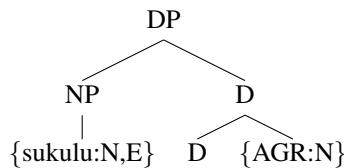


The structure in (8) is identical to the structure of a definite DP. This follows Postal (1966); Elbourne (2005); and Arkoh & Matthewson (2013) in unifying determiners with pronouns.

4.2. *The morphological structure*

In the proposed model, morphology and phonology apply cyclically to syntactic structures by phase (Marvin, 2002), and each DP is a phase (Svenonius, 2004). Thus, morphology takes the structure in (8) as an input. Via regular Distributed Morphology agreement mechanisms, an AGR-node is inserted on D, and the N feature is copied to it from the noun (cf. Halle & Marantz 1994). This is where the derivation of definite markers and pronouns differ, because the definite marker does not undergo agreement with the noun in Guébie. Only the features of the pronoun D-head trigger the insertion of an AGR-node in Guébie. Morphological agreement proceeds as shown in (9).

(9) **Morphological agreement**



After AGR-nodes are inserted, the morphological structure in (9) is linearized via Distributed Morphology Linearization mechanisms (as laid out in Embick 2010). Note that in the proposed analysis, the morphological features associated with terminal nodes are preserved through morphology (Linearization) and are available to the phonology.

4.3. *The phonology*

Here I adapt a constraint-based approach, combining Agreement-by-Correspondence (Rose and Walker 2004) with paradigm output-output faithfulness (Burzio, 1994; Benua, 1997; Kager et al., 1999).

While a derivational approach to this phonological system could yield the same results, I will discuss in section 4.4 why a constraint-based approach is preferable for our purposes.

The following widely used constraints (10) accurately select the correct noun-pronoun structures in Guébie: [sukulu u], not \*[sukulu e], \*[sukule e].

(10) **Constraints resulting in Noun-Pronoun identity in Guébie**

- IDENT-OO(N) (Benua, 1997): Heads that Agree in N must be phonologically identical.
- ANCHOR-R (McCarthy & Prince, 1993): Segments at the right edge of agreeing heads correspond.
- REALIZEMORPH(EME) (Kurusu, 2001): Each morpheme has segmental content.
- \*STRUC(TURE) (Prince & Smolensky, 1993): Assign one violation for each output segment.
- IDENT-IO (Prince & Smolensky, 1993): Assign one violation for each output segment whose features differ from the corresponding input segment.

The IDENT-OO constraint above is a simplified representation of two constraints: a CORRESPONDENCE constraint and an IDENT constraint, as in tradition Agreement-by-Correspondence analyses (Hansson, 2001; Rose & Walker, 2004). For purposes of space and simplicity, I use the single constraint here because the ranking of the CORR constraint with the IDENT constraint does not matter for our purposes.

Additional constraints such as PERIPHVOWEL preferring peripheral vowels and \*I dispreferring the output segment [i] in Guébie account for the reduced number of pronoun vowels (3) compared to the full Guébie vowel inventory (10).

Ranked as in(11), these lead to the correct output, where when the pronoun and noun are both present, the pronoun agrees phonologically with the final vowel of the noun in question.

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

For those cases where a pronoun surface without a nominal complement, I posit that the noun is present in the syntax but is elided at PF, [sukulu~~u~~ u] (cf. Merchant 2001; Lasnik 2007). Constituents that can optionally be elided are marked with a feature E in the syntax (Merchant, 2001), and here 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.

The constraint in (12) is an output-output paradigm correspondence constraint, which ensures that the phrase (phase) containing the elided element is as similar to the optimal non-elided output as possible. For example, the elided form [sukulu~~u~~ u] must be faithful to the non-elided [sukulu u].

(12) **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.

In an output-output paradigm correspondence model such as this, candidates consist of paradigms, which are evaluated together as a unit. We see that in Guébie, when DPs containing elided and non-elided nouns are evaluated together in a paradigm, the undominated constraint in (12) together with those constraints in (10) gives the correct output.

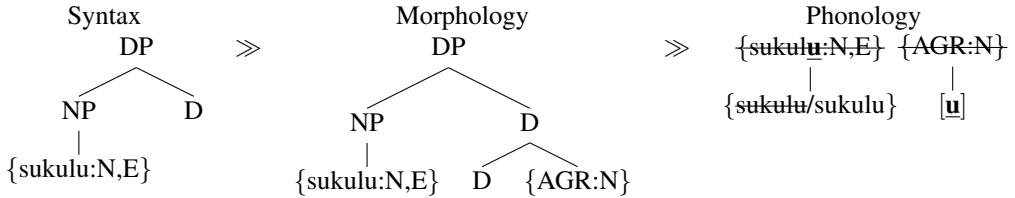
(13) **A constraint-based approach to ellipsis**

{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. That is, an terminal node which has a morphosyntactic E features (which is available to the phonology), can optionally be elided via an ellipsis paradigm at PF, as in (13).

The resulting model is as shown in (14), where the noun with an E feature is present in the syntax as complement to the pronoun D-head. An AGR-node is inserted on the D-head during morphology, and linearization occurs. The phonology has access to the linearized terminal nodes and their features, and it ensures phonological identity between nodes that agree is morphosyntactic features. Optionally, the noun with an E-feature is elided, but the elided DP must be as similar to the non-elided one as possible, resulting in agreement between noun and pronoun, even when the noun is not pronounced.

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



#### 4.4. Typological predictions

The constraints presented in section 4.3 account for the Guébie noun/pronoun phonological agreement data in section 2. We will see that the proposed analysis not only also accounts for the human pronouns and noun/adjective agreement, but it also accurately predicts the existence of phonologically determined agreement systems slightly distinct from the one found in Guébie.

The analysis in section 4.1 relies on the fact that DP is a syntactic phase, and that morphology and phonology apply cyclically by phase. It predicts that any two elements within the same syntactic phase could surface in phonological agreement, if those two elements share some morphosyntactic feature. Recall that I claim morphosyntactic features are available to phonology.

Additionally, due to the nature of correspondence and identity constraints, the phonologically corresponding segments in the morphosyntactically agreeing elements must be either edge-based or surface in some prominent position in a word. The ANCHOR-R constraint in Guébie ensures correspondence at the right-edge of the noun and pronouns. However, we could imagine a system where ANCHOR-L is at play instead, requiring that corresponding segments be anchored to the left edge of the agreeing elements.

Perhaps a more specific statement of the prediction above, only an edge-aligned or prominent segment (or, perhaps, suprasegmental) can control phonological agreement. We saw in section 4.3 that IDENT-OO(N) ensures that the final segment of two elements with N features are identical. This means that in Guébie, the final vowel of the noun will control agreement. Rather than a final vowel, we could imagine a system where the agreement controlling segment is a consonant or suprasegmental.

The above predictions are summarized in (15).

(15) **Predictions of the model**

- A. Only two elements within the same syntactic phase can 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.

In section 5 I show that the model holds for human pronouns and noun/adjective agreement in Guébie. In section 6 I turn to other attested phonologically determined agreement systems. Very few languages outside of Kru have been described as having such systems; however, in those few other languages with phonologically determined agreement, we see the above predictions born out.

## 5. Human pronouns and adjectives in Guébie

Here I show how the model proposed in section 4 accounts not only for agreement of non-human pronouns with nouns, section 5.1, but also for non-phonologically determined human pronouns, and for noun/adjective agreement, section 5.2.

### 5.1. Extending the model to human pronouns in Guébie

Recall that human pronouns in Guébie do not follow the phonological agreement pattern that all other nouns follow. Instead, they predictably take the forms /ɔ/, singular, and /wa/, plural. I repeat the pronoun chart for Guébie from (2) in (16) below.

#### (16) Human and non-human subject pronouns

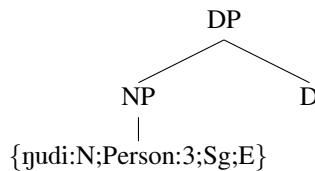
	Human		Non-human	
	Singular	Plural	Singular	Plural
1st	e <sup>4</sup>	a <sup>3</sup>	–	–
2nd	e <sup>2</sup>	a <sup>2</sup>	–	–
3rd	ɔ <sup>3</sup>	wa <sup>3</sup>	e <sup>3</sup> ,ə <sup>3</sup> ,u <sup>3</sup>	i <sup>3</sup> ,wa <sup>3</sup>

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. I claim here that 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,’ (18, 17).

#### (17) Pronoun features and realization

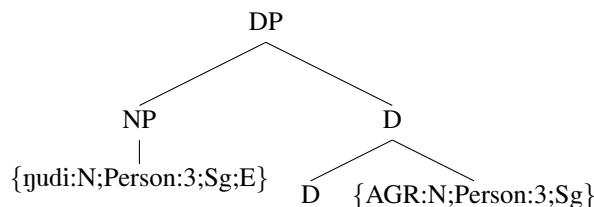
Human	Nonhuman
[+person]	[-person]
/ɔ, wa/	/e, ə, u, i, wa/
semantically determined	phonologically determined

#### (18) 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.

#### (19) Morphological agreement between human nouns and pronouns



Then, during Vocabulary Insertion, this particular bundle of features is spelled out as [ɔ], as in (16).

(20) **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. Instead, we can imagine some faithfulness constraint to the lexical item inserted during Vocabulary Insertion, /ɔ/, which is ranked higher than the IDENT constraints requiring phonological agreement between agreeing elements in the DP. It seems, then, that phonological identity is a last resort agreement strategy in Guébie, which follows from Corbett (1991)'s generalization that when semantic and phonological criteria for determining noun class are at odds, semantics takes precedence.

5.2. *Extending the model to Guébie adjectives*

Adjectives in Guébie agree in final vowel with the noun that they modify.

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

- |  |  |
|--|--|
| <p>a. bitə<sup>2.3</sup> lelə<sup>1.2</sup> jɛla<sup>1.1</sup><br/> house new red<br/> ‘A new red house’</p> | <p>b. fu<sup>3</sup> lelə<sup>1.2</sup> jɛlə<sup>1.1</sup><br/> sponge new red<br/> ‘A new red sponge’</p> |
|--|--|

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). Then 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.

Further evidence that noun/adjective agreement works the same way as noun/pronoun agreement comes from ellipsis. 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, (22).

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

- |   |  |
|---|--|
| <p>a. lelə<sup>1.2</sup> jɛla<sup>1.1</sup><br/> new red<br/> ‘A new red one’ (house)</p> | <p>b. lelə<sup>1.2</sup> jɛlə<sup>1.1</sup><br/> new red<br/> ‘A new red one’ (sponge)</p> |
|---|--|

Just like optional nominal ellipsis in [[Noun] Pronoun] constructions, [Noun [Adjective]] 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. The relevant constraint ranking is identical to the one shown for noun/pronoun agreement in in (13).

**6. Extending the model to other phonologically determined agreement systems**

Though they are few, other languages have also been described to have phonologically determined agreement systems. These include other Kru languages, Bainuk (Atlantic), and Abuq (Arapesh). Like Guébie, phonological agreement in each of these other languages is productive, predictable, and non-local.

6.1. *Kru languages*

A similar phonologically determined agreement system to Guébie is present in other 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). Krahn and Godié, like Guébie, have three possible forms for non-human third-person singular pronouns. The optimal form is the one that agrees with the noun phonologically. In Vata, there are five possible vowels for non-human third-person singular pronouns, where height and not just backness of the pronoun is determined by the final vowel of the noun.

(23) **Phonological agreement across Kru**

	<b>Guébie</b>	<b>Krahn</b>	<b>Godié</b>	<b>Vata</b>
<b>Number of Agreeing Vowels</b>	3	3	3	5
<b>(Non-human) Pronoun-Noun</b>	Yes	Yes	Yes	Yes
<b>Adjective-Noun</b>	Yes	No	Yes	No
<b>Demonstrative-Noun</b>	N/A	No	Yes	No
<b>Definite-Noun</b>	No	No	Yes	No
<b>Relative Pronoun-Noun</b>	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. However, because all of the agreeing elements occur within the DP phase, each system above is predicted by the proposed analysis (cf. Prediction A, 15).

6.2. *Bainuk*

Bainuk, Western Atlantic language spoken in Senegal and Guinea (Sauvageot, 1967), also shows phonological agreement in DPs. 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. Prefixed nouns are much like human pronouns in Guébie, while prefixless ones can be derived in the same way as the phonologically determined non-human pronouns.

In Bainuk, the first syllable of a prefixless noun, no matter its shape, surfaces as the agreement marker on demonstratives, numerals, Wh-words, adjectives, and pronouns.

(24) **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’	

The possible number of agreement prefixes is extremely high in Bainuk, not limited to three possible vowels as in Guébie. However, only a small set of nouns trigger such agreement in Bainuk, unlike Guébie.

Note that in Bainuk, phonological correspondence is anchored to the left edge of the agreement-controlling noun and the agreeing elements. Though this is distinct from Guébie, it is predicted by the proposed analysis (cf. Prediction B, 15).

6.3. *Abuq*

Abuq, a dialect of Arapesh spoken in Papua New Guinea (Nekitel, 1986), also shows phonologically determined agreement. Here, the final consonant of a noun triggers phonological agreement on demonstratives, adjectives, and verbs (Dobrin, 1995).

(25) **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-ahé'  
bird good went  
'a good bird went.
- c. ihiaburuh afu-hi h-ahé'  
butterfly good went  
'a good butterfly went.

Traditionally there are 13 possible final consonants in Abuq. Since contact with Tok Pisin and other languages, words have been borrowed with other final consonants. Even in borrowed words with non-native segments, like /r, p/ in (26), the final consonant of the noun triggers agreement, thus this is clearly a phonologically-determined system.

#### (26) Borrowed words undergo phonological agreement

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

In Abuq it is right-aligned consonants, rather than nouns (Guébie) or syllables (Bainuk) that trigger agreement. The analysis proposed in section 2 predicts such a system (cf. Prediction C, 15).

## 7. Conclusion

Here I provide an initial description of the phonologically determined agreement system of Guébie (Kru, Niger-Congo), and I provide an interface analysis where agreement arises through phonological identity to output forms via morphological agreement mechanisms. In addition to accounting for phonologically determined agreement, the proposed 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), though I leave as a question for further research whether it could serve as a model of gender and noun class systems more generally.

Crucially, this paper demonstrates that phonologically determined agreement systems can be modeled without requiring phonological features to be present in syntax. Thus *we can maintain that syntax is not sensitive to phonological features.*

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