

# The Augment in Kirundi: When Syntax Meets Phonology

Juvénal Ndayiragije, Emmanuel Nikiema, and Parth Bhatt  
University of Toronto

## 1. Introduction

Research in early generative syntax was dominated by problems concerning the right ordering of transformations and their applicability to intermediate representations. However, a major bifurcation triggered by the publication of Chomsky's *Lectures on Government and Binding* changed the course of history, and all subsequent advances in generative syntax, including the latest Minimalist framework (Chomsky 1995), were motivated by a need to reduce the number of operations and mechanisms required to derive surface representations. The recent evolution of mainstream phonology, the Optimality Theoretic framework (Prince & Smolensky 1993) to be precise, shows a drastic reduction, if not elimination, of representations in favor of a far richer computational system. The theory is built around hierarchically ranked (universal and language specific) constraints that are all violable in principle; input forms are freely generated and then evaluated in the constraint chamber. Although the number of possible constraints (GEN) appears to be unlimited in Optimality Theory, the constraint types have been reduced to two, namely faithfulness and markedness constraints, plus a single operation (EVAL) that evaluates candidates against each other and against the optimal output. As the focus on computation is accompanied by a strong tendency in current OT analyses to dispense with representations, it seems fair to characterize OT as a theory of the computation of constraint interactions rather than a theory of constraints per se (Scheer 2010).

Anderson's (1985) seminal history of phonology in the 20<sup>th</sup> century correctly stated that neither a theory of rules nor a theory of representations constitute a theory of phonology by itself. In other words, a theory of phonology can neither be reduced to representations, nor to computation. In this regard, other frameworks such as Dependency Phonology (Hulst & Ritter 1999a, Hulst 2005), Government Phonology (Charette 1991, Harris 1994, Kaye 2005, Kaye, Lowenstamm & Vergnaud 1985, 1990, Lowenstamm 1996, 2003; Scheer 2004) and Substance-Free Phonology (Hale & Reiss 1998, 2000, 2008; Blaho 2008) have been arguing for the necessity to strike a balance between representations and computation to arrive at a comprehensive theory of phonology that will interact adequately with other modules of the grammar (syntax and morphology for example). In contrast, many studies in OT tend to amalgamate phonetic, phonological, morphological and even syntactic instructions in the same constraint hierarchy (non-modular approach). We would like to provide evidence, based on the phonology of the Kirundi augment, that regardless of the framework adopted, 1) representations should be part of phonology and 2) the computational component of any phonology should be reduced to a minimal number of possible operations, should the common endeavor remain to not only account for the linguistic data, but most importantly characterize the knowledge of the speaker. As Chomsky & Halle (1968) correctly put it, one may come up with a phonological grammar that is consistent with the data, but yet fails to account for the speaker's knowledge or intuition about

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the language. We propose in this paper that the computational component of syntax is the same operating system adapted and applying to phonological representations<sup>1</sup>. More precisely, we would like to submit that the computational system  $C_{HL}$  is invariant: syntax and phonology are operationally the same. This is what we will refer to from now on as the Uniformity Hypothesis. We make the following three claims for phonology: 1) the computational component  $C_{HL}$  reduces to two elementary operations: Merge and Agree; 2)  $C_{HL}$  operations are triggered by interpretability conditions at interfaces, and finally 3) lexical items (LIs) are either (i) Feature-complete or (ii) Feature-defective at the phonological level. The consequence for the model that we are currently exploring assumes that the phonological component of languages is made up of three parts: a) an inventory of features; b) a computational component and c) a phonetic interface.

This paper lays the foundations for a research program that seeks to probe and hopefully blur the traditional boundary between syntax and phonology (see notably Bromberger & Halle 1989), by highlighting their shared architecture and tools in (1-4):

- (1) *The Uniformity Hypothesis*  
The computational system of the human language ( $C_{HL}$ ) is invariant: Syntax and Phonology use the same tools.
- (2) *Tools*  
 $C_{HL}$  reduces to elementary locality-constrained operations: Merge and Agree
- (3) *Triggers*  
 $C_{HL}$  operations are triggered by interpretability conditions at interfaces
- (4) *Lexicon*  
Lexical items (LIs) are bundles of valued or unvalued/active features. The latter drive phono/syntactic relationships (Agree) and processes (Merge /Move).

The discussion to follow explores this research program within one empirical domain: the Bantu *augment* illustrated in (5) from Kirundi, and its cross-linguistic variation.

- (5) u-mu-gabo  
*augment*-classifier-root  
“a man”

Following Bhatt, Ndayiragije & Nikiema (2007) and Ndayiragije, Nikiema & Bhatt, (2009, 2010), we propose that at the syntactic level, the *augment* is best analyzed as the spell-out of a Determiner category dominating the Kirundi noun phrase (NP), as depicted in (6)<sup>2</sup>. The Gender head merged in between D and NP in (6) hosts phi-features (gender and number) associated with the noun.

- (6) [DP      D      [<sub>GendP</sub> Gend [NP]]]

At the phonological level, we analyze the *augment* (D) as an empty V syllable associated with an EPP-feature, that is, a lexically unspecified phonetic feature, hence uninterpretable ( $uV$ ) at the PF interface. This (phonetically) empty position, depending on the parametric specifications selected by the language, may remain empty or be partially or fully realized as an epenthetic or copied vowel. We will show that these three options are precisely the ones observed in different Bantu languages.

- (7) [DP       $uV$       [<sub>GendP</sub>      CV      [NP]]]

<sup>1</sup> See also Hulst (2005) who argued, in response to Bromberger & Halle (1989)'s article entitled “Why phonology is different”, that phonology is the same. We follow this line of research established in the late 80s and early 90s mainly by tenets of Government Phonology and Dependency Phonology.

<sup>2</sup> See also Visser (2008) and Taraldsen (2010) for more discussion of the Bantu noun class and augment. Our analysis differs from Taraldsen (2010) who claims that the initial vowel/augment and the noun class in Bantu form one single lexical morpheme.

To prevent the derivation from crashing at PF in Kirundi, the uninterpretable/unvalued  $uV$  in (7) enters an AGREE relationship with the closest matching V with valued/interpretable V-feature and copies its melody onto Det, as in (8). The homophony between the augment and the vowel of the noun class in (5) follows from this agreement relationship.

(8) [DP  $V_i$  [<sub>GenDP</sub> CV<sub>i</sub> [NP]]]

The remainder of paper motivates the analysis in (6-8). Section 2 presents compelling syntactic and semantic evidence in favour of the DP analysis in (6). Sections 3 and 4 discuss the phonological variation of the augment across Bantu and its implication for the Uniformity Hypothesis in (1). Section 5 concludes.

## 2. Syntax

### 2.1. Kirundi Noun Class System: an overview

As shown in (5), each common noun in Kirundi comes with minimally 3 morphemes: the initial vowel or *augment*, the noun class marker, and the root. There are 16 noun class markers each of which specifies the phi-features (*gender* and *number* features). The singular/plural pairing reduces the 16 class markers to 10 as in (9), with illustrations of [noun class-root] clusters in (10):

(9)	<u>Classes</u>	<u>Singular</u>	<u>Plural</u>
	1.	mu-	ba-
	2.	mu-	mi-
	3.	ri-/i-	ma-
	4.	ki-	bi-
	5.	n-	n-
	6.	ru-	
	7.	ka-	tu-
	8.	bu-	
	9.	ku-	
	10.	ha-	ha-
(10)	<u>Classes</u>	<u>Singular</u>	<u>Plural</u>
	1.	mu-ntu ‘person’	ba-ntu ‘people’
	2.	mu-nwa ‘mouth’	mi-nwa ‘mouths’
	3.	ri-/i-gi ‘egg’	ma-gi ‘eggs’
	4.	ki-bazo ‘question’	bi-bazo ‘questions’
	5.	n-ka ‘cow’	n-ka ‘cows’
	6.	ru-kundo ‘love’	
	7.	ka-rorero ‘example’	tu-rorero ‘examples’
	8.	bu-menyi ‘knowledge’	
	9.	ku-ri ‘truth’	
	10.	ha-ntu ‘location’	ha-ntu ‘locations’

### 2.2. Augment: Vowel copy of the noun class

A salient feature of the Kirundi augment is that it consists of a single vowel that is identical to the vowel of the corresponding noun class marker; that is, /u/, /i/ or /a/. For Class 5, whose noun class marker is the nasal feature /N/ which prenasalizes an adjacent C, the augment slot is filled by /i/. Thus, the complete morphological forms of the paradigm in (10) is given in (11):

(11)	<u>Classes</u>	<u>Singular</u>	<u>Plural</u>
	1.	u-mu-ntu ‘person’	a-ba-ntu ‘people’
	2.	u-mu-nwa ‘mouth’	i-mi-nwa ‘mouths’
	3.	i-ri-gi ‘egg’	a-ma-gi ‘eggs’
	4.	i-ki-bazo ‘question’	i-bi-bazo ‘questions’

5.	i-n-ka ‘cow’	i-n-ka ‘cows’
6.	u-ru-kundo ‘love’	
7.	a-ka-rorero ‘example’	u-tu-rorero ‘examples’
8.	u-bu-menyi ‘knowledge’	
9.	u-ku-ri ‘truth’	
10.	a-ha-ntu ‘location’	a-ha-ntu ‘locations’

In other Bantu languages such as Luganda, the augment spells-out as /o/, /e/ or /a/, respectively, as in (12). Compare with Kirundi noun classes 1 and 4 in (11). Any adequate analysis of the Bantu augment should account for the variations observed in the quality of the vowel. We return to this issue in section 4.

(12)	<u>Classes</u>	<u>Singular</u>	<u>Plural</u>
	1.	o-mu-ntu ‘person’	a-ba-ntu ‘people’
	4.	e-ki-ntu ‘thing’	e-bi-ntu ‘things’

### 2.3. *Augment as DET*

In this section, we present compelling evidence for the view of the augment as a Determiner in Kirundi and presumably in other Bantu languages<sup>3</sup>.

#### 2.3.1. *Semantics*

Semantically, the augment is unspecified with respect to definiteness. It is compatible with both an indefinite and a definite reading as shown in (13):

(13)	i-ki-rundi	ni	u-ru-rimi	rukoóye
	Aug-cl4-Kirundi	is	Aug-cl6-language	difficult
	“Kirundi is a complex language”			

#### 2.3.2. *Augment Deletion*

The augment must drop under the scope of the constituent negation *ntaa* as illustrated in (14b), from (14a). French indefinite DPs display a similar pattern as shown in the examples in (15a-b). The indefinite article *un* in (15a) changes to the partitive *de/d’* in (15b).

(14)	a.	Yohani	yaakoze	i-ki-bázo
		John	made	exam
		“John wrote an exam”		
	b.	ntaa	(*i-)ki-bázo	Yohani
		Neg	exam	John
		[Lit: “there is no exam that John wrote]”		
		“John didn’t write any exam”		
(15)	a.	Jean a passé un examen		
		John wrote an exam		
	b.	Jean n’a pas passé d’examen		
		“John didn’t write any exam”		

<sup>3</sup> Most of these arguments are found in Kirundi reference grammars such as Ntahokaja (1994). Similar facts have been reported in the literature on other Bantu languages; see notably Visser (2008) and Taraldsen (2010).

### 2.3.3. Incorporation

According to Baker (1988), N-to-V incorporation is allowed if and only if no Det occurs between V and NP. Kirundi displays noun-incorporation within prepositional phrases (N-to-P), and no *augment* (Det) intervenes between P and NP. Illustrations are given in (16a-b).

- (16) a. mu (\*i)-ki-bazo  
in exam  
“during the exam”
- b. ku (\*a)-ba-nyeshule  
on students  
“for students”

### 2.3.4. Compounding

Cross-linguistically, compound nouns derived from [V+NP] structures ban Det-insertion as illustrated by the French compounds in (17):

- (17) a. ouvre-(\*la)bouteille  
open-(Det)bottle  
“opener”
- b. garde-(\*les)robe(s)  
hold-(Det)dress  
“closet”

Kirundi compounds follow the same pattern by deleting the *augment* from the DP complement of V as illustrated by (18b) and (19b) compounds, derived from (18a) and (19a) VP structures, respectively. It is crucial to note that in the italicized phonetic forms, vowel deletion applies to the final vowel of the verb in [V+DP] structures (18a) and (19a) but to the initial vowel (augment =Det) of the noun complement of the V-N compound in (18b) and (19b).

- (18) a. ku-zimya            u-mu-riro            [kuzimyumuriro]  
INF-turn off            fire  
“to fight the fire”
- b. u-mu-zimya            (\*u-)mu-riro            [umuzimyamuriro]  
Aug-cl1-fight            (aug-)cl2-fire  
“fire fighter”
- (19) a. ku-gumya            i-banga            [kugumyibanga]  
INF-keep            aug/cl5-secret  
“to keep secret”
- b. u-mu-gumya            (\*i-)banga            [umugumyabanga]  
aug-cl1-keep            aug/cl5-secret  
“secretary”

### 2.3.5. Vocative Case

Crosslinguistically, Vocative Case marked NPs never occur with Det. That is the case even in languages with abstract case marking such as French as in the example in (20b), which is the vocative form of (20a).

- (20) a. Le garçon  
“the boy”
- b. (\*le) garçon!  
“Eh, boy!”

Kirundi follows the same rule by deleting the *augment* on the noun as shown in (22), from (21):

- (21) a. a-ba-shiingantaáhe  
aug-cl1-gentleman  
“respected men”
- b. a-ba-pfáasóni  
aug-cl1-lady  
“respected ladies”
- (22) Bashingantahe! Bapfasoni!  
Gentlemen! Ladies!  
“Ladies (and) Gentlemen!”

### 2.3.6. *Anthroponyms*

Many Kirundi proper names are derived from regular common nouns by deleting the augment as in (24a-b) names formed from (23a-b)<sup>4</sup>.

- (23) a. u-ru-kundo  
aug-cl6-love  
“the love”
- b. a-ka-gabo  
aug-cl7-man  
“a little man”
- (24) a. Rukundo “Love”  
b. Kagabo “Little Man”

### 2.3.7. *Borrowing*

Kirundi speakers systematically delete the initial vowel of proper names borrowed from French. This shows that they interpret the initial vowel of N as an augment (Det). Moreover, this initial vowel is deleted even in cases where it is clearly not an augment (25a). (25b) illustrates Kirundi names starting with an initial vowel whose function is not that of Det.

- |      |    |               |                     |                                    |
|------|----|---------------|---------------------|------------------------------------|
| (25) | a. | <u>French</u> | <u>Kirundi</u>      |                                    |
|      |    | Emmanuel      | Manweéri            |                                    |
|      |    | Athanase      | Tanaázi             |                                    |
|      |    | Imelde        | Meerida             |                                    |
|      | b. | Arakaza       | “nice that he came” | (a= subject-verb agreement marker) |
|      |    | Irambona      | “he sees me”        | (i= subject-verb agreement marker) |

<sup>4</sup> An anonymous reviewer notes that in Greek, proper names take a determiner. This is the case in French as well, as in Leblanc, Lemarchand, Desjardins. A simple account of this asymmetry is available under Bouchard’s (1995) suggestion that the Number feature is on DET in French (and Greek), and on N in English and Kirundi. Therefore, Det-deletion is not an option in French or Greek because of the interpretable Number feature associated with it.

### 2.3.8. Augment on CP

Sentences (26a-b) illustrate tensed CPs headed by the complementizer *ko* in object and subject positions, respectively. Interestingly enough, CP complements of P(repositions) require the presence of an augment on C as illustrated by passivization in (26c), a strong indication that the augment and the inflected N are distinct heads. (27a-b) show the same behaviour with infinitival CPs.

- (26) a. Yohani yibaza [ko *pro* tu- $\emptyset$ -za]  
 John thinks C 1p-pres-come  
 “John thinks that we are coming”
- b. [ko *pro* tu- $\emptyset$ -za ] bi- $\emptyset$ -babaje Yohani  
 C 1p-pres-come 3s-pres-bother John  
 “That we come bothers John”
- c. Yohani a- $\emptyset$ -babajwe na [\* $(u)$ -ko *pro* tu- $\emptyset$ -za]  
 John 3s-pres-bother:pass by (aug)-C 1p-pres-come  
 “John is bothered by the fact that we are coming”
- (27) a. Yohani a-a-emeye [ $\emptyset$  *ku-andika* amakeéte]  
 John 3s-pst-accept INF-write letters  
 “John accepted to write letters”
- b. Yohani a- $\emptyset$ -babajwe na [\* $(u)$ -*ku-andika* amakeéte]  
 John 3s-pres-bother:pass by INF-write letters  
 “John got tired of writing letters”

From the facts above, the hypothesis that Kirundi bare nouns are DPs is inescapable on syntactic and semantic grounds<sup>5</sup>. In the next section, we show that the AGREE+MERGE analysis is motivated on phonological grounds.

## 3. Phonology

Two types of phonological elements can be assumed at the level of lexical representations some of which are interpretable at PF (28a), others are not (28b), hence must enter some phonological processes for interpretability/convergence at PF:

- (28) a. Specified features (valued, interpretable)  
 b. Unspecified features (unvalued, uninterpretable)<sup>6</sup>

Two phonological processes may occur to ensure convergence:

<sup>5</sup> One anonymous reviewer considers the augment to be a Case marker on N. We do not agree with this proposal for the following reasons, among others. First, as shown in (24), proper names do not take the augment, yet they are subject to the Case Filter. Second, the augment occurs on CP as shown in (26c) and (27b), yet CPs do not need Case (cf. Stowell’s Case Resistance Principle). Third, NPs that occur in non Case-marked positions such as adjuncts still bear the augment as shown in (i). This is unexpected if the augment is a Case marker.

(i)  $\underline{u}$ -muni umwe, Petero a-zo-za  
 Aug-day one Peter 3s-Fut-come  
 ‘One day, Peter will come’

<sup>6</sup> An anonymous reviewer points out that in languages such as Russian, /x/ remains underspecified on the surface (Keating 1988), that many unvoiced stops remain underspecified for laryngeal features (Vaux & Samuels 2005), and, most strikingly, that in Marshallese all vowels retain a high degree of underspecification (Hale, Kissonock, & Reiss 2007). We consider all these cases to fall under (28a), therefore they are interpretable. No operation is needed as these features are valued. We will show later that Swahili displays the same pattern.

- (29) a. MERGE (insertion, epenthesis)  
 b. AGREE (copy, assimilation, harmony, permutation, metathesis, etc.)

We assume that the Kirundi Gender morpheme, a CV template, is fully specified (28a) (e.g. /mu/) and that the Determiner morpheme, a V template, is unspecified (28b), hence uninterpretable at PF. Under these assumptions, a noun such as *umuntu* will be represented as in (30a) and derived as in (30b).

(30a) [DP      V      [GendP    CV      [NP]] ]  
          / ø –                    mu –      ntu/

(30b) [DP      V      [GendP    CV      [NP]] ]  
          / u<sub>i</sub> –                    mu<sub>i</sub> –      ntu/

(30b) accounts for the observed homophony between the vowel of the classifier/gender morpheme and the augment as a result of AGREE between Gend and Det.

Let us now turn to how the empty V of the Det gets its segmental specification in class 5. An illustration is given below:

(31) i-n-ka ‘cow’      i-n-ka ‘cows’

We assume that the lexical representation of the class 5 morpheme is but a specified CV syllable made of a nasal consonant in the C position and a floating front vowel [I] in the V position. AGREE copies the floating front vowel [I] of the classifier/gender morpheme onto the V slot of Det as illustrated in (32):

(32) /ø - NI - ka/ > /i- Nø - ka/ > [i-øø-<sup>n</sup>ka]

This analysis is supported by the following observation: in cases where the root noun starts with a vowel, the floating front vowel /I/ is spelled out as [y] as illustrated in (33). This predicts that under some circumstances, if a lexical item lacks an initial CV syllable to identify the phonetically (but not phonologically) empty CV template of the Gend P, one should expect either the nasal feature to surface as a real consonant, or the floating front vowel to be phonetically realized (i.e. lexically inserted), or both. This prediction is borne out as Kirundi class 5 lexical items beginning with a vowel are realized as follow:

- (33) i- nø-ubakwa > [inyubakwa] ‘house’ and not \*[inubakwa]  
 i- nø ambaro > [inyambaro] ‘dressing’ and not \*[inambaro]  
 i- nø egamo > [inyegamo] ‘sofa’ and not \*[inegamo]

#### 4. Variation

In this section, we extend our analysis to some other Bantu languages. We focus on three types of languages illustrated in (34) through (36), namely languages in which the augment is present, but different from the vowel of Gender morpheme (LuGanda), or languages in which the augment is a CV syllable as in Lubukusu (35), and languages in which the augment is simply null as in Swahili (36).

(34) LuGanda      Class      Singular      Plural  
          1.      o-mu-ntu ‘person’      a-ba-ntu ‘people’  
          4.      e-ki-ntu ‘thing’      e-bi-ntu ‘things’

(35) Lubukusu: CV      Class      Singular      Plural  
          1/2      o-muu-ndu ‘person’      ba-baa-ndu      ‘people’  
          3/4      ku-mu-saala      ‘tree’      ki-mi-saala      ‘trees’  
          5      li-li-no      ‘tooth’  
          6      ka-ma-kaanda      ‘beans’

(36)	Swahili: Null	<u>Class</u>	<u>Singular</u>	<u>Plural</u>
		1/2	Ø-mtu ‘person’	Ø-watu ‘people’
		7/8	Ø-kiti ‘chair’	Ø-viti ‘chairs’

In Luganda, the augment spells as /o/, /e/ or /a/, respectively, as in (34), whereas in Kirundi, it spells as [u], [i] and [a] respectively. How to account for this contrast? The most plausible analysis of the LuGanda facts in (34) is that the augment is an interpretable V syllable specified as /a/. We propose that the change observed in the vowel quality of the augment is a result of an AGREE relationship between the vowel of the classifier and the augment. The remaining question is why AGREE takes place here when the augment has specified features? We would like to submit that this phonological change arises as a spell out of a syntactic agreement that applies between between Det and the classifier.<sup>7</sup> This LF driven agreement applies in both LuGanda and Kirundi, but is less transparent in Kirundi because of the vowel homophony.

Next, what happens in Lubukusu? The answer is straightforward: In Lubukusu, the augment (Det) is an unspecified CV morpheme which is valued by AGREE with the Gender morpheme, hence the reduplication effect arising from AGREE (see Marantz (1982) and Raimy (2000) on reduplication patterns). Finally Swahili. This is a case in which Det is null, i.e. no augment is observed in surface forms. Within our system, saying that the Swahili Det is phonologically specified as empty means that it is fully valued. Therefore, it is not subject to any AGREE operation to be interpretable at PF. As a consequence, it remains silent.

## 5. Conclusion

In this paper, we have argued that the augment in Bantu is better analyzed as a syntactic head of a DP structure. On phonological ground, we proposed to derive its phonetic instantiations from its lexical features. To ensure convergence at the interfaces, the augment must enter an AGREE relationship with the interpretable matching feature of the Gender/noun class marker.

Our analysis has the following theoretical implications for Phonology: (1) Lexical entries contain unspecified/uninterpretable elements that trigger phonological operations to satisfy interpretability conditions at PF, (2) Phonological processes reduce to 2 basic operations —MERGE and AGREE, and (3) the computational system  $C_{HL}$  is remarkably similar in both syntax and phonology.

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<sup>7</sup> Much like gender agreement between the NP and the Determiner in Romance languages such as French as in (i) *le<sub>m</sub> chien<sub>m</sub>*, as opposed to (ii) *la<sub>f</sub> chienne<sub>f</sub>*.

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