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Kula, N.C.; Cheng, L.L.

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Phonological and syntactic phrasing in Bemba relatives¹

NANCY C. KULA AND LISA LAI-SHEN CHENG

Abstract

Tone as a distinctive feature used to differentiate not only words but also clause types, is a characteristic feature of Bantu languages. In this paper we show that Bemba relatives can be marked with a low tone in place of a segmental relative marker. We treat this low tone as a morpheme rather than as just triggering a change in tone pattern that can then be related to relativization. The low tone strategy of relativization, which imposes a restrictive reading of relatives, manifests a phonological phrasing that requires the head noun to be phrased together with the relative clause that it modifies as opposed to non-restrictives where this is not the case. The paper shows that the resultant phonological phrasing favours a head-raising analysis of relativization where the head noun is considered to be inside CP. Despite the syntactic use of the relative tonal morpheme we see that it is also subject to purely phonological constraints that results in its being unable to be used to mark headless relatives. This paper therefore highlights the phonology-syntax connection and shows that phonology can directly inform syntactic analyses.

1. Introduction

Relative clauses in Bantu have been a part of continued research dating back to Meeussen (1971). Various typologies and analyses that aim to capture the dependencies expressed in this clause type have been proposed (Givón 1972,

1. We would like to express our thanks to participants of the British Academy International Network Project on Bantu grammar, description and theory (2003-2006) from whom we have received valuable comments. We also thank two anonymous reviewers and the JALL editors whose input has greatly improved this paper. We remain responsible for any errors. The first named author would like to acknowledge financial support from NWO VENI grant 275-70-006.

Nsuka 1982, Walusimbi 1996). Despite the fact that there is overwhelming evidence of relative clauses formed by tone in various Bantu languages (Luganda, Kinyarwanda, Nsenga, Chichewa, Umbundu, Luba) hardly any analyses try to associate this fact to the syntactic analyses and generalisations proposed (but see Kamwangamalu (1988) for Luba).

This paper investigates (syntactic) analyses of relative clauses in Bantu, with particular reference to Bemba, that take recourse to phonological phrasing. We begin by outlining the strategies for relative clause formation in Bemba in Section 2 for both Subject and Object Relatives. In Section 3 we look at the limitations of the tonal marking strategy as opposed to relatives marked with segmental relative markers. In Section 4 and 5, we discuss the phonological phrasing in all relative types and its implications for the syntactic analyses of relative clauses. We finally offer, in Section 6, some concluding remarks.

2. Strategies for relative clause formation

Relative clauses in Bemba are formed with either segmental or tonal relative markers.² Subject relatives differ from object relatives in terms of the shape of the relative marker, the optionality of the relative marker, and the availability of the tonal marking strategy.

2.1. Segmental relative markers

In object relatives, the relative marker takes the shape of two of the four series of demonstratives (the hearer-proximate and the distal), but differs from these in terms of tone. While the two series of demonstratives concerned are both Low-High in tone, the derived relative markers are High-Low.³ Their independent status is illustrated by the fact that the demonstrative and the relative marker (of the same class) can co-occur, as shown in (1).⁴

- (1) **abántú abó ábo n-a-mwééne maíló ...**
 2people 2DEM 2REL 1SM-TNS-see.PERF yesterday
 'those people who/that I saw yesterday ...'

2. Our data sources are both from informants, for which we thank Fred Kula and Honoria Mutale, and from written sources. Our principal written sources are Van Sambeek (1955), Sharman (1956), Sharman and Meeusen (1955), Givón (1972) and Oger (1979). Bemba (M42) is a Bantu language spoken in the Northern and Copperbelt provinces of Zambia.

3. Although our examples only use one of these forms it seems that the two are in free variation.

4. The following abbreviations are used (numbers in glosses refer to agreement classes):

As seen in (1), segmental relative markers in object relatives function as independent prosodic words on a par with demonstratives, and like the demonstrative pronouns, they agree with the head noun in class.

The segmental relative marker in subject relatives lacks this property of acting as an independent prosodic word. In fact, it is the pre-prefix in nominal agreement that subsumes the role of relative marker in subject relatives. As opposed to various Bantu languages that have lost the use of the pre-prefix, Bemba still utilizes it in the noun class system. Consider the illustration of the pre-prefix as a noun class marker (2a), a relative marker (2b) and as part of a demonstrative (2c).

- (2) a. **ú-lu-kásu**
 11PPF-11PFX-axe
 ‘an axe’
- b. **ú-lu-kásu** **ú-lú-shítílwe** **léélo** ...
 11PPF-11PFX-axe 11PPF.11REL-11SM-buy.PERF today
 ‘the axe that has been bought today ...’
- c. **ú-lu-kásu** **úlu**
 11PPF-11PFX-axe 11DEM
 ‘this axe’

The distinction between independent and more clitic-like segmental relative markers, that are also referred to as relative concords in Bantu, can clearly be seen in the morphology. However, for the remainder of this article, we label all relative markers simply as REL. For object relatives, the relative marker is in most cases optional (see below for exceptions). For subject relatives, the segmental relative marker can be replaced by changing the tone of the subject marker, which we argue to be a separate strategy, the tonal strategy.

COP	copular	PPH	phonological phrase
CP	complimentizer phrase	PFX	noun class prefix
DEM	demonstrative	PPF	pre-prefix
DP	determiner phrase	PST	past
INT.P	intonational phrase	REL	relative marker
IP	inflectional phrase	SG	singular
LOC	locative	SM	subject marker
NEG	negative	STAT	stative
OM	object marker	TNS	tense
PERF	perfective		

We represent high tone with an acute accent and lexical low tone with no marking. Inserted (or non-lexical) low tone will be marked with a falling accent.

2.2. *The tonal strategy*

Subject relatives have the option of either being marked by a pre-prefix segmental relative marker as illustrated in Section 2.1, or by a tonal strategy that places a low tone on the subject marker. We propose to treat this low tone as a tonal morpheme that is functionally equivalent to its segmental counterpart.⁵ Consider the illustration of the tonal strategy in the paradigm in (3). (3a) is a simple sentence, showing that the subject marking/agreement on the verb is **bá**. (3b) illustrates subject relativization with the pre-prefix **á-** as relative marker, while (3c) shows relativization with the low tone morpheme on the subject marker **bà-**.

- (3) a. **ba-kafúndisha bá-léé-lolesha pansé**
 2PFX-teacher 2SM-TNS-look 16outside
 ‘The teacher is looking outside.’
- b. **ba-kafúndisha á-bá-léé-lolesha pansé ni**
 2PFX-teacher 2REL-2SM-TNS-look 16outside COP
ba-Mutale
 2PFX-Mutale
 ‘The teacher who is looking outside is Mr Mutale.’
- c. **ba-kafúndishá bà-léé-lolesha pansé ni**
 2PFX-teacher 2REL.2SM-TNS-look 16outside COP
ba-Mutale
 2PFX-Mutale
 ‘The teacher who is looking outside is Mr Mutale.’

The fact that the subject agreement in (3a) consists of only the noun class prefix is not due to the fact that the noun also bears no pre-prefix.⁶ We get the same result with a noun that has a pre-prefix as in (4).

- (4) **ú-lu-kásu lú-léé-kóntoka**
 11PPF-11 PFX-axe 11SM-TNS-break.STAT
 ‘The axe is going to break.’

5. A reviewer suggested that the tonal strategy is similar to a complementizer strategy (in contrast to a relative pronoun strategy) because of properties that will be discussed later in this paper (e.g., the tonal strategy cannot mark non-restrictive relatives). We note that the segmental relative marker strategy is not necessarily a relative pronoun strategy (see Cheng 2006 for more discussion), and that Bemba has a complementizer **ati** ‘that’, which takes a complement clause, and no tonal morpheme can be used.

6. As pointed out to us by Thilo Schadeberg, in most Bantu languages, proper names, honorific terms (such as *teacher*) and kinship terms, if they take noun class prefixes at all, never use the pre-prefix, thus **a-ba-kafundisha* for ‘teacher’ is ungrammatical in Bemba. These nouns usually belong to noun class 1a.

Note that in (3c), the subject agreement marker has a low tone, in contrast with the high tone in (3a), and the relative marker is missing (cf. (2b)). Merely deleting the pre-prefix relative marker does not yield (3c) since the typical subject agreement marker carries a high tone (as in 3a). Notice further that when the relative clause is marked with a low tone (as in 3c), the final vowel of the head noun surfaces with a high tone (compare 3c to 3a, b). To see that this high tone is not responsible for relativization, consider the sentence in (5) where the head noun has a final high tone but the subject marker in the relative clause remains high.

- (5) ***ba-kafúndishá bá-léé-lolesha pansé ni ba-Mutale**
 2PFX-teacher 2REL.2SM-TNS-look 16outside COP 2SM-Mutale
 Intended interpretation: ‘The teacher who is looking outside is Mr Mutale’

The ungrammaticality of (5) confirms that the tonal strategy involves the insertion of a low tone on the subject agreement marker. We will return, in Section 4, to the additional final high tone on the head noun in (3c).

As an independent strategy the tonal strategy can be used to distinguish a matrix independent sentence from a subject relative clause as in (6).

- (6) a. **umúkasháána á-áci-móna banamayo léélo**
 1girl 1SM-TNS-see 2woman today
 ‘The girl saw the women today’
 b. **umúkasháána à-áci-móna banamayo lééló ...**
 1girl REL.1SM-TNS-see 2woman today
 ‘The girl who saw the women today ...’

Here again, as in (3c), we see the high tone of the subject marker being overridden by a low tone, resulting in a relative clause in (6b).

2.3. *Optionality and tonal strategy*

We have described above the tonal strategy as a strategy involving the insertion of a low tone relative marker when there is no segmental marker marking the relative clause. The discussion above solely concerns subject relative clauses. In object relatives, the picture is a bit different in two respects. First, the segmental relative marker is optional in object relatives. And second, the use of the tonal strategy is restricted to cases involving disambiguation. Let us consider these in turn. The examples in (7) show the optional nature of the segmental marker in object relatives. (7a) is the non-relative sentence from which the relatives (7b–c) are derived.

- (7) a. **Chisanga á-mwééne abántu maílo**
 Chisanga 1SM-see.PERF 2person yesterday
 ‘Chisanga saw people yesterday.’
- b. **abántu ábo Chisanga á-mwééne maílo,**
 2person 2REL Chisanga 1SM-see.PERF yesterday
na-bá-ya
 TNS-2SM-go
 ‘The people who Chisanga saw yesterday have gone.’
- c. **abántú Chisanga á-mwééne maílo, na-bá-ya**
 2person Chisanga 1SM-see.PERF yesterday TNS-2SM-go
 ‘The people who Chisanga saw yesterday have gone.’

(7c) differs from (7b) only in that the relative marker **ábo** ‘those’ is omitted, and the clause headed by **Chisanga** is still a relative clause modifying the head noun **abántu** ‘people’.

Interestingly, as opposed to subject relatives, the tonal strategy cannot be used in these cases (7c), i.e., when the segmental relative marker is absent. If the subject agreement marker has low tone, the sentence becomes ungrammatical (as shown in (8a), compared with (7c)). Bantu languages also have the optional possibility of inverting the subject in object relatives.⁷ In these cases as well, the tonal strategy is still unacceptable as shown by the contrast between (8b) and (8c).

- (8) a. ***abántú Chisanga à-mwééné maílo, na-bá-ya**
 2people Chisanga 1SM-see.PERF yesterday TNS-2SM-go
 Intended interpretation: ‘The people who Chisanga saw yesterday have gone.’
- b. **abántú á-mwééné Chisanga maílo, na-bá-ya**
 2people 1SM-see.PERF Chisanga yesterday TNS-2SM-go
 ‘The people who Chisanga saw yesterday have gone.’
- c. ***abántú à-mwééné Chisanga maílo, na-bá-ya**
 2people 1SM-see.PERF Chisanga yesterday TNS-2SM-go
 Intended interpretation: ‘The people who Chisanga saw yesterday have gone.’

However, when the two arguments of the verb come from the same noun/agreement class as in (9) (**umúluméndo** ‘boy’ and **Chisanga** are both in Class 1), the tonal strategy can be used to mark relativization. Consider first the base sentence in (9a). In (9a), the relative marker **úo** ‘who’ is present, marking the clause **á-mwééne Chisanga maílo** ‘saw Chisanga yesterday’ as a subordinate

7. The typical SV(O) order becomes V(O)S in the inverted case. See Demuth and Harford (1999), Harford and Demuth (1999) for discussion of subject inverted object relatives.

clause, modifying the head noun. Note that the relative clause involves subject-verb inversion.

- (9) a. **umúluméndo úo á-mwééne Chisanga**
 1boy 1REL 1SM-see.PERF Chisanga
maílo ...
 yesterday
 ‘the boy who Chisanga saw yesterday ...’
- b. **umúluméndo á-mwééne Chisanga maílo**
 1boy 1SM-see.PERF Chisanga yesterday
 ‘The boy saw Chisanga yesterday.’
 *‘the boy (who) Chisanga saw yesterday’
- c. **umúluméndo à-mwééne Chisanga**
 1boy 1REL.1SM-see.PERF Chisanga
maílo ...
 yesterday
 ‘the boy who Chisanga saw yesterday ...’

Recall that in object relatives, the segmental relative marker is optional. However, in the case of (9a), if the relative marker is omitted, the sentence can no longer be interpreted as involving a relative clause. Instead, it is interpreted as a simple sentence, as indicated in (9b). To mark such a subject-inverted clause without a relative marker as a relative is still possible: we resort to the tonal marking strategy, as in (9c). The tone on the subject agreement marker is no longer high, as in (9a); rather it is low, just as we have seen in subject relatives without a segmental relative marker.⁸

Without subject-verb inversion in the relative clause, the tonal strategy remains unavailable even when the two arguments of the verb are from the same noun/agreement class, as (10) shows.

- (10) a. **umúluméndo úo Chisanga á-mwééne maílo** ...
 ‘the boy who Chisanga saw yesterday ...’
- b. **umúluméndo Chisanga á-mwééne maílo** ...
 ‘the boy (who) Chisanga saw yesterday ...’
 *‘The boy saw Chisanga yesterday.’
- c. ***umúluméndo Chisanga à-mwééne maílo** ...
 Int: ‘the boy who Chisanga saw yesterday ...’

8. Sentence (9c) is ambiguous between a subject and object relative reading, which relies on context for disambiguation. The subject relative interpretation of the sentence would be: ‘the boy who saw Chisanga yesterday ...’

Thus, we can conclude that in object relatives the tonal strategy is used only as a last resort when subject marking is unable to distinguish the subject from the object because they belong to the same class and moreover when word order can also not be relied upon to make the distinction. The tonal strategy is therefore only used in subject-inverted object relatives whose arguments belong to the same agreement class.

3. Restrictions on the tonal marking strategy

In addition to only being able to mark object relatives as a last resort used for purposes of disambiguation, there are further restrictions on the tonal marking strategy for relatives. The tonal strategy cannot be used to mark non-restrictive relatives or headless relatives. Let us look at this in more detail below.

3.1. Restrictive versus non-restrictive relatives

It turns out that whenever the tonal strategy is used, it necessarily leads to a restrictive reading of the relative clause. In contrast to this, the segmental relative marker strategy can have both non-restrictive and restrictive readings. Compare in this respect (11a) and (11b).

- (11) a. **abáBembá bà-shipa beekala muZambia**
 2Bembas 2REL.2SM-brave 2SM.live 18LOCZambia
 ‘Bembas who are brave live in Zambia (while those who aren’t
 brave live elsewhere).’ (restrictive only)
- b. **abáBemba á-bá-shipa beekala muZambia**
 2Bembas 2REL-2SM-brave 2SM.live 18LOCZambia
 ‘Bembas who are brave live in Zambia.’ (restrictive/non-restrictive)

In (11a), the relative clause **bà-shipa** ‘that are brave’, which is marked by the tonal morpheme (i.e., without a segmental relative marker), must be interpreted as a restrictive relative clause, restricting the reference of the head noun **abáBembá** ‘Bembas’. In contrast, (11b) with the relative clause **á-bá-shipa** ‘that are brave’ marked by the segmental relative marker, can be interpreted also as a non-restrictive (in this case, equating Bembas with brave people).

In other words, the segmental relative markers in subject relatives can be used for both restrictive and non-restrictive relatives, but only the restrictive reading is possible when the tonal strategy is used.

When the head noun is a proper name, which in principle cannot be modified by a restrictive relative clause, the tonal marking strategy cannot be used (12b).

- (12) a. **Chisanga úo Mulenga á-áci-ípusha á-léé-isa**
 1Chisanga 1REL 1Mulenga 1SM-TNS-ask 1SM-TNS-come
 ‘Chisanga, who Mulenga invited, is coming.’ (non-restrictive)
- b. ***Chisanga à-áci-ípusha Mulenga á-léé-isa**
 1Chisanga 1REL.1SM.TNS-invite 1Mulenga 1SM-TNS-come
 Intended interpretation: ‘Chisanga who Mulenga invited is coming.’

The tonal marking strategy therefore always induces a restrictive reading of the relative clause.

3.2. Headless relatives

Headless relatives in Bemba have the typical definite interpretation of a headless relative (see Grosu and Landman 1998). However, they do not have the free relative interpretation associated with the English counterpart *whoever*.⁹

Headless relatives are formed with segmental relative markers (a pre-prefix in the case of subject relatives and a demonstrative-based relative marker in object relatives), as illustrated in (13).

- (13) a. **á-bá-shipa béékala muZambia**
 2REL-2SM-brave 2SM.live 18LOCZambia
 ‘Those who are brave live in Zambia.’
- b. **úo Chisanga á-mwééne maíló, na-á-fika**
 1REL Chisanga 1SM-see.PERF yesterday TNS-1SM-arrive
 ‘The one who Chisanga saw yesterday has arrived.’

The tonal strategy cannot be used to mark headless relatives in either subject or object relatives as the ungrammaticality of (14a, b) and (15a, b) shows, respectively.

- (14) a. ***bà-shipa béékala muZambia**
 2REL.2SM-brave 2SM.live 18Zambia
 ‘Those who are brave live in Zambia.’
- b. ***à-ishilé maíló, ni Mutale**
 1REL.1SMcome.PERF yesterday COP Mutale
 ‘The one who came yesterday is Mutale.’

9. To express the free relative interpretation, a quantificational element such as **bonse** ‘all’ has to be used, as shown below:

- (i) **na-ali-temwa bonse ábo a-béésa**
 1SG.SM-TNS-love all 2DEM 2REL-2SM.come
 Literal translation: ‘I like all those who come’/‘I like everyone who comes’
 ‘I like whoever comes.’

- (15) a. ***à-mwééne Chisanga maíló, na-á-fika**
 ISM-see.PERF Chisanga yesterday TNS-ISM-arrive
 ‘Who Chisanga saw yesterday has arrived.’
 b. ***Chisanga à-mwééne maíló na-á-fika**
 Intended interpretation: ‘Who Chisanga saw yesterday has arrived.’

As seen for subject relatives in (14), it is impossible to omit the pre-prefixing relative marker and use the tonal marking strategy for headless relatives (cf. 13a). The same holds for object relatives, which we have shown to be able to employ the tonal strategy only for subject-inverted object relatives whose arguments belong to the same agreement class. In the inverted (15a), the tonal marking strategy remains unavailable.

To summarise thus far, subject relatives can utilize both the segmental relative marker strategy (noun-class pre-prefix) and the tonal strategy (low tone morpheme). Object relatives, on the other hand, primarily use a demonstrative based segmental relative marker that is in principle optional. The tonal strategy is only used as a last resort for disambiguation in subject-inverted object relatives when both the subject and object belong to the same noun class.

Since the low tone morpheme and the segmental relative marker both mark relativization they do not co-occur. The low tone morpheme is realised on the subject agreement marker, which is part of the verbal complex. Further, in both subject and object relatives the tonal marking strategy can only yield a restrictive relative clause interpretation, and it cannot be used at all in non-restrictive relatives and headless relatives.

The restrictions we have seen on the application of the tonal strategy of relativization in Bemba, particularly its limited application in object relatives is not a property of all Bantu languages that use tone to mark relatives. In the next section we briefly illustrate the use of tone in marking relativization in Ciluba showing that it can be applied equally to subject and object relatives.

4. Tonal relativization in Ciluba

Kamwangamalu (1988) describes tonal change on an auxiliary as marking relativization in Ciluba. The difference with Bemba is that while the shape of the tone is consistent in Bemba for both subject and object relatives, it varies in Ciluba. Consider first the examples of the subject relatives in (16).

- (16) a. **múntú ù-vwá mú-shípà ntámbwé**
 1person 1-AUX 1SM-kill.PST 9lion
 ‘The man killed the lion.’

- b. **múntú ú-vwá mú-shípà ntámbwé ...**
 1person 1-AUX 1SM-kill.PST 9lion
 ‘the man who killed the lion ...’

The auxiliary verb stem **-vwa** in both (16a) and (16b) has a high tone. In contrast, the subject agreement marker on the auxiliary (**u-**) has a low tone in the non-relative sentence (16a) but a high tone in the subject relative sentence (16b). This is similar to Bemba in having a tone change on the subject marker to denote relativization. In object relatives on the other hand, the change in tone is on the auxiliary rather than the subject marker (17b–c). The object relatives are derived from the simple sentence in (17a).

- (17) a. **báaná bà-vwá bá-pèeshé bálóngí bílambà**
 2children 2-AUX 2SM-give.PERF 2students 8clothes
 ‘The children gave the students clothes.’
- b. **bálóngí bà-vwà báaná bá-pèeshé bílambà ...**
 2students 2-AUX 2children 2SM-give.PERF 8clothes
 ‘the students whom the children gave clothes ...’
- c. **bílambà bì-vwà báaná bá-pèeshé bálóngí ...**
 8clothes 2-AUX 2children 2SM-give.PERF 2students
 ‘the clothes that the children gave to the students ...’

In (17b–c) relativization is indicated by a tonal change on the auxiliary stem, which is high in the non-relative (17a) but low in the two object relatives (17b–c). In contrast to Bemba there are no restrictions on the tonal strategy for relativization even though differing tone patterns may be used for subject and object relatives.¹⁰ This illustrates in a general sense that tonal relativization is a regular strategy that need not even be complemented by a segmental strategy and therefore the data being discussed are in this sense not peripheral.

In the next section, we examine phonological phrasing in Bemba relatives involving different strategies to provide us with further insight into the inner workings of the tonal strategy.

10. Kamwangamalu (1988) develops an analysis of Ciluba relativization where a moved constituent (head noun in relatives and question word in cleft questions) violates a mutual c-command relation that it held in its base position creating the configuration that he argues results in tonal change on the auxiliary.

5. Phonological Phrasing

Phonological phrasing in Bemba is generally marked by low tone and/or pause at the end of a phonological phrase.¹¹ Like in Chicheŵa (see Kanerva 1990), constituents following the verb can, at least for high-toned verbs, be tonally characterised as not belonging to the same phonological phrase as the verb if the final high tone on the verb retracts. Tone retraction is indicative of a phonological phrase boundary so that when it does not take place (i.e., the verb ends in a high tone) the constituents following the verb phonologically phrase with the verb. This behaviour of disallowing high tone from being realized on a phrase final vowel seems to be a diagnostic of phonological phrasing in Bemba as well. While the full details of Bemba phrasing and the range of strategies employed remain to be fully specified, the two characteristics above suffice for the present exposition. Consider (18), which illustrates that the same sequence of words may have different phrasings in Bemba. (Phonological phrases (PPhs) will be indicated by parenthesis).

- (18) a. **(n-ali-móna)**_{PPh} **(umwáána)**_{PPh}
 1sm-tns-see 1child
 ‘I saw the child.’ (verb focus)
- b. **(n-ali-mónóómwáána)**_{PPh}
 ‘I saw the child.’ (object focus/VP focus)
- c. **(n-ali-mónóómwáána)**_{PPh} **(mucímuti)**_{PPh}
 1sm-tns-see.1child 1tree
 ‘I saw a child in a tree.’
- d. **(n-ali-mónóómwáána a-léé-séka)**_{PPh}
 1sm-tns-see.1child 1sm-tns-laugh
 ‘I saw a child laughing.’

In (18a) with a focused verb, the verb is phrased separately from the object (the disjoint verb form), and as a result does not get final high tone. (18b) phrases the verb with the object (the conjoint verb form) and high tone on the verb final vowel can be seen on the resultant long vowel after fusion has taken

11. We follow in broad terms the basic assumptions of phrasal phonology as presented in, for example, Selkirk (1984), Nespov and Vogel (1986), that the largest constituent is the *Utterance* which itself consists of smaller constituents according to a prosodic hierarchy that ends with the prosodic word. Formation of these constituents is subject to the *Strict Layer Hypothesis* that prohibits improper bracketing, recursivity and non-exhaustiveness. We mainly focus here on phonological phrases and only briefly touch on intonational phrases.

place, indicating no phonological phrase break.¹² This phrasing results in VP or object focus. Similarly, the fact that the [verb + object] complex in (18c) does not phrase with the following phrase is indicated by the low tone on the final syllable of the phonological phrase, in contrast to (18d).

The phrasing in relative clauses reveals that while a tonally marked relative must form a phonological phrase with its head noun (19a), i.e., it is always preceded by a high tone, relatives marked with a segmental relative marker have no such restriction and can be either phrased with the head noun (19c) or not (19d). (19) corresponds to (11): (19a, b) show the tonal marking strategy and (19c, d) the segmental marker strategy.

- (19) a. (**abáBembá** **bà-shipa**)_{PPh} (**beekala muZambia**)_{PPh} (tonal REL)
 b. *(**abáBemba**)_{PPh} (**bà-shipa**)_{PPh} (**beekala muZambia**)_{PPh}
 (tonal REL)
 c. (**abáBembá** **ábá-shipa**)_{PPh} (**beekala muZambia**)_{PPh}
 (seg. REL)
 d. (**abáBemba**)_{PPh} (**ábá-shipa**)_{PPh} (**beekala muZambia**)_{PPh}
 (seg. REL)
 ‘Bembas who are brave live in Zambia’

In both (19a) and (19c) the final high tone on the head noun **abáBembá** ‘Bembas’ indicates that the constituent following it is within the same phonological phrase as opposed to (19d) where this is not the case.

As we have indicated in Section 3.1, relatives marked by segmental relative markers can be interpreted as restrictive or non-restrictive. The difference in interpretation also corresponds to a difference in phonological phrasing. (19c) in which the head noun and the relative clause form a phonological phrase yields a restrictive reading while (19d) yields a non-restrictive reading. And note further that the tonal strategy (19a) only has a restrictive reading. In other words, if we consider phonological phrasing together with interpretation, we can conclude that a restrictive relative clause, be it tonally marked or marked by a segmental relative marker, requires that the head noun and the relative clause be in the same phonological phrase. Conversely, a non-restrictive relative clause forms a separate phonological phrase from the head noun.

The same phrasing asymmetries hold for object relatives. (20a) and (20b) differ in reading, though both are marked by a segmental relative marker. The former has a restrictive relative interpretation while the latter a non-restrictive interpretation. (20c) indicates the tonal strategy with phonological phrasing

12. The vowel fusion that takes place in (18b–d) is also indicative of the absence of a phonological phrase boundary. There is therefore no vowel fusion in (18a) which has a boundary between the verb and the object. While this is a useful cue for phonological phrasing, it can only be relied upon when the conditions for vowel fusion are met.

(necessary for restrictives) and further that if the head noun was not phrased together with the verb the sentence would be ungrammatical.¹³

- (20) a. **(abántú ábo Chísanga á-mwééne maílo)_{PPH} (na-bá-ya)_{PPH}**
 ‘The people who Chisanga saw yesterday have gone.’
 b. **(abántu)_{PPH} (ábo Chísanga á-mwééne maílo)_{PPH} (na-bá-ya)_{PPH}**
 ‘The people, who Chisanga saw yesterday, have gone.’
 c. **(umúluméndó à-mwééné Chísanga maílo)_{PPH}**
 ‘the boy who Chisanga saw yesterday’
 d. ***(umúluméndo)_{PPH} (à-mwééné Chísanga maílo)_{PPH}**
 ‘the boy who Chisanga saw yesterday’

Recall that in object relatives it is possible to optionally omit the segmental relative marker and a relative clause reading still obtains. The phrasings in these cases both with and without subject inversion are given in (21a–b). In both cases, the head noun has to be phrased together with the relative clause, and there is a mandatory restrictive reading of the relative clause. If the head noun and the verb are not phrased together as in (21c) a relative interpretation cannot be obtained, rather, a topic interpretation must hold.

- (21) a. **(abántú Chísanga á-mwééne maílo)_{PPH} (na-bá-ya)_{PPH}**
 ‘The people that Chisanga saw yesterday have gone.’
 b. **(abántú á-mwééne Chísanga maílo)_{PPH} (na-bá-ya)_{PPH}**
 ‘The people that Chisanga saw yesterday have gone.’
 c. **(abántu)_{PPH} (Chísanga á-mwééne maílo)_{PPH} (na-bá-ya)_{PPH}**
 ‘The people, Chisanga saw yesterday have gone.’
 *‘The people who Chisanga saw yesterday have gone.’

This shows also that object relatives without an overt segmental relative marker can never have a non-restrictive reading. This is further confirmed by data such as those in (22a–c) in which the head noun is a proper name, which forces a non-restrictive reading.

- (22) a. **Mulénga úo Chísanga á-áci-tuma kumalíkééti**
 Mulénga REL Chísanga 1SM-TNS-send 17market
na-á-bweela
 TNS-1SM-return
 ‘Mulénga, who Chisanga sent to the market, has returned.’

13. Using PRAAT, we phonetically produced sentences where the head noun ends in a low tone and is phrased separately from the verb in tonally marked object relatives. These were all judged at best as strange and of unclear import.

- b. **#Muléngá Chísanga á-á-ci-tuma kumalíkééti na-á-bweela**
Intended interpretation: ‘Mulenga, who Chisanga sent to the market, has returned.’
Literal translation: ‘The Mulenga Chisanga sent to the market has returned.’
- c. **#Muléngá à-aci-tuma Chísanga kumalíkééti na-á-bweela**
Intended interpretation: ‘Mulenga, who Chisanga sent to the market, has returned.’

Both (22b) and (22c) lack a segmental relative marker. (22c) is marked by the tonal strategy while (22b) is completely unmarked. Note that for both (22b) and (22c), the head noun and the relative clause form one phonological phrase (with the head noun ending with a high tone). Both (22b) and (22c) are judged as odd (thus the marker #) because they require a restrictive reading of the proper name **Mulenga**.

We can thus conclude from the foregoing discussion that tonally marked relatives must be phrased together with the head noun. Since phrasing together with the head noun induces a restrictive reading of relatives, as can be seen also for segmentally marked relatives, tonally marked relatives always induce a restrictive reading and hence the strategy cannot be used for typical non-restrictives (i.e., with proper names).

6. Implications for syntactic phrasing

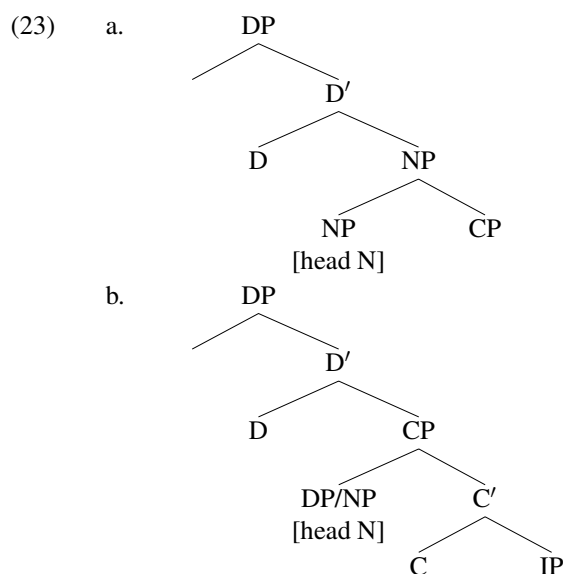
Given what we have seen in terms of phonological phrasing in relative clauses, we explore different analyses of relatives in this section. In particular, we consider the analysis for restrictives versus non-restrictives on the one hand, and headless relatives on the other. We show that phonological phrasing provides insight into which analysis of relative clauses makes the best syntax-phonology correspondence. Further, based on what we know about the structure of relative clauses, we make certain predictions about how phonological phrasing operates in Bemba.

6.1. Restrictive vs. non-restrictive relatives

Let us start by contrasting the standard structure (23a) for restrictive relative clauses with a Kaynian structure (23b) (Kayne 1994).¹⁴ The crucial difference between the two that we would like to draw on is that under the standard view

14. There are variations of the Kaynian structure, which we will not discuss in this article. See Bianchi (2000) among others.

the head noun is outside of the CP (i.e., CP is right-adjoined to the NP, as indicated in (23a)), which is the relative clause, while Kayne adopts a head-raising analysis where the head noun of the relative clause remains within the CP (and there is no adjunction structure).

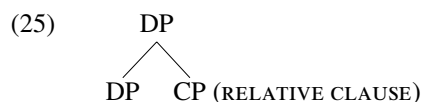


For a Bemba noun phrase such as (24a), the difference between the two analyses of relative clauses is where the CP boundary is.

- (24) a. **abántú ábo n-a-mwééne mailó ...**
 2people 2REL 1SM-TNS-see.PERF yesterday
 ‘the people who I saw yesterday ...’
- b. [DP [NP **abántú** [CP **ábo n-a-mwééne mailó ...**]]] (standard)
- c. [DP [CP **abántú ábo n-a-mwééne mailó ...**]] (Kaynian)

As indicated by (24b), within the standard analysis, the CP boundary falls right before the relative marker **ábo** ‘who’ (as the head noun is outside of CP) while in the Kaynian analysis, the CP includes the head noun **abántú** ‘people’.

For non-restrictive/appositive relatives, we follow Demirdache (1991) and assume that the CP is adjoined to a DP, as represented in (25).



What we have learned from the discussion of phonological phrasing in Bemba in Section 4 is that in restrictive relative clauses, regardless of whether the tonal strategy or the segmental relative marker is used, the head noun forms a phonological phrase with the relative clause. In contrast, in non-restrictive relative clauses (which necessarily use a segmental relative marker), the head noun does not form a phonological phrase with the relative clause.

Under the assumption that phonological phrasing is based on syntactic structure and that here specifically left edges of an XP determine the left edges of phonological phrases, let us compare the two analyses for (19c, d). As indicated in (26a), the standard analysis yields two phonological phrases for both restrictive and non-restrictive relatives. This is, for restrictive relatives, clearly contrary to the phonological phrasing, as we have seen above. On the other hand, given a Kaynian analysis (26b), we can capture the phonological phrasing without any extra assumption, since for restrictive relatives, the left edge of CP can be mapped with the phonological phrase.

- (26) a. Standard analysis
- (i) [DP [NP=PPH [NP **abáBembá**] [CP=PPH **ábá-shipa** ...]]]
(restrictive relative)
 - (ii) [DP [DP=PPH **abáBemba**] [CP=PPH **ábá-shipa** ...]]
(non-restrictive relative)
- b. Kaynian analysis
- (i) [DP [CP=PPH **abáBembá ábá-shipa** ...]]]
(restrictive relative)
 - (ii) [DP [DP=PPH **abáBemba**] [CP=PPH **ábá-shipa** ...]]
(non-restrictive relative)

The Kaynian analysis of relative clauses can capture this difference much more naturally than the Standard analysis.

More specifically, in both (26bi) and (26bii) the left edge of a CP coincides with the left edge of a phonological phrase.¹⁵ We can thus conclude that a CP must coincide with a phonological phrase. This will capture the phonological phrasing in both restrictive and non-restrictive relatives and clearly allows a better phonology-syntax correspondence: a head noun which is syntactically “internal” (i.e., in CP internal position) forms a phonological phrase with the

15. As is clear from (26bi), the left edge of DP and CP coincide. However, we do not consider DP to be a possible phrasing edge because typical DPs (for example, object DPs) do not form a separate phonological phrase (except in focus cases, such as (18a)). Further, it should be noted that Bemba does not have articles, thus the D position remains empty. Demonstratives appear to the right of the head noun (before the relative marker), as we can see in (1). Demonstratives appear rather “low” in many Bantu languages and not in D position.

relative clause, and in contrast, a head noun which is syntactically “external” does not form a phonological phrase with the relative clause.

6.2. Headless relatives

Headless relatives by definition lack an overt head noun and can only be interpreted as restrictive.¹⁶ Given these facts and considering that the Kaynian analysis of restrictive relatives provides us with a better syntax-phonology correspondence, we simply assume a prosodically empty pronoun to be in SpecCP in headless relatives, as illustrated in (27).

- (27) a. **ábáshipa na-bá-ya**
 ‘those who are brave have gone’
 b. [DP [CP *pro* [C’ **ábáshipa na-bá-ya**]]]

Given the representation in (27b), the remaining question is why the tonal strategy is unavailable for headless relatives, given that they share the structure of restrictive relatives. In the next section, we provide an answer to this question by taking into consideration the syntax-phonology interface.

6.3. The mapping between phonology and syntax

From the foregoing discussion, we have seen that the tonal strategy of relativization requires a preceding head noun to be phrased together with the low-tone morpheme, so that (28) (repeated from (19b)), which phrases the head noun and the low-tone morpheme separately, is ungrammatical.

- (28) *(**abáBemba**)_{PPh} (**bà-shipa**)_{PPh} (**beekala muZambia**)_{PPh}
 ‘Bembas, who are brave, live in Zambia.’ (tonal strategy)

Phonologically this implies that having a phonological phrase boundary immediately preceding the low tone morpheme yields undesirable structures. Following assumptions of Generalized Alignment in Optimality Theory (Prince and Smolensky 2004, McCarthy and Prince 1995) this could be formalised as a constraint that bars the relative low tone morpheme from coinciding with a phonological phrase edge. Generalized Alignment is defined in (29).

16. How headless relatives should be analysed syntactically has been a controversial topic. Note that what we posit here may not extend to free relatives in English since the reading of headless relatives in Bemba is not identical to free relatives.

(29) *Generalized Alignment*

Where Cat_1 , Cat_2 are prosodic, morphological, or syntactic categories and $Edge_1$, $Edge_2$ is a member of {Right, Left}:

ALIGN(Cat_1 , $Edge_1$; Cat_2 , $Edge_2$) iff

For each Cat_1 there is a Cat_2 such that $Edge_1$ of Cat_1 and $Edge_2$ of Cat_2 coincide.

Taking (29) into account, we can formulate a constraint such as (30) that militates against the low tone relative morpheme coinciding with a phonological phrase boundary.

(30) *ALIGN (RELOW L, PPHR L)

Do not align the relative low tone with the left edge of a phonological phrase.

Working in a framework of ranked and violable constraints this would have to be fairly highly ranked so that its violation results in ungrammaticality. To avoid the negative formulation of an Align constraint and to make the constraint less language specific, we follow Kula (2007) and treat high tone as preferable at the beginning of a phonological phrase. This is in keeping with having higher prominence at the beginning of a phonological phrase as opposed to the end where tail-off effects are usually seen. The relevant constraint is thus (31).¹⁷

(31) ALIGN (PPHR L, HIGH L)

Align the left edge of a phonological phrase with a high tone.

By requiring the left edge of a phonological phrase to coincide with a high tone, low tone, and in this respect the low tone morpheme, cannot occur at the left edge.

Another apparent phonological effect that we saw in the preceding exposition (see examples (19–21), (24)) is that if a head noun is phrased with a following CP (i.e., in restrictives), it is able to host a high tone spreading rightwards by a tone doubling rule whose details are not relevant here.¹⁸ In the inverse case (non-restrictives), where the head noun is phrased separately from the head the tone doubling rule is blocked and no high tone is seen on the final syllable of the head noun. See, for example, the contrast between (32a) and (32b) (repeated here from (19)).

17. Lexical low tone could be treated as exempt from this constraint so that lexical low tones at the right edge are retained. This treats the constraint as only pertaining to grammatical tones.

18. See Kula (2007), for an analysis of Bemba relatives based on this 'boundary' tone.

edge as marking an intonational phrase rather than a phonological phrase.²⁰ We, in a sense, adopt both of these views (although we do not formalize the former) by postulating that the left edge of CP referred to in (35) must coincide both with a phonological phrase and an intonational phrase. The constraint is thus reformulated as in (36).²¹

- (36) ALIGN-CP, L
 For each CP there is a phonological phrase such that the left edge of that CP coincides with the left edge of a phonological phrase *iff* that CP also coincides with the left edge of an intonational phrase.

In addition, we will use the WRAPXP constraint of Truckenbrodt (1999) as a constraint regulating phonological phrasing. The REALMORPH (realize morpheme) constraint will also be relevant so that a relative marker must be realized in relatives.²² NONRECURSION will also be assumed following Selkirk (1995). These additional constraints are defined in (37).

- (37) a. WRAP-XP (Truckenbrodt 1999)
 Each XP is contained in a phonological phrase.
 b. REALMORPH
 A relevant morpheme must be realized.
 c. NONREC (Selkirk 1995)
 A prosodic constituent must not contain another prosodic constituent of the same level.

ALIGN-PPhRL, HighL is highest ranked so that it is less preferable to begin phonological phrases with low tone. This is crucial in barring the relative low tone morpheme from occurring at the left edges of phonological phrases. ALIGNCP-L is ranked above WRAP-XP to allow some XPs to escape being wrapped in a phonological phrase just in case they occur in a CP whose left edge coincides with both the left edges of an intonational phrase and a phonological phrase. ALIGN-LOWR,PR is further lower ranked in this partial ranking,

20. Truckenbrodt (2005) regards root clauses, as opposed to embedded clauses, as obligatorily forming intonational phrases. Thus co-ordinated structures with two root clauses are considered as consisting of two intonational phrases. He offers Wrap-CP, which requires each CP to be contained in an intonational phrase, as the constraint ensuring this phrasing.

21. It is probably not crucial to make this reformulation since, given the well-formedness of prosodic constituents, the left edge of the phonological phrase containing the CP will necessarily coincide with the left edge of the higher prosodic category, the intonational phrase, as long as we assume that CPs form intonational phrases.

22. Note that object relatives that omit the relative marker will not violate this constraint because they can only be derived from inputs that do not have an overt relative marker. If they were derived from relatives with the relative marker they would violate high ranked general faithfulness constraints such as PARSE.

Tableau 1. ALIGN-PPHRL,HighL >> ALIGNCP-L >> ALIGN-PPHRR, LowR >> REALMORPH
 Restrictives: **ábabémbá bà-shipa** ... ‘Bembas who are brave ...’

ábabémba bá-shipa ...	ALIGN- PL,HL	AL- CPL	A-PR, LR	REAL MORPH
a. ([ábabémba] _{NP}) _P ([bà-shipa ...] _{CP}) _{PPH}	*!	*		
b. ([ábabémbá] _{NP}) _P ([bà-shipa ...] _{CP}) _{PPH / Int. p}	*!		*	
c. ([ábabémbá] _{NP} bà-shipa ...] _{CP}) _{PPH}		*!		
d. ([ábabémbá] _{NP} bà-shipa ...] _{CP}) _{PPH / Int. p}				*!
[☞] e. ([ábabémbá] _{NP} bà-shipa ...] _{CP}) _{PPH / Int. p}				

with the role of determining the right phonological phrase boundaries, ensuring that they do not end in a high tone. REALMORPH is ranked below this to ensure the realisation of relative markers. Consider the interaction of these constraints in Tableau 1 for restrictive relatives under the given ranking. (WRAP-XP and NONREC are not shown in the tableaux).²³

In Tableau 1, candidates (a–b) represent the phrasing we would get under the standard analysis where the head noun is external to the relative clause CP. With this syntactic structure, the NP and the CP are in different phonological phrases as we have already pointed out, and hence fatally violate the highly ranked Align-PPHRL,HighL. Thus candidate (b) that escapes violation of AlignCPL by phrasing the CP with an intonational phrase, is not better off for it. It also incurs the additional violation of AlignPR,LR by having a final high tone on the first phonological phrase. Candidates (c–e) represent the Kaynian analysis where the head noun is internal to the relative clause CP and therefore results in only one phonological phrase. Candidate (c) escapes violation of the high ranked Align-PPHRL,HighL by this phrasing but violates AlignCPL by having the CP in a phonological phrase that does not coincide with an intonational phrase on

23. Evaluation of grammaticality in Optimality Theory is achieved by a competition of different candidates judged against a language specific ranking of constraints. The winning candidate, signaled by the pointing finger ([☞]) is the one that least violates high-ranking constraints. An asterisk (*) indicates the violation of a constraint. A fatal violation (*!) is one that renders a candidate unable to ever emerge as the winner. When such a fatal violation is incurred the cells corresponding to all following constraints are shaded gray to indicate that the candidate is no longer in contention. Even though the winning candidates in Tableau 1–3 are shown to violate no constraints this is not a requirement as a winning candidate may violate lower ranked constraints. What is crucial is that the winning candidate is the best candidate out of all possible candidates.

Tableau 2. ALIGN-P_{PHRL},HighL >> ALIGNCP-L >> ALIGN-P_{PHRR}, LowR >> REALMORPH
 Non-restrictives: **ábabémba ábá-shipa** ...
 ‘Bembas who are brave ...’

ábabémba ábá-shipa ...	ALIGN- PL,HL	AL- CPL	A-PR, LR	REAL MORPH
☞ a. ([ábabémba] _{DP}) _P ([ábá-shipa ...] _{CP}) _{PPh} / Int. p				
b. ([ábabémba] _{DP}) _P (ábá-shipa ... _{CP}) _{PPh}		*!		
c. ([ábabémhá] _{DP}) _P ([bà-shipa ...] _{CP}) _{PPh} / Int. P	*!		*	
d. ([ábabémba] _{DP}) _P ([bà-shipa ...] _{CP}) _{PPh} / Int. P	*!			

the left edge. Candidate (d) only departs from the winning candidate (e) by having no indication of a relative morpheme therefore violating REALMORPH. The phonological phrasing thus favours a syntactic analysis that treats the head noun as internal to the CP. Restrictive subject and object relatives which use the subject marker and the demonstrative-based relative marker, respectively, are treated in the same fashion.

Recall that in object relatives the relative marker is always optional and we have shown that in cases where it is omitted a restrictive interpretation must hold. In these cases (cf. examples in (7)–(8)) Align_{PR,LR} is crucial in showing that because of the high tone on the final syllable of the head noun, no right phonological phrase boundary is present and therefore one phonological phrase is involved, hence the restrictive reading. In this sense, for segmentally marked, tonally marked and non-overtly marked relatives, restrictives are represented as one phonological phrase reflecting the close relation between the head noun and the relative clause manifested in restrictives.

Tableau 2 illustrates non-restrictives, which, as we have shown in earlier discussion, involve separate phrasing of the head noun and the relative clause. Candidate (b) loses because it fails to align a CP with an intonational phrase and hence violates Align_{CPL}. Candidates (c–d) fatally violate the high ranked Align-P_{PHRL},HighL by using the low tone morpheme. Avoiding violation of Align-LowR,P_{PHRR} therefore does not improve things for candidate (d). Candidate (a) therefore emerges as the winner by using the segmental relative marker that avoids violation of Align-P_{PHRL},HighL while maintaining the CP and the NP in separate phonological phrases. Of course a candidate with no boundary after the head noun is possible but would result in a restrictive interpretation as seen in Tableau 1 above.

Tableau 3. ALIGN-PPHRL,HighL \gg ALIGNCP-L \gg ALIGN-PPHRR, LowR \gg REALMORPH
 Headless relatives: **ábáishilé maíló** ... '(the people) who came yesterday ...'

ábáishilé maíló ...	ALIGN- PL,HL	AL-CPL	A-PR,LR	REAL MORPH
a. ([bàishile ...]CP) _{PPh} / Int. P	*!			
☞ b. ([ábáishile ...]CP) _{PPh} / int. p				
c. ([ábáishile ...]CP) _{PPh}		*!		

For non-restrictives then, an appositive structure where the DP is a sister to the relative clause CP (as in Demirdache 1991), provides an analysis that is compatible with phonological phrasing.

Compared to the analysis of restrictive and non-restrictive relatives, headless relatives are different because they lack an overt head. In terms of syntactic structure, we have treated headless relatives on a par with restrictives under a Kaynian analysis. However, recall that they share a crucial similarity with non-restrictive relatives, namely, they cannot be formed using the tonal strategy. This results from the fact that they have an empty head which though syntactically active is phonologically empty. With this assumption, the analysis of headless relatives follows straightforwardly from the given constraint ranking, as illustrated in Tableau 3.

As we have already pointed out, the tonal morpheme and the segmental relative marker cannot be used simultaneously. Candidate (a) that uses the tonal morpheme fatally violates high ranked Align-PPHRL,HighL for having a low tone at the left edge of a phonological phrase. Candidate (c) suffers the violation of AlignCPL for phrasing a CP into a phonological phrase without an intonational phrase boundary on the left edge and hence loses despite using the segmental marker and avoiding violation of high ranked Align-PPHRL,HighL. Candidate (b) is the winning candidate because unlike (c) it avoids violation of AlignCPL. The winning candidate is as such contained in one phonological phrase and gets a restrictive interpretation. From this we can conclude that it is the phonological phrasing, rather than the use of the tonal morpheme that induces a restrictive versus non-restrictive interpretation of relatives. Furthermore, we can now understand why headless relatives pattern with non-restrictives in being unable to use the tonal marking strategy; both produce phonological phrases that violate Align-PPHRL,HighL.

We can thus conclude that for the mapping between phonology and syntax for restrictive relatives, the Kaynian analysis makes the best phonological predictions. For non-restrictive relatives an appositive structure as in Demirdache (1991) coincides with phonological phrasing. Finally, for headless relatives we

see that they structurally pattern with restrictives under a Kaynian analysis and hence also get the phonological phrasing of restrictives; however, due to an empty head, they pattern with non-restrictives in being unable to utilise the tonal marking strategy.

7. Conclusion

In this paper, we have shown that along side a segmental marking strategy in relativization, a tonal marking strategy is also available in Bemba. Further, based on the contrast between the tonal marking strategy and the segmental marking strategy, we argue that the raising analysis of relativization allows a better syntax-phonology correspondence. In addition, based on the raising analysis, we can also offer an explanation as to why non-restrictive relatives and headless relatives share the property that they do not allow the tonal marking strategy, namely that the low tone morpheme cannot be at the left edge of a phonological phrase aligned with a CP. We therefore show that not only can phonological phrasing be informed by syntactic structure but preferences over different syntactic analyses can be informed by phonological phrasing information.

We leave a cross-linguistic comparison and the assessment of whether the constraints here formulated can be seen to be actively operative in other languages to a future occasion.

(Nancy Kula)
University of Essex
(Lisa Cheng)
Leiden University

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