Attachment height and prosodic phrasing in Rutooro

Lauren Clemens · Lee Bickmore

Abstract Rutooro is a Bantu language of Uganda that lacks lexical tone. Instead, prominence in Rutooro is marked with a High tone (H) on the penultimate syllable of the phonological phrase (φ-phrase). Like many languages in the family, syntactic XPs reliably correspond to φ-phrases; however, we find a previously unattested pattern in the prosody of Rutooro adnominal phrases. Head nouns are marked H when they combine with strong determiners and full relative clauses (RCs). In contrast, nouns do not bear an H tone when they combine with weak determiners, adjectives, and reduced RCs. We propose that the distribution of H tones serves as a diagnostic for whether an adnominal is generated in a DP-internal or external position. Reduced object RCs with overt subjects are a special case: the relativized head bears an unexpected H tone, while the subject is all-Low despite the fact that it is a self-contained XP. Also in the realm of reduced RCs, when a relativized head is separated from the RC by an additional modifier, e.g. an adjective, that modifier is realized as all-Low even though it is phrasal. We hypothesize that the attested, nonisomorphic phrasing arose to prevent i) ambiguity and ii) prosodic indeterminacy—when prosodic structure could be the output of more than one syntactic configuration—and was subsequently grammaticalized.

Keywords Prosody · Bantu · Syntax · Phonology

L. Clemens
University at Albany, State University of New York
Albany, New York
E-mail: lclemens@albany.edu

L. Bickmore
University at Albany, State University of New York
Albany, New York
University of the Free State
Bloemfontein, South Africa

1 Introduction

Rutooro (E/J.12), a Ugandan Bantu language, is one of only a handful of Bantu languages in which tone is no longer lexically contrastive.[1] Although Rutooro does not have contrastive tone, all words in isolation are pronounced with a prominence on the penultimate syllable, which we refer to as High (H) tone.[2] In our examples, H tones are indicated with a diacritic above the nucleus of prominent syllables, as in (1).

(1) a. a-ka-tuungúro
AUG-C12-onion
'onion'[3]
b. mpóra
slowly
'slowly'

The distribution of H tones is nontrivial in phrasal contexts, where it is neither the case that each word has a H on the penultimate syllable, nor that every utterance is restricted to a single H on the final penult. This puzzle was first noted by Kaji (2009), who discussed phrasal minimal pairs, like the one in (2) (Kaji 2009: 242). In this case, the placement of a single H tone distinguishes between a possessed nominal and a copular clause.

(2) a. e-ki-tabu ky-áánge
AUG-C7-book C7-1SG
'my book'
b. E-ki-tábu ky-áánge.
AUG-C7-book C7-1SG
'The book is mine.'

When larger sentences are examined, it is possible to find nearly any combination of toneless words and H-marked words, but the utterance-final penult will always be marked with a H tone.

[1] Others include Tumbuka (Downing 2016), Nyakyusa (Persohn 2017), Mbunga, Pogolo (Odden personal communication), and of course Swahili.

[2] Rutooro is an understudied language; previous work includes a Runyooro-Rutooro grammar (Rubongoya 1999), a Rutooro word list (Kaji 2007), a few papers on tone that take a primarily diachronic perspective (Kaji 2010, 2018), and papers on vowel elision and harmony (Bickmore 2019a, 2019b). Kaji (2009) discusses nominal modification, which is addressed in Section 3. Otherwise, to our knowledge, this paper represents an analysis of entirely novel Rutooro data.

[3] Abbreviations used in glosses are as follows: AUG — augment vowel, APPL — applicative, FV — final vowel, INF — infinitive, LOC — locative, OM — object marker, PL — plural, PST — past, PROG — progressive, REL — relative prefix, SG — singular, SM — subject marker, TAM — tense aspect mood. Cardinal numbers are used to mark noun class.

(3) a. Nii-n-j-a kw-eend-a ba-taandik-e ku-som'
PROG-1SG.SM-GO-FV C15-want-FV C2.SM-start-FV C15-read
ee-bi-tábu.
AUG-C8-book
'I am going to want that they start to read the books.'

b. Ííjo a-bá-ána b-óóna ba-ka-sóm-a
yesterday AUG-C2-child C2-all C2.SM-PST-read-FV
múú-nju.
C18.LOC-house
'Yesterday all the children READ in the house.' (far past)

In accounting for the distribution of high tones in Rutooro, we first establish that H tones link to the penultimate syllable of each phonological phrase (φ-phrase), as illustrated in (4).

(4) High tone insertion

$$\emptyset \rightarrow \underset{\sigma}{\text{H}} \quad \sigma)\varphi$$

With the noted exception of the phrases in (2), all of the data presented in this paper come from one native speaker of Rutooro in her late 20s, who travels regularly between Albany, New York and Fort Portal, Uganda. In addition to Rutooro, our language consultant is highly proficient in Luganda and English. The data that inform our analysis were elicited and recorded in Albany, New York, over a period of four years.

Data collection consisted of two steps. First, we elicited a set of sentences, which we transcribed by hand, marking H tones by ear. Next, we recorded the consultant translating the same sentences, or in cases where we were interested in different word order possibilities, we asked her to read sentences which we had typed without marking H tones. While we periodically compared our transcriptions to spectrographs generated in Praat (Boersma and Weenink 2019), H-tones in Rutooro are unmistakable; there is no need to rely on quantitative measures to detect their presence. In later elicitation sessions, we asked the consultant to produce a variety of sentences at different speech rates. We have found no evidence of variation in the distribution of H-tones that is not the direct result of a grammatical consideration.

In the sections that follow we construct prosodically-informed, syntactic analyses matrix clauses, DPs, and relative clauses in Rutooro. As we will show, the distribution of H tones in the language serves not only as a diagnostic tool for the right-edges of φ-phrases, but also as a diagnostic for syntactic constituency. Before concluding, we discuss apparent exceptions in the phonological phrasing of reduced relative clauses.

1.1 Language background

Rutooro, which is also known as Tooro, is a Bantu language spoken by approximately 850,000 speakers in western Uganda (Simons and Fennig 2017). Other closely related languages include Gwere, Haya, Kerewe, Luganda, Nyoora, Nyambo, Ruciga, Runyankore, Soga, all of which are all tonal.

As is generally true of Bantu languages, Rutooro is a highly agglutinative, polysynthetic language. SVOX is perhaps the most common word order, although arguments are often dropped and focused constituents can appear in immediately postverbal position. Most tense/aspect markers are prefixal, although the language also has a series of low aspect markers, as in (8) below.

19 of Bantu's numbered noun classes are attested in Rutooro. As is common for Bantu languages, there are separate classes for singular and plural nouns, and certain plural classes correspond to more than one singular class. Compare the singular and plural forms in (5) and (6):

(5) a. e-**rí**-íso
AUG-C5-eye
'eye'
b. a-**má**-íso
AUG-C6-eye
'eyes'

(6) a. o-**kú**-tu
AUG-C15-ear
'ear'
b. a-**má**-tu
AUG-C6-ear
'ears'

Rutooro also has rich nominal concord: note how in (7), all of the nominal modifiers are marked with the head noun's class prefix. In (8), the subject's noun class is also represented on the predicate.

(7) e-**bi**-sumuruzo **bi**-tááno **by**-áánge **by**óóna **bí**-nu
AUG-C8-key C8-five C8-my C8-all C8-this
'all five of these keys of mine'

(8) A-**bá**-ána **ba**-chuumb-ir-e e-ki-húro.
AUG-C2-child C2.SM-cook-PRFV-FV AUG-C7-meal
'The children cooked the meal. (near past)'

The final vowel (FV) is a suffixal mood marker that distinguishes between subjunctive *-e* and indicative *-a*.[4] Example (9), shows an indicative final vowel on *nitwiija* 'come' and a subjunctive final vowel on *ayaambe* 'help'.

[4] An exception to the generalization that a final *-e* indicates subjunctive mood occurs when it follows *-ir* the perfective suffix, shown in (8).

(9) Ni-tw-iij-**a** kw-eend**'** oo-mu-límí a-yaamb-**e**
PROG-1PL.SM-come-FV C15-want AUG-C2-farmer C1-help-FV
Kajúúmba.
Kajumba.
'We are going to want the farmer to help Kajumba.'

The final vowel deletes when the following word begins with a vowel due to a general process of hiatus resolution. When a non-high non-round vowel (V_1) immediately precedes another vowel (V_2), V_1 deletes and V_2 undergoes compensatory lengthening (Bickmore 2019b). Example (9) also shows the deletion of a final vowel in /kweenda/ → *kweend'* 'want' and subsequent compensatory lengthening on the following vowel in /omulimi/ → *oomulími* 'farmer'.

Note that the final vowel deletes in example (9) and others like it, because the following word begins with an augment vowel. The augment, also referred to as the pre-prefix or initial vowel in the Bantu literature, is attributed to Proto-Bantu (Meeussen 1967; De Blois 1970), but its status in modern Bantu languages varies considerably. (See Halpert to appear for a comprehensive look at the Bantu augment.) In those languages that have maintained the augment, differences arise according to its shape (CV-, V-, floating H tone) and its syntactic and semantic distribution. The Bantu augment is often linked to definiteness, specificity, and/or referentiality, but depending on the language, its distribution can be at least partially determined by semantic, pragmatic and stylistic considerations as well. In Rutooro, the augment is realized as a vowel whose shape is predictable from the noun class, glossed (AUG) throughout.

2 Distribution of H in simple matrix clauses

High tones in Rutooro mark the right edge of a prosodic unit that must be greater than the prosodic word, because not all words bear a High tone when they are realized in a phrasal context, as was shown in (3-a) above. At the same time, the prosodic unit at question must be smaller than the intonational phrase, as every word in a clause *can* bear a H tone, given the right context, as was shown in (3-b). The prosodic domain for H tone assignment in Rutooro overlaps substantially with what has been called a phonological phrase (φ-phrase) in accounting for tone distribution in related languages, including Copperbelt Bemba (Kula & Bickmore2015), Cilungu (Bickmore2007), Chimwiini (Kisseberth & Abasheikh 2011) and Xitsonga (Selkirk 2011). For these reasons, we propose that H tones are assigned to the penultimate syllable of the φ-phrase.

In this section, we discuss the location of High tones in simple matrix clauses. In each case we assume that the right edge of words containing a penultimate H sits at the right edge of a phonological phrase. We then provide an explicit syntactic structure for these clauses, demonstrating that there is a reliable correspondence between XPs and φ-phrases in Rutooro.

2.1 Data

In matrix clauses with intransitive verbs, such as those in (10), the subject and the verb each bear a penultimate H tone, which is unmarked in Rutooro orthography, but is indicated with an acute accent in our examples. Each H tone marks the right edge of a phonological phrase (φ-phrase), which is indicated here and in the remainder of the paper with a right parenthesis.

(10) a. A-ba-límí)φ ba-ka-kór-a)φ
AUG-C2-farmer C2.SM-PST-work-FV
'The farmers worked.'
b. Kajúúmba)φ a-irúk-a)φ
Kajumba C1.SM-run-FV
'Kajumba runs.'

The same H-tone distribution obtains in transitive clauses that lack lexical objects: the subject and the verb are each marked H, as in (11)

(11) a. Tu-ka-bi-gúr-a)φ
1PL.SM-PST-C8.OM-buy-FV
'We bought them.'
b. Kajúúmba)φ a-raa-bi-gúr-a)φ
Kajumba C1.SM-FUT-C8.OM-buy-FV
'Kajumba will buy them.'

Turning to transitive sentences with overt objects, as in (12), the verb surfaces as all-Low, but the object is marked with a High tone.[5]

(12) a. Tu-ka-gur' ee-bi-tábu)φ
1PL.SM-PST-buy AUG-C8-book
'We bought the books.'
b. Kajúúmba)φ a-raa-gur' ee-n-káíto)φ
Kajumba C1.SM-FUT-buy AUG-C10-shoe
'Kajumba will buy the shoes.'

The tonal patterns in (10)—(12) indicate that verbs and objects are part of the same φ-phrase, but subjects are separated from verbs by a φ-phrase boundary.

In ditransitive clauses like those in (13) both the indirect and direct objects are found at the end of a phonological phrase—again, as indicated by the High tone on the penult of each argument that follows the verb.

(13) a. A-ba-límí)φ ba-ka-h' oo-mw-áán')φ ee-by-ookúlya)φ
AUG-C2-farmer C2.SM-PST-give AUG-C1-child AUG-C8-food
'The farmers gave the child the food.'

[5] In broad focus, the verb and direct object phrase together in all tense-aspect-moods and in negative contexts, in contrast to what has been found for Haya and Luganda, e.g. see Hyman and Katamba 2010, where phonological phrasing is affected by these considerations.

b. A-ba-somésa)φ ba-k-oolek' aa-bá-án')φ ee-mí-ti)φ
AUG-C2-teacher C2.SM-PST-show AUG-C2-child AUG-C4-tree
'The teachers showed the children the trees.'

The same pattern is found in the applicative construction (14), where the applicative object and the direct object each bear a High tone on their penult.

(14) A-ba-záíre)φ ba-ka-leet-er' oo-mw-áán')φ ee-bi-yúni)φ
AUG-C2-parent C2.SM-PST-bring-APPL AUG-C1-child AUG-C8-yam
'The parents brought the yams for the child.'

Clauses in which the verb is followed by an adjunct, e.g. a locative phrase or an adverb, pattern in the same way as clauses in which the verb is followed by an argument: the verb surfaces as all-Low and each constituent that follows is marked with a High tone on its penultimate syllable, as shown in (15):

(15) a. Ba-ka-haandik-a mpóra)φ
C2.SM-PST-write-FV slowly
'They wrote slowly.'
b. A-ba-záíre)φ ba-ka-vug-a matóka)φ
AUG-C2-parent C2.SM-PST-drive-FV car
ha-Sabííti)φ
C16.LOC-Sunday
'The parents drove the car on Sunday.'

An exception to this generalization occurs in cases of predicate focus. As shown in (16-b) (see also (3-b)), the verb bears a H tone despite being immediately followed by a locative phrase. In this case, the predicate is focused. We leave an account of the syntax and H-tone distribution of focus to future work, but we note that minimal pairs like the one in (16) do not arise when the verb is followed by an argument.

(16) a. Ba-ka-byaam-a múú-nju)φ
C2.SM-PST-sleep C18-house
'They slept in the house.'
b. Ba-ka-byáám-a)φ múú-nju)φ
C2.SM-PST-sleep C18-house
'They SLEPT in the house.'

In sum, in broad focus contexts, a High tone marks the penultimate syllable of each post-verbal XP, but not the verb that precedes them.

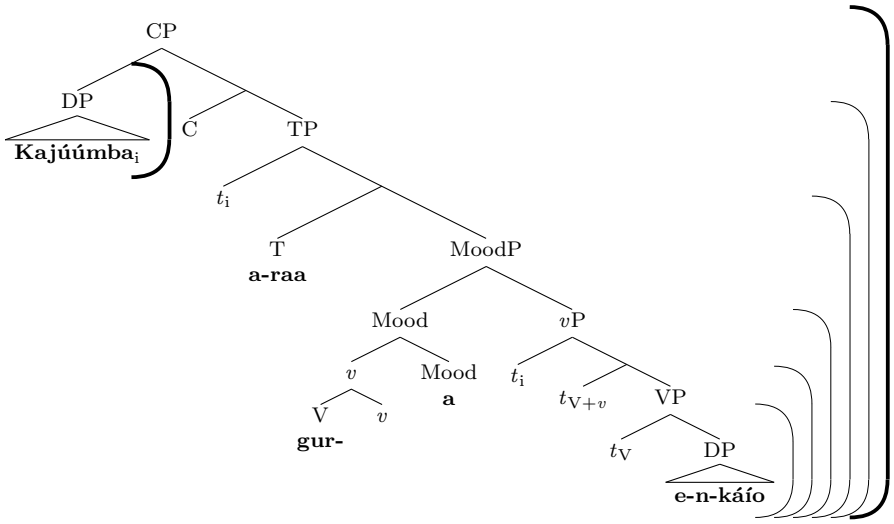
2.2 Analysis: matrix clauses

Taken together, the distribution of H tones in the examples from 1-, 2-, and 3-place predicates, as well as clauses with adverbial and locative modifiers,

indicate substantial overlap between prosodic and syntactic structure in Rutooro. In all of the examples we have seen so far, nominal phrases, locative phrases, and adverbial phrases bear a penult H tone. In contrast, the verb is not marked with a H tone unless it lies at the right edge of the phrase it heads, as in intransitive clauses (10) or when the object is dropped (11).

For the transitive clause represented in (17), the right edge of every XP is marked with a parenthesis showing where its corresponding φ-phrase boundary is located. Here and elsewhere in this paper, the number of H tones found in a phrase corresponds to the number of bold parentheses. Prosodic boundaries that align with multiple syntactic edges are cued with a single boundary, i.e. boundaries do not have a noticeably higher pitch or greater amplitude when they corresponds to multiple XPs as compared to a single XP.

(17) H tone assignment in transitive clause, as in (12-b)



We find that the structure of Rutooro's clausal spine, as illustrated in (17), follows a standard hierarchy of projections from a cross-linguistic perspective. The formal syntactic literature on Bantu languages often includes a projection that hosts the final vowel and serves as the final landing site of the verb (see e.g. Cheng & Downing 2012, Halpert 2015, Julien 2002, Zentz 2006);[6] we have chosen to represent this projection as MoodP, following Julien (2002).

In (17), the verb arrives in MoodP via cylic head movement. The internal structure of the verb stem in Rutooro is similar to other Bantu languages, where the order of morphemes, which is consistent with the Mirror Principle (Baker 1985), drives the head movement approach.[7] Head movement is

[6] Recall from Section 1 that the final vowel in Rutooro distinguishes between the subjunctive and the indicative. In this specific example, it is ultimately realized as compensatory lengthening on the augment.

[7] See Zeller 2013 for additional syntactic arguments in favor of a head movement approach to verb stem formation in Bantu languages.

adopted by most authors working on Bantu languages in a generative framework, but remnant-movement accounts also exist, e.g. Buel (2005) and Muriuni (2009). It is worth noting that were we to account for stem formation in Rutooro via remnant-movement, the mapping algorithm between XPs and φ-phrases would become considerably more opaque. Each time phrasal movement applied verb-internally, it would introduce an XP boundary that does not actually correspond to φ-phrase boundary, at least not as indicated by the presence of a H tone.

Turning to the movement path of the subject, we adopt the VP-internal Subject Hypothesis (Fukui and Speas 1986, Kitagawa 1986, Koopman and Sportiche 1991) and show the external argument generated in the specifier of vP. From there the subject moves into a local configuration with T for the purpose of agreement, which results in the subject's class marker being expressed on the verb.[8] This is now a widely accepted analysis in the Bantu literature, but see Carstens 2001 for one specific proposal. Then, for the majority of the clause-types discussed in this paper, the external argument moves to the topic position in matrix clauses, shown in (17) to be the specifier of CP.[9] This analysis also finds broads support in the Bantu literature (see e.g. Bresnan & Mchombo 1987, Cheng & Downing 2009, Downing & Hyman 2015, Henderson 2006, Henderson 2007, Letsholo 2002, Zentz 2016).

To conclude this section, we have made the case for a reliable association between maximal projections and φ-phrases in Rutooro's matrix clauses. Subsequently, the location of the H tone can be taken to indicate not only the right edges of phonological phrases, but also the right edges of syntactic phrases. The correspondence between φ-phrases and XPs in the types of constructions introduced in this section is summarized in (18) below (see (17) above for transitive clauses with two lexical arguments); square brackets indicate XP boundaries, and large bold parenthesis indicate the edges of φ-phrases that are overtly marked in Rutooro.

(18) a. Intrans with DP subject; trans with DP subject and *pro* object:

$$\Big[_{\text{CP}}\ \big[_{\text{DP}}\mathbf{S}\big]\Big)\varphi\ \big[_{\text{TP}}\big[_{\text{MoodP}}\mathbf{Verb}\ \big[_{v\text{P}}\big[_{\text{VP}}\ (\textit{pro})\big]\big]\big]\big]\Big)\varphi$$

b. Trans with *pro* subject:

$$\Big[_{\text{CP}}\ \textit{pro}\ \big[_{\text{TP}}\big[_{\text{MoodP}}\mathbf{Verb}\ \big[_{v\text{P}}\big[_{\text{VP}}\ \big[_{\text{DP}}\mathbf{DO}\big]\big]\big]\big]\big]\Big)\varphi$$

[8] We note that there is also wide agreement on the existence of projections associated with the subject located between vP and TP (see works cited above as well as Carstens 2001 and Zeller 2013). We acknowledge that these subject positions likely exist for Rutooro, but as we have not fully explored this possibility, we do not represent them in (17).

[9] The reduced relatives clauses discussed in Section 4.2 are one exception; however, other types of clauses for which the subject is not a topic might also exist, including, but perhaps not limited to, cases where the clause itself is smaller than CP. Be that as it may, as long as the subject moves above the verb, we predict that it will be delimited from the verb by a H tone associated with its right edge.

c. Ditransitive; applicative:

$[_{\text{CP}}\ pro\ [_{\text{TP}}[_{\text{MoodP}}\mathbf{Verb}\ [_{v\text{P}}[_{\text{ApplP}}\ [_{\text{DP}}\mathbf{IO}]\Big)\varphi\ [_{\text{VP}}\ [_{\text{DP}}\mathbf{DO}]]]]]]\Big)\varphi$

d. Adjunct following verb:

$[_{\text{CP}}\ pro\ [_{\text{TP}}[_{\text{MoodP}}\mathbf{Verb}\ [_{v\text{P}}[_{\text{VP}}\ [_{\text{XP}}\mathbf{Adjunct}]]]]]\Big)\varphi$

e. Adjunct in final position:

$[_{\text{CP}}\ pro\ [_{\text{TP}}[_{\text{MoodP}}\mathbf{Verb}\ [_{v\text{P}}[_{\text{VP}}\ [_{\text{DP}}\mathbf{DO}]]\Big)\varphi\ [_{\text{XP}}\mathbf{Adjunct}]]]]\Big)\varphi$

In the next section, we look at the distribution of High tones in noun phrases of varying complexity, where we find a considerable amount of parallelism with matrix clauses.

3 The nominal domain

Based on the distribution of H tones, as well as the order of constituents inside the nominal domain, Rutooro's nominal modifiers can be classified as belonging to one of two types. In the first, which we call TYPE 1 modifiers, the head noun is all-L and the modifying phrase is obligatorily postnominal. In the second, TYPE 2 modifiers, the head noun is marked with a H tone and the modifier can surface either before or after the head noun. We use the generalization from Section 2—that High tones serve as a diagnostic for φ-phrase boundaries, which in turn correspond to the edges of syntactic XPs—to develop a syntactic account that explains the fact that nominal heads belong to the same φ-phases as their modifiers in some cases, but not in others as well as the word order patterns. We begin by introducing the relevant data in Sections 3.1 and 3.2 below.

3.1 H-less nouns

Possessive constructions are head-initial in Rutooro, and the possessor, but not the possessum, bears a High tone. This generalization is illustrated in with a possessive pronoun and with a full nominal possessor.

(19) a. e-n-kaito z-áánge)φ
AUG-C10-shoes C10-1SG
'my shoes'

b. e-ki-nyonyi ky-a Kajúúmba)φ
AUG-C7-bird C7-LNK Kajumba
'Kajumba's bird'

The same pattern occurs with numerals and the quantifiers 'another', 'many', and 'how many', as in (20):

(20) a. e-bi-huguhugu bi-sátu)φ
AUG-C8-bat C8-three
'three bats'
b. e-bi-cuumbiro bí-íngi)φ
AUG-C8-kitchen C8-many
'many kitchens'
c. e-ri-iba líí-ndi)φ
AUG-C5-dove C5-another
'another dove'
d. e-bi-bira bi-ingáha)φ
AUG-C8-forest C8-how.many
'how many forests'

The distribution of H tones in nominal phrases modified by adjectives follows the same principle: the adjective bears a H tone and follows the noun (21).

(21) a. e-ki-tabu ki-rúúngi)φ
AUG-C7-book C7-good
'the good book'
b. o-muu-ntu mú-bi)φ
AUG-C1-person C1-bad
'the bad person'

The same adjectives introduced in (21) trigger a H tone on the noun they modify when they are marked with what appears to be an augment vowel, as shown in (22). Kaji (2009) discusses this type of structure in the context of the general association between the augment vowel and definiteness across the family (also mentioned in Section 1.1), and concludes that there is an association between definiteness and the distribution of Rutooro's H tone. In this case, our data align with Kaji's; however, our analysis differs. We treat these structures as 'full' relative clauses (see Section 4), supported in part by the fact that our speaker offers relative clause translations of these and related examples.[10] In line with our analysis, what Kaji (2009) glosses as the augment, we gloss as a relativizing prefix in (22).[11]

[10] For both Rutooro and closely related Luganda the presence of an augment on a nominal modifier (adjectival or clausal) co-occurs with a prosodic boundary on the noun. Hyman and Katamba (1990, 1993) analyze these structures as involving "exbraciation", which entails a syntactic distancing of the modifier from the nominal head when the modifier is introduced by an augment. One important difference between Luganda and Rutooro is that only in the case of Luganda does the presence of an augment on a direct object also necessarily co-occur with a boundary on the verb (Hyman and Katamba 1993).

[11] Kaji (2009) also reports that the presence or absence of a H tone on a nominal head depends in part on the size of the modifier: the head noun is all low when it combines with a modifier that has a monosyllabic root e.g. (20-c) and (22-b), but bears a H tone when it combines with a larger modifier, e.g. (20-d) and (22-a). As should be clear based on our transcription, our speaker does not have this contrast.

(22) a. e-ki-tábu)φ e-ki-rúúngi)φ
AUG-C7-book REL-C7-good
'the good book / the book that is good'
b. o-múú-ntu)φ o-mú-bi)φ
AUG-C1-person REL-C1-bad
'the bad person / the person who is bad'

To summarize the emerging generalization, the head noun is all-L when it combines with a TYPE 1 modifier – possessors, numerals, certain quantifiers, and adjectives. TYPE 1 modifiers are postverbal and bear a H tone. Because we take H tones to mark the right edges of φ-phrases, we must conclude that the noun and the following TYPE 1 modifier are realized in a single φ-phrase.

When multiple TYPE 1 modifiers follow the verb, each has a prominence:

(23) a. a-ma-iba a-sátu)φ gáá-ndi)φ
AUG-C6-dove C6-three C6-another
'another three doves'
b. a-ma-iba gáá-ndi)φ a-sátu)φ
AUG-C6-dove C6-another C6-three
'another three doves'
c. e-bi-cuumbiro by-áánge)φ bí-íngi)φ
AUG-C8-kitchen C8-1SG C8-many
'many kitchens of mine'
d. *e-bi-cuumbiro bí-íngi)φ by-áánge)φ
AUG-C8-kitchen C8-many C8-1SG
Intended: many kitchens of mine

The order of TYPE 1 adnominals is quite free, as illustrated by (23-a) and (23-b). One firm restriction, however, is that possessives must always immediately follow the noun, as indicated by the contrast between (23-c) and (23-d).

3.2 H-marked nouns

The second pattern found in nominal phrases involves a head noun that is marked H. This occurs when the noun is modified by a TYPE 2 modifier in either prenominal or postnominal position. As shown in (24), the universal quantifier can precede or follow the head noun. In either position, both the quantifier and the noun it modifies are marked with a H tone.

(24) a. e-bi-bíra)φ by-óóna)φ
AUG-C8-forest C8-all
'all forests'
b. by-óón)φ ee-bi-bíra)φ
C8-all AUG-C8-forest
'all forests'

The same pattern occurs with demonstratives, as shown in (26). Both the noun and the TYPE 2 modifier comprise a unique φ-phrase.

(25) a. e-ki-sumurúzo)φ kí-nu)φ
AUG-C7-key C7-this
'this key'
b. kí-nu)φ e-ki-sumurúzo)φ
C7-this AUG-C7-key
'this key'

(26) a. e-ki-sumurúzo)φ kí-nu)φ
AUG-C7-key C7-this
'this key'
b. kí-nu)φ e-ki-sumurúzo)φ
C7-this AUG-C7-key
'this key'

We have shown that TYPE 1 and TYPE 2 modifiers differ on two dimensions: phonological phrasing and constituent order. They can be distinguished on the basis of a third difference as well: TYPE 1 modifiers are permitted in existential constructions, while TYPE 2 modifiers are not. This contrast is shown in (27).

(27) a. Ha-roho e-bi-tabu bi-sátu ha-mééza.
C16.LOC-EXIST AUG-C8-book C8-three C16-table
'There are three books on the table.'
b. Ha-roho e-bi-tabu bí-íngi ha-mééza.
C16.LOC-EXIST AUG-C8-book C8-many C16-table
'There are many books on the table.'
c. Ha-roho (*by-oona) e-bi-tabu (*by-oona)
C16.LOC-EXIST C8-all AUG-C8-book C8-all
ha-meeza.
C16-table
Intended: There are all the books on the table.
d. Ha-roho (*ki-nu) e-ki-tabu (*ki-nu) ha-meeza.
C16.LOC-EXIST C7-this AUG-C7-book C7-this C16-table
Intended: There is this book on the table.

Existentials require indefinite associates (Milsark 1974) and nominals that can occur in existential sentences are traditionally categorized as 'weak' (See also Milsark 1977; Keenan 1987, 2003; Freeze 1992). In contrast, DPs that are excluded from co-occuring from existentials are categorized as 'strong.' Restrictions of this kind are referred to as definiteness effects (DE), which for Rutooro arise when TYPE 2 nominals combine with the existential *haroho*, as shown in (27-c) and (27-d) above. So, another way to categorize TYPE 1 and 2 nominals in Rutooro would be to call them 'weak' and 'strong', respectively.

We leave to future work to determine whether the definiteness effect in Rutooro existentials is fundamentally semantic, as is the prevailing approach

to the phenomenon, or if instead, the differing syntactic behavior of Rutooro's weak and strong nominals might indicate that the definiteness effect is a morphosyntactic phenomenon, as proposed by Preminger (2014:221-227).

3.3 Analysis: nominal domain

At this point we have seen two patterns with respect to the distribution of High tones in noun phrases. In the first, the head noun is all-L when it is followed by a TYPE 1 modifier. In other words, the first TYPE 1 modifier is phrased with the head noun. Every subsequent one bears its own H tone, i.e. it is realized at the right edge of a φ-phrase.

In the second pattern, the head noun bears a H tone when it is followed by a TYPE 2 modifier. TYPE 2 adnominals can precede or follow the head noun, but either way, they phrase separately from it. Multiple TYPE 2 modifiers can precede or follow the head noun) and they can also flank the head noun. In all cases, TYPE 2 modifiers bear a H tone. These possibilities are schematized in (28) and (29).

(28) TYPE 1 adnominals
  a. **Noun** TYPE 1)φ
  b. **Noun** TYPE 1)φ TYPE 1)φ

(29) TYPE 2 adnominals
  a. TYPE 2)φ TYPE 2)φ **Noun**)φ
  b. **Noun**)φ TYPE 2)φ TYPE 2)φ
  c. TYPE 2)φ **Noun**)φ TYPE 2)φ

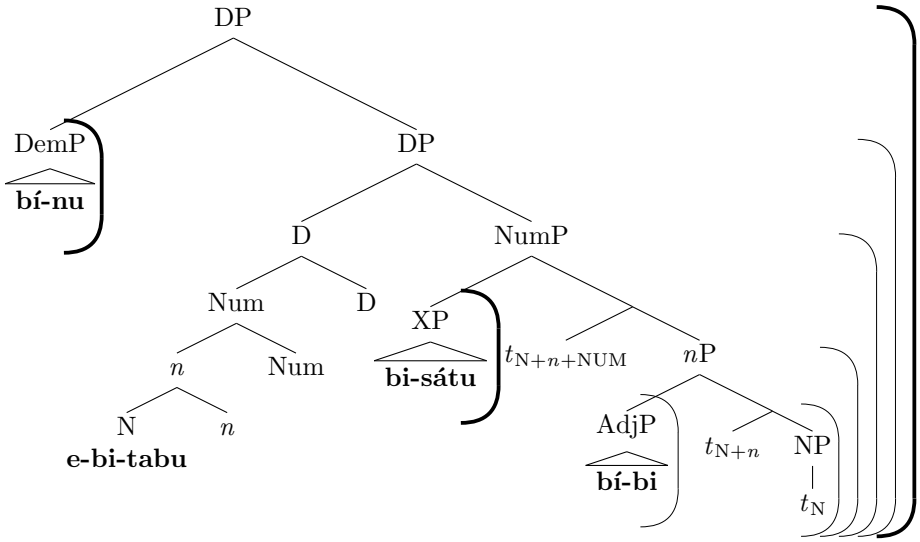
We apply the conclusion drawn in Section 2 to the distribution of H tones in nominal phrases. High tones serve as a diagnostic for φ-phrase boundaries, which in turn correspond to the edges of syntactic XPs. Thus, H tones reveal the underlying syntactic structure.

The tree in (30) represents the correspondence between φ-phrase boundaries and XPs for the example *bínu ebitabu bisátu bíbi* 'these three bad books,' elements of which were found in preceding examples. This example includes both TYPE 1 and TYPE 2 modifiers.

We analyze TYPE 1 modifiers as generated below the position where the head noun is pronounced. The result is that there is no right-edge XP boundary between the head noun and the first TYPE 1 modifier that follows it, i.e. the numeral *bisátu* 'three' in (30). When the head noun is followed by a TYPE 1 modifier it is realized without a High boundary tone.

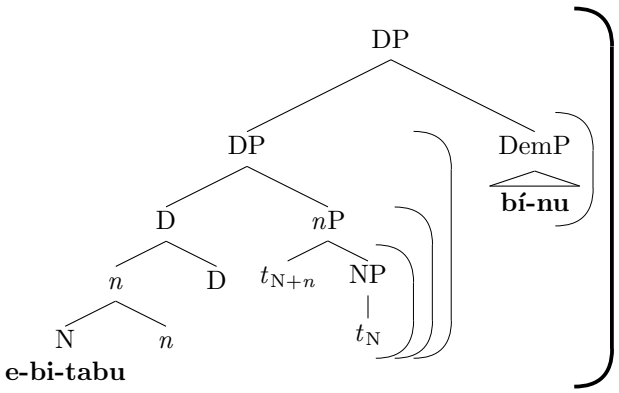
In contrast, TYPE 2 modifiers are adjoined above the position where the head noun is pronounced. Subsequently, an XP boundary follows the TYPE 2 modifier and precedes the head noun, as is the case for the demonstrative *bínu* 'that' in (30).

(30) High tone assignment in DPs



The adjunction analysis also captures the fact that Type 2 adnominals surface on either side of the head noun; the tree in (31) illustrates a right-adjoined DemP for the example *ebitabu bínu* 'these books'.

(31) Right-adjoined DemP



The structures in (30) and (31) are compatible with both the clausal structure given in (17) and—to a large extent—Carstens's (2000, 2008) account of the Bantu DP. The head noun is shown undergoing a series of head movements through a number of null heads into the determiner phrase. Type 1 modifiers are generated between the base and surface position of the noun. Type 2 modifiers, e.g. demonstrative phrases, are adjoined above the complex noun head to the left or to the right. When the demonstrative is left-adjoined, it is realized in a phrase-initial position; when it is right-adjoined, it is realized in a phrase-final position.

Until now, we have only seen noun phrases with either TYPE 1 or TYPE 2 modifiers. Of course, it is possible to combine the two, and when that happens, the distribution of H tones as well as the possible word orders falls out from the analysis presented here.

As schematized in (32), when TYPE 1 or TYPE 2 adnominals are combined, we find that there is always be a phonological phrase boundary between adjacent adnominals. TYPE 1 adnominals must follow the head noun, and TYPE 2 adnominals occur on the periphery of the noun phrase. TYPE 2 adnominals cannot intervene between the head noun and a TYPE 1 adnominal, as in (32-c) or between two TYPE 1 adnominals, as in (32-d).

(32) TYPE 1 and TYPE 2 combined

a. TYPE 2)φ **Noun** TYPE 1)φ TYPE 1)φ
b. **Noun** TYPE 1)φ TYPE 1)φ TYPE 2)φ
c. ***Noun**)φ TYPE 2)φ TYPE 1)φ TYPE 1)φ
d. ***Noun** TYPE 1)φ TYPE 2)φ TYPE 1)φ

In example (33), the TYPE 2 determiner *bínu* 'that' is shown in three different positions. Note that if it surfaces between *bisátu* 'three' and *bishááka* 'new' the sentence is still grammatical but its meaning has changed to 'these three books are new.'

(33) a. (bí-nu) e-bi-tabu bi-sátu (#bí-nu) bi-shááka (bí-nu)
C8-this AUG-C8-book C8-three C8-this C8-new C8-this
'these three new books'

We bring this section to a close with an observation about parallelism in the nominal and clausal domains: TYPE 1 modifiers behave like clausal objects and TYPE 2 modifiers behave like clausal subjects. In both cases, we can capture the prosodic phrasing via low and high attachment with respect to the post-movement landing site of the relevant head.

The distribution of H in TYPE 1 noun phrases, where the head noun does not bear a H tone, resembles the distribution of H in verb phrases with internal arguments and low adjuncts. Like internal arguments and low adjuncts, TYPE 1 modifiers are postnominal, and the first one phrases with the noun. Therefore, TYPE 1 modifiers must be located inside of the XP in which the nominal head is pronounced, so that the head noun is not pronounced at the right edge of an XP.

The distribution of H tones in nominal phrases with multiple TYPE 1 adnominals is also reminiscent of verb phrases with multiple postverbal arguments and low adjuncts, as discussed in Section 2: the head of the phrase does not bear a H tone, but every subconstituent that follows the head does. In contrast, TYPE 2 noun phrases, pattern like clausal subjects. When subjects appear in their canonical preverbal position, they surface with a H tone. Subjects can also be post-posed, and when they surface in a post-verbal position,

they still do not phrase with the verb. An example of a post-posed subject is shown in (34).[12]

(34) A-ka-yáámb-a)φ Kajúúmba)φ
C1-PST-help-FV Kajumba.
'Kajumba helped.'

Similarly, TYPE 2 adnominals can surface before or after the noun, as was shown in Section 3.2. In either position, TYPE 2 adnominals do not phrase with the head noun. As was argued for sentential subjects, TYPE 2 adnominals must be located above the position where the nominal head is pronounced to ensure that the head noun is pronounced at the right edge of an XP, whether or not it surfaces in a pre- or postnominal position.

The parallels between the distribution of H tones and the syntactic configuration is schematized in (35):

(35) Summary of clausal-nominal connection

a.	Low			**verb**		OBJECT	)φ
				noun		TYPE 1	)φ
b.	High	{SUBJECT}	)φ	**verb**	)φ	{SUBJECT}	)φ
		{TYPE 2}	)φ	**noun**	)φ	{TYPE 2}	)φ

The syntactic connection between the clausal and nominal domains can be summarized as follows. Objects and TYPE 1 adnominals attach lower than the final landing site of the relevant head and subjects and TYPE 2 adnominals attach higher than the final landing site of the relevant head. The next section applies the connection between H tone distribution and relative attachment site to the domain of relative clauses.

4 Relative Clauses

Rutooro exhibits two types of relative clauses, which we refer to as 'full' and 'reduced' RCs. While Zulu famously has two distinct RC constructions (e.g. Cheng and Downing 2007, Cheng and Downing 2010, Henderson 2007, Zeller 2004), Rutooro is somewhat unique among its closest relatives for utilizing two different relativization strategies. Whereas the closely related languages Rutooro, Luganda, Rukiga, Haya and Runyambo (e.g. Allen 2004; Duranti 1997; Henderson 2007; Hyman and Katamba 2004; Pak 2007; Zeller 2004), exhibit full RCs that agree with the relativized head, even in non-subject RCs, only Rutooro has a second relativization strategy that lacks head agreement, i.e. the reduced RC. Based on the morphosyntactic differences between full and reduced relatives, we propose that full RCs have more syntactic structure associated with them than their corresponding reduced forms.

[12] Without the High on the verb, the phrase would mean 'He/she helped Kajumba'.

Restrictive and nonrestrictive readings are possible with full relative clauses, whereas only the restrictive reading is available to reduced RCs. Perhaps the more interesting difference between full and reduced RCs, however, pertains to the distribution of H tones. The head bears a H tone when it is modified by a full RC, but not when it is modified by a reduced RC. Example (36) compares a reduced subject RC, a full subject RC, and a matrix clause in the habitual aspect. Note that *abaantu* 'people' is not marked with a H tone in the reduced subject RC (36-a), which is the only difference between the reduced RC and the matrix clause (36-c). Meanwhile *abaantu* 'people' does bear a high tone in the full subject RC (36-b), leaving the relativizer *a-* on the verb *abasoma* 'read' to distinguish between the full subject RC and the matrix clause. One additional difference between full and reduced RCs is that only the former can be used as a headless relative.

(36) a. a-baa-ntu [$_{RC}$ ba-sóm-a])φ
AUG-C2-people C2.SM-read-FV
'people who read' (habitual)
b. a-báá-ntu)φ [$_{RC}$ a-ba-sóm-a])φ
AUG-C2-people REL-C2.SM-read-FV
'the people who read' (habitual)
c. A-báá-ntu)φ ba-sóm-a.)φ
AUG-C2-people C2.SM-read-FV
'People read.' (habitual)

As in previous sections, we appeal to relative attachment height to explain whether or not the phrase head lies at the right edge of a φ-phrase boundary.

4.1 Full relative clauses

Rutooro's full relative clauses begin with a relativizing prefix. In most cases, the relativizer has the same form as the augment morpheme found in nominals (see discussion in Section 1.1); however, unlike the augment, there are cases in which the relativizer does not harmonize with the following vowel. One such example is (37), in which the relativizer surfaces as *o-* [ow-] before the Class 1 subject marker *a-*.[13] The augment would be expected to take the (phonologically harmonizing) form *a-* before a class marker containing /a/.

(37) úúw' [$_{RC}$ oow-a-raa-rór-a]
C1.INDEP REL-C1.SM-FUT-see-FV
'HE/SHE who will see'

Below we compare a matrix clause (38-a) to a full subject relative (38-b), a full direct object relative (38-c), and a full indirect object relative (38-d).

[13] In this example, the relativizer undergoes compensatory lengthening and [w] is inserted to prevent hiatus (see 1.1 for more information on both of these phonological processes).

(38) a. A-báá-ntu)φ ba-som' ee-bi-tábu)φ
AUG-C2-person C2.SM-read AUG-C8-book
'People read books.' (habitual)

b. a-báá-ntu)φ [$_{RC}$ **a**-ba-som' ee-bi-tábu])φ
AUG-C2-person REL-C2-read-FV AUG-C8-book
'the people who read books' (habitual)

c. e-bi-tábu)φ [$_{RC}$ a-báá-ntu)φ **e-bi**-ba-sóm-a])φ
AUG-C8-book AUG-C2-person REL-C8-C2.SM-read-FV
'the books that the people read' (habitual)

d. a-bá-ána)φ [$_{RC}$ a-báá-ntu **a-ba**-ba-som-er'
AUG-C2-child AUG-C2-person REL-C2-C2.SM-read-APPL
ee-bi-tábu])φ
AUG-C8-book
'the children who the people read books to' (habitual)

The word order in full relative clauses is also the same as the word order in simple matrix clauses, i.e. there is no subject-verb inversion as found in the relative clauses of other Bantu languages. In each of the examples in (38), the verb bears the subject's class marker (C2), which we analyze as subject agreement that takes place at T.

A second class marker—one which agrees with the relativized head—is obligatorily represented on the predicate of the relative clause when something other than the subject is relativized. In (38-c), the direct object (C8) is relativized, and in (38-d), the indirect object (C2) is relativized. In both cases, the class marker of the relativized head appears before the subject marker.

We also note that there can be morphological differences between the verbs in main clauses and relative clauses. In some cases a different prefix or suffix is used. For instance the far past is marked by the prefix *ka-* and final vowel *-a* in affirmative main clauses, while it is marked by the prefix *a-* and final vowel *-ire* in relative clauses. While most TAM prefixes in main clause verbs follow the subject marker, one, the progressive *ni-* seen in (3a) precedes the subject marker. In relative forms, however, all TAM prefixes must follow the subject marker (the progressive is expressed by *ku-*). Similarly, negation is often expressed as a prefix preceding the subject marker in main clauses, but following it in relative clauses. The difference is illustrated in (39).

(39) a. A-báá-ntu)φ **ti**-ba-ku-sóm-a)φ
AUG-C2-people NEG-C2.SM-PROG-read-FV
'The people are not reading.'

b. a-báá-ntu)φ [$_{RC}$ a-ba-**ta**-ku-sóm-a])φ
AUG-C2-people REL-C2-NEG-PROG-read-FV
'the people who are not reading'

The verbal morphology of full relative clauses is schematized in (40).

(40) **Full RCs**: REL-CM.HEAD-CM.SUBJ-NEG-T-Root-FV

In terms of how Rutooro's full relative clauses fit into the Bantu relative clause typology, they would be classified as Type 1 by Henderson (2006, 2007), because they show obligatory agreement with both the subject and the relativized head in non-subject RCs. RCs in the languages most closely related to Rutooro are of the same basic type; however, there is interesting variation with respect to the location of non-subject RC head agreement markers.

In Rukiga, the RC head agreement marker is separated from the verb stem by the lexical subject, as in (41-a) from Allen (2014: 330), while for Rutooro (38-c) and Luganda (41-b) from Hyman and Katamba (2010:58), the non-subject RC head agreement immediately precedes the verb stem.

(41) a. o-mu-piira [$_{RC}$ o-gu o-mu-shaja
AUG-C3-ball AUG-C3.REL AUG-C2-man
a-aa-ba-h-a]
3SG.SM.PST-C2-give-FV
'the ball which the man has given' (immediate past)

b. bí-kópò [$_{RC}$ wàlúsìmbì byè y-à-léèt-á]
C8-cup walusimbi C8.REL 3SG.SM-PST-bring-FV
'the cups that Walusimbi brought'

In Haya (Duranti 1997) and Runyambo (Josephat Rugemalira p.c.), the relative clause head agreement marker can surface in either location: attached to the verb, as in Luganda and Rutooro, or attached to subject, as in Rukiga.

For Rutooro, we analyze agreement with the relative head as taking place at C. We take the lack of agreement on C in matrix clauses to represent a difference between the C of matrix vs. relative clauses with respect to feature sensitivity: only C[REL] is an agreeing head.[14]

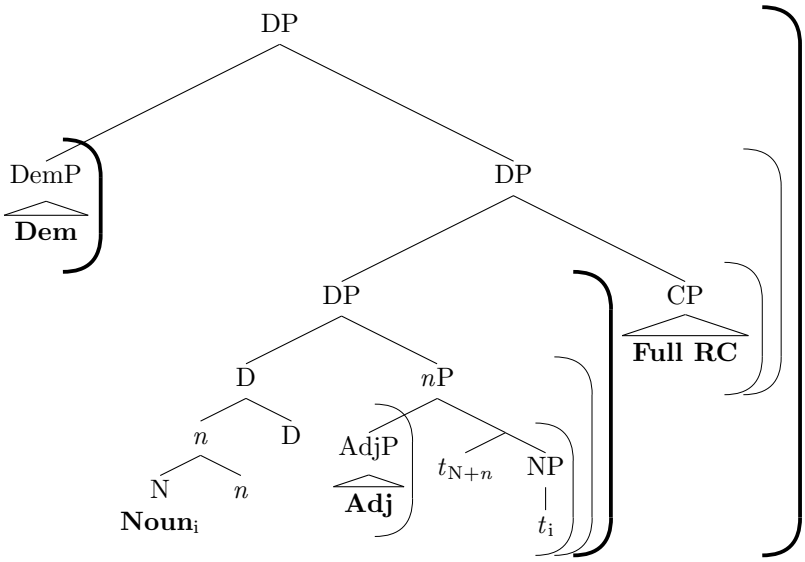
As already mentioned, in both full object and full subject RCs, the head is marked with a H tone. Within the relative clause itself, the distribution of H tones is the same as it is in root clauses: the subject is marked with a H tone (38-c), the object is marked with a H tone (38-b), and by comparing (38-b) and (38-c), we see that the verb is only marked with a H tone if it is not followed by an argument (or adjunct). The presence of a H tone indicates a φ-phrase boundary, so the heads of full relative clauses are at the right-edge of a φ-phrase, which in turn corresponds to the right-edge of an XP.

We account for the prosodic phrasing of full RCs in the same way we accounted for TYPE 2 modifiers (see Section 3.3): we appeal to the relative height of the attachment site. In other words, the relative clause is attached above the XP in which the relativized nominal is pronounced. We adopt a head-external account of RC formation (Partee 1975; Chomsky 1977; Jackendoff 1977) illustrated in (42). We maintain that the relativized head originates in

[14] Because subject agreement is obligatory in all RCs and takes place at T (see Section 2.2), we might expect subject agreement to occur twice in subject relative clauses (once at T and once at C). In the literature on Bantu languages, this situation is sometimes described as Kinyalolo's Constraint (Kinyalolo 1991): spell-out of agreement on T fails to surface when C also agrees with the category that controls agreement on T (Carstens 2005). For more on Kinyalolo's Constraint see Baker 2012, Carstens 2005, Henderson 2013, and Kinyalolo 1991.

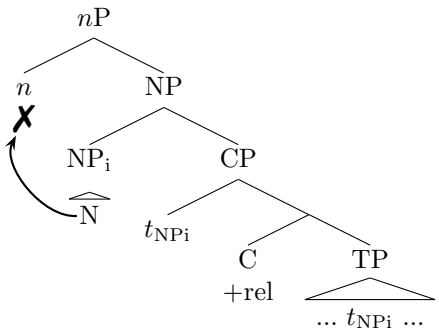
an RC-external position and is co-indexed with a null element internal to the relative clause; in other words, the external and internal relative clause heads are not part of a movement chain. See also Zeller (2004) and Pietraszko (2019) for matching analyses of relative clauses in Zulu and Ndebele, respectively.

(42) High tone assignment in full RCs



Traditional raising-based analyses (Schachter 1973; Kayne 1994; Bianchi 2000; Bhatt 2002) are incompatible with head-movement in the DP domain. The final position of the relativized head varies according to the specific analysis (e.g. compare Kayne 1994 and Bhatt 2002), but on any raising account, the head originates inside the Relative Clause CP in the position associated with its θ-role. The RC head, an NP, later undergoes phrasal movement. Assuming moved constituents are islands to extraction (e.g. Wexler and Culicover's 1980 Freezing Principle), once the head of the relative clause is extracted (an NP), the head of that NP (an N) is inaccessible to further movement, as in (43).

(43) An alternative raising-based analysis of RCs

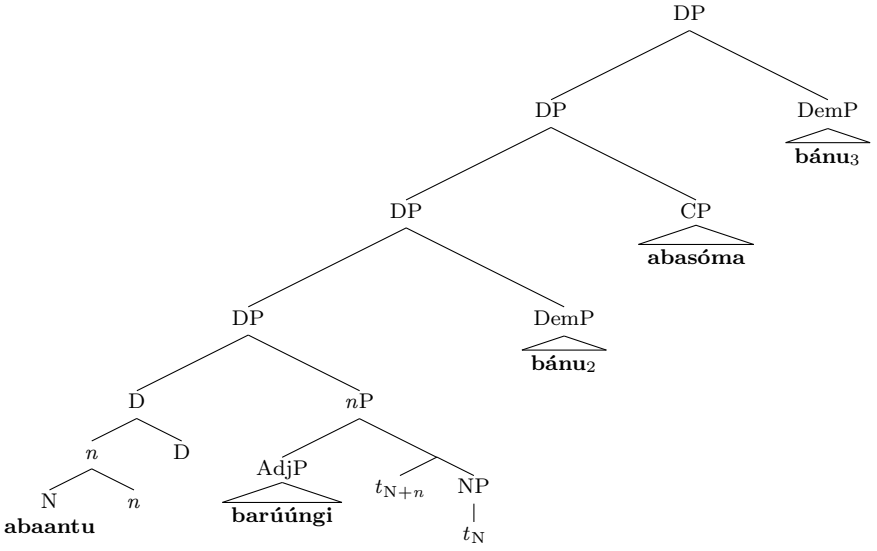


A head-external analysis, shown in (42), does not have the aforementioned theoretical problem, and an additional point in its favor is that it easily explains why TYPE 2 modifiers, e.g. demonstratives, can precede the relativized nominal, precede the relative clause, or follow the relative clause. In (45), the three possible positions for the demonstrative *bánu* are indicated numerically.

(44) (**bá-nu**$_1$)φ a-baa-ntu ba-rúúngi)φ (**bá-nu**$_2$)φ [$_{\text{RC}}$
C2-this AUG-C2-people C2-good C2-this
a-ba-sóm-a])φ (**bá-nu**$_3$)φ
REL-C2-read-FV C2-this
'these good people who read' (habitual)

The head-external analysis allows for alternate orders by varying the direction and location of DemP attachment. The tree in (45) schematizes two of the possible positions for *bánu* 'C2-this' in (44), corresponding to *bánu*$_2$ and *bánu*$_3$. Rotating either of these branches yields a pre-RC-head demonstrative (*bánu*$_1$).

(45) Variable position of demonstratives in association with full RCs



4.2 Reduced relative clauses

Rutooro's second relative clause type—the 'reduced' relative clause—falls into Type 2 in Henderson's (2006, 2007) typology for the reason that it exhibits subject agreement, but no agreement with non-subject RC heads. From the perspective of the relativization strategies employed by Rutooro's closest relatives, the reduced RC is more divergent than the full RC. Reduced RCs

behave similarly to full RCs with respect to word order and the use of the low negation marker; however, this construction differs with respect to preverbal morphology and H tone distribution.

Beginning with the morphosyntax of reduced RCs, unlike in full RCs, reduced RCs do not appear with a relativizing prefix. Compare the reduced subject RC in (46-a) to the full subject RC in (46-b).

(46) a. a-baa-ntu [$_{RC}$ ba-som' ee-bi-tábu])φ
AUG-C2-people C2.SM-read AUG-C8-book
'the people who read books' (habitual)
b. a-báá-ntu)φ [$_{RC}$ **a**-ba-som' ee-bi-tábu])φ
AUG-C2-people REL-C2-read AUG-C8-book
'the people who read books' (habitual)

As discussed in the previous section, in Rutooro's full relative clauses, subject and non-subject relatives differ with respect to the number of class markers on the verb. The subject marker is always present, but in non-subject RCs, a second class marker appears that agrees with the relativized nominal. To see this difference compare (46-b) to (47-b). In contrast, the form of the verb in subject as compared to non-subject relative clauses is invariable in reduced relative clauses. Compare the class marker on the reduced subject relative in (46-a) to the reduced object relative in (47-a). In both cases, the verb only agrees with the subject, which may be the head of the relative clause as in (46-a) or *pro* as in (47-a).

(47) a. e-bi-tabu [$_{RC}$ ba-ta-ku-sóm-a])φ
AUG-C8-book C2.SM-NEG-PROG-read-FV
'the books (they) are not reading'
b. e-bi-tábu)φ [$_{RC}$ **e-bi**-ba-ta-ku-sóm-a])φ
AUG-C8-book REL-C8-C2.SM-NEG-PROG-read-FV
'the books that (they) are not reading'

A template summarizing the verbal morphology of reduced subject and object relative clauses is provided in (48):

(48) **Reduced RCs**: CM.SUBJ-NEG-T-Root-FV

At this point, having only considered the morphological differences between full and reduced relatives, it might appear that the contrast between full vs. reduced RCs amounts to a difference between overt vs. null C. However, there is reason to believe that the absence of the relativizing prefix indicates an absence of CP structure as opposed to simply phonological material, and subsequently, we propose that reduced relative clauses only project only as high as TP.

In addition to lacking the relativizing prefix and class agreement with the relativized nominal, reduced relative clauses behave differently than both full relative clauses and matrix clauses with respect to the placement of high adverbs. High adverbs cannot precede the verb in reduced object relatives with

overt subjects, as shown in (49-c) below. In contrast, the same adverb can surface in exactly the position disallowed in reduced relatives in matrix clauses and in full object relatives, as shown in (49-a) and (71-c), respectively.

(49) a. A-báá-ntu)φ **ííjo**)φ ba-ka-som' ee-bi-tábu.)φ
AUG-C2-people yesterday C2.SM-PST-read AUG-C8-book
'the people read books yesterday.' (far past)

b. e-bi-tábu)φ [$_{\text{RC}}$ a-báá-ntu)φ **ííjo**)φ
AUG-C8-book AUG-C2-people yesterday
e-bi-ba-a-som-ére])φ
REL-C8-C2.SM-PST-read-FV
'the books that the people read yesterday.' (far past)

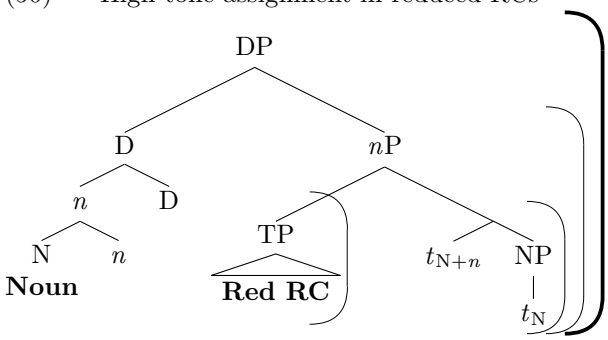
c. e-bi-tábu)φ [$_{\text{RC}}$ a-báá-ntu)φ (***ííjo**))φ
AUG-C8-book AUG-C2-people yesterday
ba-a-som-ére])φ
C2.SM-PST-read-FV
Intended: the books the people read yesterday. (far past)

In matrix clauses and full relatives, where preverbal subjects are topics located in CP, an adverb can adjoin at TP and surface between the topic and the verb, e.g. *ííjo* 'yesterday' (49-a). In contrast, in reduced object relatives adjoining to TP results in the adverb preceding the subject or following the verb.

Supported in part by the behavior of adverbs such as *ííjo* 'yesterday', we maintain that the subject sits in the specifier of CP in full object relatives, whereas it sits in the specifier of TP in reduced object relatives. Together, the morphological form of reduced RCs and the behavior of high adverbs suggest that this type of relative clause only projects as high as TP.

Next, we account for the prosodic phrasing of reduced relatives. As evident from examples (47-a) and (46-a), the heads of reduced RCs surface as all-L, so they must not surface at the right-edge of a prosodic boundary. As before, we appeal to the relative height of attachment to account for the distribution of H. Like nominal heads modified by demonstratives and other weak determiners (see 3.3), the heads of reduced RCs are attached internally to the XP in which the RC head is pronounced, as shown in (50).

(50) High tone assignment in reduced RCs

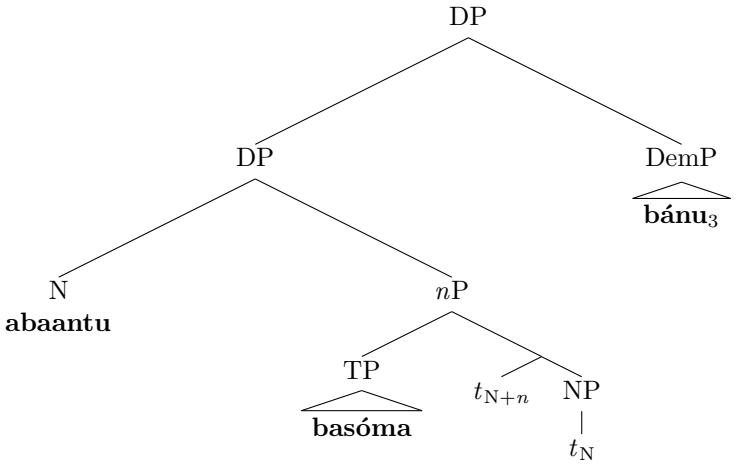


This analysis also captures the fact that our speaker disprefers high determiners preceding the relative clause in reduced RCs (51), whereas they are fully grammatical in this position in full RCs (44).

(51) (**bá-nu**$_1$)φ a-baa-ntu (**?bá-nu**$_2$)φ [$_{\text{RC}}$ ba-sóm-a])φ
C2-this AUG-C2-people C2-this C2-read-FV
(**bá-nu**$_3$)φ
C2-this
'these people who read' (habitual)

The structure in (52) schematizes one of the possible positions for *bánu* 'C2-this' in (51), corresponding to *bánu*$_3$. Rotating this branch would yield *bánu*$_1$, e.g. a demonstrative that surfaces before the relativized head.

(52) Variable position of demonstratives in association with reduced RC



The difference between full and reduced RCs with respect to the location of the demonstrative *bánu* is the consequence of how full vs. reduced relative clauses attach to the relativized nominal. The demonstrative only ever adjoins to the DP, but in the case of full relative clauses, which also adjoin to DP, *bánu* can attach above or below the RC. For reduced relatives, which attach internally to the relativized head, *bánu* is necessarily adjoined above the position of the RC, and consequently it cannot surface between the relativized head and the reduced RC.

At this point, we have sketched a head-external analysis of full CP relative clauses and reduced TP relative clauses in Rutooro that accounts for the presence of a H-tone boundary on nouns modified by full RCs and the absence of a H-tone boundary on nouns modified by reduced RCs. The explanation relies on two different attachment sites for relative clauses: full relative clauses attach outside of the relativized nominal's DP, while reduced relative clauses attach in a DP-internal position. It remains an open question as to why CP-

and TP-modifiers attach in these two locations; however, this difference in attachment site and H tone distribution is found across adnominal phrases in Rutooro. Indeed, the connection between H tones and phrase-internal vs. external positions relative to a particular phrase head extends more broadly across the language: internal arguments pattern with TYPE 1 modifiers and reduced relative clauses, while external arguments pattern with TYPE 2 modifiers and full relative clauses. As such, the analysis finds broad support in a variety of constructions in the language. However, a subset of reduced relative clauses, discussed in the next section, challenges the perfect association between φ-phrases and syntactic XPs.

5 Prosodic analysis

In Section 1, we described the insertion of high tones in Rutooro as a process in which H tones link to the penultimate syllable of each phonological phrase, introduced in (4) and repeated in (53):

(53) High Tone Insertion

$$\emptyset \rightarrow \begin{matrix} \sigma \\ | \\ \text{H} \end{matrix} \quad \sigma)\varphi$$

Before H tones can be inserted, however, the prosodic component of the grammar must convert syntactic XPs into phonological φ-phrases. The data we have gathered to this point do not allow us to distinguish between two prominant theoretical approaches on empirical grounds. We offer a MATCH-theoretic account (Selkirk 2011; Elfner 2012, 2015; Itô and Mester 2013), but note that certain alternative approaches, such as an EDGE-BASED account based on ordered rules (Selkirk 1986, 1995, 2000; Truckenbrodt 1995, 1999, 2007), would be equally able to handle these data.

MATCH theory is an indirect reference theory of the syntax-prosody interface; so in MATCH theoretic accounts, phonological processes make reference to prosodic units as opposed to referring directly to the syntax.[15] Syntactic and prosodic units correspond in MATCH theory; and as such, it is unique among indirect reference theories for building prosodic recursion into its framework (see Elfner 2012 et seq.; Itô and Mester 2003 et seq.; Wagner 2005 et seq. for prosodic recursion). Further explanation of the basic tenets of MATCH Theory as well as a contextualization of the theory in the broader syntax-prosody literature can be found in Bennett and Elfner 2017 and Elfner 2018. Examples of research offering MATCH-theoretic accounts of a variety of puzzles at the syntax-prosody interface include the papers cited above as well as Bennett et al. 2015, 2016, 2019, Clemens 2014a, 2019, Myrberg 2013, and Tyler 2019.

Individual MATCH constraints make specific predictions about how syntactic units map onto prosodic units, as summarized by (54). Note that each of

[15] See Kaisse (1985), Odden (1990), Samuels (2009), and Wagner (2005, 2010) for examples of direct reference theories.

these constraints is violable in the context of Optimality Theory (Prince and Smolensky 1993/2004).

(54) Schematization of MATCH Constraints (Based on Selkirk 2011)
   a. Syntactic head (X^0) $\longleftrightarrow$ Prosodic word (ω)
   b. Syntactic phrase (XP) $\longleftrightarrow$ Phonological phrase (φ)
   c. Illocutionary phrase (CP/IP) $\longleftrightarrow$ Intonational phrase (ι)

For all of the data presented thus far—matrix clauses, nominals, and relative clauses—only one MATCH constraint (55) is needed to capture the distribution of H tones in Rutooro:

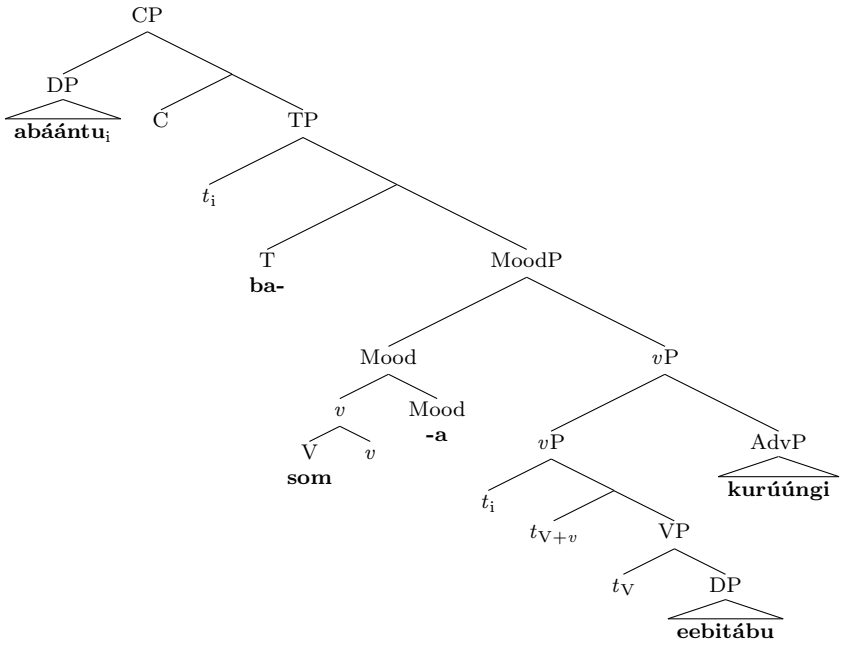
(55) MATCH PHRASE: XPs correspond to φ-phrases.

By way of example, we consider the syntax-prosody mapping of a transitive clause modified by an adverb, first introduced as (15), repeated in (56):

(56) A-báá-ntu)$_\varphi$ ba-som ee-bi-tábu)$_\varphi$ ku-rúúngi)$_\varphi$
AUG-C2-person C2.SM-read AUG-C8-book C17-well
'The people read the books well.' (habitual)

A syntactic tree for this specific example is shown in (57):

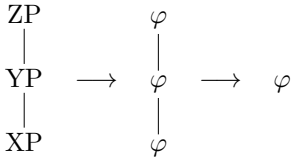
(57) Syntactic tree: transitive clause with adverbial modifier



The structure in (57) is the input to the prosodic component of the grammar; however, we assume the tree in (57) is pruned in a number of ways dis-

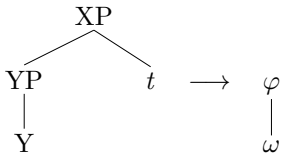
cussed at length in Elfner 2012 (see also Clemens 2019). First, XPs embedded in unary-branching XPs are deleted, as in (58):

(58) No redundant recursive structure



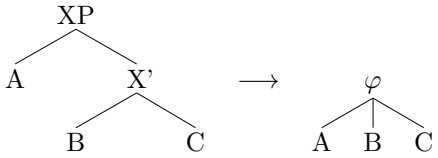
Second, terminal nodes that do not correspond to phonologically overt material are not assigned prosodic structure, as illustrated in (59):

(59) No empty categories



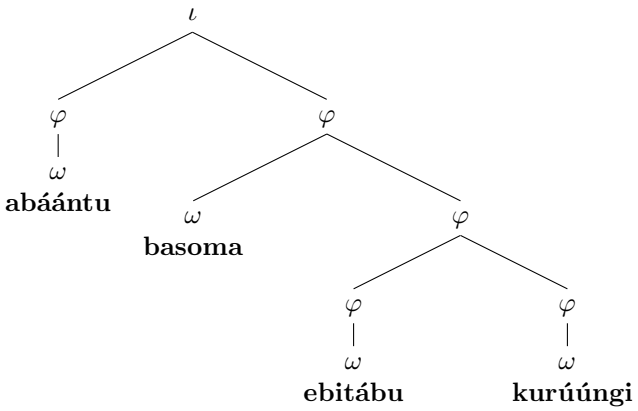
Finally, the X'-node does not have an associated prosodic category, so tertiary prosodic branching is the predicted outcome when the specifier of a phrase contains phonologically overt material, as in (60):

(60) Bar-level mapping



With these mapping considerations in mind, the syntactic tree in (57) is translated into a prosodic structure in (61):

(61) Prosodic tree: transitive clause with adverbial modifier



In the tableau in (62), the output candidates illustrate alternate ways in which the syntax might be assigned prosodic structure. The candidate with the prosodic structure shown in (61)—Candidate (a)—is also the candidate with the structure more isomorphic to (57).

(62) Assigning prosodic structure to (57)[16]

Input: [$_{CP}$[$_{DP}$abaantu][$_{TP}$[$_{MoodP}$basoma[$_{vP}$[$_{VP}$[$_{DP}$ebitabu]][$_{AdvP}$kuruungi]]]]]		MATCH PHRASE
a. ☞	abáántu)$_\varphi$ basoma ebitábu)$_\varphi$ kurúúngi)$_\varphi$	
b.	abáántu)$_\varphi$ basoma ebitabu kurúúngi)$_\varphi$	∗!
c.	abáántu)$_\varphi$ basóma)$_\varphi$ ebitábu)$_\varphi$ kurúúngi)$_\varphi$	∗!

Candidate (a) is the winning candidate, because it faithfully maps all φ-phrases onto syntactic XPs. Candidate (b) incurs a violation of MATCH PHRASE, because there is a syntactic XP in the input—associated with the direct object—that does not map onto a φ-phrase in the output. Candidate (c) incurs a violation of MATCH PHRASE, because the phonological phrase boundary on the verb represents a φ-phrase in the output that does not map onto a syntactic XP in the input.

The entirety of the data presented thus far can be accounted for in this manner; however, we find two types of exceptions. First, we find the addition of a H tone on a prosodic-ω that is not on the right edge of a syntactic XP. Second, we find the suppression of a φ-boundary on a prosodic-ω aligning with the right edge of a syntactic XP. Both of these exceptions take place in the context of reduced relative clauses and will be discussed in turn.

5.1 Reduced relative clauses with modified heads

When a noun is modified by both a TYPE 1 modifier as well as a reduced relative clause and the TYPE 1 modifier precedes the reduced RC, the TYPE 1 modifier is realized all-L. This is shown in (63) where the adjective *baruungi* 'good' is realized without a H tone.

(63) a-ba-ana ba-ruungi [$_{RC}$ ba-sóm-a])$_\varphi$
AUG-C2-child C2-good C2.SM-read-FV
'good children who read' (habitual)

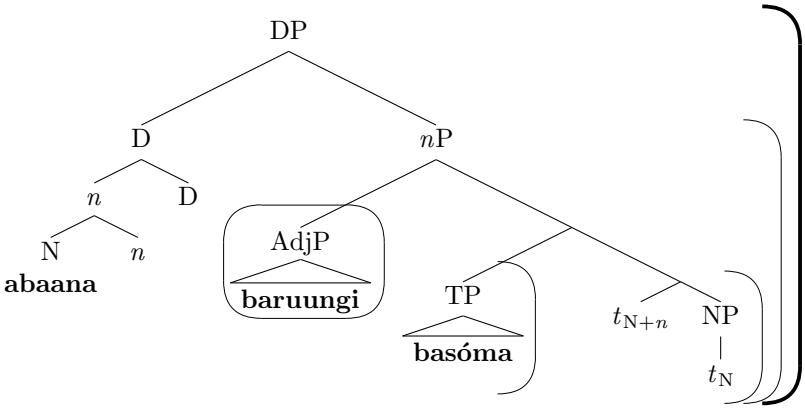
We wrongly predict *baruungi* 'good' in (63) to be realized with a H tone based on the observation that in cases where a DP has more than one internal modifiers, each modifier typically *does* bear a H tone, cf. (64).

[16] Only the right-side edges of φ-phrases are marked in our tableau, because H tones are only found at right-side edges. As stated elsewhere, MATCH THEORY does posit the existence of both right-and left-edge boundaries.

(64) a-ma-iba ma-rúúngi)φ a-sátu)φ
AUG-C6-dove C6-good C6-three
'three good doves'

Furthermore, the syntactic structure that we proposed for the Rutooro DP in Section 4.2 also predicts that *baruungi* 'good' in (63) would be realized with a H tone for the reason that it sits at the right edge of an XP. The adjectival phrase corresponding to *baruungi* 'good', where we expect *barúúngi* with a H on the penultimate syllable, is boxed in (65).

(65) High tone assignment in a reduced RC with a modified head (63)



To account for the pattern found in reduced relative clauses with modified heads, we propose the constraint shown in (66):

(66) $*$) RED REL: Assign a penalty to the right edge of a φ-phrase before the reduced relative clause stem.

In short, the constraint $*$) RED REL penalizes structures for which a prosodic boundary precedes the stem of a reduced relative clause. The constraint refers to linear adjacency, because it is active in examples such as (63), when the element with a suppressed H tone is external to the relative clause, as well as when the element with a suppressed H tone is a clausemate of the RC's stem. This type of example will be shown in Section 5.2, when we discuss the case of reduced object RCs with overt subjects. In the meantime, (67) shows how $*$) RED REL is added into the prosodic analysis in order to cover the type of example shown in (63).

(67) Assigning prosodic structure to (63):

Input: [$_{DP}$abaana[$_{nP}$[$_{AdjP}$buruungi][$_{TP}$basoma]]]]		$*$) RED REL	MATCH PHRASE
a.	abaana burúúngi)φ basóma)φ	$*$!	
b. ☞	abaana buruungi basóma)φ		$*$

The syntactic analysis of Rutooro's DP structure together with MATCH PHRASE makes the correct predictions for the simple reduced relative clauses, i.e. there is no H tone following the relativized head. Note that—at least for this example—the constraint ∗) RED REL also makes the correct prediction on its own. Thus, there is a certain amount of redundancy in the analysis, and perhaps the concern that ∗) RED REL weakens the case for a syntactic analysis that is largely isomorphic with the prosodic facts.

When the head of a reduced RC is modified, and—crucially—the RC immediately follows the head, the predicted prosodic structure obtains, i.e. the prosodic structure predicted by the syntactic analysis and MATCH PHRASE. This is shown in (68):

(68) a-ba-ana [$_{RC}$ ba-sóm-a])φ bá-nu)φ
AUG-C2-child C2.SM-read-FV C2-this
'these children who read' (habitual)

For examples like (68), the basic mapping constraint and the highly specialized prosodic constraint are doing double duty, which is illustrated in (69)

(69) Assigning prosodic structure to (68):

Input: [$_{DP}$[$_{DP}$abaana[$_{nP}$[$_{TP}$basoma]]][$_{DemP}$banu]]	∗) RED REL	MATCH PHRASE
a. ☞ abaana basóma)φ bánu)φ		
b. abaana basoma bánu)φ		∗!
c. abáána)φ basóma)φ bánu)φ	∗!	∗

In (69), either ∗) RED REL or MATCH PHRASE is sufficient to rule out Candidate C, in which the relativized head is realized with a H tone. However, ∗) RED REL alone does not rule out Candidate B, which incurs a violation of MATCH PHRASE, because there is a syntactic XP in the input—associated with the RC—that does not map onto a φ-phrase in the output.

Thus, ∗) RED REL is a necessary component of the analysis, although in a subset of cases it is somewhat redundant with the syntax-prosody mapping predictions of MATCH PHRASE. MATCH PHRASE, in turn, is needed to account for the distribution of H in a wide range of scenarios including the one in (68), as well as any phrase that does not include a reduced RC, e.g. (62).

Next, we consider whether the syntactic analysis of reduced RCs should be streamlined with that of full RCs. Perhaps both types of relatives—full RCs that project as high as CP and reduced RCs that project as high as TP—are generated above the relativized head. Were this the case, the syntax-prosody mapping constraint MATCH PHRASE would predict a H tone to appear on the relativized head for both types of RCs, but in the case of reduced RCs, the higher ranked ∗) RED REL causes the syntax-prosody nonisomorphism.

While the syntactic analysis of reduced RCs, together with MATCH PHRASE, was primarily meant to explain the distribution of the H tones, it has other

points in its favor as well. First, it offers an explanation as to what types of elements can intervene between the head and the reduced RC (see (51) and accompanying discussion). Second, it unifies the syntactic treatment of RCs with other adnominals, specifically Type 1 modifiers, by appealing to attachment height relative to the head. For those reasons, we decide against unifying the account of full and reduced relative clauses in Rutooro, with respect to the location of attachment.

Returning to the nature of ∗) Red Rel, one lingering question is why the grammar would include such a specialized prosodic constraint. To speak to that concern, we return to an observation first made in Section 4.2: reduced RCs and matrix clauses are often string ambiguous. Consider example (70), which compares the attested phrasing of a reduced RC with a modified head, first introduced as (63) and repeated as (70-a), with its predicted phrasing (70-b), and a matrix clause with a modified subject (70-c):

(70) a. a-ba-ana ba-ruungi $[_{RC}$ ba-sóm-a])φ
aug-C2-child C2-good C2.sm-read-fv
'good children who read' (habitual)
b. ∗a-ba-ana ba-rúúngi)φ $[_{RC}$ ba-sóm-a])φ
aug-C2-child C2-good C2.sm-read-fv
Intended: 'good children who read' (habitual)
c. A-ba-ana ba-rúúngi)φ ba-sóm-a])φ
aug-C2-child C2-good C2.sm-read-fv
'Good children read.' (habitual)

Example (70-b) is ungrammatical with the H tone on *barúúngi* 'good'. We note that (70-b)—the prosodic realization that would be the most isomorphic with the underlying syntax—is entirely ambiguous with the matrix clause in (70-c). Thus, the syntactic account together with Match Phrase predicts that (70-b) should be grammatical, but it is only when ∗) Red Rel enters the picture that (70-a) can emerge as the winning candidate. Subsequently, no ambiguity arises.

The idea that prosodic phrasing is a strategy for syntactic disambiguation is a familiar one that at best finds modest support in the processing literature (Price et al. 1991, Schafer et al. 2000, Schepman and Rodway 2000, Kraljic and Brennan 2005, Millotte et al. 2007, cf. Ferreira et al. 1996 and Wasow 2002). Here, we consider the possibility that the prosodic constraint ∗) Red Rel might be motivated by syntactic ambiguity avoidance. Specifically, we would like to consider the idea that there is the causal effect between a communicative need to distinguish between main clauses and relative clauses, i.e. to prevent ambiguity, and the existence of ∗) Red Rel. We view our account of this corner of Rutooro's syntax-prosody mapping as offering a formalization of a processing-cum-grammatical consideration. In this case we would need to consider ∗) Red Rel to be fully grammaticalized, because it represents actual prosodic realization and strong prosodic intuitions, not merely prosodic pref-

erences, and because it is active even when the more isomorphic realization is not truly ambiguous with a matrix clause.

For example, in (71), the attested phrasing of a reduced object RC (71-a) is compared to the predicted phrasing without high-ranking ∗) Red Rel in (71-b). Note that in this example, (71-b) is not string ambiguous with a matrix clause interpretation, because in the matrix clause version (71-c), the class marker on the verb must agree with *ebitáabu* 'books'.

(71) a. e-bi-tabu [$_{RC}$ ba-som-ére])φ
AUG-C8-book C2.SM-read-FV
'the books that (they) read' (near past)
b. ∗e-bi-tábu)φ [$_{RC}$ ba-som-ére])φ
AUG-C8-book C2.SM-read-FV
Intended: 'the books that (they) read' (near past)
c. e-bi-tábu)φ [$_{RC}$ (∗ba/bi)-som-ére])φ
AUG-C8-book C2.SM/C8.SM-read-FV
'The books read.' (near past)

Thus we imagine that the predicted boundary preceding reduced RCs was dropped in order to disambiguate that structure with a matrix clause interpretation and eventually this processing consideration was grammaticalized as ∗) Red Rel and extended to reduced RCs across the board. We expand the intuition behind ∗) Red Rel to explain a second necessary, but peculiar constraint needed to account for a second puzzling prosodic structure in the domain of reduced relative clauses.

5.2 Reduced object relative clauses with overt subjects

In reduced object relative clauses with overt subjects, the relativized nominal bears a H tone, but the subject of the relative clause does not. The crucial example is provided in (72-a) next to the predicted form in (72-b):

(72) a. o-mw-áána)φ [$_{RC}$ a-ba-limi ba-ta-góónz-a])φ
AUG-C1-child AUG-C2-farmer C2.SM-NEG-like-FV
'the child that the farmers don't like'
b. *o-mw-aana [$_{RC}$ a-ba-límí)φ ba-ta-góónz-a])φ
AUG-C1-child AUG-C2-farmer C2.SM-NEG-like-FV
Intended: the child that the farmers don't like

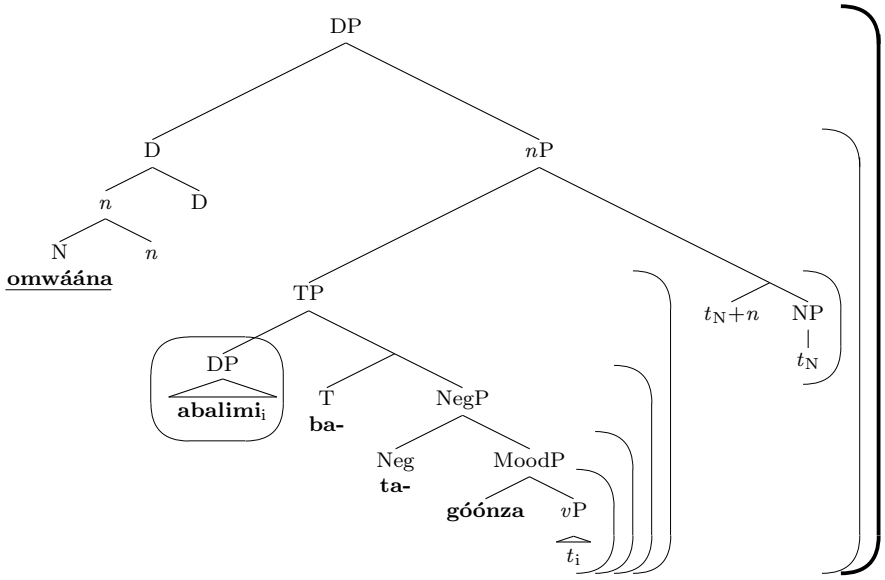
The attested H tone distribution is surprising for two reasons: i) the head of reduced relatives do not usually bear a H tone, cf. (73-a) and ii) subjects across construction types typically *do* bear a H tone, cf. (73-b).

(73) a. a-baa-ntu [$_{RC}$ ba-sóm-a])φ
AUG-C2-people C2.SM-read-FV
'people who read' (habitual)

b. A-ba-límí)φ ba-ka-kór-a)φ
AUG-C2-farmer C2.SM-PST-work-FV
'The farmers worked.'

Based on the syntactic account of Rutooro that we have been building, we predict— contrary to fact—that i) *omwáána* 'child' would be realized all-Low, because it is not realized at the right edge of a syntactic XP, and ii) *abalimi* 'farmers' would be realized with a H tone for the reason that it does sit at the right edge of an XP. In the tree in (74), the complex D corresponding to *omwáána* 'child', where we expect *omwaana* without a H on the penultimate syllable, is underlined. The DP corresponding to *abalimi* 'farmers', where we expect *abalími* with a H on the penultimate syllable, is boxed.

(74) H tone assignment in a reduced object RC with an overt subject (72-a)



To summarize the problematic data introduced in this section and in Section 5.1, in a subset of reduced RCs, we find XPs that are *not* marked with a H tone, and one instance of an X^0 that *is* marked with a H tone, even though it is not at the right edge of a φ-phrase, according to our syntactic analysis.

Once again, we might consider revisiting the syntax of reduced relative clauses; however, we know that reduced object relative clauses with and without lexical subjects do not represent different clause sizes. Whether or not the subject is pronounced, subject agreement is present. Reduced RCs that lack overt subjects exhibit pro-drop, as opposed to, say, less structure.

The absence of a H tone on the RC's subject is directly accounted for by $*)$ Red Rel—the constraint proposed in Section 5.1. As such, we momentarily leave that aspect of the prosodic realization of these reduced RCs aside. In-

stead, we note that while the unexpected H tone on the relativized head (shown underlined in (74)) in reduced RCs with overt subjects is nonisomorphic with the syntax, it is consistent with a general observation about adjacent DPs in the language. Namely, immediately adjacent DPs are typically separated by a φ-phrase boundary. The examples in (75) illustrate this point.

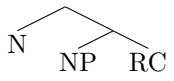
(75) a. A-ba-somésa)φ ba-k-olek a-bá-ána)φ e-mí-ti)φ
AUG-C2-teacher C2.SM-PST-show AUG-C1-child AUG-C4-tree
'The teachers showed the children the trees.'
b. o-múú-ntu)φ mu-somésa)φ
AUG-C1-person C1-teacher
'The person is a teacher.'

When we compare two adjacent DPs in a ditransitive clause (75-a) and a nominal predicate (75-b), we find that the first nominal is marked H. In fact, the closest example we could find in which two adjacent DPs are not separated by φ-phrase boundary comes from the possessive construction, in which the possessor DP and possessum DP are not separated by a φ-phrse boundary, but they are separated by a linking element, as shown in (76):

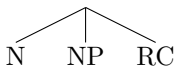
(76) e-by-ookulya by-' oo-mu-límí)φ
AUG-C8-food C8-LNK AUG-C1-farmer
'the farmer's food'

Moving towards the assertion that adjacent DPs must be delimited by a H tone—or a linking element, as in (76)—we observe that a NOUN NOUN)φ RC)φ string has the potential to represent a number of different syntactic constituencies, the most likely of which are shown in (77). This situation arises in Rutooro because boundary cues aren't gradient, i.e. the H tone is not louder or higher when it corresponds with multiple syntactic XPs. Furthermore, left edges are unmarked by tone in Rutooro, and they are also unmarked by other prosodic cues that we know to be relevant in the language, e.g. lengthening.

(77) NOUN NOUN)φ RC stem)φ
a. [NOUN [[NOUN] RC stem]]



b. [NOUN [NOUN] [RC stem]]



c. [[NOUN [NOUN]] [RC stem]]

In (77-a)—but not (77-b) or (77-c)—the second noun and the RC stem form a unique constituent, while in (77-c)—but not (77-a) or (77-b)—the first and second noun form a unique constituent, as in possessives. If prominence

were gradient or left edges were overtly marked in the language,[17] each of the syntactic constituencies in (77) would be prosodically distinct. Such as it is, we describe the prosodic structure in (77) as being indeterminate (78), because it is the output of more than one syntactic configuration, and crucially, more than one syntactic configuration that has an analogue in the language.

(78) **Indeterminate prosodic structure:** Prosodic structure that could be the output of more than one syntactic configuration is indeterminate.

The question is whether H tones are such a reliable indicator of constituency, that a NOUN NOUN)φ RC)φ string is disallowed, because it could point to an unintended constituency. If so, this would motivate the second constraint that we need to account for the H tone distribution in reduced relative clauses—N)N—which is defined in (79):

(79) N)N: Assign a penalty to adjacent DPs not separated by a prosodic boundary.

Once N)N is added into the account, we predict the attested phrasing for reduced object RCs with overt subjects, as shown in (80):

(80) Assigning prosodic structure to (72-a):

Input: [$_{DP}$Noun[$_{nP}$ [$_{TP}$ [$_{DP}$Noun] Red Rel]]]		N)N	$*$) RED REL	MATCH PHRASE
a.	Noun Noun)φ Red Rel)φ	$*$!	$*$	
b.	Noun Noun Red Rel)φ	$*$!		$*$
c.	Noun)φ Noun)φ Red Rel)φ		$*$!	$*$
d. ☞	Noun)φ Noun Red Rel)φ			$**$

The fact of the matter is that we need the constraint N)N to account for the anomalous phrasing of reduced object RCs with overt subjects. We have sketched the beginning of a proposal that would treat the anomalous prosodic structure of reduced object relative clauses with overt subjects as an attempt to unambiguously represent the underlying syntactic constituency of the phrase. The attested, non-isomorphic phrasing prevents an indeterminate prosodic structure from surfacing that, while predicted by the syntax and resolvable by the morphology, would result in the violation of the otherwise reliable correspondence between syntactic and prosodic constituents in the language. Thus, while the prosodic realization of one specific construction in the language is exceptional, this exception allows for greater regularity in the signaling of syntactic constituency via prosodic structure. Of course, the

[17] MATCH THEORY makes reference to prosodic constituents as opposed to prosodic edges, and as such we need to distinguish the left edge of the prosodic constituent, which we assume exists, from a left edge that is overtly realized.

viability of this explanation rests on our availability to find similar scenarios in other languages, which we leave for future research.

6 Conclusion

While Rutooro has lost the underlying tonal contrast exhibited in most other Bantu languages, the distribution of H tones within phrases is nonetheless complex. Many words surface as all-L, no word ever has more than one H, and in certain contexts, every word in an utterance has a H tone. The heart of our proposal is that H tones are found at the right edges of phonological phrases—specifically on the penultimate syllable of phrase-final words. Match Theory, predicts that the edges of phonological phrases coincide with the edges of syntactic XPs. We show that this makes correct predictions regarding most surface H tones, if one assumes a parallel syntactic structure between the attachment height of verbal arguments within the CP (e.g. subject versus object) and modifiers within the DP (e.g. our Type 1 vs. Type 2). After discussing the distinction between high and low attaching modifiers within the DP, we explored relative clauses.

We demonstrated that unlike closely related languages, Rutooro exhibits two different RC types, a distinction we characterized as full versus reduced. While the distribution of H tones within full relative clauses is directly predicted by our Match-theoretic account, we showed several apparent tonal anomalies within reduced relatives. We accounted for apparent exceptions with additional OT constraints. In two cases, a High tone was predicted to occur but did not, and in another, case a H surfaced in a location where it was not predicted to appear. To account for the lack of a H tone on modifiers that intervene between the head and stem of reduced RCs and overt subject DPs in non-subject relatives, we posited a constraint which penalizes a phonological phrase boundary before a reduced relative. We argued that the motivation for such a constraint might be to disambiguate a potential neutralization of main clause verb forms with their corresponding relatives.

Finally, to account for the presence of a H tone on the heads of non-subject relatives with overt subjects, we posited a constraint mandating a phonological phrase boundary surface between two successive nouns. The motivation for this second highly specialized constraint was to prevent prosodic indeterminacy, which we defined as prosodic structure that might be the output of more than one syntactic configuration. While our account of prosodic phrasing in Rutooro is presented in the context of Match Theory; it diverges from its theoretical foundation by proposing two constraints motivated by interface considerations, as opposed to explaining syntax-prosody non-isomorphisms on the basis of prosodic well-formedness alone. This study thus adds to a growing body of research which seeks to explore the range of factors, formalized as constraints, which may dominate the basic mapping of prosodic phrases as proposed in Match Theory.

Acknowledgements We warmly thank our language consultant Barbara Balinda. Thanks also to Ryan Bennett, Michael Diercks, Claire Halpert, Larry Hyman, Sharon Inkelas, Ruth Kramer, Asia Pietraszko, Omer Preminger, and Nicholas Rolle, and Jason Zentz for useful discussion. We also benefited from feedback we received at The Annual Conference on African Linguistics 47 (University of California, Berkeley), The Workshop on the Effects of Constituency on Sentence Phonology (University of Massachusetts, Amherst), and audiences at The University of Toronto, The University of Maryland, Rutgers University, and the Princeton Symposium on Syntactic Theory.

References

[Allen, 2014] Allen, A. (2014). *Definiteness and specificity in Runyankore-Rukiga*. PhD thesis, Stellenbosch University.

[Baker, 1985] Baker, M. (1985). The Mirror Principle and morphosyntactic explanation. *Linguistic Inquiry*, 16:373–415.

[Baker, 2012] Baker, M. (2012). "obliqueness" as a component of argument structure in amharic. In Cuervo, M. C. and Roberge, Y., editors, *The end of argument structure?*, pages 43–74. Bingley, UK: Emerald Group Publishing Limited.

[Bennett and Elfner, 2019] Bennett, R. and Elfner, E. (2019). The syntax-prosody interface. *Annual Review of Linguistics*, 5:151–171.

[Bennett et al., 2015] Bennett, R., Elfner, E., and McCloskey, J. (2015). Pronouns and prosody in Irish. In Breatnach, L., Ó hUiginn, R., McManus, D., and Simms, K., editors, *Selected Proceedings of the XIV International Congress of Celtic Studies*, pages 19–74. Dublin: Dublin Institute for Advanced Studies.

[Bennett et al., 2016] Bennett, R., Elfner, E., and McCloskey, J. (2016). Lightest to the right: an anomolous displacement in Irish. *Linguistic Inquiry*, 47:169–234.

[Bennett et al., 2019] Bennett, R., Elfner, E., and McCloskey, J. (2019). Prosody, focus and ellipsis in Irish. *Language*, 95(1):66–106.

[Bhatt, 2002] Bhatt, R. (2002). The raising analysis of relative clauses: Evidence from adjectival modification. *Natural Language Semantics*, 10:43–90.

[Bianchi, 2000] Bianchi, V. (2000). The raising analysis of relative clauses: A reply to Borsley. *Linguistic Inquiry*, 31(1):123–140.

[Bickmore, 2007] Bickmore, L. (2007). *Cilungu Phonology*. Center for the Study of Language and Information, Stanford, CA.

[Bickmore, 2019a] Bickmore, L. (2019a). Liquid realization in rutooro. In Clem, E., Jenks, P., and Sande, H., editors, *Theory and description in African Linguistics: Selected papers from the 47th Annual Conference on African Linguistics,*.

[Bickmore, 2019b] Bickmore, L. (2019b). Unaltered morphemes as phonological triggers and targets in Rutooro. *Journal of African Languages and Linguistics*, 40(1):3–22.

[Boersma and Weenik, 2013] Boersma, P. and Weenik, D. (2013). Praat: doing phonetics by computer [computer program]. Version 5.3.51. http://www.praat.org/.

[Bresnan and Mchombo, 1987] Bresnan, J. and Mchombo, S. A. (1987). Topic, pronoun, and agreement in Chicheẁa. *Language*, 63:741–782.

[Buell, 2005] Buell, L. (2005). *Issues in Zulu verbal morphosyntax*. PhD thesis, University of California Los Angeles.

[Carstens, 2000] Carstens, V. (2000). Concord in Minimalist Theory. *Linguistic Inquiry*, 31(2):319–355.

[Carstens, 2001] Carstens, V. (2001). Multiple agreement and case deletion: Against φ-incompleteness. *Syntax*, 4(3):147–163.

[Carstens, 2008] Carstens, V. (2008). DP in Bantu and Romance. In De Cat, Cécile Demuth, K., editor, *The Bantu-Romance Connection: A comparative investigation of verbal agreement, DPs, and information structure*, volume 131, pages 131–165. Linguistik Aktuell/Linguistics Today.

[Cheng and Downing, 2007] Cheng, L. and Downing, L. J. (2007). The prosody and syntax of Zulu relative clauses. In Kula, N. C. and Marten, L., editors, *Bantu in Bloomsbury: Special issue on Bantu Linguistics,*, volume 15, pages 51–63. SOAS Working Papers in Linguistics.

[Cheng and Downing, 2009] Cheng, L. L.-S. and Downing, L. J. (2009). Where's the topic in Zulu? *The Linguistic Review*, 26:207–238.
[Cheng and Downing, 2010] Cheng, L. L.-S. and Downing, L. J. (2010). *Locative Relatives in Durban Zulu*. Universitätsbibliothek Johann Christian Senckenberg.
[Cheng and Downing, 2012] Cheng, L. L.-S. and Downing, L. J. (2012). Against FocusP: Arguments from Zulu. In Kučerová, I. and Neeleman, A., editors, *Contrasts and positions in information structure*, pages 247–266, Cambridge, UK. Cambridge University Press.
[Chomsky, 1977] Chomsky, N. (1977). *Essays on Form and Interpretation*. North-Holland, New York.
[Clemens, 2014] Clemens, L. (2014). *Prosodic noun incorporation and verb-initial syntax*. PhD thesis, Harvard University, Cambidge, MA.
[Clemens, 2019] Clemens, L. (2019). Prosodic noun incorporation: The relationship between prosody and argument structure in Niuean. *Syntax*, 22(4):337–377.
[De Blois, 1970] De Blois, K. F. (1970). The augment in the Bantu languages. *Africana Linguistica*, 4:85–165.
[Downing, 2016] Downing, L. J. (2016). Tone and intonation in chichewa and tumbuka. *Intonation in African Tone Languages*, 24:365.
[Downing and Hyman, 2015] Downing, L. J. and Hyman, L. M. (2015). Information structure in Bantu. In Féry, C. and Ishihara, S., editors, *The Oxford Handbook of Information Structure*, pages 790–813, Oxford. Oxford University Press.
[Duranti, 1997] Duranti, A. (1997). Relative clauses. In Ernest Rugwa Byarushengo, Alessandro Duranti, L. H., editor, *Haya Grammatical Structure*, number 6 in Southern California Occasional Papers in Linguistics. University of Southern California Deptartment of Linguistics.
[Elfner, 2012] Elfner, E. (2012). *Syntax-prosody interactions in Irish*. PhD thesis, University of Massachusetts Amherst.
[Elfner, 2015] Elfner, E. (2015). Recursion in prosodic phrasing: Evidence from Connemara Irish. *Natural Language and Linguistic Theory*, 33:1169–1208.
[Elfner, 2018] Elfner, E. (2018). The syntax-prosody interface: current theoretical approaches and outstanding questions. *Linguistics Vanguard*, 4(1).
[Ferreira et al., 1996] Ferreira, F., Anes, M. D., and Horine, M. D. (1996). Exploring the use of prosody during language comprehension using the auditory moving window technique. *Journal of Psycholinguistic Research*, 25(2):273–290.
[Freeze, 1992] Freeze, R. (1992). Existentials and other locatives. *Language*, 68:553–595.
[Halpert, 2015] Halpert, C. (2015). *Argument licensing and agreement*. Studies in Comparative Syntax. Oxford University Press, Oxford.
[Halpert, pear] Halpert, C. (to appear). The augment. In *The Oxford Handbook of Bantu Linguistics*. Oxford: Oxford University Press.
[Henderson, 2006] Henderson, B. (2006). *The Syntax and Typology of Bantu Relative Clauses*. PhD thesis, University of Illinois at Urbana-Champaign.
[Henderson, 2007] Henderson, B. (2007). The syntax of agreement in Bantu relatives. In *Texas Linguistic Society IX: The Morphosyntax of Underrepresented Languages*, pages 167–184.
[Henderson, 2013] Henderson, B. (2013). Agreement and person in anti-agreement. *Natural Language & Linguistic Theory*, 31(2):453–481.
[Hyman and Katamba, 1990] Hyman, L. M. and Katamba, F. X. (1990). Final vowel shortening in luganda. *Studies in African Linguistics*, 21(1):1.
[Hyman and Katamba, 1993] Hyman, L. M. and Katamba, F. X. (1993). A new approach to tone in luganda. *Language*, pages 34–67.
[Hyman and Katamba, 2010a] Hyman, L. M. and Katamba, F. X. (2010a). Tone, syntax, and prosodic domains in luganda. *UC Berkeley PhonLab Annual Report*, 6(6).
[Hyman and Katamba, 2010b] Hyman, L. M. and Katamba, F. X. (2010b). Tone, syntax, and prosodic domains in Luganda. In Downing, L., Rialland, A., Beltzung, J.-M., Manus, S., Patin, C., and Riedel, K., editors, *Papers from the workshop on Bantu relative clauses*, volume 53, pages 69–98. ZAS Papers in Linguistics.
[Itô and Mester, 2013] Itô, J. and Mester, A. (2013). Prosodic subcategories in Japanese. *Lingua*, 124:20–40.
[Jackendoff, 1977] Jackendoff, R. (1977). *X syntax: A study of phrase structure*. Cambridge, MA: MIT Press.

[Julien, 2002] Julien, M. (2002). *Syntactic heads and word formation*. Oxford Studies in Comparative Syntax. Oxford University Press, Oxford.
[Kaisse, 1985] Kaisse, E. (1985). *Connected Speech: The Interaction of Syntax and Phonology*. Academic Press, Orlando.
[Kaji, 2007] Kaji, S. (2007). *A Rutooro vocabulary*. Tokyo: Research Institute for Languages and Cultures of Asia and Africa (ILCAA).
[Kaji, 2009] Kaji, S. (2009). Tone and syntax in Rutooro, a toneless Bantu language of Western Uganda. *Language Sciences*, 31(2-3):239–247.
[Kaji, 2010] Kaji, S. (2010). A comparative study of tone of west ugandan bantu languages, with particular focus on the tone loss in Tooro. In Downing, L., Rialland, A., Beltzung, J.-M., Manus, S., Patin, C., and Riedel, K., editors, *Papers from the workshop on Bantu relative clauses*, volume 53, pages 33–51. ZAS Papers in Linguistics.
[Kaji, 2018] Kaji, S. (2018). From Nyoro to Tooro: Historical and phonetic accounts of tone merger. *Tonal Change and Neutralization*, 27:330.
[Kayne, 1994] Kayne, R. (1994). *The Antisymmetry of Syntax*. Cambridge, MA: MIT Press.
[Keenan, 1987] Keenan, E. L. (1987). A semantic definition of "Indefinite NP". In Reuland, E. and ter Meulen, A., editors, *The Representation of (In)definiteness*, pages 286–317. Cambridge, MA: MIT Press.
[Keenan, 2003] Keenan, E. L. (2003). The definiteness effect: Semantic or pragmatic? *Natural Language Semantics*, 11:187–216.
[Kisseberth and Abasheikh, 2011] Kisseberth, C. and Abasheikh, M. (2011). Chimwiini phonological phrases revisted. *Lingua*, 121(13):1987–2013.
[Kisseberth and Odden, 2003] Kisseberth, C. and Odden, D. (2003). Tone. In Nurse, D. and Philippson, G., editors, *The Bantu Languages*, pages 59–70, Routledge. Routledge Press.
[Koopman and Sportiche, 1991] Koopman, H. and Sportiche, D. (1991). The position of subjects. *Lingua*, 5:211–258.
[Kraljic and Brennan, 2005] Kraljic, T. and Brennan, S. E. (2005). Prosodic disambiguation of syntactic structure: For the speaker or for the addressee? *Cognitive psychology*, 50(2):194–231.
[Kula and Bickmore, 2015] Kula, N. and Bickmore, L. (2015). Phrasal phonology in Copperbelt Bemba. *Phonology*, 32:147–176.
[Lesholo, 2002] Lesholo, R. (2002). *Syntactic domains in Ikalanga*. PhD thesis, University of Michigan, Ann Arbor.
[Meeussen, 1967] Meeussen, A. (1967). Bantu grammatical reconstructions. *Africana Linguistica*, 3:79–121.
[Millotte et al., 2007] Millotte, S., Wales, R., and Christophe, A. (2007). Phrasal prosody disambiguates syntax. *Language and cognitive processes*, 22(6):898–909.
[Milsark, 1974] Milsark, G. (1974). *Existential sentences in English*. PhD thesis, Massachusetts Institute of Technology.
[Milsark, 1977] Milsark, G. (1977). Toward an explanation of certain peculiarities of the existential construction in English. *Linguistic Analysis*, 3:1–30.
[Muriungi, 2009] Muriungi, P. K. (2009). Phrasal movement inside bantu verbs: Deriving affix scope and order in kiitharaka.
[Myrberg, 2013] Myrberg, S. (2013). Sisterhood in prosodic branching. *Phonology*, 30(1):73–124.
[Odden, 1990] Odden, D. (1990). Phonology and its interaction with syntax and morphology. *Studies in the Linguistic Sciences*, 20:69–108.
[Pak, 2007] Pak, M. (2007). Relative clauses without CPs in Luganda.". In Colavin, R., Cooke, K., Davidson, K., Fukuda, S., and Guidice, A. D., editors, *Proceedings of the 37th Western Conference On Linguistics*, pages 189–2011. California: Department of Linguistics, University of California, San Diego.
[Partee, 1975] Partee, B. (1975). Montague grammar and transformational grammar. *Linguistic inquiry*, 6:203–300.
[Persohn, 2017] Persohn, B. (2017). *The verb in Nyakyusa*. Language Science Press, Berlin.
[Pietraszko, 2019] Pietraszko, A. (2019). Obligatory CP nominalization in Ndebele. *Syntax*, 22(1):66–111.
[Preminger, 2014] Preminger, O. (2014). *Agreement and its failures*. MIT Press, Cambridge, MA.

[Price et al., 1991] Price, P. J., Ostendorf, M., Shattuck-Hufnagel, S., and Fong, C. (1991). The use of prosody in syntactic disambiguation. *the Journal of the Acoustical Society of America*, 90(6):2956–2970.

[Prince and Smolensky, 2004] Prince, A. and Smolensky, P. (1993/2004). Optimality theory: Constraint interaction in generative grammar. Technical report, Department of Computer Science, University of Colorado, Boulder, CO.

[Samuels, 2009] Samuels, B. D. (2009). *The Structure of Phonological Theory*. PhD thesis, Harvard University, Cambridge, MA.

[Schafer et al., 2000] Schafer, A. J., Speer, S. R., Warren, P., and White, S. D. (2000). Intonational disambiguation in sentence production and comprehension. *Journal of psycholinguistic research*, 29(2):169–182.

[Schepman and Rodway, 2000] Schepman, A. and Rodway, P. (2000). Prosody and parsing in coordination structures. *The Quarterly Journal of Experimental Psychology Section A*, 53(2):377–396.

[Selkirk, 1986] Selkirk, E. (1986). On derived domains in sentence phonology. *Phonology Yearbook*, 3:371–405.

[Selkirk, 1995] Selkirk, E. (1995). The prosodic structure of function words. In Beckman, J. N., Dickey, L. W., and Urbancyzk, S., editors, *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*. Amherst, MA: Graduate Linguistic Student Association, University of Massachusetts, Amherst.

[Selkirk, 2000] Selkirk, E. (2000). The interaction of constraints on prosodic phrasing. In Horne, M., editor, *Prosody: Theory and Experiment*, pages 231–261. Dordrecht: Kluwer.

[Selkirk, 2011] Selkirk, E. (2011). The syntax-phonology interface. In Goldsmith, J., Riggle, J., and Yu, A. C. L., editors, *The Handbook of Phonological Theory*, pages 435–484. Wiley-Blackwell, 2nd edition.

[Simons and Fennig, 2017] Simons, G. F. and Fennig, C. D., editors (2017). *Ethnologue: Languages of the World, 20 th ed.* Dallas, TX: SIL International.

[Truckenbrodt, 1995] Truckenbrodt, H. (1995). *Phonological Phrases: Their Relation to Syntax, Focus, and Prominence*. PhD thesis, Massachusetts Institute of Technology.

[Truckenbrodt, 1999] Truckenbrodt, H. (1999). On the relation between syntactic phrases and phonological phrases. *Linguistic Inquiry*, 30:219–256.

[Truckenbrodt, 2007] Truckenbrodt, H. (2007). The syntax-phonology interface. In deLacy, P., editor, *The Cambridge handbook of phonology*, pages 435–456. Cambridge, UK: Cambridge University Press.

[Tyler, pear] Tyler, M. (to appear). Simplifying MATCH WORD: Evidence from English functional categories. *Glossa*.

[Wagner, 2005] Wagner, M. (2005). *Prosody and recursion*. PhD thesis, MIT.

[Wagner, 2010] Wagner, M. (2010). Prosody and recursion in coordinate structures and beyond. *Natural Language and Linguistic Theory*, 28:183–237.

[Wasow, 2002] Wasow, T. (2002). *Postverbal behavior*. Center for the Study of Language and Information Publications, Stanford, California.

[Wexler and Culicover, 1980] Wexler, K. and Culicover, P. (1980). *Formal Principles of Language Acquisition*. Cambridge, MA: MIT Press.

[Zeller, 2004] Zeller, J. (2004). Relative clause formation in the bantu languages of south africa. *Southern African Linguistics and Applied Language Studies*, 22(1-2):75–93.

[Zeller, 2013] Zeller, J. (2013). In defense of head movement: Evidence from bantu. *Diagnosing syntax*, pages 87–111.

[Zentz, 2016] Zentz, J. (2016). *Forming Wh-Questions in Shona: A Comparative Bantu Perspective*. PhD thesis, Yale University.