

Issues in the Phonology-Syntax Interface in African Languages

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1. Introduction

Prosodic phenomena in African languages, and most notably Bantu languages, have played – and continue to play – an important role in the development of theories of the phonology-syntax interface. (See, e.g., Cheng & Downing (2009, 2012), Dobashi (2004, 2009, 2010); Hyman & Byarushengo (1984), Kandybowicz (2009), Kanerva (1990), Odden (1987, 1990, 1995), Pak (2008), Seidl (2001), Selkirk (1986, 2000, 2011), Truckenbrodt (1995, 1999, 2007) and several papers in Inkelas & Zec (1990).) A central question for these theories is, as Chen (1990) so neatly puts it, “What must phonology know about syntax?” One finds two leading approaches, which provide two very different answers to this question. *Indirect reference theories* (e.g., Nespor & Vogel 1986, Selkirk 1986, Kanerva 1990, Truckenbrodt 1995) propose that phonology is not directly conditioned by syntactic information. Rather, the interface is mediated by phrasal prosodic constituents, which need not match any syntactic constituent. Only very limited syntactic parameters can be referred to in defining the prosodic constituents. *Direct reference theories* (e.g., Kaisse 1985; Odden 1995; Pak 2008; Seidl 2001), in contrast, argue that phrasal prosodic constituents are superfluous, as phonology can – indeed, must – refer directly to syntactic structure.

In this paper, I first present a brief survey of phrasal processes (mostly tonal) in selected Bantu languages. Then I briefly review how the indirect and direct reference approach account for these syntactic contexts. As we shall see, a challenge for both of these approaches is that reference to non-syntactic factors is necessary to account for phrasing in some languages. A final issue that I will address is the growing importance of experimental methodology in phonology and its implications for work on the phonology-syntax interface.

2. A brief survey of phrasal processes in Bantu languages

From the earliest work on phrasal phonology in Bantu languages – Byarushengo et al. (1976) on Haya and Kisseberth & Abasheikh (1974) on Chimwiini – it has been clear that the syntactic context is an important conditioning factor. In this section, I briefly survey patterns of phrasal phonology in selected Bantu languages.

In some Bantu languages the entire sentence to the right edge of the clause is the domain for some prosodic processes. Languages with this pattern include: Haya (Byarushengo et al. 1976, Hyman & Byarushengo 1984); Northern Sotho (Zerbian 2006, 2007); Kimatuumbi (Odden 1987, 1990, 1995) and Kinyambo (Bickmore 1990). For example, in Haya, one finds one tone pattern on a verb when it is followed by a right-dislocated noun (1c). One finds another tone pattern on a verb when it is followed

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by an in situ object (1a). All preverbal nouns have what Byarushengo et al. (1976) characterize as a phrase-medial tone pattern (1a, b). This tone pattern contrasts with the one found in right-dislocated nouns, as we can see by comparing the tone patterns of ‘snuff’ and ‘Kakulu’ in (b) vs. (c).

(1) Haya phrasing (Byarushengo et al. 1976); Parentheses indicate the boundaries of domains relevant to High tone realization

- (a) *Canonical order* – one assertion = one tone domain
 aba-kázi ba-bon’ ómw-ààna) ‘The women see the child.’
 CL2-woman 2.SM-see CL1-child
- (b) *Left dislocation* – one assertion = one tone domain
 aba-kázi Kakúlw óbu-goló ba-bu-mú-ha)
 CL2-woman CL1.Kakulu CL14-snuff 2SUBJ-14.OM-1.OM-give
 ‘The women, Kakulu, the snuff, they GIVE it to him.’
- (c) *Right dislocation* – right dislocations follow the assertion = in separate tone domain
 a-bu-bón’) óbu-góló) Kakúlu) ‘He SEES it, the snuff, Kakulu.’
 1 SUBJ -14.OM-see CL14-snuff CL1.Kakulu

In Byarushengo et al.’s (1976), Hyman & Byarushengo’s (1984) analysis, this phrasing pattern is accounted for by proposing that the sequence from the beginning of the sentence through the end of the assertion (i.e., the right clause edge) defines a tone realization domain. Right-dislocated elements follow the assertion, and are therefore parsed into separate tone realization domains.

In other Bantu languages, one typically finds a variable domain boundary following a preverbal subject or topic, rather than at the end of the assertion. This pattern is found in, e.g., Chichewa (Kanerva 1990; Downing & Mtenje 2011), Chizigula (Kenstowicz & Kisseberth 1990), Luganda (Hyman & Katamba 1993, 2010; Pak 2008); and Zulu (Cheng & Downing 2009). For example, in Chichewa, the verb phrase (the verb and complements) phrase together, and preverbal or postverbal subjects or (other) topics phrase separately from the VP - data in (2).

(2) Chichewa phrasal tone domains (Kanerva 1990: 103ff; Downing field notes)

- (Subj) (VP)
- (a) (mwaána) (a-na-pézá galú kú dáambo)
 CL1.child 1SUBJ-TAM-found CL1.dog at swamp
 ‘The child found the dog at the swamp.’
- (b) (Malúume) (a-ná-lémbera mkázi kálaata).
 CL1.uncle 1SUBJ-TAM-write to CL1.woman CL5.letter
 ‘Uncle wrote a letter to the woman.’
- (c) (Subj) (VP) (Top)
 (mwaána) (a-na-’m – pézá kú dáambo) (gaálu)
 CL1.child 1SUBJ-TAM-1OM-found at swamp CL1.dog
 ‘The child found it at the swamp, the dog.’
- (d) (Top) (VP) (Subj)
 (a-leenje) (zi-ná-wá-luuma) (njúuchi)
 CL2.hunter 10SUBJ-TAM-2OM-bite CL10.bees
 ‘The hunters, they bit them, the bees [did].’

The phrase boundaries – indicated with parentheses in the data – are motivated by penult vowel lengthening as well as by tone alternations. For example, notice that the word /galú/ ‘dog’ has a short penult vowel and a High tone on the final syllable in (2a), where it is phrase-medial, while the High tone is retracted to the penult mora of the long penult syllable in (2c), where it is phrase-final.

In other Bantu languages every DP (XP) ends a prosodic domain. Languages with this pattern include: Chimwiini (Kisseberth & Abasheikh 1974, 2004; Kisseberth 2010, 2011; Selkirk 1986, 2011); Tsonga (Kisseberth 1994); Tumbuka (Downing 2011, to appear). This pattern is illustrated for Chimwiini in (3):

- (3) Chimwiini phrasal accent (Kisseberth 2011: 114); note that vowel length is contrastive
- (a) Bázi / m-pele mw-áana / khalámu
 Bazi OP-give child pen
 ‘Bazi gave the child a pen.’
- (b) Núuru / pakize gáari / ma-jíwe
 Nuuru load truck stones
 ‘Nuuru loaded the truck with stones.’
- (c) mw-aalímu / m-andikilíle mw-áana / kháti
 teacher OP-write.for/to child letter
 ‘The teacher wrote a letter for/to the child.’
- (d) chi-buku ch-uziizá / n-chha Núuru ‘The book that was sold / belongs to Nuuru.’
- (e) n-uzize chi-buku ch-a Nuurú / m-bozelo mw-aaná
 ‘I sold the book that Nuuru / stole from the child.’

The phrase boundaries – ‘/’ indicates phrasing – are motivated by vowel length alternations (vowel length is contrastive) and by accent; every phrase is accented on either the penult syllable (default) or the final (in specific grammatical contexts).

The generalization that emerges from this brief survey is that phrasal prosody often serves to highlight particular syntactic constituent edges. Prosodic phrase boundaries fall at the right edge of the CP (clause) in languages like Haya; at the left and/or right edge of the *vP* (verb plus complements) in languages like Chichewa; and at the right edge of the XP (i.e., noun phrases) in languages like Chimwiini.

3. Accounting for the data: indirect and direct reference approaches

In this section, I sketch how indirect and direct reference approaches to the phonology-syntax interface could account for the patterns illustrated in section 2.

3.1. Edge-based approach (indirect reference)

A leading indirect theory of prosodic domains, Edge-based alignment theory, developed in work like Selkirk (1986, 1995, 2000) and Truckenbrodt (1995, 1999, 2007), takes the frequent match between an edge of a major syntactic constituent and an edge of a prosodic phrasal constituent as its founding tenet. That is, it proposes that phonology needs to know very little about syntax: prosodic parsing algorithms are only informed by where the edge – right or left – of major constituents, like XP, *vP* and CP are located in the string. Phonological processes refer to prosodic constituents, not directly to syntactic information.

The repertoire of prosodic constituents is limited in this theory to just those found in the Prosodic Hierarchy (Selkirk 1986, 1995; Truckenbrodt 1995, 2007; Elfner 2012): Phonological Phrase, Intonation Phrase and Phonological Utterance. Phonological Phrase aligns to XP (lexical projections), while Intonation Phrase aligns to CP (functional projections). Recent Edge-based OT analyses of prosodic phrasing demonstrate how effectively this minimalistic approach accounts for phrasal phenomena in Bantu languages like: Chimwiini, Chichewa, Haya and Kimatuumbi (Cheng & Downing, 2012; Downing 2010, 2011; Downing & Mtenje 2011; Kisseberth 2010, 2011; Truckenbrodt 1995, 1999, 2007); Northern Sotho (Zerbian 2006, 2007); and Zulu (Cheng & Downing 2009).

3.2. Direct reference approaches

In direct reference theories, prosodic constituents are considered a superfluous extra layer of structure, as phrasal phonological processes can – even must – be formalized by referring directly to syntactic information. Work like Odden (1995) points out two general problems with the Edge-based approach that argue in favor of a direct reference approach. First, for languages with complex phrasal phonology, the prosodic phrase types provided by the Prosodic Hierarchy (e.g., Phonological Phrase,

Intonation Phrase, Phonological Utterance) might not be enough levels. Secondly, phrasal phonology is often sensitive to more specific morphosyntactic information than just the edges of major syntactic constituents.

Tsonga (Kisseberth 1994) illustrates both of the problems, as Odden (1995) demonstrates. The data in (4) shows that the verb's High tone spreads to the penult of the first following unmodified object noun of affirmative verbs. (The High tone spread (HTS) span is underlined in the Tsonga data below):

(4) Tsonga tone domains (Kisseberth 1994: 148)

- (a) vá-xávélá mú-nhu tin-guuvu
 They-buy for person clothes
 'They are buying someone clothes.'
- (b) Ndzi-nyíka xí-kóxa nyaama
 I-give old woman meat
 'I am giving an old woman meat.'
- (c) ndzi-kómbélá xí-phúkúphúkhu n-guluuve
 I-ask for fool pig
 'I am asking a fool for a pig.'

However, we find a different pattern with negative verbs. As shown in (5a, b), the grammatical High tone of the negative verb is realized through the final vowel of the entire verb phrase if both following objects are toneless:

(5) Tsonga Negative VPs (Kisseberth 1994: 150, 162, 163)

- (a) a-vá-xav!élí xí-kóxá nyáámá
 NEG-they-buy old woman meat
 'They are not buying meat for the old woman'
- (b) a-ndzí-nyíkí mú-fáná tí-n-gúúvú
 NEG-I-give boy clothes
 'I am not giving the boy clothes'

The difference in the extent of High tone spread in these two data sets shows that phrasal processes must refer to specific morphosyntactic information like the difference between affirmative and negative verbs.

The data in (4) and (5) illustrate another phrasal rule of Tsonga, namely, phrase penult vowel lengthening. As Odden (1995) points out, the domain for this process, like the domain of High tone spread of negative verb tone, is often distinct from that of High tone spread to the penult (HTS). For example, in (4), the domain for HTS is the verb plus first object noun while the domain for lengthening is the entire sentence.

In short, Tsonga presents two types of problems for an indirect reference approach. In languages where we find several phrasal processes and each process takes a slightly different domain we seem to require more domains than those provided by the Prosodic Hierarchy. (See, though, Selkirk (2011) for a reanalysis of Tsonga phrasal prosody which appeals to domain recursion to account for this problem.) Further, some processes must refer to specific morphosyntactic information, like negative aspect, to determine the phrasal domain, not just constituent edges.

Work like Pak (2008) develops a different sort of argument in favor of direct reference theories, from current phase-based syntactic theory. In strictly phase-based approaches to the phonology-syntax interface, prosodic domains are directly defined by syntactic spell-out domains. (The spell out domain is the complement of the head of a phase.) Therefore, there is no need for a set of phrasal prosodic constituents (e.g., Phonological Phrase, Intonation Phrase) independent from syntactic ones. Each spell-out domain is by definition a domain for the application of phonological processes (i.e., phonological interpretation). Phrasal phonological processes are only conditioned by these syntactically-defined (spell out) domains.

3.3. Comparing Edge-based (indirect) vs. phase-based (direct) prosodic domains: a case study from Chichewa

In this section I compare the Edge-based (indirect) and phase-based (direct) approaches with a case study from Chichewa phrasal prosody. As we saw in (2), above, the generalization for Chichewa phrasing is that *vPs* form a separate prosodic phrase from preverbal or postverbal topics/subjects. The phrasing predicted by the two approaches is illustrated with sentence (2d), repeated below for convenience, which has a preverbal and postverbal topic:

- (6) (Top) (VP) (Subj)
 (a-leenje) (zi-ná-wá-luuma) (njúuchi)
 CL2.hunter 10SUBJ-TAM-2OM-bite CL10.bees
 ‘The hunters, they bit them, the bees [did].’

An Edge-based analysis of this pattern requires the simple Edge-based constraint below:

- (7) *Right edge alignment* (Cheng & Downing 2009; Downing 2010; Downing & Mtenje 2011):
 The right edges of prosodic phrases consistently align with right CP (phase) edges.

Postverbal topics/subjects are syntactically adjoined outside the right CP edge. Therefore, they are necessarily preceded by a prosodic phrase boundary, as shown in (8). Preverbal subjects and preverbal topics would be expected to phrase with what follows following the alignment constraint in (7), as they precede the first CP right phase edge. To account for the fact that they phrase separately from the *vP* in Chichewa, I propose, following Cheng & Downing (2009), that they are CP-external (topicalized), with the structure in (8):

- (8) Topicalized subject/preverbal topic: [Topic] ([CP
 [CP (a-leenje) [CP (zi-ná-wá-luuma)] (njúuchi)]

Preverbal topics/subjects are, in fact, proposed to be attached on a separate plane from an adjacent *vP/CP*: cf. Chomsky (2004); see also An (2007). Only elements in the same plane can be parsed into the same prosodic phrase.

A phase-based analysis *à la* Pak (2008) could also derive the correct phrasing, by different means. In this approach, each spell-out domain equals a prosodic domain. The spell-out domain (TP) of the clause in (6), forms its own prosodic phrase. Constituents outside this spell-out domain – preverbal subjects and topics, as well as postverbal topics – are necessarily prosodified separately:

- (9) [CP [CP (a-leenje) [TP (zi-ná-wá-luuma)]] (njúuchi)]

As we can see, for simple sentences, both approaches derive the correct phrasing. However, for relative clauses, only the Edge-based analysis derives the correct phrasing. In a standard Kaynian head-raising analysis, the head of the restrictive relative clause is within the relative CP, while the head and complementizer are outside the spell-out domain of the relative CP. The example from English in (10), below, where the spell-out domain is bolded, makes the crucial aspects of the representation clear:

- (10) Restrictive relative clause syntactic structure
 ‘We invited [DP the [CP students [C' who [IP **Tracy taught to ski**]]] to visit the Alps.’

A direct approach to prosodic domains *à la* Pak (2008) predicts that a restrictive relative clause should form an independent prosodic domain from the matrix clause because each spell out domain is an independent prosodic domain.

The Chichewa data in (11) shows this prediction is incorrect. There is no prosodic break separating the head of the relative clause and the relative complementizer from the relative clause, as expected from (10). Instead, we find a prosodic domain break following the relative clause (not preceding). Note that this is exactly as expected in the Edge-based analysis in (7), above, where prosodic phrases right-align with phase edges (vP or CP):

(11) Chichewa relative clauses (Downing 2010; Downing & Mtenje 2011)

- (a) (m-waná wá súkúlú a-ná-lémba káláta
 CL1-child CL1.POSS CL9.school 1SBJ-PAST2-write CL5.letter
 kwá á-nyúuzi)
 for 2-newspaper
 ‘A student wrote the letter for the newspaper.’
- (b) (m-waná wá súkúlú a-ná-lémba [káláta i-méné
 CL1-child CL1.POSS CL9.school 1SUBJ-PAST2-write CL5.letter CL9-REL
 m-phunzitsi á-ná-weléenga]) (kwá á-nyúuzi).
 CL1-teacher 1SBJ-PAST2-read for CL2-newspaper
 ‘A student wrote [the letter which the teacher read] for the newspaper.’
- (c) (Subj) (VP) Kanerva (1990: 103, fig (114b))
 (mwaána) (a-na-pézá galú kú-dáambo).
 CL1.child 1SBJ-PAST1-find CL1.dog LOC-5.swamp
 ‘The child found the dog at the swamp.’
- (d) (ti-ku-gáníza kutí m-nyamatá á-pézá [galú
 WE-PROG-think that CL1-boy 1SBJ.FUT-find CL1.dog
 a-méné á-ná-mu-sowéetsa]) (ku-dáambo).
 CL1-REL 1SBJ-PAST2-1OBJ-lose LOC- CL5.swamp
 ‘We think the boy will find [the dog which he lost] in the swamp.’

To sum up this section, we can see why the merits of the indirect and direct approaches continue to be debated. Current direct approaches to the interface cast within phase-based syntax cannot account for a range of prosodic phrasing data, especially in complex sentences. However, indirect approaches cannot easily account for phrasal processes which are conditioned by specific morphosyntactic constructions, like sentences containing negative verbs.

4. Non-syntactic factors conditioning prosodic phrasing

Up until this point in the paper, we have only discussed the syntactic factors which condition phonological phrasing. In this section, we shall see that non-syntactic factors also affect phrasing.

4.1. Phonological factors: branchingness and minimality

The syntactic properties of a string are not all that phonology needs to know to define the contexts for phrasal tone domains. It has been recognized since the earliest work on phrasal phonology – e.g., Nespor & Vogel (1986) – that the phrasing of, especially, noun phrases, can be conditioned by whether or not the noun is modified. Non-modified noun phrases (non-branching, subminimal) tend to be phrased with adjacent material, while modified noun phrases are not.

Bickmore (1990) demonstrates this pattern for Kinyambo. Data like that in (12) illustrate the phrasal process of High tone deletion (HTD): the rightmost High tone of a word is deleted if the following word has a High tone. The examples in (12a) and (12c) show that the entire sentence can be contained in the domain of HTD if none of the XPs contained in it branch. Examples (12b) and (12d) show that a branching XP (underlined>, however, is not phrased with what follows:

(12) Kinyambo (Bickmore 1990: 14-15); HTD motivated phrasing is indicated with parentheses

- (a) (ba-kuru bá-ka-júna).
Mature ones helped
'The mature ones helped.'
- (b) (Aba-kozi bakúru) (bá-ka-júna).
Workers mature helped
'The mature workers helped.'
- (c) (Nejákworech' ábakoz' émbwa.)
s/he will show workers dog
'He will show the workers the dog.'
- (d) (Nejákworech' ómukama w'ábakózi) (émbwa).
s/he will show chief of workers dog
'He will show the chief of the workers the dog.'

To see the effect of modifying a noun phrase on prosodic phrasing, we can compare the tone on *bakuru* 'mature (ones)' in (a) vs. (b). In (a), *bakuru* is the head of a non-modified noun phrase. It therefore can phrase with the following verb and loses its High tone due to HTD. In (b), *bakuru* modifies the noun *abakozi* 'workers'. (Note that *abakozi* loses its High tone due to HTD, as it phrases with *bakuru*.) Since the subject noun phrase is modified, it cannot prosodically phrase with the verb, and *bakuru* retains its penult High tone.

In Tsonga, we also find that modifying a noun affects its prosodic phrasing. Recall from (4), above, that a nominal object phrases prosodically with a preceding verb for the process of High tone spread (HTS). However, as shown in (13), if the nominal object is modified, HTS does not apply (' indicates where HTS fails to apply):

- (13) Tsonga (Kisseberth 1994, p. 157, fig (27))
- (a) hi-vóné | ti-n-guvu lé-ti-nyíngí 'We saw many clothes.'
we-saw clothes many
- (b) ndzi-lává | ti-m-balelo ti-m-birhí 'I want two laths'.
I-want laths two
- (c) ndzi-vóná n-gúlú:ve 'I see a pig'
I-see pig
- ndzi-vóná | n-guluve y!á we:n!á 'I see your pig'
I-see pig your

A final example of the effect of modifying a noun on prosodic phrasing comes from Chichewa. Recall from (2) and (11), above, that all verbal complements phrase with a preceding verb when the nominal complement is not modified. However, as shown in the data below, every nominal modifier is followed by a phrase break, and the entire vP-internal no longer forms a single prosodic phrase:

- (14) Chichewa (Downing & Mtenje 2011)
- (a) (A-ná-ménya nyumbá yá í-kúulu) (ndí mw-áálá).
s/he-TAM-hit CL9.house 9.of 9-big with CL3-rock
'S/he hit a big house with a rock.'
- (b) (M-nyamatá a-ná-ménya nyumbá yá-pá-kóona) (ndí mw-áálá).
CL1.boy 1SUBJ-TAM-hit CL9.house 9.of-LOC-corner with CL3-rock
'The boy hit the house on the corner with a rock.'

- (c) (alendó a-na-dyétsa a-nyaní nsóomba.)
 CL2.visitor 2SUBJ-TAM-feed CL2-baboon CL10-fish
 ‘The visitors fed the baboons fish.’
- (d) (alendó a-na-dyétsa a-nyaní á m-fúumu) (nsóomba.)
 CL2.visitor 2SUBJ-TAM-feed CL2-baboon 2.of CL9-chief CL10-fish
 ‘The visitors fed the chief’s baboons fish.’
- (e) (A-lendó a-na-dyétsá a-nyaní á-saanu) (á-á-kúulu) (nsóomba).
 CL2.visitor 2SUBJ-TAM-feed CL2-baboon CL2-five CL2.of- CL2-big CL10-fish
 ‘The visitors fed five big baboons fish.’

There are several analyses of this pattern – unsurprisingly, since the details of the effects of nominal modification are somewhat different from language to language, and the authors of the analyses have different theoretical commitments. (See, e.g., Bickmore 1990; Dobashi 2004, 2010; Downing & Mtenje 2011; Selkirk 2011 for a sampling of approaches.) Where the analyses agree is in acknowledging that this phrasing is not motivated by syntactically-grounded principles. From the point of view of syntax, the internal structure of a noun phrase should not be relevant to its prosodic phrasing. It remains an open issue how to incorporate non-syntactic motivations for phrasing into theories – both direct and indirect – that assume that syntax is the main conditioning factor. This observation makes the pattern a challenge for both direct and indirect approaches, which assume that syntax is the principal factor conditioning prosodic phrasing.

4.2. Information structure and prosodic phrasing

Cross-linguistically, information structure roles – like focus and topic – often condition prosodic prominence and related phrasing. (See Gussenhoven 2004, Ladd 2008 for introductions.) For example, in English, the answer to a question is prosodically prominent, and following (repeated, given) material is reduced:

- (15)
 (a) What broke the window?
 (b) THE WIND broke the window.

As far as I know, analogous use of obligatory prosodic prominence or prosodic phrasing to signal focus is not used in Bantu or other African languages. (See Downing, to appear, for an overview.) Instead, focused or topicalized elements often are required to occur in particular syntactic positions, and these positions can coincide with prosodic phrase boundaries.

For example, in Zulu, topics occur in preverbal position while (most) focused verbal complements occur in Immediately after the Verb (IAV) position (Cheng & Downing 2009). Both preverbal topics and focused IAV elements are followed by a phrase break and receive phrasal stress, as illustrated in (16), below.

(16) Zulu phrasing (Cheng & Downing 2009); focused words are underlined

- (a) Q [CP (Ú-si:pho) [CP [VP (ú-yí-phékéla ba:ni)] (ín-ku:khu)]
 CL1-Sipho SM1-OM9-cook.for CL1.who CL9-chicken
 ‘Who is Sipho cooking the chicken for?’
- A [CP (Ú-síph’ [VP ú-yí-phékél’ ízi-vakâ:sh’)] (ín-ku:khu)]
 CL1-Sipho SM1-OM9-cook.for CL8-visitor CL9-chicken
 ‘Sipho is cooking the chicken for the visitors.’
- (b) Q [CP [VP (u-wa-thwéle ngâ:n’)] (amá-tha:nga)]
 You-OM6-carry how CL6-pumpkin
 ‘How are you carrying the pumpkins?’
- A [CP (amá-tha:nga) [CP [VP (si-wa-thwéle ngó-bhasikí:di)]]
 CL6-pumpkin we-OM6-carry with.CL1a-basket
 ‘We are carrying the pumpkins with a basket.’

However, this phrasing is not directly due to the information structure status of focused or topicalized elements. Rather, Cheng & Downing (2009) argue that the syntactic structure predicts the attested Zulu phrasing. Preverbal Topics are clause external in Zulu, as in many Bantu languages – see (8), above. Focused elements in IAV ‘position’ in Zulu are vP final (and often sentence-final), as non-focused verbal complements are obligatorily dislocated. (Object marking on the verb (bolded) is one piece of evidence that non-focused objects are dislocated.) Since focused postverbal complements must be in phase-final position (recall that vP is a phase), an Edge-based analysis right-aligning prosodic phrases with phase (vP or CP) edges straightforwardly derives a prosodic phrase break following an IAV focused element. Recall from (8), above that clause-external topics are excluded from this prosodic phrase for syntactic reasons.

4.3. A closer look at Chichewa focus phrasing (Downing & Pompino-Marschall, to appear)

Based on Kanerva’s (1990) pioneering study, Chichewa is regularly cited in the focus intonation literature (see, e.g., Hyman 1999, Gussenhoven 2004, Ladd 2008) as *the* example of a language where the prosodic correlate of in situ focus is phrasal stress (i.e., penult lengthening). This focus-conditioned phrasing pattern is illustrated in (17), below. Note that the underlined focused words have penult lengthening in this speaker’s pronunciation (elicited in non-experimental conditions):

- (17) Focus phrasing in Chichewa (Downing et al. 2004)
- (a) *Broad focus* [Context: ‘What happened?’]
 Malúme a-ná-lémbera mkázi kálaata
 CL1.uncle 1SUBJ-PAST-write CL1.woman CL5.letter
 ‘Uncle wrote a letter to the woman.’
- (b) *Narrow focus on first verbal complement (underlined)*
 Q Who did uncle write a letter to?
 Malúme a-ná-lémbera ndaání kálaata
 CL1.uncle 1SUBJ-PAST-write who CL5.letter
- A Uncle wrote a letter to the woman.
 Malúme a-ná-lémbera mkáazi kálaata
 CL1.uncle 1SUBJ-PAST-write CL1.woman CL5.letter

Surprisingly, no systematic follow-up phonetic study of Chichewa has investigated the focus prosody reported in Kanerva (1990). To fill this gap, Bernd Pompino-Marschall and I recently carried out a study with the cooperation of Al Mtenje and his students and colleagues at the University of Malawi. We summarize this experiment briefly below. (See Downing & Pompino-Marschall, to appear, for detailed discussion.)

Method

We elicited focus prosody by means of Q/A pairs like those in (18). (Note that the *input* tone and vowel length are cited here; words in narrow focus are underlined):

- (18) (a)=broad focus; (b)=subject focus; (c)=object focus; (d)=verb focus
- (a) Q /Chí-na-chítíka ndi chi-yáni/
7SUBJ-TAM-happen COP CL7-what
'What happened?'
- A /Mwaná a-ná-menya nyumbá ndí mwalá/
CL1-child 1SUBJ-TAM-hit CL9.house withCL3.rock
'The child hit the house with a rock.'
- (b) Q /Ndaní á-na-menyá nyumbá ndí mwalá/
1.who 1SUBJ.REL-TAM-hit CL9.house with CL3.rock
'Who hit the house with a rock?'
- A /Mwaná a-ná-menya nyumbá ndí mwalá/
CL1-child 1SUBJ-TAM-hit CL9.house withCL3.rock
'The child hit the house with a rock.'
- (c) Q /Mwaná a-ná-menya chi-yáni ndí mwalá/
CL1-child 1SUBJ-TAM-hit CL7-what withCL3.rock
'What did the child hit with a rock?'
- A /Mwaná a-ná-menya nyumbá ndí mwalá/
CL1-child 1SUBJ-TAM-hit CL9.house withCL3.rock
'The child hit the house with a rock.'
- (d) Q /Mwaná a-ná-menya kapéna ku-génda nyumbá ndí mwalá/
CL1-child 1SUBJ-TAM-hit or INF-hit CL9.house withCL3.rock
'Did the child hit (by pounding) or hit (by throwing) the house with a rock?'
- A /Mwaná a-ná-menya nyumbá ndí mwalá/
CL1-child 1SUBJ-TAM-hit CL9.house withCL3.rock
'The child hit the house with a rock.'

The subjects (7 analyzed), all undergraduates at the University of Malawi and native speakers of Chewa, read a set of Q/A pairs (24 in all) a total of 10 times, randomly presented using PRAAT (Boersma & Weenink). They were instructed to read the statements in the way that sounded most natural (i.e., pragmatically appropriate) as an answer to the paired question. Two Chewa native speaker linguist observers monitored the recording sessions.

Expected results

The list of positions where penult lengthening=phrasal stress is expected, based on (Kanerva 1990, Downing et al. 2004, Downing & Mtenje 2011) is listed in (19):

- (19)
- variably, the subject (if topicalized);
 - sentence-final/pre-pausal word (culminative lengthening);
 - words in narrow focus.

Actual results

The Table in (20) shows that the results we got are different from what we expected in sentences with in situ narrow focus. (This table summarizes the mean results across all subjects):

(20) Penult vowel durations under different focus conditions: mean (sd) [in ms] in parentheses, followed by lengthening ratio with respect to pword final vowels

subject	focus	mwaná	a-ná-ménya	nyumbá	ndí mwáálá
all	broad	116.967 (32.241) 1.792	64.183 (25.188) 0.842	72.512 (20.105) 0.805	129.949 (22.314) 1.400
all	verb	114.555 (27.233) 1.793	63.931 (27.359) 0.934	58.504 (17.047) 0.743	132.821 (20.826) 1.423
all	object	118.180 (28.391) 1.802	63.165 (23.989) 0.869	63.488 (19.180) 0.748	134.236 (24.141) 1.489

As this table illustrates, (a) in statements with broad focus, long penult vowels are clearly seen for the first and last phonological word (pw). Compared to the word final vowels, the length ratio for the first pw varies between ca. 1.5 and 2.5. Due to the extra lengthening of the utterance final vowel, this length ratio is generally less for the last pw (again ranging between 1.5 and 2.0 for most subjects). (b) in situ focus on the verb (pw 2) or object (pw 3) does not result in consistent penult lengthening in the focused word. Within one sentence type, the last pw in general shows the longest penult vowel. While it sometimes does not differ significantly from the penult of pw 1, it does differ significantly from pw 2 and pw 3 whether they are focused or not.

To sum up, Downing & Pompino-Marschall (to appear) find the following matches and mismatch between expected positions of penult lengthening (PL) listed in (19) and the actual results presented in (20):

(21)

Position	Result	Matches expectation?
subject	variable PL	expectation matched
sentence-final word	consistent culminative PL	expectation matched
word in narrow focus	no consistent PL	EXPECTATION FAILS

The conclusion we draw from this mismatch is that Chichewa does not have obligatory focus prosody. We propose that the phrasal stress (i.e. penult lengthening) that Kanerva (1990) and Downing et al. (2004) found on words with in situ focus is best explained as non-grammatical emphasis prosody. (See Downing & Pompino-Marschall, to appear, for detailed motivation of this point.)

5. General conclusions

In this paper, I have aimed to show why it is no surprise that African languages – in particular, Bantu languages – have been analyzed and reanalyzed by linguists interested in the phonology-syntax interface. We find data that is relevant for a range of central issues:

- What does phonology need to know about syntax?
- Is prosodic constituency with limited access to syntactic structure necessary and sufficient to define the domains for High tone realization?
- Do independently-motivated syntactic constituents and principles adequately define phonological domains?
- How do new syntactic theories (like syntactic phases) bear on these questions?
- How can non-syntactic factors on prosodic phrasing be accommodated into theories of the phonology-syntax interface?
- How can new methodologies for eliciting and analyzing data shed new light on familiar languages?

The African language data illustrating these issues is complex enough that one can confidently predict that linguistic theories will be wrestling with these fascinating questions for some time to come.

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