



UNIVERSITY OF GOTHENBURG

This is an author produced version of a paper published in **Natural language and linguistic theory**

This paper has been peer-reviewed but does not include the final publisher proof-corrections or journal pagination.

Citation for the published paper:

Downing, L; Pompino-Marschall, B

The focus prosody of Chichewa and the Stress-Focus constraint: a response to Samek-Lodovici (2005)

Natural language and linguistic theory, 31 (3) s. 647-681

<http://dx.doi.org/10.1007/s11049-013-9192-x>

Access to the published version may require subscription. Published with permission from: **Springer**

GUP

Gothenburg University Publications

<http://gup.ub.gu.se>

The focus prosody of Chichewa and the Stress-Focus constraint:

A response to Samek-Lodovici (2005)

Laura J. Downing (ZAS) & Bernd Pompino-Marschall (HU)

accepted, *NLLT*

1 Introduction

Samek-Lodovici (2005) contributes to a well-established tradition of work on the prosody-focus interface, which proposes that, cross-linguistically, there is a necessary correlation between culminative prosodic prominence and focus. Samek-Lodovici formalizes the strong form of the correlation as the OT interface constraint in (1):

(1) STRESS-FOCUS (Samek-Lodovici 2005: 697):

For any XP_f and YP in the focus domain of XP_f , XP_f is prosodically more prominent than YP .

In other words, a focused element (XP_f) is required to have the culminative degree of some suprasegmental feature which correlates with prominence – pitch, duration and/or amplitude or intensity – in its domain: prosodically, the Intonation Phrase and syntactically, the sentence. This principle is, in fact, widely assumed, and variations on it are found in work like Buring (2010), Féry & Lodovici (2006), Frota (2000), Gussenhoven (1984, 1996, 1999), Jackendoff (1972), Reinhart (1995), Roberts (1998), Rochemont & Culicover (1990), Rooth (1992, 1996), Selkirk (1984, 1995, 2004), Szendrői (2003), Truckenbrodt (1995, 2005), and Zubizarreta (1998), to name just a few.

As Samek-Lodovici (2005) persuasively demonstrates, formalizing the STRESS-FOCUS correlation as a constraint that can interact with both syntactic and prosodic constraints provides an elegant analysis of why sentence stress and focus align in both Italian and English, even though the languages use different means to achieve this alignment. In both English and Italian ‘normal’ sentence stress is sentence-final:

(2) Sentence-final stress and focus (Samek-Lodovici 2005: 688)

(a) English: [John has LAUGHED.]_f Context: What happened?

(b) Italian: [Gianni ha RISO.]_f Context: What happened?

If the subject (canonically sentence-initial in both languages) is narrowly focused, sentence stress ‘moves’ to be realized on the subject in English (3a), while the subject ‘moves’ to be realized in the position of sentence stress in Italian sentences like those in (3b), below:

We would like to thank, first of all, the students who participated in the experiment reported on in this paper. We also are grateful to the following people involved in the experiment: Al Mtenje and Peter Kishindo for help in preparing the Chichewa materials, choosing students and supervising the recordings; Ellen van Zanten for help in preparing materials and carrying out the recordings; Paul Boersma for technical assistance in setting up the presentation of the material to record on PRAAT. We thank the Centre for Language Studies, Zomba, Malawi, for their hospitality during research visits to Malawi. This work was supported (in part) by the Bundesministerium für Bildung und Forschung (BMBF) (Grant Nr. 01UG0711) and an ANR/DFG French-German cooperation grant (BantuPsyn). We are grateful to the audiences of CALL 40, TIE4, the PJ workshop, and OCP8 for discussion, in particular Yiya Chen, Gorka Elordieta, Carlos Gussenhoven, Larry Hyman, Frank Kügler, Michael Rochemont and Lisa Selkirk. Finally, we would like to thank Michael Kenstowicz and the anonymous reviewers for detailed comments which improved both the content and presentation of the paper. The usual disclaimers apply.

- (3) Subject focus (Samek-Lodovici 2005: 688)
- (a) English: JOHN_F has laughed. Context: Who has laughed?
- (b) Italian: Ha riso GIANNI_F. Context: Who has laughed?
Has laughed John.

Samek-Lodovici (2005) accounts for these facts by proposing that Italian allows (even requires in some cases) syntactic movement to satisfy the STRESS-FOCUS constraint, as the position of sentential stress is relatively rigid (i.e., [-plastic] in Vallduví's (1991) terms), while syntax is flexible. In contrast, English requires sentential stress to move, as syntactic position is relatively rigid, while the position of sentential stress is flexible (i.e., [+plastic]). OT's principle of factorial typologies allows this difference to be formalized through the relative ranking of the STRESS-FOCUS constraint with constraints on syntactic movement and sentence stress assignment.¹

As Samek-Lodovici (2005, 2006) notes, Chichewa focus prosody is problematic for the STRESS-FOCUS constraint in (1), because words with in situ focus do not bear sentence level stress, according to Kanerva's (1990) description. Since OT constraints are, in principle, freely rankable (see, e.g., Prince & Smolensky 2004), it would seem that the most straightforward way to fit Chichewa into a factorial typology would be to propose that the STRESS-FOCUS constraint can be low enough ranked in some languages as to have no effect on the grammar.

However, Samek-Lodovici (2005, 2006), like most of the authors cited above, assumes that all languages satisfy the STRESS-FOCUS constraint in some form. That is, in OT terms this constraint has a fixed (harmonic) ranking high enough for its effects to be felt in all languages. To account for Chichewa, then, Samek-Lodovici (2005, 2006) proposes that, in essence, Chichewa does not have culminative focus prosody because it does not have culminative sentential prosody. Formally put, instead of having a single head at the Intonation Phrase level, each Phonological Phrase head in Chichewa projects its headedness to the next level to satisfy the following constraint:

- (4) STRESSXP_{All} (Samek-Lodovici 2005: 737):
 A lexically headed XP must contain phrasal stress across all layers of the prosodic hierarchy.

This constraint is optimally satisfied, if the heads of all of the Phonological Phrases – including, of course, one containing a focused element – have the same level of metrical prominence at the Intonational Phrase (and Utterance) level, as shown below:

- (5) Samek-Lodovici (2005: 737, T25a)

(anaméeny_F) (nyuúmba) (ndí mwáála)
 (x) (x) (x) PhonPhrase
 (x x x) IntonPhrase

¹ Samek-Lodovici's (2005) formalizes in OT terms a long-standing proposal that the syntactic derivation of the position of focused elements in many languages has the effect of satisfying the STRESS-FOCUS correlation. See work like Elordieta (2007a, b), Engdahl & Vallduví (1996), Face & D'Imperio (2005), Szendroï (2003), Vallduví (1991), Vallduví & Engdahl (1996), and Zubizaretta (1998) for further discussion.

That is, in languages like Chichewa where $\text{STRESSXP}_{\text{All}}$ is high ranked, all Phonological Phrase heads – not just some – must be (equally) metrically prominent at the Intonation Phrase level.

The metrical representation in (5) allows Chichewa to satisfy a weaker form of the STRESS-FOCUS constraint, SF', formalized below:

(6) SF' (Samek-Lodovici 2005: 738; 2006: fig. (16))

Let XP_f be a focused phrase, then for any unfocused YP in the focus domain of XP_f , XP_f is at least as prosodically prominent as YP.

A focused element in Chichewa satisfies this weaker version of the STRESS-FOCUS constraint, if it is true that it and all other Phonological Phrase heads share culminative prosodic prominence at the IP level, satisfying $\text{STRESSXP}_{\text{All}}$ (4).

In this response we critique two claims that Samek-Lodovici's (2005) analysis of Chichewa crucially depends on. First, we show that the claim that Chichewa does not have culminative sentence level (IP-level) stress conflicts with phonetic studies showing Chichewa has fixed culminative stress on the IP-final foot which is not affected by the position of focus. Secondly, we show that the claim that all languages satisfy either the strong version of the STRESS-FOCUS constraint in (1) or the weaker version in (6) has numerous counterexamples, including Chichewa.

The argument is organized as follows. In section 2, we provide background on the expected prosody of sentences in broad focus and with VP-internal in situ focus, based on previous studies. These studies show that Chichewa has fixed culminative prominence on the Intonation Phrase-final penult in all focus conditions, *contra* Samek-Lodovici's characterization of Chichewa sentence prosody. In section 3, we present a controlled focus elicitation experiment that we carried out in Malawi, and show that preliminary results confirm Chichewa has culminative stress that is not affected by the position of focus. In contrast to Kanerva's (1990) well-known study, we found no consistent effect of focus on prosodic phrasing in our data. In section 4, we argue that the Focus Phrasing reported in some previous studies is best understood as optional emphasis prosody (in the sense of work like Hartmann (2008) and Ladd (2008)) rather than obligatory focus prosody. In section 5 we show that many languages are, like Chichewa, exceptions to the STRESS-FOCUS correlation that Samek-Lodovici posits to be a universal. We adopt the proposal – developed in work like Elordieta (2007a,b), Face & D'Imperio (2005), Ladd (2008: 251-253) and Zerbian (2006: 165-168) – that the STRESS-FOCUS constraint, in either its strong or weak form, must therefore be able to be ranked low enough that it need not have an effect on the grammar of all languages (in all contexts).

2 Focus phrasing reported in previous studies of Chichewa

Chichewa is a Bantu language (N30), a major language of Malawi, and it is a tone language, like most Bantu languages (Kisseberth & Odden 2003). As demonstrated in some detail in Kanerva (1990) and Bresnan & Kanerva (1989), lexical (and grammatical) High tone realization is conditioned by phonological processes which take the Phonological Phrase as their domain. Kanerva (1990) argues that two main factors define the edges of Phonological Phrases in Chichewa: syntax and focus. Syntax determines the prosodic phrasing under neutral (or broad) focus. In the analyses of Bresnan & Mchombo (1987), Bresnan & Kanerva (1989), Kanerva (1990) and Mchombo (2004), sentences (S) in Chichewa have three main subconstituents – an optional subject NP, an obligatory VP, and an optional topic NP – which can be freely ordered. The VP consists of the verb and all its complements. Each of these three constituents, when they co-occur, is parsed into its own prosodic phrase. As shown in

(7b) and (7c), topicalized NPs are in a distinct syntactic and Phonological Phrase, and can occur in either order with respect to the VP. Phonological Phrases are indicated with parentheses in all the data which follows:²

- (7)
- (a) (Subj) (VP) – Kanerva (1990: 103, fig (114b))
 (mwaána) (a-na-pézá galú kú-dáambo)
 1.child 1SBJ-TAM-find 1.dog LOC-swamp
 ‘The child found the dog at the swamp.’
- (b) (Subj) (VP) (Top) – (Kanerva 1990: 107, fig (123b))
 (mwaána) (a-na-m-pézá kú-dáambo) (gaálu)
 1.child 1SBJ-TAM-1OBJ-find LOC-swamp 1.dog
 ‘The child found it at the swamp, the dog.’
- (c) (Top) (VP) (Subj) – (Kanerva 1990: 102, fig (110c))
 (a-leenje) (zi-ná-wá-luuma) (njúuchi)
 2.hunter 10SBJ-SIMPLE.PAST-2OBJ-bite 10.bee
 ‘The hunters, they bit them, the bees [did].’

However, Downing et al. (2004) find the subject NP is only variably followed by a Phonological Phrase boundary; a boundary apparently correlates with topicalization of the subject. This variation in the phrasing of subjects is illustrated in the data below, where we see that the subject is not phrased separately in (8a) but it is in (8b):

- (8)
- (a) (Ma-kóló a-na-pátsíra mwaná ndalámá zá mú-longo wáake)
 6-parent 6SBJ-RECENT.PAST-give 1.child 10.money 10.of 1-sister 1.her
 ‘The parents gave the child money for her sister.’
- (b) (M-fúumu) (i-na-pátsá mwaná zóóváala)
 9-chief 9SBJ-RECENT.PAST-give 1.child 10.clothes
 ‘The chief gave the child clothes.’

Kanerva (1990) shows, based on the speech of Sam Mchombo, that narrow focus within the VP interferes with the syntactically-motivated phrasing. As shown in (9), in situ focus on any element of the VP is possible in Chichewa, and is realized, according to Kanerva (1990), only by a change in the Phonological Phrasing of the VP:

- (9) Focus and phrasing (Kanerva, 1990: 98, fig. (101))
- (a) What did he do? (broad focus/VP focus)
 (a-na-mény-á nyumbá ndí mwáála)
 1SBJ-RECENT.PAST-hit 9.house with 3.rock
 ‘S/he hit the house with a rock.’
- (b) What did he hit the house with? (Oblique PP focus)
 (a-na-mény-á nyumbá ndí mwáála_F)
- (c) What did he hit with the rock? (Object NP focus)
 (a-na-mény-á nyuúmba_F) (ndí mwáála)
- (d) What did he do to the house with the rock? (V focus)
 (a-na-mény-a_F) (nyuúmba) (ndí mwáála)

² The following abbreviations are used in the morpheme glosses: numbers indicate noun agreement class; OBJ = object marker; SBJ = subject marker; TAM=tense-aspect marker; PERF = perfective; LOC = locative.

The reported effect of focus on Phonological Phrasing is what Hyman (1999) calls ‘boundary narrowing’: a Phonological Phrase boundary must follow the focused element, and each subsequent XP constituent of the VP is parsed into a separate Phonological Phrase. As a result, the VP is parsed into more, smaller prosodic phrases under narrow focus. Downing et al.’s (2004) study of the influence of focus on prosodic phrasing in Chichewa, based on the speech of Al Mtenje, confirms this basic pattern, as illustrated by the data in (10) and (11):³

(10)

- (a) (M-fúumu) (i-ná-pátsa mw-aná zóóváala) (broad VP focus)
 9-chief 9-SIMPLE.PAST-give 1-child 10.clothes
 ‘The chief gave the child clothes.’
- (b) Q (A-ná-páts-a mw-aáná) (chiyáani_F)
 ‘He gave the child what?’
 A (A-ná-páts-a mw-aáná) (zóóváala_F) (Direct Object NP focus)
- (c) Q (A-ná-pátsa ndaání_F) (zóóváala)?
 ‘Who did he give clothes to?’
 A (A-ná-páts-a mw-aáná_F) (zóóváala) (Indirect Object NP focus)

(11)

- (a) (A-ná-dyétsa nyani nsóomba) (broad VP focus)
 2SBJ-SIMPLE.PAST-feed 9.baboon 9.fish
 ‘They gave the fish to the baboon.’
- (b) Q (A-ná-dyétsa nyaání) (chiyáani_F)
 ‘They gave the baboon what?’
 A (A-ná-dyétsa nyaání) (nsóomba_F) (Direct Object NP focus)
- (c) Q (A-ná-dyétsa ndaání_F) (nsóomba)
 ‘Who did they feed fish to?’
 A (A-ná-dyétsa nyaání_F) (nsóomba) (Indirect Object NP focus)

In the above data we find a phrasing difference compared to Kanerva’s (1990) study, namely, often a Phonological Phrase boundary occurs before a sentence-final focused element, at least under contrastive focus, as shown in (10c), for example. Phonological Phrase boundaries only occur following elements in focus in Kanerva’s (1990) data, leading to ambiguity in Chichewa, as in English, between broad, VP and oblique PP focus. We take up differences between the focus prosody reported in these two studies in section 4.2.

As Kanerva (1990) and Bresnan & Kanerva (1989) demonstrate, four phonological processes motivate the Phonological Phrasing indicated in (7) through (11). First, the phrase penult vowel is lengthened. This is illustrated by all the data. Chichewa does not have contrastive vowel length, and penult lengthening is the only common vowel lengthening process in the language. While sequences of identical vowels arise across certain morpheme boundaries, all penult long vowels in the data are due to phrasal lengthening. Second, in sentences with High tones, a High tone on a phrase-final vowel is retracted to the penultimate mora. In the Nkhotakota variety (Kanerva 1990), the phrase-final vowel is disassociated from the retracted High tone, as shown by the phrase-final tone pattern of the word for /nyumbá/ ‘house’ in (9c, d). In the Ntcheu variety (Downing et al. 2004), the retracted High tone is realized on both the penultimate and final moras, as shown in the tones of /mwaná/ ‘child’ in (10a) vs. (10b). Third, within a Phonological Phrase High tones double to the following

³ As mentioned above, Downing et al.’s (2004) study, like that of Kanerva (1990), analyzes data elicited from one native speaker. The speakers in these two studies represent different tonal dialects of Chichewa: Nkhotakota in Kanerva (1990) and Ntcheu in Downing et al. (2004).

syllable. However, the disyllabic window at the end of a Phonological Phrase is a barrier to tone doubling. To see this, compare the tone pattern on the verb in (9c) vs. (9d). The High tone of the verb doubles from the penultimate mora to the final mora in (9c), where the verb is in phrase-medial position: [*a-na-mény-á*]. In contrast, in (9d), when the verb is focused and so is in phrase-final position, the High tone on the (lengthened) penult does not double into the two-syllable window at the right edge of the Phonological Phrase: [*a-na-méeny-a*]. There is one principled set of exceptions to the generalization that High tones do not double into the disyllabic phrase-final window, namely a process of High tone plateauing. A High tone can double into the phrase-final disyllabic window if it is followed by another High tone. This is illustrated by the phrase [*ndí mwáála*] ‘with a stone’ in (9), where the High tone of the preposition *ndí* doubles onto the phrase-penult vowel, forming a High tone plateau with the (retracted) final High tone of /*mwalá*/ ‘rock’.⁴

To sum up, Kanerva’s (1990) work on the prosody of focus in Chichewa (Samek-Lodovici’s only data source) reports phonological rephrasing as the main correlate of focus. Under broad focus, the entire VP is parsed into a single Phonological Phrase. Asking Wh-questions or contrastive questions which place focus on a VP-internal constituent induces a Phonological Phrase break after the word in focus in both the question (where Wh-words, with inherent focus, are always followed by a Phonological Phrase break) and in the answer. Constituents which follow a non-final focused element are each parsed into their own Phonological Phrase. Downing et al.’s (2004) study of Ntcheu Chichewa also finds that phrasing is a consistent correlate of in situ focus, and focus has a similar effect on phrasing except that, in this variety, a Phonological Phrase break also often precedes a VP-final constituent in focus.

In both of these studies of Chichewa prosody, penult lengthening is considered the primary correlate of phrasal stress, following the standard interpretation in the Bantuist literature: see, e.g., Carleton (1996), Demuth (2003), Doke (1954), Downing (2010), Hyman (2009), Hyman & Monaka (2011), Odden (1999) and Zerbian (2006) for detailed discussion. Kanerva (1990) reports that Chichewa has both Phonological Phrase level stress, described above, and culminative penult lengthening (i.e. sentence stress), which is fixed on the final word of the Intonation Phrase (IP). IP-medial focused words do not attract culminative stress, as Kanerva’s (1990) detailed description, cited in (12), makes clear:

(12) Intonation Phrases (Kanerva 1990: 140)

(a-na-pátsá mwaána_F) (njiínga)↘ | (ósatí mfúumu) ↘
 1SUBJ-RECENT.PAST-give 1.child 9.bicycle not 9.chief
 S/he gave the *child* a bicycle, not the chief.

“Both IPs in [(12)] end in low falling contours and show IP-final lengthening; in particular, the IP-penultimate syllable in *njiínga* is noticeably longer than the penultimate syllable in *mwaána*, which is lengthened only at the [Phonological Phrase] level [...].⁵ Tonal catathesis occurs twice in the first IP, not only within the first [phonological phrase], but also between it and the second [phonological phrase]. No catathesis, however, occurs between the IPs; in fact, the High tones of the second IP are all higher pitched than those in *njiínga* and even *mwaána*.”

⁴ High tone plateauing, tone doubling and avoidance of High tones on final vowels are common tonal processes cross-Bantu (Kisseberth & Odden 2003). See work like Hyman & Mtenje (1999), Moto (1989), Mtenje (1986, 1987), Myers (1996, 1998, 1999a, b), Myers & Carleton (1996) for detailed analyses of tone in Chichewa, including some discussion of the dialectal variation in tone realization mentioned in this section.

⁵ Kanerva (1990) actually argues that Intonation Phrases dominate Focus Phrases in Chichewa, not Phonological Phrases. Following Truckenbrodt (1995, 2005), we consider Focus Phrases in Chichewa focus-conditioned variants of Phonological Phrases, not a distinct level in the Prosodic Hierarchy.

Kanerva (1990) characterizes culminative stress as noticeable additional lengthening of the IP-penult syllable (in fact, the final two syllables of IP) compared to a Phonological Phrase-penult syllable (or other penult syllable). Carleton's (1996) and Downing et al.'s (2004) subsequent phonetic studies confirm this observation. Further, Kanerva (1990) explicitly mentions for the above example that the word under focus in the first IP [*mwaána*] 'child' does not bear sentential stress (that is, culminative penult lengthening), as it is not IP final. Carleton's (1996) and Downing et al.'s (2004) subsequent phonetic studies confirm that culminative stress (lengthening) is fixed on the IP-final foot and is not affected by the position of focus. Kanerva (1990) also explicitly mentions that focus has no effect on pitch. Indeed, based on Kanerva (1990), Chichewa is widely cited – see, e.g., Féry (2001), Gussenhoven (2004), Hayes & Lahiri (1991), Hyman (1999), Kenstowicz & Sohn (1997), Ladd (2008), and Selkirk (2004) – as a language where phrasing (and phrasal prominence), rather than culminative IP-level prosodic prominence, is the main correlate of focus.

Kanerva's (1990), Carleton's (1996) and Downing et al.'s (2004) studies show that Chichewa has culminative IP-level prominence which is not affected by the position of focus, which obviously contradicts Samek-Lodovici's (2005, 2006) characterization of Chichewa sentential prosody sketched in section 1, above. However, one can concede that previous phonetic studies of Chichewa prosody are not without their problems. Kanerva (1990) does not provide phonetic figures to support his description of IP-level prominence in (12), and the precise methodology used to elicit the recorded materials that support his analysis of focus prosody is not described. Surprisingly, none of the subsequent phonetic studies of Chichewa has systematically investigated focus prosody (penult lengthening and other prominence lending prosody) in a controlled experimental setting. Myers (1996) confirms that focus has no effect on pitch, but the effect of focus on penult vowel length is not analyzed. Carleton (1996) confirms that there is fixed culminative lengthening on the IP-penult and found no effect of focus on penult vowel length. However, her data come from natural discourse, rather than a controlled focus elicitation experiment. Downing et al. (2004) confirms that there is fixed culminative lengthening on the IP-penult which is not affected by the position of focus, and show that focus affects pitch as well as Phonological Phrase-level penult lengthening for their speaker. However, their study, like Kanerva (1990), is based on the speech of a single native speaker linguist, and the methodology used to elicit the recorded materials they analyze is not clearly described. In the next section, we present the results of a recent experiment conducted to elicit focus prosody in Chichewa. The goal of the experiment was to test the partially conflicting results of earlier studies and their interpretation by Samek-Lodovici (2005).

3 Chichewa focus elicitation experiment

To evaluate how well the weaker STRESS-FOCUS constraint in (6) matches the facts of Chichewa focus prosody, it is important to first define prominence in an experimentally testable way. Following Samek-Lodovici (2005, 2006), we equate prominence with stress and consider penult lengthening the primary correlate of phrasal stress in Chichewa.⁶ (As noted above, this is, in fact, the standard interpretation in the Bantuist literature and the correlate referred to in previous phonetic studies of Chichewa sentence stress from Kanerva (1990) on.) Also following Samek-Lodovici, we make the standard assumption that the domain of focus for *Wh*-questions and their answers is the entire sentence (prosodically, the Intonation Phrase). The strong version of the STRESS-FOCUS constraint in (1) is thus satisfied for Chichewa if the focused element has culminative duration above the level of the

⁶ See work like Hayes (1995), Jun (2005), Selkirk (2005) and Truckenbrodt (1995) for detailed discussions of the correlates of stress and of the notion of culminative prominence.

Phonological Phrase. The weaker version, SF' (6), is satisfied if the penult of the focused element has culminative duration at the Phonological Phrase level, and there is no culminative duration at the Intonation Phrase level (beyond what might be attributed to phonetic final lengthening).

3.1 Methodology

We adopted a standard experimental method of eliciting focus prosody, namely, asking the subjects to read sets of question-answer pairs. (Detailed discussion of this focus elicitation technique can be found in work like Cooper et al. (1985), Eady & Cooper (1986) and, more recently, Wu & Xu (2010), and Xu & Xu (2005).) The questions targeted broad focus, subject focus, verb focus and (non-final) post-verbal object focus. A sample set of Q-A pairs, with English translation, is given in (13), for a sentence with High-toned words. Note that the *input* tone and vowel length (that is, the values before the application of the phrasal processes described in section 2) are cited here:⁷

(13) Sample Q-A pairs to elicit focus; words in narrow focus are underlined

(a)=broad focus; (b)=subject focus; (c)=object focus; (d)=verb focus

(a) Q /Chí-na-chítika ndí chi-yáni/

7SBJ-TAM-happen COP 7-what

'What happened?'

A /Mwaná a-ná-menya nyumbá ndí mwalá/

1-child 1SBJ-TAM-hit 9.house with 3.rock

'The child hit the house with a rock.'

(b) Q /Ndaní á-na-menyá nyumbá ndí mwalá/

1.who 1SBJ.REL-TAM-hit 9.house with 3.rock

'Who hit the house with a rock?'

A /Mwaná a-ná-menya nyumbá ndí mwalá/

1-child 1SBJ-TAM-hit 9.house with 3.rock

'The child hit the house with a rock.'

(c) Q /Mwaná a-ná-menya chi-yáni ndí mwalá/

1-child 1SBJ-TAM-hit 7-what with 3.rock

'What did the child hit with a rock?'

A /Mwaná a-ná-menya nyumbá ndí mwalá/

1-child 1SBJ-TAM-hit 9.house with 3.rock

'The child hit the house with a rock.'

(d) Q /Mwaná a-ná-menya kapéna ku-génda nyumbá ndí mwalá/

1-child 1SBJ-TAM-hit or INF-hit 9.house with 3.rock

'Did the child hit (by pounding) or hit (by throwing) the house with a rock?'

A /Mwaná a-ná-menya nyumbá ndí mwalá/

1-child 1SBJ-TAM-hit 9.house with 3.rock

'The child hit the house with a rock.'

The subjects were orally instructed to read both the questions and the answers in the way that sounded most natural (that is, most pragmatically appropriate). The subjects, all undergraduates at the University of Malawi and native speakers of Chichewa representing more than one dialect, were selected in an 'audition' session where two Chichewa native

⁷ The attentive reader will note that the verbs in the subject questions in (13b) and (14b) do not have the same tone as in the other sentences in its set. This is because subject questions are reduced clefts, and the verb has the tone pattern found in relative clauses. See Mchombo (2004) and Downing & Mtenje (2011) for further discussion.

speaker linguists demonstrated what the subjects were expected to do in the experiment, and then each student did a practice set of Q-A pairs. Out of some 25 students who took the practice test, 9 were chosen for the experiment based on how well they performed (i.e., how comfortable they were with the experimental setup and how naturally they read the materials). For the experiment, the Q-A pairs were presented to the subjects ten times in totally randomized order (not allowing for a sequence of equal pairs) on a laptop screen using the MFC routine of PRAAT (Boersma & Weenink); this routine allowed the students to pace themselves.⁸ Each of the subjects read a total of 240 sentences in a single recording session, which lasted 45 minutes to an hour for each subject. The sentences were presented to the subjects in Chichewa only, using Chichewa orthography, which does not indicate tone or vowel length. The recordings were made in a classroom at the University of Malawi, and the two Chichewa native speaker linguists sat in on the recordings to monitor whether the students were reading the materials in a pragmatically appropriate way. The linguists conducting the experiment (including the Malawian colleagues) were available to answer the subjects' questions during the recordings. (Only one subject at a time was present in the classroom.) The recordings of two students whose performances were judged to be too wooden and hesitant to be natural were rejected for analysis. (Occasional obvious slips of the tongue and/or hesitations in the 7 remaining subjects were also not included for analysis.)

A representative sample of this corpus was prepared for further analysis using PRAAT manual segmentation: namely, the 10 repetitions of (13a, c, d), above, and (14a, c, d), below. (Words in narrow focus are underlined; input tone and vowel length are indicated):

(14) Q-A pairs to elicit focus; answer has only Low tones

(a)=broad focus; (b)=subject focus; (c)=object focus; (d)=verb focus

(a) Q/Chí-na-chitika ndi chi-yáni/

7SBJ-TAM-happenCOP 7-what

'What has happened?'

A/Mu-limi wa-patsa bambo tambala/

1-farmer 1SBJ.TAM-give 1.father 5.rooster

'The farmer has given father a rooster.'

(b) Q/Ndaní wá-patsa bambo tambala/

1.who 1SBJ.REL-TAM-give 1.father 5.rooster

'Who has given father a rooster?'

A/Mu-limi wa-patsa ndaní tambala/

1-farmer 1SBJ.TAM-give 1.father 5.rooster

'The farmer has given father a rooster.'

(c) Q/Mu-limi wa-patsa ndaní tambala/

1-farmer 1SBJ.TAM-give 1.who 5.rooster

'Who has the farmer given a rooster to?'

A/Mu-limi wa-patsa bambo tambala/

1-farmer 1SBJ.TAM-give 1.father 5.rooster

'The farmer has given father a rooster.'

(d) Q/Mulimi wa-patsa kapéna wa-gulitsa tambala kwá bambo/

1-farmer 1SBJ.TAM-give or 1SBJ.TAM-give 5.rooster LOC 1.father

'Has the farmer given or sold the father a rooster?'

⁸ We would like to thank Paul Boersma for his help in setting up PRAAT to present the question-answer pairs in random order, allowing for self-pacing, in the experiment.

A /Mu-limi wa-patsa bambo tambala/
 1-farmer 1.SBJ.TAM-give 1.father 5.rooster
 ‘The farmer has given father a rooster.’

All 10 repetitions of the 6 sentences in (13a, c, d) and (14a, c, d) for the 7 subjects were analyzed, giving a total of roughly 420 tokens, i.e., 25% of the total corpus of 1680 sentences.⁹ These two sentence sets were chosen in order for this study to parallel Downing et al. (2004), where we found different realizations in mixed High and Low tone vs. all Low toned sentences. (See discussion in section 4.2, below.) We used all repetitions of these two sets instead of fewer repetitions of more sets in order not to obscure effects due to possible intrinsic differences of the different segmental make up of the sentences (e.g. intrinsic vowel durations). Using all replications of these two sets also allowed us to check for intraspeaker as well as interspeaker variability in the repetitions. Since all sentence sets in the corpus have the same syntactic structure and test the same focus conditions, there is no reason to anticipate significant differences in an analysis of the remainder of the corpus. Analyzing a representative sample of this size was considered sufficient to test simply whether this subject pool shows the same pattern of culminative stress realization, unaffected by focus, as the subjects in the previous studies of Chichewa focus prosody discussed in section 2.

3.2 Results

Based on Kanerva’s (1990) and Downing et al.’s (2004) studies of Chichewa focus prosody, we expected to find cues to phonological phrase edges in the following positions: variably, on the subject (if topicalized) - cf (8b)); consistently on the IP-final word, and consistently on words in narrow focus. Culminative lengthening at the IP-level was expected on the IP-final word. We expected from previous work to find the following prosodic cues to focus phrasing: consistent penult lengthening and tonal alternations, potentially also the sort of focus-conditioned pitch raising and pauses reported in Downing et al. (2004).

We looked for all these effects in this new multispeaker material. Maximal pitch values within the four pwords (Phonological Words) in each sentence (subject, verb, object, IP-final (prepositional) object) were subjected to an ANOVA with focus condition as the independent variable (4 levels) and maximal pitch as the dependent one split by phrases. In contrast to the results of Downing et al. (2004), for none of the speakers could we find an influence of focus on pitch raising. Words also do not have a different tone pattern when in focus than when not in focus, nor do pauses set off words in focus. This is, in fact, unsurprising, given the absence of penult lengthening under focus which is illustrated in tables (15) and (16), below. As Downing et al. (2004) demonstrate, pauses regularly trigger penult lengthening. And as Myers (1998, 1999b) argues, penult lengthening also provides the phonetic conditioning context for the phrase-final tone alternations.

Therefore, in the more detailed description of our results below we concentrate on penult lengthening in words in different focus contexts, the property that Samek-Lodivici (2005), following the Bantuist tradition and previous studies of Chichewa, singles out as the main cue to phrasal prominence. More specifically, our analysis investigates the following questions raised by Samek-Lodivici’s analysis of Chichewa. First, does the penult of an Intonation Phrase (IP)-final word show culminative duration (the equivalent of sentence-level prominence) in broad focus conditions? The STRESSXP_{ALL} constraint in (4) crucially assumes there is no culminative IP-level prominence. Second, is the prominence structure of sentences affected by focus? The weak STRESS-FOCUS correlation, SF’ (6), crucially assumes that words in focus attract culminative prominence at the Phonological Phrase level, while no other position is assigned culminative prominence at the IP level. To address these questions, the

⁹ For some subjects and conditions there were only nine correct repetitions available.

following durations were analyzed. In each sentence in the representative sample, the durations of the penult and final vowels of the four pwords were measured under the different focus conditions (broad, verb, object).

The results are presented in the tables in (15) – for (13a, c, d) – and (16) – for (14a, c, d). Each table gives the mean duration of the ten repetitions of the penult vowels (together with their standard deviation (sd) as well as their length ratio in comparison to their respective pword final vowels) split by subjects and focus condition for each of the 7 subjects. The tables show the average penult vowel duration for each word when it occurs in: a broad focus context, in the context where the focus is on the verb, and in the context where the first object following the verb is focused. The pooled data for all subjects in the three focus conditions are given in the last three rows of the tables. Note in (15) that the significantly longest vowels per sentence type are marked in bold italics; penult durations of focused words are underlined:

(15) 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
EN	broad	96.401 (11.175) 2.102	38.005 (9.018) 0.487	65.501 (8.696) 0.984	<i>127.591 (16.080)</i> 1.518
EN	verb	108.124 (10.462) 2.252	<u>37.162 (15.932) 0.486</u>	57.322 (7.132) 0.790	<i>130.360 (21.270)</i> 1.871
EN	object	92.898 (17.277) 2.228	37.689 (9.973) 0.493	<u>59.371 (5.645) 0.916</u>	<i>117.048 (16.123)</i> 1.529
GN	broad	<i>103.762 (21.924)</i> 1.988	32.590 (5.858) 0.530	57.940 (7.914) 0.561	<i>102.041 (15.267)</i> 1.181
GN	verb	<i>110.051 (20.975)</i> 2.075	<u>31.103 (7.762) 0.593</u>	45.775 (6.694) 0.580	<i>109.078 (15.451)</i> 1.802
GN	object	<i>118.285 (22.675)</i> 2.222	36.733 (12.588) 0.588	<u>45.124 (9.543) 0.508</u>	<i>112.110 (13.002)</i> 1.424
HC	broad	<i>159.332 (50.731)</i> 1.459	87.696 (15.802) 0.908	70.754 (23.791) 0.813	<i>149.637 (25.300)</i> 1.877
HC	verb	<i>143.267 (45.511)</i> 1.617	<u>88.964 (23.344) 1.121</u>	75.374 (9.017) 0.876	<i>145.976 (21.847)</i> 1.389
HC	object	<i>139.832 (36.693)</i> 1.503	76.798 (11.136) 0.951	<u>72.298 (8.822) 0.810</u>	<i>162.107 (26.361)</i> 1.768
IN	broad	108.691 (11.291) 2.380	67.321 (6.969) 0.916	100.365 (13.122) 1.268	<i>125.405 (11.545)</i> 1.401
IN	verb	101.210 (14.904) 2.142	<u>60.721 (8.354) 0.986</u>	64.702 (6.307) 0.956	<i>133.823 (13.004)</i> 2.840
IN	object	<i>109.991 (17.009)</i> 2.213	61.792 (9.896) 0.816	<u>70.176 (9.128) 0.816</u>	<i>128.850 (26.822)</i> 1.692
LM	broad	<i>127.708 (5.921)</i> 1.665	96.453 (17.434) 1.237	77.332 (15.986) 0.549	<i>137.523 (15.507)</i> 0.799
LM	verb	106.981 (13.322) 1.259	<u>98.658 (18.352) 1.440</u>	47.266 (4.094) 0.495	<i>139.534 (10.653)</i> 0.646
LM	object	<i>131.393 (14.671)</i> 1.488	99.513 (22.235) 1.437	<u>62.189 (19.710) 0.467</u>	<i>140.033 (19.702)</i> 0.788
PM	broad	<i>135.822 (10.953)</i> 1.545	74.411 (9.079) 0.898	79.769 (15.599) 1.165	<i>145.732 (15.614)</i> 2.426
PM	verb	<i>135.578 (11.392)</i> 1.430	<u>75.637 (4.131) 0.838</u>	79.587 (17.780) 1.044	<i>127.685 (24.386)</i> 1.841
PM	object	<i>143.821 (8.720)</i> 1.392	74.263 (8.653) 0.789	<u>91.591 (13.162) 1.224</u>	<i>139.338 (9.853)</i> 2.086
SY	broad	87.050 (15.998) 1.982	52.805 (12.281) 0.839	55.920 (13.319) 0.686	<i>121.714 (18.084)</i> 1.561
SY	verb	94.697 (16.028) 3.108	<u>52.271 (7.845) 1.029</u>	40.003 (8.559) 0.539	<i>143.142 (15.124)</i> 1.998
SY	object	86.681 (10.426) 2.595	56.453 (12.607) 1.119	<u>43.124 (8.476) 0.622</u>	<i>139.028 (16.095)</i> 2.003
all	broad	116.967 (32.241) 1.792	64.183 (25.188) 0.842	72.512 (20.105) 0.805	<i>129.949 (22.314)</i> 1.400
all	verb	114.555 (27.233) 1.793	<u>63.931 (27.359) 0.934</u>	58.504 (17.047) 0.743	<i>132.821 (20.826)</i> 1.423
all	object	118.180 (28.391) 1.802	63.165 (23.989) 0.869	<u>63.488 (19.180) 0.748</u>	<i>134.236 (24.141)</i> 1.489

An ANOVA with *pword* (4 levels), *subject* (7 levels) and *focus condition* (3 levels) as the independent variables, and *duration of the penult vowel* as the dependent variable yielded the following results: both the factor *pword* ($F(3,739) = 908.449$, $p < .001$) and the factor *subject* ($F(6,739) = 101.637$, $p < .001$) showed a clearly significant influence on penultimate vowel length. Besides these main effects there is a significant interaction of these factors ($F(18,739) = 15.176$, $p < .001$). The factor *focus condition*, on the other hand, only showed a tendency in

influencing penultimate vowel duration ($F(2,739) = 3.271, p < .05$). Since this last effect is entirely due to differences in penultimate vowel length differences in pword 1 (that are of no primary relevance for our analysis of narrow focus) and restricted to only some of our subjects it is neglected in the further analysis. The ANOVA split by subjects and the corresponding post hoc Scheffé tests showed the following detailed results for pword dependent penultimate vowel length: EN: $F(3,100) = 245.056, p < .001$ with $4 > 1 > 3 > 2$ ($p < .001$); GN: $F(3,108) = 223.873, p < .001$: $1 = 4 > 3 > 2$ ($p < .001$); HC: $F(3,108) = 65.745, p < .001$: $4 = 1 > 2 = 3$ ($p < .001$); IN: $F(3,104) = 136.654, p < .001$: $4 > 1 > 3 > 2$ ($p < .001$); LM: $F(3,104) = 132.093, p < .001$: $4 > 1 > 2 > 3$ ($p < .001$); PM: $F(3,236) = 37.174, p < .001$: $1 = 4 > 3 = 2$ ($p < .001$); SY: $F(3,107) = 274.113, p < .001$: $4 > 1 > 2 = 3$ ($p < .001$). Pooled over subjects, this results in the following durational ranking of the penultimate vowels of p-words: $4 > 1 > 3 = 2$ ($p < .001$). An additional ANOVA was run to check for durational differences in the penult vowels of focused pwords 2 and 3 and their non-focused counterparts. The result clearly shows there are no significant differences: ($F(1,260) = 0.718, n.s.$) and ($F(1,258) = 0.901, n.s.$).

The table in (16) shows near-identical results for the second set of sentences, in this case, all Low toned; significantly longest vowels per sentence type are marked in bold italics; penult durations of focused words are underlined:

(16) Penult vowel durations under different focus conditions: mean (sd) [in ms] in parentheses, followed by lengthening ratio with respect to pword final vowels; * = ratio due to long utterance final devoiced vowels; ** = ratio due to word final [i] reduction

subject	focus	mu-limi	wa-patsa	bambo	tambaala
EN	broad	84.727 (12.827) 2.272	62.154 (12.363) 1.074	122.575 (8.075) 2.501	166.383 (21.922) 2.614
EN	verb	82.536 (11.839) 2.606	55.760 (4.505) 0.988	117.943 (6.041) 2.535	160.149 (19.278) 2.346
EN	object	69.455 (16.040) 2.801	57.163 (5.388) 1.013	<u>117.979 (7.254)</u> 2.710	160.703 (17.166) 2.649
GN	broad	83.950 (15.592) 3.077	81.156 (9.694) 1.430	73.245 (12.210) 1.348	130.322 (11.862) 2.213
GN	verb	93.945 (13.814) 1.919	<u>78.983 (9.855)</u> 1.611	66.942 (13.038) 0.949	130.078 (13.945) 2.182
GN	object	93.603 (19.129) 3.092	75.099 (7.937) 2.096	<u>68.097 (18.240)</u> 1.016	133.228 (12.274) 2.055
HC	broad	84.426 (23.905) 1.799	87.373 (18.236) 1.556	113.889 (13.784) 1.953	186.816 (16.473) 1.720
HC	verb	78.023 (20.477) 1.795	<u>114.436 (46.244)</u> 1.517	117.685 (12.406) 1.967	196.893 (10.293) 2.299
HC	object	81.454 (15.256) 1.175	84.460 (25.532) 1.297	<u>121.232 (10.266)</u> 1.933	188.651 (20.622) 2.267
IN	broad	80.220 (19.652) 2.838	68.793 (7.528) 1.302	125.552 (7.216) 2.193	161.196 (10.798) 3.198
IN	verb	79.078 (15.751) 2.860	<u>65.520 (8.873)</u> 1.188	125.492 (12.237) 2.134	163.645 (8.747) 2.627
IN	object	63.467 (14.564) 1.653	68.997 (6.390) 1.389	<u>118.482 (7.718)</u> 2.033	158.408 (8.105) 2.225
LM	broad	129.690 (16.456) 1.643	91.587 (26.500) 1.692	122.018 (14.796) 0.958	175.167 (16.080) 0.873*
LM	verb	122.339 (15.354) 1.587	<u>84.182 (19.278)</u> 1.795	107.401 (14.928) 1.180	168.646 (9.968) 0.871*
LM	object	121.817 (9.996) 1.453	83.507 (16.562) 1.265	<u>114.669 (9.329)</u> 0.994	171.089 (12.009) 0.815*
PM	broad	104.599 (11.487) 1.308	72.439 (7.113) 1.936	111.497 (10.054) 1.811	165.823 (27.921) 2.186
PM	verb	93.330 (20.566) 0.978	<u>68.228 (6.217)</u> 1.975	112.778 (9.297) 1.772	155.114 (16.268) 2.208
PM	object	99.546 (10.249) 1.009	70.585 (4.220) 1.976	<u>116.255 (7.427)</u> 1.989	164.645 (10.919) 2.936
SY	broad	71.813 (10.796) 5.909**	66.003 (8.871) 1.174	108.490 (15.288) 2.095	158.363 (11.483) 2.769
SY	verb	81.299 (31.663) 4.653**	<u>68.698 (6.239)</u> 1.247	115.498 (9.087) 1.957	164.727 (10.911) 2.689
SY	object	70.864 (18.524) 5.157**	64.872 (9.742) 1.344	<u>111.733 (4.919)</u> 2.300	161.123 (18.257) 2.722
all	broad	91.656 (24.018) 2.058	75.118 (17.110) 1.421	110.910 (20.438) 1.662	162.878 (22.925) 1.864
all	verb	89.733 (23.256) 1.837	<u>76.547 (26.307)</u> 1.427	109.037 (21.276) 1.707	162.634 (22.595) 1.922
all	object	85.806 (24.206) 1.685	71.918 (15.112) 1.421	<u>109.612 (19.935)</u> 1.689	162.171 (20.684) 1.875

Parallel to (13), the data was subjected to an ANOVA with *pword*, *subject* and *focus condition* as the independent variables, and *duration of the penult vowel* as the dependent variable. The results showed the following main effects and interactions: *pword* ($F(3,731) = 1338.857$, $p < .001$), *subject* ($F(6,731) = 60.808$, $p < .001$), *focus condition* ($F(2,731) = 2.579$, n.s.), *pword* * *subject* ($F(18,731) = 28.009$, $p < .001$) and *subject* * *focus condition* ($F(12,731) = 2.267$, $p < .01$). The ANOVA split by subjects and the corresponding post hoc Scheffé tests showed the following detailed results for *pword* dependent penultimate vowel length: EN: $F(3,108) = 369.666$, $p < .001$: $4 > 3 > 1 > 2$ ($p < .001$); GN: $F(3,107) = 119.048$, $p < .001$: $4 > 1 > * 2 = 3$ ($p < .001$, $*p < .01$); HC: $F(3,92) = 123.572$, $p < .001$: $4 > 3 > * 2 = 1$ ($p < .001$, $*p < .05$); IN: $F(3,108) = 450.620$, $p < .001$: $4 > * 3 > 1 = 2$ ($p < .001$); LM: $F(3,104) = 145.643$, $p < .001$: $4 > 1 = 3 > 2$ ($p < .001$); PM: $F(3,108) = 241.862$, $p < .001$: $4 > 1 > * 3 > 2$ ($p < .001$, $*p < .01$); SY: $F(3,104) = 254.536$, $p < .001$: $4 > 3 > 1 = 2$ ($p < .001$). Pooled over subjects, this results in the following durational ranking of the penultimate vowels of *p*-words: $4 > 3 > 1 = 2$ ($p < .001$).

In contrast to the material in (13), the ANOVA check for differences between penult vowel lengths of focused vs. non-focused *p*words 2 and 3 showed a significant interaction *subject* * *focus* for *pword* 2 ($F(6,259) = 1.383$, $p < .001$). This difference is due to subject HC, who shows a slight tendency to mark verb focus by penultimate lengthening ($F(1,33) = 7.197$, $p < .05$). *Pword* 3 (the first postverbal complement), on the other hand, again showed no influence of focus on penultimate length ($F(1,259) = 0.038$, n.s.).

3.3 Discussion

The pooled results (last three rows) of the tables in (15) and (16) show that in statements with broad focus, long penult vowels are consistently found in the first and last *pword* in both tables. Compared to the word final vowels, the length ratio for the first *pword* varies between ca. 1.5 and 2.5. Due to the extra lengthening of the utterance final vowel (see (18) below), this length ratio is generally less for the last *pword* (again ranging between 1.5 and 2.0 for most subjects). However, in situ focus on the verb (*pword* 2) or object (*pword* 3) does not result in consistent penult lengthening in the focused word, except for subject HC in the sentence set analysed in (16). The table in (16) also clearly demonstrates that this effect cannot be reduced to intrinsic vowel durational differences (cf. the parallel results for the penultimate vowels of the verbs in (15) [*a-na-ménya*] [é] and in (16) [*wa-patsa*] [a]). Crucially, within each sentence type, the last *pword* in general has the longest penult vowel, and its length differs significantly from the penults of *pword* 2 and *pword* 3, whether they are focused or not.

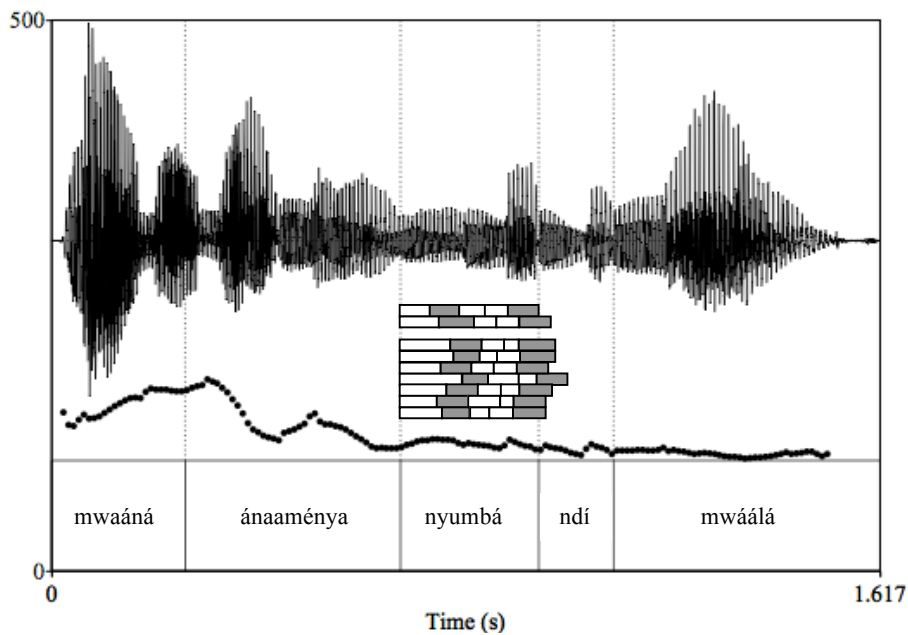
For example, if we look at the average durations for subject EN in table (15), we can see that the penult of the first *pword* (the subject, [*mwaná*] ‘child’) is always relatively long, but not comparable in duration to the penult of the last *pword* of the sentence, which is always significantly longer than the other penult vowels. If we look at the durations of the penults of the verb [*anáménya*] and the object [*nyumbá*] we can see that the focus context has no effect on duration: the penult is roughly the same length in all three contexts.

The figures in (17) illustrate these points in a different way. We can see that there is no obvious difference in the pitch, intensity, tone pattern or penult vowel length of [*nyumbá*], whether it is in narrow focus (17b) or not (17a). (Both recordings are by the same male speaker (EN) of the Ntcheu dialect. The first rendering of the phrase as audio signal and the corresponding pitch contour is given with word segmentation. The bars depict the segment lengths in [*nyumbá*] [ɲ, u, m, b, a] (vowels in gray) of all repetitions):

(17)

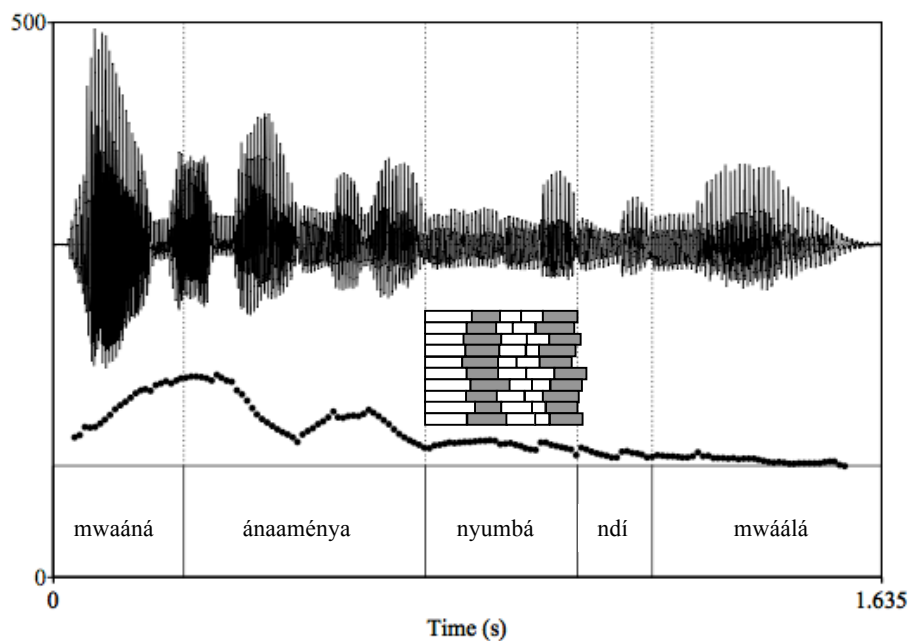
(a) [mwaáná ánaaménýa nyumbá ndí mwáálá]¹⁰

Answering, /Chí-na-chítika ndi chí-yáni/ ‘What happened?’



(b) [mwaáná ánaaménýa nyumbá ndí mwáálá]

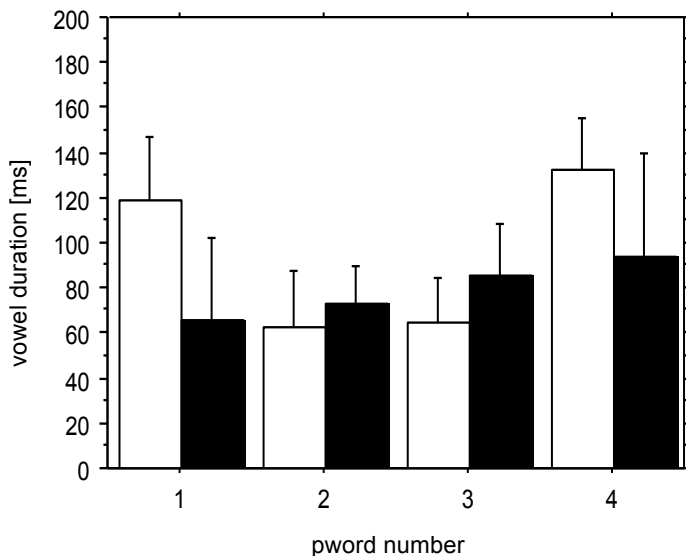
Answering, /Mwaná a-ná-ménya chí-yáni ndí mwalá/
‘What did the child hit with the rock?’



¹⁰ There are three different tense/aspect prefixes spelled ‘na’ in Chichewa orthography, which are distinguished only by tone and/or morphological vowel length (probably having its origin in coalescence of two morphemes). The speaker has chosen a different tense than we had anticipated. This explains the difference in the transcription here compared to (13).

The other subjects (GN, HC, IN, LM, PM, SY) show similar patterns for the sentences analyzed in (15), except that, for some, the penult of the first pword is variably comparable in length to that of the final word in the sentence. These results are summarized visually in the bar graph below, which compiles the mean penult and final vowel durations for all subjects for the sentence set (i.e., all focus conditions) in table (15). In the graph, pword 1 is the subject; pword 2 is the verb; pword 3 is the first object; pword 4 is the second object/verb complement:

(18)



Mean duration of penult (white bars) and final vowels (hatched bars) with error bars of 1 sd for the four pwords of sentences in (15); all subjects.

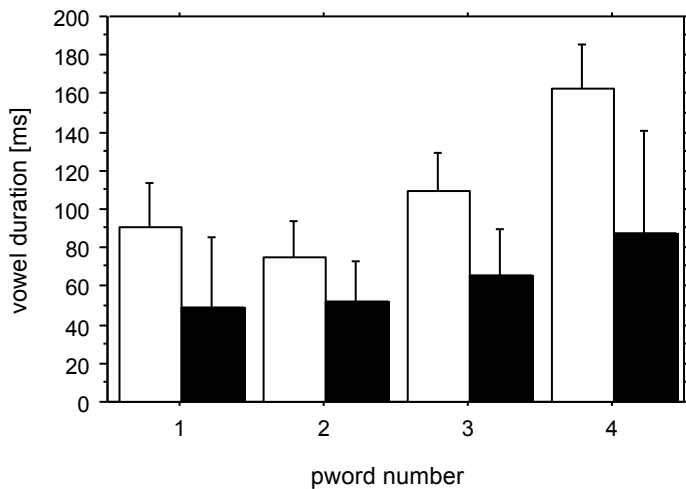
We interpret the occurrence of penult length on the subject (pword 1) to mean it is topicalized and is parsed into a Phonological Phrase.¹¹ Following Kanerva (1990) and Carleton (1996), we propose that the extra lengthening of the utterance final vowel found with all speakers,¹² combined with the significant length of the utterance penult, lends culminative prominence to the IP-final foot: i.e., the two final syllables of the IP. (See Carleton (1996) and Kanerva (1990) for detailed arguments that the two final syllables of a prosodic phrase constitute a metrical foot in Chichewa. And see van Zanten (2011) for discussion of the accent-like properties of IP-penult syllables in Chichewa.)

Culminative duration on the IP-final foot is also found for the sentences analyzed in (16), as shown in the bar graph in (19) (same conventions as for (18)). The mean durations of both the penult and the final vowels of the IP-final word (pword 4) are significantly longer than

¹¹ The grammatical subjects (pword 1) with lengthened penults show tonal retraction, providing additional evidence that they are Phonological Phrase-final. They are not likely IP-final, however, as we do not find any effect of phrase-final vowel lengthening or final boundary tone on lengthened subjects like we do on words in sentence-final position. More research is certainly needed, however, on the levels of prosodic phrasing in Chichewa and prosodic cues to each level.

¹² An ANOVA and post hoc Scheffé test showed the following results for final vowel length: pword $F(3,1079) = 38.738$, $p < .001$ with $4 > 3 > 2 = 1$ ($p < .001$, $*p < .05$), i.e. the difference between $4 > 3$ is only significant at the 5% level.

the penult and final vowels of other words in the sentence, with the IP-penult vowel asymmetrically longer than the IP-final vowel:¹³
 (19)



Mean duration of penult (white bars) and final vowels (hatched bars) with error bars of 1 sd for the four pwords of sentences in (16); all subjects.

We now return to the questions we posed at the beginning of this section. First, does the penult of an Intonation Phrase (IP)-final word show culminative duration (the equivalent of sentence-level prominence) in broad focus conditions in our study, as in previous studies of Chichewa sentence prosody? As we can see, the answer is ‘yes.’ IP-final words show significant lengthening of their penults compared to other words in the IP both under broad focus and when IP-internal words are in focus. While the subject of the sentence variably shows significant penult lengthening, only the IP-final word also has lengthening on the final vowel, which Kanerva (1990) and Carleton (1996) argue lends the IP-final foot culminative prominence. This result contradicts Samek-Lodovici’s (2005) STRESSXP_{ALL} constraint in (4), which crucially assumes that Chichewa does not have any culminative prominence above the level of the Phonological Phrase (i.e., at the IP level).

Second, is the prominence structure of sentences affected by focus? As we can see, the answer is ‘no.’ The tables in (15) and (16) show no consistent effect of focus on penult vowel length. (Only one speaker showed a slight tendency in one set of sentences to mark only verb focus with penult lengthening.) Further, we found that IP-level culminative prominence remains fixed on the IP-final foot under all focus conditions. This last result is consistent with previous studies of Chichewa sentence prosody. However, it contradicts Samek-Lodovici’s weak STRESS-FOCUS constraint, SF’ (6), which crucially assumes that words in focus attract culminative prominence at the Phonological Phrase level, and that no other position is assigned culminative prominence at the IP level.

4 Rethinking focus phrasing in Chichewa

While our study confirms previous studies of Chichewa, discussed in section 2, in finding that culminative IP-level prominence is consistently realized on the IP-final foot, it gives a different picture of focus phrasing in Chichewa from Kanerva (1990) and Downing et al. (2004), which were based on the speech of one native speaker linguist each. In our study, like

¹³ An ANOVA and post hoc Scheffé test showed the following results for final vowel length: pword F(3,1087) = 65.793, p < .001 with 4 > 3 > 2 = 1 (p < .001).

Carleton (1996), we find that focus has no effect on penult vowel length (or other cues to phrasing). In this section, we explain how we account for the focus-related phrasing found in previous studies and the lack of focus-related phrasing found in ours.

4.1 *Emphasis prosody not focus prosody*

Before presenting the account we argue for, we first briefly take up an explanation we reject, namely, that the subjects did not understand the task. We find this unlikely, for a couple of reasons. First, none of the students consistently phrased the sentences with the *in situ* focus phrasing pattern described in the previous literature. It is implausible that none of the students understood the task, especially since the subjects were selected for the experiment based on how well they were judged to perform on a practice test. Also, as mentioned above, two Chichewa native speaker linguists were asked to monitor the subjects' responses for pragmatic acceptability as the recordings were being made. While they commented (after the subjects finished and left the room, naturally, not during the recordings) on other things about the each student's pronunciation (e.g., their tonal dialect), they did not comment that they judged any of the students' pronunciation of the answers to the questions pragmatically unacceptable.

We propose that the best explanation for our results is that the focus-related prosodic phrasing described by Kanerva (1990) and Downing et al. (2004) reflects paralinguistic emphasis prosody not obligatory focus prosody. Emphasis prosody could easily have been misinterpreted as focus prosody in the earlier studies (which only involved two speakers) because, as work like Gussenhoven (2004: 85-88), Hartmann (2008) and Ladd (2008: 255ff) points out, focus and emphasis can be prosodically and conceptually hard to distinguish. Both are often realized with greater articulatory effort or prominence (more concretely, raised pitch, greater duration or intensity) to make sure the important part of the message comes across clearly. Indeed, one easily finds languages where focus and emphasis are described as having the same prosodic reflex. In Porteño Spanish (Feldhausen et al. 2011), contrastive focus/emphasis is realized with a L+*H+L intonational accent. In Baule (Kwa), both are realized with super high tones and prosodic phrasing (Leben & Ahoua 2006). In the Bantu languages, Chimwiini (Kisseberth 2010) and Shingazidja (Patin 2010), both are realized by prosodic phrasing, similar to what Kanerva (1990) described for Chichewa. And in the Bantu language Shekgalagari (Hyman & Monaka 2008) both focus and emphasis are realized with what the authors call emphatic penult lengthening. (The pragmatic meanings distinguishing focus from emphasis are not always made explicit in these studies.) Chen & Gussenhoven's (2008) study of Shanghai Chinese shows subtle prosodic distinctions between focus and emphasis: (corrective) focus affects tone realization but (more) emphasis does not, while both focus and (more) emphasis lead to gradient lengthening.

Because of this overlap of form and function, the relationship between focus and emphasis has been a longstanding concern in the linguistics literature. Summarizing broadly, two positions have been taken: what Hartmann (2008) terms the *asymmetry* approach, which considers emphasis a linguistically distinct semantic and prosodic category from focus (often classified as related to contrast), and the *uniformity* approach, which considers emphasis to be an optional paralinguistic overlay to the prosodic realization, if any, of semantic focus. (Emphasis might have other functions, as well.) We follow work like Bolinger (1989), Ladd (2008), Gussenhoven (2004), Hartmann (2008), Hyman (1984), and Pike (1963) in adopting the uniformity approach. In this approach, focus is a uniform semantic category that can be expressed with more or less (prosodic) prominence. The degree of prominence is partly controlled by the grammar: in languages like English, focus obligatorily attracts sentence stress; in languages like Chichewa, as we have shown, focus does not obligatorily attract sentence or phrasal stress (or other prosody). However, the degree of prominence is also

under individual speaker control, as it partly depends on the emphasis that a speaker chooses to assign to the focused constituent. In other words, in this approach focus is a linguistic category, while emphasis (prosody) is paralinguistic: gradiently realized in a particular focus context only if the speaker so desires.¹⁴

Ladd (2008) provides an especially clear example of how emphasis prosody optionally overlays focus prosody in English. We find ambiguity in the scope of focus in English (and many other languages) when sentence stress is sentence final. The scope of focus can be the entire sentence, the VP or just the final constituent in the VP. As Ladd (2008: 255) notes, many jokes in English play on this ambiguity, for example:

Q: Why do you rob banks?

A: Because that's where the money is.

The answer is a joke because it misinterprets the scope of focus, which is ambiguous from the position of sentence stress under normal pronunciation. However, the scope can optionally be disambiguated through emphasis prosody. A question like, “Why do you rob BANKS?” with emphasis prosody on ‘banks’ could not felicitously have a broad focus answer like, “Because I lost my job.” Several other examples of the gradient and optional way that emphasis prosody can overlay focus prosody in English and other languages are discussed in Bolinger (1989), Ladd (2008) and Hartmann (2008).

We propose that the emphasis prosody reported in the earlier studies of Chichewa has the same function: it disambiguates the position of focus, when desired, since sentence and phrasal stress (and other obligatory prosody) do not. In Chichewa, as in English, emphasis prosody can be realized with a gradient range of prosodic cues. In English, emphasis prosody is realized by gradient expansion of the pitch of an intonational accent and also increased duration and intensity (Ladd 2008). In Chichewa, previous studies show that emphasis prosody is realized with optional prosodic phrasing, and, in addition, with pause and/or pitch span expansion (discussed more in the next section) setting off words in focus. The difference between Chichewa and English is that in English, there is obligatory focus prosody, so scope of focus is only ambiguous in some contexts. In Chichewa the scope of in situ focus is always ambiguous from a prosodic point of view (out of context only, of course) since there is no obligatory focus prosody.

4.2 Gradience and variability in the realization of Chichewa emphasis prosody

If the speakers in the previous studies were using emphasis prosody, this helps us account for the fact that we find striking differences in the prosody of the two speakers analyzed in previous studies of Chichewa focus prosody, as well as intraspeaker variability for words or constituents in narrow focus. Such variability is expected for emphasis prosody, which is gradient and expresses speaker choice, while it would not be expected for grammatically-conditioned (and not subject to speaker choice) focus prosody. In this section we review some of the previously reported correlates of emphasis prosody in Chichewa.

First, recall from section 2, above, that while both speakers in the previous studies use rephrasing to set off focused elements, one finds differences in the phrasing of sentence-final focused elements. Kanerva (1990) reports that Phonological Phrase boundaries only occur following elements in focus, as illustrated in the data in (9) and (22). However, a phrase boundary is variably found before the sentence-final focused elements in Downing et al.’s (2004) data, as illustrated in (10) and (11).¹⁵

¹⁴ See Ladd (2008) and Myers (2000) for detailed motivation of the gradient vs. categorical distinction as the principal criterion for classifying processes as either phonetic (gradient) or phonological (categorical).

¹⁵ The focus-related phrasing in (10c) has parallels in other languages. In Bengali (Hayes & Lahiri 1991) and Northern Kyungsang Korean (Kenstowicz & Sohn 1997), a focused constituent can be set off by a Phonological Phrase break; and in English Selkirk (2000) and Vogel & Hoskins (1996) report that a

Another gradient correlate of emphasis is optional raising of the pitch of the focused constituent. It is clear from Kanerva’s (1990) discussion in (12) that focus has no effect on pitch in his data. Myers’s (1996, 1999a) studies of Chichewa intonation confirm that, for many speakers, focus has no effect on pitch. However, Myers (1996: fn 8) reports “dramatic raising of H in the focused phrase for one speaker” who participated in a study of the intonation of Wh-questions and answers. The speaker in Downing et al.’s (2004) study also has a pattern of pitch raising for High tones which accompanies focus rephrasing. For illustrative purposes, some figures from Downing et al. illustrating this pitch raising pattern are cited here. The mean maximal pitch values for utterance set (9), given in (20), show that the pitch of High tone sequences in the Phonological Phrase containing the narrowly focused element (underlined) is significantly higher (**bolded**) than when the same constituent is not focused. Note that the register of all the High tones in the Phonological Phrase containing the focused element is raised, not just the word in focus:

(20) Mean maximal pitch values for the Phonological Words (pwords) in (9)¹⁶

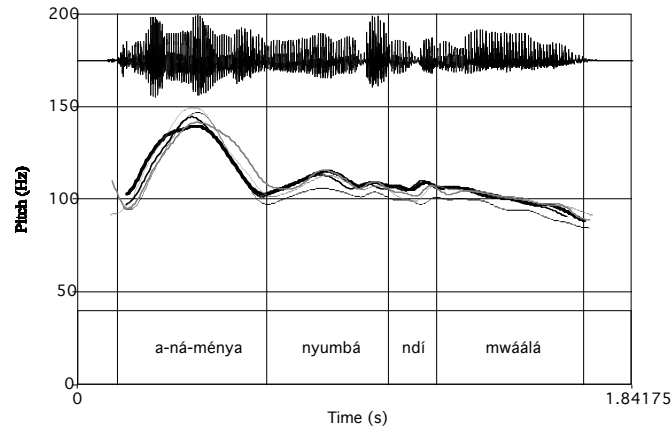
	a-ná-mé(e)ny-a	nyu(ú)mbá	p: [ms]	N	ndí-mwáálá
(a)	147.6 (3.96)	113.7 (2.96)	-	-	110.9 (3.18)
(b)	144.0 (7.29)	115.2 (5.07)	193.2 (32,23)	2	<u>120.0 (6.02)*</u>
(c)	154.1 (8.71)	<u>134.4 (15.22)**</u>	252.7 (52.43)	5	109.6 (3.63)
(d)	<u>179.0 (11.9)**</u>	109.9 (4.21)	-	-	101.2 (1.37)

The pitch tracks on the next page, which provide the audio signal, pitch contour and segmentation of the utterance set in (20), show these patterns clearly. (Different line styles of the pitch contours represent single repetitions. The illustrations are time warped according to mean word duration. Focused pwords are in all-caps in the labeling):

sentence-final focused element can variably be set off as an independent Phonological Phrase. As Kager & Zonneveld (1999: 27) note, “constituents tend to behave as prosodic islands under emphasis.”

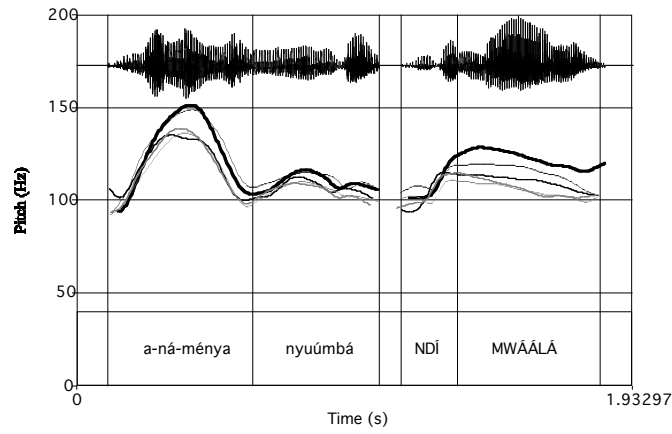
¹⁶ Bolding highlights the significantly raised f_0 -values (in Hz; and their sd in parentheses) of the pwords under focus (underlined) as revealed by Scheffé post hoc tests for an ANOVA over pitch maxima split by pword (**: $p < .01$; *: $p < .05$). Bold cell borders indicate prosodic phrasing. The duration in ms of pauses is given in column ‘p.’; the ‘N’ column indicates the number of repetitions out of 5 containing a pause at that position. The interruption of the pitch contour of the fourth repetition in the lowest panel in (21), (8d), is caused by low volume level and not by a pause.

(21)

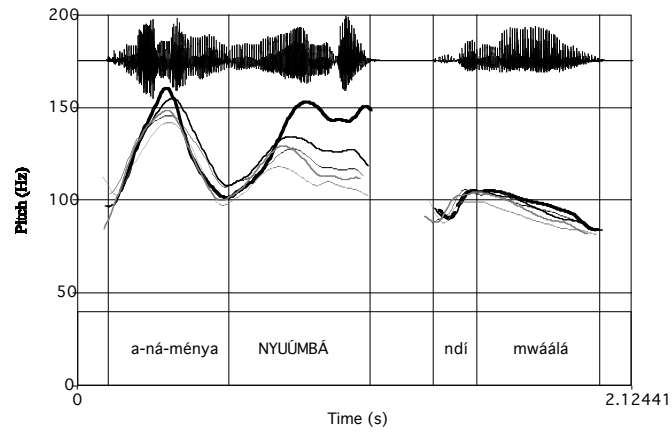


(20a)

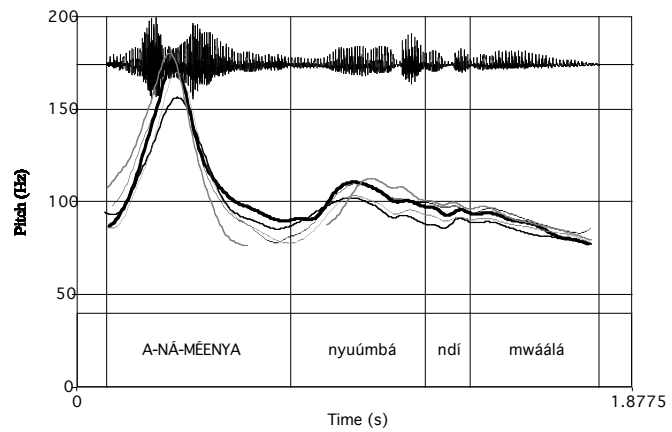
(20b)



(20c)



(20d)



(For purely illustrative purposes, one can compare the pitch track for (9c) in (21) with the pitch track for the speaker (also a male speaker of the Ntcheu dialect) with no emphasis prosody on focused *nyumbá* in (17b).)

The literature on pitch raising shows that there are two different mechanisms which could be responsible for this speaker's raising of High tones in focused phrases: either pitch level expansion or pitch span expansion. The diagnostic for determining which is involved is the effect of pitch raising on Low tones: see e.g. Grice et al. (2009), Gussenhoven (2004), Gussenhoven & Rietveld (2000), Patterson & Ladd (1999). Pitch level expansion affects both High and Low tones, while pitch span expansion asymmetrically affects High tones; it has no significant effect on Low tones.

Downing et al.'s (2004) analysis of the effect of focus on the prosody of all-Low toned utterances shows that focus leads to rephrasing, just as in utterances with High tones, with this speaker. Penult lengthening is found on the focused indirect object in examples like (22bA), compared to the other two statements in this data set, where it is not focused. (Note that surface tone and vowel length is transcribed in this data set.) Downing et al. (2004) found a significant difference – $F(2,12) = 148.645$; $p < .001$ – in the average length of the penult of *bambo* 'father', in the data set in (22), when focused (216.6 ms (sd = 14.88)) compared to the average length of the penult of the same word in a broad focus context (71.8 ms (sd = 11.74)):¹⁷

(22)¹⁸

- | | | |
|-------|---|----------------------------|
| (a) Q | (w-a-t-aá-ní) | |
| | 'What has s/he done?' | |
| A | (w-a-patsa bambo tambaala) | (broad VP focus) |
| | 1.SBJ-PERF-give 1.father 9.rooster | |
| | 'S/he has given father the rooster.' | |
| (b) Q | (w-a-patsa ndaání _F) (tambaala) | |
| | 'Who has s/he given the rooster to?' | |
| A | (w-a-patsa baambo _F) (tambaala) | (Indirect Object NP focus) |
| (c) Q | (w-a-patsa bambo tambaálá _F)(kapéná baakha _F) | |
| | 'Has s/he given father the rooster or the duck?' | |
| A | (w-a-patsa bambo tambaala _F) | (Direct Object NP focus) |

However, Low tones are inert, not raised, in phrases containing focused words. This can be seen by comparing the table of mean maximal pitch values in (23) with those for the data sets containing High-toned words in (20). Note the pause following the focused word in (22b) provides additional evidence for emphasis phrasing:

¹⁷ Recall from (16), above, that none of the subjects in our study showed evidence of penult lengthening on focused indirect objects in sentences with all Low tones.

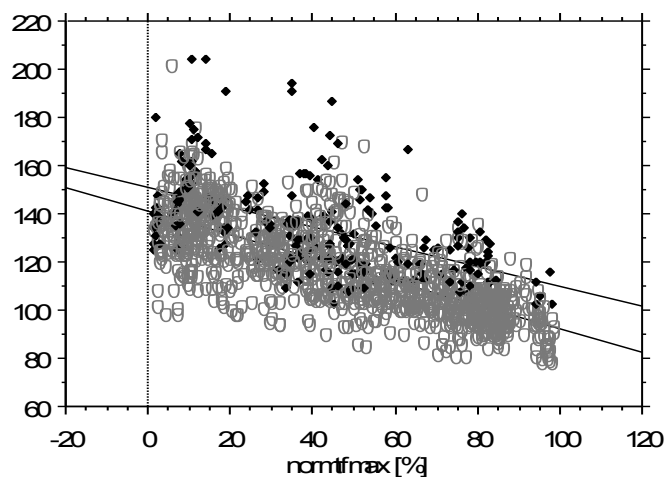
¹⁸ As we can see in (22c), there is no phrase break before *tambala* 'rooster', even though it has contrastive focus and should be preceded by a phrase break to match data like (10b). This provides another example of the variability we find in the prosody of rephrasing, which shows it is more properly conditioned by emphasis rather than focus.

(23) Mean maximal pitch values (in Hz; and their sd in brackets) for the pwords in (22a, b, c); words in narrow focus are underlined (conventions as in (20), above)

	w-a-pats-a	ba(a)mbo	p: [ms]	N	tambaala
(22a)	116.4 (8.33)	103.8 (4.27)	-	-	100.6 (4.10)
(22b)	120.6 (10.92)	<u>105.4</u> (1.34) ^{n.s.}	613,4 (99,11)	5	100.0 (5.79)
(22c)	116.0 (5.34)	104.8 (3.35)	-	-	<u>105.8</u> (5.07) ^{n.s.}

The declination graphs in (24) and (25) confirm the inertness of Low tones for emphasis raising. In (24) is shown a scatter plot of non-focused and focused High-toned vowels. Here we see declination of about the same slope but a mean raising of focused High vowels by about 10 Hz ($f_{max} = 151.007 - 0.411 \times t$, $r = 0.653$):

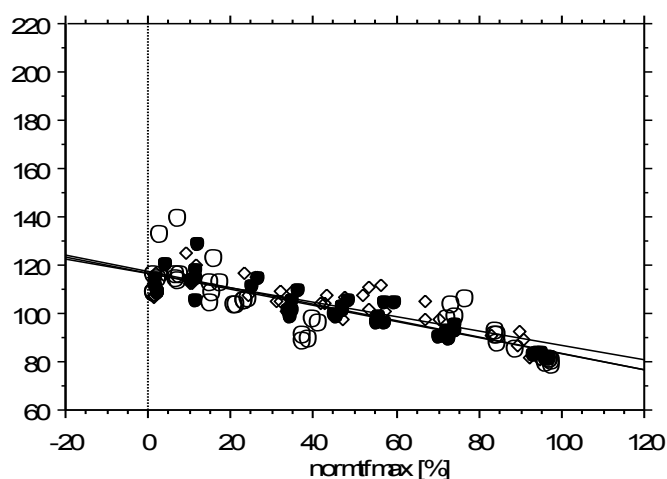
(24)



Scatter plot of maximal pitch value (f_{max}) of High-toned vowels ($N = 1400$) split by focus (focused: black diamonds, upper regression line; non focussed: grey circles, lower regression line) against normalized time of occurrence.

In (25) are shown the measurements for the all Low-toned vowel utterance set in (22), above. This figure shows no effect of focus on pitch; the declination lines are flat and nearly the same in all cases:

(25)



Scatterplot of maximal pitch value (fmax) of all Low-toned vowels (N = 120) of utterance set (22) split by sentence ((22a): dots, (22b): circles, (22c): diamonds) against normalized time of occurrence.

The asymmetry in the effect of pitch raising on High vs. Low tones that we find in this speaker's prosody leads us to conclude that pitch raising is implemented by pitch span expansion. Gussenhoven & Rietveld (2000) propose that pitch span expansion is, in fact, a common phonetic correlate of paralinguistic functions related to what they call "intonational explicitness": emphasis or surprise, corrections or liveliness. The emphasis prosody of the speaker analyzed in Downing et al. (2004) fits this cross-linguistic pattern well.

To sum up this section, we have proposed that the 'focus' prosody found in earlier studies of Chichewa is actually best interpreted as paralinguistic emphasis prosody. Arguments in favor of this proposal come from the fact that emphasis and focus are conceptually and prosodically so similar that they are notoriously hard to disentangle. As work like Gussenhoven (2004), Hartmann (2008), Ladd (2008) and Pike (1963) argues, the difference between them is that focus prosody is part of the grammar – and therefore obligatory and categorical. In contrast, emphasis prosody is paralinguistic – and therefore expected to be a gradient prosodic overlay on focused words, optional as it expresses speaker choice. If speakers in earlier studies of Chichewa were using emphasis prosody rather than focus prosody, this accounts both for the inter- and intraspeaker differences in the prosody of focused words found in earlier studies and for the differences we find between the prosody reported in the earlier studies and the results of the study presented in section 3. In Chichewa, speakers have the choice of whether or not to emphasize words in focus, and have a gradient range of prosodic means to realize emphasis.¹⁹ Unsurprisingly, the speakers in our study did

¹⁹ That emphasis prosody might be involved in the phrasing documented in previous studies of Chichewa was originally suggested to us by the Chichewa linguists who helped prepare the elicitation materials for the experiment reported on in section 3. It turned out to be quite difficult for our colleagues to decide on questions that might elicit rephrasing motivated by verb focus. (The attentive reader will have noticed that the questions used to elicit verb focus are alternative questions, not constituent questions.) They both insisted that this was because it would not be very common to have a phrase break following a verb. It was pointed out that such phrasings are documented in the Chichewa literature, and we asked if they could propose a translation or offer a likely context for a phrase break following the verb. In response, they offered as a translation of (9d), for example, "They really HIT the house with a rock." Here a phrase break is possible because "you can emphasize anything" with rephrasing. We would like to thank our colleagues for bringing to our attention the possibility that rephrasing might be more closely connected with emphasis than

not make much use of emphasis prosody. As Xu (2010b) observes, reading experiments like the one we implemented tend to elicit a formal speaking style, rather than an emotional or emphatic style.

5 Implications for the typology of focus prosody

In this section, we evaluate the results of the experiment reported in section 3 in the light of current typologies of the focus-prosody interface.

5.1 *Universal focus prosody?*

As noted in the introduction, the STRESS-FOCUS correlation in (1), repeated below in (26) for convenience, formalizes a widely-held claim about the prosodic realization of focus:

- (26) STRESS-FOCUS (Samek-Lodovici 2005: 697):
 For any XP_f and YP in the focus domain of XP_f , XP_f is prosodically more prominent than YP,
 i.e. a focused XP has culminative pitch, duration and/or intensity or amplitude within its domain: the sentence or Intonation Phrase.

In Samek-Lodovici's analysis, the constraint is considered to be harmonically ranked (in the OT sense) high enough that in all languages we expect a focused element to be asymmetrically assigned some form of culminative IP-level prominence. Indeed, Büring (2010) asserts that, because this constraint is universally high ranked, it must be satisfied in Chichewa:

- (27) Focus prominence in Chichewa, according to Büring (2010: 185, fig. 13)

(mwaáná)	(anáménýa nyuúmba _F)	(ndí mwáála)	
(x)	(x)	(x)	Phonological Phrase
(x)	Intonation Phrase

Chichewa is, however, problematic for the strong version of the STRESS-FOCUS correlation because, as work since Kanerva (1990) has shown, culminative sentence-level prominence is not attested as a correlate of focus. Sentence-level prominence is fixed at the right edge of the Intonation Phrase and is not affected by focus.

Recall from the introduction that Samek-Lodovici (2005, 2006) proposes that Chichewa is not a true exception to this typology because – he claims – it does not have culminative sentence (IP-level) stress. Instead, Chichewa should have the Intonation Phrase-level stress pattern shown in (28):

- (28) Focus prominence in Chichewa, according to Samek-Lodovici (2005, 2006)

(mwaáná)	(anáménýa nyuúmba _F)	(ndí mwáála)	
(x)	(x)	(x)	Phonological Phrase
(x	x	x)	Intonation Phrase

This allows it to satisfy the weaker version of the STRESS-FOCUS correlation in (6), repeated below for convenience:

focus – though we must admit that we did not appreciate the importance of this observation until after we had analyzed the results of the experiment.

- (29) SF' (Samek-Lodovici 2005: 738; 2006: fig. (16))
 Let XP_f be a focused phrase, then for any unfocused YP in the focus domain of XP_f , XP_f is at least as prosodically prominent as YP.

Samek-Lodovici's analysis crucially predicts that Chichewa should not possess any culminative prominence above the level of the Phonological Phrase. If there were any culminative prominence, it should 'move' (either by a shift or reduction of prominence or a word order change) under narrow focus to satisfy the STRESS-FOCUS correlation. The problem for this analysis is that culminative prominence fails to 'move'. Sentence stress invariably remains on the IP-penult syllable, regardless of focus structure, while no word order changes occur.²⁰

Our results are also problematic for an alternative typological hypothesis (Féry 2001; Hayes & Lahiri 1991; Ladd 2008: 278-280), which proposes that prosodic phrasing is the basic (universal) prosodic correlate of focus. Prominence is one potential, but not obligatory, correlate of focus phrasing. Chichewa was considered a central example supporting this hypothesis, based on Kanerva's (1990) analysis. Our results show, however, that phrasing in Chichewa is a correlate of emphasis, not an obligatory correlate of focus. Chen (2004) provides further arguments from Chinese that there is no necessary correlation between focus and phrasing.

5.2 A factorial typology of focus prosody

As Samek-Lodovici (2005) argues, his analysis elegantly formalizes another traditional typology of the expression of focus, which classifies languages by whether they primarily use syntax or prosody to mark focus. (See e.g., Elordieta (2007a, b), Engdahl & Vallduví (1996), Face & D'Imperio (2005), Frota (2000), Ladd (2008: 252), Vallduví (1991), Vallduví & Engdahl (1996), Van Valin (1999) and Zubizarreta (1998) for discussion.) In this typology, prosody-dominant languages of the English type have flexible (or [+plastic], in Vallduví's (1991) terms) sentence stress but relatively, rigid [-plastic] syntax: sentence stress can move to the position of focus, while focused words do not move to a position of prominence.²¹ This contrasts with syntax-dominant languages of the Italian type, having [-plastic] prosody but relatively [+plastic] syntax which allows movement to place focused words in the position of sentence stress. Van Valin (1999) argues that these two binary parameters – [+/- plastic syntax] and [+/- plastic prosody] – define a four-way typology that includes the possibility that both the syntax and prosody of a language might be too rigid [-plastic] to allow focus to be marked. We have inserted Chichewa in the [-plastic syntax], [-plastic prosody] column in the table below: as we have shown, focus words can occur in situ and sentence stress also stays 'in situ,' in IP-final position. Otherwise, the language classifications follow Van Valin, adopting Vallduví's (1991) terminology for ease of comparison with Samek-Lodovici (2005):

- (30) Typology of the interaction of focus prosody and syntax (adapted, Van Valin 1999: Table 1)

	[-plastic prosody]	[+plastic prosody]
[-plastic syntax]	Chichewa	English
[+plastic syntax]	Italian	Russian, Polish

²⁰ We would like to thank one of the reviewers for formulating this point so clearly.

²¹ Following others who implement this typology, we are idealizing somewhat by setting aside focus-marking structures like clefts or pseudo-clefts, which English and other languages classified [-plastic syntax] have.

In Samek-Lodovici's (2005) approach, this four-way typology can be defined by the (partial) factorial typology in (32) of the universal constraint set in (31):

(31)

- (a) STAY (Samek-Lodovici 2005: 698)
No traces. [i.e., no syntactic movement]
- (b) SENTENCE STRESS (=HEAD-I; Samek-Lodovici 2005: 701)
Align the right boundary of every intonational phrase with its head. [i.e., sentence stress is rightmost in the Intonational Phrase]
- (c) STRESS-FOCUS (Samek-Lodovici 2005: 697, repeated from (26), above)
For any XP_f and YP in the focus domain of XP_f , XP_f is prosodically more prominent than YP.

(32) Partial factorial typology of the interaction of focus prosody, sentence stress and syntax

	[-plastic prosody]	[+plastic prosody]
[-plastic syntax]	(a) STAY, SENTENCE-STRESS >> STRESS-FOCUS	(b) STAY, STRESS-FOCUS >> SENTENCE-STRESS
[+plastic syntax]	(c) SENTENCE-STRESS >> STRESS-FOCUS >> STAY	(d) STRESS-FOCUS >> STAY, SENTENCE-STRESS

As we can see, for a language to have [-plastic syntax] = (32a, b), STAY must be ranked above STRESS-FOCUS; to have [-plastic prosody] = (32a, c), SENTENCE-STRESS must be ranked above STRESS-FOCUS; and to have [+plastic prosody] = (32b, d) or [+plastic syntax] = (32c, d), STRESS-FOCUS must be relatively high-ranked.

However, STRESS-FOCUS can also be ranked low enough in this factorial typology to define a language like Chichewa where neither syntax nor prosody express focus = (32a). Samek-Lodovici (2005) does not take up this possibility, but other recent work on focus prosody specifically argues for the ranking in (32a), i.e., with STRESS-FOCUS too low ranked to have an effect on the grammar (at least in some contexts). For example, Zerbian (2006), in a very thorough phonetic and phonological study of focus in Northern Sotho, demonstrates that this language, like Chichewa, allows in situ focus (for non-subjects) but has no focus prosody highlighting words in focus. Sentence stress (realized in Northern Sotho, as in Chichewa, as IP-penult lengthening) does not move to the position of focus but stays fixed at the right IP edge. In her analysis, she adopts the constraints in Samek-Lodovici (2005) to provide an OT account of Northern Sotho which is essentially identical to the one schematized in (32a).

A somewhat more complex example comes from Elordieta's (2007a,b) and Hualde et al.'s (2002) phonetic and phonological analyses of focus in Basque dialects. In Basque, focused words occur in immediately before the verb (IBV) position, which is also the position of sentence stress, realized as an obligatory accent in Northern Biscayan Basque (NB Basque). While accent is lexically contrastive in NB Basque, unaccented words (like *laguna* 'friend.abs' in the example below) receive an accent when they are in IBV position. (An acute accent in the NB Basque data cited indicates both lexical and IBV accent; *umiágas* is lexically accented):

(33) IBV focus accent in NB Basque (Elordieta 2007b: 5-6); focused constituents are underlined in the translation

(a) umiágas laguná etorri da
child.com friend.abs come aux
'The friend has come with the child.'

cf.

(b) laguna umiágas etorri da
friend.abs child.com come aux
'The friend has come with the child.'

If the IBV constituent is complex (a modified noun, for example) the sentence accent falls on the final word of the constituent. The question that arises is whether this accent can move, for example to indicate contrastive focus on a non-final word within the IBV constituent. Elordieta (2007a, b) shows that if a non-final word in contrastive focus has no lexical accent (like *nebien* 'brother-gen' or *lagunen* 'friend-gen'), then there is no prosodic strategy to indicate this word is in narrow focus. Note the absence of an acute accent on these words in the examples below; only the final word in IBV has an accent just as it would in the broad focus pronunciation:

(34) Contrastive focus within the IBV constituent in NB Basque (Elordieta (2007a: 209, 223; the intended narrowly focused elements are underlined in the translation

(a) nebien diruá galdu dot
brother-gen money-abs lose aux
'I have lost the brother's money.'

(b) Es, lagunen liburúa biar dot
no friend-gen book-abs need aux
'No, I need the friend's book.'

To account for this pattern, Elordieta (2007a) proposes an analysis very similar to that schematized in (32a). Crucially, SENTENCE-STRESS – and the prosodic constraints penalizing parsing *nebien* or *lagunen* into an independent prosodic phrase in the above examples – outrank STRESS-FOCUS.²²

In fact, Chichewa, Northern Sotho and NB Basque form part of a growing list of languages that challenge the universally high-ranked status of the STRESS-FOCUS constraint. Like Chichewa and Northern Sotho, many languages do not have any prosodic marking of focus: e.g., Buli and other Gur languages (Schwartz 2009), Thompson River Salish (Koch 2008), Tumbuka (Downing 2008), Wolof (Rialland & Robert 2001) and Yucatec Mayan (Kügler et al. 2007; Gussenhoven & Teeuw 2008). Zerbian et al. (2010) provides a recent overview of such cases. Other languages do not mark focus with sentence stress: e.g., Bengali (Hayes & Lahiri 1991), Egyptian Arabic (Hellmuth 2006), and Zulu (Cheng & Downing 2009). And like NB Basque, others mark focus prosodically in some contexts (or some focus types) but not others: e.g., Hausa (Hartmann 2008), Italian (Ladd 2008, Swerts et al. 2002),

²² Elordieta's (2007a: 216) HIGHLIGHT constraint is the equivalent of STRESS-FOCUS, while INFORMATION FOCUS is the equivalent of SENTENCE-STRESS. We have replaced his terms in the discussion above for ease of comparison with Samek-Lodovici's (2005) approach. Of course additional prosodic constraints are needed to formalize accent realization in NBB. The interested reader is referred to Elordieta (2007a,b) and Hualde et al. (2002) for detailed discussion of the complexities of focus prosody in NBB.

Castilian Spanish (Face & D’Imperio 2005), Mandarin (Shyu 2010), Porteño Spanish (Feldhausen et al. 2011), and Swahili (Geitlinger & Waldburger 1999). Ladd (2008) and Cruttenden (2006) provide overviews of such cases. The fact that there are so many languages which do not have obligatory focus prosody has led Chen et al. (2009) and Xu (2010) to propose that focus prominence might be an areal feature confined to some northern Asian and European languages. (Notice these are the languages which so far have been most thoroughly studied.) More research is obviously necessary to test this typological proposal, which follows from allowing STRESS-FOCUS to be freely ranked, rather than harmonically high ranked.

6 Conclusion

As we have shown, Samek-Lodovici’s (2005, 2006) proposal that even a weaker version of the STRESS-FOCUS constraint accounts for Chichewa focus prosody is untenable, as it depends on the incorrect claim that Chichewa does not have culminative IP-level stress. As we have shown, phonetic studies of Chichewa prosody demonstrate that it does have culminative IP-level stress, fixed on the IP-final foot under all focus conditions. Further, our study confirms Carleton’s (1996) finding that there is no obligatory focus prosody in Chichewa. The focus-related phrasing reported in some previous studies is instead better interpreted as optional (speaker-dependent), paralinguistic emphasis prosody. This study of focus prosody in Chichewa adds, then, to a body of cross-linguistic research demonstrating that the STRESS-FOCUS constraint (the version in (1) or in (6)) cannot be maintained as a universally inviolable principle. We propose instead, following Zerbian (2006), Elordieta (2007a, b) and Ladd (2008: 151-53), that the STRESS-FOCUS constraint – like most OT constraints – must be able to be ranked low enough to account for languages like Chichewa (and Northern Sotho and NB Basque, etc.) which have culminative sentence level prosody, but no culminative, obligatory focus prosody.

References

- Boersma, Paul & David Weenink. Praat: doing phonetics by computer. (Software).
<http://www.fon.hum.uva.nl/praat/>
- Bolinger, Dwight. 1989. Is there an intonation of “contrast”? *Intonation and its uses: Melody in Grammar and Discourse*. Stanford, CA: Stanford University Press, 341-349.
- Bresnan, Joan & Jonni Kanerva. 1989. Locative inversion in Chichewa: a case study of factorization in grammar. *Linguistic Inquiry* 20, 1-50.
- Bresnan, Joan & Sam Mchombo. 1987. Topic, pronoun and agreement in Chichewa. *Language* 63, 741-782.
- Büring, Daniel. 2010. Toward a typology of focus realization. In: Malte Zimmermann & Caroline Féry (eds.), *Information Structure*, 177-205. Oxford: OUP.
- Carleton, Troi C. 1996. *Phonetics, Phonology and Rhetorical Structuring of Chichewa*. Ph.D. dissertation, The University of Texas at Austin.
- Chen, Szu-Wei, Bei Wang & Yi Xu. 2009. Closely related languages, different ways of realizing focus. *Interspeech 2009*, Brighton, UK.
- Chen, Yiya. 2004. Focus and Intonational Phrase Boundary in Standard Chinese. *Proceedings of the International Symposium on Chinese Spoken Language Processing*, Hong Kong, 41-44.
- Chen, Yiya & Carlos Gussenhoven. 2008. Emphasis and tonal implementation in Standard Chinese. *Journal of Phonetics* 36, 724-746.

- Cheng, Lisa & Laura J. Downing. 2009. Where's the topic in Zulu? In: Helen de Hoop, & Geertje van Bergen (eds.), *Special issue on Topics Cross-linguistically, The Linguistic Review* 26, 207-238.
- Cooper, William E., Stephen J. Eady & Pamela R. Mueller. 1985. Acoustical aspects of contrastive stress in question-answer contexts. *Journal of the Acoustical Society of America* 77, 2142-2156.
- Cruttenden, Alan. 2006. The de-accenting of old information: a cognitive universal? In: Giuliano Bernini & Marcia L. Schwartz (eds.), *The Pragmatic Organization of Discourse in the Languages of Europe*. Berlin: Mouton de Gruyter, 311-356.
- Demuth, Katherine. 2003. The acquisition of Bantu languages. In: Derek Nurse & Gérard Philippson (eds.), *The Bantu Languages*. London: Routledge, 209-222.
- Doke, Clement M. 1954. *The Southern Bantu Languages*. London: Oxford University Press for the International African Institute.
- Downing, Laura J. 2008. Focus and prominence in Chichewa, Chitumbuka and Durban Zulu. *ZAS Papers in Linguistics* 49, 47-65.
- Downing, Laura J. 2010. Accent in African languages. In Harry van der Hulst, Rob Goedemans & Ellen van Zanten (eds.), *A Survey of Word Accentual Patterns in the Languages of the World*. Berlin: Mouton de Gruyter, 381-427.
- Downing, Laura J. & Al Mtenje. 2011. Prosodic phrasing of Chichewa relative clauses. *Journal of African Languages and Linguistics* 32, 65-111.
- Downing, Laura J., Al Mtenje & Bernd Pompino-Marschall. 2004. Prosody and information structure in Chichewa. *ZAS Papers in Linguistics* 37, 167-186.
- Eady, Stephen J. & William E. Cooper. 1986. Speech intonation and focus location in matched statements and questions. *Journal of the Acoustical Society of America* 80, 402-415.
- Elordieta, Gorka. 2007a. A constraint-based analysis of the intonational realization of focus in Northern Bizkaian Basque. In: Carlos Gussenhoven & Tomas Riad (eds.), *Tones and Tunes*, vol. 1, 201-234. Berlin: Mouton de Gruyter.
- Elordieta, Gorka. 2007b. Constraints on intonational prominence of focalized constituents. In Chungmin Lee, Matthew Gordon & Daniel Büring (eds.), *Topic and Focus: Cross-Linguistic Perspectives on Meaning and Intonation*. Dordrecht: Springer, 1-22.
- Engdahl, Elisabet & Enric Vallduví. 1996. Information packaging in HPSG. *Edinburgh Working Papers in Cognitive Science* 12, 1-31.
- Face, Timothy L. & Mariapaola D'Imperio. 2005. Reconsidering a focal typology: Evidence from Spanish and Italian. *Rivista de Linguistica* 17, 271-289.
- Feldhausen, Ingo, Andrea Peškova, Elena Kireva & Christoph Gabriel. 2011. Categorical perception of Portefño Nuclear Accents. *Proceedings of ICPHS 2011*, Hong Kong, 116-119.
- Féry, Caroline. 2001. Focus and phrasing in French. In: C. Féry & W. Sternefeld (eds.), *Audiatur Vox Sapientiae: A Festschrift for A. v. Stechow*. Berlin: Akademie Verlag, 153-181.
- Féry, Caroline & Vieri Samek-Lodovici. 2006. Focus projection and prosodic prominence in nested foci. *Language* 82, 131-150.
- Frota, Sonia. 2000. *Prosody and Focus in European Portuguese*. New York: Garland.
- Geitlinger, Karin & Daniela Waldburger. 1999. Intonation in Swahili. *Brücken und Grenzen: Werkschau Afrikastudien* 2. Münster: LIT Verlag, 419-434.
- Grice, Martine, Stefan Baumann & Nils Jagdfeld. 2009. Tonal association and derived nuclear accents – the case of downstepping contours in German. In: Sabine Zerbian, Laura J. Downing & Frank Kügler (eds.), *Special Issue on Tone and Intonation from a Typological Perspective, Lingua* 119, 881-905.

- Gussenhoven, Carlos. 1984. *On the Grammar and Semantics of Sentence Accents*. Dordrecht: Foris.
- Gussenhoven, Carlos. 1996. Sentence accents and argument structure. In: I.M. Roca, ed. *Thematic Structure: Its Role in Grammar*. Berlin: Foris, 79-106.
- Gussenhoven, Carlos. 1999. On the limits of Focus Projection in English. In: Peter Bosch & Rob van der Sandt (eds.), *Focus: Linguistic, Cognitive, and Computational Perspectives*. Cambridge: Cambridge University Press, 43-55.
- Gussenhoven, Carlos. 2004. *The Phonology of Tone and Intonation*. Cambridge: Cambridge University Press.
- Gussenhoven, Carlos & Toni Rietveld. 2000. The behavior of H* and L* under variations in pitch range in Dutch rising contours. *Language and Speech* 43, 183-203.
- Gussenhoven, Carlos & Renske Teeuw. 2008. A moraic and a syllabic H- tone in Yucatec Maya. In: Esther Herrera Z. & Pedro Martín Butrageño (eds.), *Fonología instrumental: Patrones fónicos y variación*. Mexico City: El Colegio de México, 49-71.
- Hartmann, Katharina. 2008. Focus and emphasis in tone and intonational languages. In Anita Steube (ed.), *The Discourse Potential of Underspecified Structures*. Berlin: Walter de Gruyter, 389-411.
- Hayes, Bruce. 1995. *Metrical Stress Theory: Principles and Case Studies*. Chicago: University of Chicago Press.
- Hayes, Bruce & Aditi Lahiri. 1991. Bengali Intonational Phonology. *NLLT* 9, 47-96.
- Hellmuth, Samantha. 2006. *Intonational pitch accent distribution in Egyptian Arabic*. Ph.D. dissertation, SOAS.
- Hualde, José I., Gorka Elordieta, Iñaki Gaminde & Rajka Smiljanić. 2002. From pitch accent to stress accent in Basque. In: Carlos Gussenhoven & Natasha Warner (eds.), *Laboratory Phonology 7*. Berlin: Mouton de Gruyter, 547-584.
- Hyman, Larry M. 1984. Form and substance in language universals. In Brian Butterworth, Bernard Comrie & Östen Dahl (eds.), *Explanations for Language Universals*. Berlin: Mouton, 67-85.
- Hyman, Larry M. 1999. The Interaction between Focus and Tone in Bantu. In: Georges Rebuschi & Laurie Tuller (eds.). *The Grammar of Focus*, 151-177. Amsterdam: John Benjamins.
- Hyman, Larry M. 2009. Penultimate lengthening in Bantu: analysis and spread. *UC Berkeley Phonology Lab Annual Report*, 195-209.
- Hyman, Larry M. & Kemmonye C. Monaka. 2011. Tonal and non-tonal intonation in Shekgalagari. In Sónia Frota, Gorka Elordieta & Pilar Prieto (eds.), *Prosodic Categories: Production, Perception and Comprehension*. Dordrecht: Springer, 267-289.
- Hyman, Larry M. & Al Mtenje. 1999. Prosodic Morphology and tone: the case of Chichewa. In: René Kager, Harry van der Hulst and Wim Zonneveld, (eds.). *The Prosody-Morphology Interface*. Cambridge: Cambridge University Press, 90-133.
- Jackendoff, Ray. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge, MA: MIT Press.
- Jun, Sun-Ah. 2005. Prosodic Typology. In: Sun-Ah Jun (ed.), *Prosodic Typology: The Phonology of Intonation and Phrasing*. Oxford: Oxford University Press, 430-458.
- Kager, René & Wim Zonneveld. 1999. Phrasal Phonology: an introduction. In: René Kager & Wim Zonneveld, *Phrasal Phonology*. Nijmegen: Nijmegen University Press, 1-43.
- Kanerva, Jonni M. 1990. *Focus and Phrasing in Chichewa Phonology*. New York: Garland.
- Kenstowicz, Michael & Hyang-Sook Sohn. 1997. Phrasing and focus in Northern Kyungsang Korean. *MIT Working Papers in Linguistics* 30, 25-47.
- Kisseberth, Charles W. 2010. Phrasing and relative clauses in Chimwiini. *ZAS Papers in Linguistics* 53, 109-144.

- Kisseberth, Charles W. & David Odden. 2003. Tone. In: Derek Nurse & Gérard Philippson (eds.), *The Bantu Languages*. London: Routledge, 59-70.
- Koch, Karsten. 2008. *Intonation and Focus in Nteŋkepmxcin (Thompson River Salish)*. Ph.D. dissertation, University of British Columbia.
- Kügler, Frank, Stavros Skopeteas & Elisabeth Verhoeven. 2007. Encoding Information Structure in Yucatec Maya: On the Interplay of Prosody and Syntax. In: Shinichiro Ishihara, Stefanie Jannedy & Anne Schwarz (eds.), *Interdisciplinary Studies on Information Structure* 8, 187-208.
- Ladd, D. Robert. 2008. *Intonational Phonology*. 2nd edition. Cambridge: Cambridge University Press.
- Leben, Will & Firmin Ahoua. 2006. Phonological reflexes of emphasis in Kwa languages of Côte d'Ivoire. In: *West African Linguistics: Papers in Honor of Russell G. Schuh*, ed. by Paul Newman & Larry M. Hyman. *Studies in African Linguistics, Supplement* 11, 145-158.
- Mchombo, Sam. 2004. *The Syntax of Chichewa*. Cambridge: Cambridge University Press.
- Moto, Francis. 1989. *Phonology of the Bantu Lexicon*. Ph.D. dissertation, University College London.
- Mtenje, Al. 1986. *Issues in the Nonlinear Phonology of Chichewa*. Ph.D. dissertation, University College London.
- Mtenje, Al. 1987. Tone shift principles in the Chichewa verb: a case for a tone lexicon. *Lingua* 72, 169-209.
- Myers, Scott. 1996. Boundary tones and the phonetic implementation of tone in Chichewa. *SAL* 25, 29-60.
- Myers, Scott. 1998. Surface underspecification of tone in Chichewa. *Phonology* 15, 367-391.
- Myers, Scott. 1999a. Downdrift and pitch range in Chichewa intonation. *Proceedings of ICPHS99*, 1981-1984.
- Myers, Scott. 1999b. Tone association and f₀ timing in Chichewa. *SAL* 28, 215-239.
- Myers, Scott. 2000. Boundary disputes: the distinction between phonetic and phonological sound patterns. In Noel Burton-Roberts, Philip Carr & Gerard Docherty (eds.), *Phonological Knowledge: Conceptual and Empirical Issues*. Oxford: Oxford University Press, 245-272.
- Myers, Scott & Troi Carleton. 1996. Tonal transfer in Chichewa. *Phonology* 13, 39-72.
- Odden, David. 1999. Typological issues in tone and stress in Bantu. In Shigeki Kaji (ed.), *Cross-Linguistic Studies of Tonal Phenomena: Tonogenesis, Typology, and Related Topics*. Tokyo: ILCAA, 187-215.
- Patin, Cédric. 2010. The prosody of Shingazidja relatives. *ZAS Papers in Linguistics* 53, 187-209.
- Patterson, David & D. Robert Ladd. 199. Pitch range modeling: linguistic dimensions of variation. *Proceedings of the XIVth International Congress of Phonetic Sciences*, vol. 2, 1169-1172.
- Pike, Kenneth L. 1963. A syntactic paradigm. *Language* 39, 216-230.
- Prince, Alan & Paul Smolensky. 2004. *Optimality Theory: Constraint Interaction in Generative Grammar*. Malden, MA: Blackwell.
- Reinhart, Tanya. 1995. Interface strategies. *OTS Working Papers in Theoretical Linguistics* 02-001, Utrecht: OTS, Utrecht University.
- Rialland, Annie & Stéphane Robert. 2001. The Intonational system of Wolof. *Linguistics* 39, 893-939.
- Roberts, Craige. 1998. Focus, the flow of information, and universal grammar. *The Limits of Syntax, Syntax and Semantics* 29. San Diego: Academic Press, 109-160.

- Rochemont, Michael S. & Peter W. Culicover. 1990. *English Focus Constructions and the Theory of Grammar*. Cambridge: Cambridge University Press.
- Rooth, Mats. 1992. A theory of focus interpretation. *Natural Language Semantics*, 75-116.
- Rooth, Mats. 1996. Focus. In: S. Lappin (ed.), *Handbook of Contemporary Semantic Theory*. Oxford: Blackwell, 271-297.
- Samek-Lodovici, Vieri. 2005. Prosody-syntax interaction in the expression of focus. *NLLT* 23, 687-755.
- Samek-Lodovici, Vieri. 2006. Absence of stress culmination and prosodic phrasing. In: Eric Bakovic, Junko Ito, and John McCarthy, (eds.), *Wondering at the Natural Fecundity of Things: Essays in Honor of Alan Prince*. eScholarship Repository, University of California, <http://repositories.cdlib.org/lrc/prince/>
- Schwartz, Anne. 2009. Tonal focus reflections in Buli and some Gur relatives. In: S. Zerbian, L.J. Downing & F. Kügler (eds.), *Special Issue on Tone and Intonation from a Typological Perspective*, *Lingua* 119, 950-972.
- Selkirk, Elisabeth O. 1984. *Phonology and Syntax: The Relation between Sound and Structure*. Cambridge, Mass.: The MIT Press.
- Selkirk, Elisabeth O. 1995. Sentence prosody: intonation, stress and phrasing. In: John A. Goldsmith, (ed.). *The Handbook of Phonological Theory*. Cambridge, MA: Blackwell, 550-569.
- Selkirk, Elisabeth O. 2004. Bengali intonation revisited. In: Chungmin Lee, Matthew Gordon & Daniel Büring (eds.), *Topic and Focus: A Cross-Linguistic Perspective*. Dordrecht: Springer, 217-246.
- Shyu, Shu-ing. 2010. Focus interpretation of *zhi* 'only' associated arguments in Mandarin triadic constructions. *Linguistics* 48, 671-716.
- Swerts, M., E. Krahmer & C. Avesani. 2002. Prosodic marking of information status in Dutch and Italian: a comparative analysis. *Journal of Phonetics* 30, 629-654.
- Szendroï, K. 2003. A stress-based approach to the syntax of Hungarian focus. *The Linguistic Review* 20, 37-78.
- Truckenbrodt, Hubert. 1995. *Phonological Phrases: Their Relation to Syntax, Focus, and Prominence*. Ph.D. dissertation, MIT.
- Truckenbrodt, Hubert. 2005. The syntax-phonology interface. In: Paul de Lacy (ed.), *The Cambridge Handbook of Phonology*. Cambridge: Cambridge University Press, 435-456.
- Vallduví, Enric. 1991. The role of plasticity in the association of focus and prominence. *Proceedings of ESCOL 7*, 295-306.
- Vallduví, Enric & Engdahl, Elisabet. 1996. The linguistic realization of information packaging. *Linguistics* 34, 459-519.
- Van Valin, Robert D., Jr. 1999. A typology of the interaction of focus structure and syntax. In E. Raxilina & J. Testelec (eds.), *Typology and Linguistic Theory: From Description to Explanation*. Moscow: Languages of Russian Culture, 511-524.
- Vogel, Irene & Steve Hoskins. 1996. On the interaction of clash, focus and phonological phrasing. *Proceedings of ICSLP 96*, vol. 4, 2040-2043.
- Wu, Wing Li & Yi Xu. 2010. Prosodic focus in Hong Kong Cantonese without post-focus compression. *Proceedings of Speech Prosody 2010*, Chicago.
- Xu, Yi. 2010a. Prosodic focus: The Altaic origin hypothesis. http://www.phon.ucl.ac.uk/home/yi/focus_crosslinguistic/
- Xu, Yi. 2010b. In defense of Lab Speech. *Journal of Phonetics* 38, 329-336.
- Xu, Yi & Ching X. Xu. 2005. Phonetic realization of focus in English declarative intonation. *Journal of Phonetics* 33, 159-197.
- van Zanten, Ellen. 2011. Penultimate lengthening in Chichewa: a pilot experiment. ms. Leiden University.

- Zerbian, Sabine. 2006. *Expression of Information Structure in the Bantu Language Northern Sotho*. *ZAS Papers in Linguistics* 45.
- Zerbian, Sabine, Susanne Genzel & Frank Kügler. 2010. Experimental work on prosodically-marked information structure in selected African languages (Afroasiatic and Niger-Congo). *Proceedings of Speech Prosody 2010*, Chicago.
- Zubizarreta, Maria Luisa. 1998. *Prosody, Focus and Word Order*. Cambridge, MA: MIT Press.