The Prosodic Hierarchy in Chichewa: How Many Levels?[*]

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Abstract: Recent work (Itô & Mester, 2012, 2013; Selkirk, 2009, 2011) proposes that Prosodic Hierarchy is made up of only three levels of prosodic constituents, which are morpho-syntactically motivated and universally instantiated: Intonation Phrase, Phonological Phrase and Prosodic Word. This paper tests the validity of the three-level hypothesis by investigating the phonology of Chichewa, a Bantu language spoken in Malawi. Two challenges to the hypothesis emerge from this investigation. First, three levels of prosodic constituency is too parsimonious, as Chichewa, like many languages, provides evidence for another level, the Prosodic Stem (immediately dominated by Prosodic Word). The analysis also questions the universal validity of the three levels, as there is no strong evidence, at the phrasal level, for a Phonological Phrase domain distinct from Intonation Phrase. This paper argues for a middle path between extreme parsi-

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mony in the number of prosodic constituents admitted to the Prosodic Hierarchy and an empirically adequate theory which allows for more domains, when evidence for them can be provided.

Key words: Prosodic Stem, composite word group, Bantu languages, reduplication, tone domains, minimality, clitics, hiatus resolution.

1　Introduction

Prosodic theory proposes that phonological strings are parsed into a set of hierarchically arranged constituents — the Prosodic Hierarchy — which provide the domains for morpho-syntactically-conditioned phonological processes. (See, e.g., Inkelas, 1989; Nespor &Vogel, 1986; Selkirk, 1986, 1995; Hayes, 1989). A persistent research issue for the Prosodic Hierarchy is to determine what the cross-linguistically valid repertory of constituents should be. In addressing this issue, two conflicting considerations must be balanced (Inkelas, 2014): 1- The number of constituents should be as *parsimonious* as possible, as this is the best way to insure the posited constituents are of universal cross-linguistic relevance; and 2- The number of constituents must provide *sufficient* prosodic domains to account for morpho-syntactically conditioned phonological processes in all languages.

Selkirk (2009, 2011) and Itô & Mester (2012, 2013) have recently argued in favor of a parsimonious view. They make the strong claim that the Prosodic Hierarchy contains only the three universal, syntactically-defined constituents in (1):

(1) Prosodic Hierarchy (adapted, Itô & Mester, 2013: 26; Selkirk, 2011: 439)

Intonational Phrase　　　　　matches　　　　　syntactic clause (CP)

|

Phonological Phrase　　　　　matches　　　　　syntactic phrase (XP)

|

Prosodic Word	matches	syntactic word (X^0); i.e., a "word in syntactic constituent structure" (Selkirk, 2011: 439)

Any additional prosodic domains must, in their framework, be defined as recursions of one of these constituents. Further, all languages are expected to require this set of prosodic constituents, since they match universally instantiated syntactic constituents.

This paper investigates the cross-linguistic validity of the set of prosodic constituents in (1), based on a case study of Chichewa, a Bantu language (N.31) spoken mainly in Malawi. I argue, first, that this definition of the Prosodic Hierarchy is too parsimonious: an additional constituent, Prosodic Stem, is required to account for the distinction between stem- and word-level phonological domains that is motivated by Chichewa and has been demonstrated for many other languages. (See, e.g., Inkelas, 1989, 1993; Downing, 1999; Kiparsky, 2000; Bermudez-Otéro, 2011, 2012.) Secondly, I argue that this definition of the Prosodic Hierarchy is too inflexible: not every language has two levels of phrasing at the post-lexical level.

The paper is structured as follows. In section 2, I review arguments for prosodic constituents distinct from morphological ones, at the level of Prosodic Word (PWord) and also at the level of Prosodic Stem (PStem) – a sublexical constituent dominated by PWord – in Bantu and other languages. In section 3, I present data from Chichewa, showing that in this language, too, we find evidence for PWord distinct from grammatical word and also from PStem. Section 4 shows that alternatives to a PWord–PStem distinction are not workable. The distinction cannot be recast in terms of recursive Prosodic Word domains, following recent proposals by Itô & Mester (2012, 2013), Riad (2012), and Selkirk (2009, 2011). Another alternative approach (Vigário, 2010; Vogel, 2009, 2010) will also be shown to encounter problems

in accounting for the data.

In section 5, we turn to post-lexical prosodic constituency. Previous work on prosodic phrasing in Chichewa (Kanerva, 1990; Truckenbrodt, 1995) argues for two levels of phrasing, Phonological Phrase and Intonation Phrase. However, once one includes a broader range of data in the prosodic analysis, it is more plausible to argue that Chichewa has only one level of prosodic phrasing, the Intonation Phrase. In section 6, I conclude by proposing a revised view of the number and the universality of the levels in the Prosodic Hierarchy.

2　Arguments for prosodic constituents distinct from morphological ones

Under the Indirect Reference Hypothesis (Nespor & Vogel, 1986; Selkirk, 1986) phonological processes apply with reference to prosodic constituents, not directly to morpho-syntactic ones. Evidence for prosodic constituents distinct from morpho-syntactic constituents comes from two sources: the constituent is a domain for phonological processes; and/or one finds mismatches between morpho-syntactic constituents and the prosodic constituent. In the default case, constituents such as Prosodic Word are coextensive with the corresponding morphological constituent: grammatical word. That is, as shown in (1), by definition prosodic constituents 'match' morpho-syntactic constituents (Inkelas, 1989, 1993; Itô & Mester, 2013; Selkirk, 2009, 2011). However, prosodic and morphological constituents may be misaligned, and these misalignments provide the best motivation for prosodic constituents. (See, e.g., Selkirk, 1986, 1995, 2011; Nespor & Vogel, 1986; Inkelas, 1989, 1993, 2011, 2014.) Before turning to the Chichewa data, we briefly review general evidence for mismatches between prosodic and morphological constituents, giving examples of mismatches at the word level and at the stem level.

2.1   Arguments for Prosodic Word: Sources of Misalignment

We begin by briefly reviewing common sources of misalignment between Prosodic Word and grammatical word. (Unless specified otherwise, prosodic constituency is indicated with parentheses throughout, while morphosyntactic constituency is indicated with square brackets).

2.1.1   Final extrametricality: ([xx) x]

It is very common for word-final syllables to be ineligible for stress or tone assignment. For stress, cross-linguistic surveys like Hyman (1977) and Goedemans & van der Hulst (2013) show that there are twice as many languages with penult stress as with final stress. For Bantu tone, surveys like Cassimjee & Kisseberth (1998) and Kisseberth & Odden (2003) show that it is common for the final syllable to be ineligible as a target of High tone spread. As Inkelas (1989) argues, the prosodic exceptionality of final syllables can be formalized by misaligning the Prosodic Word (the domain for stress or tone) and the grammatical word, excluding the final syllable or mora or Foot. To illustrate, in English, the final syllable is typically extrametrical for stress in nouns but not in verbs. This contrast in stress domain can be formalized as, for example: ([cón)tract] (noun) vs. ([contráct]) (verb). We can then make the generalization that main stress is assigned to the rightmost syllable in both types of words.

2.1.2   Initial vowel extrametricality: [V (xx)]

It is also fairly common for onsetless initial vowels to be excluded from the domain of parsing into stress feet or from tone association. Downing (1998a) provides a survey of such cases. (See, too, Goedemans, 1996; Odden, 2006.) As Downing (1998a, 1998b) argues, this generalization can be formalized in terms of PWord/grammatical word misalignment: optimal left-alignment of PWord is with the leftmost syllabically well-formed (onset-ful) syllable, leaving the initial

vowel of the grammatical word unparsed by the corresponding PWord: [V (xx)].

2.1.3　Augmentation to satisfy Minimality: (x [x])

As work beginning with McCarthy & Prince (1986) has documented in some detail, it is very common, cross-linguistically, for words to be required to have a particular minimal size. One strong piece of evidence for a minimality requirement comes from languages where subminimal words are augmented through epenthesis of morphologically empty material. As Myers (1987, 1995) and Mudzingwa (2010) show, an example of this is provided by imperative verb formation in Zezuru Shona. In (2e-2h), below, we see that in minimally disyllabic stems, the imperative consists of the bare verb stem. However, in (2a-2d) we see that monosyllabic verb stems like *-pa* 'give' must be augmented with *i-* in the imperative form:

(2) Zezuru Shona imperatives; epenthetic elements are bolded; 'j' is the palatal glide (Downing & Kadenge, 2015)

Imperative	Infinitive	Gloss
a. **i**pá	ku-pá	'give'
b. **i**dyá	ku-dyá	'eat'
c. **i**nwá	ku-nwá	'drink'
d. **i**bvá	ku-bvá	'leave'
cf.		
e. ímbá	ku-**j**ímbá	'sing'
f. fámbá	ku-fámbá	'walk'
g. túmírá	ku-túmírá	'to send to'
h. verengerana	ku-verengerana	'read to each other'

The comparison between (2a-2d) and (2e) is instructive, as it shows that verb stems which begin with non-epenthetic *i-*(2e) retain it in the infinitive form (where a palatal glide - *j* - is inserted before the stem-initial vowel to resolve

vowel hiatus). In contrast the epenthetic vowels in (2a-2d) do not occur in the infinitive, where the infinitive prefix allows the word to satisfy the disyllabic minimality requirement.

2.1.4   Clitics: ([x]x))

Clitics are defined as morphemes that are prosodically bound to an adjacent word, even though they are not necessarily morpho-syntactically dependent on that word. Cliticization can thus be formalized as a process that leads to misalignment between prosodic and morpho-syntactic constituency: e.g., ([[Base] clitic]) or ([clitic[Base]]), as argued for in work like Inkelas (1989), Selkirk (1995). For example, English enclitics – like possessive *s*, and the reduced forms of the auxiliary verb, *has* and *is* – are prosodically bound to a preceding word, whatever its lexical category. Evidence that these clitics are parsed into a Prosodic Word with their phonological host comes from the fact that they show voicing agreement with the final sound of their host, a process which only applies to coda consonants within the (P)word domain: e.g., Pat's ([Pat]s]) vs. Ed's ([ed]z]).

2.2   Arguments for Prosodic Stem: sources of misalignment

Empirical evidence for the Prosodic Stem (PStem) – distinct from both the morphological Stem and the Prosodic Word – has come from languages as diverse as:

(3)
- Salishan languages (Czaykowska-Higgins, 1996, 1998; Shaw, 2005),
- Athapaskan languages (McDonough, 1990),
- Chumash (Downing, 1998b; Inkelas, 2011, 2014; Inkelas & Zoll, 2005),
- Axininca Campa (Downing, 2006),
- Bantu languages (Downing, 1998a, 1998b, 1999, 2006; Hyman, 1987, 1998, 1999, 2009; Hyman & Inkelas, 1997; Jones, 2011; Mchombo, 1993;

Mudzingwa, 2010; Mutaka, 1994),

- Bengali (Fitzpatrick-Cole, 1993),

- Japanese (Itô & Mester, 1996).

What many of the languages in (3) have in common is that words, especially verb words, consist of a string of inflectional prefixes, preceded or followed by a morphologically complex Stem:

(4) [Inflectional Prefixes [**Stem**]] OR [[**Stem**] Inflectional Prefixes]

The Bantu verb structures given in (5) illustrate in more detail the morphological complexity typical of these kinds of languages:

(5) Bantu verb structure; obligatory components are bolded (Meeussen, 1967; Myers, 1987, 1997; Downing, 1999; Hyman, 2009)

a. Verb word

Verb Word = V^0

5

INFL		Macro**Stem**
prefixes:		5
Subj-	(Object Prefix)	[Compound **Stem**]
TAM		5
	([RED Stem])	[**Inflected verb stem**]

b. Inflected verb stem

Inflected verb stem

wo

Derivational Stem	**Inflectional Final Suffix (IFS)**
ty	
Root　(Derivational Suffixes/Extensions)	

Morphologically, the Stem constituent recognized by Bantuists is defined as the word minus inflectional prefixes. This is a rather standard definition of stem: see, e.g., Bauer (2003), Bermudez-Otéro (2013), and Matthews (1991). Thus, in the Bantu verb structure in (5a), preverbal inflectional prefixes like Subject

Agreement and Tense-Aspect-Mood (TAM) prefixes are not part of the Stem. However, the Inflectional Final Suffix is traditionally included in the Stem.

Recent work in OT phonology like Kiparsky (2000) and Bermudez-Otéro (2011, 2012, 2013) explicitly proposes that a distinction between a stem vs. word domain (or stratum) is necessary to account for a wide range of phonological processes. For example, it is uncontroversial that many, if not most, languages have phonological processes that take some domain smaller than the morphological word, systematically excluding some affixes from the smaller domain. In many languages, we find the kinds of mismatches between the grammatical stem and the equivalent prosodic domain which motivate the Prosodic Stem as a distinct domain from the grammatical. The arguments for Prosodic Stem thus parallel those for the Prosodic Word.[①] We briefly review a couple of these arguments below.

2.2.1   Initial vowel extrametricality: [V (CV)]

As work like Hyman (2009) has demonstrated, the inflected verb stem in (5b) is the domain for verbal reduplication in most Bantu languages. This observation is reflected in the verb word structure in (5a), where the reduplicative morpheme forms a compound stem with the inflected verb stem. However, as Downing (1998a, 1998b) shows, it is rather common for (stem‑)initial vowels to fail to reduplicate. (This is true not only in Bantu languages but also cross-linguistically.) The data from KiNande (Bantu D.41; Mutaka & Hyman, 1990), illustrate that with consonant-initial stems, the reduplicative morpheme copies the initial portion of the base stem. However, the stem-initial vowel is not reduplicated with the longer vowel-initial stems in (6c), and the reduplicative morpheme is infixed following the stem-initial vowel:

(6) Kinande verbal reduplication (Mutaka & Hyman, 1990; Mutaka, 1994); *eri-* is the infinitive prefix; the reduplicant is underlined

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① See Inkelas (1989, 1993, 2014) for detailed conceptual arguments in favor of PStem.

Stem	Reduplicated Form	Gloss
a. *Consonant-initial*		
eri-huma	eri-<u>huma</u>=huma	to beat
eri-humira	eri-<u>huma</u>=humira	to beat for
eri-humirana	eri-<u>huma</u>=humirana	to beat for each other
b. *Monosyllabic*		
eri-swa	eri-<u>swa.swa</u>=swa	to grind
erí-ta	erí-<u>ta.ta.</u>=ta	to bury
c. *Vowel-initial, infixing*		
ery-esera	ery-e=<u>sera</u>=sera	to play for
ery-óhera	ery-ó=<u>hera</u>=hera	to pick for
d. *Vowel-initial, prefixing*		
ery-esa	ery-<u>e.se.s</u>=e.sa	to play
ery-ôha	ery-<u>ó.ho.h</u>=o.ha	to pick

As Downing (1998a, 1998b, 1999) argues, this pattern of misalignment is best accounted for by proposing that initial vowels are not parsed into the PStem – e.g., [e (sera)] – allowing the PStem to begin with a well-formed onset-ful syllable. The reduplicative morpheme (RED) aligns with the PStem, not the grammatical stem, deriving infixation. Reduplication copies the PStem base.

2.2.2　Minimality

The forms in (6a) show that the reduplicative PStem is subject to a disyllabic maximality condition in Kinande. The forms in (6b) show that the reduplicative PStem is also subject to a disyllabic minimality constraint. In Kinande, this minimality constraint is satisfied by double reduplicating the base stem, leading to a mismatch between the base grammatical stem and the reduplicative PStem.

2.2.3　Left edge Onset requirement: (C [VCV…])

The requirement that the verb stem must begin with a well-formed on-

set-ful syllable is satisfied in other languages by epenthesizing an onset for the initial vowel. The Zezuru Shona infinitive form in (e) illustrates this strategy. An epenthesized palatal glide resolves vowel hiatus at the prefix-stem juncture, leading to misalignment between the PStem and the grammatical stem.

In the next section, we illustrate these kinds of misalignments at the word and stem level in detail with a case study of Chichewa prosody.

3   Prosodic Word and Prosodic Stem in Chichewa: a case study

This section builds on previous studies on prosodic domains for phonological processes in Chichewa, such as Downing & Mtenje (to appear), Hyman & Mtenje (1999), Kanerva (1990), Mchombo (1993), Moto (1989) and Mtenje (1988). As we shall see, Chichewa phonology provides evidence for two prosodic domains, Prosodic Word and Prosodic Stem, which roughly match grammatical word and grammatical stem but are sometimes misaligned with them.

3.1   Evidence for Prosodic Word

Kanerva (1990) provides several arguments in favor of a Prosodic Word (PWord) domain, distinct from grammatical word, in Chichewa. First, in Chichewa, as in Zezuru Shona, imperative verbs are subject to a minimality requirement.[①] The evidence is identical to Zezuru Shona: subminimal verb stems

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① It is a matter of current debate how best to account for disyllabic minimality requirements like the one holding in Chichewa imperatives. Work like Kanerva (1990), McCarthy (2000) and McCarthy & Prince (1986) argues that minimality requirements are foot-based. However, a body of work has pointed out that the correlation between metrical foot size and minimal word size is very weak, cross-linguistically. See Downing (2006) and references therein for detailed discussion of this debate and of alternative proposals to account for word minimality requirements.

are augmented with an *i-* in the imperative which does not occur in the infinitive; note that penult vowels are predictably lengthened in Chichewa:

(7) Imperative verbs (Kanerva, 1990: 42ff)

a. Stems with more than one syllable

Imperative	Gloss	cf. Infinitive
viina	'dance'	ku-víina
goóná	'sleep'	ku-góona
lemeérá	'get heavy'	ku-léméérá
yasamuula	'yawn'	ku-yásámuula

b. Monosyllabic stems

ii-ba	'steal'	kuú-bá
ii-dya	'eat'	kuú-dyá
ii-gwa	'fall'	kuú-gwá
ii-mwa	'drink'	kuú-mwá

Again, it is instructive to compare imperative forms with an epenthetic *i-* with the imperative of verb stems like those in (8), which begin with non-epenthetic *i-*. As in Zezuru Shona, these verbs retain the initial vowel in the infinitive form, and a palatal glide – *y* – is inserted before the stem-initial vowel to resolve vowel hiatus:

(8) Verb stems with an underlying initial *i-* (Kanerva, 1990: 43)

Imperative	Gloss	cf. Infinitive	
iika	'put'	ku-**y**íika	*kuú-ká
iima	'stand'	ku-**y**íima	
iimba	'sing'	ku-**y**íimba	
iwaálá	'forget'	ku-**y**íwáálá	

Surprisingly, the imperatives of monosyllabic stems do not lose the augmentative syllable when an enclitic, such as the 2nd person plural or *=nso*, is added to them, even though the enclitic alone would suffice to make the result-

ing output word form disyllabic:[①]

(9) Monosyllabic imperative verbs plus enclitics (Downing & Mtenje, to appear)

a. i-phaa=ni 'kill, polite plural imperative'   *phaa=ni

b. i-pháa=nso   'kill also, again, imperative'   *pháa=nso

Myers (1987) proposes for identical Zezuru Shona data that the augment is retained because the enclitics subcategorize for Prosodic Word, which, as we have just seen, is subject to a disyllabic minimality condition. These forms provide further evidence for PWord, since one must specify a minimal PWord, rather than a grammatical word, as the Base for cliticization.

The question now arises of what prosodic constituent the cliticized verbs in (9) are parsed into. Given the restricted set of prosodic constituents provided by the Prosodic Hierarchy in (1), the answer can only be that a word like *i-phaa=ni* forms a recursive Phonological Word: ((i-phaa)=ni). And, indeed, as Kanerva (1990) shows, there is tonal evidence in Chichewa that enclitics of different types have this prosodic parse. Three common enclitics – ⁻*nso* 'even, also', ⁻*di* 'indeed, truly, in fact' and ⁻*tu* 'believe me, for sure, really' – contribute a High tone to their host, which can be either a noun or a verb.[②] The High tone contributed by the enclitic does not surface on the enclitic itself, but rather surfaces on the preceding (penultimate) syllable:

(10) Toneless imperatives with High-toned enclitics(Downing & Mtenje, to appear)

a. piita	'go'	pitáa=nso	'go again'
b. yiimba	'sing'	yimbáa=di	'sing indeed'
c. sangalaala	'rejoice'	sangalaláa=nso	'rejoice again'
d. samaala	'take care'	samaláa=di	'take care indeed'

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① The same facts hold for Zezuru Shona, as Myers (1987) shows, and for Swati, as Downing (1999) demonstrates. That is, imperatives of monosyllabic stems retain their minimality-motivated augment in these languages when certain clitics are added to them.

② See Moto (1989: chapter 5) for a thorough discussion of the tonal properties of various enclitics in Chichewa.

(11) Toneless nouns with High-toned enclitics (adapted, Kanerva, 1990: 152)

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a. nyaama	'meat'	nyamáa=nso	'meat=also'
b. ma-deengu	'baskets'	ma-dengúu=nso	'baskets=also'
c. ci-pataala	'hospital'	ci-pataláa=nso	'hospital=also'
d. phiili	'mountain'	pilíi=di	'mountain=indeed'
e. m̩-leenje	'hunter'	m̩-lenjée=di	'hunter=truly'
f. nthiwatiiwa	'ostrich'	nthiwatiwáa=di	'ostrich=indeed'

However, when a High-toned enclitic is added to a noun with a High tone on its penult, such as *mfúumu* 'chief', the High tone of the enclitic does not surface on the penult of the encliticized form. If the enclitic's High tone were to be assigned to the penult of the encliticized form, an H-H sequence would be created – e.g., *mfúmú=nso* 'chief also' – yielding an OCP violation. In this case, as Moto (1989) and Kanerva (1990) show, the OCP violation is resolved by associating the enclitic's High tone with the enclitic itself (the final syllable of the form), as illustrated in the examples below:

(12) Examples of TONE SHIFT when enclitic is added to noun with penult High tone (adapted, Kanerva, 1990: 156)

a. m-fúumu	'chief'	m-fúmúú=nsó
b. ci-páatso	'fruit'	ci-pátsóó=nsó
c. nkhúuku	'chicken'	nkhúkúú=dí
d. mi-káango	'lions'	mi-kángóó=dí

Hyman & Mtenje's (1999b: 100) formulation of this process, which shifts (or 'bumps,' in their terms) a High tone from its usual association site, the penult, to the final syllable to avoid an H-H sequence, is given below:

(13) LOCAL TONE SHIFT (Hyman & Mtenje, 1999b: 100)

σ   σ   σ

H   H] PWord
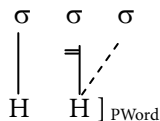
To illustrate:

(14)

a. Input to TONE SHIFT: mfúmú=nso

b. Local TONE SHIFT: mfúmu=nsó

c. Output pronunciation: mfúmúú=nsó

   due to Penult lengthening and other tone processes; see section 5

As Kanerva (1990: 180, 181) shows, TONE SHIFT takes the Prosodic Word as its domain. First, as we have seen, "penult" and "final" refer to positions with the Prosodic Word, not the grammatical word, since an enclitic can be a target for "shifted" High tone. Furthermore, TONE SHIFT is Prosodic Word bound: encliticized forms with a High tone on the antepenult and penult have the same output tone pattern as uncontroversially word-internal sequences with the same input tone pattern. This is illustrated by the verbs in (15): a High tone lexically associated with the penult surfaces on the final syllable due to TONE SHIFT:

(15) Word-internal TONE SHIFT (adapted, Kanerva, 1990: sec. 6.2.1, 6.2.2); lexical High tone positions are underlined

a. a-dz<u>á</u>-ch<u>íí</u>-bá   'S/he will steal it (cl.7).'

b. ndi-n<u>á</u>-ch<u>íí</u>-dyá   'I ate it (cl.7).'

In contrast, TONE SHIFT does not apply across word boundaries in uncontroversially phrasal sequences such as those in (16) with the same input tone pattern: i.e., a High tone on the antepenult and High tone on the penult. Note we find a falling tone on the penultimate syllable of these phrases rather than a High tone on the final vowel, as we would expect if TONE SHIFT had applied (cf. the forms in (12) and in (15)):

(16) TONE SHIFT fails to apply across Prosodic Word boundaries (adapted, Kanerva, 1990); underlying High tone positions are underlined

a. nd<u>í</u> nj<u>ú</u>uchi   'by bees'   *ndí njúúchí

b. ti-tsek<u>é</u> nd<u>é</u>ege   'We should open the airplane.'   *ti-tseké ndéégé

In sum, evidence for PWord (as opposed to grammatical word) in Chichewa

comes from two sources of misalignment: to satisfy minimality and through cliticization.

3.2　Evidence for Prosodic Stem

To motivate Prosodic Stem (PStem) for any language, one must demonstrate, first, that some stem-external affixes are not included in the domain of some phonological processes, showing that the word and the stem are distinct phonological domains. Further, one must demonstrate that the grammatical stem is subject to prosodic well-formedness constraints that lead to misalignment with a PStem domain. The next two sections take up these arguments in turn.

3.2.1　Phonological processes that take stem (not word) as their domain

Verbal reduplication in Chichewa, as in Kinande (6) and most other Bantu languages (Hyman, 2009), takes the verb stem as its Base. Prefixes are not reduplicated. Reduplication expresses frequency or intensity of the action or state of the base verb, and it can also have the distributive meaning of doing the action "here and there." Unlike Kinande, there is no maximality condition on the reduplicative morpheme. As shown by the data below, the entire verb stem can be reduplicated, no matter how long it is:[1]

(17) Verbal reduplication in the remote past paradigm (adapted, Hyman & Mtenje, 1999b: 108; Moto, 1989: 278ff); '=' indicates the stem; the reduplicative morpheme is underlined[2]

a. Low-toned stems

tí-náa=phá　　　　　tí-náa=phá-<u>ííphá</u>　　　　　　　'we killed'

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[1]　See Hyman & Mtenje (1999b), Kanerva (1990: 48ff), Moto (1989: chapter 6), Mtenje (1988) and Myers & Carleton (1996) for detailed discussion and analysis of Chichewa reduplication.

[2]　The data is adapted in order to indicate the surface, isolation pronunciation of words, including predictable phrase penult lengthening and its effect on the tone patterns.

tí-náa=méenya	tí-náa=ményá-<u>meényá</u>	'we hit'
tí-náa=thandíiza	tí-náa=thandízá-<u>thandíiza</u>	'we helped'
tí-náa=vundikíila	tí-náa=vundikílá-<u>vundikíila</u>	'we covered'
tí-náa=fotokozéela	tí-náa=fotokozélá-<u>fotokozéela</u>	"we explained to'

b. High-toned stems

tí-náa=péeza	tí-náa=pézá-<u>peézá</u>	'we found'
tí-náa=namíiza	tí-náa=namízá-<u>namíiza</u>	'we deceived'
tí-náa=thamangíila	tí-náa=thamangílá-<u>thamangíila</u>	'we ran to'
tí-náa=khululukíila	tí-náa=khululukílá-<u>khululukíila</u>	'we pardoned; forgave'

Reduplication of monosyllabic verb stems like *-pha* 'give' emphasize that only the verb stem is the base for reduplication. As we can see, the reduplicative morpheme is subject to a disyllabic minimality condition. This condition is satisfied by augmenting the reduplicant with *i-*, not by copying prefixes outside the stem. (Recall, it is the prefixes which allow the verb word containing the base stem to satisfy disyllabic minimality.)

Vowel height harmony is another common Bantu phonological process that takes the stem (not the entire verb word) as its domain. Hyman's (1999) survey demonstrates that "canonical" Bantu VHH has the following characteristic properties:

(18) "Canonical" Bantu VHH (Hyman, 1999: 238)

a. *Morphological conditioning*:

• It does not apply to the final vowel.

• It does not apply to prefixes.

That is, it applies roughly within the derivational stem (bolded):

[[Prefixes] [**Root+Derivational Suffixes**] FV]; cf. (5b)

b. *Front-back asymmetry*:

• Front vowel suffixes harmonize to both mid vowels, *e, o*;

• Back vowel suffixes harmonize only to the back mid vowel, *o*.

c. *The low vowel a is also asymmetric*:

- It does not trigger harmony: like the high root vowels, it is followed by high vowels, not mid ones, for alternating suffixes.

- It is also opaque: it does not undergo harmony and blocks the spread of harmony.

Chichewa has all the properties of "canonical" Bantu VHH, as is well documented in work such as Kanerva (1990), Moto (1989), Mtenje (1985, 1986). What is relevant for our purposes is the morphological conditioning on the process: vowel harmony applies within the verb stem; it does not apply to prefixes. This is illustrated by the data below (cited from Downing & Mtenje, to appear). In comparing the data in (19a) vs. (19b), notice that the vowel of the infinitive prefix *ku-* is always [+high]; it does not harmonize with the root. However, the applicative suffix *-il-/-el-*, contained within the stem, does undergo harmony to agree with the root vowel:

(19)

a. Peripheral root vowels – i, u, a – are followed by peripheral suffix vowels

Applicative

ku=phíika	'to cook'	ku=phíkiila	'to cook for'
ku=túuma	'to send'	ku=túmiila	'to send for someone's benefit'
ku=gáawa	'to divide'	ku=gáwiila	'to share out; distribute'
ku=khúuta	'to be satisfied'	ku=khútiila	'to be satisfied with'
ku=líima	'to cultivate'	ku=límiila	'to farm for'
ku=váala	'to get dressed'	ku=váliila	'to put on'

b. Mid root vowels – e, o – are followed by mid suffix vowels

Applicative

ku=kóoka	'to pull out'	ku=kókeela	'to pull out for'
ku=tséeka	'to close'	ku=tsékeela	'to close for'
ku=méenya	'to hit'	ku=ményeela	'to hit someone with'
ku=góona	'to sleep'	ku=gónéélá	'to sleep on something'

Further, the subjunctive verbal final vowel suffix –*é* is always mid, no matter what vowel precedes (Mtenje, 1986: 113-114):

(20) Final vowels are outside the harmony domain

mu=won-eédw-é	'you should be seen (subjunctive)'	ti=namizaán-é	'we should deceive each other (subjunctive)'
ndi=khululuk-iík-é	'I should be pardonable (subjunctive)'		
liimb-a	'be tough (imperative)'	mu=liímb-é	'you should be tough (subjunctive)'

In sum, one must be able to refer to a stem domain, distinct from the word, to define the context of reduplication and vowel harmony. Both processes ignore prefixes to the stem, even though the prefixes are part of the grammatical verb word. (We set aside here the complication that vowel harmony ignores final vowel suffixes, whereas these suffixes are copied in reduplication.)

3.2.2   Prosodic misalignment of PStem and grammatical stem

In Chichewa, as in other Bantu languages, vowel initial stems provide the context for processes to apply which lead to misalignment between PStem and the grammatical stem. The reason for this is that sequences of vowels in separate syllables are not found in Chichewa. Vowel sequences that arise across morpheme boundaries must be resolved by various morphologically-conditioned vowel hiatus resolution processes.[①] The relevant morphological domains for hiatus resolution are schematized below:

————————————

① Interestingly, both the morphological generalizations and the processes found to resolve hiatus are essentially identical to those described for Zezuru Shona by Myers (1987), Mudzingwa (2010) and Mudzingwa & Kadenge (2011). See Downing & Mtenje (to appear) for more detailed discussion and exemplification of vowel hiatus resolution strategies in Chichewa.

(21)   Verb structure relevant for vowel hiatus resolution[①]

[$_{\text{INFL}}$SBJ - NEG2 - TAM = [$_{\text{MACROSTEM}}$ OM [$_{\text{STEM}}$ Root - extensions-FV]]

One set of vowel hiatus resolution strategies applies within the inflectional prefix string: i.e., subject prefix, NEG2 and tense/aspect/mood prefixes (TAMs). Another set applies at the macro-stem and stem junctures and at the juncture between the word-initial negative prefix (NEG1) and a following subject marker. However, vowel hiatus is not resolved between words. Each of these contexts is illustrated below.

When vowel hiatus occurs between a CV subject marker and a vowel-initial TAM prefix, the first vowel deletes (unless it is a high, back vowel, which undergoes gliding). This process is illustrated by the data in (22):

(22)

a. ti-a-bweél-á →ta-bweél-á   'we have come'
   we-PERF-come-FV
      cf. ti-ku-bwéel-a   'we are coming'

b. ndi-a-lot-a → nda-loot-a   'I have dreamt'
   I-PERF-dream-FV
      cf. ndi-ná-loot-a   'I dreamt'

c. a-a-dula →a-duula   'they have cut'
      cf. a-ku-dúula   'they are cutting'

d. mu-a-gon-a →mwagoóná   'you have slept'

e. mu-a-pit-a → mwapiita   'you have gone'

A different strategy for resolving vowel hiatus is found in the prefix=(macro)stem context, namely, a glide is inserted between the two vowels, thus preserving both the prefix vowel and the stem vowel and leading to misalignment between the grammatical (macro)stem and the prosodically well-formed PStem; inserted glides are bolded:

——————————

① The macro-stem is a Bantuist term for the constituent which comprises the object prefix (OM) and the verb stem.

(23)

ku= [imb-a →	kuyíimba	'to sing'
ku= [on-a →	kuwóona	'to see'
ku= [im-a →	kuyíima	'to stop'
ti= [end-e →	tiyeéndé	'let us walk'
ti= [imb-e →	tiyiímbé	'let us sing'
mu= [uluk-e →	muwuluúké	'you (pl.) should fly'
mu-a= [imb-a →	mwayiimba	'you have sung'
mu= [imb-a →	múyiimba	'you will soon sing'
ndi-ø-[a= [on-a →	ndíwáwoona	'I will soon see them (cl.6)'
	OR ndáawoona[①]	
ndi-a= [i-[on-a →	ndayíwoona	'I have seen it (cl.9)'
ndi-sa= [i-[on-e →	ndisayiwóone	'we should not see it (cl.9)'

Vowel hiatus is not resolved across word boundaries involving main lexical categories (i.e., XPs like nouns and verbs), whether by vowel deletion or by glide epenthesis, as illustrated by the data below:

(24)

a. *No vowel deletion*

mwaná a-kuú-dyá	*mwan' akudya	'the child is eating'
galú a-ná-thaaw-a	*gal' anathawa	'the dog ran away'

b. *No glide epenthesis*

nkhúkú i-ku-thámáángá	*nkhuku yikuthamanga	'a chicken is running'
mbulí í-ma-nyáad-a	*mbuli yimanyada	'an ignorant person brags'

In sum, hiatus resolution is a word bound process. Word-internally, hiatus is morphologically-conditioned, with one strategy – glide epenthesis – applying at

———————

① This example illustrates that in this context hiatus can be resolved in one of two ways: either a glide is inserted before both the object marker and the stem OR vowel assimilation applies between the subject marker and the object marker.

the left edge of the (macro-)stem, and another strategy applying outside of this context. Thus, it provides further evidence for the stem as a phonological domain. Furthermore, glide epenthesis creates a prosodically well-formed PStem constituent, which is misaligned with the grammatical stem.

3.3   Summary of the evidence for two domains

We have shown that minimality restrictions, TONE SHIFT, vowel hiatus resolution, vowel harmony and reduplication motivate two phonological domains in Chichewa, one roughly corresponding to the word, and one roughly corresponding to the stem. The resulting overall prosodic structure of (verb) words is represented below, where parentheses indicate the smaller of the two domains while curly brackets indicates the larger one:

(25)   Prosodic domains motivated by the data

{Infl (OM (Stem))} clitic}

Let us briefly summarize the evidence for two distinct domains. First, a disyllabic minimality requirement holds of words but not of stems. Further, vowel hiatus resolution strategies are word bound, and a different strategy is found at the left edge of the (macro-)stem than between other affixes. Word and stem are thus subject to different prosodic well-formedness conditions, which lead to misalignment between prosodic word and stem and grammatical word and stem.

Word and stem are also domains for different phonological and prosodic processes. TONE SHIFT is a word bound process. While it applies across word-internal morphological boundaries, including within the maximal PWord formed by enclitization, TONE SHIFT does not apply across word boundaries. In contrast, reduplication and vowel harmony are stem-bound processes. Prefixes contained within the verb word (and PWord) are not included in their domain.

The table in (26) summarizes these differences between stem and word domain:

(26) Contrasting prosodic domains in Chichewa

Process/Domain	max { }	(OM (Stem))
Minimality	√ (2 syllables)	X
Glide Epenthesis (left edge)	X	√
TONE SHIFT	X (across Word boundaries)	√ (across Stem boundaries)
Base for reduplication	X	√
Domain of vowel harmony	X	√

4 Labelling the domains

4.1 Why the two domains are best labelled PStem vs. PWord

I propose that it is best to label these two domains PWord – { } – vs. PStem – ( ) – as shown in (27). Note that the representation allows for some recursion, following standard practice since Inkelas (1989) in defining clitics as adjoined to PWord (i.e., recursively phrased with PWord to create a maxPWord). Similarly, Object Markers (OM) are clitics to PStem (i.e., recursively phrased with PStem to create a maxPStem):

(27) $\{_{\text{maxPWord}} \{_{\text{minPWord}}\text{SBJ-TAM-} (_{\text{maxPStem}} \text{OM} (_{\text{minPStem}} \text{Stem}))\} \text{clitic}\}$

One argument in favor of this labelling is that it follows work like Inkelas (1989 ff), Kiparsky (2000) and Bermudez-Otéro (2011, 2012, 2013) in recognizing, to quote Kiparsky (2000: 362):

> "The categories 'stem' and 'word' are special in being anchored in the universal prosodic hierarchy, their status in UG is comparable to the status of such categories as 'noun' and 'verb.'"

Indeed, the work cited in section 2.2 shows the broad cross-linguistic appli-

cability of the PStem-PWord distinction. Furthermore, this labelling is transparent, respecting the requirement that the labeling of a prosodic domain should, all things being equal, match the label of the corresponding morpho-syntactic constituent. (See, e.g., Inkelas, 1989, 1993; Itô & Mester, 2012, 2013; Selkirk, 2009, 2011.) Finally – and most importantly – this labelling does not have the empirical or conceptual problems faced by two leading alternative approaches.

4.2　Alternative 1: Recursive PWord

As noted in the introduction, recent work on the Prosodic Hierarchy (Itô & Mester, 2012, 2013; Riad, 2012; Selkirk, 2009, 2011) makes the strong claim that it comprises only three universal constituents: Intonational Phrase, Phonological Phrase and Prosodic Word. (See (1), above.) In this framework, the Stem vs. Word domain distinction in Chichewa must be recast as a recursion of one of these constituents, most plausibly PWord. That is, this analysis would follow work like McCarthy (2000) in proposing Stem is parsed as the minProsodic Word. Other word-internal morphemes – like the object prefix (OM), tense/aspect/mood prefixes (TAM) and the subject prefix – are presumably parsed as non-maximal recursions of PWord. Clitics would be parsed into a maxProsodic Word. This alternative is formalized in the representation below, where ')' indicates PWord edges:

(28) Recursive PWords:$(_{maxPWord}$ SBJ-$(_?$TAM- (OM $(_{minPWord}$ Stem))) clitic)

That is, instead of defining two different prosodic domains, stem and word must be defined as recursive instantiations of the same prosodic domain type to achieve parsimony. This is the advantage of the approach.

However, the approach faces the disadvantage of suffering from both empirical and conceptual problems. First, it seems paradoxical to categorize Stem as a minPWord, when stem is not subject to a minimality constraint. This contradicts the usual definition of a minimal Prosodic Word. (See McCarthy & Prince, 1986 and much subsequent work.) Furthermore, the recursive PWord parse

cannot account for why the innermost recursion of PWord – the constituent corresponding to the Macro-Stem domain – has distinct phonological properties: glide epenthesis applies at this edge but not at the edge of the other recursions of PWord, including the maximal PWord. 'First recursion of PWord' has no status as prosodic domain in this theory. The recursive PWord approach also cannot account for why inflectional prefixes count towards satisfying PWord minimality, whereas clitics do not. This is because it is not clear how to formalize the generalization that clitics subcategorize for a minimal PWord, whereas prefixes subcategorize for the stem (or PStem). As we have already noted, the minimal PWord parses the stem in this approach, yet the stem is not subject to disyllabic minimality.

In addition, the recursive PWord approach faces a serious conceptual prob-lem. As Vigário (2010) and Vogel (2009, 2010) argue, recursive instantiations of the same prosodic constituent should, by definition, have the same prosodic properties. To quote Vogel (2010: 151):

" […] since constituents in linguistics are defined by a specific set of prop-erties, if all of the strings in question are labeled as the same type of constituent, the expectation is that they will all behave in the same way phonologically."

However, as the table in (26) makes clear, the two domains have distinct phonological properties in Chichewa. Vigario (2010), Frota & Vigario (2013) and Vogel (2009, 2010) discuss in detail other problems with using recursion to give phonologically distinct domains similar labels in the name of parsimony.

In sum, even though their names partially overlap, we have established that minPWord and maxPWord in (28) are phonologically distinct. For this reason, it is not clear that the definition of recursion is met by a structure like the one in (28), which replaces PStem with minPWord. Even if this use of recursion were legitimate, it faces the empirical problem that it cannot identify phonologically significant word-internal morpheme boundaries, such as the one between the object prefix (OM) and the other prefixes, and it cannot distinguish clitics and prefixes. As a result, PWord recursion is not a viable strategy to replace the

PStem vs. PWord domain distinction.

4.3   Alternative 2: Composite Word Group/Prosodic Word Group

Frota (2012), Frota & Vigário (2013), Kabak & Vogel (2001), Vogel (2009, 2010) and Vigário (2010) favor another definition of the Prosodic Hierarchy, based on studies of the phonology of compound-like and clitic-group like structures. They argue persuasively that these groupings should not be parsed as recursive Prosodic Words, but rather as a distinct prosodic constituent, called composite word group Vogel (2009, 2010) or prosodic word group Vigário (2010). One important argument in favor of this constituent is that many languages are like English in having special compound prosody (e.g., stress) that is distinct both from word stress and phrase stress: e.g., in American English: *I was stung by a yéllowjacket*. vs. *I love your yellow jácket.* Compound stress is at the left edge of a compound, but at the right edge of a phrase. Main stress at the word level also is at the right edge of a word, so one cannot properly define the domain of compound stress, if a compound is parsed as a recursion of prosodic word. The proposed revision of the Prosodic Hierarchy is given in (29):

(29)   Adding CWG/PWG to the Prosodic Hierarchy

Intonation Phrase

|

Phonological Phrase

|

Composite Word Group

|

Phonological Word

|
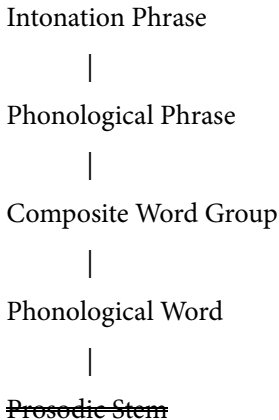
~~Prosodic Stem~~

Both Vogel (2009, 2010) and Vigário (2010) suggest that Downing's (1999) PStem vs. PWord distinction (argued for on the basis of other Bantu languages) can be replaced by a PWord vs. Composite Word Group (or Prosodic Word Group) distinction. This suggestion is not worked out in detail by either author, though. I assume they would replace the representation in (27) with one like (30), which parses the Stem as a PWord and parses all prefixes and clitics into a Composite/Prosodic Word Group. Since these authors argue so strongly against the use of recursion, it is avoided in this representation:

(30) {_{CWG}SBJ-TAM- OM (_{PWord} Stem) clitic}

This alternative approach has the advantage of respecting that a desire for parsimony should not lead to a misuse of recursive constituents. However, it faces the same empirical and conceptual problems in accounting for stem vs. word domains in Chichewa as the recursive PWord proposal. It seems paradoxical to categorize PStem as a PWord when it is not subject to a word minimality constraint. Further, this approach also does not distinguish object markers from other prefixes, nor does it distinguish clitics from affixes, even though, as we saw, these morpheme types have different phonological properties that are captured by the representation in (27). As a result, this approach is also not a viable alternative to one which appeals to a PStem vs. PWord distinction.

4.4   Interim summary

Chichewa data has been presented which motivates two constituents for phonological processes: stem vs. word. I follow earlier work like Inkelas (1989, 1993), Downing (1998a, 1998b, 1999, 2000, 2006), Mudzingwa (2010) and Downing & Kadenge (2015), among many others, in proposing that these two constituents are best categorized prosodically as PStem vs. PWord. Alternative labels and parsings have been shown to be empirically and conceptually inadequate.

Adding PStem to the Prosodic Hierarchy seems to go against the grain of Itô & Mester's (2012, 2013) and Selkirk's (2009, 2011) arguments in favor of being parsimonious with universal prosodic categories in the Prosodic Hierarchy. However, one might contend that it actually fits the spirit of their proposal. PStem is not a language-specific category. It has cross-linguistic validity because it is defined with respect to morphosyntactic structure. The Stem is an important sublexical morphological constituent in Bantu and other agglutinative languages. Further, it has been shown to account for phonological and prosodic processes in a number of unrelated languages. Indeed, Bermudez-Otéro (2013) identifies a cross-linguistic 'stem-level syndrome'. Adding PStem to the Prosodic Hierarchy allows phonological theory to better account for these phenomena.

5   Postlexical prosodic constituency

In this section, we turn to postlexical prosodic constituency in Chichewa and evaluate the number of levels in the Prosodic Hierarchy required to account for phrasal processes. Kanerva's (1990) original prosodic analysis of Chichewa argues for two levels of phrasing: Phonological Phrase and Intonation Phrase: the two phrasal constituents in (1). As we shall see, new data and new syntactic theories lead to a reconsideration of this proposal.

Kanerva (1990) and Bresnan & Kanerva (1989) demonstrate in some detail that lexical (and grammatical) High tone realization is conditioned by phonological processes which take the Phonological Phrase as their domain. Syntax is the main factor defining prosodic phrasing. In the analyses of Bresnan & Mchombo (1987) and Kanerva (1990), sentences have three main subconstituents – an optional subject noun phrase (NP), an obligatory verb phrase (VP), and an optional topic NP – which can be freely ordered. The VP consists of the verb and all its complements, as shown in (310a, 31d). According to these authors, each of the three constituents, when they co-occur, is parsed into its own Pho-

nological Phrase. As shown in (30b) and (30c), topicalized NPs are in a distinct syntactic and prosodic phrase, and can occur in either order with respect to the VP. Phonological phrases are indicated with parentheses in the data below:[①]

(31)

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-ḿ-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].'

d. (VP) – (Kanerva, 1990: 98, fig. (101))

(a-na-mény-á   nyumbá   ndí   mwáála)
1SBJ-RECENT.PAST-hit   9.house   with   3.rock
'S/he hit the house with a rock.'

Kanerva (1990) and Bresnan & Kanerva (1989) demonstrate that four phonological processes motivate the prosodic phrasing indicated in (31). First, the phrase penult vowel is lengthened. As noted above, 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

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across certain morpheme boundaries, all penult long vowels in the data are due to phrasal lengthening. Second, a High tone on a phrase-final vowel is retracted towards the penultimate mora. In the Nkhotakota variety (Kanerva, 1990), a High tone on a phrase-final vowel is completely retracted, as shown by the phrase-final tone pattern of the word for */galú/* 'dog' in (31b). In the Ntcheu variety (Downing & Mtenje, 2011a, 2011b), a phrase-final High tone is realized on both the penultimate and final moras: e.g., [gaálú] 'dog'. Third, within a prosodic phrase High tones double to the following syllable. However, the disyllabic window at the end of a prosodic phrase is a barrier to tone doubling. To see this, compare the tone pattern of */kálata/* 'letter' in phrase-medial (32b) vs. phrase-final (32a):

(32) Tone doubling blocked phrase finally (Downing & Mtenje, 2011a)

a. ((m-phunzitsi　　*a-méné*　　á-ná-kwiyá　　kwámbíiri)　　a-ná-wélengera

　　　1-teacher　　1-REL 1SBJ-TAM-be.angry　very　　1SBJ-TAM-read.to

　　　aná　　　　á súkúlú　　　kálaata)

　　2.child　　2.of school　　5.letter

'The teacher who was very angry read the students a letter.'

b. ((Káláta　　*i-méné* m-phunzitsi　á-ná-weléenga)　　í-ma-néná　　m-fúumu)

　　　5.letter　　5-REL　　1-teacher　　1SBJ-TAM-read　5SBJ-TAM-criticize

　　　　9-chief

'The letter which the teacher read criticizes the chief.'

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 rock' in (31d), 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'. As Kisseberth & Odden (2003) show, High tone plateauing, tone doubling and avoidance of High tones on final vowels

are, in fact, common tonal processes cross-Bantu.

Kanerva's (1990) prosodic analysis of Chichewa argues for two levels of phrasing: the Phonological Phrase is the domain of penult lengthening and tone processes, illustrated just above. The Intonation Phrase is the domain of culminative penult lengthening and downstep (= catathesis in Kanerva's terms). Kanerva, as was typical of his time, does not provide phonetic details of these correlates of the Intonation Phrase, but subsequent work confirms his observations. Myers' (1996, 1999) careful phonetic study provides an analysis of downstep in Chichewa sentences. Downing & Pompino-Marschall's (2013) phonetic analysis demonstrates that the penult vowel of an Intonation Phrase-final word is significantly longer than sentence-internal lengthened penults.

However, later work on the language has also led to some new generalizations about phrasing. Downing & Mtenje (2011a, 2011b) find that the subject NP is only variably followed by a prosodic phrase boundary. This variation in the phrasing of subjects is illustrated in the data below, where we see that the subject is not phrased separately in (33a), but it is in (33b):

(33)

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.'

As Downing & Mtenje (2011a, 2011b) and Cheng & Downing (2009, 2016) argue, a prosodic phrase boundary following the subject correlates with topicalization.

Moreover, it is not always true that all postverbal complements phrase with the verb. In relatively simple VPs, like those in (31), we do find that a verb and

more than one following complement phrase together. In fact, this phrasing is the essential problem to be accounted for in any analysis of Chichewa. The Phonological Phrase which includes the VP is larger than we expect because there is no phrase break following the first XP complement of the verb. (Recall from (1), above, that a Phonological Phrase matches an XP.) The prosodic algorithm must therefore optimize a Phonological Phrase break setting off subject and topic noun phrases, yet it must not optimize a Phonological Phrase break following noun phrases internal to the verb phrase. Truckenbrodt's (1995, 1999) well-known WRAP constraint is a mechanism for achieving this. WRAP penalizes breaking the verb phrase into more than one Phonological Phrase.

Downing & Mtenje (2011a, 2011b) show, however, that WRAP predicts the incorrect phrasing when the first complement of a verb is modified by a relative clause. The verb plus the modified first complement plus a following complement should be WRAP-ed into a single Phonological Phrase. What we find instead is a prosodic phrase break following the relative clause.

(34)　Phrasing of relative clauses violates WRAP; relative clause is underlined (Downing & Mtenje, 2011b)

　　a. ((Ma-kóló a-na-pátsíra　　　　mwaná　　a-méné
　　　　6.parent　6SBJ-TAM-give　　　1.child　　1-REL

　　á-ná-wa-chezéera)　　　　ndalámá　　zá　　　mú-longo wáake)
　　1SBJ-TAM-6OBJ-visit　　10.money　10.of　1-sister　　　　1.her

　　'The parents gave [the child who visited them] money for her sister.'
　　cf.

　　b. (Ma-kóló a-na-pátsíra　　　　mwaná　ndalámá　zá
　　　　6.parent　　　6SBJ-PST1-give　　1.child　10.money　10.of

　　　mú-longo　　wáake)
　　　1-sister　　　1.her

　　'The parents gave the child money for her sister.'

　　c. (Ti-ku-gáníza　　kutí　　m-nyamatá　á-pézá　　　　galú

we-TAM-think   that   1-boy   1SBJ.TAM-find   1.dog

a-méné   á-ná-mu-sowéetsa)   ku dáambo)

1-REL 1SBJ-TAM-1OBJ-lose   LOC 5.swamp

'We think the boy will find [the dog which he lost] at the swamp.'

cf.

d. (Subj) (VP)   Kanerva (1990: 103, fig (114b))

(Mwaána)   (a-na-pézá   galú   ku dáambo])

1.child   1SBJ-PST1-find   1.dog   LOC 5.swamp

'The child found the dog at the swamp.'

Kanerva (1990) and Downing & Mtenje (2011a, 2011b) show that while all embedded complement clauses, including *think/say* clauses, phrase with what precedes in Chichewa, a break comes at the end of the most deeply embedded clause:

(35) Embedded and recursive clauses (underlined) (Downing & Mtenje, 2011a, 2011b)

a. (Mu-nthu a-méné   á-ná-bweréká   búkhú

    1-man   1-REL 1SBJ-TAM-borrow   5.book

li-méné   ndí-ná-gulá ku Liloongwe)   w-a-pita   ku Mzúuzu)

5-REL I-TAM-buy LOC Lilongwe   1SBJ-TAM-leave   LOC Mzuzu

'The man who borrowed the book which I bought in Lilongwe has moved to Mzuzu.'

b. (Mu-nthu a-méné   á-ná-néná   kutí   m-balá

1-man   1-REL   1SBJ-TAM-say   that   9-thief

i-ná-bá   ndaláama)   a-ná-thaawa)

9SBJ-TAM-steal   10.money   2SBJ-TAM-run.away

'The man who said that the thief stole some money ran away.'

c. (Mu-nthu   a-na-néná   kutí   m-balá i-méné

1-man   1SBJ-TAM-say   that   9-thief 9-REL

í-ná-bá   ndaláama)   i-na-tháawa)

9SBJ-TAM-steal 10.money 9SBJ-TAM-run.away

'The man said that the thief who stole the money ran away.'

This range of data shows that prosodic phrases can be quite large in Chichewa, as they typically right-align with clauses (phases), rather than XPs, like noun phrases.

Based on this generalization, Chichewa prosodic phrases are best characterized as Intonation Phrases, since, by definition, this is the level of prosodic phrasing that aligns with the syntactic clause. Another motivation for identifying this prosodic constituent as an Intonation Phrase is that boundary tones often coincide with the right edge, as is expected for Intonation Phrases. For example, we find a continuation rise at the right edge of a relative clause, as illustrated in (36). Note in (36) that the words which end each of the Intonation Phrases – *kusáamba* 'swim' and *mtsíinje* 'river' – have the same tone pattern: a HL on the lengthened penult syllable. But the final vowel of *kusáamba* rises in pitch, while the final vowel of *mtsíinje* falls in pitch due to the effect of intonational boundary tones. Notice, too, that High tones undergo downdrift, with the final High-toned string considerably lowered in pitch, typically barely rising above the level of a preceding Low tone:

(36)

We also typically find a continuation rise following an initial Topic (in this case, a topicalized subject):

(37)
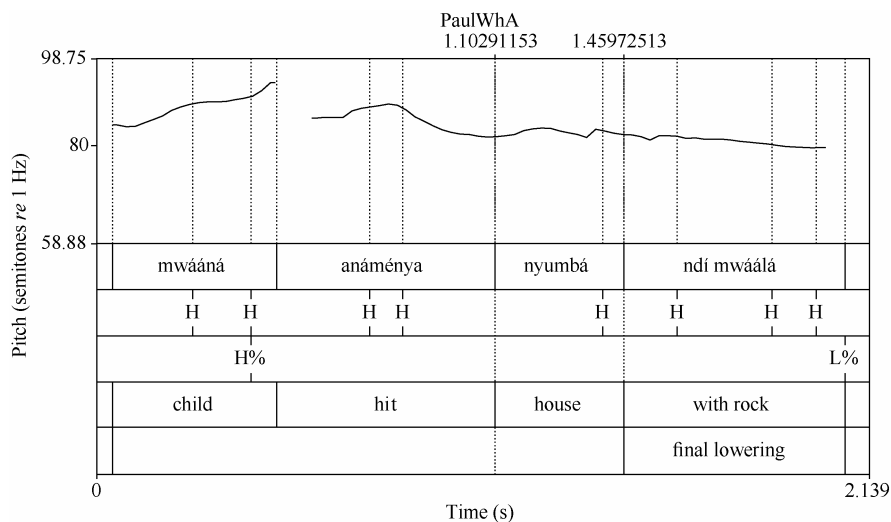
To sum up, there is no strong evidence for a distinction between Intonation Phrase and Phonological Phrase in Chichewa. Prosodic phrasing only seems to motivate an Intonation Phrase level, as phrasing targets clause edges and right edges of initial Topics. How then, can we define the domain for downstep and culminative penult lengthening, the correlates of Kanerva's (1990) Intonation Phrase? Following work like Itô & Mester (2012, 2013) and Selkirk (2009, 2011), I appeal to recursive levels of phrasing to maintain a parsimonious analysis. Adopting this view, Chichewa has recursive Intonation Phrasing and distinguishes a minimal and maximal Intonation Phrase. The minimal Intonation Phrase replaces the Phonological Phrase of earlier analyses, while the maximal Intonation Phrase replaces the Intonation Phrase.

6   Conclusion

In this article, arguments have been presented that the following recursive

levels of the Prosodic Hierarchy are relevant to an analysis of Chichewa phonology:

(38) Levels of the Prosodic Hierarchy relevant for Chichewa

       Intonation Phrase

           |

       Phonological Word

           |

       Prosodic Stem

Two differences can be noted from the standard Prosodic Hierarchy in (1), defended in recent work like Selkirk (2009, 2011) and Itô & Mester (2012, 2013). First, Chichewa requires reference to one fewer phrasal domain than is provided by the standard hierarchy, since Phonological Phrase plays no role in the language. Second, Chichewa requires reference to one more lexical domain than is provided by the standard hierarchy, since Phonological Word and Prosodic Stem are distinct phonological domains.

The analysis thus challenges the universality of the Prosodic Hierarchy in (1) in two ways. First, the set of prosodic constituents in the Hierarchy in (1) has been shown to be too parsimonious. While it might be sufficient to account for phonological processes at the phonology-syntax interface, the distinction between stem and word level phonology – widely attested in the world's languages – argues for an additional prosodic level to account for the interface between the phonological and morphological components of the grammar.[1] Second, the analysis questions whether the levels of the Prosodic Hierarchy are universally instantiated, since Phonological Phrase plays no role in Chichewa phonology. If the realization of the constituents in the Prosodic Hierarchy is mediated by Optimality Theoretic constraints, we actually do not expect constituents at all of the

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[1] Frota (2012), Frota & Vigário (2013), Kabak & Vogel (2001), Vogel (2009, 2010) and Vigário (2010) provide compelling arguments for adding the Composite Word Group or equivalent to the Prosodic Hierarchy. It is not discussed here, as Chichewa does not seem to provide evidence for this level.

levels to be instantiated in every language. A prosodic constituent will only be found if the language provides overt phonological evidence for it. As Cheng & Downing (2016) argue, if there is no evidence, then the high-ranked constraint in (39) banning the insertion of prosodic structure without prosodic motivation, a variant of the general *STRUC(TURE) constraint (Prince & Smolensky, 2004: 30, fn 13), penalizes parsing a phonological string into that prosodic constituent type:

(39) *STRUC/PROSODY: Prosodic domain structure must have prosodic motivation.

So we end the paper still striving for a balance between a parsimonious theory and an empirically adequate theory of prosodic interface constituents. Empirical evidence clearly argues for more prosodic constituents than the three given in (1). However, Itô & Mester (2012, 2013) correctly caution against adding more constituents on a language-by-language basis. We want to be equally cautious about insisting that all constituents are realized in every language whether there is phonological evidence for them or not. This paper argues for a middle path: adding prosodic constituents to the Hierarchy only if they have morphosyntactic correlates and are widely attested in the world's languages. And invoking, in an analysis, only the constituents for which phonological evidence can be provided. It is a matter for future research to determine whether the choice of levels relevant for a particular language falls out form independently-motivated syntactic or prosodic properties of the language.

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齐佩瓦语的韵律层级：几个层次？

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摘要：近来的研究（Itô & Mester，2012，2013；Selkirk，2009，2011）认为，韵律层级由三层韵律成分构成，即语调短语、音系短语以及韵律词。它们为形态-句法所激发且在各种语言中皆有例示。本文通过调查齐佩瓦语的音系来检测该三层级假说的效度问题。齐佩瓦语是班图语的一支，使用于马拉维共和国。通过此次调查，我们发现，该假说面临着两个挑战，第一，三层的韵律层级设置过于俭省，因为齐佩瓦语（及其他许多语言）都表明，有必要在韵律词之下设置另一层级，韵律词干。第二，这一分析还对三层级假说的普遍效度问题提出了质疑，因为在短语层面，没有足够的证据来对韵律短语与语调短语做出鲜明的区分。对于韵律层级成分的数目问题，本文既不支持过于俭省的做法，亦对按需设置韵律域的观点持保留态度。

关键词：韵律词干，复合词组，班图语系，重叠，调域，最小限度，黏附词，间断分辨率

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