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Phrase-level Prosodic Smothering in Makonde

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This paper focuses on the issue of 'prosodic idiosyncrasies' as it arises in the Bantu language Makonde [kde]. Recently, Bennett, Harizanov, & Henderson (2018) proposed 'prosodic smothering', whereby prosodic requirements of an outer morpheme override (i.e. 'smother') prosodic properties of inner morphemes. We extend their analysis to phrase-level phonology in Makonde. Previous description has established that whether a nominal modifier forms a single phonological phrase φ with the noun is an idiosyncratic property, e.g. a [NOUN ADJECTIVE] phrase maps to 2 phonological phrases $_\varphi$(N) $_\varphi$(ADJ) while a [NOUN DEMONSTRATIVE] phrase forms a single phonological phrase $_\varphi$(N DEM). Prosodic smothering is seen in [NOUN ADJ DEM] sequences which form a single $_\varphi$(N ADJ DEM) phonological phrase, where the ADJ has been 'entrapped' and its prosody 'smothered'. We highlight three contributions which Makonde makes to understanding smothering: (i) smothering targets the lexical head, (ii) smothering is both inward-oriented (a morphological relation) and leftward-oriented (a linear relation), and (iii) a limited amount of outward smothering is parasitic on the presence of inward smothering. From the smothering facts in Makonde, we conclude that prosody is established at two stages: first, prosodic idiosyncrasies apply at spell-out (i.e. the mapping from syntax to phonology), followed by default prosodification which is established within the phonological module itself.

1   Introduction

This paper focuses on the issue of 'prosodic idiosyncrasies'. Under an indirect reference view of the syntax-phonology interface (Selkirk 1984, Nespor & Vogel 1986, Inkelas 1990; cf. discussion in Scheer 2011), syntactic constituents are mapped to prosodic constituents which then define domains for phonological generalizations. Several theories have developed in the past decades, a recent prominent one being 'Match Theory' (Selkirk 2009, 2011, Elfner 2012, 2015, a.o.). Under this theory, by default syntactic words and phrases are mapped to prosodic words and phrases with three constraints commonly posited, shown below.

(1) Match Theory
    a.   MATCHWORD   X° → ω syntactic word/terminal head → prosodic word
    b.   MATCHPHRASE   XP → φ syntactic phrase → prosodic phrase
    c.   MATCHCLAUSE   CP → ι syntactic clause → intonational phrase

As all proponents point out, however, this interface ideal can be disrupted by prosodic markedness constraints. These include BINMIN requiring binary branching, EQUALSISTERS requiring sister branches to be at the same level in the prosodic hierarchy (Myrberg 2013), STRONGSTART requiring "a prosodic constituent optimally [to begin] with a leftmost daughter constituent which is not lower in the prosodic hierarchy than the constituent that immediately follows [it]" (Selkirk 2011), among others (see overview in Ito & Mester *to appear*).

This paper stresses an equally important way in which default mapping can be disrupted: idiosyncratic prosodic requirements associated with particular lexical items or natural classes of items (Inkelas 1990, Paster 2006, Bennett, Harizanov, & Henderson 2018, a.o.). Following this literature, we collectively refer to these as 'prosodic idiosyncrasies'. Bennett, Harizanov, & Henderson (2018) (hereafter BHH) illustrate a less discussed aspect of idiosyncrasies, namely the ability to 'vertically subcategorize' for the prosodic constituent within which the lexical item is contained. BHH point out that most instances involving subcategorization for a *sister* node involves subcategorization for a *mother* node, e.g. "be contained within a prosodic word".

One prediction which BHH's adoption of subcategorization makes is the existence of 'prosodic smothering', in which prosodic requirements of an outer morpheme override (i.e. 'smother') the prosodic properties of inner morphemes. Although their examples involve the interaction between competing affixes or clitics, we extend prosodic smothering in this paper by showing it occurs at the phrase-level phonology in Makonde, a Bantu language of Tanzania and Mozambique. To this end, we catalogue the distribution of phonological phrasing in seven dialects of Makonde, and illustrate that it is highly constrained by idiosyncratic properties of lexical items (or natural classes of items) within the noun phrase. For example, a [NOUN ADJECTIVE] phrase may map to 2 phonological phrases $_\varphi$(N) $_\varphi$(ADJ) while a [NOUN DEMONSTRATIVE] phrase forms a single phonological phrase $_\varphi$(N DEM). As we will see, [NOUN ADJ DEM] sequences produce phrase-level prosodic smothering where the cohering outer DEM 'entraps' the inner non-cohering ADJ to form a single $_\varphi$(N ADJ DEM) phonological phrase. In BHH's terminology, the prosody of ADJ has been 'smothered'.

This paper has three immediate goals. First, we seek to establish the range of prosodic structures in Makonde which produce phrase-level prosodic smothering. Second, we show a number of contributions which Makonde makes to the understanding of this phenomenon: (i) smothering targets the lexical head (in these cases, the noun), (ii) smothering is both inward-oriented (a morphological relation) and leftward-oriented (a linear relation), and (iii) the limited amount of outward smothering is parasitic on the presence of inward smothering. Finally, from these facts we conclude that prosody is established at two stages in Makonde. First, prosodic idiosyncrasies apply at spell-out, i.e. the mapping from syntax to phonology, and only later is default prosodification established within the phonological module itself.

2   Phonological phrases in Makonde

Makonde [ISO 639-3:kde; Guthrie P23] is an Eastern Bantu language spoken primarily in the Tanzania and Mozambique border area, and also by some communities in Zanzibar and Kenya. Vowel length in Makonde is not contrastive. Instead, in all dialects surveyed Makonde shows phrase-level penultimate lengthening, an areal trend among Bantu languages that have lost the Proto-Bantu vowel length contrast (Hyman 2013). The forms in (2) are from Zanzibar Makonde (Manus 2003, 2018).

(2)
a.	sí-lólo	$\rightarrow$	$_\varphi$(síl**óó**lo)			
	CL7-mirror		'mirror'			
b.	kú-lúmúl-a	$\rightarrow$	$_\varphi$(kúlúm**úú**la)	(INF = infinitive; FV = inflectional final vowel;		
	INF-cut-FV		'to cut'	CL = noun class)		
c.	kú-lúmúl-áng-a	$\rightarrow$	$_\varphi$(kúlúmúl**áá**nga)			
	INF-cut-into.pieces-FV		'to cut into small pieces'			
d.	NOUN ADJ	VERB	$\rightarrow$	$_\varphi$(NOUN)	$_\varphi$(ADJ)	$_\varphi$(VERB)
	sí-lólo sí-kúmêne	si-ndî-gwa	$\rightarrow$	$_\varphi$(síl**óó**lo)	$_\varphi$(síkúm**eê**ne)	$_\varphi$(sind**iî**gwa)
	CL7-mirror CL7-big	CL7-PAST-fall	'(a) big mirror fell'			

The examples in (2a-c) show that nouns and verbs in isolation bear non-contrastive penultimate lengthening (regardless of internal morphology), as in isolation they constitute a phonological phrase. Further, (2d) shows that in simple intransitive clauses, the subject and the verb form separate phonological phrases.

Also in (2d), notice that the noun phrase is complex, and that the noun and the modifying adjective form separate phonological phrases, as evidenced by the fact that each undergo penultimate lengthening. Nouns appear with several types of post-nominal modifiers typical of Bantu languages, including adjectives, demonstratives, quantifiers, possessors, nouns (in compounds), among others. Whether a post-nominal modifier forms one phonological phrase φ with the noun, $_\varphi$(N MOD), or forms 2 separate phrases, $_\varphi$(N) $_\varphi$(MOD), is an idiosyncratic property of the modifier (class). This is shown from the same Zanzibar Makonde in (3)-(5) below where we label them 1φ-modifiers, 2φ-modifiers, and 1~2φ-modifiers.

(3) 2φ-modifiers which form two phonological phrases
a.	NOUN	ADJ	$\rightarrow$	$_\varphi$(NOUN)	$_\varphi$(ADJ)
	lí-ngéla	lí-kúmêne	$\rightarrow$	$_\varphi$(líng**ée**la)	$_\varphi$(líkúm**eê**ne)
	CL5-mango	CL5-big		'big mango'	

b. NOUN   NUM   → $_\varphi$(NOUN) $_\varphi$(NUM)
    vi-lôngo   vi-víli   → $_\varphi$(vil**oô**ngo) $_\varphi$(viv**íí**li)
    CL8-pot   CL8-two   'two pots'

(4) 1φ-modifiers which form one phonological phrase
    NOUN   DEM   → $_\varphi$(NOUN   DEM)
    ví-lóngó   avilá   → $_\varphi$(vílóngó   av**ii**lá)
    CL8-pot   CL8.DEM   'those pots'

(5) 1 ~ 2φ-modifiers which vary between one or two phonological phrases
    NOUN   POSS   → $_\varphi$(NOUN POSS)   ~ $_\varphi$(NOUN) $_\varphi$(POSS)
    sí-júlú s-ángu   → $_\varphi$(síjúlú s**á**ngu) ~ $_\varphi$(síj**úu**lu) $_\varphi$(s**áa**ngu)
    CL7-hat CL7-1SG.POSS   'my hat'   'hat of mine'

Example (3) shows that adjectives and numerals form separate phonological phrases from the noun, while example (4) shows that demonstratives form a single phonological phrase with the noun. In comparison, example (5) shows that possessive pronouns vary between 1 to 2 phrases, with slightly different translations.[1]

It is important to note that the modifiers function as a class, i.e. all adjectives show the same prosodic idiosyncrasy uniformly. However, as seen in Table 1 the prosodic behavior of modifiers varies across Makonde dialects. This table is a reduced form of the much larger classification of the prosodic behavior of 25 distinct modification contexts, provided in full in Table 2 in the Appendix (section 6).

Source	Dialect	Dialect Code	POSS	DEM	ADJ	NUM
Leach (2010)	Plateau Shimakonde	P	1φ	1~2φ	2φ	2φ
Devos (2004)	Makwe	M	1φ	1~2φ	2φ	2φ
Manus (2003, 2018)	Zanzibar Simakonde	Z	1~2φ	1φ	2φ	2φ
Kraal (2005)	Chinnima	N	1φ	1φ	2φ	2φ
Liphola (2001)	Coastal Shimakonde	C	1φ	1φ	1φ	2φ
Odden (1990a,b)	Chimaraba	R	1φ	1φ	1φ	1φ
Odden (1990c)	Chimahuta	H	1φ	1φ	1φ	1φ

Table 1: Phonological phrasing in NP across Makonde dialects

On the basis this table (and the one in the Appendix), we can make several observations. First, the major modifier classes possessive pronouns and demonstratives tend to be 1φ-modifiers, while adjectives and numerals tend to be 2φ-modifiers (as exemplified above). Second, across modifier contexts, certain dialects are described as nearly always forming a single phonological phrases, e.g. two Tanzanian varieties Chimaraba and Chimahuta (Odden 1990a,b,c). In contrast, the Zanzibar Simakonde and Plateau Shimakonde dialects tend to form two phrases, e.g. as reflected in the Appendix table where these dialects form a single φ in only 19% and 23% of modifier contexts, respectively. Third, several types of modifiers pattern individually rather than as a class. For example, examining several *wh*-modifiers from Appendix Table 2 (ignoring the two dialects which are always 1φ at the bottom), the modifier *-aani* 'which, what kind' across dialects exclusively forms 1φ, *–ngápi* 'how many' forms 2φ, and the *wh*-modifier *-lida* 'which' forms 1 or 2 depending on dialect. Finally, whether the modifier forms 1 or 2 φ's cannot be strictly determined based on whether the modifier is a syntactic phrase or syntactic head. As seen in the Appendix, there is substantial cross-dialect prosodic variation across contexts as well as within the same context. We note, however, that two modifiers which are often analyzed as heads – namely demonstratives and possessive pronouns – tend to form a single phonological phrase (see also footnote 2 below for correlates of focus).

As a whole, the above cross-dialectal comparison illustrates that prosodic behavior co-varies with specific modificational contexts. We interpret this as prosodic idiosyncrasy which should be encoded in the lexical entry to modifier classes and/or individual modifiers.[2]

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[1] There are additional tone differences in 1φ vs. 2φ phrases, which we do not account for in this paper.

[2] There are two additional factors which we do not explore here with regard to the prosodic behavior of modifiers: the role of speech rate and the role of focus. For example, Kraal (2005:263) writing on the Chinnima dialect notes that when modifiers occur before the noun, they "do not occur in the same p-phrase, but each forms a p-phrase on its own" with the modifier undergoing penultimate

3 Phrase-level prosodic smothering

3.1 *Prosodic behavior with multiple modifiers* A central question to ask is how many phonological phrases result when multiple modifiers occur in sequence? In this section, we show how these prosodic idiosyncrasies can result in φ-phrase-level prosodic smothering in such cases. Consider the additional Zanzibar data from Manus (2018) in (6).

(6)
  a. $_\varphi$(NOUN) $_\varphi$(ADJ) $_\varphi$(GEN) $_\varphi$(NUM)
       $_\varphi$(vi-l**oô**ngo) $_\varphi$(ví-kúm**eê**ne) $_\varphi$(vy-á   n**aá**swe) $_\varphi$(vi-v**ií**li)
       CL8-pot   CL8-big   CL8-GEN white   CL8-two
       'two big white pots'
  b.   cf. *$_\varphi$(NOUN ADJ GEN NUM)

In this case, the adjective, genitive construction (GEN), and numeral are 2φ-modifiers. When they are all placed together, each forms a separate phonological phrase, evidenced by penultimate lengthening on the noun and each modifier. The formation of a single phonological phrase would be ungrammatical, as in (6b). Now consider the examples in (7).

(7)
  a. $_\varphi$(NOUN   DEM)
       $_\varphi$(ví-lóngó   av**ii**lá)
       CL8-pot   CL8.DEM
       'those pots'
  b. $_\varphi$(NOUN   ADJ   GEN   NUM   DEM)
       $_\varphi$(ví-lóngó ví-kúméné vy-á   náswé ví-vílí   av**ii**lá)
       CL8-pot   CL8-big   CL8-GEN white   CL8-two   CL8.DEM
       'those two big white pots'
  c.   * $_\varphi$(NOUN) $_\varphi$(ADJ) $_\varphi$(GEN) $_\varphi$(NUM   DEM)
  d.   * $_\varphi$(NOUN) $_\varphi$(ADJ) $_\varphi$(GEN) $_\varphi$(NUM) $_\varphi$(DEM)

In (7a) (repeated from above), the 1φ-modifier demonstrative forms a single phonological phrase with the preceding noun. Demonstratives most commonly appear in the rightmost modifier position as in (7b). where DEM appears after the 2φ-modifiers ADJ, GEN, and NUM. Here, Manus (2018) states that the prosodic idiosyncrasy associated with the demonstrative forces the entire noun phrase into a single phonological phrase φ. The prosodic idiosyncrasy associated with the outer DEM modifier thus overrides the prosodic idiosyncrasies of the inner modifiers. Manus shows that it is ungrammatical for the noun and individual modifiers to form separate phonological phrases, whether the demonstrative is phrased with the preceding modifier as in (7c), or not as in (7d).[3]

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lengthening. However, Kraal also notes that "penultimate shortening may also occur with faster speech". We interpret speech rate shortening as subject to different constraints than prosodic idiosyncrasy.

  Further, Devos (2008) on Makwe calls 1φ modifiers 'conjoint', and claims that "conjoint modifiers appear to be inherently focused" as they "all have the function of selecting one or more things to the exclusion of others and thus indicate contrastive focus." (p.378). Note, however, that most authors do not discuss the role of focus. Kraal (2009) discusses the intersection of focus and phonological phrasing with modifiers citing Devos (2008) overtly, but concludes that while "demonstratives involve a context-related choice" involving focus, in general "whether or not the head noun and the specifier are joined into a single p-phrase"…"is to a large extent lexically determined" (p. 302).

[3] Note, however, that in some constructions certain dialects add a condition that the smothering modifier must be adjacent to the lexical head. For example in Makwe (Devos 2008:377, a mixed Makonde-Swahili dialect – Kraal 2009:281), ex. (i) below shows a 1φ-modifier POSS smothering a NOUN, followed by a 2φ-modifier ADJ. As shown in (ii), if the order of ADJ and POSS are switched, the 1φ-modifier POSS forms a separate phonological phrase and does *not* smother the inward NOUN and ADJ, as indicated in (iii). (It is possible that the postposed possessive is appositional in (ii), i.e. 'beautiful house mine'.) We can compare this to (7b) and (8c) above where the smothering ability is not suppressed in similar contexts.

This type of 'entrapment' is a robust feature of Makonde dialects when a 1φ-modifier appears outside of a 2φ-modifier. For example as seen in (8)a. from Coastal Shimakonde (Liphola 2001), adjectives are 1φ-modifiers unlike in most of the other dialects where they 2φ-modifiers.

(8)
    a.   φ(NOUN   ADJ)
         φ(mápápájá   mángúlúg**uu**ma)
         'round papayas'
    b.   φ(NOUN)   φ(NUM)
         φ(mapap**áa**ja) φ(mat**aá**tu)
         'three papayas'
    c.   φ(NOUN   NUM   ADJ)
         φ(mápápájá   mátátú   mángúlúg**uu**ma)
         'three round papayas'

As seen in (8c), however, when the 1φ-modifier ADJ occurs outside of the 2φ-modifier NUM, it forces the entire sequence to form a single phonological phrase, even though the numeral would not normally form a phrase with the noun, as in b.

In contrast, consider the structure below in which a 1φ-modifier is *inside* while a 2φ-modifier is outside, from the Zanzibar variety (Manus 2018:149).

(9) φ(NOUN   POSS)   φ(ADJ)
     φ(li-jembé   ly-**aá**ko)   φ(lí-díkíd**iî**ki)
     CL5-hoe   CL5-POSSSG2   CL5-small
     'your small hoe'

In this case, possessive pronouns are variable 1~2φ-modifiers while adjectives are 2φ-modifiers. If the adjective is in an outer position, it does not cause all words within the noun phrase to become separate phonological phrases. In other words, 2φ-modifiers do not trigger prosodic restructuring of inner constituents, which suggests that their prosodic behavior is not idiosyncratic but instead assigned by default.

3.2   *Prosodic smothering*   We classify this behavior as constituting 'prosodic smothering', as established in Bennett, Harizanov, & Henderson (2018) (hereafter, BHH). BHH present an analysis of similarly idiosyncratic prosodic behavior of a subclass of dependent morphemes in (Western) Macedonian and Kaqchikel. In these 'smothering' cases, prosodic requirements of an outer morpheme override (i.e. 'smother') the prosodic properties of inner morphemes. This is schematized below, slightly modified from BHH's schema (p. 196).

(10) Prosodic smothering schematization
    a.   / A B /   → $_\delta$[A $_\pi$[B]]   (where $\delta \geq \pi$ on the prosodic hierarchy)
    b.   / F A B /   → $_\pi$[F A B]   (prosodic smothering of A by F)

Here, two morphemes A and B which occur in a simple construction / A B / form a prosodic structure where A is grouped into a higher prosodic domain, e.g. $_\delta$[A $_\pi$[B]]. In the context of a third morpheme F however, F triggers "restructuring of the prosodic boundary between A and B", with the "prosody of A and B flatten[ing] out such that all three morphemes are contained within the same domain" (p. 196). For exemplification, consider the following data from Macedonian (BHH:202-203, citing Rudin *et al*. 1999:553 and Tomić 2012:66, respectively).

(i)   φ(NOUN   POSS)   φ(ADJ)   (ii) φ(NOUN)   φ(ADJ)   φ(POSS)   (iii) * φ(NOUN ADJ POSS)
     φ(nyumbá   y**áa**ngu) φ(iz**úu**li)…   φ(ny**úu**mba) φ(iz**úu**li) φ(y**áa**ngu)
     'my beautiful house…'   'my beautiful house…'

(11) Prosodic smothering in Macedonian

    a.   (CL=   CL= ω-MIN(VERB)))

           (mi   go ω-MIN(**DA**le)))

           1SG.DAT 3SG.M.ACC   give.3PL.PST

           'they gave it to me' (Cf. *mi GO dale)

    b. ω-MIN(ne CL=   CL=   VERB)

           ω-MIN(ne mu   **GI**   dava) ω-MIN(ja**BLO**kata)

             NEG 3SG.M.DAT   3PL.ACC give.3SG.PRS the.apples

           'She/he is not giving him apples'

(11a) represents normal prosodification in which a verb constitutes a separate prosodic domain ω-MIN, while pronominal clitics before the verb are outside of this domain. This is evidenced by the distribution of stress whose domain is ω-MIN. BHH note that stress in the western dialects of Macedonian is regularly initial in monosyllabic and disyllabic words, and antepenultimate in larger words. In (11a), stress appears on the initial syllable of the verb; if the entire sequence was the ω-MIN then we would expect stress on the antepenult (the clitic *go=*), contrary to fact. In contrast, (11b) shows prosodic smothering in the context of an idiosyncratic class of morphemes, one of which includes the negative marker *ne*. When *ne* is in outer position, it forces the entire sequence into a single ω-MIN prosodic domain. In (11b), this is evidenced by stress on the antepenultimate syllable, i.e. on the clitic *gi=* rather than on the verbl

3.3   *Prosodic smothering via subcategorization*   BHH formalize prosodic smothering as a special type of subcategorization (Shieber 1986, Inkelas 1990, Paster 2006, Yu 2007, a.o.), which they call 'vertical subcategorization'. The better known cases of prosodic subcategorization involve specifying prosodic properties of a sister, e.g. a requirement to attach to a minimal phonological word, or to a C- or V-initial stem (segmental). In contrast to such horizontal relations (referred to as 'lateral' by BHH), vertical subcategorization specifies properties of the *mother* node which immediate dominates both sisters, e.g. needing to form a phonological word. The difference between these is sketched below, where X indicates the subcategorizing morpheme.[4]

(12) Types of subcategorization: Horizontal   Vertical

                                      (X $_\omega$(…)) $_\omega$(X (…))

With respect to the prosodic smothering-triggering morpheme *ne* in Macedonian (11)b. above, *ne* has a vertical subcategorization frame which triggers prosodic restructuring of the whole constituent, as the "default prosodic structure would lead to a violation of the lexical requirements of the selecting morpheme" (BHH:198). Such cases are predicted from early work on subcategorization, e.g. Inkelas' (1990:83) statement that "in addition to encoding dependence, subcategorization frames include a number of properties which characterize bound morphemes", properties which include specifying "the type of constituent attached to, **the type produced**, and the linear order of the combination" (bolding ours).

3.4   *Smothering at the phrase-level*   In light of this work, we classify the Makonde patterns as demonstrating prosodic smothering, albeit involving phrasal phonology. This is important, as the cases discussed in BHH involve subcategorization of the (minimal) phonological word ω (and most cases of subcategorization involve domains at or below the phonological word). Makonde thus shows that prosodic smothering is not restricted just to word-level phonology, and therefore shows crucial parallels across different constituency levels.

We exemplify this schematically below, along with a real example using the 'far demonstrative' *a-...-lá* 'that' ([+DISTAL]) which shows class agreement with the noun (Chinnima dialect - Kraal 2005:132-133), e.g. with class 5 noun in *lítínjí al**ii**lá* 'that pumpkin' (p. 133).

(13) Makonde subcategorization: Schema   Example

    a.   Syntactic structure: [+DEM]   [+DISTAL,+CL5]

    b.   Phonological structure: /DEM/   /(a)-li-lá/

    c.   Subcategorization frame: $_\varphi$((…)   X) $_\varphi$((…)   X)

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[4] This property is akin to morphology, e.g. *-en* attaches to an adjective (horizontal) to form a verb (vertical) in *black-en*.

In contrast, 2φ-modifiers have no subcategorization frame and therefore receive default prosodification.

One alternative which BHH (p.213-216) explicitly argue against is pre-specification approach (Idsardi 1992, Halle & Idsardi 1995, Özçelik 2014, a.o.). Under this approach, the phonological structure and subcategorization frame are merged and both form part of the underlying representation of the morpheme, i.e. something akin to / DEM$_\varphi$) / or / $_\varphi$(DEM) /. For example, Özçelik's work on exceptional stress in Turkish proposes the representation types in (14) with pre-specified feet $_F$(on certain syllables (we ignore harmony here, whereby the underlying vowels would be an archiphonemic representation):

(14) Underling representations of exceptional suffixes in Turkish (Özçelik 2014:252,263)
    a.   Pre-stressing: *-lejin*   'during'   /- $_F$(le)jin/   /- $_F$(σ)σ/
    b.   Strong stressed: *-indʒe*   'when'   /- $_F$(indʒe)/   /- $_F$(σσ)/
    c.   Weak stressed: *-iver*   'just' (MOOD)   /- i$_F$(ver)/   /- σ$_F$(σ)/

In this case, foot boundaries are pre-specified in the input. Together with a grammar which favors faithfulness to right edge of input feet (ANCHOR-R) and binary feet (FTBIN), this can account for exceptional stress properties without subcategorization.

The arguments for pre-specification vs. subcategorization are subtle, and space does not permit a proper treatment within this paper. In section 5, we conclude that the Makonde type of prosodic idiosyncrasy must be satisfied first before default prosodification, regardless of whether one implements it with subcategorization or as part of the underlying representation. We therefore understand Makonde as significantly contributing to our understanding of smothering regardless of theoretical account.

4   Contributions of Makonde

In this section, we emphasize contributions which Makonde makes to the understanding of prosodic idiosyncrasy, especially in light of the established empirical phenomenon of 'prosodic smothering' and a theoretical account via 'vertical subcategorization'. These are the following: (i) smothering in Makonde always involves the lexical head, (ii) smothering is both inward-oriented and leftward-oriented, and (iii) outward smothering is highly marked and always parasitic on inward smothering. Following this section, we present an analytic contribution: prosodic idiosyncrasies need to be satisfied before default prosodification.

4.1 *Smothering targets the lexical head*   The first point we make is that prosodic smothering always involves the lexical head, which we interpret as targeted. The lexical head in the cases shown here is the noun (whereas in the case of Macedonian in BHH, it involve verbs). In Makonde the demonstrative DEM is a trigger of prosodic smothering, and the resulting phonological phrase must include the NOUN, as in (15).

(15) Target of prosodic smothering must include the lexical head (i.e. a noun)
    a.   Targets noun: $_\varphi$(NOUN   ADJ   GEN   NUM   **DEM)**
    b.   Does not target noun: * $_\varphi$(NOUN) $_\varphi$(ADJ) $_\varphi$(GEN) $_\varphi$(NUM) $_\varphi$(**DEM)**
                * $_\varphi$(NOUN) $_\varphi$(ADJ) $_\varphi$(GEN) $_\varphi$(NUM   **DEM)**
                * $_\varphi$(NOUN) $_\varphi$(ADJ) $_\varphi$(GEN   NUM   **DEM)**
                * $_\varphi$(NOUN) $_\varphi$(ADJ   GEN   NUM   **DEM)**

This requirement is consistent across the Makonde dialects, such that we do not find a smothering pattern which resembles any of the prosodic structures in (15b) above.

This finding is important as it shows that the triggers of smothering prosodically restructure the entire phrase and not strictly its more local structures. Thus, however a trigger's prosodic idiosyncrasy is formalized, it is not the case that it can merely form a constituent with a neighboring word – i.e. something akin to the ungrammatical * $_\varphi$(NUM DEM) above – but rather must include the lexical head.

4.2 *Smothering is inward-oriented and leftward-oriented*   Further, these data show that smothering is both inward-oriented and leftward-oriented. Inward/outward are notions associated with morphological hierarchical structure, while rightward/leftward are strictly linear notions. This is schematized below.

(16)   LexHead   InnerMod   OuterMod

     a. $_\varphi$(N   +   ) $_\varphi$(-   )   ← Inner modifier smothers inwardly only

     b. * $_\varphi$(N   +   -   )   ← No 'outward smothering'

        * $_\varphi$(N   ) $_\varphi$(+   -   )   ← No 'outward smothering'

Here, the structure consists of a lexical head N, an inner modifier which triggers smothering (indicated with +), and an outer modifier which does not trigger smothering (indicated as -). (16a) shows that the inner modifier only smothers the lexical head N, i.e. it only smothers inwardly. The unattested patterns in (16b) show cases where the inner modifier smothers an outer modifier, which we call 'outward smothering'. Such outward smothering is not found across the Makonde dialects (however, see section 4.3 below). For example in (9) above, the inner modifier POSS triggers smothering and only targets the noun, repeated below as (17a). For the inner modifier POSS to target the outer modifier ADJ is unattested across Makonde dialects (17b).

(17)

     a. $_\varphi$(NOUN   POSS) $_\varphi$(ADJ)

         $_\varphi$(lijembé   ly**aá**ko) $_\varphi$(lídíkíd**iî**ki)

         CL5-hoe   CL5-POSSSG2   5-small

         'your small hoe'

     b. * $_\varphi$(NOUN   POSS   ADJ)

       * $_\varphi$(NOUN) $_\varphi$(POSS   ADJ)

Further, smothering is also leftward-oriented in the sense that the target is to the left of the trigger in nearly all cases. This is clearly seen in some of the Tanzanian varieties described in Odden (1990a-c), e.g. the following data from Chimaraba Makonde below (Odden 1990a:93-94). Within nearly all modificational contexts of these dialects, a single phonological phrase results (see the bottommost dialects in the Appendix). Thus, in (18a) a noun phrase [NOUN DEM] forms a single phonological phrase.[5]

(18) Targets morphologically leftward structure, not rightward

     a.   1φ $_\varphi$(NOUN DEM)   ayuma mámbéndé y**áa**nó

                               'he is buying these skins'

     b.   2φ $_\varphi$(DEM) $_\varphi$(NOUN)   ayakulá v**íi**nó   vik**áa**pu

                                'he's taking these baskets'

However, we can contrast this to (18b) where the demonstrative has dislocated before the noun, resulting in a [DEM NOUN] configuration. In this case, two phonological phrases are formed – i.e. $_\varphi$(DEM) $_\varphi$(NOUN) – which shows that prosodic smothering is restricted from applying to rightward targets.

    One instance of rightward smothering is attested. In the Chinnima dialect (Kraal 2005). The question words -*ngápi* 'how many' and -*lída* 'which' are 2φ-modifiers. As seen in (19a, c) below, the structure [NOUN QUES] forms two separate phonological phrases. However, in the presence of the pre-verbal particle *yé* which indicates 'amazement' (translated as the English particle-like exclamation 'what?'), the sequence [ye NOUN QUES] now forms a single phonological phrase, as in (19b,d) (Kraal 2005:256).

(19)

     a. $_\varphi$(NOUN) $_\varphi$(QUES)   c. $_\varphi$(NOUN) $_\varphi$(QUES)

         $_\varphi$(mát**ii**nji) $_\varphi$(mang**áa**pi) $_\varphi$(chiy**ee**we) $_\varphi$(chil**íi**da)

         pumpkin   how.many   chin   which

         'how many pumpkins?'   'which chin?'

     b. $_\varphi$(ye   NOUN   QUES)   d. $_\varphi$(ye   NOUN   QUES)

         $_\varphi$(yé   mátínjí   mang**áa**pi) $_\varphi$(yé   chiyéwé chil**íi**da)

         what? pumpkin   how.many   what? chin   which

         '(what?) how many pumpkins?'   '(what?) how many pumpkins?'

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[5] Note that the verb is incorporated within the φ for independent reasons, outside of the scope of this paper.

4.3 *Outward smothering is parasitic*   The last contribution concerns the limited outward smothering in Makonde in which the trigger of smothering is in a morphologically more inward position and the target in a morphologically more outward position. In the general case, smothering by a trigger Z in a sequence [[Y Z] X] can target an inner constituent Y but cannot simultaneously target an outer target X. In other words, it can only map to $_\varphi$(Y Z) $_\varphi$(X) and never *$_\varphi$(Y Z X). However, in at least one instance we have catalogued outward smothering where a sequence [X [Y Z]] maps to $_\varphi$(X Y Z) with Z targeting both the inner constituent Y and the outer constituent X. As both of these are on the same side, the generalization is that if smothering first applies inwardly it can then 'overshoot' the lexical head and subsequently also target outer constituents.

We refer to this as 'parasitic outward smothering', as outward smothering here takes places only if it can continue from logically prior inward smothering. We find parasitic outward smothering in a Mozambican variety Coastal Shimakonde (Liphola 2001) in (20) below.

(20) Parasitic outward smothering (Liphola 2001:421)

    a. $_\varphi$(N$_1$) $_\varphi$(*na*   N$_2$)
        $_\varphi$(n-k**óo**ngwé) $_\varphi$(na   li-putip**uú**ti)
        CL1-woman   and   CL5-sheep
        'woman and sheep'

    b. $_\varphi$({N$_1$ *na* N$_2$}   ADJ})
        $_\varphi$(n-kóngwé ná n-númé   vá-díkíd**iî**ki)
        CL1-woman and CL1-man   CL2-small
        'small {woman and man}' (both are small)

    c. $_\varphi$(N$_1$ *na* {N$_2$ ADJ})
        $_\varphi$(n-kóngwé ná lí-pútípútí   lí-díkíd**iî**ki)
        CL1-woman and CL5-sheep   CL5-small
        'woman and {small sheep}' (only the sheep is small)

(20a) shows that coordinated nouns mediated by *na* 'and' phrase separately, i.e. $_\varphi$(N$_1$) $_\varphi$(*na* N$_2$). In this dialect adjectives are 1φ-modifiers (see the Appendix). In (20b) the adjective -*dikidiki* 'small' scopes over the entire {N$_1$ na N$_2$} sequence, as evidenced by its class 2 plural marking *vá*-. In this case, it results in smothering of the entire phrase. Liphola points out the unexpected parallel case in example (20c) where the adjective scopes over only N$_2,$ again evidenced by class marking. In this case, the adjective still triggers restructuring of the entire noun phrase. Thus, the semantico-syntactic distinctions (also reflected in morphology) between these constructions are neutralized prosodically, with both surfacing as $_\varphi$(N$_1$ *na* N$_2$ ADJ). In this case, inward ADJ parasitically smothers outward N$_1$. This instance also demonstrates that prosodic smothering does not necessarily align to the edge of the modified lexical head, something not seen in the cases shown in BHH.

5   Conclusion: Prosodic idiosyncrasies apply before default prosody

In our analysis, an important analytic contribution which Makonde makes is that prosodic idiosyncrasies associated with 1φ-modifiers must apply before default prosodification of the larger phrase. We therefore require a two-step account whereby in stage one some prosodic properties are established, and at a later stage other prosodic properties are established. We view this first stage as the mapping from syntax to phonology, a mapping which we understand to be synonymous with spell-out. We conceive of spell-out as an optimal mapping between a syntactic input to a prosodic output. Such an Optimality-Theoretic (OT) mapping is assumed by all work on Match Theory, and has been proposed also in work on OT-Distributed Morphology (Trommer 2001, Rolle 2018; see also Rolle *in press* for arguments and references).

We view the second stage as phonology proper, in particular general phrase level phonology which takes the previous prosodic output as its input and outputs a more articulated prosodic structure. These derivational stages bear distinct grammars (i.e. distinct constraint rankings/weights), and are thus part of a long history of serial approaches to phonology (e.g. Kiparsky's 1982 'Lexical Phonology and Morphology' and its modern Stratal OT descendents, e.g. Kiparsky 2015, Bermúdez-Otero 2018; 'Cophonology Theory' in Anttila 1997, 2002, Inkelas & Zoll 2007; among others).
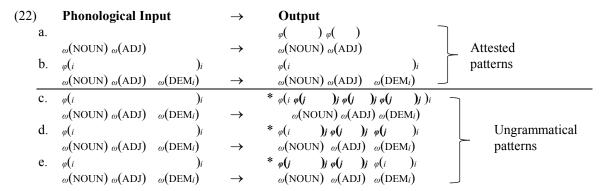
Let us exemplify this analysis by comparing derivations involving a 2φ-modifier ADJ in (21a), and an (outer) 1φ-modifier DEM in (21b).

(21) a.　Syntax　　　→　Prosody　　　b.　Syntax　　　　　→　Prosody
$_\varphi($i　　　　　　　　　　　　)i

　　　[[N^0] ADJ^0] → $_\omega$(NOUN) $_\omega$(ADJ)　　　[[[N^0] ADJ^0] DEM^0] → $_\omega$(NOUN) $_\omega$(ADJ)　$_\omega$(**DEM**$_i$)

For our purposes, let us assume the relevant syntax as in (21a) above, whereby the adjective is morpho-syntactically higher than the noun. The only relevant prosodic constraint here is MATCHWORD whereby a syntactic head is mapped to a phonological word, i.e. X^0 → $_\omega$( ).[6] Compare this to example (21b) with the smotherer DEM. MATCHWORD applies as it does in (21a), but additionally a phonological phrase is introduced. This is indexed with *i* to indicate that it is sponsored by the 1φ-modifier DEM. As a shorthand, we attribute this φ-constituent to a constraint SUBCAT(DEM) which enforces the subcategorization frame.

One can see that the left φ-boundary aligns with the leftmost phonological word (the lexical head), while the right φ-boundary aligns to the trigger DEM itself. This structure is not guaranteed by the constraint SUBCAT(DEM), which would equally be satisfied by several φ-phrase alignments. To guarantee the attested structure, we adopt constraints ALIGN-L(Domain,φ) and the ALIGN-R(DEM,φ) to enforce φ-alignment. In an analysis with pre-specification rather than subcategorization, the φ-phrase comes pre-aligned to the right edge of DEM in the underlying representation. Regardless, it is critical that no Match constraint MATCHPHRASE apply here which maps XPs to $_\varphi$( ).

The prosodic structure output from spell-out is then fed into the phonological module where additional prosodic patterns are established. This is shown below.

(22)　　**Phonological Input**　　　　→　　**Output**

a.
$_\varphi($ 　) $_\varphi($ 　)

　　$_\omega$(NOUN) $_\omega$(ADJ)　　　　→　　$_\omega$(NOUN) $_\omega$(ADJ)　　　　　　　Attested

b.　$_\varphi($i　　　　　　　)i　　　　　　$_\varphi($i　　　　　　　　　)i　　　patterns

　　$_\omega$(NOUN) $_\omega$(ADJ)　$_\omega$(DEM$_i$)　→　$_\omega$(NOUN) $_\omega$(ADJ)　$_\omega$(DEM$_i$)

c.　$_\varphi($i　　　　　　　)i　　　　* $_\varphi($i $_\varphi($j　)j $_\varphi($j　)j $_\varphi($ 　)j)i

　　$_\omega$(NOUN) $_\omega$(ADJ)　$_\omega$(DEM$_i$)　→　　$_\omega$(NOUN) $_\omega$(ADJ) $_\omega$(DEM$_i$)

d.　$_\varphi($i　　　　　　　)i　　　　* $_\varphi($i　　　)j $_\varphi($j　)j　$_\varphi($j　　)i　　Ungrammatical

　　$_\omega$(NOUN) $_\omega$(ADJ)　$_\omega$(DEM$_i$)　→　$_\omega$(NOUN)　$_\omega$(ADJ)　$_\omega$(DEM$_i$)　patterns

e.　$_\varphi($i　　　　　　　)i　　　　* $_\varphi($j　　)j $_\varphi($j　)j　$_\varphi($i　)i

　　$_\omega$(NOUN) $_\omega$(ADJ)　$_\omega$(DEM$_i$)　→　$_\omega$(NOUN)　$_\omega$(ADJ)　$_\omega$(DEM$_i$)

In (23a) with only a non-smothering 2φ-modifier ADJ, there is no φ-structure in the input. Therefore by default each phonological word coincides with a phonological phrase, for which we can employ constraints ALIGN-L(ω,φ) and ALIGN-R(ω,φ), constraints which were not active at spell-out. In contrast in (23b), the input has φ-structure in the input which is faithfully preserved in the output.

There are three ungrammatical examples in (22c-e) which maximally satisfy the two ALIGN(ω,φ) constraints, whereby all phonological words coincide with a phonological phrase. These patterns are non-optimal due to other highly ranked constraints. In (22c), recursive φ-structure is introduced which we can eliminate as it violates NONRECURSIVITY (Selkirk 1995, Elfner 2015:1202). In (22d), the φ-boundaries indexed to the demonstrative are interrupted by new φ-boundaries, which we index $_j$ for clarity. We can eliminate this pattern with a prosodic integrity constraint *$_\Pi($i　)j $_\Pi($j　)i which states that a prosodic boundary $_\Pi($j of prosodic category Π cannot disrupt a prosodic constituent $_\Pi($i　)i of the same category Π. Finally, (22e) where the $_\varphi($i boundary moves to the left edge of $_\omega$(DEM$_i$) is eliminated due to an IDENT-φ constraint (or family of constraints), requiring faithfulness to the input structure.

In short, although we have framed prosodic smothering as 'restructuring' (section 3.2 above, following BHH:196), our analysis actually posits an early stage establishing idiosyncratic prosodic structure, with a later stage establishing default prosodic structure. Strictly speaking, no actual 'restructuring' takes place,

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[6] We gloss over the fact that nouns in Bantu are complex, with both a class marker and a nominal root.

although we still find the metaphor a useful one. A consequence of this analysis is that subcategorization frames associated with particular morphemes (or natural classes of morphemes, e.g. demonstratives) are satisfied at spell-out, with default prosodification after spell-out. In this way, our analysis is reminiscent of early approaches to subcategorization. As Inkelas (1990) points out, "prosodic subcategorization frames introduce structure which blocks the application of the default Prosodic Constituent Formation Algorithm" (p. 78-79), with such an algorithm "operat[ing] as an elsewhere case, assigning phrasal constituency only to material already lacking it" (p. 255).

6 Appendix: Prosodic behavior of modifiers across Makonde dialects

While our discussion deals primarily with POSS ADJ NUM DEM (whose properties were summarized in Table 1 in section 2), many other modifiers occur in Makonde. Their cross-linguistic phrasal properties are summarized in Table 2 below (some modifiers also have additional tonal idiosyncrasies, not surveyed here). The modifiers in the table are divided into two sections (indicated by the solid black horizontal dividing line): the first section for which there is more complete data with most cells filled, and the second with sparse data (only 1-2 cells filled). The blank, dark grey cells indicate there was no available data.

Modifier	Z	P	M	N	C	R	H	% 1φ
-aani 'which, what kind'	1φ		1φ	1φ	1φ	1φ	1φ	100
POSS	1~2φ	1φ	1φ	1φ	1φ	1φ	1φ	86
-éne 'itself'	1~2φ	1φ	1φ	1φ				75
-lida 'which'			1φ	2φ		1φ	1φ	75
DEM	1φ	1~2φ	1~2φ	1φ	1φ	1φ	1φ	71
ADJ	2φ	2φ	2φ	2φ	1φ	1φ	1φ	43
-ngápi 'how many'	2φ		2φ	2φ		1φ	1φ	40
connexive 'N of N'	2φ	2φ	2φ	2φ	1φ	1φ		33
NUM	2φ	2φ	2φ	2φ	2φ	1φ	1φ	29
relative clause	2φ	2φ	2φ	1~2φ	1φ			20
-óe 'many'	2φ	2φ		2φ	2φ	1φ		20
-^{H}nji 'other'	2φ	2φ	2φ	2φ				0
na 'with, and'	2φ			2φ	2φ			0
-éka 'on one's own'			1φ	1φ				100
yé -lída/-ngápi 'which'				1φ				100
-naángo 'the same'				1φ				100
chiihi 'only'				1φ				100
viila 'only'		1φ						100
-íingi 'many'						1φ		100
-taándi 'first'		2φ			1φ			50
-oté 'the whole'			2φ		1φ			50
-ohe-óhe 'all'				2φ			1φ	50
uúti 'all'		2φ			2φ			0
pa-diki 'a few'	2φ				2φ			0
kila 'each'	2φ							0
% 1φ	19	23	36	42	64	100	100	

Table 2: Prosodic behavior of modifiers [Dialect codes: Z = Zanzibar Simakonde, P = Plateau Shimakonde, M = Makwe, N = Chinnima, C = Coastal Shimakonde, R = Chimaraba, H = Chimahuta]

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