Issues in the Phonology-Morphology Interface in African Languages

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1. Introduction

A major issue in the study of interfaces concerns the difficulties in disentangling morphology from other parts of the grammar. As Spencer (1991: xii) puts it:

> "Morphology is unusual amongst the subdisciplines of linguistics, in that much of the interest of the subject derives not so much from the facts of morphology themselves, but from the way that morphology interacts with and relates to other branches of linguistics, such as phonology and syntax."

Basic questions include: What is (vs. isn't) morphology? How or when should morphology be identified as something different from phonology? As Inkelas (2008: 1) points out, there is much in common between realizational morphology and morphologically conditioned phonology:

> "Morphology and phonology intersect insofar as the statement of morphological generalizations includes information about sound patterns (realizational morphology), and insofar as the statement of phonological generalizations includes information about morphology (morphologically conditioned phonology). This intersection is extensive, blurring the distinction between morphology and phonology in many situations."

Although African languages are quite varied in how they treat morphology (including barely at all), their contribution to our understanding of the phonology-morphology interface comes largely from the following areas: (i) tonal morphology, e.g. tonal morphemes (Welmers 1959), cyclic tonology (Pulleyblank 1985, 1986); (ii) segmental "featural affixes" (Akinlabi 2011), e.g. labiality, palatality, consonant gradation; (iii) non-concatenative morphology, e.g. CV templates (McCarthy 1981, 1986); (iv) reduplication, especially Bantu, e.g. Downing (1999, 2000), Hyman, Inkelas & Sibanda (2009).

Because of the centrality and variety of tonal interfaces in so many African languages, I propose to limit discussion to tonal morphology and make the following points: (i) Tonal morphology can do anything that non-tonal morphology can do; (ii) tonal morphology can do more than non-tonal morphology can do; (iii) tonal morphology often obscures the compartmentalization of phonology, morphology, and syntax. My starting point is the more general question I raised and answered in Hyman (2011: 214):

(1)   Tone: is it different? Answer:

   Tone is like segmental phonology in every way—only more so!

   a.   QUANTITATIVELY more so: tone does certain things more frequently, to a greater extent, or more obviously (i.e. in a more straightforward fashion) than segmental phonology.
   b.   QUALITATIVELY more so: tone can do everything segments and non-tonal prosodies can do, but segments and non-tonal prosodies cannot do everything tone can do.

To cite just one such qualitative difference, consider the following two sentences from Giryama [Bantu; Kenya] (Volk 2011: 1), where an acute accent marks H(igh) tone and the lack of an accent marks L(ow) tone:

(2) a.   ni-na-mal-a ku-gul-a ŋguuwo   'I want to buy clothes'
     b.   a-na-mal-a ku-gul-a ŋguúwo   's/he wants to buy clothes'
           ‖ ------------------▶
           H

As seen, whereas (2a) consists of an all L utterance, in (2b) the /H/ of the subject prefix /á-/ has shifted long-distance to the penultimate mora of the phonological phrase. No other phonological feature or property has this ability to relocate across words. In the same study I therefore noted:

> "... anyone who is interested in the outer limits of what is possible in phonology would thus be well-served to understand how tone systems work." (Hyman 2011:198)

The corresponding question that I raise in this paper is in (3).

(3)   Tonal morphology: is it different?

My first answer will be "no", my second answer "yes". As I will now show, tonal morphology can do anything that non-tonal morphology can do—and then some. After presenting a number of such cases I will speculate as to why this might be so.

2. Tonal morphology is like other morphology

The idea is occasionally expressed that tone cannot mark certain things. A few years ago, the president in his address to the Annual Meeting of the Linguistic Society of America proposed the following universal: "No language uses tone to mark case". However, as seen in the following examples from Tucker & Ole Mpaayei (1955: 177-184), Maasai [Nilotic; Kenya, Tanzania] uses tone to mark nominative vs. accusative case (cf. Bennett 1974, Plank 1995: 59-62):

(4)		*nominative*	*accusative*			*nom. vs. acc. tone patterns*
	class I:	èlùkònyá	èlúkúnyá	'head'		L^n-H vs. L-H^n
		èncùmàtá	èncúmátá	'horse'		
	class II:	èndérònì	èndèrónì	'rat'		H on σ_2 vs. σ_3
		ènkólòpà	ènkòlópà	'centipede'		
	class III:	òlmérégèsh	òlmérègèsh	'ram'		H on σ_2 & σ_3 vs. on σ_2 only
		òlósówùàn	òlósòwùàn	'buffalo'		
	class IV:	òmótònyî	òmótònyî	'bird'		identical tones
		òsínkìrrî	òsínkìrrî	'fish'		

The mistake that some researchers make is to think of tone as somehow deficient, whereas the opposite is the case. As Hyman & Leben (2000: 588) put it:

> "tonal morphology... exhibits essentially the same range of morphological properties as in all of segmental morphology."

In other words, if tone can be a morpheme, it can do everything that a morpheme can do!

This having been said, it is still important to distinguish at least the following three ways in which tone can be an exponent of a morpheme or morphological process:

(5)   a.   tone can be the sole exponent
        b.   tone can be a systematic co-exponent
        c.   tone can be an arbitrary co-exponent

(5a) has already been exemplified the marking of case in Maasai classes I-III. Both (5a) and (5b) are illustrated in the following paradigm from Chimwiini [Bantu; Somalia] (Kisseberth 2009):

(6)

		singular			*plural*		
1st pers.		n-	ji:lé	'I ate'	chi-	chi-ji:lé	'we ate'
2nd pers.	final H:		ji:lé	'you sg. ate'	ni-	ni-ji:lé	'you pl. ate'
3rd pers.	penult H:		jí:le	's/he ate'	wa-	wa-jí:le	'they ate'

Chimwiini has only grammatical tone, hence no tonal contrasts on lexical morphemes such as noun or verb stems. In addition, it assigns a single, obligatory H occurs within the relevant domain, restricted either to the final or penultimate syllable. The data in (6) show that in this past tense the H will be realized on the final syllable if the subject is first or second person, but to the penult if the subject is third person. This is what I refer to as a "systematic co-exponent" in (5b). As the left brace indicates, tone will be the sole exponent in the second and (class 1) third person singulars, which do not have an overt segmental subject prefix. Finally, as a case of (5c), consider the following paradigm from Kalabari [Ijoid; Nigeria] (Jenewari 1977):

(7)

		singular					*plural*		
L:	à	ɓó	bà	'I will come'	H:	wá	ɓó	bà	'we will come'
H:	í	ɓó	bà	'you sg. will come'	H:	ó	ɓó	bà	'you pl. will come'
L:	ò	ɓó	bà	'he will come'	L:	ĩ̀	ɓó	bà	'they will come'
H:	á	ɓó	bà	'she will come'					

As seen, the pronoun tones are arbitrary, not attributable to a single feature. In other words, tone is a property of morphemes in the same way as consonant and vowel features.

3. Determining internal structure in tonal paradigms

Of course establishing the typology in (5) goes only part way in identifying the ways in which tone may become implicated in morphological paradigms and the potential analytical issues that arise therefrom. Note, for example, that co-exponents sometimes lend themselves quite naturally to a featural analysis, as in Gban [Mande; Ivory Coast] (Zheltov 2005:24), where 1 = the lowest and 4 = the highest tone:

(8)

	present		*past*		
	sg.	pl.	sg.	pl.	
1st pers.	ĩ²	u²	ĩ⁴	u⁴	[+upper]
2nd pers.	ɛɛ²	aa²	ɛɛ⁴	aa⁴	
3rd pers.	ɛ¹	ɔ¹	ɛ³	ɔ³	[-upper]
	[-raised]		[+raised]		

As seen, first and second person markers have a higher tone than third person, and both are two steps higher in the past tense than in the present. One way to express these relationships is to apply the tone features Upper and Raised, as introduced by Yip (1980) and modified by Pulleyblank (1986). In (8) I have assumed that [±upper] marks person and [±raised] marks tense, as if tense modifies person, but the reverse would also work. The issue is whether the two features enter into a morphological head-dependent relation.

This question takes on further significance in Kunama [Nilo-Saharan; Eritrea] (Connell, Hayward & Ashkaba 2000:17), whose "possessive determiners" are subject to at least the following three interpretations:

(9)		(a)		(b)		(c)	
		paradigmatic		*[[person]-number]*		*[number-[person]]*	
		sg.	*pl.*	*sg.*	*pl.*	*sg.*	*pl.*
1st pers. (excl.)		-àaŋ-	-áaŋ-	-aaŋ-`	-aaŋ-´	`-aaŋ-	´-aaŋ-
2nd pers.		-èy-	-éy-	-ey-`	-ey-´	`-ey-	´-ey-
3rd pers.		-ìy-	-íy-	-iy-`	-iy-´	`-iy-	´-iy-
1st pers. incl.			-íŋ-		-iŋ-´		´-iŋ-

As seen in (9a), the segmental information marks person, while L marks singular and H marks plural number. While the overlap of the segmental and tonal features suggest simultaneity, it seems reasonable to assume that number is a dependent spell-out on person. However, should number be conceptualized as suffixal, as in (9b) or prefixal, as in (9c)? Although segmental morphology is canonically concatenative, tone is often hard to "segment" in this way. This is potentially important: If one cannot segment tone unambiguously, it may affect morphological generalizations such as the following from Trommer (2003: 284):

(10) a.   number agreement should be maximally rightwards
     b.   person agreement should be maximally leftwards

Compare also Hawkins & Gilligan (1988), who indicate that languages show a clear suffix tendency for marking number (as well aso gender, case, indefiniteness, nominalization, mood, tense, aspect, valence, causative) vs. Enrique-Arias (2002) who suggests that person marking favors prefixation.

The internal structure of tonal (and other non- or sub-segmental) paradigms is thus often less evident that segmental paradigms. In "canonical" concatenative morphology, i.e. with syntagmatic affixation external to the base (e.g. root), there is an expected isomorphism throughout the components of the grammar:

(11) a.   semantic compositionality :   morphological spellouts correlate with semantic scope
     b.   syntactic mirror principle :   morphological spellouts correlate with the order of
                                            syntactic operations
     c.   morphological layering   :   morphological spellouts correlate with affix sequencing
                                            (*vs.* in(ter)fixing)
     d.   phonological cyclicity   :   morphological spellouts correlate with cyclic phonology

While not stringable in the same way as full segments, tonal and other non-concatenative featural morphology also show layering and cyclicity. Thus, Andersen (1992-4: 61) presents the following analysis of Dinka [Nilotic, Sudan], which contrasts tone, breathiness, creakiness, and three degrees of vowel length on monosyllabic words:

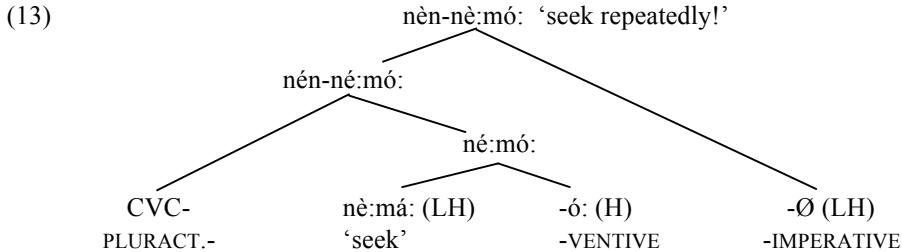(12)   wé̤éc 'kick it hither!' [kick.CENTRIPETAL.2sg]

		voice	*length*	*tone*	
inflectional layer	2sg.	—	—	H	[wé̤éc]
derivational layer	CP	[+breathy]	+1	L	wè̤èc
root layer	'kick'	—	1	HL	/wêc/

As Andersen puts it, there is a bottom-to-top derivation, with each higher level adding to and overriding anything occurring lower (= more internally) in the structure:

"The morphological layers are simultaneous but 'vertically' ordered, with the root as the 'deepest' layer, optionally followed by the derivational layer, followed by an inflectional layer." (p.61)

The following example shows how the uppermost tone wins also in Hausa [Chadic; Nigeria, Niger] (Inkelas 2011: 75):

(13)   nèn-nè:mó: 'seek repeatedly!'

            nén-né:mó:

                              né:mó:

        CVC-   nè:má: (LH)   -ó: (H)   -Ø (LH)
        PLURACT.-   'seek'   -VENTIVE   -IMPERATIVE

As the above examples show, tonal morphology can inflectional, derivational, layered and/or cyclic (cf. Pulleyblank's 1985 cyclic analysis of Tiv tone). However, instead of layers (strata, cycles), conflicting paradigmatic conditioning may require a ranking of the tonal spell-outs by inflectional features (tense, aspect, mood, negation). Thus consider the following verb stem tones in Leggbó [Cross River; Nigeria] in the following table, where the first tone goes on the root, and the second tone is a suffix (Hyman, Narrog, Pater & Udoh 2002:407). (MCA = main clause affirmative, SRA, ORA = subject/object relative affirmative, and NEG = negative (all clause types)):

(14)

	MCA/ORA		SRA		NEG	
Root tone:	/L/	/M/	/L/	/M/	/L/	/M/
Perfect/Progressive:	H-M	M-M	L-M	M-M	H-M	M-M
Habitual	L-L	M-L	L-L	M-L	H-M	M-M
Future/Conditional:	L-L	M-L	L-L	M-L	L-L	M-L

As indicated, Leggbó verb roots show a binary contrast, which I have identified as /L/ vs. /M/. However, when the inflectional features are spelled out, /L/ verb roots are sometimes realized H. The observed patterns can be predicted according to the following featural hierarchy:

(15) *Future/conditional   >>   Negative   >>   Habitual   >>   Other*
          L-L/M-L   H-M/M-M   L-L/M-L

Compare this with Dagbani [Gur; Ghana], where the inflections override the lexical root tones (Hyman & Olawskly 2004: 107):

(16) *Future   >>   MCA, Imperfective   >>   Lexical (default)*
          H   LH   H vs. L

In both Leggbó and Dagbani, "irrealis" future or future/conditional mood is "higher" (further out) than aspect, as per Bybee's (1985) "Relevance Hierarchy".
    Such disjunctive tone patterns vie for the same tonal "slot" as segmental affixes often do. In some cases we can identify a tonal morpheme or melody as a stratum 1 or stratum 2 affix or as a clitic (cf. Van de Velde 2008). In other cases there may be "replacive" tone (Welmers 1973:132-3). In the following examples we see that Kalabari [Ijoid; Nigeria] detransitivizes verbs by replacing their base tone with a LH melody (Harry & Hyman 2012):

(17)   *transitive*   *intransitive*

a.	kán	H	'tear, conquer, demolish'	kàán	LH	'tear, be conquered, demolished'
	kɔ̀n	L	'judge'	kɔ̀ɔ́n	LH	'be judged'
b.	ányá	H-H	'spread'	ànyá	L-H	'be spread'
	ɗìmà	L-L	'change'	ɗìmá	L-H	'change'
	sá↓kí	H-↓H	'begin'	sàkí	L-H	'begin'
c.	kíkíma	H-H-L	'hide, cover'	kìkìmá	L-L-H	'be hidden, covered'
	pákɪrɪ́	H-L-H	'answer'	pàkɪ̀rɪ́	L-L-H	'be answered'
	gbóló↓má	H-H-↓H	'join, mix up'	gbòlòmá	L-L-H	'be joined, mixed up'

4. Phrasal tonal morphology

In a number of cases the syntactic relevance of the tonal morphology is particularly striking. One such example is the complex phenomenon of "tone cases" attested in many Southwestern Bantu languages, e.g. Kikongo [DRC] (Daelemann 1983, Blanchon 1998) Umbundu [Angola] (Schadeberg 1986), Herero (Kavari, Marten & van der Wal 2011). Consider in (18) the five distinct tone cases in Giphende [DRC], based on joint work with Mwatha Ngalasso in 1998 (L- = the noun prefix, . marks syllable breaks):

(18)

	a.	b.	c.	d.	e.	f.	g.	h.
URs:	/L-L.L/	/L-L.L.L/	/L-L.H/	/L-L.H.L/	/L-H.L/	/L-H.H/	/L-H.H.L/	/L-H.H.H/
1.	L-L.L	L-L.L.L	L-L.H	L-L.H.L	L-H.L	L-H.H	L-H.H.L	L-H.H.H
2.	H-H.L	H-H.H.L	L-L.H	L-L.H.L	L-H.L	L-H.H	L-H.H.L	L-H.H.H
3.	H-H.L	H-H.H.L	H-L.H	H-L.H.L	L-H.L	L-H.H	L-H.H.L	L-H.H.H
4.	H-H.L	H-H.H.L	H-H.↓H	H-H.↓H.L	H-↓H.L	H-↓H.H	H-↓H.H.L	H-↓H.H.H
5.	H-H.L	H-H.H.L	H-L.H	H-L.H.L	H-H.L	H-H.H	H-H.H.L	H-H.H.H

1. citation, subject, object of a negative infintiive, left-dislocation
2. focused object
3. genitive, second object, object after a negative verb, subject after a relative verb
4. object after an affirmative verb or after *na* 'with'
5. predictative ('it's ...')

Although I assume Giphende to contrast /H/ vs. Ø, the underlying forms are shown with /L/ for clearer comparison with the H and L outputs. In (18) forms above the dark line surface with a L- noun prefix, while those below begin with H-. As seen, except for case 1, all forms acquire a H prefix, with however quite different properties across the cases:

(19) a. case 2:   H- appears only if the stem is all L (a-b), and spreads from the prefix to the penult
      b. case 3:   H- appears only if the stem begins L (a-d) and spreads to the penult if the stem is all L (a-b)
      c. case 4:   H- appears on all nouns, spreads onto all following Ls (a-d) and downsteps a following H
      d. case 5:   H- appears on all nouns, only on prefix, except spreading to penult if stem is all L (a-b); it does not condition downstep on a following stem H

The question is how to interpret the different left-edge H tone effects. Cases 2-5 might be viewed in terms of prefixal vs. proclitic H tones, different realizational morphology, or co-phonologies (Inkelas 2008, 2011). (See Blanchon 1998 for a historical account with tones coming in cyclically from the left.) In a co-phonology approach, the underlying toneless prefix would be changed to H- as follows, with H- spreading to the penult if the noun stem is underlyingly toneless ($\rightarrow$ all L):

(20) a. case 1: no change: the prefix is realized L from /Ø/
      b. case 2: prefix $\rightarrow$ H- unless there is a H anywhere in the stem, hence a skeleton-insensitive OCP(H) restriction
      c. case 3: prefix $\rightarrow$ H- unless there is a H in the first syllable of the stem to avoid a local, skeleton-sensitive OCP(H) restriction
      d. case 4: prefix $\rightarrow$ H- in all nouns; the H spreads to the penult or up to a H, which is downstepped to avoid an OCP violation
      e. case 5: prefix $\rightarrow$ H- in all nouns; the H spreads to the penult if the stem is all L, otherwise is realized only on the prefix, without downstepping the following H, the OCP violation thus being tolerated

It is not clear what to compare the above "tone cases" with. As seen below (18), the contexts which require tone cases 1-5 do not seem to be natural groupings and have as much to do with information structure as they do with grammatical relations. Since the five patterns can be affect the realization of noun tones at the word level, this does seem to be morphology determined by phrasal conditions.

While such tonal cases are restricted to the lexical noun, tonal morphology has been observed to extend beyond the word. Depending on the tense Kikuria [Tanzania, Kenya] first assigns a H tone to one of the first four moras of the verb stem, which then spreads to the penult (Marlo & Mwita 2009:2):

(21) a. μ_1 n-to-o- [hóótóótér-a 'we have reassured' *Past*
      b. μ_2 n-to-o- [hoótóótér-a 'we have been reassuring' *Past progressive*
      c. μ_3 n-to-re- [hootóótér-a 'we will reassure' *Future*
      d. μ_4 to-ra- [hootoótér-a 'we are about to reassure' *Inceptive*

In the following forms the inceptive tense attempts to assign a H to the fourth mora:

(22) a. μ_4 to-ra- [karaaŋg-á 'we are about to fry' *H tone assignment:*
      b. μ_4 to-ra- [sukur-ǎ 'we are about to rub' [sukur-a μ́
      c. μ_4 to-ra- [βun-aº 'we are about to break' [βun-a μ μ́
      d. μ_4 to-ra- [ry-aº 'we are about to eat' [ry-a μ μ μ́

When the stem is one mora short, a rising tone is obtained, as in (22a); when it is two or three moras short, as in (22b,c), there is a level Lº tone, indicating a final floating H. What is particularly interesting is what happens when the verb is followed by another word. In (23) we see that the moras of a following toneless noun are counted along with those of the verb stem, and the H spreads to the penult:

(23) a. μ_4 to-ra- [karaaŋg-á éɣétɔ́ɔ́kɛ 'we are about to fry a banana'
      b. μ_4 to-ra- [sukur-a éɣétɔ́ɔ́kɛ 'we are about to rub a banana'
      c. μ_4 to-ra- [βun-a eɣétɔ́ɔ́kɛ 'we are about to break a banana'
      d. μ_4 to-ra- [ry-a eɣetɔ́ɔ́kɛ 'we are about to eat a banana'

As Marlo & Mwita point out, suffixal H seems as if it should be word-level morphology—in fact, stem-level, since the prefixes are not available for tone mapping. However, as seen in (23), the μ_4 assignment is calculated at the phrase level! The stem—the head of the verb—combines with the following noun to form a domain to the exclusive of the prefixes which outside the domain. Myers' (1995, 1998) proposal to treat the Bantu verb as one phonological, but two grammatical words might

seem relevant, except that it is a phonological domain that is needed for tone assignment. At the very least Kikuria represents an exception to the expectation that morphs should stay on their own word! Instead we observe apparent postlexical co-phonologies. The situation in Kikuria may not be that isolated.

Recall from the Chimwiini data in (6), where we saw that a first or second person subject assigned a final H to the verb while a third person person subject assigned a penultimate H. The H tone is in fact a property of the phonological phrase (Kisseberth 2009). Thus compare:

(24) a.   jile: namá   'you sg. ate meat'   jile ma-tu:ndá   'you sg. ate fruit'
      b.   jile: náma   's/he ate meat'   jile ma-tú:nda   's/he ate fruit'

In fact, Kisseberth also shows that depending on the focus structure, final vs. penultimate H marking can be observed at the end of each (nested) phonological phrase ( ]):

(25) a.   Ø-wa-ṭinḍiḷiḷe w-aaná] ṇamá] ka: chi-sú]   'you sg. cut for the children meat with a knife'
      b.   Ø-wa-ṭinḍiḷiḷe w-áana] ṇáma] ka: chí-su]   's/he cut for the children meat with a knife'

The question which obviously arises is: What is this? Is it:

(26) a.   morphology?   (a property of [1st/2nd pers.] vs. [3rd pers.] subject prefixes)
      b.   phonology?   (a property of the phonological phrase—H is semi-demarcative)
      c.   syntax?   (a property of the syntactic configurations which define the P-phrases)
      c.   intonation?   (not likely—who ever heard of a 1st/2nd vs. 3rd person intonation?)

Note further that if this is "phrasal morphology", it is not exactly like English possessive *'s*, whose distribution is syntactically defined, as it occurs at the end of a noun phrase.

The lack of clarity between phrasal morphology and post-lexical co-phonologies is also observed in Kalabari, where different types of modifiers assign distinct tonal melodies to a following noun (Harry 2004, Harry & Hyman 2012). The examples in (27) involve the all H noun /ɓúrúmá/ 'indigo'. (Both [`] and absence of an accent mark L tone.)

(27)   *construction*   *assigned tones*   *example*
      a.   N + N   HL   tʊbɔ ɓurúmà   'the child's indigo'
                                                      H L
      b.   Poss + N   HLH (→ H-↓H)   ɪna ɓurú↓má   'their indigo'
                                                      H LH
      c.   Interrog + N   LH   tɔ ɓùrùmá   'which indigo?'
                                                      L   H
      d.   Quant + N   L   ja ɓùrùmà   'some indigo'
                                                      L

As seen, there is a tendency for the four tonal melodies or "constructional tones" to align at the right edge of the following word. The following examples show that all five underlying tone patterns on bisyllabic nouns merge in each construction:

(28)   *'the child's'*   *'their'*   *'which'*   *'some'*
                                              (HL)   *(HLH)*   *(LH)*   *(L)*
      a.   námá   'meat'   H-H   →   tʊbɔ námà   ɪna ná↓má   tɔ nàmá   ja nàmà
      b.   pulo   'oil'   L-L   →   tʊbɔ púlò   ina pú↓ló   tɔ pùló   ja pùlò
      c.   béle   'light'   H-L   →   tʊbɔ bélè   ɪna bé↓lé   tɔ bèlé   ja bèlè
      d.   garí   'garri'   L-H   →   tʊbɔ gárì   ɪna gá↓rí   tɔ gàrí   ja gàrì
      e.   ɓá↓rá   'hand'   H-↓H   →   tʊbɔ ɓárà   ɪna ɓá↓rá   tɔ ɓàrá   ja ɓàrà

While it is not surprising for a tonal pattern to be assigned at the word level, as we saw with the detransitivizing LH melody in (17), it is highly unusual that distinct melodies are assigned by construction—in effect, from one word to another. Again, this is something that only tone can do.

5. Summary

To summarize the above, we have seen that tonal morphology is quite varied. As in the case of tone in general (see (1) above), tonal morphology can do everything that non-tonal morphology can do—and then some! In so doing, tonal morphology more greatly obscures the phonology/morphology and morphology/syntax boundaries, as we saw in Kikuria, Chimwiini, and other cases. The question is why should tone should provide so many more possibilities than other expressions of morphology. I believe the answer has to do with the greater versatility of tone in general (which in turn has to do with the ability of human beings to isolate or "autosegmentalize" pitch). Most of the above discussion has had to do with the versatility of H and L tones, which can serve at least the following four functions:

(29) a. distinctive : distinguish morphemes (lexical, grammatical) at the word level
      b. accentual : realize metrical prominence (word, phrase, utterance)
      c. demarcative : mark prosodic domain boundaries (word, phrase, utterance)
      d. pragmatic : distinguish utterance types (declarative, interrogative etc.)

No other phonological feature or property has such a range of capabilities. The focus of this paper has been on the exploitation of tone as an exponent of what is traditionally referred to as grammatical morphemes. Although we have already witnessed a tremendous richness, tone provides numerous additional areas open for further exploration, especially in African languages.

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Selected Proceedings of the 43rd Annual Conference on African Linguistics: Linguistic Interfaces in African Languages

edited by Ọlanikẹ Ọla Orie and Karen W. Sanders

Cascadilla Proceedings Project   Somerville, MA   2013