TONE AND PHRASE STRESS: THE EXTRA HIGH TONE IN OBOLO

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A description of the phrase stress system in Obolo is followed by an outline of the behavior of the Extra High tone in relation to other tones underlyingly as well as at the surface. Finally, the possible implications of the existence and evolution of phrase stress and extra high tone for the analysis of the behavior and historical development of tone systems in other Benue-Kwa languages will be outlined and discussed.

Après avoir décrit le système d'accentuation de phrase en obolo, nous faisions un sommaire du comportement du ton super-haut par rapport aux autres tons dans la langue. Enfin, nous discutons les implications que l'existence et l'évolution de l'accentuation de phrase et du ton super-haut en obolo peut avoir pour l'analyse du comportement et du développement historique des systemes tonals dans d'autres langues bénoué-kwa.

0. INTRODUCTION

Preliminary analyses[1] of Obolo, a Delta-Cross (Benue-Kwa) language of southeastern Nigeria, yielded five tonemes: high, low, step, falling, and rising. As the result of intensive field work as well as machine analyses of Obolo speech performed at the Phonetics Laboratory of the University of Ibadan,[2] it has become apparent that Obolo has only three tonemes: high, low, and extra high (falling). Moreover, there are serious drawbacks to the designation falling for the third tone in Obolo due in part to the existence of a system of "phrasal stress" alongside that of tone in the suprasegmental structure of the language. We therefore suggest the designation extra high.

1. PHRASE STRESS IN OBOLO

As research into suprasegmental phenomena continues and more and more "tonal" systems are described and analyzed taking more global prosodic factors into account, it is becoming clear that a stress

or accent system can and often does cooccur alongside a system of contrastive lexical tone in the same language.[3]

In Obolo, each syllable of a noun is assigned one tone lexically, while each verb stem is assigned a single tone (high or low) which is distributed suprasegmentally over however many syllables it may contain. The systems of lexical tone and downdrift, however, coexist and interact with other suprasegmental systems, including a system of phrasal stress.

The primary cues for phrase stress in Obolo are:

1) Extra high pitch (F_0), which may or may not be accompanied by a gliding tone pattern.
2) High amplitude.
3) Extra length.

The correlation of high pitch to stress is by no means typical only of Obolo. Extra high pitch signals stress-related phenomena in other "tone" languages such as Marinahua (E.V. Pike 1979), Ayutla (Pankratz and E.V. Pike 1967), Diuxi Mixtec (E.V. Pike and Oram 1976), and Golin (Bunn 1970). Raised F_0 levels are cited by Lehiste (1970:82) as universal correlates of stress, an assertion that is supported by experimental work on the perception of stress (Janota 1979).

In Obolo, a syllable over which the phrase stress falls will in most cases have extra high tone, regardless of the tone associated with it underlyingly. Under the influence of phrase stress, level tones often become gliding tones; extra high becomes a fall from extra high to high; high becomes a fall from high to low; and low becomes a rise from low to high.

Gliding tones are not unique to Obolo as cues for stress either. Experimental evidence shows that contours enhance the perceptibility of pitch level (Abramson 1976). Hyman (1977a:43) mentions falling tone as one of the universal cues for stress. In Tenango Otomí (E.V. Pike 1979) as in Obolo, both downglides and upglides are used to signal stress.

In Obolo, both extra high pitch and vowel length function each at two different levels as a signal for two different variables. Extra high functions as one of the distinctive lexical tones, but at the same time acts as a cue for phrase stress. Length distinguishes one set of underlying vowels from another, while also signalling phrase stress.

In English, where length is one of the primary correlates of stress, Lehiste (1971:41) has observed that length due to syllable (word) stress is subordinate to length due to sentence-level stress. Thus, in fast speech, length due to syllable stress is reduced while that due to sentence stress persists. In Obolo, in fast speech the

underlying length distinction between vowels is not maintained, while length due to phrase stress is preserved. The following are examples[4] of rapid speech (an apostrophe (') precedes stress syllables):

/mâ kwé:k/ === ['mâ:kwèk]
1PSF sit, remain 'I will remain'
/mâ kwèk/ === ['mâ:kwɛ̂k]
1PSF prevent 'I will prevent it.'

2. AVERAGE LENGTH OF VOWELS IN STRESSED VS. UNSTRESSED SYLLABLES IN OBOLO

Environment	Length of V_1 [-stress]	Length of V_1 [+stress]
CV_1	181.3 msec.	245.3 msec.
CV_1C	161.4 msec.	245.5 msec.
$CVCV_1$	117.9 msec.	215.6 msec.

A parallel pattern of subordination of lexical tone to phrase-stress-related pitch phenomena is evidenced in Obolo. We have already noted that underlying high and low tones are often replaced by extra high tones under phrase stress. Downdrift, however, seems to operate across utterances independently of phrase stress and even intonation patterns. Although phrase stress may temporarily interrupt a downdrift pattern, the pattern most often "picks up where it left off" before the interruption, a few syllables (at most) after the phrase stress (see examples that follow).

In Obolo, the speech chain divides itself into several units of varying length which correspond to the different units to which suprasegmental features are assigned. Intonation patterns are realized over pause groups, which are usually bounded by pauses before and after, as the name would suggest. Phrase stress is realized over stress groups, which are usually smaller than pause groups (although the two may coincide over one single phrase). One phrase stress is assigned to each stress group in a given utterance.

Stress groups consist of the following elements:

1) Verb Phrases. Most stress groups are centred around a verb phrase More often than not subjects, objects, and any modifiers associ-

ated with them are included with the verb to which they are most closely related syntactically in the same group. Each verb in a serial verb construction constitutes a separate stress group. Indirect objects are also separate stress groups, since they are introduced by serialized verbs such as ɲe 'give'.

Examples (Numbers indicate F_0 levels in H_z, ´ indicates high tone, ` indicates low tone, ^ indicates extra high tone. Double vertical bars indicate pause group boundaries. Single bars indicate stress group boundaries.):

/ è	mâ	kpê	rjɔ̀ŋ	ì	bè
NO	3PPPN	NEG	know	NO	REL
ké	è	mì	Ǹ	gâ	kí
REL	NO	1PSPN	1PSC	CON	CON
kpɔ́	è	bɔ́t /			
look at	NO	3PPPN			
[//L	E	'E	L /	L	L
117	127	142	116 /	116	116
[//e	ma	'kpe	rjɔŋ/	i	be
H	L	'E	H	H	H//]
117	115	137-109	116	115	113-95
ke	min	'ga	ki	kpɔe	bɔt//]

'They didn't know that I was looking at them.'

/ Ǹ	nú	mè	í	dʒé	ó
1PSC	come	and	INF	go	2PSC
wè:k	í	mô	mùŋ	è	mì /
want	INF	RED	see	NO	1PSPN
[//L	'H /	'H	H /	'H	L /
109	173- / 134	162	122 /	156	122 /

[//n	'nu	/	'mi	dʒe /	'o wek /
'H	E		L	L //]	
130	113		95	85	
'i	mo		mũ	ẽm //]	

'I came because you wanted to see me.'

2) Adverbial Complements. Complements of place, time, and manner often constitute a single stress group, especially if there is only one verb in the entire pause group.

Example:

/gàrí	jà	í	kúp	mé
gari	DEF	3PSC	stay	LOC
èmèn	à	kpà	jà /	
within	NO	bag	DEF	
[//L	'H	L	H	H
180	300-190	160	190	240
[//ga	'ri	ja	i	kup/
'E	L	L	L	L//]
300	150	150	155	111
'me	men	a	kpa	ja//]

'The gari is in that bag.'

3) Noun Phrases. Noun phrases sometimes detach themselves from the verb phrases to which they are related to constitute stress groups in themselves. This happens especially when the noun in question is given prominence grammatically, lexically, or syntactically. Noun phrases in series linked by the conjunction /mè/ may optionally form stress groups, each one receiving one stress.

Example:

/ì	sí	ŋàm	ò	fjɔ́ŋ
3PSC	go	sell	NO	plantain

è	békè	mè	á	mângèrè
NO	white person	and	NO	mango
mè	á	kpùt	mè	Ǹ
and	NO	papaya	and	NO
g^{w}ôbà	mè	ù	lâ:dʒà	mè
pineapple	and	NO	orange	and
ú	k^{w}á	è	békè /	
NO	yam	NO	white person	

[//L	'H	L /	L	'H
118	163	155 /	113	140
[//i	'si	ɲam /	o	'fjɔ̃ẽ
(H)	(L) /	L	H	'E
107	115-95 /	108	109	138
be	ke /	me	a	'maŋ
L	L /	L	'H	L /
107	100 /	100	103-127	103
ge	re /	me	'a	kput /
L	'E	L /	L	'E
101	121	95 /	100	123
meŋ	'g^{w}o	ba /	mu	'la
L /	H	H	L	(H)
103 /	109	109	95	95
dʒa /	mu	k^{w}á	e	be
'L //]				

117-
80

ke //]

'He went to sell bananas, mangos, papaya, pineapples, oranges, and breadfruit.'

It should be noted that the preceding listed constituents of stress groups correspond very closely to the constituents of McCawley's (1965) phonological phrases as well as to the domains for the operation of suprasegmentals in both Bụmọ (Ịjọ) (Efere 1981) and Engenni (Thomas 1974).

While the criteria which determine the boundaries of stress groups are purely syntactic, the criteria that enter into the determination of which syllable within each stress group will actually carry the stress are not only morphosyntactic, but phonological and semantic-pragmatic as well. Each set of criteria may be hierarchically ordered internally, but the relative importance of one set in relation to the other depends on yet another set of less easily measurable factors such as situational context, the attitudes of the speaker and the listener, the amount of information they share about the topic under discussion, etc. A preliminary outline of the three hierarchies would look something like this:

A) Phonological. Stress tends to gravitate toward:

1) Underlying [-Low] F_0 levels.

2) Stress group boundaries. This criterion is clearly subordinate to number 1, as well as to most criteria listed in the other hierarchies.

Examples: ['î ŋam á kpùt] 'He sold papayas.'

[ò 'mô ŋàm á kpùt] 'He sold papayas (not me).'

B) Morphosyntactic. Stress tends to gravitate toward:

1) Verbal prefixes which carry extra high tone (see A above and C below).

2) The first morpheme of a complement of place, time or manner. Example:

['î ŋam á kpùt 'mê wè]

'He sold papayas in the market.'

3) Verbal roots which carry extra high tone (see C, Semantic-Pragmatic).

4) Subject noun phrases, especially when postposed or given prominence in some other way. Example:

[ˈâ kpùt kè lɔ̀ ˈî kùp ˈmê wè]

'Those papaya are in the market.'

C) Semantic-Pragmatic.

1) Verb Focus - The correlates of verbal focus (prefocus, verb-focus, and postfocus) are often associated with different stress patterns. Example:

/òmɔ̂	i	lèp	gàrí	ì	ˈjákʷùt/
3PSPN	3PSC	buy	gari	NO	yesterday

Verb Focus:

[ˈî lèp gà rí ì ˈjá kʷùt]

'He BOUGHT gari yesterday.'

Post-verb Focus:

[ì ˈlêp gà rí ì ˈjá kʷùt]

'He bought GARI yesterday, or

'He bought gari YESTERDAY.'

Pre-Verb Focus:

[ò ˈmɔ̂ ó lép gà rí ì ˈjá kʷùt]

'HE bought gari yesterday.'

Several researchers have observed a correlation between [-low] F_0 and stress in Bantu (Byarushengo, Hyman, and Terenbaum 1976:191-206; Johnson 1976:207-11) as well as a tendency for stress to occur near phrase boundaries universally (Hyman 1977a). In Mbembe (Barnwell 1974:66-7) the initial element of a locative phrase carries stress.

In Obolo, certain morphemes that, by their phonological, morpho-syntactic, and/or semantic nature tend almost invariably to rate high on the preceding outlined hierarchies have become automatically stressed. These morphemes all have extra high tone underlyingly, though whether extra high is derived from a falling tone or developed because of the high frequency at which the morpheme succeeded in attracting phrase stress to itself is an interesting question. According to Hyman (1977a) lexical (unpredictable) stress is derived from grammatical (predictable) stress. A sample of such automatically stressed morphemes in Obolo includes:

/kâ/ negative marker (verbal prefix)

/mâ, mô, mê/ future markers (verbal prefixes)

/î/ third person singular completive marker (verbal prefix, verb focus)

/kpasî/ 'which' and most other question words, most of which constitute verb phrases in themselves and usually occur near stress group boundaries.

All interjections and most imperative forms in Obolo attract phrase stress as well.

Extra high tone is associated with negative, imperative, and interrogative constructions in Mikasuki (West 1962) and in Engenni (Thomas 1974). Question words carry extra high tone in Higi (Mohrlang 1974:121).

Phrase stress often not only affects the syllable which bears the stress, but also the adjacent syllables. Pitch is often raised over the syllables immediately preceding and/or following a stressed syllable. In some cases, the stress seems to distribute itself evenly over two or even three syllables. Examples:

103	105	151	140	140-105	
[kà	sì	'sâ:k	édʒ	ít]	
	'Don't worry!'				
108	125	114	113	118	105
[ò	'wá	rà	káj	kpâ	jà]
	'You passed the test.'				

In Obolo, such processes as tone spreading, absorption, shifting, and displacement occur both anticipatorily and perseveratively. All of these phenomena are very difficult to describe in terms of tone rules. But they can be quite easily dealt with if we accept the fact that they are to some degree stress-related rather than purely tonal phenomena.

Interestingly, one of the primary devices used to differentiate one intonation pattern from another in Obolo is the suspension of non-initial stress groups and phrase stress assignment over the utterance. In statement and yes-no question intonation, utterances divide themselves into the normal stress groups; phrase stress is placed over them as has been outlined. Under information-question, imperative, negative, exclamatory, hypothetical, and indirect discourse intonation patterns, only the very first stress group receives the phrase stress, and no other phrase stress occurs after the initial stress within the same pause group. Examples:

/èmâ	mê	ɧèk	í
3PPPN	3PPF	agree	INF
gɔ̀k	èdʒì	í	gbá /
follow	1PPPN	INF	visit

[//èmâ 'mê ɧjì / 'gɔ̂ gɔ̀e / dʒî gbá //]

'They will agree to come visiting with us.'

/èmâ	kpê	ɧjèk	í	gɔ̀:k
3PPPN	3PPNEGFUTP	agree	INFP	follow
èdʒì	í	gbá /		
1PPPN	INF	visit		

[//è mâ 'kpê ɧjí gɔ́ gɔ́e dʒí gbá //]

'They will never agree to come visiting with us.'

3. THE EXTRA HIGH TONE IN OBOLO

As mentioned above, preliminary analyses of Obolo postulated two gliding tonemes: a fall and a rise. Rising tone is found only over verb stems which have underlying low tone and which receive phrase stress. In actuality, there are two falling tones phonetically in Obolo; a fall from high to low, which is an allotone of stressed syllables with underlying high tone, and a fall from extra high to high, which is an allotone of extra high. The statistical occurrence of the tonemes of Obolo and their major allotones is given in the following table:

Toneme	% of Total Syllables	% of Realizations of Toneme in Question	
		Level Allotone	Gliding Allotone
Extra High	18,3%	46,9%	43,4%
High	38,0%	87,4%	11,0%
Low	42,4%	91,4%	1,8%
(Step)	(1,4%)	(100%)	-

As can be seen from the table, the gliding allotones of high and low are relatively rare in occurrence when compared with the gliding toneme of extra high. The extra high glide is more common because: 1) underlying extra high tends to attract stress accent more frequently than high and especially low, and 2) in natural speech, once the pitch of the voice reaches the elevated F_0 level typical of extra high, it is often necessary for a rapid drop in pitch to take place over the same syllable to effect a smooth transition to a following high or low. In short, although falling allotones are more typical of extra high than of high, the critical distinction between the two tonemes is not one of contour vs. level tone (since both have gliding and level allotones) but rather one of relative pitch level.

While high and low occur statistically with roughly the same frequency, extra high occurs only half as often. High and low are found in all environments, but extra high is never found over verb stems and occurs only extremely rarely over noun prefixes.

Extra high tones have been attested to in many languages in Africa: Gurma (Rialland 1981) and other Kru languages (Elimelech 1964), Engenni (Thomas 1974), Izi (Bendor-Samuel and Meier 1974), Higi (Mohrlang 1974), and Mbembe (Barnwell 1974). Extra high tones have also been described in languages of the Americas: Mikasuki (West 1962), Tenango Otomí (Blight and E.V. Pike 1976), and the Ayutla (Pankratz and E.V. Pike 1967), Acatlán (E.V. Pike and Wistrar 1974), and Diuxi (E.V. Pike and Oram 1976) dialects of Mixtec. In Mbembe, Tenango Otomi, and Diuxi Mixtec, the extra high tone is in free variation with an extra high downglide, just as it is in Obolo. In Acatlán Mixtec and Engenni extra high tone results from upstep, and, in most of the other languages mentioned above, extra high tone is principally the result of some type of stress, accent, or intonational phenomenon. In these languages, extra high tone has, in some cases, become bound to certain grammatical particles. A similar process has occurred in Obolo (as has been outlined).

In Obolo, however, extra high tone also occurs over noun stems in cases where there is no apparent reason to postulate accent or stress at any level.

Example:	/í kɔ̂ /	[íkɔ̂]	'word'
	/ú kó /	[úkó]	'farm'

In many Niger-Congo languages, falling and rising tones (which can ultimately be analyzed into combinations of level tones, in most cases) occur lexically in a similar distribution in relation to high and low tones as extra high does to high and low lexically in Obolo. Given that falling tone is more common in languages universally than rising tone (Ohala and Ewan 1972), that falling tones in many languages begin at a level higher than the average high tone (Gandour

1978), and that tones are perceived categorically (Lieberman 1957; Lieberman, Cooper, Shankweiler and Studdert-Kennedy 1967), it seems likely that the extra high tone over noun stems in Obolo probably evolved from a falling tone. K. Pike (1982) suggests that the extra high tone in Izi developed from the sequence fall-low.

Just as extra high tone and downglide are in free variation as markers for accent in Obolo--and possibly universally since experimental evidence shows that contours enhance the perceptibility of tone level (Abramson 1976)--lexical falling tone developed an extra high allotone that has by now become the most common phonetic realization as well as the primary cue for what was originally a high-low sequence with a slightly elevated onset. Apparently, then, the extra high tone in Obolo has two sources: lexically, it is derived from a falling tone, while grammatically, it has developed as the result of stress patterns in the language.

A tonal system which seems to have undergone developments similar to those leading up to the present state of affairs in Obolo is that of Jibu, a Jukunoid (Benue-Kwa) language. According to J. Van Dyken (1974) Jibu has four tones: high, mid, downstepped mid, and low. These would seem to correspond in relative pitch to extra high, high, step, and low in Obolo, respectively.

Let us now compare the possible tonal sequences over nouns in the two languages:

JIBU	OBOLO	
H-H	--	(E-E does not occur)
M-H	H-E	
M-M	H-H	
M-'M	H-S	
M-L	H-L	
H-L	--	(E-L does not occur)
L-H	L-E	
L-M	L-H	
L-'M	--	(L-S does not occur)
L-L	L-L	

Two facts should be borne in mind when considering this data: 1) Extra high over noun stems is extremely rare in Obolo; 2) Jibu is rather peculiar in having a downstepped mid tone but no downstepped high. Jibu, then, may have developed what is interpreted by Van Dyken as a three-level tone system (plus step) from a two-level system, passing through a stage similar to that at which we find Obolo synchronically.

Proto-Niger-Congo had in all probability a two-level tonal system Many Niger-Congo languages have three-level systems however. The Obolo data is suggestive of how two basic tone levels, combining at times into glides and interacting with other factors such as stress and intonation, can give rise to three distinct levels of tone.

Downdrift in Obolo occurs not only between low and high tones, but also between successive lows and successive highs. According to Hombert (1974) languages with such pervasive downdrift patterns don't have downstep, for example, Shona, Hausa, Nembe (Ịjọ). As noted above, step tone is very rare in Obolo. Step only occurs after a high tone. The proportional relationship in terms of F_o level between extra high and high tone in Obolo is roughly the same as that between high and step. A similar proportional relationship between extra high, high and step tones has been reported for Izi (Bendor-Samuel and Meier 1974).

In fact, in every instance, the sequence high-step in Obolo is in free variation with the sequence extra high-high.

Examples:

[ólīk] ~ [ôlík] 'rope'

[ékīfùk] ~ [êkífùk] 'they were reading'

Hyman (1977a) suggests the reinterpretation of H-S sequences as E-H sequences as one of the possible processes involved in the evolution of a three-level tone system from a two-level system.

It is interesting to note that among the languages with downdrift patterns similar to that of Obolo, Nembe is essentially a pitch-accent language (Efere 1981) and Shona has been cited by Hombert (1974) as a language where stress and intonation patterns are causing "tonoexodus" (Lea 1973; Hombert 1974) or the progressive suspension of the system of distinctive lexical tone.

While the pitch pattern of nearly every Obolo utterance cannot be analyzed without taking into account other suprasegmental factors such as phrase stress and intonation, the consideration of lexical tone is also essential. Obolo may, however, be moving toward developing a system similar to that of Shona or Nembe, where lexical tone plays a relatively marginal role in determining the pitch level at which syllables are realized.

FOOTNOTES

[1]Much of the material presented in this paper is included in chapters 6 and 7 of *A Phonology of the Western Dialects of Obolo* by the present author (publication forthcoming). A preliminary draft was read at the Third Annual Conference of the Linguistics Association of Nigeria, University of Ilorin, August 18-22, 1982.

[2]In this connection, I am deeply indebted to Dr. B. O. Elugbe and Mr. G. Ehimika for their help and cooperation.

[3]See, for example, E.V. Pike and Williamson in E. Fischer-Jørgensen *et al.*, eds. (1979).

[4]Tone marking is as follows: high ´, low `, extra high ˆ. Abbreviations used in glosses are:

C	completive marker	P	plural
CON	continuative marker	PN	pronoun
DEF	definite article	RED	reduplicated syllable
F	future marker	REL	relative particle
INF	infinitive marker	S	singular
LOC	locative particle	1P	first person
NEG	negative marker	2P	second person
NO	nominal prefix	3P	third person

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