YORUBA: A 'TERRACED-LEVEL' LANGUAGE WITH THREE TONEMES

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1.   Introduction to Yoruba tone

Like most Niger-Kordofanian languages, Yoruba has phonemic tone.
Tone is particularly interesting in Yoruba for two reasons: first, its
very high functional load; and second, the unusual combination of three
phonemic tones and a pervasive system of gliding allotones with a 'ter-
racing' effect similar to that in many two-tone Niger-Kordofanian lan-
guages such as Igbo, Bambara, and Tiv.

The three 'basic' tones, high (symbolized here by ´ over a vowel),
mid (vowel left unmarked), and low (`), can be illustrated by the fol-
lowing:

(1a)	ló	'to be lukewarm'
	lɔ	'to go'
	lɔ̀	'to grind, smooth'
(1b)	dí	'to block'
	di	'to become'
	dì	'to tie'
(1c)	ɔkó	'hoe'
	ɔkɔ	'husband'
	ɔkɔ̀	'vehicle'
	ɔ̀kɔ̀	'spear'
(1d)	awó	'guinea fowl'
	awo	'secret'
	awò	'eyeglasses, seine'
	àwo	'plate'
(1e)	ìwó	'umbilical cord'
	ìwɔ	'poison'
	ìwɔ̀	'hook'
	ìwɔ	'you (sg.)'

Even with the restriction that a noun cannot begin with a high tone

vowel, there is obviously a heavy functional load borne by tone in distinguishing utterances. The frequent tonal contractions and assimilations made in spoken Yoruba complicate the situation still further.

For native speakers at least, many African languages can be written with tone diacritics omitted without rendering a text unintelligible to the reader. However, tone is so essential in Yoruba that even native speakers often use tone marks in especially ambiguous cases. Furthermore, a Yoruba reads his language with difficulty and with many hesitations when all tone marks are omitted.

The gliding allotones referred to above are two: low tone is realized as a glide from high to low immediately following a high tone; high tone is realized as a glide from low to high immediately following a low tone syllable. When either of these two 'extreme' tones follows a mid or itself, however, it remains a level pitch. Examples of glides:

(2a)   ìwǒ   'umbilical cord' is realized as   ⌊_⌝⌋

(2b)   mótò   'car'   is realized as   ⌈⌐⌝⌉

'Terracing' refers to an automatic lowering of both high and mid tones after a low tone; in the case of high, as mentioned above, the tone takes the form of a glide starting at low but ending a little lower than a preceding high. (It ends especially low in utterance-final position or before another high tone.)

Examples:

(3a)   àwo   'plate'   is realized as   ⌊----⌝⌋

(3b)   ìwǒ   'umbilical cord' is realized as   ⌊---⌝⌋

These considerations, combined with the fact that two different tones on succeeding vowels of identical quality produce other phonetic glides, e.g.:

(4a)   Mo rí i   'I saw it' may be realized as   ⌈-⌝⌉

(4b)   Mo Jɛ ɛ́   'I ate it' may be realized as   ⌊-⌝⌋

and that a basic low tone may be pronounced with a slight falling glide,

have led one investigator [Olmstead 1951] to propose nine basic tonemes
for Yoruba. It will shortly become clear that the situation is con-
siderably simpler; but the tonal system of Yoruba cannot be understood
without a fairly extensive knowledge of the language, including the
remainder of the phonology and the syntax. Yoruba tonal assimilations
and contractions, in particular, depend to a large extent upon syntax.

2. Typology of tone languages

Kenneth Pike, in Tone Languages [1948:3-13] has attempted to di-
vide the tone languages of the world into two basic types, 'register'
and 'contour' languages. The first type comprises tonal phonemes
which are level in pitch; the second, tonemes of a gliding type. Pho-
netically, few languages can be found which exhibit one of these tonal
types exclusively. However, phonetic glides in a register language can
be analyzed into combinations of or transitions between two or more le-
vel tones; the end points of such glides can be identified with differ-
ent level tonemes in the language or may be allotones of level tonemes.
Glides in a contour language are basic tonemes; the end points of such
glides cannot be equated with level tonemes even if the language pos-
sesses one or more level tones.

Yoruba may at first sight seem to fall into some category midway
between these two types, since it has on the phonetic level both several
level tones and several contour tones. I shall establish, however,
that on the level of systematic phonemics Yoruba is a pure register-
tone type, and not a 'mixture' or a 'split-level' language.

Pike based his now classic work largely on American Indian and
Oriental languages; Africanists have long recognized that some revision
or supplementation must be made to account for certain features of many
African languages. I do not think, however, that it has yet been con-
clusively shown that at the systematic phonemic level African languages
are sufficiently different in their tonal structures to merit having
a new type or subtype set up for them. Yet something of this sort has
been proposed in different ways by several scholars [Welmers 1959;
Schachter 1961; Arnott 1964; Stewart 1965], and some of them have sug-
gested that Yoruba is a special case of this new type, called first by

Welmers a 'terraced-level' system.

Let us see first how a 'terraced-level' tone system differs pho-
netically from the kind of register tone language called 'discrete-
level' by Welmers [1959]. He gives us as an example of a sentence in
a discrete-level language the following utterance in Jukun, a language
of northern Nigeria:

(5)   áni zè súrà à syi ní bi[1]

        'Who bought these yams?'

(I have changed the tone marking system slightly to correspond with
that which I have used for Yoruba.) The pitches of this sentence may
be diagrammed as follows:

(6)
3	á		sú			ní	
2	ni				syi	bi	
1		zè	rà	à			

Each high pitch is essentially the same as every other high tone
in the sentence; the same is true for each low pitch and each mid
pitch. Yoruba may seem to be of this same type when one examines a
carefully chosen sentence such as the following:

(7)   wɔ́n ín bú ramúramù

        'They (e.g. airplane engines) are making a very loud noise'

diagrammed as:

(8)
3	wɔ́n ín bú	mú	
2		ra ra	
1		mù	

Again, each tone identified as the same toneme (high, mid, or low)
is realized on the same pitch level throughout the sentence. However,

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[1]Welmers states now [personal communication] that this particular
Jukun sentence is grammatically not very well-formed, though perhaps
acceptable. At any rate, this information has no bearing on the dis-
cussion of the Jukun tone system.

if there were a low tone in this sentence anywhere but at the very end as in this example, a different picture would emerge; and Yoruba would then appear to be a language of the sort to be illustrated next: 'terraced-level'. It is this sort of 'split personality' which has led Welmers facetiously to call Yoruba a 'split-level' language. The tonal assimilations and contractions complicate the situation still further.

3. <u>Terraced-level languages</u>

For an introduction to terraced-level languages, a Bamako dialect of Bambara, a Mande language with only two tonemes, will serve since it presents less complications in the general area of tone than many languages:

(9)   À bè ń ká fìnín kò lá

'She is washing my clothing'

The phonetic pitches in this sentence may be diagrammed as follows:

(10)

4		ń ká		
3	À bè		nín	
2			fì	lá
1			kò	

The rule for such pitches is simple enough: high tone is lowered one step immediately following a low tone, while a high tone following another high remains at the same level as that preceding high. It is a corollary of this rule that once a high is lowered in a given breath group, a succeeding high in that group cannot go up again to the pitch of a preceding high. Such a rule might be written:

(11)   [+ H] → [- 1 step]   /   [+ L] _____

The Bambara example given above is of a type which has been considered by the aforementioned linguists to exhibit only one sort of 'terracing' or 'downstepping' common in these languages: what Stewart [1965:5] terms 'automatic downstep'. This is the downstepping of high tone which occurs after a low tone. But terracing commonly occurs in many African languages when no low tone is in evidence on the surface

level. Take the example below, in Bambara:

(12) Mùsó yá nyíní súgú lá

      'The woman looked for him at the market.'

The vertical mark (') represents a high tone dropped one step from the preceding high, diagrammed as follows:

(13)

5	só		
4	mù	yá	
3		nyíní súgú	
2			lá

(Pitches start at 2 for ease of comparison with the next diagram.)

Such an example would seem to require another phoneme for autonomous phonemics, since the (simplified) 'morphophonemic' version below does not occur in actual speech:

(14)

Mùsó	ò	yé	à	nyíní	súgú	ù	lá
woman	the	past	him	look for	market	the	at

5	só			
4	Mù	yé		
3		ò	nyíní súgú	
2			à	lá
1				ù

Tonal assimilation too can produce such a result:

(15) À kó à térí mà...

    He say his friend to

    'He said to his friend...'

4	kó á	
3	A térí	
2		
1	mà	

In Bambara, the underlying forms on the systematic phonemic level

are rather transparent from the surface level. Although the sentence

(16)   Mùsó yà nyìnì súgú là

never occurs with the low tone definite articles actually evident, their
underlying presence can be deduced from such other examples as mùsó ò
'the woman' or 'woman' (nouns never occur in isolation without the def-
inite article in this dialect) and the compound mùsòkòrònìn ìn '(the)
little old woman', where it is evident that the basic tone of the word
for 'woman' is low; the high tone on the second syllable of mùsó ò is
an example of the operation of a Bambara rule raising the last syllable
of a low-tone word when it is followed by another low-tone word. · In
other languages, such as Igbo and apparently Twi, the underlying forms
are often nowhere near so obvious; but further investigation may well
reveal underlying regularities not evident on the surface level here,
as well.

My argument depends in no small way on the phonetic equivalence of
'automatic' and 'non-automatic' downstep, an equivalence which was at
one time denied by Schachter [1961] and defended by Stewart [1965].
Schachter then (he has since changed his mind, see Schachter and
Fromkin [1968]) considered 'automatic downstep' to be an intonational
phenomenon, while 'non-automatic' downstep was considered something
else entirely. His arguments in support of this contention had little
to do with phonetics, however; I personally know of no language where
these 'two types' of downstep can be shown to be phonetically dissimi-
lar. Schachter pointed out that 'downdrift' ('automatic downstep') is
characteristic of neutral intonation in Twi; and that such downdrift
is absent in emphatic speech of various sorts, while 'non-automatic'
downstep is never optional. However, 'downdrift' can be omitted with
no difficulty because the conditioning factor of low tone is still
present, and there is no possibility of ambiguity being caused by such
omission. On the other hand, omission of 'non-automatic' downstep,
where the lowering of the high tone is the only remaining indication
of an original (underlying) low, would be an assault on the very struc-
ture of the language, often resulting in ambiguity and indicating the

absence of a low tone which is no doubt still very much present at the
systematic phonemic level. I have several times had the experience of
having a Yoruba tell me that a certain utterance he had just made
contained a low tone when, phonetically speaking, there was no such
thing present, but only its effect, downstep. The presence of various
intonational contours overlaid upon tones does not change the underlying
structure or even indicate anything in particular about it. A language
like Hausa, which has automatic but no non-automatic 'downstep' and more
than one intonation contour, may be viewed as essentially the same type
of 'terraced-level' language as Bambara or Igbo: a register tone
language with a phonetic feature of downdrift. However, since Hausa,
having a different sort of morpheme structure from that of these
languages, does not have the type of wholesale deletion and assimilation
of low tones that they do, the question of 'non-automatic' downstep has
simply not arisen. Stewart [1965] points out the similarity of Hausa
and Twi in terms of drift, but does not emphasize that Hausa is at some
sort of midpoint in the range between a register language with no
downdrift and a fully 'terraced' register language with both 'automatic'
and 'non-automatic' downstep.

The theoretical status of 'non-automatic' downstep is somewhat
different for Welmers, Schachter, and Stewart; partly because the three
are dealing with different languages, and perhaps trying to subsume
under one heading more than one kind of entity. Welmers posits essen-
tially three phonemes, low and two kinds of non-low: 'same' and 'drop'.
Schachter, similarly, proposes 'low', 'high', and 'high-change'. When
a non-low tone begins a sentence, since the difference between 'same'
and 'drop' or 'high' and 'high-change' is neutralized in this position,
each must decide arbitrarily to which toneme such a tone belongs. In
Twi, Schachter has the same problem after low, also; Welmers does in
some of the languages he cites, but he mentions ShiTswa as a language in
which it is possible to have a three-way contrast after low as well as
after high. Such a language seems to me to be a different sort of case
from the others. Welmers otherwise seems to be dealing with languages
such as Igbo, where an arbitrary decision one way or the other can be

made for the language as a whole; every non-low after a low can be considered 'same' rather than 'drop', for instance, without causing trouble elsewhere in the language.

Both Welmers and Schachter must cope with endless cases of having the same phonetic pitch assigned to two different phonemes and vice versa. Stewart avoids this problem by considering 'downstep' to be not another toneme, but a phoneme (of uncertain theoretical status) which has an effect on a following toneme.[2] This phoneme bears certain similarities to Ayọ Bamgboṣe's (.) symbol for Yoruba [Bamgboṣe 1965], which represents a 'prosody' (again of uncertain theoretical status, since there is no formalization of rules) which has the same effect as a low tone upon a following tone. Such a phoneme or prosody seems particularly useful for dealing with a language like Tiv, which, I am informed by David Arnott [personal communication] has many words which condition downstep either before them (i.e., on their first syllable) or after them or both.

The various possible positions of a 'downstep' phenomenon before, after, or within a word, combined with the obvious origin of downstep in a language like Bambara, suggests that the origin of most if not all downsteps in these languages is a deleted or assimilated low tone. We may then consider that such low tones are still present at the systematic phonemic level. At this level, then, such languages are simple register tone languages, possessing a low-level P-rule for terracing.

4. Yoruba as a terraced-level language

Yoruba, with all its phonetic complications and its three independent tonemes, is no exception to the last statement. Apparently the phonetic complications of Yoruba tone have obscured the underlying simplicity of

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[2] Welmers [again, personal communication] tells me that F. D. D. Winston first put forth this analysis in a 1960 article called "The 'Mid Tone' in Efik", in African Language Studies 1, 185-192. Welmers' own most recent discussion of tonal systems will soon be available in his African Language Structures (forthcoming from the University of California Press).

the system for many years now; it would seem to be a case of not being able to see the forest for the trees. Many linguists have seen clearly different aspects of the problem; it remains to tie them together.

As previously mentioned, David Olmsted [1951], apparently basing his analysis on phonetics alone without any extensive knowledge of Yoruba syntax, concluded that there were nine tonemes in the language. He includes tonal clusters (though he missed some) and what I am calling allotones; and, as Siertsema [1959:44] points out, disregards crucial junctures. Most other linguists working on Yoruba since have recognized the allophonic status of such tones as the 'second mid tone' which is the automatic exponent of mid immediately following low; 'rising' tone, which is high following low; and 'falling' tone, which is low following high. Ida Ward [1952:29-41] wrote a particularly detailed and careful explanation of both the phonetic facts and her suggestions as to their interpretation. She was to my knowledge the first to mention the 'lowered' or 'second' mid tone in print; even Abraham [1958] often missed this tone in his otherwise impressively tonally accurate dictionary. Abraham was, however, apparently working with a dialect which does not have the sort of tonal contraction which makes this tone most obvious. Examples of this sort of contraction in my informants' dialect follow:

(17) ní 'have' + awo 'secret' ⟶ láwo

(18) ní 'have' + àwo 'plate' ⟶ láwò

The (ˈ) symbol in the second contraction indicates the 'lowered' or 'second' mid tone. In the dialect dealt with by Abraham, only assimilation of the vowel, not deletion of the low tone, takes place in the second case:

(19) láwo   versus   láàwo

In such a situation, the pitch of the mid tone is of course much less significant.

Autonomous phonemicists would have little trouble reducing Yoruba to a three-tone system if it were the case that a non-contracted form in slower or more formal speech always existed side by side with its contraction. A quotation from Stevick [1965:91] will show that this is not in fact the case:

> "...one concludes that three morphotonemes and a set of rules are not adequate to deal with present-day Yoruba, because some of the most frequent and best documented words in the language no longer occur unabbreviated: látí (high, lowered mid) must certainly be from */ní àti/."

In a generative phonology, a contraction rule which is usually optional and stylistic must be marked in the lexicon as obligatory for such words.

The same problem is to be found in the case of high versus rising tone:

(20)   rí   'see'   +   ilán   'fire'   --→   rílán

(21)   rí   'see'   +   ìlán   'type of beetle'   --→   rílǎn

The (˘) in the second contraction indicates lowered rising tone.

Some such contractions, again, no longer have corresponding uncontracted forms: e.g.:

(22)   jókŏ   (verb-plus-noun combination)

       'sit down'

This can be listed in the lexicon as:

(23)   [V [VR jó]VR [NOUN ìkó] NOUN]V

with obligatory contraction.

The similarity of origin and behavior of lowered-mid and rising tones has led linguists to consider them together as simply the different exponents of mid and high tone after low, like the falling tone

which is the exponent of low after high. This grouping together of lowered mid and rising tone has obscured the fact that there are actually two separate processes going on to produce a 'rising' tone, and has prevented the recognition of Yoruba as a true 'terraced-level' language. Bamgboṣe [1966:2] has taken a step in the right direction in calling the rising glide a 'low-rising' tone, since it certainly does not end at the level of a preceding high; but he does not go on to the logical extension that the lowered pitch as well as the motion of this tone is significant. The tonal system of Yoruba will be clarified considerably if it is recognized that the phonetic lowering (or terracing) of both the high and the mid tones is one process. A second process occurs which changes an extreme (i.e., high or low) tone into a glide whenever it is immediately preceded by the opposite extreme tone.

Thus the terracing is simple and obvious when only <u>mid</u> tones following lows are involved:

(24)   ɛyìn kèrìn
       egg   fourth
       '(the) fourth egg'

This can be diagrammed as:

(25)   _____
    5 _____
    4   ɛyìn_____
    3   kè_____
    2   rìn____
    I _____

This utterance comes from forms given in the lexicon as   ɛyìn   and ṼkV + ɛ̀rìn 'four'. (Kèrìn is one of many adjectives which have a corresponding noun beginning with a vowel; I am deriving the former from the latter. An ordinal numeral like ɛ̀kɛrìn is derived by contracting ṼkV (with unspecified vowels to be assimilated) with the counting form of a numeral, here ɛ̀rìn.)

Diagram showing the original low tones:

(26)

| 5		
4	ɛyìn	
3	kɛ́	
2	ɛ̀	rìn
1		ɛ̀
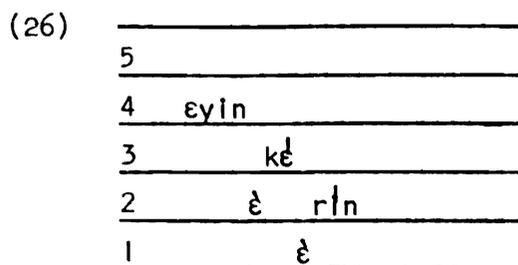
However, when high tones are involved, the glides obscure the terracing process. I shall illustrate with a sentence taken through first the terracing and then the gliding in separate steps:
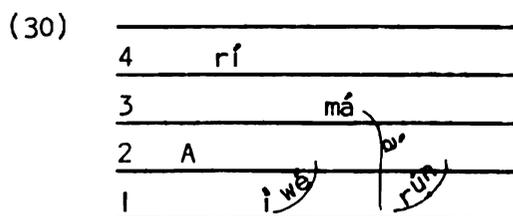
(27)   A rí ìwé máàrún

       'We saw five books.'

(Systematic phonemic level as far as the tones are concerned:)

(28)

3		rí	wé	má	rún
2	A				
1		ì		à	
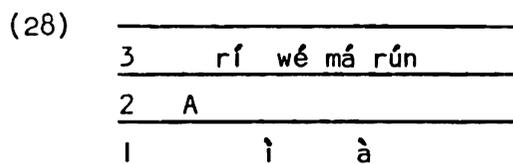
Here there are three and only three tonemes. The next step is the terracing:

(29)

4		rí		
3			wé má	
2	A			rún
1		ì		à

Now the glides:

(30)

4		rí	
3			má
2	A		
1		ì wé	rún
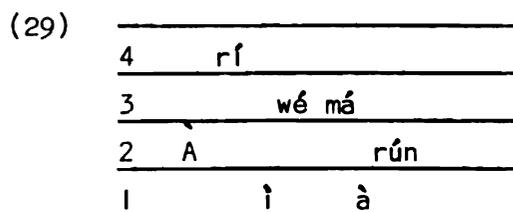
If the rules deriving glides from extreme tones did not exist, Yoruba would be an obvious three-toned terraced-level language. (It might also be an almost unintelligible one.) It will be revealing to look at a Yoruba sentence containing all three tones when it is at the stage following the terracing but preceding the gliding rules:

(31)   A   rí   ꜜwé   ꜜyɛn àtì ɔ̀bɛ èyí

        We found book that and knife this

        'We found that book and this knife.'

Diagram of tones at the systematic phonemic level:

(32)

3		rí	wé				yí	
2	A			yɛn	tì	bɛ		
1				ì	ì	à	ɔ̀	è

Following terracing but preceding gliding:

(33)

7		rí				
6	A	wé				
5						
4			yɛn			
3				tì		
2					bɛ	yí
1		ì	ì	à	ɔ̀	è

Thomas Peterson [1967] has stated that a downstepping rule in a terraced-level language must appear early in the set of ordered phonological rules. If this were the case, it would be necessary to apply such a rule cyclically, starting from the innermost brackets and proceeding outward, in the manner of application of the transformational cycle of English stress rules (see Chomsky and Halle [1968]).

At least for Yoruba, and probably for all terraced-level languages, such a cycle is unnecessary and in fact unworkable. The terracing rules of Yoruba apply across all boundaries within a breath group, and appear very late in the phonological rules.

It is necessary only to have a formal device which will allow dele-
tion of vowels at various stages in the P-rules without also deleting
the tones of these vowels, which must be retained until after the
terracing rules have applied. Such a device was developed by Fromkin
(see Schachter and Fromkin [1968]) for Akan; it applies equally well
to Yoruba.

When the segmental features of a vowel are deleted by a P-rule, the
tone of the vowel remains, carried by a symbol ∅. At the end of the
P-rules, the terracing rules apply; and only then are all tones of
segments without non-tonal features deleted. The glide rules must
apply after the deletion of ∅ -- so that, for instance, a high tone in
a sequence L M H where the mid tone is deleted will become rising now
that it directly follows the low.

For an example, let us take the phrase Ìn ìgbà èwo 'at what
time?'. The segmental features of the first vowel of both nouns
(ìgbà 'time' and èwo 'which one?') are deleted by regular P-rules.

(34)   Underlying form   Ìn ìgbà èwo
        after P-rules   Ìn ∅̀gbà ∅̀wo
        after terracing rules   Ìn ∅̀gbà ∅̀wó
        after ∅-deletion rule   Ìn gbà wó
        after glide rules   Ìn gbâ wó

The tonal diagrams given previously were simplified for the sake of
clarity. Low tones actually terrace also; the following Terracing Rules
will give a better idea of the actual phonetic pitches. (I am indebted
to Victoria Fromkin for devising the numerical table.)

(35)   Terracing Rules: Rules apply from left to right, with + or -
        integers added to immediately preceding tone.

        Tone --> n after Pause
        H --> +6 / L _____
               +3 / M _____
                0 / H _____

$$L \longrightarrow \begin{array}{l} -8 \ / \ H \ \underline{\quad} \\ -4 \ / \ M \ \underline{\quad} \\ 0 \ / \ L \ \underline{\quad} \end{array}$$

$$M \longrightarrow \begin{array}{l} +3 \ / \ L \ \underline{\quad} \\ -3 \ / \ H \ \underline{\quad} \\ 0 \ / \ M \ \underline{\quad} \end{array}$$

(36)   Ø-Deletion Rule:

$$\begin{bmatrix} -F \\ +segment \end{bmatrix} \longrightarrow \begin{bmatrix} -segment \\ -tone \end{bmatrix}$$

(37)   Glide Rules:

$$H \longrightarrow L\text{-}H \ glide \ / \ L \ \underline{\quad}$$
$$L \longrightarrow H\text{-}L \ glide \ / \ H \ \underline{\quad}$$

Yoruba, then is an orthodox if three-toned 'terraced-level' language -- that is, a discrete-level or register tone language with phonetic rules for downstepping. Its gliding rules and other idiosyncracies need not obscure the basic structure.

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