

TONE SYSTEM TYPOLOGY AND DISTINCTIVE FEATURES

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Pike's typological division of tone systems into "register" and "contour" types (1948: 5) was refined by Welmers (1959) who pointed to the difference between register types where the tones maintain discrete levels and those which display a downward stepping of tones named terracing. Tonal systems of African language appear to be mainly of the register type. Those which were thought to contain contour tones generally on re-scrutiny have turned out to be analysable in terms of level tones when the correct number of segments is recognised or the pattern of conditioned variation is considered (cf Siertsema 1959, George 1970). Typological classification of tone systems of African languages has therefore centred recently on identifying the correct number of levels involved and stating the presence or absence of terracing. Thus Hausa, Yakurr and Margi have a two-level system with no terracing. Efik, Igbo and Akan have two-level systems with terracing; Yoruba, Jukun, Ogoja Yala, and Nupe are among those with three levels and no terracing, whilst Ikom Yala is an example of a 3-level system with terracing. Such assignments are the main concern of Meeussen's recent article on "Tone Typologies for West African Languages" (1970).

The presence or absence of terracing is a question of the presence or absence of certain rules in the phonological component of a grammar which affect the phonetic output (Williamson 1970). The downstep produced by these rules does not feature in underlying forms as these can be stated in such a way as to enable the occurrence of downstep to be predicted. In this light Hausa and Akan, Yakurr and Efik all have two-level systems; Yoruba and Ikom Yala alike have three-level systems. Such a statement, however, obscures a very important difference which may exist between tonal systems with the same number of tone levels. This difference concerns the arrangement of the tones in a hierarchy of dominance. The dominance of one tone over another can be most easily seen in the case of the contraction across a word-boundary of two adjacent syllables with different tones. The surviving tone of the contracted syllable can be said to have dominated the other. Such contractions are usually best viewed as subsequent to an assimilation producing two identical adjacent segments which then contract. Care must be taken to ensure that the changes observed are genuinely assimilatory and are not the result of a change in the paradigm of the

words involved, or that the relevant construction is not one which involves an element with no other segmental features apart from pitch.

In the Idoma-Yala group where there are three tone levels the construction Verb + Object Noun shows a series of assimilatory changes free of the complications mentioned above. Bunkowske (1972) has identified the rules which govern these assimilations in Ogoja Yala. A low tone after the boundary is assimilated upwards towards a higher tone before the boundary, but does not go higher than the tone on the next syllable following. A mid or a low tone before the boundary is assimilated upwards to a higher tone on the syllable after the boundary. If these two rules produce identity of tones before and after the boundary the two syllables contract into one; if not, a glide is produced.

High tone dominates over mid tone in the following contraction:

$M \# H \rightarrow H$ e.g., *wā áchí* → *wāchí* 'tie grass'

Mid tone dominates over low in the following contractions where the *second* tone after the boundary (in parentheses) must also be considered:

$M \# L (H \text{ or } M) \rightarrow M (H \text{ or } M)$ e.g., *bī òchí* → *bóchí* 'carry stick'

$L \# M (H \text{ or } M) \rightarrow M (H \text{ or } M)$ e.g., *dè ɔ́pá* → *dǎpá* 'give cloth'

High also dominates over low tone, as in the sequences:

$H \# L (H) \rightarrow H (H)$ e.g., *má òchí* → *mòchí* 'see tree'

$L \# H \rightarrow H$ e.g., *dè áchí* → *dáchí* 'give grass'

and in the sequence:

$H \# L (M) \rightarrow HM (M)$ e.g., *má ìhí* → *míhí* 'see yams'

where the low tone is prevented from rising higher than mid by the mid tone which follows it. In no case does a lower tone dominate over a higher one. There is clearly a hierarchy of dominance thus:— High above mid above low.

Compare the situation in Wukari Jukun (Shimizu 1970), another language with three tones and no terracing. In the same verb-nominal construction, high tone dominates mid in the sequence:

$H \# M \rightarrow H$ e.g., *kí átā* → *kítā* 'in house'

No other verbs except *kí* 'to be at' have high tone but the same contractions can be seen in other constructions. Low tone also dominates mid, as in the sequences:

$L \# M \rightarrow L$ e.g., *dù āyō* → *dùyō* 'get mother'

$M \# L \rightarrow L$ e.g., *bā àswē* → *bàswē* 'have guinea fowl'

Except in these cases no tonal assimilation takes place so the overall situation is that both high and low dominate mid, whilst neither high nor low exercises dominance over the other. The tones may be ranked:—High and low above mid.

A third situation exists in Yoruba. Because of a morpheme structure condition which does not permit high tone on noun 'prefixes' and a tone change rule which raises a low tone verb to mid when an object follows, only four of the nine possible sequences of the three tones occur in the Verb + Object Noun construction. The combinations that do occur show the following:

High tone dominates mid tone in the sequence:

$H \# M \rightarrow H$ e.g., *fě ēyìn* → *fěyìn* 'like eggs'

Low tone also dominates mid tone, in the sequence:

$M \# L \rightarrow L$ e.g., *jě ògèdè* → *jògèdè* 'eat plantain'

Both of the other tones thus dominate mid. There is a domination of low by high in the contraction:

$H \# L \rightarrow H$ e.g., *fě èbà* → *fěbà* 'like cassava'

which suggests a hierarchy of tones as follows:— High above low above mid.

In the languages considered here both lexical counts and counts of running texts show that the commonest underlying tone is the one at the bottom of the hierarchy of dominance. This suggests that this hierarchically-lowest tone is the unmarked tone level. Thus in Ogoja Yala, low is the unmarked term, mid is marked and high is doubly marked. In Jukun high and low are equally marked, whilst mid is unmarked. In Yoruba mid is unmarked, low is marked, and high is doubly marked. Now the variation in which is the marked tone may appear to create a difficulty if universal assumptions about markedness are desired. It is the contention of this paper that no difficulty arises if the correct set of phonological features for the description of pitch is selected and such differences are viewed as differences arising from selection among a set of resultant 'universal tones'.

The establishment of this inventory of pitch features is discussed in Maddieson (1970b) and will not be re-examined here. The features are [Raised], [Lowered] and [Extreme]. The plus value of [Raised] is 'pitch above a median level', of [Lowered] 'pitch below a median level' and of [Extreme] 'pitch extended towards the extremes of the voice range'. The pitch levels describable in terms of this inventory are five in number and these constitute the set of 'universal tones' from which languages may select. We may display the possible co-occurrences of the values for the three pitch features in the matrix shown in Table 1.

TABLE 1

	Mid	High	Low	Extra High	Extra Low
Raised	u	m	u	m	u
Lowered	u	u	m	u	m
Extreme	u	u	u	m	m

The labels at the head of the columns of this matrix are useful mnemonic labels which indicate relative pitch levels. 'Mid' is the label for the unmarked term.

Schachter, in his important article on 'Natural Assimilation Rules in Akan' (1969), has shown how the asymmetry of a terraced-level tone system with two basic tones can be explained with the help of the generalisation that "Unmarked feature values assimilate to adjacent marked feature values, rather than conversely". Given an overall intonational downdrift of tones following those of opposite value the three-way contrast after a high tone arises because low tones are in some cases assimilated and absorbed by adjacent high tones whereas the converse (high assimilated by low) does not occur. Thus the intonational downdrift is found after a high tone instead of after the expected low. The cases examined in this paper confirm Schachter's generalisation. The explanation of variations is to be made in terms of differing selections from among the five universal tones of the matrix. Two-level systems may employ 'Mid' and 'High' such as Akan, or 'Mid' and 'Low' such as Hausa. The Ogoja Yala tones are universal 'Extra High' 'High' and 'Mid' whilst Jukun and Yoruba employ a different selection. Four-level languages discard one of the levels — in the case of Igede this is 'Extra Low, (Bergman 1971). These selections are displayed in Table 2, using the customary labels for tones based solely on relative pitch height.

TABLE 2

	Akan	Hausa	Ogoja Yala	Jukun	Yoruba	Igede
Extra High	—	—	High	—	High	Top
High	High	—	Mid	High	—	High
Mid	Low	High	Low	Mid	Mid	Mid
Low	—	Low	—	Low	Low	Low
Extra Low	—	—	—	—	—	—

In typing tone systems not only the number of tone levels but also their relative degrees of markedness must be analysed. This realisation simplifies the statement of assimilatory changes and is required for proper and natural explanation of them. It further promises to be very suggestive in the analysis of the historical evolution of tone systems and the explanation of dialectal variation in the number of tones kept distinct.

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REFERENCES

- Bergman, R.
1971 "Vowel Sandhi and Word Division in Igede", *Journal of West African Languages* 8:13-25.
- Bunkowske, E.W.
1972 "Eliding Boundaries in Ogoja Yala", in Maddieson I, ed., *Assimilation Elision in West African Languages (= Research Notes 5)* (Ibadan, Nigeria).
- George, I.
1970 "Nupe Tonology", *Studies in African Linguistics* 1:100-122.
- Maddieson, I.
1970a ed. *Tone in Generative Phonology (= Research Notes 3. 2-3)* (Ibadan, Nigeria, Department of Linguistics and Nigerian Languages, University of Ibadan).
1970b "The Inventory of Features required for handling Tone in Transformational Phonology" in *Tone in Generative Phonology (= Research Notes 3.2-3)* (Ibadan).
1972 ed. *Assimilation-Elision in West African Languages (= Research Notes 5)* (Ibadan, Nigeria, Department of Linguistics and Nigerian Languages, University of Ibadan).
- Meeussen, A.E.
1970 "Tone Typologies for West African Languages", *African Language Studies* 11:266-271.
- Pike, K.L.
1948 *Tone Languages* (Ann Arbor, University of Michigan Press).
- Shimizu, K.
1970 "Contraction of Tones and Inherent Gliding Tones", in *Tone in Generative Phonology*, Maddieson, I., ed. (= *Research Notes 3.2-3*) (Ibadan, Nigeria).
- Siertsema, B.
1959 "Long Vowels in a Tone Language", *Lingua* 8:42-64.
- Welmers, W.
1959 "Tonemics, Morphotonemics, and Tonal Morphemes", *General Linguistics* 4:1-9.
- Williamson, K.
1970 "The Generative Treatment of Downstep", in *Tone in Generative Phonology*, Maddieson, I., ed. (= *Research Notes 3.2-3*) (Ibadan, Nigeria).