

TOONE-VOWEL HEIGHT CORRELATION AND TONE ASSIGNMENT
IN THE PATTERNS OF VERB AND NOUN PLURALS IN HAUSA¹

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0. The purpose of this paper is twofold: (a) to formulate a set of rules which determine the assignment of tones in the patterns of verb and noun plurals; and (b) to discuss the relationship between the tone of the final vowel and the degree of the vowel height, in other words, the relationship between the suprasegmental and segmental features in the final syllable of verb and noun plurals in Hausa.

It will be shown in particular that the height of the tone on the final syllable corresponds with the phonetic quality of the vowel. At the same time the quality of this final vowel together with the corresponding tone determine the presence or absence of tonal contrast or tone spreading in the patterns of verb and noun plurals in Hausa.

0.1. I have chosen [+H] and [-H] symbols to indicate the pitch height; [+H] for a high tone, [-H] for a low tone. Throughout this paper the marks ' and ` are used to designate high and low tones respectively. As syllables are juxtaposed in speech the tones of a word could be the same, e.g. háalíi 'character', or could be different, e.g. dóokìi 'horse'; in this case a tonal contrast is present in the pattern. The tonal contrast is shown by a connecting line: \lrcorner for a high-low tone sequence, and \llcorner for a low-high tone sequence.

0.2. The rules proposed in this paper are based on high, mid, rounded distinctive features for vowels:

	<u>i</u>	<u>e</u>	<u>a</u>	<u>o</u>	<u>u</u>
high	+	+	-	+	+
mid	-	+	-	+	-
rounded	-	-	-	+	+

¹The work on this paper was completed in the Phonology Laboratory at the Department of Linguistics, University of California, Berkeley. I wish to express my gratitude to Professor William S-Y. Wang who made the facilities of the laboratory available for this research, encouraged me in my work and commented on the original version of it. I am also indebted to Mr. Robert Kroner for his patience and kind help in the use of the Linc-8 computer, hardware Pitch Extractor, by means of which this study became implemented.

0.2.1. I find it useful to divide all Hausa vowels into [+high] and [-high]. I wish to stress that I am introducing this division solely for the needs of this paper. While [+high] vowels can be subdivided into [+mid] /e,o/ and [-mid] /i,u/ vowels, the feature [-high] can be attributed to the vowel /a/ only.

0.2.2. The feature [mid] is opposed to other more "extreme" vowel heights like 'pure' high and [-high] vowels. In addition the feature [mid] in correlation with the feature [rounded] is responsible for the tone spreading in the pattern.

0.2.3. The feature [rounded] was chosen to differentiate both the [+high, -mid] vowels and [+mid] vowels. The [+high, -mid] vowels are [+rounded] /u/ and [-rounded] /i/. As final vowels at the suprasegmental level they function in the same way: both have [+H] tone. At the segmental level, however, [-rounded] /i/ palatalizes certain preceding consonants, while [+rounded]/u/ labializes them.

Appearing as final [+mid] vowels, [+rounded] /o/ and [-rounded] /e/ function differently at both levels. At the segmental level the [-rounded] /e/ palatalizes certain preceding consonants; the [+rounded] /o/ labializes them. At the suprasegmental level they differ again. The [-rounded] /e/ behaves as a "pure" [+high] vowel: it appears with the [+H] tone, and causes the tonal contrast in the pattern just as the other "extreme" ([-mid]) vowels do. The [+mid, +rounded] vowel /o/ causes the tone to spread within the pattern. From this point of view the [+mid, +rounded] vowel /o/ differs from all other vowels.

0.3. The symbol [S] is used to represent any possible kind of syllable: with short vowel CV, with long vowel CVV, or closed syllable CVC. It should be noticed that every syllable in Hausa begins with a consonant.

Since I am discussing in this paper the correlation of the tone and vowel height it seems to be appropriate to combine the suprasegmental and segmental features into a single matrix: suprasegmental features are written with capital letters, segmental features with lower-case ones.

1. The verb

1.0. To exemplify the rules and above mentioned correlations the following paradigm of endings and tone patterns of monosyllabic, bisyllabic, trisyllabic, and quadrisyllabic verbs in all Grades (1-7) and Forms (A,B,C) has been composed:²

Grade	1	2	3	4	5	6	7
endings	-aa	-aa/-ii	-a	-ee	-ar	-oo	-u
1 syl.		-		-		-	
2 syl.							
3 syl.							
4 syl.							
endings	-aa	-ee/-ii		-ee	-ar+da	-oo	
1 syl.							
2 syl.							
3 syl.							
4 syl.							
endings	-a	-i		-e	-ar+da	-oo	
1 syl.		-					
2 syl.							
3 syl.							
4 syl.							

²The term Grade was introduced in Parsons [1960:29] for "two or more morphologically distinct forms which occur only in complementary distribution to one another and represent but a single lexical item." Concerning Forms he writes (Parsons [1960:22-23]): "all transitive verbs in Hausa are characterized by having three potentially distinct forms with following

1.0.1. The tones of object pronouns are designated in the paradigm by a crossed circle. As to the "person-aspect indicator" it plays no role in the assignment of tones in the pattern of the verb. Therefore though it is always required before the verb, it is not included in the paradigm. This absence of a "person-aspect indicator" should not be confused, however, with the verb in imperative.³

The case of the intensive form although not distinguished separately in the paradigm, is considered in the rule 3.

1.0.2. Eight rules for the tone assignment in the patterns of the verb are derived from the above shown paradigm:

(1) High tone rule:

$$S \rightarrow \begin{bmatrix} S \\ +H \end{bmatrix} / \# \text{ ____ } \#$$

(2) Progressive tonal contrast rule:

$$\begin{bmatrix} S_{2/3} \\ -high \end{bmatrix} \rightarrow \begin{bmatrix} S \\ -\alpha H \end{bmatrix} / \begin{bmatrix} S_{1/2} \\ \alpha H \end{bmatrix} \text{ ____ } \# \text{ -object}$$

(3) Tone repetition rule:

$$S \rightarrow \begin{bmatrix} S \\ \alpha H \end{bmatrix} / \text{ ____ } \begin{bmatrix} S \\ \alpha H \end{bmatrix} S \begin{bmatrix} S \\ -high \end{bmatrix} \#$$

(4) Tone-vowel height correlation rule:

$$\begin{bmatrix} S \\ +high \end{bmatrix} \rightarrow \begin{bmatrix} S \\ +H \end{bmatrix} / \text{ ____ } \#$$

distribution: Form A, used whenever there is no object word, Form B, used whenever there is a pronominal object following, Form C, used whenever there is a nominal object following immediately after the verb."

³The tone pattern of the verbs in imperative is low-high for bisyllabic verbs, and low-low-high for trisyllabic verbs in all Grades and Forms with exceptions of Grade 1, Form C and Grade 2, Form B which have all tones low. The imperative will not be discussed further in this paper.

(5) Regressive tonal contrast rule:

(a) $S \rightarrow \begin{bmatrix} S \\ -H \end{bmatrix} / \text{---} \begin{bmatrix} S \\ +H \\ +high \end{bmatrix} \#$

(b) $S \rightarrow \begin{bmatrix} S \\ +H \end{bmatrix} / \text{---} \begin{bmatrix} S:CVC \\ \text{---} \end{bmatrix} \# + \begin{bmatrix} da \\ -H \end{bmatrix}$

(6) Tone spreading rule:

$$S \rightarrow \begin{bmatrix} S \\ +H \\ +\text{"down-} \\ \text{step"} \end{bmatrix} / \text{---} \begin{bmatrix} S \\ +high \\ +mid \\ +round \\ +H \\ +\text{"down-} \\ \text{step"} \end{bmatrix} \#$$

(7) Tone lowering of [-high] vowel before a noun object:

$$\begin{bmatrix} S \\ -high \end{bmatrix} \rightarrow \begin{bmatrix} S \\ -H \end{bmatrix} / \text{---} \# +\text{noun object}$$

(8) Object pronoun rule:

$$\text{object pronoun} \rightarrow [-\alpha H] / \begin{bmatrix} S \\ \alpha high \end{bmatrix} \# \text{---}$$

1.1. High tone rule.

(1) $S \rightarrow \begin{bmatrix} S \\ +H \end{bmatrix} / \# \text{---} \#$

Rule (1) places a high tone on every one-tone pattern verb. This rule applies to all monosyllabic verbs with a one-tone pattern. It also contains the statement restricting the occurrence of the low tone in the one-tone pattern verb: the low tone never occurs in a one-tone pattern verb used with a "person-aspect indicator".

1.2. Progressive tonal contrast rule.

(2) $\begin{bmatrix} S_{2/3} \\ -high \end{bmatrix} \rightarrow \begin{bmatrix} S \\ -\alpha H \end{bmatrix} / \begin{bmatrix} S_{1/2} \\ \alpha H \end{bmatrix} \text{---} \# -\text{object}$

Rule (2) states that with the final vowel [-high] (and without an object) the successive syllables of the bisyllabic and trisyllabic verbs

should be tonally contrasted. Thus:

Grade 1 bisyllabic verb has the pattern	+H	-H		
Grade 1 trisyllabic verb has the pattern	+H	-H	+H	
Grade 2 bisyllabic verb has the pattern	-H	+H		
Grade 2 trisyllabic verb has the pattern	-H	+H	-H	
Grade 3 bisyllabic verb has the pattern	-H	+H		
Grade 3 trisyllabic verb has the pattern	-H	+H	-H	

Two possibilities are exemplified here: (1) the pattern begins with a high tone while the following second tone is low (Grade 1 pattern); (2) the pattern begins with a low tone while the second tone is high (Grade 2 and Grade 3 patterns). In trisyllabic verbs the third syllable is contrasted with the second one. In this way, the pattern of trisyllabic verb begins and ends with the same tone, high or low, according to its Grade. The tonal contrast has a progressive direction. The rule of tonal contrast has a progressive direction. The rule of tonal contrast is obligatory, and characterizes the patterns of Basic Grades (Grades 1, 2, 3) in Form A (without an object).

1.3. Tone repetition rule.

$$(3) \quad S \rightarrow \begin{bmatrix} S \\ \alpha H \end{bmatrix} / \text{---} \begin{bmatrix} S \\ \alpha H \end{bmatrix} S \begin{bmatrix} S \\ \text{-high} \end{bmatrix} \#$$

Rule (3) assigns the same tone to the first and second syllables of a quadrisyllabic verb with the [-high] final vowel. The repetition of the tone at the beginning of the pattern with the following contrast of successive syllables demonstrates either that the verb is more than trisyllabic or indicates an intensive form of a trisyllabic verb. In each case the verb has an extended pattern. Thus the pattern of more than trisyllabic verb has to be regarded as extended. An extended pattern begins and ends with the same tone, high or low, e.g. *rágárgàzáa* [$\text{---}\text{---}\text{---}\text{---}$] 'to shatter', Grade 1, *dùrgùrgúzàa* [$\text{---}\text{---}\text{---}\text{---}$] 'to eat much of', Grade 2 verb. Considering the tonal structure, the quadrisyllabic verb and the intensive form of trisyllabic verb have the same four-tone pattern, and the same tone

tone of other [+high] final vowels is about 125-135 Hz.⁵ This indicates that the pitch range of the [+H] tone in verbs with the final vowel /c/ is somewhat lower than the [+H] tone in verbs with any other final [+high] vowel. In cases of [+high, +mid, +rounded] vowel /o/ the [+H] tone is influenced by [+mid, +rounded] quality of the vowel. This phenomenon can be regarded as a kind of "downstep" or "new-high". What happens here is an observable effect of vowel quality on the pitch: a correlation of high tone on [+high] vowel; [+H, +"downstep"] tone on the [+high, +mid, +rounded] vowel.

1.4.3. As to the pitch-vowel height correlation, the phenomenon itself is not unknown. In the Foochow dialect of Chinese, high tones morphophonemically raise vowels from low to mid and from mid to high (see Wang [1967]). Different explanations for this phenomenon existing in Foochow and in other languages are suggested. B. Mohr, who discusses the correlation between pitch and vowel height in a general framework, points out the following two tendencies in his explanation (Mohr [1969:23]):

- (a) "It has been assumed--and still is, for example, in Ladefoged [1964], Wang [1969 a, b], Lehiste [1969]--that the high tongue position of the high vowels raises the larynx since the tongue is attached to the superior part of hyoid bone, and some of the laryngeal muscles to the inferior part, and that this

acquires a four-tone pattern, with the Grade remaining unchanged. Compare: HL --> HLH (káamàa --> kákkàamàa); LH --> LHL (nèemàa --> nènneemàa); HLH --> HHLh; LHL --> LLHL.

⁵Examples: yáa zóo (110, 105 Hz.) 'he came'; mún zóo (105, 100 Hz.) 'we came'; sùkà zóo (140, 90, 110 Hz.) 'they came'; kíkà dáawóo (140, 90, 110, 80 Hz.) 'you (f.) came back'. In cases of nouns with the final vowel /o/ the pitch does not rise higher than 125 Hz., e.g. túuwóo (120, 120 Hz.) 'guinea-corn mush'; wàndóo (92, 120 Hz.) 'pants'; tsóofóo (125, 122 Hz.) 'old'. The exception in the analyzed material was the noun bángóo 'wall' with first syllable closed by nasal; it has 130, 123 Hz. With other [+high] final vowels the pitch on the nouns in isolation rises 130-145 Hz. Compare kííffí 'fish' 146, 137 Hz. Thus the "downstepping" phenomenon takes place both in the patterns of the verb and of the noun in Hausa. The range 80-205 Hz. was employed by a speaker from Dogondoutsi, Niger.

elevated larynx position which stretches these laryngeal muscles is directly responsible for the increased tension of the vocal folds and the increased rate of vibration.

- (b) "Another explanation suggested in House and Fairbanks [1953] is based on the hypothesis that tensions in the tongue musculature during the production of high vowels when the tongue is relatively far away from its neutral position, are conveyed to the laryngeal musculature which in turn controls vocal folds tension. The relative closeness to the neutral position of the tongue during the production of low vowels would allow for a fairly low degree of muscle tension, thus allowing for a smaller degree of vocal fold tension and lower pitch."

In conclusion Mohr [1969:32] expresses an opinion that what has to be assumed is "an as yet unspecified correlation between tongue height and rate of vocal fold vibration to account for the intrinsic pitch levels of vowels."

I would not like to prolong this outline on the diverse approaches to the pitch-vowel height correlation any longer. There is no doubt that suprasegmental and segmental features are interdependent in some languages. Hausa is the case where this phenomenon evidently appears in a peculiar manifestation. To my knowledge in the literature of the subject this problem has not been posed until now. I think that its study can greatly contribute to the better understanding of the entire Hausa tone system.

1.5. Regressive tonal contrast rule.

$$(5a) \quad S \rightarrow \begin{bmatrix} S \\ -L \end{bmatrix} / \text{---} \text{---} \begin{bmatrix} S \\ +H \\ +\text{high} \end{bmatrix} \#$$

Rule (5a) states that tones of non-final syllables are contrasted with the tone of the final [+high, +H] syllable. This rule assigns a low tone to all but the final syllable of the verb. In this case the tonal contrast is regressive. (See examples of rule 4.)

It should be noticed, however, that this rule does not apply to Grade 4 verbs. The reason is that Grade 4 verbs do not exhibit their own tone pattern. Instead they utilize the pattern of Grade 1 verbs.

$$(5b) \quad S \rightarrow \left[\begin{array}{c} S \\ +H \end{array} \right] / \text{---} \text{---} [S:CVC] \# + \left[\begin{array}{c} \text{da} \\ -H \end{array} \right]$$

The regressive tonal contrast rule in (5b) applies to verbs in Grade 5. It assigns [+H] tone to every syllable of the verb with final closed syllable. The tones of the verb are contrasted with the tone of the particle *dà* commonly used with verbs in Grade 5, e.g. *náa sánád dà shíi* 'I informed him', *náa sánád dà Sani* 'I informed Sani'.

1.6. Tone spreading rule.

$$(6) \quad S \rightarrow \left[\begin{array}{c} S \\ +H \\ +\text{"down-"} \\ \text{step"} \end{array} \right] / \text{---} \text{---} \left[\begin{array}{c} S \\ +\text{high} \\ +\text{mid} \\ +\text{round} \\ +H \\ +\text{"down-"} \\ \text{step"} \end{array} \right] \#$$

Rule (6) applies to verbs in Grade 6. It states that the tone of word-final [+high, +mid, +rounded] vowel /o/ spreads all over other preceding syllables. In other words, the "downstepped" high tone of the final "non-extreme" vowel conditions the tones of all other syllables. The tone spreading has a regressive direction. Thus the rule contains a restriction concerning the occurrence of tonal contrast in the pattern with "non-extreme" [+mid, +rounded] vowel.

The term "extreme" in this paper specifies that the pitch level is either far above or below some idealized pitch median, the [-mid] is the case of such vowels. For the feature "extreme" I here utilized Wang's definition of the feature "high" (Wang [1967]).

The rule of tonal contrast (5a) does not operate with final [+mid, +rounded] vowel /o/. It pertains only to cases with "extreme" vowels in the final syllable (see also pp.). From this point of view, the [+high, +mid] but [+rounded] vowel /o/ differs from that of [+high, +mid] but [-rounded] vowel /e/. The latter functions as "extreme" vowel.

1.7. Tone lowering of [-high] vowel before a noun object.

$$(7) \quad \begin{bmatrix} \text{S} \\ \text{-high} \end{bmatrix} \rightarrow \begin{bmatrix} \text{S} \\ \text{-H} \end{bmatrix} / \text{ ______ } \# \text{ +noun object}$$

Rule (7) states that before a noun object the [-H] tone is attributed to the final [-high] vowel of the verb. Here again an evident correspondence between the tone and vowel height appears. It occurs before a noun object and in this case the low tone and the shortening of the vowel in the final syllable of the verb are simultaneous. Compare *yáa dánkàrà táabàa* (Form C) 'he pressed tobacco down', *yáa dánkàráa shí* (Form B) 'he pressed it down'.

It should be noticed that the same high-low-low pattern before a noun object is commonly attested for Grade 4 verbs, e.g. *dóokli yáa dáùkè káfàa* 'the horse is lame'. In this case the Grade 4 utilizes the pattern of Grade 1. But Grade 4 verbs can also have high-low-high pattern before a noun object thus showing the tendency to keep the same pattern in all Forms as other Secondary and Tertiary Grades. Examples: *yáa dáùkéé hánkàlínsù* 'he hoodwinked them' (Abraham [1962:202]); *án kúràashée rúuwáa dàgà ràndáa* 'the dregs of the water were removed from the pot' (Pilszczikowa [1969:16,78]). On high-low-high pattern see more in Parsons [1971/72:53-54].

1.8. Object pronoun rule.

$$(8) \quad \text{object pronoun} \rightarrow [-\alpha H] / \begin{bmatrix} \text{S} \\ \alpha \text{high} \end{bmatrix} \# \text{ ______ }$$

Rule (8) attributes the tone contrasting the degree of final vowel height of the verb to the object pronoun. The high tone is attributed to the object pronoun used with the verb in Grade 1, e.g. *yáa káamàa shí* 'he seized him'; *yáa dánkàráa shí* 'he pressed it down'. In this case the final vowel of the verb is [-high]. In turn, the low tone is attributed to the object pronoun used with verbs in Grade 2 and Grade 6, e.g. *yáa hàrbée shì* 'he shot him'; *yáa tàràbáyée shì* 'he asked him' (Grade 2 verbs); *yáa káawóo shì* 'he brought it' (Grade 6 verb). The final vowels of the verbs in

Grade 2 and Grade 6 are [+high]. The contrast between the degree of final vowel height of the verb and the tone of the object pronoun is progressive.

1.8.2. In my opinion the object pronoun in Hausa has to be considered as a verb pronominal suffix in spite of the fact of its separate appearance in writing. According to Abraham [1959] and Wängler [1963] the main stress in Form B in case of trisyllabic verbs is shifted on the syllable before the object pronoun strongly binding the verb and its object pronoun.

It is obvious, and the paradigm on page 401 confirms it, that from the tonal analysis perspective there is no difference between the tone pattern of bisyllabic verbs with their object pronoun (Form B), and trisyllabic verbs of Basic Grades without an object (Form A). A bisyllabic verb with its object pronoun form a three-tone 'triangle' pattern. It is of interest to notice that the bisyllabic verbs in their intensive form have also a three-tone 'triangle' pattern. Hence the three-tone pattern with a 'triangle' shape appears in trisyllabic verbs (Form A), bisyllabic verb plus object pronoun (Form B), and bisyllabic verbs in their intensive form. Examples:

Grade 2 bisyllabic verb + object pronoun, yáa hàrbée shì

Grade 2 intensive form of bisyllabic verb, hàhàrbàa

Grade 2 trisyllabic verb (Form A), sàráutàa

The preceding discussion demonstrated that bisyllabic verbs have to be considered as of special interest here, therefore I would like to devote some more attention to them now.

2. Bisyllabic verb

2.0. Only four out of the eight rules defining the tone patterns of the verb pertain to the bisyllabic variety. These rules are: tone-vowel height correlation rule (4), regressive tonal contrast rule (5), regressive tone spreading rule (6), and object pronoun rule (8).

2.1. Tone-vowel height correlation rule. For bisyllabic verbs the rule is:

$$(9) \quad \begin{bmatrix} S \\ \text{ahigh} \end{bmatrix} \rightarrow \begin{bmatrix} S \\ \text{ah} \end{bmatrix} / \text{ ______ } \#$$

We see that in case of bisyllabic verbs the rule is applicable not only to the verbs with the [+high] final vowel, but also with [-high] and [+high, +mid] final vowels:

$$(9a) \quad \begin{bmatrix} S \\ \text{-high} \end{bmatrix} \rightarrow \begin{bmatrix} S \\ \text{-H} \end{bmatrix} / \text{ ______ } \#$$

Ex. yáa káamàa shí
'he seized him' (Grade 1 Form B)

$$(9b) \quad \begin{bmatrix} S \\ \text{+high} \end{bmatrix} \rightarrow \begin{bmatrix} S \\ \text{+H} \end{bmatrix} / \text{ ______ } \#$$

Ex. yáa nèemée tà
'he sought her in marriage' (Grade 2 Form B)
yáa nèemí máatáa
'he committed adultery' (Grade 2 Form C)
wátàa yáa kàamú
'the moon is in eclipse' (Grade 7)

$$(9c) \quad \begin{bmatrix} S \\ \text{+high} \\ \text{+mid} \\ \text{+round} \end{bmatrix} \rightarrow \begin{bmatrix} S \\ \text{+H} \\ \text{+"down-"} \\ \text{step"} \end{bmatrix} / \text{ ______ } \#$$

Ex. yáa dáawóo dàgà Māsàr
'he returned from Egypt' (Grade 6 Form A)

In all examples the tone corresponds with the degree of the vowel height: [+high] vowels have [+H] tone; the [-high] vowel /a/ has [-H] tone; and [+high, +mid, +rounded] vowel /o/ has a not-so-high [+H, +"downstep"] tone. Thus the phonetic quality and pitch level of the final vowel are correlated. As was noted before, the vowel /e/ behaves as "extreme" vowels do.

2.1.1. There are exceptions in application of this rule to bisyllabic verbs. The tone and vowel height are not correlated in Grade 2 (Form A), Grade 3 and Grade 4. The tone pattern of Grade 2 and Grade 3 is low-high, while the final vowel is [-high] /a/, e.g. nèemáa 'to

look for' (Grade 2 Form A); fìtá 'to go out' (Grade 3). The tone pattern of Grade 4 is high-low, while its final vowel is [+high] /e/, e.g. káamèe 'to take forcibly'. However, these exceptions do not change in any way the validity of the outlined rule: the low-high pattern of Grade 2 (Form A) and Grade 3 reveals a reverse order of the high-low pattern of Grade 1.⁶ Compare káamàa (grade 1), nèemáa (Grade 2 Form A--in other Forms the tones and vowel height are correlated). As to the Grade 4, it does not exhibit its own pattern and more often utilizes the pattern of Grade 1.

2.2. Regressive tonal contrast.

$$(10a) \quad S \rightarrow \begin{bmatrix} S \\ -aH \end{bmatrix} / \text{---} \begin{bmatrix} S \\ a\ddot{i} \\ -mid \end{bmatrix} \#$$

The rule for bisyllabic verbs in (10a) states that the tone of non-final syllable is contrasted with the tone of [-mid] vowel in the final syllable. Thus the tonal contrast pertains only to cases with "extreme" vowels in the final syllable. Examples:

Grade 1 Form B,	yáa káamàa shí	'he seized him'
Grade 2 Form B,	yáa nèemée tà	'he sought her in marriage'
Grade 2 Form C,	yáa nèemí máatáa	'he committed adultery'
Grade 7,	wátàa yáa kàamú	'the moon is in eclipse'

⁶It seems pertinent to note here that while Grade 1 verbs are used with both indirect and direct objects, Grade 2 verbs have a more restricted usage appearing with the direct object only. (See Pilszczikowa [1969:100-101]). Perhaps the reverse order of tones in the low-high pattern of Grade 2 verbs in comparison with the high-low pattern of the primary, fundamental Grade 1 could be explained as a reflection of this more specialized and more restricted usage of Grade 2 verbs. This topic still requires more research.

Two heights for mid vowels probably should be distinguished in Hausa: [+mid 1] for [+rounded] vowel /o/ and [+mid 2] for [-rounded] vowel /e/. The level of the [+mid 2] final vowel /e/ is sufficiently high to produce a tonal contrast only in cases when the final vowel is of "extreme" quality; the final vowel should be [+high] or [-high] or at least [+mid 2].

$$(10b) \quad S \rightarrow \begin{bmatrix} S \\ +H \end{bmatrix} / \text{---} \begin{bmatrix} S:CVC \\ \text{---} \end{bmatrix} \# + \begin{bmatrix} da \\ +H \end{bmatrix}$$

For example:

náa sánád dà Aúdu

'I informed Auúu'

2.3. Tone spreading rule.

$$S \rightarrow \begin{bmatrix} S \\ +H \\ +\text{"down-} \\ \text{step"} \end{bmatrix} / \text{---} \begin{bmatrix} S \\ +high \\ +mid \\ +round \\ +H \\ +\text{"down} \\ \text{step"} \end{bmatrix} \#$$

For example:

Grade 6, yáa dáawoo dàgà Masar

'he returned from Egypt'

2.4. Object pronoun rule.

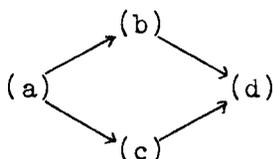
$$(11) \quad \text{object pronoun} \rightarrow [-\text{a}] / \begin{bmatrix} S \\ \text{ahigh} \\ \text{ali} \end{bmatrix} \# \text{---}$$

In comparison with rule (8) the object pronoun rule for bisyllabic verbs (11) has an additional substantiation: the tone of the object pronoun is contrasted not only with the quality of the verb final vowel but, at the same time, with the tone. The tone

of the object pronoun is low when it follows the verb with [+high, +h] final vowel: *yáa hàrbéé shì* 'it (the scorpion) stung him' (Grade 2); *yáa káawóo shì* 'he brought him' (Grade 6). On the contrary, the tone of the object pronoun is high when it follows the verb with a final [-high, -H] vowel, e.g. *yáa káamàa shí* 'he seized him' (Grade 1). The contrast is progressive.

The order of composition of such a pattern can be presented as follows:

- (a) tone-vowel height correlation rule;
- (b) tonal contrast rule or
- (c) tone spreading rule;
- (d) the object pronoun rule (in case of transitive verbs).



2.5. As it was shown above, only four of the eight rules defining the tone patterns of the verb apply to the bisyllabic variety. And none of them is entirely new. Two rules, the tone-vowel height correlation rule and the object pronoun rule, have to be marked out as having an additional substantiation in their application to the patterns of bisyllabic verbs.

Discussing further the peculiarities of bisyllabic verbs I wish to note: (i) while the progressive tonal contrast appears only beyond, the regressive tonal contrast takes place only within the verb-stem boundary; (ii) the tone spreading is usually regressive.

All that was said before seems to indicate that bisyllabic verbs display an older stage in the development of the tone system of the verb in Hausa in comparison with trisyllabic verbs. Therefore their

analysis is of special interest and of greatest importance. Quadri-syllabic verbs can be quite easily detected as being of derivative origin.

2.6. Summarizing all concerning the verb, it has to be said:

- i. The tone assignment is dependent on the length of the tone pattern and the quality of the final vowel. One-tone pattern verbs have a high tone. Two- and three-tone pattern verbs (with [-high] final vowel) have all syllables tonally contrasted, while four-tone pattern verbs with final vowel [-high] have the first tone repeated on the first two syllables of the verb.
- ii. The assignment of the tone on the final vowel depends on the degree of vowel height. The supra-segmental feature of pitch and the segmental feature of vowel height are correlated. This is especially clear at the bisyllabic verb level.
- iii. The tonal contrast plays an extremely important role in the assignment of tones in the pattern of the verb. Whether the tonal contrast is present in the tone pattern of the verb depends first of all on the quality of the verb final vowel. It appears only in patterns when the final vowel is of "extreme" quality or at least [+mid 2]. Tone spreading occurs when the final vowel is of "non-extreme" [+mid 1, +rounded] quality.
- iv. The tone of the object pronoun is determined by the degree of vowel height (and by the tone in case of bisyllabic verbs) in the final syllable of the verb. It is contrasted with the vowel height and in the case of bisyllabic verbs also with the tone of the verb final vowel. The contrast is progressive in this case.

3. Noun plurals

3.0. The number of classes of noun plurals in diverse studies on the subject depends on the criteria applied. Thus some authors distinguish

ten or even more of such classes. The classification Kraft [1965] gives seems to be well suited for the purpose of this study. To recall, he distinguishes four major classes and several minor categories or classes.

Major classes (Kraft [1965:272-273]):

- Class 1: plurals are characterized by all high tones and an -oo...ii ending, e.g. hányàa 'road', pl. hányóófi.
- Class 2: plurals are characterized by a -u...aa with all tones high except the final -aa, e.g. (a) kèekée 'bicycle', pl. kóekúnàa; (b) àbù 'thing', pl. ábúbúwàa; (c) kàréé 'dog', pl. kárnúkàa.
- Class 3: plurals are characterized by an -aa...ee ending with a high-low-high tone pattern, e.g. (a) súnáa 'name', pl. súnàayée; (b) mùtùm 'man', pl. mútànée.
- Class 4: plurals are characterized by all low tones except for a final high tone -ai, -ii, -uu suffix, e.g. (a) àbóókíi 'friend', pl. àbòókáii; (b) sáabóo 'new', pl. sàabàbbíi; (c) kújèeráa 'chair', pl. kújèerúu.

Minor classes (Kraft [1965:285-287]):

- Class 5: plurals are characterized by a high-low-high (or falling-high) tone pattern with the following vowel and consonant patterns in the final two syllables: (a) aaCaa pattern, (b) aaCuu pattern, (c) Caa pattern. E.g. (a') s'rdìi 'saddle', pl. s'iràadáa; (b') ídòò 'eye', pl. ídàanúu; (c) yáaròò 'boy', pl. yáàràa.
- Class 6: plurals are characterized by a variety of tone patterns with an -aCii termination, where the -a may be long or short, high or low tone. E.g. (a) góonáa 'farm', pl. gòonàkíi; (b) ùbáa 'father', pl. ùbànníi; (c) dóokíi 'horse',

pl. dáwáakíi; (d) káayáa 'load', pl. káyàyyákíi.

Class 7: plurals are characterized by a high-high tone pattern with a terminal -uu. E.g. yáatsàa 'finger', pl. yáatsúu.

Class 8: plurals of this class may be termed 'opposite' or 'polar' plurals. If the singular ends in -a or the plural ends in -i. If the singular ends in -i or -e the plural ends in -a. E.g. kàazáa 'chicken', pl. kàajíi; mǎjǐi 'husband', pl. mázáa.

Class 9: in class 9 are lumped a miscellani of other plurals ending in -a, e.g. cóokàlíi 'spoon', pl. cóokúlàa; mǎròókíi 'beggar', pl. mǎròókáa.

Class 10: Class 10 plurals are reduplicative, e.g. írǐi 'kind', pl. írǐi írǐi; yáakǐi 'war', pl. yàaké yàakée.

From the analysis of these plural classes one can derive the following concerning the tone patterns of noun plurals.

3.1. Some nouns have the same tone patterns in the singular and in the plural and differ only by a terminal vowel, e.g. kàazáa 'chicken', pl. kàajíi. These will not be analyzed further here.

3.2. Some nouns have all tones high in the plural, e.g. (a) dáakǐi 'house', pl. dáakóokíi; kújèeráa 'chair', pl. kújéeróoríi; (b) yáatsàa 'finger', pl. yáatsúu; mǎcè 'woman', pl. mǎatáa.

3.2.1. An interesting occurrence has to be noted at this point. The [+H] tone on the final syllable which appears in plural patterns occurs also in verbs with the same [+high] final vowel (see p. 405).

As to the infix /o/, verbs with this [+high, +mid, +rounded] vowel in the final syllable usually have the [+H, + "downstep"] tone on this syllable (see Rule 6). The pattern of a verb terminated by the vowel /o/ does not have a tonal contrast; the tone of the final syllable is spread over other syllables of the verb.

The plural pattern with *-CooCii* termination has all tones high, its final syllable with [+high] vowel carries [+H] tone. The tonal contrast is absent. Two rules are proposed here for such a pattern: (a) tone-vowel height correlation rule: the final [+high] vowel receives [+H] tone, and (b) regressive tone spreading rule: the tone of *-CooCii* termination spreads over other syllables. The tonal contrast phenomenon becomes neutralized by the presence of the [+high, +mid, +rounded] vowel in the termination. For noun plurals with this termination the tone spreading rule appears as somewhat different than for the verb:

(12)

$$S \rightarrow \begin{bmatrix} S \\ +H \end{bmatrix} / \text{---} \text{---} \begin{bmatrix} S \\ +high \\ +mid \\ +round \\ +H \end{bmatrix} \begin{bmatrix} S \\ +high \\ -mid \\ -round \\ +H \end{bmatrix} \#$$

3.2.2. I cannot offer any explanation why the tonal contrast is absent, for example, in the plural noun *yáatsúu* (tones: high-high) and for a [+H] tone on [-high] vowel of the plural noun *máatáa*.

These are certainly exceptions.

3.2.3. There are only a few nouns with all tones low in the singular (but none among them is monosyllabic). Many nouns have all tones high. In the plural, however, I have not found a pattern of only low tones. It could be assumed that low tones patterns are restricted only to the imperative (verb) and to the singular (noun).

3.3. Some nouns exhibit in plural the pattern of two tonal contrasts. It is of importance to note that such a pattern usually begins with a high tone, never with a low tone.

3.3.1. In the singular the noun can have such patterns as ∇ , Λ , $\nabla\nabla$, $\Lambda\Lambda$, etc. and we can find nearly all possible combinations of high and low tones with the number of tonal contrasts limited only by the number of syllables. In the plural the tone pattern can have at the most two tonal contrasts. High-low-high pattern sometimes with the first or final tone repeated in two syllables: $\nabla\nabla$ or $\Lambda\Lambda$ were found only. Thus it confirms again the statement that the usage of the low tone is restricted. A bicontrasted pattern can begin only with a

high tone. In other words, it should have a high tone both at the beginning and at the end of the pattern. E.g. *kásáa* 'earth', pl. *kásàashée* (s → sh/___ e); *qáawáa* 'corpse', pl. *qáawàwwákíi* [∨∨]. The final vowels are vowels /e/ and /i/ of [+high] quality.

3.3.2. Some bisyllabic plurals have a falling-high tone pattern with [-high] final vowel. E.g. *yáaròo* 'boy', pl. *yáàráa*; *dámìi* 'bundle of corn', pl. *dámámáa*. Though I cannot state this with full confidence, it seems that such plurals were originally constituted of three syllables. More research has to be undertaken to explain satisfactorily enough the exceptional case of these nouns.

3.4. Frequently the plural patterns exhibit a one tonal contrast. In such cases, the tonal contrast takes place at the end of the pattern: either between the tone of the suffix and that of the non-stem or within the bisyllabic suffix itself. The contrast is regressive. The patterns with one tonal contrast are: $(-)^{-}\searrow$ or $(-)^{-}\swarrow$.

3.4.1. And again, as in the case of the verb, the degree of the final vowel height determines its tone. The rule is:

$$(13) \begin{bmatrix} S \\ \text{ahigh} \\ \text{-mid} \end{bmatrix} \rightarrow \begin{bmatrix} S \\ \text{cH} \end{bmatrix} / \text{---} \#$$

Noun plurals with a [-high] final vowel of -naa, -uwaa, -ukaa, -aa suffixes usually have tonal patterns with [high₀-low] tonal contrast. Examples: *cóokúlàa* 'spoons', *dáakúnàa* 'houses'.

Noun plurals with a [+high] final vowel or rising diphthong of -kii, -ai, -nii, -uu suffixes have patterns with [low₀-high] tonal contrast. Examples: *gòonàkíi* 'farms', *àbàsúu* 'onions'.

3.4.2. As it was shown in 3.4.1 the "extreme" vowels of the final syllable cause the tonal contrast to appear in the monocontrasted pattern as it happened in the case of the verb (see page 412).

The rule is:

$$(14) S \rightarrow \begin{bmatrix} S \\ \text{-cH} \end{bmatrix} / \text{---} \begin{bmatrix} S \\ \text{cH} \end{bmatrix} \#$$

3.4.3. Two important observations have to be pointed out here: (a) the [+high, +mid, +rounded] vowel /o/ does not appear as final in the plural patterns at all. It can be found only as a part of -CooCii plural suffix (see paragraph 3.2.1); (b) the [+high, +mid, +rounded] vowel /e/ does not appear in monocontrasted patterns. It is present in bicontrasted patterns only (see 3.3.1).

3.5. The same rules determine the assignment of tones in the noun plural patterns as well as in the verb patterns in Hausa: tone-vowel height correlation rule, regressive tonal contrast rule of monocontrasted patterns, and tone spreading rule in patterns with the [+high, +mid, +rounded] vowel /o/ in plural termination.

4. Conclusions

4.0. The assignment of tones within the patterns of the verb and noun plurals in Hausa is largely predictable.

4.1. We cannot be sure whether tones in Hausa originated from the vowel height of the termination. We can, however, definitely posit that the tone and the degree of vowel height in the termination of the verb and noun plurals are correlated. To put it otherwise, the suprasegmental feature is correlated with the segmental one.

4.2. The tonal contrast plays a very special role in the patterns in that it organizes them. The presence or absence of tonal contrast in the pattern is determined by the quality of the final vowel; the tonal contrast takes place in the pattern only with the final vowel of "extreme" quality. The final (in verb) or infix (in noun plurals) vowel of [+high, +mid, +rounded] quality is responsible for the tone spreading in the pattern. While the tonal contrast may be progressive or regressive, tone spreading in Hausa is always regressive.

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