SYLLABLE WEIGHT AS A PHONOLOGICAL VARIABLE

The Nature and Function of the Contrast
Between "Heavy" and "Light" Syllables

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1. Introduction

In general phonological works, a basic dichotomy is commonly drawn between open syllables, i.e. those of the form (C)V, and closed syllables, i.e. those of the form (C)VC. For example, Pike says: "A syllable is checked (or closed) whenever it ends in a contoid...A syllable is free (or open) when it ends in a vocoid. The word 'hast' is a syllable checked by the arresting group [st]. The word 'spa' is a free syllable" [1943: 119, underline his]. In most cases the open/closed contrast is seen not as a simple dichotomy, but rather as an unequal opposition in which one member of the pair—the open syllable—has special status. "A syllable consisting of a consonant plus a vowel represents the most primitive, and without doubt historically the oldest, of all syllable types, the only one which is general in all languages. We call it the open syllable. All languages have open syllables. Very many have only open syllables. No language has only closed syllables" [Malmberg 1963: 129]. An almost identical statement is made by the Russian phonetician Bondarko [1969: 3]: "The combination CV is [the] most common and elementary syllabic pattern. This is supported by a number of facts, both linguistic...and psychological." Cairns [1971: 42] reaffirms the same point: "Given all this evidence, the hypothesis that open syllables are, in some yet-to-be-defined sense, more natural than closed syllables is reasonable...it is not a priori true." Approaching the matter historically, Martinet [1952] and Malmberg [1965] see the tendency toward open syllability as an ongoing mechanism of linguistic change. Fulgram [1970] utilizes the principle of open syllability as the first of his criteria for determining
syllable boundaries, a step which he justifies on general linguistic grounds. Similarly, Hooper [1972] takes the primacy of open syllables as a linguistic universal in her attempt to set up what in effect would be automatic discovery procedures for assigning syllable boundaries. The distinction between open and closed syllables is also taken for granted in works on language acquisition, speech pathology, speech perception, slips of the tongue, and in synchronic descriptions of language specific allophony rules. It seems fair to generalize from the above that the open/closed dichotomy is one of the most natural, least controversial dichotomies in linguistics and one which by now is familiar to all linguists.¹

By contrast there is another system of classifying syllables which has been utilized time and time again in synchronic descriptions of individual languages, but which has generally been ignored in typological and theoretical papers on the syllable. This is the classification of syllables on the basis of their internal composition into what are sometimes labelled "long" and "short", other times "heavy" and "light" syllables.² In spite of its widespread use, the concept of syllabic quantity--or "weight" as I prefer to call it--is not even mentioned in major works dealing with the syllable such as Fudge [1969], Hála [1961], Hockett [1955], Malmberg [1963], Pike [1943], Pulgram [1970], or

¹I, of course, am taking the existence of the syllable for granted and reject as nonsense articles such as Hohler [1966] which purport to do away with it. As Fudge [1969: 264] says, "The reason why syllables are still with us is that they are valid as basic elements of linguistic structure..." (See also Anderson [1969], Fromkin [1970], and Sampson [1970: 602-604]).

²I have adopted the terms "heavy" and "light" for this paper and advocate their general usage. In so doing, I am following Allen [1965, 1968, 1969] who argues convincingly that the terms "long" and "short" should be reserved for vowels (and presumably consonants as well) and should not be used for syllables. "The need for employing an unambiguous terminology, which clearly distinguishes syllabic quantity [=weight] from vowel length, cannot be too strongly emphasized" [1965: 92]. The contrast between heavy and light syllables must also be kept distinct from the well-known contrast between strong and weak syllables. The major difference between these two oppositions is that syllable weight is determined intrinsically whereas syllable strength is determined positionally. For an interesting illustration of the interplay between syllable weight and syllable strength, see Miyaoka [1971].
Stetson [1951]. I would argue, nevertheless, that syllable weight does indeed constitute a phonological variable of general, cross-language significance. Its neglect by phonologists can only be viewed as a gross and inexplicable oversight. What I propose to do in this paper, then, is to discuss the essential nature of the distinction between heavy and light syllables and to provide a brief survey of selected languages where it is found. Finally I will focus on three Chadic languages (Bolanci, Kanakuru, and Hausa) in order to demonstrate in greater detail how syllable weight participates in rules that account for various phonological and morphological phenomena.

2. The Concept of Syllable Weight

The nature of the heavy/light dichotomy (and the difference between this dichotomy and the open/closed one) is set forth in an important paper by Kuryłowicz. "Cette distinction s'appuie en même temps sur l'opposition e:ē (e étant ici le symbol d'une voyelle quelconque) et sur l'équivalence quantitative ē = et (t = consonne simple ou groupe quelconque)... Grâce surtout à l'équivalence ē = et toute syllabe y peut être mise au nombre de syllabes soit longues soit brèves. Le double fondement de la quantité syllabique prouve en même temps que la quantité n'est pas un caractère du phonème, c.-à-d. de la voyelle, mais bien de la syllabe" [1948: 112-113]. In his paper, Kuryłowicz makes two essential points with regard to syllable weight:

1. Given the analysis of a syllable as consisting of three parts--onset, peak, and coda--the peak and coda naturally group together as one constituent, the core as opposed to the onset. The analysis of syllables into heavy and light is determined solely by the makeup of the core, the presence, absence, or nature of the onset being in all cases irrelevant.

2. Syllable weight (i.e. the functional distinction between heavy and light syllables) exists only in languages with phonemic vowel length,

3. Notable exceptions are Lehiste [1970], which contains important information on linguistic quantity and duration at various levels of analysis, and Vennemann [1972].

4. The idea of subjecting syllables to immediate constituent analysis is applied in an early paper by Pike and Pike [1947]. The IC cut adopted in this paper, i.e. onset/core as opposed to Pike and Pike's peak/margin, is made for somewhat similar reasons by Cheng [1966].
being based on the structural equivalence of open syllables containing long vowels and closed syllables, i.e. the grouping together of syllables of the form CV and CVC as opposed to those of the form CV.

Before proceeding, let me explain the notational conventions adopted in this paper.

(a) The symbol S stands for any syllable, Š for a heavy syllable, and Š for a light syllable. The equals sign = is used to indicate syllable boundaries.

(b) The lower case symbols c and v stand for one phoneme only in contrast to the class symbols C and V. A word such as /strik//, for example, could be represented either as ccvccc or as CVC depending on the level of analysis intended.

(c) Long vowels and consonants will be written with double letters, e.g. Bolanci /råmu/ 'to repair' as /raamu/ (pattern cvccv) and /kapu/ 'to sow' as /kappu/ (pattern cvccv).

(d) Diphthongs will be written as a sequence of segments, e.g. Hausa /gàurée/ 'fig tree' (with pattern cvccv). The interpretation of the final element of diphthongs as either v or c is undoubtedly a language specific question, in some cases functionally significant, in other cases not. In languages with phonemic vowel length, vv diphthongs and simple long vowels can be expected to have the same value for purposes of syllable structure rules and thus the designation vv can be utilized indiscriminately for both of them.

(e) In representing syllable types, an onset C will automatically be employed. Unless specifically stated to the contrary, it is to be understood that this C could equally well be simple, complex, or null.

3. Syllable Weight Illustrated Outside of Chadic

While the heavy/light syllable dichotomy has been amazingly neglected on the theoretical, typological level, it has a long history of use at the language specific level. A quick survey of the literature discloses that its importance has been tacitly recognized for years in the analysis of a wide range of languages. Skeletal information on six of these languages is presented below. These sketches are intended merely to document the widespread existence of syllable weight as a phonological variable and to give a rough indication of its functional import. For a full description of the facts from which these sketches are drawn, the
sources cited for the individual cases should be consulted.

A. Latin (according to Allen [1965 and 1969]):

   (a) Composition: open syllables with short vowels are light; all others are heavy, including syllables of the form Cvv, Cvc, and Cvvc. Diphthongs have the same value as long vowels.

   (b) Function: syllable weight participates in accessional and metrical rules. For example, the "Penultimate Law" states that in words of more than two syllables, the accent automatically falls on the penultimate if it is heavy but on the antepenultimate if the penultimate is light, e.g. coon=féctus 'accomplished' and i=ní=mi=cus 'hostile', but coon=féci=o 'I accomplish' and té=ne=brae 'darkness'.

B. Classical Greek (according to Allen [1968]):

   (a) Composition: same as Latin, i.e. Cv syllables are light; all others, e.g. Cvv, Cvc, and Cvvc, are heavy.

   (b) Function: syllable weight is important as a rhythmic factor in meter and in morphological processes. For example, in forming the comparative of adjectives, words with light first syllables take a long vowel in the second syllable while words with heavy first syllables take a short vowel in the second syllable, thus resulting in both cases in an alternation between heavy and light syllables, e.g. so=phós/so=phōçois 'wise' vs. oo=móis/oo=mós 'raw' and lep=tóis/lep=tōs 'slim'.

C. Finnish (according to Lehiste [1965]):

   (a) Composition: "An open syllable ending in a short vowel counts as a [light] syllable. All other syllables are [heavy]--open syllables ending in long vowels or diphthongs, and all closed syllables regardless of the quantity of the vowel" [p. 449].

   (b) Function: the opposition between heavy and light syllables constitutes an important factor in the description of the phonologically possible word types in Finnish. The meter of Finnish (and Estonian) folk songs is also dependent on syllable weight.

D. Estonian (according to Lehiste [1960, 1965]):

   (a) Composition: Estonian has three degrees of vowel and consonant length and, correspondingly, three degrees of syllable weight. The

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6The full three-way syllable contrast applies only to the first syllable.
basic principle of equivalence stated by Kuryłowicz, namely $vv = vc$, operates equally well here, only being further extended to account for the extra dimension. The three degrees of syllable weight are as follows: light syllables consist of those of the form $Cv$; heavy syllables include those of the form $Cvv$ and $Cvc$; extra-heavy syllables include those of the form $Cvvv$ and equivalent combinations of $v$'s and $c$'s, e.g. $Cvvc$ and $Cvcc$. All syllables except the first require a consonantal onset, which, however, has no bearing in determining syllable weight.

(b) Function: "In the phonological hierarchy of Estonian, there are two intermediate levels between the phoneme and the phonological word: the syllable and the disyllabic sequence. Quantity [=weight] is the factor which relates the units within the hierarchy to each other" [1965: 455-56]. Syllable weight and ratios of syllable weights enter into the determination of possible word types and in the specification of the phonetic duration of non-initial vowels and of pitch and intonation contours.

E. Classical Arabic (according to Fleisch [1956]):

(a) Composition: syllables of the form $cv$ are light; those of the form $cvcv$ and $cvc$ are heavy. In Arabic, the consonantal onset is obligatory in all syllables. Closed syllables with long vowels, which result from morphological processes, are considered extra-heavy. These "ultra-long" syllables constitute an aberrant type of heavy syllable rather than a true third degree of syllable weight.

(b) Function: Arabic poetic meters are bases on specific arrangements of heavy and light syllables. Accentual rules are also dependent on syllable weight.

F. Gothic (according to Vennemann):

(a) Composition: syllables of the form $Cv$ are light; all others are heavy.\(^7\)

(b) Function: rules of syllable division are dependent upon the

\(^7\)Vennemann [1971: 104] distinguishes light roots of the form $Cv$ and $Cvc$ from heavy roots of the form $Cvcc$ and $Cvcc$. As he himself is aware these abstract "roots" are not to be confused with phonological syllables which emerge later in the generative process as a result of the application of syllabification rules.
interplay of syllable weight and accent placement.  

4. Syllable Weight in Chadic

Let us now turn our attention to the Chadic language family of norther Nigeria where we find syllable weight entering into the description of a wider range of phenomena than in the case of the languages surveyed above. The three languages to be considered are Bolaruci (=Bolewa), Kanakuru (=Dera), and Hausa, all fairly closely related members of the western group of the Plateau-Sahel branch of the Chadic language family (see Newman and Ma [1966]). All three languages are tonal with two phonemic tones: Hi indicated ' and Lo indicated `. All have phonemic vowel length and all make some use of the contrast between heavy and light syllables.

4.1. Bolaruci (according to Newman [n.d.]):

(a) Composition: light syllables are cv; heavy syllables are cvv or cvc. Long vowels do not occur in closed syllables.

(b) Function: in Bolaruci, disyllabic verbs occur with two basic tone patterns: Hi-Hi and Lo-Hi. Unlike most other Chadic languages, where tone of verbs is lexically distinctive, Bolaruci verb tone is completely determined on the basis of syllable weight and the nature of the final vowel (either -u or -aa, the choice not being predictable). Verbs ending in -u behave as a single tone class, all being either Hi-Hi or Lo-Hi depending on the dialect. 9 The weight of the first syllable of -aa verbs is also predictable, only verbs of the form SCaa being found. Verbs ending in -u occur with both tone patterns, the sole determining factor being syllable weight. If the initial syllable is heavy, then the verb will have Lo-Hi tone; if the initial syllable is light, the tone will be Hi-Hi. There are no exceptions.

8 Contrary to first impression, Sievers' Law is not a direct function of syllable weight in Gothic nor in Vedic (see footnote 19 for a fuller discussion of this point).

9 There are differences on some points between my data, collected in the Gombe area, and those of Lukas [1970/71], which represent the Fika district; but both data sets equally exhibit the workings of syllable weight.
As in many Chadic languages, what is orthographically represented in Bolanci as a sequence of a nasal plus a stop is often a unit phoneme, e.g. mboza 'speech' (cvcv not *cccvv), ndi 'to go' (cv not *ccv), and ngadu 'to eat meat' (cvcv not *cccvv). In medial position, however, Bolanci always treats these as if they were two elements, with the result that the first syllables of words such as wundu 'to call', and gandu 'to lie down' are considered heavy.

Note that in Bolanci the tone pattern of a verb form is determined strictly by the syllable weight of an actually occurring stem and not on the form of an underlying root. Compare, e.g. the tone of the following pairs of verbs where the basic root has initial Š while the derived stem begins with Š.

\[ \text{Light} \]
(1a) bolú 'to break' (intr.) (1b) bolú 'to break' (tr.)
(2a) ngomú 'to fill' (intr.) (2b) ngomú 'to fill' (tr.)

The contrast in ū-verbs between those with initial Š and those with initial Š, which determines underlying tone, also has importance elsewhere in the language. In the subjunctive, the stem final -ū is obligatorily replaced by a front vowel, -ė or -ɨ depending on syllable weight. If the initial Š is heavy, then ū → ė; if it is light, then ū → ɨ. The tone of verbs in the subjunctive is completely determined by the aspect—being Lo-Hi in all cases—and overrides the tonal distinction found in their basic forms.
4.2. Kanakuru (according to Newman [1972]):

(a) Composition: light syllables are (c)v; heavy syllables are (c)vc. Unlike Hausa and Bolanci, Kanakuru has syllables without consonantal onsets. (As expected, however, the presence or absence of the onset has no effect on syllable weight.) Kanakuru also has a small number of words containing long vowels in closed syllables due to the loss of /h/ between identical vowels, e.g. gáak 'crow', díl 'hoe', and búút 'he-goat' (<*búhút, cf. the plural búkúrin with the Tera word bòkàrè). Since these "extra-heavy" syllables are historically recent, it is too early to determine whether they will be permitted to stay as such and if so how they will influence syllable structure rules.

(b) Function:

(i) Verbal nouns: the tone of verbs in Kanakuru is to a great extent predictable from the class of the initial consonant. If the initial consonant is a voiceless or glottalized obstruent the verb tone is Lo-Hi, if it is a voiced obstruent it is Hi-Lo, e.g.

(7a) tópé 'to send'      (7b) dápè 'to collect'
(8a) bùlf 'to write'    (8b) gènl 'to fill'
(9a) pàarè 'to exchange' (9b) jàarè 'to comb'

The tone of verbs with initial vowels or sonorants is not predictable, e.g.

(10a) àdé 'to eat'      (10b) àtè 'to dip out'
(11a) mànà 'to return' (11b) múlè 'to smooth (something)'

Unlike the case in Bolanci, the tone of basic verb forms in Kanakuru is not sensitive to syllable weight. When one turns to verbal nouns,
however—by which I mean lexically derived nominals (cf. Bagari [1971]) as opposed to gerundive forms—syllable weight turns out to be a crucial variable. In determining the tone of verbal nouns formed with the derivational suffix -ök,\(^{10}\) it is the weight of the initial syllable that matters and not the phonation class of the initial consonant or the tone of the underlying verb. Derived nominals formed with -ök are automatically Hi–Hi if the first syllable is light, Hi–Lo if it is heavy.

\[
\begin{align*}
\text{Light} \\
(12) \text{ mônê } & \text{ mônêk} & \text{ 'to forget'} \[ \text{ verb } \text{ verbal-noun} \]  \\
(13) \text{ jôôê } & \text{ jôôêk} & \text{ 'to wash'}  \\
(14) \text{ bîndê } & \text{ bîndêk} & \text{ 'to squeeze'}
\end{align*}
\]

\[
\begin{align*}
\text{Heavy} \\
(15) \text{ pàarê } & \text{ pàarêk} & \text{ 'to exchange'}  \\
(16) \text{ yâhjê } & \text{ yâhjêk [yâyjêk]} & \text{ 'to sift'}  \\
(17) \text{ shîmdê } & \text{ shîmdêk} & \text{ 'to thatch'}
\end{align*}
\]

In contrast with the situation in Bolanci, the prenasals mb, nd, nj, and ng in Kanakuru function as unit phonemes even in the middle of words. They are not interpreted as clusters and they do not add to the weight of preceding syllables. The word bîndêk, for example, has the syllabic shape cv=cvc and thus has Hi–Hi tone, as is expected of words with light initial syllables.

Although the correlation of verbal noun tone and syllable weight is clear enough, the reasons for it are not. It seems strange that the syllables which contrast in syllable weight should carry the same tone while the uniform őök syllables should differ in tone. One possible explanation is that verbal nouns with initial ő originally had Lo–Hi tone, like Bolanci verbs, and only later acquired their present Hi–Lo pattern by a historical flip-flop tone rule.\(^{11}\) This hypothesis is supported by

\[\text{---}
^{10}\text{There are other derivational affixes in Kanakuru for forming verbal nouns, but -ök is the most common and, at present, the only one that seems to be productive.}
^{11}\text{Wang [1967] describes both synchronic and diachronic cases of flip-flop tone rules.}\]
the existence of cognate pairs with opposite tone such as K. bóök 'mouth', Hausa bàskí and K. wárlŋ 'nose', Bolancí wùntí.

Perhaps a better explanation, however, is to assume that all verbal nouns with -eK have underlying Hi-Hi tone and that the surface forms with Hi-Lo result from the inability of the phonologically weak suffix to sustain its Hi tone after a heavy, stressed syllable.

(ii) Pronouns: another place in Kanakuru where syllable weight manifests itself is in the canonical shape of pronoun sets. The subject pronouns used in the perfective, for example, are all light while the continuous aspect pronouns are heavy.

<table>
<thead>
<tr>
<th>Perfective</th>
<th>Continuous</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>nà</td>
</tr>
<tr>
<td>you</td>
<td>kà</td>
</tr>
<tr>
<td>you (f.)</td>
<td>shì</td>
</tr>
<tr>
<td>he</td>
<td>Ø</td>
</tr>
<tr>
<td>she</td>
<td>Ø</td>
</tr>
<tr>
<td>we</td>
<td>mè</td>
</tr>
<tr>
<td>you (pl.)</td>
<td>kà</td>
</tr>
<tr>
<td>they</td>
<td>wù (&lt;wà)</td>
</tr>
</tbody>
</table>

The contrast in Kanakuru between pronoun tense/aspect sets on the basis of syllable weight is of course extremely interesting from a comparative point of view because of the existence of this same type of contrast in present day Hausa and in other Chadic languages. Historical linguistics aside, the most fascinating thing about the heavy-syllable continuous pronoun paradigm is the presence of the second person feminine form shìjì, reminding us of the metrical equivalence in Greek of one heavy to two light syllables and of the fact that the implications of this paper go far beyond the specifics of Chadic linguistics.12

4.3. Hausa

(a) Composition: the classification of Hausa syllables into light

12 This equivalence of two light = one heavy perhaps explains why the Hausa third person feminine independent pronoun 'fìtā' ends in a short vowel when all the other independent pronouns end in long vowels. Cf. the full paradigm nfi, kái, kèe, shìì, fìtā, múu, kúu, sùu, 'I, you, you (f.), he, she, we, you (pl.), they'.
and heavy dates back to Klinghenheben [1927/28]. The light class includes only syllables of the form cv; the heavy class includes syllables consisting of a consonant plus a long vowel, a consonant plus a diphthong, or a consonant plus a short vowel plus another consonant. The consonantal onset is present in all cases, words orthographically represented with an initial vowel actually containing an initial glottal stop. As Klinghenheben recognized, Hausa does not allow long vowels or diphthongs in closed syllables, the maximum number of segments permitted in a syllable being three. Syllables beyond the prescribed limit that result in intermediate structure from the addition of affixal elements are automatically pared down to permissible weight by syllable-overload rules.  

(b) Function:

(i) ANSQ (according to Parsons [1955]): "Abstract Nouns of Sensory Quality" is the name by which I designate a group of some 60 Hausa words that exhibit a remarkable degree of homogeneity at all levels of analysis, phonological, tonological, morphological and semantic" [p. 373]. This class includes such words as záäfii 'heat', tsámii 'sourness', gáncii 'astringent taste', and zúrrfii 'depth'. Focussing strictly on the phonological characteristics of the set, Parsons noted four common phonological features: (a) the words all end in the vowel /i/, (b) they all have Hi–Hi tone, (c) they are all disyllabic, and (d) their first syllables always contain either a long vowel, a diphthong, or a consonantal coda. Given the availability of the concept "heavy syllable", the canonical shape of ANSQ's can be represented neatly by the abbreviation ŠCii. Note that the heaviness of the first syllable—which is an abstract, classificatory notion involving the equivalence of consonantal and vocalic elements--

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13 In Hausa syllable overload is normally handled by reducing long vowels to short, e.g. *kăn=sa --> kăn=sə 'his head', *r̥l̥gāar ruwaa --> r̥l̥g̱r̥ r̥w̥a 'raincoat', *baaw=t̥a --> b̥w̥t̥a 'slavery' (<b̥w̥t̥a 'slave'). In other Chadic languages, overload situations are usually alleviated by epenthetic schwa insertion and resyllabification, e.g. Ga'anda *cans-ca 'chicken+plural' --> c̥=m̥s=c̥ 'chickens' (see R. Newman [1971]).
figures just as importantly in the description of this word class as
do criteria (a), (b), and (c), which refer to particular phonemes
and tonemes and a specific number of syllables.

(ii) Plurals. Pluralization in Hausa is accomplished by means
of two distinct processes: stem preparation, and affix insertion. Stem
preparation minimally involves deletion of the tones and final vowel
of the singular, e.g. ràagóó 'ram', plural stem *raag, plural form
ráagúnàa. With some words stem preparation is marked by other, some-
times optional, sometimes obligatory, changes in segmental composition,
e.g. tâushí 'drum', pl-stem *tafsh, plural form táfàashée. The
plural affixes themselves all contain two elements: a segmental affix
and an associated word tone pattern. The affix aa...ee, for example,
regularly occurs with Hi-Lo-Hi tone, unaa with Hi-Lo. Hausa has a
number of other ways to form the plural, but for the sake of this paper
I will limit myself to these two. As has been known for some time the
use of one of these affixes rather than the other is related to the
tonal structure of the singular. What has not been recognized is that
the differences in the surface variants that make up these plural classes
are almost entirely predictable if one takes the matter of syllable
weight into account.

Plural type aa...ee/Hi-Lo-Hi: disyllabic singular nouns with Hi-Hi
tone commonly have corresponding plurals which contain the vowel components
aa...ee and the tone pattern Hi-Lo-Hi, e.g.

\[\text{14} \] The most common changes in the formation of pl-stems--replacement
of u by a labial or velar obstruent and the replacement of r by t--
represent the reverse of a series of well-known historical changes in
Hausa generally referred to as Klinghenheben's Law (cf. Schuh, in this
number). Some words require the recovery of the historically earlier
form in the plural (e.g. fáñkée, pl. fátàakée 'trader') while others
allow pl-stems built either on the historically earlier segmental
structure or on the segmental structure of the present-day form (e.g.
jàùnàa, pl. jákàanée or jáùnəayée 'bush-cow').
The rule for inserting this affix to add *aa immediately after the second consonant \( C_2 \) of the pl-stem and *ee at the very end of the stem. The tone pattern is always added last. E.g.

\[
\begin{array}{lll}
\text{sg} & \text{pl-stem} & \text{pl} \\
(24) & \text{kásıkóo} & \text{*kask} & \rightarrow & \text{kásàakée} & \text{'bowl'} \\
(25) & \text{jírgíí} & \text{*jirg} & \rightarrow & \text{jíráagée} \\
(26) & \text{táushíí} & \text{*tafsh} & \rightarrow & \text{táfàashée} \\
(27) & \text{júujíí} & \text{*jibj} & \rightarrow & \text{jíbàajée} \\
\end{array}
\]

Nouns with syllable initial short open vowels, as in (20) and (21), are usually said to employ a suffix *aaCee in forming the plural (where C is identical to the stem final consonant). When one recognizes the importance of stem preparation in plural formation, it becomes clear that the reduplicated C one finds on the surface is not part of the affix but rather must be assigned to the pl-stem. The underlying principle seems to be that all pl-stems participating in the construction of *aa...ee plurals must have a heavy first syllable. If the first syllable of the singular is already heavy, as in the case of examples (18), (19), (22), and (23), then nothing more is required. If, however, the first syllable is light, then it must be made heavy—and this is done by doubling the stem final consonant. Once the pl-stem has been prepared to the required specification, then the affix can be inserted as described above, namely insert *aa after \( C_2 \) and add *ee at the end, e.g.\(^{15}\)

\(^{15}\) One interesting consequence of the above analysis is that these "reduplicated plurals" now become examples of the widespread Afroasiatic internal *a-plurals described by Greenberg [1955].
(28) káfáa  *kaff —> káfàaféé 'hole'
(29) wúr lí  *wurr —> wúràraréé 'place'
(30) dámóó  *damm —> dámàaméé 'monitor'
(31) zúguú  *zugg —> zùguagéé 'roll of cloth'

When the plural affix is inserted in pl-stems of the form cvvc
(derived from nouns with long open vowels as in examples (22) and
(23), the as added after C2 and the ee added at the end of the stem end
up immediately juxtaposed. In such cases a semivowel /y/ is interposed
to act as a phonological buffer, e.g.

(32) kíffí  *klif —> *kíffàaée —> kíffàayée 'fish'
(33) gáuláa  *gaul —> *gáulàaée —> gáulàayée 'idiot'
(34) zóomóó  *zoom —> *zóomàaée —> zóomàayée 'hare'
(35) súunáa  *suun —> *súunàaée —> súunàayée 'name'

Note that the /y/ used in the above plurals is strictly epenthetic in
origin and has no independent status, neither as part of the plural
stem nor as part of the affix. 16

In order to know how to apply the affix insertion rule to words
containing diphthongs, one must first know whether the second component
of the diphthong is being interpreted as [-vocalic] and thus acts as C2
or whether it is [+vocalic], in which case it does not count as C2, e.g.

\[
\begin{array}{c|c|c}
\text{sg} & \text{pl-stem} & \text{pl} \\
\hline
\text{baurée} & \text{baur} & \text{bauràayée} (\text{not } *\text{sáwàarée}) \quad \text{'fig tree'} \\
\end{array}
\]

\[C2\]

16The use of /y/ as an epenthetic C is found elsewhere in Hausa
as well, e.g. sháyás/sháyáaf 'to water' < sháa 'to drink' + the
causative suffix ás/áfr.
(37) kwáurée kwawr --> kwáwàarée (not *kwáuràayée)\textsuperscript{17}  
\([-\text{voc}]\) \[C_2\]

What is particularly interesting in this connection is that syllable final n's also behave as if they were [+vocalic] and thus never act as C\textsubscript{2}. So we find that the plurals of words of the form cvn=cvv such as zánkóo 'bird's crest' pattern with those of cvv=cvv nouns such as k’ìffì 'fish' rather than with cvc=cvv nouns such as káskóo 'bowl', e.g.

\[
\begin{array}{ccc}
\text{sg} & \text{pl-stem} & \text{pl} \\
(38) & \text{gúntúu} & \text{*gunt} & \rightarrow & \text{gúntàyée} (\text{not} \ *\text{gúnàatée}) & \text{'short person'} \\
& [+\text{voc}] & C_2 \\
(39) & \text{bángóó} & \text{*bang} & \rightarrow & \text{bángàyée} (\text{not} \ *\text{bánàayée}) & \text{'wall'} \\
(40) & \text{dúmbúu} & \text{*dumb} & \rightarrow & \text{dúmbàyée} (\text{not} \ *\text{dúnàayée}) & \text{'old tool'} \\
(\text{<} *\text{dúnbúu}) \\
(41) & \text{tállée} & \text{*tall} & \rightarrow & \text{tállàyée} (\text{not} \ *\text{tánàalée}) & \text{'soup-pot'} \\
(\text{<} *\text{tànlée}) [+\text{voc}] & C_2 \\
\end{array}
\]

To sum up, one can say that all Hausa plurals identifiable as the aa...ee type—whether appearing on the surface as aa...ee, aaCee, or aayee—employ exactly the same affix and exactly the same rule governing affix insertion. In addition they all make use of prepared plural stems with exactly the same canonical shape described in terms of syllable weight. E.g.

\[
\begin{array}{ccc}
\text{sg} & \text{pl-stem} & \text{pl} \\
\text{example initial S (5C)} & (aa...ee/Hi-Lo-Hi) \\
(42) & \text{káskóó} & \text{cvc} & \text{*kask} & \text{kásàakée} & \text{'bowl'} \\
(43) & \text{dámmóó} & \text{cv} & \text{*damm} & \text{dámàamée} & \text{'monitor'} \\
(44) & \text{k’ìffì} & \text{cvv} & \text{*kilf} & \text{k’ìffàayée} & \rightarrow & \text{k’ìffàyée} & \text{'fish'} \\
(45) & \text{gúntúu} & \text{cvv} & \text{*gunt} & \text{*gúntàayée} & \rightarrow & \text{gúntàyée} & \text{'short person'} \\
\end{array}
\]

\textsuperscript{17}Both examples of Hi-Hi nouns that I have found where the diphthongal ending is treated as [-voc] have /k/ as the word initial consonant. With Hi-Lo nouns taking a related plural affix (not described in this paper), the interpretation of diphthongs and long vowels as ending in a [-voc] segment is much more common, e.g. dúutsée, pl. dúutsuu 'stone' or k’ufíìlì, pl. k’ufíìsáá 'flank'.
Plural type uNaa/Hi-Lo:¹⁶ one of the most productive plurals for disyllabic singular nouns with Hi-Lo or Lo-Hi tone employs a suffix of the form unaa, ukaa, or uwaa (for which I am using the cover designation uNaa) and the tone pattern Hi-Lo, where the Hi tone extends over all the syllables in the word except the last, e.g.

\[
\begin{array}{lll}
\text{sg} & \text{pl} & \text{English} \\
(46) & \text{dákí} & \text{dákúnàà} & \text{'room'} \\
(47) & \text{húuláà} & \text{húulúnàà} & \text{'cap'} \\
(48) & \text{rùmbũu} & \text{rùmbúñàà} & \text{'shed'} \\
(49) & \text{káuyéé} & \text{káuyúkàà} & \text{'village'} \\
(50) & \text{kàrée (< *kàrñée)} & \text{káññúkàà} & \text{'dog'} \\
(51) & \text{bàkáà} & \text{bákkúñàà} & \text{'bow'} \\
(52) & \text{gàrñi} & \text{gàrúrúwàà or gàrúrrúkàà} & \text{'town'} \\
(53) & \text{sùlè(e)} & \text{súlúllúkàà or súlúulúwàà} & \text{'shilling'}
\end{array}
\]

There are two matters to be accounted for, namely the choice of the suffixal consonant—either \( n \), \( k \), or \( w \)—and the presence or absence of reduplication. The use of the suffixal consonant is partially in complementary distribution, partially in free (or dialectal) variation. This can be accounted for by the following simplified rules (omitting details and exceptions). To begin with, we have to group \( k \) and \( w \) into a single class (K) as opposed to \( n \). Then, if we take unaa as the basic form of the suffix, we can describe the alternation between \( n \) and K primarily in terms of a process of dissimilation between the stem final consonant and the suffixal \( n \). If the stem final C is \( n \), \( r \), or \( y \) (and sometimes \( f \)) then \( n \) must be replaced by K (see examples (49), (50), and (52).)

With nouns having initial light syllables, the dissimilation of \( n \rightarrow K \) also applies to stem final \( l \), \( t \), \( s \), and \( r \) as well (cf. (53) with (47). Otherwise \( n \) is used (eg. (46), (47), (48), (51)). The choice between \( k \) and \( w \), on the other hand, is strictly a matter of syllable

¹⁶ The analysis of the uNaa plurals adopted here derives in great part from informal conversations with Parsons at the African Linguistics Conference held at Bloomington, Indiana, in April of this year (1972) and from ideas contained in a manuscript of his entitled "Nausa and Chadic".
weight. If the initial syllable is heavy, then K is realized as /k/; if the initial syllable is light, then K is normally realized as /w/, although /k/ also occurs as a much less common alternative.

Not surprisingly, the presence or absence of reduplication in the plural also turns out to be a function of syllable weight. As in the case of the aa...ee plural, the basic principle seems to be that the initial syllable of the pl-stem must be heavy, and that if it is not already so in the singular, then it must be made so by doubling the stem final consonant, e.g.

\[
\begin{array}{cccc}
<table>
<thead>
<tr>
<th>sg</th>
<th>pl-stem</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>(54)</td>
<td>ràagóó</td>
<td>*raag</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(55)</td>
<td>káuyèè</td>
<td>*kauy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(56)</td>
<td>bàrgóó</td>
<td>*barg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(57)</td>
<td>túdoùu</td>
<td>*tudd</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(58)</td>
<td>kwábòò</td>
<td>*kwabb</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(59)</td>
<td>búnúu</td>
<td>*bunn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
\]

In the case of the modified pl-stems with the geminates, the plural affix is also reduplicated, being inserted in truncated uC form after C₂ (optional for the unaa variant) and in full uCaa form at the end of the stem, e.g.

\[
\begin{array}{cccc}
<table>
<thead>
<tr>
<th>sg</th>
<th>pl-stem</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>(60)</td>
<td>bàkáa</td>
<td>*bakk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(61)</td>
<td>tábòò</td>
<td>*tabb</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(62)</td>
<td>gárrí</td>
<td>*garr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(63)</td>
<td>káshlí</td>
<td>*kass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
\]

The double affix insertion rule also applies to the light syllable nouns which allow ukaa as an alternative to uwaa. This is not immediately obvious because of the existence of a general realization rule whereby syllable final velars completely assimilate to all immediately following consonants, e.g.

\[
\begin{array}{cccc}
<table>
<thead>
<tr>
<th>sg</th>
<th>pl-stem</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>(64)</td>
<td>súlàèe</td>
<td>*sull</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(65)</td>
<td>bátùúu</td>
<td>*batt</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(66)</td>
<td>kwàrñí</td>
<td>*kwarr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
\]
5. **Summary and conclusions**

In this paper, data from three Chadic languages have been presented that illustrate the importance of syllable weight as a linguistic concept. A brief survey of the same phenomenon in a half dozen other languages (three Indo-European, two Finno-Ugric, and one Semitic) shows it not to be a peculiar feature limited to Chadic. Rather, all the materials taken together suggest a wide applicability of Kuryłowicz' principle equating syllable final long vowels with syllabic cores composed of a vowel plus a consonantal coda, and thus a general cross-language validity for the concept of syllable weight as a phonological variable. In closing, let me summarize the basic principles that enter into the description of syllable weight as a phonological variable.

(a) Syllable weight is determined solely by the make-up of the nucleus plus the coda, i.e. the "core"; the syllabic onset never plays a role in determining syllable weight. For this purpose a complex initial cluster and a zero onset are of equal irrelevance. The consonantal coda usually has the same value in determining syllable weight regardless of its internal complexity but one must leave open the possibility that in some languages complex codas might be heavier than simple codas.

(b) In languages with distinctive syllable weight, there will be one and only one type of light syllable, namely, Cv. We would not expect, therefore, to find a language which, for example, grouped Cv and Cvc syllables together as opposed to Cvv and Cvvc.  

---

19 According to Edgerton [1934], Sievers' Law in Vedic was a function of syllable weight where, contrary to our expectation, Cvc syllables counted as light. Edgerton's statement of the law can be represented as follows:

\[
\begin{array}{c}
y \\
w
\end{array} \rightarrow \begin{array}{c} iy \\
uw \end{array} / \text{closed } \underline{S} \_V \text{ where cv and cvc are light} \\
\text{and all others are heavy}
\end{array}
\]

It can be shown, however, that Edgerton's analysis is incorrect, that the conditioning environment for Sievers' Law is not syllable weight, and that his description does not stand as a valid counterexample to our general claim about the shape of light syllables. Approaching the matter with the advantage of a non-specialist's tabula rasa, it becomes immediately obvious that Sievers' Law can be handled in extremely simple terms if one describes the conditioning phonological environment after the insertion
(c) All languages distinguishing syllables on the basis of weight will necessarily have heavy syllables of the form Cvv and Cvc. The existence of heavy syllables of other types and the associated matter of maximum syllable weight must be considered as language specific (or language-family specific) phenomena.

(d) The light/heavy dichotomy and the open/closed dichotomy are distinct. The open/closed dichotomy is limited to languages with phonemic vowel length. Although light syllables are always open, heavy syllables may be both open and closed, and there are times when it may be necessary to distinguish between them on that basis.

(e) Although syllable weight is definitionally dependent upon and empirically related to the matter of vowel length, the distinction between heavy and light syllables cannot be assumed on a priori grounds to be phonologically analyzable in terms of units of duration nor to be phonetically correlated with actual time-length differences.

(f) Given the essence of the contrast between heavy and light syllables, it seems natural to find that syllable weight as a distinctive variable functions most often in the realm of tonal, accentual, and rhythmic phenomena. However, having recognized an inherent naturalness about the heavy/light opposition itself, we can also expect to discover, not only more languages utilizing syllable weight as a phonological

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20 Vennemann [1972], in an otherwise excellent paper, mistakenly fails to preserve the distinction between the two dichotomies and adopts the terms "open" and "closed" for what I am calling "light" and "heavy". In a personal communication, he explains that this was not an oversight, but rather represents an implicit hypothesis to the effect that languages with distinctive vowel length will only distinguish syllables on the basis of weight and never on the basis of openness.

21 Kim (personal communication) suggest that the contrast between heavy
variable, but also—as we saw in Chadic—a greater range of phonological and morphological environments where the variable has a functional role in linguistic description.\textsuperscript{22}

and light may be more a matter of differences in physiological energy than in time. For an excellent review of recent experimental work on the syllable see Kim [1971].

\textsuperscript{22}This is a revised version of a paper presented at the Third Annual Conference on African Linguistics, held at Indiana University, April 7-8, 1972. In developing the ideas in this paper, I have benefited by discussions with William Cook, Warren Cowgill, Chin-Wu Kim, Alvin Liberman, Floyd Lounsbery, Roxana Ma Newman, F. W. Parsons, Franz Rosenthal and Russell Schuh. I would particularly like to thank Theo Vennemann and Joan Hooper for making available prepublishing copies of certain of their papers. Research in Nigeria on Bolanci and Kanakuru was supported by an NSF Grant GS-2279.

\begin{center}
REFERENCES
\end{center}


