NUER PHONOLOGY :
THE ROLE OF SYLLABLE STRUCTURE

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DECLARATION

I, the undersigned, declare that this thesis has been submitted for examination with my approval as University Advisor.

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Date June 6, 1993

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TABLE OF CONTENTS

ABBREVIATIONS

voc	vocalic
voi	voice
nas	nasal
occ	Occlusive
CCL	complete closure
Vib	vibrant
BK	Back
Lab	Labial
Api	Apical
Cor	Coronal
Hi	High
Lo	Low
Cen	Central
Br	Breathy
CR	complement Rule
DR	Default Rule
L	Low tone
H	High tone
M	Mid tone
F_1	First formant frequency
F_2	Second formant frequency
V	Vowel
O	Onset
R	Rhyme
C	Coda
N	Nucleus
T	Tone
σ	Syllable

ABSTRACT

This paper deals with the phonology of Nuer. It attempts to give a brief description of the phonology and examines the role of the syllable structure in light of the autosegmental approach.

Chapter one gives some background information about the people and the language, the review of literature and the theoretical models employed in the analyses.

Chapter two deals with a brief description of the phonology, describing and analyzing the consonant and vowel phonemes in the light of underspecification theory. The underspecified feature matrices are given with the relevant redundancy rules for both consonants and vowels. The description gives special attention to the vowel system, because of its interesting but difficult nature. There are sixteen vowel phonemes against the twenty consonant phonemes. The vowels belong to two types of voice qualities: plain and breathy. It is a distinction based on the acoustic analyses of the two sets of vowels. Besides, the tonal system is briefly described and three tone levels-high, mid and low- are recorded.

Chapter three discusses the morphophonemic processes and the role the syllable structure plays. From both descriptive and theoretical points of view, the syllable structure is found to be an interesting aspect of Nuer phonology. It can control most of the morphophonemic processes of the language and these processes are conditioned both by the principle of licensing and the syllable template of Nuer.

The fourth and the last chapter gives the summary and conclusion of the thesis.

1. INTRODUCTION

1.1 The people and the language

The Nuers, along with the Burun and Anywa, belong to the Western Nilotic group. They live in the Republic of Sudan and Ethiopia. The main body of Nuer speakers, numbering perhaps half a million, is found in southern Sudan. (Bender, 1975 : 51) The Nuers of Ethiopia, about 60,000 - 65,000, inhabit the south-western border of the country along the bank of Baro (Sobat) River, centered in Gambella Region of Western Ethiopia.

Though pastoral-horticulture forms the basic economy, cattle are the passion of Nuer; and according to Bender (1975:52), the Nuer are noted as the cattle people par excellence in Africa and the world. By and large, the payments of bride-wealth, blood-wealth, etc are paid in terms of cattle.

Nuer is the name of the language as well as the people who speak the language. Linguistically, this language is classified under the East-Sudanic sub-family in the Nilo-Saharan phylum (Bender, 1976:441).

Tucker and Bryan, (1956:98) say that in Nuer "there are several main dialects, roughly corresponding to the geographical divisions of the Nuer tribes" However, according to the present study Nuer has four dialects, namely : (1) gaajak, (2) gaajiọk, (3) ɭɔ̱w , and (4) Jikuecieŋ [1]

Only the first two dialects are partially represented in Ethiopia while all four are spoken is Sudan. The dialect variation is quite distinctive in the phonology of the language. One major variation could be the dental and interdental sounds. In gaajak and gaajiọk (eastern dialects) the phonemes /t̪/ , /d̪/ and /n̪/ are interdental sounds while in the western dialects, ɭɔ̱w and Jikuecieŋ , they are produced at the dental position.

Moreover, in some words the phonemes /k/ and /h/ appear interchangeably in different dialects. The following are examples:

	Eastern Nuer	Western Nuer	Gloss
(1)	/ cɔk /	/ cɔh /	'ant'
(2)	/ coak/	/coah/	'bone'
(3)	/ puɔ̤k/	/ puɔ̤h/	'the ash of cow dung'

From the above examples, it is reasonable to suppose that the gaaJak and gaajiok dialects are closer to each other whilst the lɔu and Jikuecieŋ dialects are also closer to each other.

However, since the paper limits itself to the gaajak dialect it is difficult to say precisely the extent to which the dialects vary from each other, but a further contrastive study of these dialects might reveal it.

1.2 Previous studies

In the past, very few linguistic studies have been made of the structure of the language. These are:

1.2.1 Outlines of A Nuer Grammar by J.P.Crazzolara (1933). This is the oldest book on Nuer grammar. It starts with a brief sketch of the sound system of the language and goes on with the morphological and syntactic description in some detail. As far as phonology is concerned, the author identified three types of vowels which he labelled as 'normal', 'hollow' and 'bag sounds' (Crazzolara, 1933:2) While the distinction between normal (=plain) and hollow (=breathy) vowels seems to be clear enough, the third distinction, of 'bag sounds' is quite ambiguous. All in all, twelve vowel phonemes are recorded.

1.2.2 Hand book of African Languages. Part III. The Non-Bantu Languages of North-Eastern Africa. Tucker and Bryan (1956). This book gives some basic information on the dialect variation and linguistic classification of Nuer in brief.

1.2.3 Linguistic Analyses, the Non-Bantu Languages of North-Eastern Africa by Tucker and Bryan (1966). The book deals with "Nilotic" languages of which Nuer is a member according to the authors. These languages include Dinka, Northern Iwo and Southern Iwo. The purpose was to give a comparative sketch of these languages. Although it might be very brief, the book is a useful guide for further investigation into the grammar of the language.

1.2.4 Tentative Time depths for Nuer, Dinka, and Anuak by John Mclaughlin (1967). This paper attempts to determine the chronological linguistic relationship, or time of separation, between Nuer, Dinka and Anuak in terms of glottochronology.

The study is based on the comparison of the basic vocabulary items originally proposed by Swadesh.

The result of the study is supposed to show that the language group of which Anuak was a member began to separate from the Nuer-Dinka language around 335 B.C. and the Nuer-Dinka began to separate some 42o years later around A.D. 85.

According to the analyses presented in the study Nuer is closer to Dinka than to Anuak.

1.2.5 A more recent paper is done by Tsehainesh G/Yohannese a senior essay in Linguistics, entitled Nuer phonology (1983). In this preliminary study of Nuer phonology the writer presents thirty-two segmental phonemes twenty-four of which are consonants and the rest vowels; all vowels appear both short and long. Besides, the distribution and cooccurence of Nuer phonemes are discussed. Concerning the tonal system three contrastive tonemes, high, mid and low are recorded.

1.3 The objective of the present study:

As can be seen in the review of literature, Nuer is one of the least described languages of the Western Nilotic group. Very little descriptive work has been done on the language. Particularly, the wowel system, probably due to its complicated nature, is one of the areas of Nuer phonology that is hardly described.

Hence, the main objectives of the present study are:-

(1) to give a brief description of the phonology, and
(2) to show the role the syllable structure plays in Nuer phonology.

For this purpose, a non-linear approach is employed. It is claimed in this study that phonological phenomena like the syllable can more adequately and consistently be described in the autosegmental framework. Further developements of this approach such as ' Autosegmental Licensing' and 'underspecification Theory' are also utilized in the analyses.

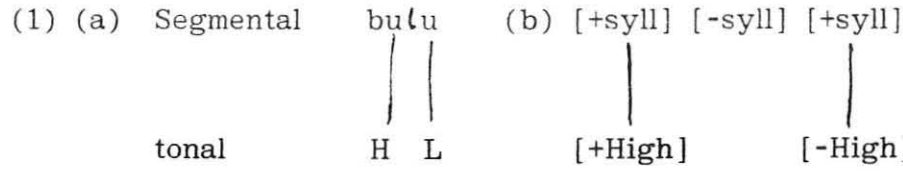
1.4 Theoretical Models

1.4.1 Non-linear phonology

In order to analyse a tone language such as Nuer, it has been argued that the standard generative approach is inadequate (Goldsmith,1976). The SPE model assumes that tone is an inherent property of the segment and both segmental and suprasegmental elements are arranged in a linear order one after another (Katamba, 1989:189).

As discussed in the literature at length (Goldsmith, 1976,1990), (Durand,1990), an approach which assumes more than one tier can more adequately describe a tonal phenomena. According to this approach, tone is a property whose domain is tied to a segment but which assumes an independent tier of its won. Hence, a tonal tier should be distinct from, but associated to a segmental tier (Goldsmith, 1976).

Goldsmith (1990:8-9) gives a simple picture to illustrate this point



According to him, "Each tier itself consists of a string of segments, but the segments on each tier differ with regard to what features are specified in them ... in (1a) the segments are not analysed as features, in (1b), features are used to illustrate much the same representation" (1990:8-9)

Therefore, on the tonal tier each segment or feature is specified only for tone and on the segmental tier all the other features are specified. This idea of having two or more parallel tiers in phonological representations was also extended to other phenomena such as vowel harmony, nasalization, reduplication,etc.

Another advantage of the non-linear approach is its recognition of the syllable as a phonological unit. In the SPE the syllable was practically ignored and the emphasis was on segments and boundaries. The need for the syllable was later established on the basis that:

(1) a segment-based description is inadequate to express rules which are syllable-based;

(2) the specification of the phonotactics of a language can be complicated ,if the syllable is ignored;

and as a result, a large number of important generalizations would be missed.

As we shall discuss in chapter 3, in Nuer, as in some other languages, recognising a syllable-based description will more adequately describe the morphophonemic processes and the phonotactic restrictions. In analysing the syllable structure the notion of 'Autosegmental Licensing' is applied and a brief summary of the notion is as follows.

1.4.2 Autosegmental Licensing

The notion of 'autosegmental licensing' was first introduced by Goldsmith(1990) in his book Autosegmental and Metrical phonology. He claims that the notion of licensing serves to link autosegmental structure together with the hierarchical structure of the syllable (Goldsmith 1990:5).

According to this notion there are prosodic units that are licensers- the syllable node, the coda and certain word-final morphemes. The syllable node is the primary licenser, and the remaining two are secondary licensers. Goldsmith (1990:123)says "a licenser is endowed by the grammar of the language with the ability to license a set of phonological features..."

Accordingly, the syllable node, being the "main licenser" can license all the distinctive features of the language. It can license any feature or autosegment in the combined domain of the onset-nucleus span. The onset and the first element of the nucleus are counted as a single unit.

The coda, which is a "secondary licenser", on the other hand, licenses only a subset of the distinctive feature of the language. This means that a coda may be incapable of licensing some of the distinctive features of the language.

One example is homorganic assimilation where nasals and obstruents that appear in coda will either be homorganic to the following consonant, i.e. they will share the point of articulation of the autosegment that is licensed by the following onset or they will have a non-distinct default point of articulation.

Elements that are not licensed at word-level will be deleted. According to Goldsmith(1990:124)."... all autosegmental material must be licenced at the level we called the W-level, the word-level. Elements not licensed at this level will not proceed to the postlexical phonology, i.e. are deleted".

In short, the basic principles of the theory of licensing can be spelled out as follows.

(1) The syllable node will always be a licenser for all the distinctive features of the language.

(2) The coda will be a licenser for a small subset of the features of the language, thus having only a small set of possible contrasts.

(3) The onset and the first element of the nucleus are counted as a unit. Anything to the right of the single obligatory nucleus position is part of the coda.

(4) There is a maximum of one apperance of each distinctive feature over the onset-nucleus span.

(5) Tone and stress can also be licensed by the syllable node. But the coda licenses tone or stress depending upon language specific parameters.

1.4.3 Underspecification Theory (UT)

UT is developed by Pulleyblank (1983,1986) and Archangeli (1984) as a theory of distinctive features and their specification in underlying representation. This theory assumes that there should be few feature specifications as possible in the lexicon. According to Archangeli (1984:50) "A grammar is most highly valued when underlying representations include the minimal number of features necessary to make different the phonemes of the language" This principle is known as The Feature Minimization Principle. It is also stressed that "redundancies should be extracted from underlying entries not only for distinctive features but for all other aspects of phonological representation" (Durand,1990:159).

Goldsmith (1990:243) summarizes the core ideas of underspecification theory in two principles.

(1) 'eliminate redundant features from the lexical phonology'. This means that we have to use the smallest number of distinctive features necessary to keep the phonemes distinct.

(2) 'eliminate unmarked feature specifications from underlying forms'. Only the 'marked'or the less expected value may be explicitly present in underlying representations.

The advantage of this theory is it reduces the amount of information stored in the deepest representation. Its application to Nuer data will also account for the asymmetric behaviour of a consonant and a vowel.

1.5 Distinctive Features :

Within the main-stream generative phonology there are different assumptions as to how distinctive features operate in phonological systems and their specification in underlying representations. For instance, in SPE it is assumed that phonological rules operate on fully specified Distinctive Feature Matrices. That is , "a value for every feature is assigned to every phoneme,..." (Archangeli, 1984:39)

On the contrary, as discussed above, UT advocates that there are as few feature specification as possible in underlying representations.

As to which features and which values should be represented underlyingly, Archangeli (1984:56) proposes that the features that are truly distinctive in a particular language and those values which are unpredictable should be represented. The choice of the underlying value depends on both language specific and universal principles. The predictable distinctive features or feature values are supplied by Redundancy Rules-which are also the result of the interaction between language specific and universal principles.

The Redundancy Rules that fill in the missing values are two types: default rules and complement rules. "Default rules are, for the most part, universal but can be language specific. Complement rules are language-specific but result from a universal convention and are therefore, cost free " (Durand, 1990:161).
A typical example of a default rule can be:

(2) [ ]---→ [-low] / [+high]

Which means that for high segments non-low is a normal value.

A complement rule supplies the opposite value of the feature selected for underlying representation. If, for instance, in a language for certain vowels the feature [+low] is marked in underlying representation, the opposite value would be marked for the remaining vowels by a complement rule such as (3) below.

(3) [ ] ---→ [-low]

The ordering of redundancy rules relative to each other and to the other rules of the language is largely derivable from the Elsewhere Condition. According to this principle, the more specific rule applies first and later the more general rule applies elsewhere. Goldsmith (1990:221) says "The Elsewhere Condition states, in informal terms, that, when two principles of operation are in conflict at a certain point in a derivation, then the one whose domain of operation is more restricted has priority of action."

Notes on chapter 1

1. I was able to find informants from these different dialects in Gambella town and all of them agree that Nuer has four varieties. It is based on the judgements of these informants and my own observation in the field that I made this claim. Some lexical evidences is also given on page 2.

2. A BRIEF DESCRIPTION OF THE PHONOLOGY:

In this section, a brief description of the consonant system, the vowel system, the tonal system and phonotactics will be given.

2.1 The consonant system [1]

2.1.1 consonant phonemes.

Nuer has twenty consonant phonemes. These phonemes are similar to phonemes given by Tucker and Bryan (1966:402) as "a characteristic basic consonant system" for Nilotic languages.

		Bila	Dental	Alveo	Palat	Velar	Glott
Plosives	Vl	p	t̪	t	c	k	
	Vd	b	d̪	d	J	g	
Nasals		m	n̪	n	ɲ	ŋ	
Liquids				l,r			
Glides		w			y		h

chart 1 consonant phonemes of Nuer[2]

The dental and alveolar sounds are contrastive as can be seen in the following examples.[3]

(4) / túk / 'began'
/ t̪ūk / 'languages'

(5) / dol / 'to collect'
/ d̪ol / 'boy'

(6) / niam / 'face'
/ n̪ial / 'rain'

These are not truly minimal pairs rather they are sub minimal pairs.

The scarcity of fricative sounds in the system is apparent. While discussing the phonology of Anuak, Keefer, J. and et al (1976:165) say that "one of the most striking phonological features of the Nilotic languages to which Anuak belongs is the scarcity of fricative sounds". This statement holds true for Nuer since almost no fricative sound is identified in this study.

There are also some phonetic variations in the consonant system: aspiration, palatalization and labialization are apparent in the language.

Voiceless plosives are aspirated word-finally as well as intervocalically as can be seen in the following examples.

(7) [dep^h] 'rope'

(8) [dok^h] 'fat'

(9) [$dɔt^hɔal$] 'young snake'

(10) [$mit^hɔt^h$] 'little'

Palatalization and labialization appear both with front and back fowels

(11) [tyec] 'ask!'

(12) [byɪ̈l] 'taste!'

(13) [kyɛl] 'cough!'

(14) [cwɔ̈ŋ] 'finish!'

(15) [gwe̤ri̤] 'touch!'

(16) [ƿwɔ̈t] 'sweel!'

(17) [Jyek] 'find!'

(18) [gwɔ̈r] 'elephant'

(19) [lwɔc] 'answer!'

(20) [lwɤ̈k] 'help!'

(21) [riɛm] 'blood'

(22) [ruɔ̈n] 'year'

Except /h/ , all consonants occur with the features of palatalization and labialization. With the exception of the high vowel /i/ all vowels occur after palatalized consonants. Similarly, all vowels except the high back vowel /u/ occur after labialized consonants. In Nuer, these high glides are analysed as vowel sequences or diphthongs.

Consonant cluster do exist word-initially in the language and they are a consonant plus one of the high glides. This happens, however, only preceding double vowels and the first vowel should be a non-high vowel as in the following examples.[4]

(23) / kwɛ̀ɛ́t / 'tortoise'

(24) / ǰ yòòň / ' to scratch'

(25) / twààr / 'bee'

(26) / kwɔɔt / 'to grow up'

(27) / rwéée / 'to forget'

(28) / kwēí / 'name of a person '

2.1.2 Classificatory features and Redundancy Rules

In this section, the distinctive features needed for Nuer consonants will be presented. The fully specified feature matrix will be given first and then the minimal feature matrix will follow with the relevant rules.

The first feature listed in the matrix (see chart2) is [voc] or vocalic. In the non-linear analysis, the feature consonantal is not needed since the syllable structure will define consonants and vowels. The feature [+voc] will be sufficient identification for [w] or [y] and the syllable structure will define it as a consonant.

	voc	voic	son	nas	occ	ccl	vib	BK	Lab	Api	Cor	Hi
P	-	-	-	-	+	+	-	-	+	-	-	-
b	-	+	-	-	+	+	-	-	+	-	-	-
ʈ	-	-	-	-	+	+	-	-	-	+	+	-
ɖ	-	+	-	-	+	+	-	-	-	+	+	-
t	-	-	-	-	+	+	-	-	-	-	+	-
d	-	+	-	-	+	+	-	-	-	-	+	-
c	-	-	-	-	+	+	-	-	-	-	+	+
ɟ	-	+	-	-	+	+	-	-	-	-	+	+
k	-	-	-	-	+	+	-	+	-	-	-	+
g	-	+	-	-	+	+	-	+	-	-	-	+
m	-	+	+	+	+	+	-	-	+	-	-	-
ɳ	-	+	+	+	+	+	-	-	-	+	+	-
n	-	+	+	+	+	+	-	-	-	-	+	-
ɲ	-	+	+	+	+	+	-	-	-	-	+	+
ŋ	-	+	+	+	+	+	-	+	-	-	-	+
w	+	+	+	-	-	-	-	-	+	-	-	+
y	+	+	+	-	-	-	-	-	-	-	+	+
h	-	+	+	-	-	+	-	-	-	-	-	-
l	-	+	+	-	-	+	-	-	-	-	+	-
r	-	+	+	-	-	+	+	-	-	-	+	-

Chart 2. Distinctive Feature Matrix for consonants

The feature voice, [voi], is needed to distinguish the voiced and voiceless plosives. The sonorant[son] feature is necessary to distinguish the plosives from all the other phonemes in order to capture the morphophonemic process prevalent in the language. The feature Nasal [Nas] will distinguish nasals within the sonorant class.

There is a phonotactic restriction for which we need the feature central closure [CCL]. This feature distinguishes the semi-vowels /W/ and /y/ from the rest of the consonants. It is defined by Sommerstein(1977:103) as a complete closure involving the center of the oral tract. The feature Occlusive, [occ], which blocks the flow of air in the mouth (Sommerstein, 1977:103), will exclude the liquids from all the other consonants and it is necessary to account for the morphophonemic process restricted to liquids. The /l/ and /r/ also must be distinguished from each other. Therefore, we need the category vibrant,[vib].

As far as point of articulation (P of A) is concerned, the features Labial [Lab], Apical [Api], coronal [cor], and [High] have been set up. The glides /w/ and /y/ are distinguished by the feature [Lab] and [cor] respectively. The combination of [cor] and [Hi] will distinguish the palatals. The velars will be[-cor] and [+hi]. The feature Back,[BK],is used redundantly for consonants. However, it is useful in the Vowel Feature Matrix.

As can be seen in the above matrix, much of the information is non-distinctive or redundant. According to the Feature Minimization Principle, a matrix should include the bare minimum of information and the unspecified features are filled in by either a default Rule (DR) or a complement Rule (CR).

(29) The Redundancy Rules for consonants are :

[ ] ------→ [-voc]	CR
[ ] ------→ [-CCL / [+voc]	DR
[ ] ------→ [+son] / [+voc]	DR
[ ] ------→ [-occ] / [+voc]	DR
[ ] ------→ [-Api] / [+voc]	DR
[ ] ------→ [+son]/ [+Nas]	DR

[ ] -----> [+Occ] / [+Nas]	DR
[ ] -----> [-Nas]	CR
[ ] -----> [-Occ]	CR
[ ] -----> [+CCL] / [+Occ]	DR
[ ] -----> [+voi] / [+son]	DR
[ ] -----> [-son]	CR
[ ] -----> [-voi]	CR
[ ] -----> [-vib]	CR
[ ] -----> [+CCL] / [+vib]	DR
[ ] -----> [+son] / [+vib]	DR
[ ] -----> [+cor] / [+vib]	DR
[ ] -----> [-Api] / [+vib]	DR
[ ] -----> [-Hi] / [+vib]	DR
[ ] -----> [-BK]/ [+vib]	DR
[ ] -----> [+voi] / [+vib]	DR
[ ] -----> [-cor]	CR
[ ] -----> [-BK] / [+lab]	DR
[ ] -----> [-Hi] / $\begin{bmatrix}\text{-voc}\\ \text{+lab}\end{bmatrix}$	DR
[ ] -----> [-Api] / [+lab]	DR
[ ] -----> [-lab]	
[ ] -----> [-BK] / [+cor]	DR
[ ] -----> [+BK]	CR
[ ] -----> [+Api]	CR
[ ] -----> [-Hi] / [+Api]	DR
[ ] -----> [-Hi] / $\begin{bmatrix}\text{+CCL}\\ \text{-OCC}\\ \text{-Vib}\end{bmatrix}$	DR
[ ] -----> [+Hi]	CR

In Nuer, the least specified consonant is /r/ and as we shall see in section(3.12) it is also the only epenthetic consonant in the language. One reason could be its being the least stable phoneme in the language, sometimes it does not appear on the surface when it is expected to be there. For instance, the underlying form of the verb /wʌ̈ː/ 'to go' is /wʌ̈r/. When the suffix is added to the root the lost final /r/ will come out as in /wḕrɛ / 'go!' (Imp.2ps).

	voc	voi	son	Nas	Occ	CCL	Vib	Bx	Lab	Api	Cor	Hi
P					+				+			
b		+			+				+			
t̪					+						+	
d̪		+			+						+	
t					+					-	+	-
d		+			+					-	+	-
c					+					-	+	
J		+			+					-	+	
k					+					-		
g		+			+					-		
m				+				-	+	-		
n̪				+				-			+	
n				+						-	+	-
ň				+						-	+	
ŋ				+						-		
w	+								+			
y	+										+	
h			+			+		-		-		
l			+			+				-	+	
r							+					

Chart 3, Matrix of underspecified Features for Nuer consonants.

2.2 The vowel system

The vowel system of Nuer, although it is difficult to analyse, is an interesting part of Nuer phonology. In the past, a few have commented on the nature of vowels but no one has given a detailed account of the system.

Tucker and Bryan (1966:402) in their discussion of 'The Nilotic Languages' noted that an outstanding characteristic of these languages is the presence of both 'hard' and 'breathy' (or 'hollow') voice quality in the pronunciation of vowels, diphthongs, and semi-vowels.

They also stated that in the Nilotic languages like Dinka, Nuer and Shilluk almost any vowel may be pronounced with both types of voice quality, depending largely on grammatical context.

Commenting further on Dinka-Nuer vowel systems the authors stated that Dinka-Nuer has 7-9 vowels pronounced with 'hard' voice and the same vowels pronounced with 'breathy' voice. Moreover, there are 2-4 centralized vowels pronounced with breathy voice. Since Tucker and Bryan have mentioned Nuer while comparing it with other Nilotic languages their comparative sketch is very brief and too summary in description. Only general statements are given on the nature of vowels and according to the authors "the exact phonemic boundaries of some of the vowels are still uncertain" (1966:402). The present study, however, agrees with Tucker and Bryan in the presence of two types of voice qualities: plain and breathy.

On the other hand, Tsehainesh (1983:17) recorded eight basic vowels all of which occur both short and long; and length being phonemic, she concluded that there are sixteen vowels in the language.

Front	central	Back
i	ɨ	u
e		o
ɛ		ɔ
	a	

Chart 4 : Vowel phonemes of Nuer as given by Tsehainesh.

This study differs from Tsehainesh's analysis on the following points.

(a) The present study identifies two types of voice quality but she identified only one type.

(b) Tsehainesh identified the high central vowel / ɨ̈ / as a phoneme of Nuer. But it is not identified in the present study and not recorded in any of the related languages like Dinka and Anuak.[5]

According to the analysis made in this study there are two types of voice qualities: plain and breathy. Acoustic evidence is given is section 2.2.3 below.

2.2.1 Plain (or non-breathy) vowels :

There are seven plain vowels in Nuer. Of these the front vowels / i̤ ,e, ɛ / are similar to the cardinal vowels 1,2, and 3 respectively. The back vowels / ɔ,o,u / are also similar to the cardinals 6,7 and 8 respectively. The other vowel is the low central vowel /a/ which is similar to the cardinal vowel 4 . The following are examples.

(30) (a) /tit̀/ 'to remember'
(b) /tet̀/ 'hand'
(c) /tɛ̀t/ 'reclaim'
(d) /tát/ 'one side of buttock'
(e) /tɔ́t/ 'waste'
(f) /tót/ 'to bend'
(g) /túut/ 'bulls'

There is little allophonic variation in the vowel phonemes. Nasalization is apparent preceding or following nasal consonants and it does not affect breathy vowels.

Concerning the distribution of plain vowels, back vowels are not found in word initial position while front vowels are found in all positions in a word. However, for the time being, the reasons for the non-occurence of back vowels in initial position are not clear.

2.2.2 Breathy Vowels

Breathy vowels, as in other Nilotic languages like Dinka and Anuak, are produced with open pharynx accompained by glottal friction. Some linguists have commented on the nature of breathy vowels.

According to Welmers (1973:28) during the production of these vowels "the vocal cords do not entirely close, permitting the air passing from the lungs to produce an audibly frication effect" While discussing the Dinka vowels John Duerksen and Salva Agany (1982:3), as quoted by Job Malou (1988:29), also say that "The breathy voice is produced by opening the vocal cords slightly, increasing the flow of air from the lungs and expanding the pharynx."

A more detailed description of breathiness is given by John Laver (1980). For him the quality of breathy voice is a modified form of the normal voice which he calls a 'modal voice' . He says that breathiness is a normal voice which is accompained by slight audible friction (1980:132)

The impressions given by different linguists concerning the breathy voice are more or less similar in the sense that breathy voice is produced with slight opening of the glottis that permits a higher flow of air to cause glottal friction and expansion of the pharynx.

As in the other Western Nilotic languages in Nuer also what is involved in the production of breathy vowels is an audible glottal friction which is caused by increasing flow of air. The effect is , as Catford in Laver (1980:132) explained it, somewhat like that of sighing.

Consider the following examples and compare them with examples in (30) above.

(31)	(a)	/tit̤/	'magicians'
	(b)	/tet̤/	'to dig'
	(c)	/tɛt̤/	'branch of something'
	(d)	/tat̤/	'erection'
	(e)	/tɔt̤/	'summer'
	(f)	/tot̤/	'lifting up'

As can be seen from the above examples Nuer has six breathy vowels. The breathy /u/ is absent in the system and the reason for this asymmetry is not clear. Probably it could be due to historical reasons because the vowel is also absent in closely related languages like Dinka (Malou,1988) and Anuak ((Lusted,1976) (keefer et al, 1976)) [6]

Concerning the distribution of the breathy vowels, they occur in medial and final positions only.

Word medially

(32)	(a)	/ i̤ /	/ tin̤ /	'breast'
	(b)	/ e̤ /	/ tèk̤ /	'alive'
	(c)	/ ɛ̤ /	/ pɛɛ̰ /	'to fall'
	(d)	/ a̤ /	/ mat̤ /	'smoke'(V)
	(e)	/ ɔ̤ /	/ hɔ́k̤ /	'cattle'
	(f)	/ o̤ /	/ kọt̤ /	'climbing'

Word finally

(33)	(a)	/ i̤ /	/ ídì̤ /	' how?'
	(b)	/ e̤ /	/ yìè̤ /	'breath'
	(c)	/ ɛ̤ /	/ kɛɛ̤ /	'the first born child'
	(d)	/ a̤ /	/ bákà̤ /	'early morning'
	(e)	/ ɔ̤ /	/ dɔ́ɔ̤ /	'may be'
	(f)	/ o̤ /	/ hòò̤ /	'because'

Why such vowels are not found in initial postition is an interesting and challenging problem awaiting solution.

In Nuer there are also other central breathy vowels[7] which do not have plain counterparts. This is in line whith Tucker and Bryan's general statement which says that in Dinka-Nuer there are 2-4 central vowels

produced with breathy voice (1966:402). Particularly, in Nuer there are three central breathy vowels; unlike in Dinka where they are analysed tentatively as phonetic vowels by Malou (1988:74) here they have phonemic status. The following examples illustrate this point.

(34) (a) / kɛ̤ɛ̤ / 'with'

(b) / kɛ̤ɛ̤ / 'the first born child'

(c) / kɛ̤ɛ̤ / 'a divorced lady'

(35) (a) / pàt / 'to clap'

(b) / pà̤t / 'cook'

(c) / pà̰t / 'tray'

(36) (a) / lɔk / 'washing mouth'

(b) / lɔ̤k / 'umbilical cord'

(c) / lɔ̰k / 'refusal'

Of the central breathy vowels / ɛ̤ , a̤ , ɔ̤ /,the mid low central breathy vowel / ɛ̤ / is very rare in the language and so far it is found only in two words. Moreover, the short counterpart of this vowel is absent and only the long one is found. The remaining two are found frequently in many words in the language. As the other breathy vowels, no central breathy vowels are found in word initial positions.

As can be gathered from the above discussion the vowel phonemes of Nuer are the following

	Front	Central	Back	Front	Central	Back
High	i		u	i̤		
High-mid	e		o	e̤		o̤
Low-mid	ɛ		ɔ	ɛ̤	a̤	ɔ̤
Low		a				
	Plain Vowels			Breathy Vowels		

Chart 5: Vowel phonemes of Nuer

In Comparison with the plain vowels, among the breathy vowels there are more central vowels. The central vowels have no plain counterparts. The gap is similar in the other languages like Dinka. The reason for this gap could be historical, that is to say, either the plain vowels lost these vowels or these vowels are recent innovations in the breathy vowels in the history of the language. This should be verified by historical analyses of Nuer and the related languages.

2.2.3 The Acoustic evidence

The voice quality difference in vowels discussed above, from an articulatory point of view, can be supported by the acoustic analysis of these vowels.

In order to see the acoustic characteristics of the voice qualities-breathy and non-breathy-spectrographic analysis was made on selected examples.[8] From the formant data given in footnote(8), the voice qualities are represented in graph(1). (see Appendix 1)[9]

The result of the analysis shows that generally the frequency of F_1 (first formant frequency) is lower and the frequency of F_2 (second formant frequency) is higher for breathy vowels than plain vowels. Hence, the breathy vowels appear more front or central and higher in the graph than their plain counterparts. Having a lower frequency of F_1 is a result of a lower vocal tract which gives a greater vowel height. (Jacobson,1980:185)

If we compare the spectrogram (see Appendix 2) of the breathy vowels with the plain ones, we see the loss of high frequency energy in breathy vowels. This loss in high frequency energy is seen as lightness of high formant frequencies. Such a loss shows the absorption of high frequency energy by the lax pharyngeal wall which is a result of the dilation or expansion of the pharynx (Jacobson,1980:186)

As indicated by the lower frequency of F_1 of the breathy vowels, the plain vowels are lower in position than the breathy vowels. This is

in line with Laver's (1980:115) comparison of breathy voice with ' modal voice ' (normal voice) where breathy voice has a lower F_1 frequency.

In general, despite some problems[10], which are concerned with differences in vowel qualities, the acoustic characteristics of the vowel phonemes shows that in Nuer there are two types of voice qualities:- Plain and breathy.

2.2.4 Vowel length [11]

In this language vowel length seems to be contrastive both at the lexical and at the grammatical level for almost all vowels. Consider examples in (37) , (38) and (39).

(37) (a) / ɟ̀it̪ / 'Scorpion'
/ ɟíìt̪ / 'stopping of the rain'

(b) / kèk / 'dam'
/ kéèk / 'ruler'

(c) / tɛ́r / 'conflict'
/ tɛ̀ɛ́r / 'september'

(d) / gàk / 'to quarrel'
/ gàák / 'flower'

(e) / kɔr / 'after'
/ kɔɔr / ' homosexual'

(f) / tók / 'sound of a broken thing'
/ took / 'calabash'

(g) / kut / 'beside'
/ kuut / ' fiance'

(38) (a) /bi̤ / 'you will'
/ bii̤i̤ / 'cloth'

(b) / tɛ̀t̤ / 'to dig'
/tɛ́ɛ̀t̤ / 'to take it back'

(c) / rɛ̀l̤ / ' sunrise'
/ rɛ́ɛ̀l̤ / 'of hill'

(d) / la̤ŋ / 'praying'
/ laa̤ŋ / 'golden colours'

(e) / kɔ̤c / ' cold'
/kɔ̤ɔ̤c / 'a cow which is not agressive'

(f) / kɔ̤t / 'climbing'
/ kɔɔ̤t/ 'spear-like instrument used for fishing'

(39) (a) / bʌ̤r / 'long'
/ bʌʌ̤r / 'arrow'

(b) / kɔ̤r / 'war'
/ kɔɔ̤r / 'stream'

As can be seen in example (39) all central breathy vowels but one have short and lengthened form. As explained in section (2.2.2) the mid-central breathy vowel has only the lengthened form.

In general, by considering examples in (37),(38) and (39) one may conclude that vowel length is contrastive at the lexical level for almost all vowels.[12] Unlike the previous studies, however , in this paper the above examples are treated as sequences of juxtaposed identical vowels. One piece of evidence for this treatment is the productive occurence of sequences of non-identical vowels in the language. The following are some examples.

(40) (a) /ŋuar/ ' bean '

(b) /ŋuan/ 'four'

(c) / nial/ ' sky '

(d) / ciaŋ / ' day '

(e) / yèi / ' canoe '

(f) / yɔac / ' to pull '

(g) / rɔam / ' sheep '(sg)

(h) / pàì / ' moon '

(i) / lèì / ' animal '

Another piece of evidence comes from the tonal system. Short vowels carry one tone of high,mid or low and never a contour tone. But phonetically long vowels sometimes carry a glide or contour tone. It is a result of the combination of two register tones within a single syllable. Therefore, the length in Nuer is not one lengthened vowel but a sequence of juxtaposed identical vowels. Consider the following data.

(41) (a) [tɛ́r] 'conflict'

[tɛ́ɛr] 'september'

(b) [ɟ̀it] 'scorpion'

[ɟìit] 'stopping of the rain'

(c) [rɛ̀l] 'sunrise'

[rɛ́ɛl] 'of hill'

2.2.5 Classificatory Features and Redunduncy Rules

The features used for the vowel system are High [Hi], Low[Lo], Back [BK], central [cen], and Mid [Mid]. The feature [Lo] is not necessary for consonants since there are no [Lo] consonants in Nuer, but it is being used redundantly because it is needed for the vowels. One additional feature Breathy [Br] will distinguish the two set of vowels. Except/u/ all vowels may be either [±Br].

	i	e	ɛ	a	ɔ	o	u
Hi	+	-	-	-	-	-	+
Lo	-	-	+	+	+	-	-
BK	-	-	-	-	+	+	+
Mid	-	+	+	-	+	+	-
Cen	-	-	-	+	-	-	-

Chart 6 Distinctive Feature Matrix for vowels

(42) Redundancy Rules for vowels are:

[ ] ---> [+hi] CR
[ ] ---> [-Hi] / [+Lo] DR
[ ] ---> [-Lo] CR
[ ] ---> [+BK] CR
[ ] ---> [-Mid] CR
[ ] ---> [-cen] CR

	i	e	ɛ	a	ɔ	o	u
Hi		-				-	
Lo			+	+	+		
BK	-	-	-	-			
Mid		+	+		+	+	
Cen				+			

Chart 7: Matrix for underspecified vowels of Nuer

As can be seen in chart 7, the vowel /u/ is the least specified vowel in Nuer. It is also an opaque vowel in the vowel harmony process discussed in section(3.1.3) below and specified underlyingly for the opposite value of the harmonizing feature-value.

According to Gilley (1988:24), "It is often the case... that one phoneme in each major subsystem (i.e., vowels and consonants) may be represented as prosodic functions without any feature specification at all." In case of Nuer, as we have seen above, the consonant /r/ and the vowel/u/ are the least specified phonemes in the language.

2.3 Tone :

In the past very little has been said concerning the tonal system and tone functions in Nuer. Tucker and Bryan (1966) and Tsehainesh(1983) mentioned tone in their studies. Simply brief statements are given with some examples.

The present study does not claim to give an exhaustive treatment of the tonal system and the tone functions in this language. But it attempts to look at the system in more detail than the previous works.

Both Tucker and Bryan (1966) and Tsehainesh (1983) recorded three tone levels, i.e. high, mid and low. Tsehainesh's transcription is inaccurate for both tonemes and segmentals.

In fact, Nuer is a register tone language with three tone levels, high /´/, mid /-/ and low / ` /. In addition, we can find contour tone as a result of the combination of two register tones within a single syllable.

Consider the following examples

(43) / pʌ́t / 'to miss while shooting'
/ pʌ̄t / 'foot'
/ pʌ̀t / 'tray'

(44) / wáŋ / 'eye'

/ wàŋ / 'to burn '

(45) /ɟi̤t̤ / 'Scorpion'

/ɟi̤t̤ / 'ear'

(46) /ɟʌ̤̄l / 'Journey'

/ɟʌ̤̄l / ' guest '

(47) / tùɔ́ŋ / ' egg '

/ tūɔ́ŋ / ' horns '

Examine also the minimal pairs in (43) with the following frame.

(48) (a)/pʌ̤̀d -ɗún / ' your(pl) tray '

(b)/ pʌ̤̄d - dún 'your(pl) foot '

(c)/ téd-dún / 'your(pl) hand '

2.3.1 Lexical Tone :

In the lexicon tone makes a distinction both among nouns and verbs.

(49) (a) /ňáŋ / ' colourful (for cows)'

/ ňàŋ / ' Crocodile'

(b) / tùɔ́ŋ / ' egg '

/ tūɔ́ŋ / ' horns '

(c) / pʌ̤̄t / ' foot '

/ pʌ̤̀t / ' tray '

(50) (a) / kạ̀k / 'to spit '

/ ká̤k / ' to hunt '

2.3.2 Grammatical Tone

The plural form of some nouns is distinguished by different tone levels. The following are some examples:-

(51) (a) /wúm / ' nose '

/ wùm / 'noses '

(b) / gùɔ̰r/ ' elephant '

/ gúɔ̰r/ ' elephants '

Nevertheless, tone classes are unpredictable between singular and plural forms of nouns; there are also other means of plural formation (Moges, forthcoming). Consider the following examples.

	Tone	Singular	Plural	Gloss
(52)	L-L	màc	mɅ̰̀c	' fire '
(53)	L-H	t̰ìn	t̰ín	'breast'
(54)	H-L	lɔ́c	lɔ̰̀c	'heart'
(55)	M-M	t̰ōk	t̰ūk	'mouth
(56)	H-LH	dít	díit	'bird'
(57)	LH-L	tùɔ́ŋ	tòŋ	'egg'

The first person plural exclusive, inclusive and dual-inclusive forms are also distinguished by tone.

(58) (a) / kɔ̄n / ' we (exclusive)

(b) / kɔ́n / ' We (inclusive)

(c) / kɔ̀n / ' We (dual inclusive)

The exclusive and inclusive forms can be used without restriction and occur with nouns and verbs. The dual inclusive is, however, limited to few verbs one of which is the verb / t̰ét /' to dig ' as can be seen in the following examples.

(59) (a) / tét̪ kɔ̄n / 'we dig' (exclusive)

(b) / tét̪ kɔ́n / ' we dig ' (inclusive)

(c) / tét̪ kɔ̀n / ' we dig ' (dual inclusive)

The semantic nature of the verbs to which the dual-inclusive form is limited to is not clear for the time being.

2.4 Phonotactics

Consonant sequences are found at word-initial and word-medial positions. Some examples are as follows.

(60) / bɔ̀ pdiit / ' sea '

(61) / kundur / ' domestic pig '

(62) / pɛlpɛɪ/ 'hare '

(63) / kwɛɛ̤t / ' tortoise '

In this language, consonant gemination does not exist, except as a result of the process of assimilation.

NOTES ON CHAPTER 2

1. This study disagrees with the previous study undertaken by Tsehainesh (1983) on the following points.

In the previous study, 24 consonant phonemes were recorded while in my study only 20 consonant phonemes are found. According to Tsehainesh (1983:12) the firicatives /s/ and /š/ and the alveolar affricates /ɕ/ and /ʑ/ are phonemes of Nuer. In my study, however, they are not recorded as phonemes of Nuer, since they are absent in the language or dialect under discussion. The examples presented in Tsehainesh's paper for the occurence of these phonemes were checked with the informants I had, and were found to be different phonemes. Some of the examples are the following. The (T) sign shows the way the word is transcribed in her study. Those without the sign indicate what I have found

T /ŋaɕ/	' ashes '	T [mílɛ̀s]	' hot '
/ŋɛt̪ʰ/	' ashes '	[mílɛ̀t̪ʰ]	' hot '
T /maɕ/	' to drink '	T [šáŋ]	' poor '
/maːt̪ʰ/	' to drink '	[câŋ]	' poor '

Moreover, she didn't mention the dialect her study was based on, though the above differences do not seem to be dialectal differences, since the dialect variation as briefly described in chapter 1, indicates the alternation is only between /k/ and /h/.

2. The phonemes /ɲ/ and / h / are rare in the language. Each of them do occur in less than a dozen of words out of about 600 items.

Since there are no fricative sounds in the language, the sound /h/ is patterned with glides. However, for the time being, there is no proof for the patterning of this sound with glides.

3. In this paper examples which are not marked for tone are those examples for which tone is not identified.

4. When three sequences of vowels appear the first vowel is toneless and since vowels are the only tone-bearing units in the language, this is one piece of evidence to consider the first vowel as a glide.

5. The examples presented in Tsehainesh's paper for the occurence of this phoneme were checked with the informants I had, and found to be a different phoneme. The (T) sign again shows the way the word is transcribed in her study and those without the sign indicate what I have found

T [bɨr] 'come' (Imp.2PS)
[ber] 'come' (Imp.2PS)

T [ɟɨn] 'You(sg)'
[ɟi̤n] 'You(sg)'

6. Some analyses of Dinka (Anderson, 1987) and Anuak (Reh,1988) differ from others concerning the voice quality of the vowel/u/. According to Anderson (1987:7), the vowel /u/ can only be breathy. He says that"my identification of /u/ as breathy is based on my own perception as well as on judgements by informants, who consistently identify the voice quality of /u/ with the voice quality of indisputably breathy vowels. The disagreement might (between him and Job Malou) reflect a dialectal difference but Malou does not indicate which dialect he describes."

Reh(1988), on the other hand, differs from keefer et al (1976) and Lusted (1976)by labelling the vowel /u/ as'breathy' (=type B) vowel. According to the author, "while keefer et al and Lusted list it in their phonetically oriented charts among the plain vowels, it turns up as one of the type B vowels in my functionally oriented classification" (1988:21).

Therefore, according to Anderson and Reh the breathy vowel /u/ is not absent in Dinka and Anuak respectively but its plain counterpart is missing.

7. These vowels are transcribed with two dots on the top of the vowel to show centralization and two dots beneath the vowel to show breathiness as in ɛ̤̈ . In the revised IPA of 1989 the centralized vowel is transcribed with two dots on the top of it as ɛ̈ ; and breathy voice is transcribed with two dots beneath the vowel as in ɛ̤ . Since in this study it is claimed that certain vowels have possessed the two qualities, the above transcription is used following the revised IPA. But as far as consonants are concerned, IPA is not used exclusively. Some symbols such as / y,J,C/ are also used.

8. The selected examples were analysed on the spectrograph. From the spectrographic display the F_1 (first formant frequency) and F_2(second formant frequency) values in hertz for every word were taken as can be seen from the following table.

F_1	F_2	Word	Gloss
300	2100	tìt	'to remember '
200	2100	tɪ̈̀t	' magicians '
320	1850	tɛ̈̀t	' hand '
300	1900	tɛ̈́t	'to dig '
300	1800	tɛ̂t	' reclaim '
250	1700	tɛ̤̀t	' branch of something '
350	1500	tat	'one side of buttock '
320	1600	tàt	' erection '
350	1350	tɔ́t	' Waste '
280	1400	tɔ̈̀t	' summer '
280	950	tót	' to bend '
260	1350	tòt	' lifting up '
200	850	tút	' bulls '
200	1600	tʌ̈t	' both sides of buttock'
250	1650	kɛ̤̈ɛ̤	' Ironing '
300	1350	kɔ̤̈r	' war '

9. In order to show the relationship between the vowels using the formant data, the first formant is plotted vertically against the second formant which is plotted horizontally. This arrangement allows us to represent vowels in the way we are accustomed to in traditional articulatory descriptions (Ladefeged, 1982:180). Some linguists sometimes plot formant one against the difference between formant two and one. However, usually formant one is plotted against formant two. There is only a slight difference between the two kinds of plots. (Ladefoged, 1982:180).

10. One problem is that the low central plain vowel /a/ is a bit higher as far as the mid low back plain vowel / ɔ / in the graph and it assumes a close and a parallel position to the vowel / ɔ / . A more serious problem is the central breathy vowel /ə̤ / which is further back in position than the other back breathy vowels. Another problem is the central breathy vowel /ɨ̤ / which is as high as the breathy/ i̤ / This vowel, although it assumes acoustically the high central position, in hearing it appears as mid central breathy vowel. One reason could be vowel spacing due to the absence of breathy / ʊ̤ / .

11. Tucker and Bryan (1966) claim that in Dinka-Nuer there is a ternary vowel length contrast. Crazzolara (1933) also states that Nuer has a ternary length contrast in vowels. But both authors gave only brief statements on the issue. However, Anderson (1987:7) found out for Dinka three contrasting lengths: short, medium and long . As far as I am concerned, Nuer has only a binary contrast.

12. None of these pairs are truely minimal. There is also always a difference in tone, at least on those specified for tone.

3. MORPHOPHONEMIC PROCESSES AND THE ROLE OF SYLLABLE STRUCTURE

In this chapter, the morphophonemic processes found in the language will be described. Besides, the role the syllable structure plays will also be examined.

3.1 Morphophonemics :

The following are the morphophonemic processes found in Nuer:

(a) Deletion
(b) Insertion
(c) Assimilation

3.1.1 Deletion

Deletion refers to both vowel and consonant deletion; however, only vowel deletion is a general process in the language.

A vowel is deleted when it follows another vowel and precedes a sequence of consonants. In other words, when a suffix (i.e. cv syllable type) is added to a root which has a complex vowel and ends in a consonant the second member of the complex vowel is deleted.

Examples : (64) / miet / ' to eat '
/ midni / 'eat!' (Imp.2ps)
(65) / gɔar / ' to write '
/ gɔrɔŋ / ' Writing '
(66) / määt / ' friend '
/ mädni / 'friends '
(67) / ñuur / 'to sit'
/ ñurri / 'sit!'(Imp.2ps)
(68) / nien / ' to sleep '
/ ninni / 'sleep! ' (Imp.2ps)
(69) / ɟ yoon / 'to scratch'
/ ɟ yonni / 'Scratch! ' (Imp.2ps)

As can be seen from the above examples, besides the vowel deletion, other processes such as voicing, vowel harmony and tonal change are also involved. The following derivation might illustrate the processes more clearly.

(70) / mìèt+nì / 'underlying representation'
/ mìèdnì / 'voicing'
/ mìdnì / 'deletion'
/ mìdnì / 'vowel harmony'
/ mídnì / 'surface representation'

In this section, we shall concentrate on the vowel deletion. The following rule accounts for the process of vowel deletion.

(71) V → ∅ / v_cc

Rule (71) says that a vowel is deleted when it comes following another vowel and preceding a sequence of two consonants.

Another type of deletion that is found in the language is the following. When the personal pronoun suffix is added to verb root that ends in a vowel, the vowel of the verb root will be deleted.

In Nuer, very few verb roots end in a vowel and as we shall see in the following sections, the most common syllable type of the language is CVC.

Among the verbs that end in a vowel are:

(72) / cì / 'to do'
(73) / bì / 'will'
(74) / wɛ̀ / 'to go'

This type of verbs are usually auxiliary verbs. In example (74), the verb 'to go' is underlying of the CVC type, i.e. /wɛ̀r/. When a suffix is added to the root the lost final /r/ will come out as in /wɛ̀rɛ̀/ 'go!' (Imp 2ps).

Consider the following examples:

(75) /cì+ʌ́/ → /cʌ́/ 'I do'
(76) /cì+ī/ → /cī/ 'you (sg) do'
(77) /cì+ɛ́/ → /cɛ̀/ 'he/she does'
(78) /bì+ʌ́/ → /bʌ́/ 'I shall'
(79) /bì+ī/ → /bī/ 'you (sg) will'
(80) /bì+ɛ̀/ → /bɛ̀/ 'he/she will'

Here we can observe the deletion of the final vowel of the verb (auxiliary) root before the personal pronoun suffixes. This is a reduction of the complex vowel at morpheme boundary but the process is restricted to auxiliary verbs and the personal pronoun suffixes:

A consonant deletion is also apparent in the language, i.e. when a possessive suffix, which is a CV syllable type, is added to a liquid-final root, the suffix initial consonant /d/ is deleted.

Examples: (81) /dɛ́ɛ̀ì+dɛ̀/ → /dɛ́ɛ̀ìɛ̀/ 'his sheep'
(82) /ìɔ́c+dɛ̀/ → /ìɔ́ɔ̀ɛ̀/ 'his heart'
(83) /ìɛ́ƥ+dɛ̀/ → /ìɛ́bɛ̀/ 'his tongue'

Consider also the following examples

(84) /ɲì́n/ 'eyes'
/ɲìn+kɛ̀/ 'his eyes'
(85) /dei/ 'houses'
/dei+kɛ̀/ 'his houses'

In Nuer if a possessed noun is plural, the possessive suffix has a different form. As can be seen in examples (84) and (85) above, the deletion is restricted to the singular form of the possessive suffix.

3. 1.2 Insertion

Insertion, in this language, refers to consonant insertion. That is, the consonant /r/ is inserted to break impermissible vowel sequences as can be seen from the following examples.

(85) /kéè+ī/ → /kérī/ 'you(sg) have not'
(86) /kéè+ɛ/ → /kérɛ̀/ 'he/she has not'
(87) /déè+ī/ → /dérī/ 'you (sg) would'
(88) /déè+ɛ/ → /dérɛ/ 'he/she would'

In Nuer, sequences of more than two vowels are not allowed. To avoid sequences of more than two vowels, the trill consonant /r/ is inserted between the root and the personal pronoun suffix vowel. After the insertion, however, one of the complex vowels of the root is deleted.

(89) $\emptyset \longrightarrow$ [+vib]/VV___+V

Rule (89) accounts for the insertion of [+vib]consonant between the complex vowel of the root and the personal pronoun suffix.

Consider the following derivation:

(90) /kéè+ī/ Underlying representation
/kéèrī/ Insertion
/kérī/ Deletion
/kérī/ Surface representation

This process is limited to the personal pronouns. Why the trill consonant is preferred to insertion is an interesting point that needs further discussion. We shall come back to this point in section (3.2.2.).

3.1.3 Assimilation:

Assimilation is a productive process in Nuer. It refers to both consonants and vowels.

3.1.3.1 Consonant Assimilation

Root - final voiceless plosives become voiced between two voiced segments. The following are some examples.

(91) /d̪ṳt̪/ 'to dance'
/d̪ṳd̪ɛ/ 'dance!'(Imp.2ps)
(92) /pʌ̈̃t/ 'foot'
/pʌ̈ddɛ/ 'his foot'
(93) /tét/ 'hand'
/téddṳ/ 'your (sg) hand'
(94) /kḛ́t/ 'to swim'
/kḛ́dnʌ̤́/ 'swim!' (Imp 2ps)
(95) [+plosive] ⟶ [+voi] / [+voi[____ +[+voi]

Rule (95) accounts for the voicing of root-final voiceless plosives between voiced segments,

3.1.3.2 Vowel Assimilation (Harmony)

Vowel harmony is a rare phenomenon in Nuer. It is restricted to a morphological class-the imperative morpheme {-nʌ̤}. When the imperative morpheme is added to a root which has a non-breathy vowel, the breathy vowel in the suffix harmonizes the vowel in the root. Consider the following examples.

(96) /mi̤ê̤t̪/ 'to eat'
/mi̤d̪nʌ̤́/ 'eat!'(Imp 2ps)
(97) /liʌ̂p/ 'to wait'
/li̤bnʌ̤/ 'wait!'
(98) /nìèn/ 'to sleep'
/ní̤nnʌ̤́/ 'sleep!'

Compare the following data with the above examples.

(99) /lɛ́p/ 'tongue'
/lɛ́bdʌ̈́/ 'my tongue'
(100) /ɟɔ́k/ 'back'
/ɟɔ́gdʌ̈́/ 'my back'
(101) /iɔ́c/ 'heart'
/iɔ́ɟdʌ̈́/ 'my heart'

3.2 The Role of Syllable structure:

The syllable is another interesting part of Nuer phonology. As we shall see in the following discussions syllable structure controls most of the morphophonemic processes described above.

3.2.1 Overview of syllable structure :

The following are the syllable types of Nuer. The most frequent syllable type is CVC. Statistically, about 50% of the basic vocabulary items are of the CVC type.

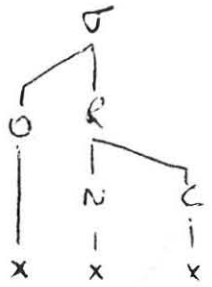
(102) (a) CV / ŋù / 'what'
(b) CVV / yìè / 'breath'
(c) CVC / ŋɛc / 'to milk'
(d) CVVC / ñúòŋ/ 'to stand'
(e) CCVVC /kwɛɛt/ 'tortoise'

Listing the syllable structure in this way, as it has been done traditionally, however, does not go far enough. It is also claimed that a segment-based description of the language which ignores the syllable, as in the case of SPE, does not help us on grounds of both simplicity and adequacy.

In the SPE model, the syllable was practically ignored. Durand (1990:198) says "Chomsky and Halle, in their attempt to provide formal foundations for phonology, neglected the existing tradition of work on the syllable...". The emphasis in the SPE model was on segments and boundaries.

A non-linear approach, unlike the linear one, recognizes the fact that the syllable has an internal hierarchy of its own which determines possible CV sequences (Hogg and McCully, 1987:36). A syllable is, according to this view, made up of an onset (0) and a rhyme (R). The rhyme again is made up of a nucleus (N) and a coda (C) as represented in the following diagram. The x's represent timing slots.

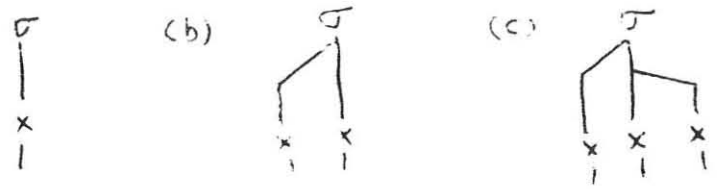
(103)



It is assumed that the onset-rhyme distinction is a universal of syllable structure and Xs to the left of the syllable head (nucleus) and Xs to the right of the syllable head are subject to language specific constraints.

Underlyingly, in Nuer, the syllable is partially specified, i.e. the syllable head is associated. The order of syllabification is, therefore, as follows. The next step is, since the syllable head is indicated underlyingly, to co-syllabify the onset and then to co-syllabify the rhyme as can be seen below.

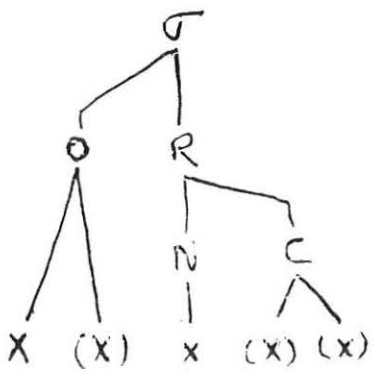
(104) (a) (b) (c)



In other words, the syllabification approach is "the all nuclei first approach" (Goldsmith, 1990:117). By using this approach it is possible to build up syllables that conform to the syllable template of Nuer.

The maximum syllable template for Nuer is the following.

(105)



According to this template an onset can branch and it consists of an onset satellite and an onset head. The head is the first member of a branching onset while the second member is the onset satellite. The head is an obligatory element at word-medial position and the satellite is optional. In other words, the syllable should, at least, have an onset word medially[1].

As stated above, the syllable head is to be indicated underlyingly and it is, therefore, an obligatory element. There are two opposing views on whether the syllable head has to branch or not. The first view says that the nucleus or the syllable head may be branching in order to accomodate long vowels or diphthongs; and the second view proposes that the nucleus is a single, obligatory position. The coda, then, is all of the rhyme to the right of the single, obligatory, nucleus position.

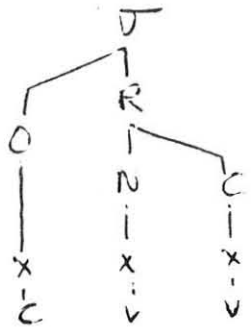
Goldsmith argues that what defines a heavy syllable is the appearance of two positions in the rhyme. That is, the syllable type CVV, being a heavy syllable, takes two positions in the rhyme. Similarly, a closed syllable one ending in a vowel plus at least one consanant, i.e. CVC syllable type, can be equally counted as a heavy syllable since it can take two positions in the rhyme.

Therefore, he concludes that, "The prosodic parallel between long vowels and vowel-consonant sequences, then, suggests that the two skeletal positions associated with long vowel are found in nucleus and coda positions, ..." (Goldsmith, 1990:114).

It is worth mentioning here that in Nuer long vowels and diphthongs are treated similarly; that is to say, long vowels are sequences of juxtaposed indentical vowels, whereas diphthongs are sequences of juxtaposed non-identical vowels.

In the analyses of diphthongs and long vowels a complex rhyme is choosen rather than a complex nucleus because a complex rhyme can account for the principle of licensing. And licensing, in turn, accounts for most of the morphophonemic processes found in the language. Therefore, following Goldsmith, a complex vowel is associated to two timing slots found in Nucleus and coda position respectively as in the following diagram

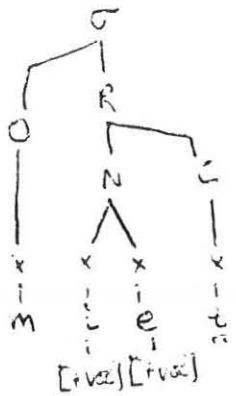
(106)



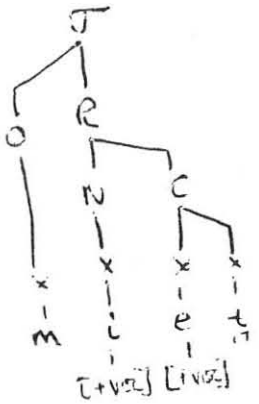
In the description of consonants (see secton 2.1), it is stated that a glide is to be interpreted as a vowel preceding a single vowel, but as a consonant preceding a double vowel.

In the autosegmental framework, the interpretation of a glide as a vowel preceding a single vowel follows from the principle of licensing as can be seen below.

(107) (a) *



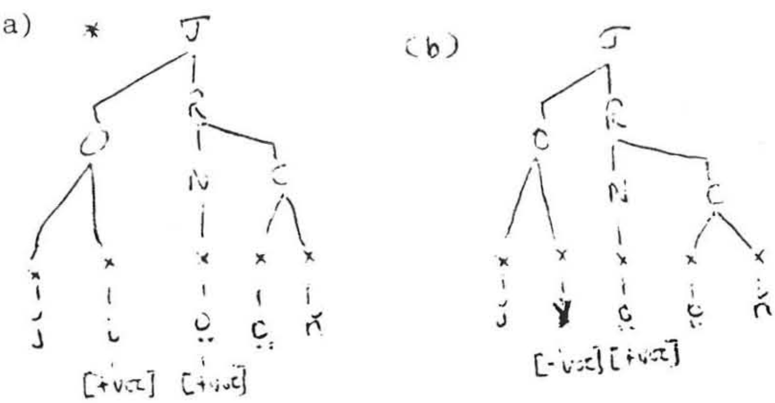
(b)



In (107a) the principle of licensing which says that there should be a maximum of one appearance of each distinctive feature over the onset-nucleus span is violated.In other words, the syllable node licenses the feature [voc[more than once to the onset-nucleus domain. In (107b) the principle is not violated since the feature [voc] is licensed only once to the onset-nucleus span and the coda also licenses the same feature only once.

Furthermore, the interpretation of a glide as a consonant preceding a double vowel also comes from the same principle. Examine the following configurations.

(108) (a) *

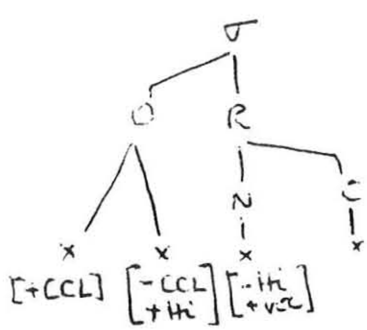


In (108a) the same principle violated in (107a) is violated since the syllable node licenses the feature [voc] more than once in the onset-nucleus span, whereas in (108b) the feature is licensed only once by the syllable node.

Hence, due to licensing considerations, in Nuer sequences of more than two vowels are not allowed;and a complex onset consists of any consonant plus a glide.

On the other hand, the glides in the onset slot may only be followed by a non-high vowel as can be seen in the configuration (109) below.

(109)



Consider the following data

(110) /ɟyèo̤ ɲ̂ / 'to scratch'

(111) / kwɛ̤̀ɛ̤́ t / 'tortoise'

(112) / twàa̤r / 'bee'

(113) / kwēí / 'name of a person'

(114) / cwaal / 'sack'

(115) / pya̤a̤r / 'scar'

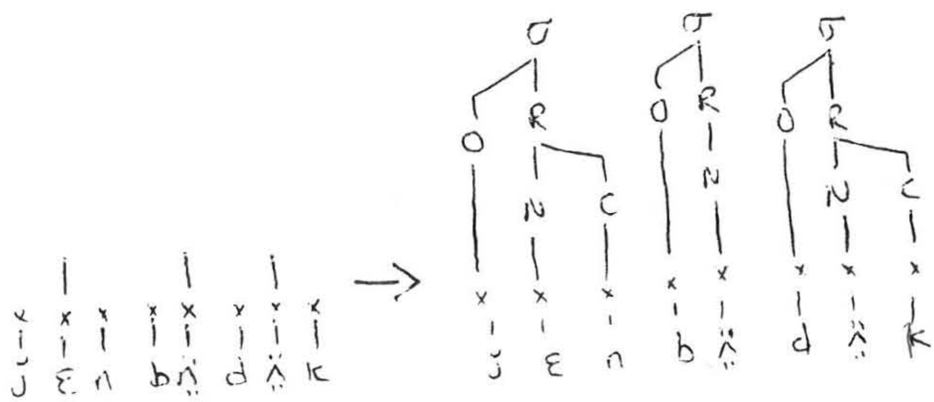
Again the same principle excludes the high vowels when there is a glide in the onset slot. That is, since the glides are high phonemes and the feature [Hi] is already licensed by the syllable node to glides, the principle disallows the licensing of the same feature more than once in the same domain2.

Examine the following multi-syllabic words of Nuer which are syllabified in (118) and (119) below according to the syllabification approach given above.

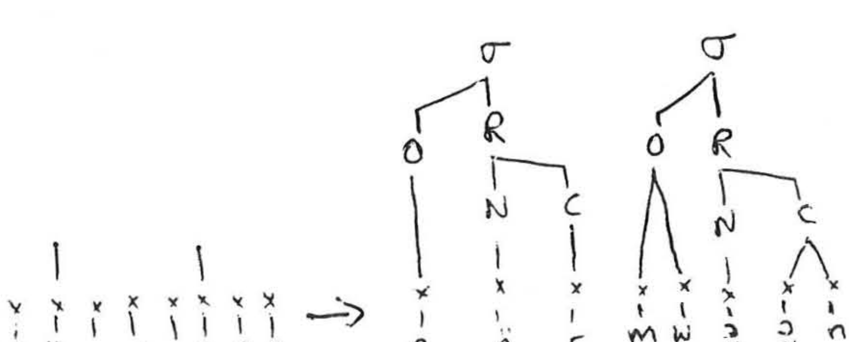
(116) /ɟɛnbʌ̤̈dʌ̤̈k/ 'eighty'

(117) /nʌ̤̈rmwɔ̤ɔ̤n/ 'worm'

(118)



(119)



3.2.2 Syllable structure Conditions Controlling segmental Rules

3.2.2.1 Deletion :

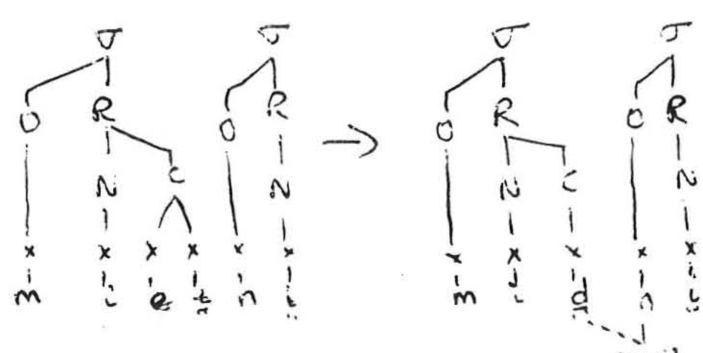
In section (3.1.1) we have discussed various types of deletions. One of these is a general process in the language. For convenience, we shall restate some of examples as follows.

(64) / mìe̤t̪ / 'to eat'
/ mí̤d̪ʌ̤́ / 'eat!' (Imp.2ps)
(66) / mʌ̤̂ʌ̤t̪ / 'friend'
/ mʌ̤́d̪ʌ̤́ / 'friends'
(69) / ɟye̤e̤n̪ / 'to scratch'
/ ɟyè̤n̪ʌ̤́ / 'scratch!'

The deletion is controlled by the syllable structure conditions at word level. In terms of licensing the deletion is aimed at constructing a well-formed syllable structure.

In example (64), for instance, the reduction of the complex vowel and the voicing of the plosive are conditioned by licensing of considerations. Examine the syllabification in (120) below.

(120)

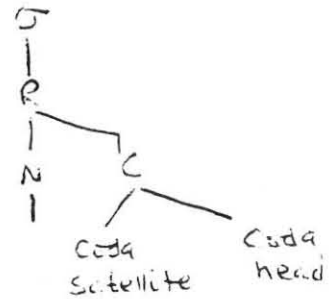


In Nuer, the coda licenses a small subset of features such as [PofA], [voc], [Son], [nas] and [tone]. According to the theory of licensing "... the coda, acting as a secondary licenser, behaves as a 'minisyllable', with a limited degree of ability to license distinctive features". (Goldsmith, 1990:168)

As can be seen in the configuratin (120) above, since the coda cannot license the feature [voi], the segment in the coda slot has to share the feature from the following onset which is licensed by the syllable node. The reduction of the complex vowel also follows from the same principle and as a result the second member of the complex vowel, which is dominated by the coda, has to be deleted.

The reason why only the vowel dominated by the coda is deleted and not the consonant /d̪/ could be a language particular case. That is, a branching coda has a coda satellite and a coda head. In Nuer, the coda head is the second member and the coda satellite is the first member of a branching coda as in the following diagram.

(121)



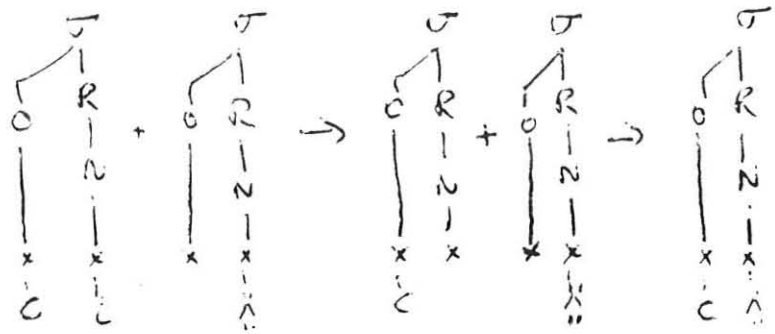
In a derivation, the head is an obligatory element while the satellite can be delinked.

The other types of deletions are more restricted ones. One is restricted to a few verbs (auxiliary verbs) and personal pronoun suffixes. The other type of deletion is also restricted to a single morpheme, i.e. the singular form of a possessive suffix. For convenience, we shall restate some of the examples as follows.

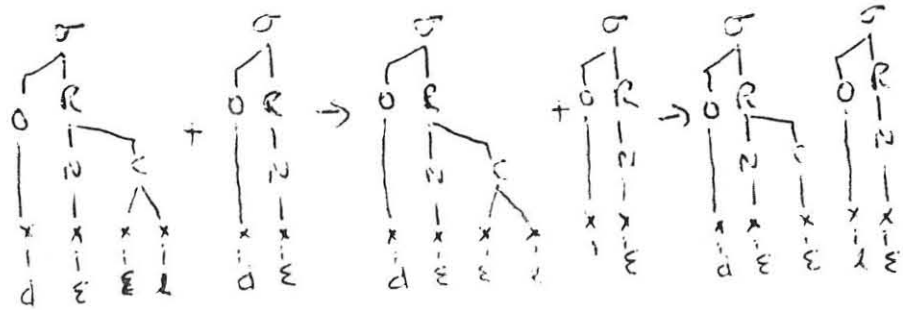
(75) / cì + ä́ / → / cä́ / 'I do'
(78) / bì + ä́ / → / bä́ / 'I will/shall'
(81) / dɛ́ɛ̀ + dɛ / → / dɛ́ɛ̀ + ɛ̀ / 'his sheep'
(82) / ɪ́ɔ̀c + dɛ̀ / → / ɪ́ɔ̀j + ɛ̀ / 'his heart'

Examine the following syllabifications:

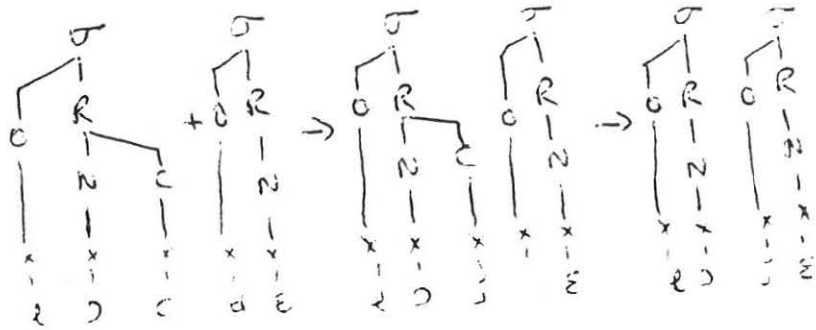
(122)



(123)



(124)



The syllabification in (122), (123) and (124) follows from the syllable template of Nuer. It is stated above that the onset is an obligatory slot word medially. In (122), in the second syllable the onset is empty and inorder to fill that empty slot, the syllabification process has to reduce the licensing unit and move the first onset to the empty onset slot or vice versa. Which direction is preferable is not clear for the time being. Probably it is the onset that moves to the empty slot to fill in the gap because the first syllable has lost its syllable head which is already specified underlyingly.

In (123) and (124), there is also an empty onset slot. The syllabification process has taken place again to meet the requirement of the syllable template. That is, in case of (123) the second member of the coda moves to the empty onset slot and in case of (124) the element dominated by the coda moves to fill in the gap because word-medially it is an obligatory slot that should be filled in.

From the point of view of licensing, the reason for these deletions could be the reduction of the number of licensers whenever there is an empty onset slot in the syllabification word-medially. As can be seen in configurations (122) and (123) the number of licensers is reduced to fill in the empty onset slot word-medially. In (122), instead of two primary licensers we have only one; and in (124), instead of two primary and one secondary licensers, we have only two primary licensers. This reduction of the number of licensers is also applicable in configuration(120) above, where the coda is no more a licenser, and in configurations(125) and (126) below.

Hence, the syllabification process minimizes the number of licensers. This is because, according to Goldsmith (1990:137), having the fewest possible number of licensers in syllabification will enable us to construct the fewest possible syllables consistent with the syllable structure of the language. Goldsmith (1990:137) further notes that"...the principle that syllabification is established by means of the fewest possible number of licensers has, as one of its consequences, the Maximal Onset Principle." As we have observed in the above configurations,in order to fill in the empty onset slot, which is obligatory word-medially, the syllabification process reduces the number of licensers, the effect of which is the Maximal Onset Principle.

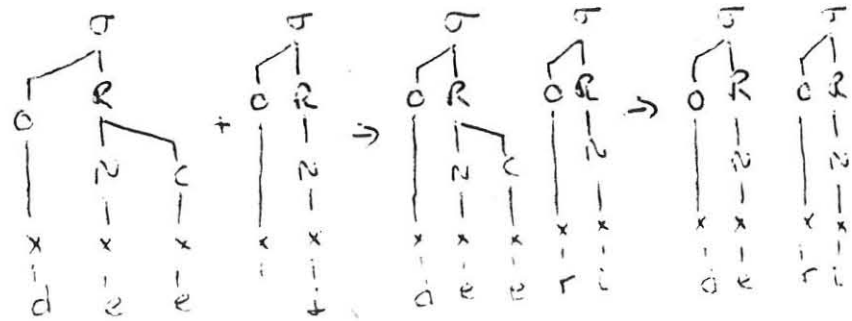
3.2.2.2 Insertion

As described in section (3.1.2), the [+vib] consonant /r/ is inserted between the root and the suffix vowel to break the impermissible vowel sequences. Acording to the principle of licensing, only sequences of two vowels are allowed in the complex rhyme. Therefore, to avoid the third member of the vowel sequence a consonant is inserted.

Examples (85-88) above are restated as follows.

(85) / kéè + ī / → / kérī / 'you (sg) have not'
(86) / kéè + è / → / kérè / 'he/she has not'
(87) / déè + ī / → / déri / 'you (sg) would'
(88) / déè + è / → / dérɛ / 'he/she would'

(125)



According to the syllable template of Nuer since the onset is an obligatory element word-medially, the /r/ consonant is inserted to fill in the empty onset slot. After the consonant is inserted, one of the vowels dominated by the coda (coda satellite) will be deleted. This ordering follows from the else where condition. The result of the two processes is, therefore to construct a well-formed syllable structure.

In section (3.1.2) above, we have raised the question why /r/ should be preferred as an epenthetic consonant and why it is the only one in the language. Probably the reason could be its being the least specified consonant in the language."Often an epenthetic element is considered the best candidate for the non-specified segment. Since that element's function is to make up for deficiencies in the prosodic structure, and it is not present underlyingly, then its feature specification would be supplied by rules" (Gilley, 1988:25-6).

Therefore, since /r/ is the least specified phoneme and it is inserted to break the impermissible vowel sequences (to make up for deficiencies), it receives its full specification and appears by default on the empty onset slot.

3.2.2.3 Assimilation:

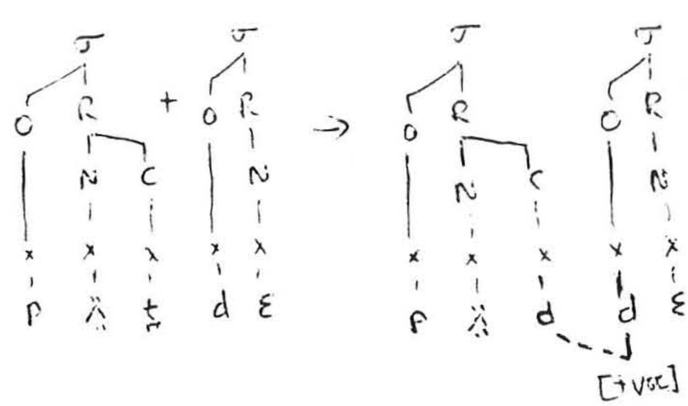
Root-final voiceless plosives are voiced between voiced segments[3]. This process can be described at the syllable level as a 'coda weakening process.' In other words, the voicing in coda position is conditioned by licensing considerations.

Examine examples in (91-94) restated for convenience as follows.

(91) / d̠ut̠ / 'to dance'
/ d̠ud̠ɛ / 'dance! (Imp.2ps)
(92) / pʌ̤̄t / 'foot'
/ pʌ̤̄ddɛ̀ / 'his foot'
(93) / t̪ét / 'hand'
/ t̪éddù / 'your (sg)hand'
(94) / kẹ́t / 'to 'Swim'
/ kẹ́dnʌ̤́ / 'swim!'

Syllabification of the above examples shows that the coda cannot license the feature [voi] rather it shares it from the following onset as in (126) below.

(126)



The other type of assimilation discussed in section (3.1.3.2) above is vowel assimilation (harmony). The vowel harmony is between the voice qualities-breathy and non-breathy. Depending upon a grammatical context a non-breathy vowel changes to a breathy vowel. The vowel which determines the harmonic quality is the suffix vowel, that is the influence moves regressively across some intervening segments.

For convenience, we shall restate some examples as follows.

(96) / mɪ́èt̪ / 'to eat'

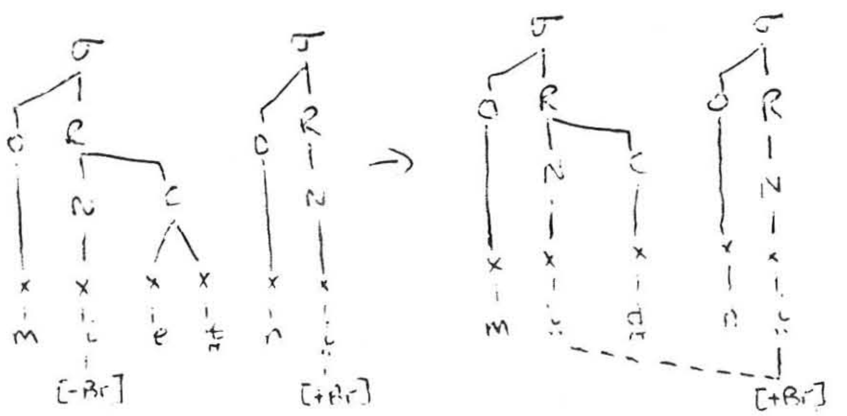
/ mɪ̤́d̪nɪ̤́ / 'eat!'

(97) / lìə̤̈p / 'to wait'

/ lɪ̤bnɪ̤̈ / 'wait!'

Examine the following syllabification:

(127)



But this does not mean that all vowels are involved in the process of harmony. Consider the following examples.

(128) / cúɔ̀ŋ̤ / 'to stand'

/ cúŋnɪ̤́ / 'stand' (Imp.2ps)

(129) / ɲúùr / 'to sit'

/ ɲúrrɪ̤́ / 'sit!'

In the above examples, the root vowel /u/ blocks the spreading of the feature [Br] because the breathy /u/ is absent in the language and here the vowel is opaque for harmony.

3.2.3 Syllable structure conditions involving tone

The process of syllabification in Nuer has its own effect on the tone assignments of the syllables concerned. We can see from the examples given in the preceding sections that when the vowel is lost, the tone is also delinked. For convenience, let us restate some of the examples.

(64) /mìe̤t̤/ ' to eat'

/mi̤ɖni̤/ ' eat!' (Imp.2 ps)

(67) /ɲúùr/ 'to sit'

/ɲúrri̤/ ' sit!'

(76) /cì + ī/ → /cī/ 'you(sg) do'

(86) /kéè + ɛ̀/ → /kérɛ̀/ ' he/she has not'

(87) /déè + ī/ → /dérī/ ' You (sg) would'

Since in Nuer the only tone bearing units are the vowels, when a vowel is delinked from the timing tier, its tone will receive no phonetic realization.

Looking at tone association from the point of view of licensing, Goldsmith (1990:167) makes a distinction between quantity-insensitive and quantity-sensitive tone languages. He points out that:-

> A quantity-insensitive tone language will allow the same number of tones (often just one) per syllable regardless of the internal make up of the syllable. A quantity-sensitive system will allow one tone to a light syllable-typically of the form CV-and two tones to a syllable with more material in the coda.

The point is that tone being a distinctive feature in a tone language, it can be licensed by the syllable node as any distinctive feature but the coda can only license tone depending up on language specific parameters. According to this distinction, Nuer belongs to the quantity-sensitive tone languages. In a quantity sensitive tonal system both the syllable node and the coda can license tone .

In Nuer, the syllable node licenses the first tone, which is in the onset-nucleus span, and the coda licenses the second tone.

Consider the following data:

(130) /kéè/ ' has not '

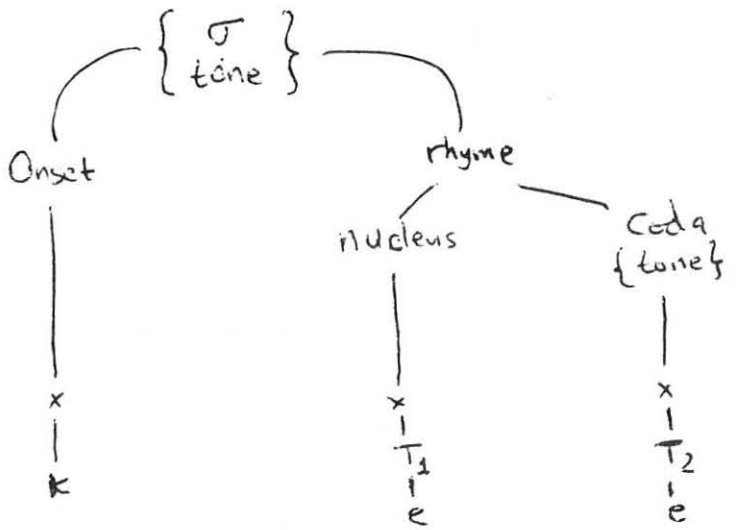
(131) /déè/ ' would '

(132) /yìè/ ' breath '

(133) /bìá/ ' come! ' (Imp.2pp.)

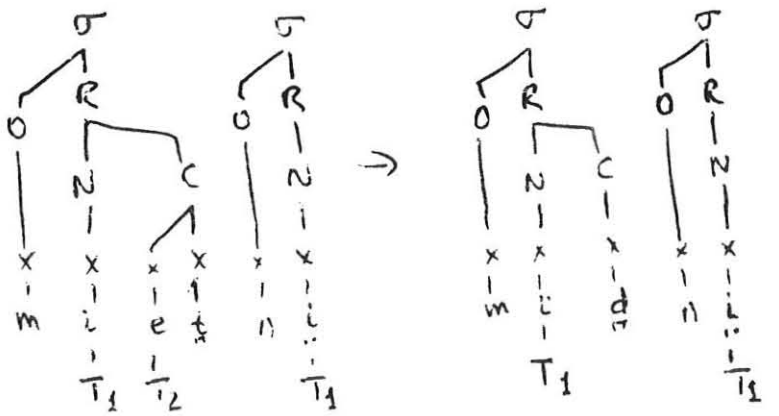
In terms of licensing, one of the above examples can be represented as follows.

(134)



The licensing consideration, therefore, has a secondary effect on the tone delinking process as can be exemplified in (135) below.

(135)



NOTES ON CHAPTER 3

1. The syllable types such as V,VC and VCV are very rare in the language. They are restricted to a few lexical items such as /ɔ̈/ 'Yes'; /ɛ̈ɣ/ 'no'; and /ɪ́dɪ̀/ 'how?'. They are not considered as basic syllable types of Nuer due to their restricted distribution.

2. The avoidance of a high phoneme when the complex onset contains a glide might also be accounted for in terms of OCP. Since OCP also disallows the appearance of two identical consecutive autosegments, there seems to be some sort of overlapping with the principle of licensing discussed here. This is, however, not the concern of the present study.

3. The underlying form of the root-final stop is the voiceless one. Consider the following examples.

/ŧuk-dɛ/ → [ŧugdɛ] 'his language'

/ŧuk-ɛmɔ/ → [ŧuhɛmɔ] ' this language '

As can be seen in the above examples the root-final velar plosive/K/ is changed to either /h/ or /g/ between vowels or before a voiced segment respectively.

4. Licensing has no direct effect on tonal deletion. It has only a secondary effect. Therefore, the tonal deletion results mainly from the vowel deletion and this can also be explained by other alternatives as suggested by Pulleyblank (1983)

4. Summary and conclusion

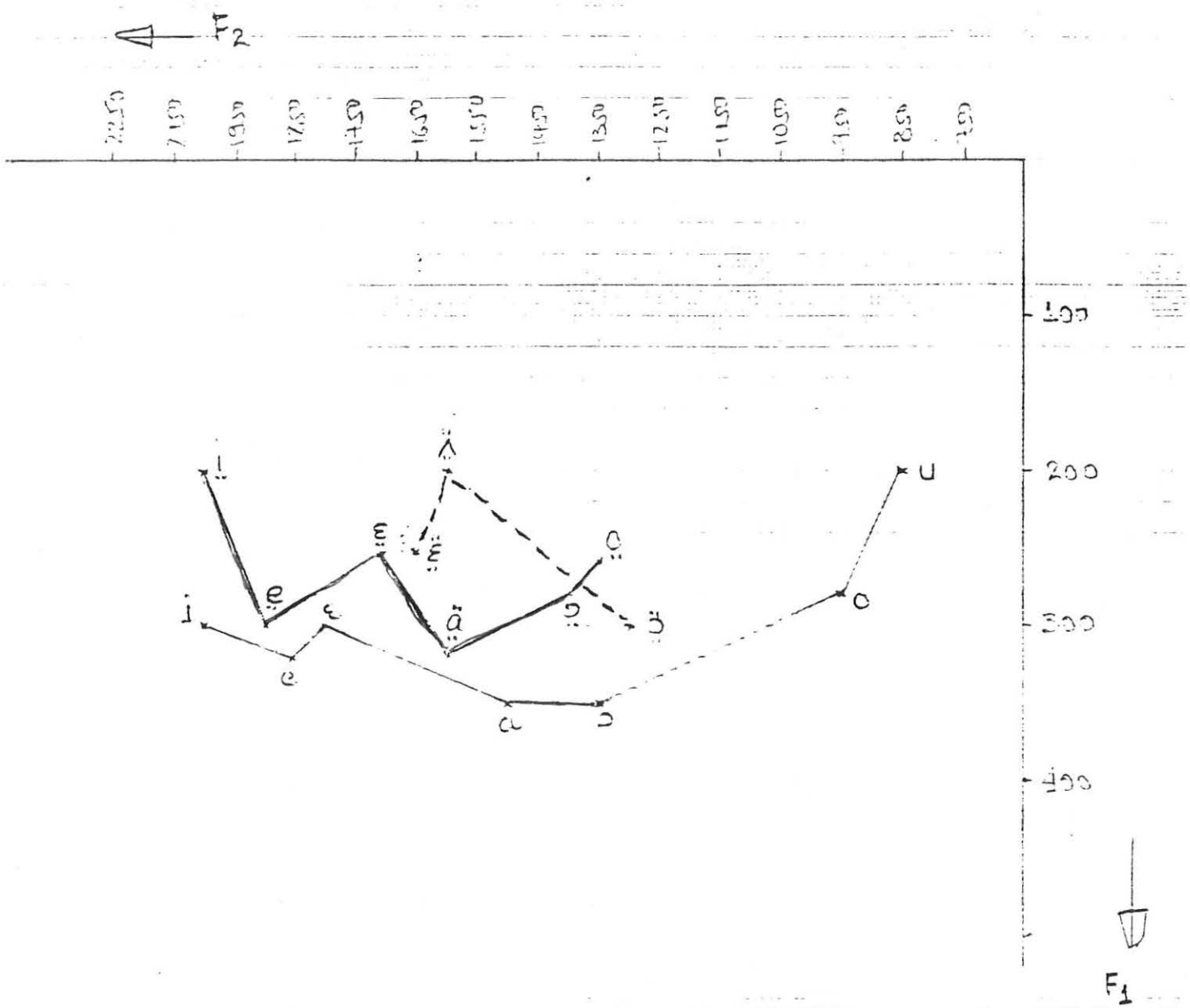
In this study, twenty consonant phonemes are identified with little phonetic variations. The consonant phonemes are typical of the Nilotic consonant system.

Vowel phonemes, unlike the Semitic, Cushitic and Omotic languages of Ethiopia, are many in number. There are sixteen phonemic vowels against the twenty consonant phonemes. These vowels belong to two types of voice qualities:- plain and breathy. The plain vowels are seven with little phonetic variations, and the rest are breathy vowels. Among the breathy vowels there are central breathy vowels which are labelled by Tucker and Bryan (1966:402) as a third type of vowels. In this study, however, they are grouped with breathy vowels because, firstly, they are produced with breathy voice quality; and secondly, there is no good phonological reason to group them as a third type of vowels in the language.

The property of vowels having such distinctions of plain and breathy is probably a typical phonological feature of Western Nilotic languages to which Nuer belongs. ((cf. Anuak (Reh 1986) and Dinka (Malou 1988)).

In general, however, Nuer shares none of the characteristic phonological features of the Ethiopian language area proposed by Ferguson (1976:65); and therefore according to Ferguson Nuer is clearly outside the Ethiopian language area. Nevertheless, one can question whether Ferguson's phonological features are adequate to characterize all Ethiopian languages.

From both descriptive and theoretical point of view, on the other hand, the syllable structure is an interesting aspect of Nuer phonology. Its role is so vital in the sense that it can control most of the morphophonemic processes of the language and these processes are conditioned both by the principle of licensing and the syllable template of Nuer.



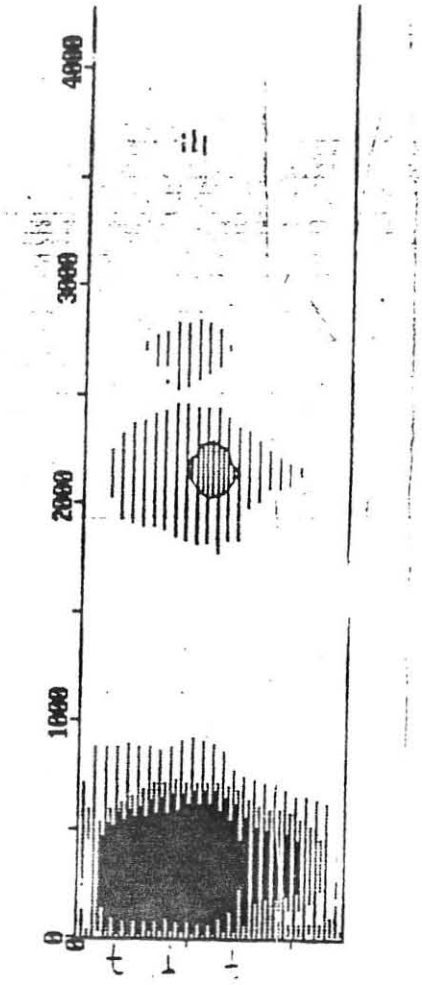
— plain vowels

▬ Breathy vowels

--- central - breathy vowels which have no plain counterparts

GRAPH (1) Frequencies of F_1 and F_2 of Nuer vowels

Appendix - 2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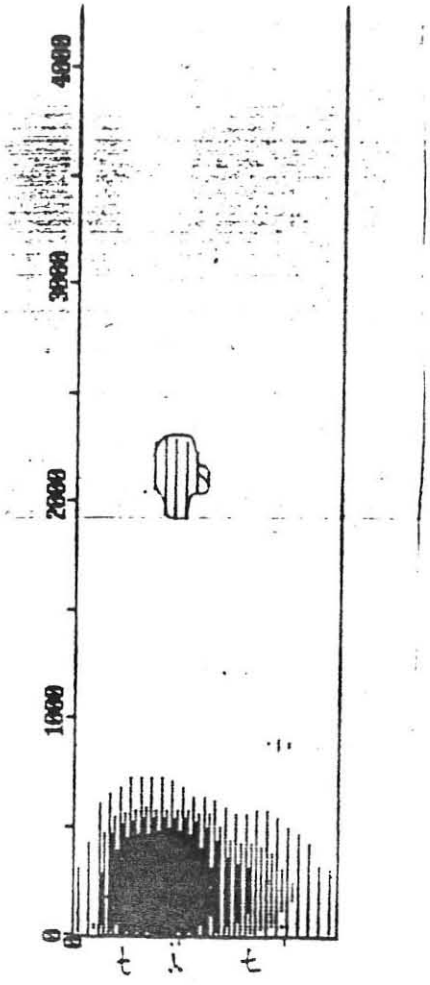
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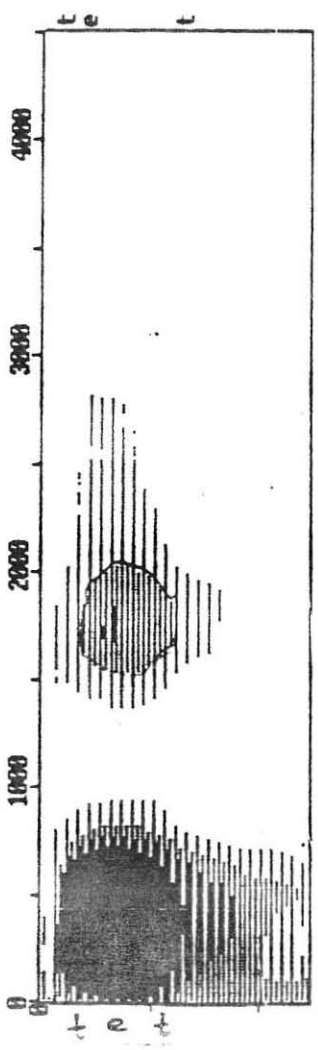
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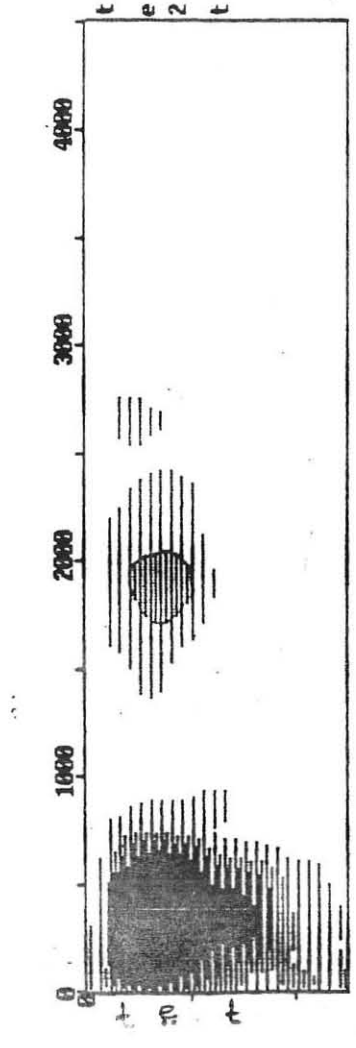
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