

A STUDY OF NOUN PLURAL FORMATION IN BOR DIALECT OF DINKA

**BY
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DECLARATION

This Research Project is my original work and has not been presented for a degree in any other university.

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DATE

This Research Project has been submitted for examination with our approval as the university supervisors.

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.....

DATE

DEDICATION

I dedicate this work to

my wife Martha Amach

and

my children, namely

Deng

Nyok

Bior and

Chiengkou.

They endured my long period of absence from home.

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LISTS OF ABBREVIATIONS AND SYMBOLS

Aff	Affix
AP	Autosegmental Phonology
C	Consonant
H	high tone
IDPs	Internally Displaced Persons
IPA	International Phonetic Alphabet
L	low tone
LP	Lexical Phonology
LR	Lexical representation
N	Noun
NTS	Non-topical subject
NOM	Nominative
PL	plural
PR	Phonetic representation
SFX	suffix
SG	Singular
SPLM	Sudan Peoples' Liberation Movement
Syll	Syllable
Trans.	Transcription
V	Vowel

VV	long vowel
WFR	word formation rules
→	Becomes
>	changes to
*	Ungrammatical
//	Phonemic (underlying representation)
~	Alternate with
[]	Phonetic representation
#	Word boundary

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ABSTRACT

This is a descriptive study of the noun plural formation in Bor dialect of Dinka spoken in South Sudan. The study was conducted within the framework of the theory of the Lexical Phonology and the theory of Auto-segmental Phonology. Therefore, the study adopted an eclectic approach with Lexical Phonology as the main theory and Autosegmental Phonology as the minor theory. It aimed at investigating and describing, in detail, various processes of noun plural formation in Bor dialect.

The study sets out to investigate and examine the vowel and consonant processes as well as tonal changes in forming plurals in Bor dialect. It also examines the part of the noun plural where affixation occurs.

In order to investigate the objectives adequately, data was obtained by recording the voices of different informants, using Digital Voice Recorder VN-712PC Olympus brand. Data was then transcribed phonemically. Tone was also marked on the words in both the singular and plural forms. The researcher was able to identify different morphological and phonological processes emerging from the plurals formed.

The researcher established that there was vowel lengthening, vowel alternation, vowel shortening, and vowel insertion, suppletion of consonants, consonant alternation consonant insertion and changes in the tone in the noun plural formation process in Bor dialect. It was also observed that it is the stem that is usually modified in noun plural formation in this dialect. The findings confirmed that Bor dialect has an irregular morphology and therefore it is flectional.

CHAPTER ONE

INTRODUCTION

1.0 Background to the Language

Dinka is a Western Nilotic language within the Nilo-Saharan language family according to Storch (2005:22). Western Nilotic languages include Dholuo, Dinka, Acholi, Nuer, Shiluk, etc. (Okombo, 1982: 11-12). Based on Greenberg's classification of African languages, it is widely known that Dinka is closely related to Nuer and these two languages form a sub-group of Western Nilotic languages (Greenberg, 1963: 85). All related languages do originate from a common ancestor, hence a truism. Dinka is also known as *Thuɔŋjäŋ*, meaning 'the mouth of *Jieng*' (that is, the language of the *Jieng* or Dinka people). The population of the *Jieng* people is about 4.5 million according to the 5th Sudan population census of 2008.

The Dinka people live in the centre and the northern part of South Sudan. They are in the States of Jonglei, Upper Nile, Unity, Warrap, Lakes, Northern and Western Bhar el Ghazal, in the area along the White Nile River and its tributaries, for instance, from Renk in the north to Bor in the south and from Bor in the east to Aweil in the west.

Four major dialect areas (clusters) are commonly distinguished: Padang, Bor, Agaar and Rek. Padang (northern dialects) is the first cluster spoken northeast of Sudd, along the White Nile and the Sobat, north of Bahr el-Ghazal River, and around Abyei. The dialects of this cluster include Abiliang, Ageer, Dongjol, Ngok, Thoi, Rut, Luach and Pan-Aru. Agaar (central dialects) is the second cluster spoken west of the Nile and the Sudd. Its dialects are Agaar, Aliap (known as Aliab in the map in appendix II), Gok, Ciec and Atuot but the latter has its own language which is known as Thok Reel which is very close to Nuer (Storch 2005: 23). The third cluster is Rek (Southwestern dialects) which is spoken to the north and northwest of Wau town in Western Bahr el-Ghazal region. The dialects in this cluster are Rek, Luach, Twic and Malual. The fourth cluster is Bor (Southeastern dialects). It is spoken east of the Nile, around Bor and North of Bor Town.

The dialects are: Bor, Twic, Nyarweng and Hol (Storch 2005:23). The variety on which this study will be based is Bor dialect within the cluster of Greater Bor. It is spoken by around 250,000 speakers according to ethnologue (Gordon 2005).

1.1 Statement of the Problem

Studies have been carried out on Dinka noun morphology, e.g. studies conducted by Storch (2005), Andersen (1987, 1990) and Ladd and Manyang (2009). For example, the study by Storch (2005) touches on the Padang and Rek varieties of Dinka while Andersen (1987) studied the Agaar dialect of Dinka. Ladd and Manyang (2009) conducted a study on Luanyjang (Rek). These studies do not touch on the morphology of Bor dialect which the current study intends to undertake. This study focuses on noun plural formation only. The noun, just like any other part of speech, is a very important component of any language. Some languages such as English have their noun plurals formed by suffixation, especially the category known as regular nouns. For example, the plural form of *book* is *books*. Here, there is the addition of 's', i.e. the sound /s/. But in Bor dialect, it was my observation that suffixation or prefixation do not seem to apply.

Other processes involving vowels and consonants as well as changes in tone seem to play a major role in the formation of noun plurals in Dinka in general. It is these processes and changes that this study investigated. The few studies conducted in other dialects of Dinka such as Rek, Agaar, Padang, etc. indicate that Dinka noun morphology is highly irregular. It was indeed my task to look at how noun plurals are formed and what vowel and consonant changes plus tonal changes occur.

This study is motivated by the need to answer the questions: what changes take place in the vowels, consonants and tone when noun plurals are formed in Bor dialect? Due to inadequate study of noun plural formation in this dialect, the study proceeds to analyse and explain the processes using the claims of the lexical Phonology theory with the view to establish how these theoretical principles account for morphological and phonological processes in noun plural formation.

The problem for the linguists studying Bor dialect of Dinka is to establish how the changes in the vowels and consonants plus tone take place when noun plurals are formed. The study endeavoured to show the description of noun plurals and to provide a basis for any linguist who may wish to conduct further study on the same dialect.

This general concern was broken down into the following specific questions:

- a) What vowel processes are involved in forming noun plurals in Bor dialect?
- b) What consonant processes take place in the formation of noun plurals?
- c) In which part of the noun, if any, does affixation occur in this particular dialect?
- d) What tonal changes take place in the noun plural formation?

1.2 Objectives of the Study

The objectives of the present study were:

- a) To investigate the vowel processes involved in forming noun plurals in Bor dialect.
- b) To find out the consonantal processes that take place in the noun plural formation.
- c) To examine the part of the noun plural where affixation occurs in this dialect.
- d) To investigate the tonal changes that takes place in the noun plural formation.

1.3 Rationale / Justification of the Study

This study sought to show how noun plurals are formed in Bor dialect of Dinka. Researchers of Western Nilotic languages have found out that Nilo-Saharan languages have a very complex and irregular morphology and the researcher expected that Bor dialect was no exception. This study is significant in the following ways: First, being the only detailed analysis of noun plural formation in Bor dialect, it shows to the linguists the important components of the morphophonemic system.

Second, the findings of this study will contribute to the phonological study of Western Nilotic languages generally and to the Dinka phonology in particular. It will also be

useful to those scholars engaged in teaching, conducting studies or researching in Nilotic languages. Thus, this study provides important information on the various alternations that take place in the morphological and phonological processes in Bor dialect of Dinka.

1.4 Scope and Limitation of the Study

This study looked at the phonemic inventory, tones and syllable structure in the noun plural formation of Bor dialect because most of the changes involved were phonological. Other parts of speech such as verb, adjective, etc. were outside the scope. The other noun derivation and inflection processes that do not touch on the formation of noun plurals were not covered, simply because they were outside the scope of this study. Only Bor dialect and not any other dialect of Dinka was studied.

1.5 Literature Review

This section explores the work done by other linguists on Dinka morphology and phonology in particular. Donald (1998:1) defines morphology as “the study of word formation, i.e. how prefixes, roots and suffixes adjoin to form words. He goes on to define phonology as “the study of the sound systems of a language”. Spencer (1991:16) gives a detailed study on morphology with regard to vowel processes, consonant processes, syllable structure and tone. He contends that:

It is not uncommon to find that an affix conditions a phonological change in the base to which it attaches. On occasion, we find that, as the language has evolved, the phonological form of the affix itself has withered away over time and left as its only trace the phonologically conditioned allomorph of its base. When this happens, the phonological alternation, i.e. change in shape shown by the base morpheme takes place over the function of original affixation.

Furthermore, Watson (2002: 200) also posits that:

Phonological processes fall into two broad classes: those which are sensitive to lexical information and morphological structure and those which do not exhibit such sensitivity. Processes which are insensitive to phonological structures take place of the elimination of all morphological cues.

1.5.1. Noun Morphology of Dinka

Storch (2005:163) conducted a study which can be described as one of the comprehensive descriptions of morphological processes in Western Nilotic languages such as Dinka, Nuer, Burun, Shilluk, etc. all spoken in South Sudan. She notes that:

Dinka is best characterized as a language with a non-linear morphology. It is generally monosyllabic with few affixes that are used in derivational morphology and most grammatical functions are encoded through morphological alternations of the root vowels and tones.

There are nouns whose plurals are formed by lengthening of a vowel while others are formed by complete modification of the root. For example, vowel lengthening is shown by *ájìth* [áʒìṯ] ‘hen’ whose plural is *ájííth* [áʒííṯ] ‘hens’ and a complete modification of a root is illustrated by noun *mòc* [mòc] ‘man’ whose plural is *ròòr* [rò:r] ‘men’. These findings are important because there is a possibility that Bor dialect has the same morphological and phonological processes described in the formation of noun plurals.

1.5.2 Dinka Phonology

A description of the Dinka sound system can be found in Malou (1988), Andersen (1987, 1990, 1993), Gilley and Kiir (2001). All those researchers conducted studies on the morphophonological alternations. The details of some of these studies are given below.

1.5.2.1 Vowels

Malou (1988:20) posits that in Dinka, there are seven vowels and six breathy vowels with a contrastive function. Malou (1988:20-21) explains thus:

Dinka has a system of contrasts relying on seven vowel positions and four dimensions of vowel quality: breathiness vs. non-breathiness, tone, length, and centralization. The seven vowel positions are [i, e, ε, a, ɔ, o, u]. These vowels can be contrasted in pairs between sounds that are adjacent such as /i/ vs. /e/, /e/ vs. /ε/, and /a/ vs. /ɔ/. For example, a distinction can be made in word such as *rim* ‘blood’ vs. *rem* ‘cohorts’, *luel* ‘say it’ vs. *luel* ‘narration’ and *rak* ‘lulu tree’ vs. *rɔk* ‘fence’, respectively.

It is noted that “the ‘breathy’ vowels are articulated with a lowering of the larynx, which leads to a dilation of the vocal tract” (Malou 1988: 79-80). On his part, Andersen (1987:7) argues that “There are three contrasting lengths: short (V), medium (VV) and long (VVV). There are no restrictions on the combinability of lengths with vowel qualities and voice qualities.

Remijsen (2009: 116-7) claims that “these vowels phonemes /i, e, ε, a, o, u/ combine freely with the various suprasegmental distinctions. For example, voice quality, vowel length, and tone. He goes on to say that there are also two restrictions. First, the high back vowel is invariably breathy. Second, the vowel /ε/ does not occur in the shortest level of length. This study investigated the behaviour of vowels in noun plurals. It investigated the vowel processes involved in the noun plural formation in Bor dialect. Vowels seem to play a crucial role in the noun plural formation because they are used to create a contrast between singular and plural forms.

The current study was therefore guided by the findings of those researchers. Their ideas were important because this study was partly on how these vowels behave phonologically in plural formation in this dialect. For example, the researcher intended to find out if these vowels alternate lengthen, etc. to contrast between noun singular and plural as already claimed by Malou (1988) and other linguists.

1.5.2.2 Consonants

Dinka has twenty distinctive consonant sounds including the dental consonants /t̪, d̪, n̪/ which are written orthographically as *th, dh, nh* which can be distinguished from /t, d, n/. There are also pure palatal consonants /c, ɟ, ɲ/ written orthographically in Dinka as *c, j, ny*. It is important to note that there are no consonant clusters in Dinka. Duerksen (1989: 125) noted that “Dinka phonology has voiced and voiceless stops (including affricates) and nasals at five places of articulation”. Malou (1988: 19) notes that “There are no fricatives among Dinka consonants”. However, Bor dialect seems to have the voiceless glottal fricative. The variations of those consonants especially their places of articulation, is useful in the investigation of the processes in noun plural formation.

1.5.2.3 Syllable Structure

On syllable structure and word structure, Dinka is characterized by inflected stems that are mostly monosyllabic, as claimed by Andersen (1990). For instance, instead of clear marking of affixes, noun plurals are indicated by changes in the vowel length, tone and voice quality and segmental changes in the coda (Andersen 1990: 6). Take, for example, there are nouns whose plurals are formed by lengthening of a vowel as seen in the example in (1) below which was borrowed from Storch (2005: 167).

(1)	Singular	Plural	Gloss
	áwèt /áwèt/	áwêṭ /áwêṭ:ṭ/	‘crane’

Following the above examples taken from Storch (2005:167) in Rek dialect of Dinka, the changes involved in noun plural formation are vowel lengthening /e/ > /ee/ or /e: / plus tonal change as illustrated in the above example, i.e. a low tone in singular becomes a falling tone in the plural form. Based on the finding above, some nouns maintain their syllable structure when a noun plural is formed. A vowel may be distinguished by voice quality and it may carry a high or low tone.

In Dinka, according to Storch (2005: 179-81), vowels are graded into grade 1, 2 and 3. For example, grade 1 vowels form the pattern ‘CVC’ singulars; grade 2 vowels have the pattern ‘CVVC’ singulars and grade 3 with the pattern ‘a-CVC’, ‘a-CVVC’ singulars. Grade 3 vowels indicate that a noun starts with a prefix ‘a-’. In Rek dialect, Storch (2005:179-81) explains:

The CVC plurals may have a low or high tone and any vowel quality of either grade 1 or grade 2 as seen in words such *lâr* ‘drums’ and *lóm* ‘ribs’, CVVC plurals such as *ḡuùṭ* ‘female animals’ and *wééc* ‘brooms’ and a-prefixes such as *ákón* ‘elephants’ and *ágép* ‘palm trees’.

According to Duerksen (1989: 125), “most words forms have the shape CVC or CVVC, and CV also occurs very commonly”. These findings are important in this study because of their direct relation to the area under investigation. The current study investigates if there are any syllable structures that are peculiar to Bor dialect especially in its noun plural forms.

1.5.2.4 . Tone

Linguistic studies of Dinka have not covered much about tone. Tucker (1948: 19) quoted by Malou (1988:57) only mentioned that “Intonation is present to a high degree ... semantically, tone is not very common.”

Yip (2002:106-7) defines tone as “a fixed underlying pitch pattern carried by a syllable or mora that can distinguish words or grammatical functions in a language”.

Gilley (1992:145) notes that “Dinka has two level tones and the contour tones High fall, Low fall and Rise. In Dinka, tone plays a crucial role in determining the distinction between singular and plural pairs”. Gilley (1992:146) gave the following examples to illustrate tonal changes in Dinka.

(2)	Sg	pl.	Gloss
a)	gém	gè̀m	‘cheek’
b)	kít	kìt	‘colour’

The tone in the singular is high (´) and it becomes low (̀) in plural form as shown in (2a). While in (2b), a low tone (̀) in the singular becomes high tone (´) in its plural counterpart. The same findings will be used in Bor dialect of Dinka to find out what tonal changes occur in noun plural formation. Malou (1988: 60) argues that, “In Dinka, tone (pitch contrasts) are employed not only to distinguish lexical items, but to indicate a major modulatory contrast in morphology”.

Kutsch (1986: 59) explains that,

Many researchers and learners as well as speakers of given languages have often ignored tone simply because they find consonants and vowels more “concrete”. They tend to avoid marking tone saying that “the sentence context would clarify to the reader or readers.

1.6 Theoretical Framework

This section discusses an eclectic approach with Lexical Phonology as the main theory and Autosegmental Phonology as the minor theory. Lexical Phonology (LP) was expounded by (Kiparsky 1982 and Mohanan 1982). It refers to a subset of phonological

rule application which takes place in the lexicon in tandem with the morphological operations and another subset takes place post lexically (Mohanana 1986: 8). Autosegmental Phonology (AP) is associated with Goldsmith (1976) whose major focus is on tone in languages. This theory represents tones on a separate tier from the rest of representation.

Lexical phonology was used for handling the vowel and consonant processes while Auto-segmental Phonology handled the tonal changes in the formation of plurals of nouns in Bor dialect because tonal changes could not be handled by the theory of the lexical phonology. The two theories are discussed in the sections that follow.

1.6.1 The Tenets of Lexical Phonology

Lexical phonology is actually a combination of two theories, a theory of phonology and a theory of morphology in word formation rules (WFR) (Keith 1999: 13). In the course of its development, some of the influential works that emerged included Kiparsky (1982a) a shorter version of which appeared as Kiparsky (1985,1982b,) and Mohanana's (1982) doctoral dissertation, published as Mohanana (1986). The lexicon is divided into at least two strata, corresponding to the traditional Levels 1 and 2.

1.6.1.1 The Principle of Strata

According to the claims of the lexical phonology, the lexicon consists of ordered levels (strata). It is posited that the lexicon is structured hierarchically. Phonologists such as Kiparsky (1982) and Mohanana (1982) proposed different levels based on their interpretation.

Kiparsky (1982: 133) suggests that the lexicon is arranged as follows:

Level 1- Derivations and Primary (irregular) Inflection.

This involves primary (irregular) inflection morphologically, e.g. the English plural form of tooth is teeth (umlaut) and the past tense of sing is sang/sung (ablaut). Level 1 also involves primary (irregular) derivation, e.g. words may be derived through the addition of

the following primary affixes -ous, -al, and -th as in words such as *joyous*, *withdrawal* and *growth*, respectively. The word formation rule (WFR) involves phonological rules depending on a particular morphological operation, e.g. an addition of suffix -al to the root triggers a stress shift in English as seen in párent vs. paréntal.

Vowel lengthening takes place in level 1. This is the principle of the lexical phonology that was used in the analysis and explanation of the data in Bor dialect, especially the bracketing convention.

Level 2- Compounding and Secondary (regular) Derivations

This level involves secondary (regular) derivation and compounding. Examples of derivation are ev[**ou**]ke vs. ev[**ɑ**]c-at-ive and velar softening, e.g. opa[**k**]e vs. opa[**s**]-ity. These examples show suffixation.

Level 3- Secondary inflection, e.g.

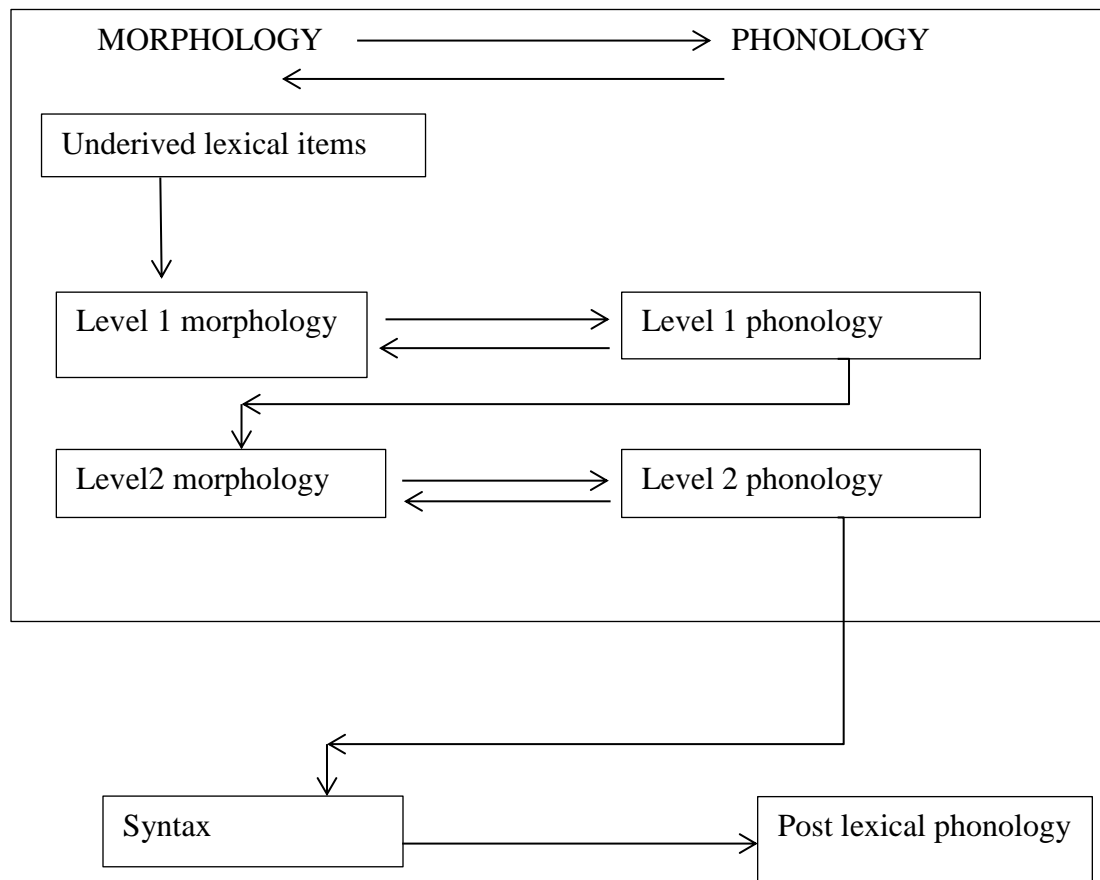
Mohanan (1982:28) has suggested four levels, namely: Level 1- class 1 derivations, Level 2- class 2 derivations, Level 3- class 3 compounding and Level 4- Inflection.

The researcher considered Kiparsky's (1982) level 1 which deals with both irregular derivational and inflectional affixes morphologically. This is so because noun plurals in Bor dialect are formed through consonant mutation, vowel alternation, vowel lengthening among others. Therefore, level one is sufficient for this language because all these changes take place within the root.

1.6.1.2 The Principle of Ordering of Affixes

The principle of strata is illustrated in the figure below which shows the structure of the lexicon.

Fig 1: Structure of the Lexicon (Adopted from Katamba, 1989: 257)



The English word *sectarianism* is used to illustrate how phonology interacts with morphology. The word would be derived by first subjecting the underived lexical item *sector* to *sector+ian* suffixation. After attaching *-ian suffix*, the form *sectarian* is taken to the level 1 phonology box where we can assign a stress on the syllable immediately preceding the suffix. *Sectarian* is then transferred to level 2 morphology where it receives the suffix *-ism* and is handed over to level 2 phonology (Katamba 1989: 273).

The figure below indicates the level ordered affixes in English.

Fig 2: Level-ordered Affixes

Prefix		[Root]		Suffix
	[Level 1 affix]	[Root]	[Level1 affix]	
[Level 2 affix]	[Level 1 affix]	[Root]	[Level 1 affix]	[Level 2 affix]
		[sector]	- ian]	- ism]

The concept of the strata states that the lexicons are made up of the root, base and affixes. Affixation is arranged hierarchically according to the lexical phonological theory. Katamba (1989:262), explains that, “level 1 affix will be closer to the root than level 2 in cases where both occur in the same word” as seen from the example given in Fig 2.

1.6.1.3 The Principle of Level Ordering

Proponents of this theory argue that morphological processes of a language involve the addition of affixes at different levels/strata which result in the formation of different word categories (nouns, verbs, adjectives, etc.) and that the different levels at which affixation is done are of course associated with a set of morphological rules (Keith 1999:14). In light of this, Kiparsky (1982: 131) argues thus,

The basic insight of level –ordering morphology is that the derivational and inflectional processes of a language can be organized in a series of levels. Each level is associated with a set of phonological rules for which it defines the domain of application. The ordering of levels moreover defines the possible ordering of morphological processes in word formation.

It is worth noting that although the proponents of the lexical phonology theory generally agree on the notion that the lexicon is orderly structured, they nevertheless differ on the number of levels or strata involved.

Mohanan (1986: 8) suggests a four-level hierarchical structure. He goes on to explain that derivations take place at both level 1 and level 2, while level 3 and 4 involve the

processes of derivation and inflection, respectively. According to the level-ordering hypothesis a given level 1 affix must attach before a level 2 affix, because level 2 output cannot feed level 1.

On his part, Kiparsky (1982: 133) advocates for a 3 strata in which stratum 1 constitutes derivation as well as primary inflection, stratum 2 involves derivation while stratum 3 constitutes secondary inflection.

Katamba (1989: 259) argues in favor of two strata/levels namely stratum 1, which involves derivations and stratum 2 which involves inflections. He goes on to say that a suffix at a given level can be followed by other suffixes at the same level where all the suffixes in question are at level 1 or at level 2. This study concentrated on level 1 in the analysis and explanation of vowel and consonant processes in the plural noun formation.

1.6.1.4 The Principle of Rule Ordering

Katamba (1989:258) in his words says:

The rules are made to apply in a circle first to the root, then out ward to the outer layer of affixes. For instance, in this theory the word can be linked to an onion with the root of the word as the core and LEVEL 1 as the inner layer, LEVEL 2 as the outer layer and post-lexical phonology as the skin on the outside.

Lexical phonology can also account for blocking regular derived forms by existing forms. Blocking can be accounted for by the notion that the application of a given rule at one stratum blocks the application of the same rule at a later stratum (Plag 1999: 212-3). For example, the English suffixation of irregular plural of the word *foot* is *feet* and *ox* is *oxen*. This rule blocks the application of the more general, regular plural suffix *-s*. This is a case with the ‘elsewhere condition’, which stipulates that “special rule has to apply first, and the more general rule elsewhere” (Katamba 1989: 271-2).

According to Katamba (1989: 261), “there are several ways of forming the past tense and verb morphology is not altogether regular”. The forms in [3] show various regularities in English grammar. Katamba (1989:261) also noted that “Level 1 rules would be used to

state the vowel changes” as shown in example (3). Level I rules state that the vowels tend to cause drastic change in the root to which they are attached. The “strong” verbs undergo changes in the root itself as shown below in (3).

(3) Present		past		Perfective
[ɪ]	~	[æ]	~	[ʌ]
sing		sang		(has) sung
ring		rang		(has) rung
[aɪ]	~	[əʊ]	~	[ɪ]
drive		drove		(has) driven

Taken from Katamba (1989:260)

The analysis given by Katamba on level 1 will be used to analyse the formation of plural forms of nouns in Bor dialect because their formation mostly involve vowel changes.

In English, derivation of verbs from nouns uses two level I rules. For example, one rule changes the vowel as in past tense of ‘sing’ which is ‘sang’ as illustrated in (3). The other level I rule in example 4 comes in and changes the voiceless fricative into a voiced one (Katamba, 1989:261). The voicing of a final fricative is a phonological rule which applies elsewhere in level 1 morphology. Therefore, a phonological rule plays a role in the noun plural formation as illustrated by the examples in (4) as follows.

(4)	Singular		Plural
	[f]	~	[v]
	hoof		hooves
	wife		wives
	leaf		leaves
	loaf		loaves

Taken from Katamba (1989: 262)

Another level I morphological and phonological interaction process is the derivation of noun from adjectives in English. Phonologically when the suffix *-th* is added, it triggers off a change in vowel quality from /ɒ/ to /e/, /ɔ/ to /e/ and /aɪ/ to /ɪ/ as the following examples show (Katamba 1989: 262).

(5)	Adjective		Noun
	long	/ɒ/	length
			/e/
	strong	/ɔ/	strength
			/e/
	wide	/aɪ/	width
			/ɪ/

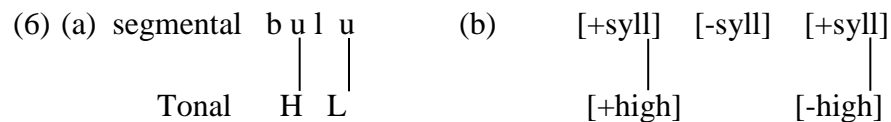
In conclusion, lexical phonology sheds light on four different areas such as the application of morphological processes and its counterpart phonological operations, productivity of different processes, the direction of conversion and the phenomenon of blocking the rule.

1.6.2 Autosegmental Phonology

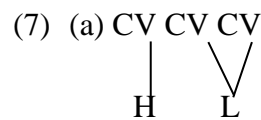
On the analysis of tone, Auto-segmental phonology is used as a minor theory to explain the tonal changes. Auto-segmental phonology represents tones on a separate tier from the rest of the representation. The basic insight is that “the elements of phonology (features) are not grouped together in unordered segments, but that they lead their own independent lives” (Goldsmith 1990:8). This tenet is applied in Bor to mark the tone of noun plural. According to Carlos (2004: 28), “certain phonological features; such as tone or those involved in vowel harmony, may be realized differently in a single vowel or consonant, or in two or more such units”.

In the case of tones, successive high and low tones might be realized sometimes on two separate syllables (CVCV) and sometimes on a single syllable. The tone on that single syllable will then be phonetically falling (c^h). Features like these are described as auto-segments and are represented at a structural level which is higher than that of individual vowel or consonant segments (Carlos 2004:29). The ways in which these features are realized in particular forms are then shown by association lines or tier. For example, see

the illustration below in (6). In (6a), the segments are not analysed as features; but in (6b), features are used to illustrate the same representation (Goldsmith 1990: 9).



In (7a), we see a representation with two tones and three vowels. The low tone is multiply associated, that is, two consecutive syllables are produced with low tone.



Conversely, two tones may be produced during the same period in which a single syllable is produced as shown by the diagram in (7b). The linear ordering on the tonal tier shows explicitly that the high tone precedes the low tone. Associating both tones with a single vowel indicates that the vowel is produced with a falling tone (Carlos 2004: 29).

Finally, the diagrams in (6a), (7a) and (7b) show the tone bearing units (TBU): one-to-one association, multiple associations and the existence of a contour tone respectively.

According to Yip (2002: 106), tonal morphemes abound and it is important to divide them into two types based on where they (tones) surface in the word. The first types are tonal morphemes that affix to the beginning or at the end of a word.

Yip goes on to say that in Hausa (Nigeria), for example, monosyllabic verbal nouns formed from high-toned verbs show a falling tone. In order to derive a noun from a verb, a falling tone is used. One common way to analyze the tonal changes in the examples in (8) is the application of a low (L) tone followed by lengthening of the final vowel to

accommodate the extra tone (Yip 2002: 106-110). This is important because Bor dialect seems to be using tone in forming the plural forms of nouns.

(8) shá “to drink” sháà “drinking” (N)

cí “to eat” cî “eating” (N)

The theoretical findings above in autosegmental phonology were important guide to this study because the analysis of tone was based on it.

1.7 Research Hypotheses

The researcher expected that in Bor dialect of Dinka:

- i) There is root-vowel lengthening, alternation and shortening in making noun plurals.
- ii) There is consonantal alternation in forming noun plurals.
- iii) There is a non-linear affixation in the noun plural formation.
- iv) There is a tonal change in some roots in the noun plural formation.

1.8 Methodology

1.8.1 Research Design

The research design that was used in this study was descriptive survey. The study aimed at collecting data from respondents on how plurals are formed in Bor dialect. The researcher also used a native speaker’s intuition to generate part of primary data while secondary data was obtained from the earlier findings by Andersen (1987), Malou (1988), Storch (2005) and Remijsen and Manyang (2009).

1.8.2 Location of the Study

This study was conducted in Juba County, Kampala and Nairobi as the alternative study sites due to the conflict in Jonglei State, South Sudan that forced the civil population in Bor County to leave their homes for safety. A total of 20 members of Bor County hailing

from the five payams (districts) were interviewed. These payams include: Anyidi, Makuach, Kolnyang, Jale and Baidit. The researcher visited the five payams such as Jebel, Gudele, Muniki, Lologo and Rajaf in Juba for data collection. These payams accommodate a vast number of the Internally Displaced Persons (IDPs) from Bor County following the insecurity in Bor County that was triggered by the division within the South Sudan's ruling party, Sudan Peoples' Liberation Movement (SPLM). The differences within the party led to violence on the 15th December 2013. 10 informants were interviewed in Juba while the other 10 members were also interviewed in Kampala, Uganda and Nairobi, Kenya.

1.8.3 Target Population

Bor County has an estimated population of 240,000 speakers of Bor dialect. The subjects of the study were drawn from the population of this county in Juba County, South Sudan, Kampala, Uganda and Nairobi, Kenya. The respondents included persons with competence in Bor dialect which is their first language, particularly men and women between the ages of 20 and 70. These informants were the people who were able to express themselves with confidence in their dialect. The 20 people selected were representative of the whole population of Bor dialect speakers. They (informants) were randomly selected. For instance, in each Payam in Juba County, 2 respondents were selected making a total number of 10. The other 10 speakers of Bor dialect were also interviewed in Kampala and Nairobi.

1.8.4 Sample Selection

A data was collected from 20 speakers, 10 women and 10 men, aged between 20 and 70 years old. They were selected randomly. Bor dialect of Dinka is their first language. The informants were drawn from the speakers of Bor dialect of Dinka in Juba County in South Sudan and the cities called Kampala, Uganda and Nairobi, Kenya, respectively.

1.8.5 Data Collection Techniques

The researcher first generated the data and then participated in natural conversations in order to collect more data. The data was compared from one informant to another in order

to confirm the truths about the correct sounds in the singular and plural forms of nouns in this dialect. The data was recorded using the Digital Voice Recorder VN-712PC Olympus. The researcher recorded the voices of the respondents during the articulation of singular and plural forms of nouns. This helped greatly in the identification of the distinctions of sounds in the noun plural formation.

1.8.6 Data Analysis

After the data collection, the researcher thereafter transcribed and categorized the nouns morphologically and phonologically according to the changes that emerged in the noun plural formation processes such as vowel lengthening, shortening, insertion and alternation as well as changes in consonants and tone. On the one hand, the theory of lexical phonology was used to analyze and explain the changes in noun plural formation as illustrated in the theoretical framework. It was used to show the vowel processes and consonant processes in forming noun plurals. On the other hand, the theory of autosegmental phonology was used handle the tonal changes in the noun plural formation.

CHAPTER TWO

A PHONEMIC INVENTORY OF DINKA SOUNDS

2.1 Introduction

This chapter explores the sound system of Dinka. It begins by looking at consonants and vowels at the phonemic level. In the noun plural formation in Bor dialect of Dinka, most of the changes are seen in the phonological processes involving vowels and consonants. The syllable in this dialect is discussed because most of these changes take place within monosyllabic words. Since the changes also involve tone, the tones that feature in this particular dialect are identified and discussed.

2.2 Dinka Consonants

Dinka has twenty 20 consonants with 6 places of articulation as seen in Table 1. These places of articulation are labial, dental, alveolar, palatal, velar and glottal. It also has 6 different ways in which consonants are articulated (manner of articulation). They are plosive, nasal, trill, fricative, glide and lateral.

Dinka has dental consonants /t̪/, /d̪/, /n̪/, which are written orthographically as ‘th’, ‘dh’, and ‘nh’, respectively. They are distinguished from the alveolar consonants /t/, /d/, /n/ and their difference occurs in the place of articulation. While /t/, /d/, and /n/ are articulated with the tongue tip against the alveolar ridge, [t̪, d̪, n̪] are produced with the tongue tip against the upper front teeth. Table 1 below shows Dinka Consonant Phonemes.

Table 1: Dinka Consonant Phonemes

	Labial	Dental	Alveolar	Palatal	Velar	Glottal
Plosive	p b	t̪ d̪	t d	c ɟ	k ɡ	
Nasal		m	n̪	n	ɲ	ŋ
Trill				r		
Fricative						h
Glide			w		j	
Lateral				l		

In addition to nineteen consonants, there is ‘ɣ’ which is a voiceless glottal fricative /h/. It is influenced by vowel next to it. In Dinka, for instance, if the vowel next to ‘h’ is non-breathy, ‘h’ sound will also be non-breathy, but if it is breathy, then ‘h’ will be breathy. Or if the vowel following it is rounded, then ‘h’ will be rounded; it will be unrounded if the vowel next to it is unrounded according to Malou (1988:20). This is as illustrated in (9) below:

(9) Examples showing how /h/ the position sound influenced by vowels in Bor dialect.

Dinka word	Gloss
a) ɣɛ̀ɛ̀r [hɛ̀:r]	‘light’
b) ɣóóc [hó:c]	‘buying’

In (9a), it is worth noting that /h/ has been influenced by the vowel /ɛ/ making it non-breathy while in (9b), the breathy voiced vowel ‘ö’ influences the /h/ consonant thereby making it breathy. /h/ sound does not appear at the stem- final position in Dinka nouns and it is not found in the cognates of some of the Nilotic languages like Acholi. Thus, resulting in long vowels as illustrated in the following examples in Acholi in (10) below.

(10)	Dinka	Acholi	Gloss
	γέèn [hê : n]	aan [a : n]	‘I’
	γòt [hòt]	oot [o : t]	‘hut’
	γàm [hàm]	eem [e : m]	‘thigh’

The retention of /h/ sound in Dinka has solved the problem of VC syllable pattern and ‘VVC’ vowel cluster as seen in Dinka words such as εεn* (γέèn) and óóc* (γóóc), respectively. This would contradict the CV, CVC and CVVC pattern which is the preferred syllable structure as seen in the following nouns of Dinka for example, CV: cá [cá] ‘milk’, CVC: màc [màc] ‘fire’, and CVVC: wèl [wè : l] ‘guinea fowl’.

Besides blocking the occurrence of the VC syllable type, /h/ breaks up some potential vowel clusters of VVC, a structure which is not in the orthographic system of Dinka. This is illustrated in Example (11) below:

(11)	Dinka word	Transcription	Gloss
	áyóm	[áhóm]	‘hole’
	áyóth	[áhót]	‘basket’
	γòc	[hò : c]	‘selling’

Table 2 shows the orthographic representation of the Dinka consonants as they appear in the IPA chart.

Table 2: IPA Symbols and Graphemes used for Dinka Consonants

IPA	GRAPHEME	DINKA WORD	TRANSCRIPTION	GLOSS
p	p	piny	/pĩɲ/	‘earth’
b	b	bul	/bul/	‘drum’
t̪	th	thou	/t̪ou/	‘death’
ɖ	dh	dhuk	/ɖuk/	‘boy’
t	t	tɔŋ	/tɔŋ/	‘spear’
d	d	dít	/dít/	‘bird/song’
c	c	cók	/cók/	‘hunger’
ʃ	j	jòk	/ʃòk/	‘devil’
k	k	kòr	/kò:r/	‘elbow’
g	g	gòr	/gò:r/	‘water lilly’
m	m	múl	/múl/	‘donkey’
ŋ	nh	nhièr	/ŋiɛ:r/	‘love’
n	n	nòk	/nòk/	‘epilepsy’
ɲ	ny	nyáŋ	/ɲáŋ/	‘crocodile’
ŋ	ŋ	ŋaâp	/ŋâ:p/	‘fig tree’
r	r	ròr	/rò:r/	‘men’
w	w	wéŋ	/wéŋ/	‘cow’
j	y	yôm	/jôm/	‘wind’
l	l	luèth	/luèt̪/	‘lie’
h	ɣ	yòt	/hɔt/	‘house’

From the examples given on the table above, it is important to mention that all voiced stops such as /b, d, g/ do not occur in the word medial and stem-final positions in Dinka (Andersen 1991:3). There are no consonant cluster like ‘nd’, mb, ‘ng’,etc. The ‘th,’ ‘dh’ and ‘nh’ are digraphs representing /t_h/, /d_h/ and /n_h/, respectively.

2.3 Dinka Vowels

In Dinka, there are seven vowels. There are also two main voice qualities in vowels namely “breathy and “non-breathy” plain voices. The plain vowels include seven vowels such as i, e, ε, a, o, o, and u . Malou (1988: 20 notes that “the breathy vowels are ä, ë, ï, ö, ë and ö ”. In the IPA, breathy voiced vowels are marked with the diacritic (̤), i.e.(̤) below the vowel but for Dinka orthography, the diacritic is above the vowel (̣), i.e. (̣). In Bor dialect of Dinka, there are short and long vowels unlike in the other dialects of Dinka where the vowels could be short, medium-long and long. The seven short vowels in Bor dialect are shown in Figure 3 below.

Figure 3: Short vowels of Dinka

i	u
e	o
ε	o
a	

Table 3 indicates both Short and Long Vowels of Dinka.

Table 3: IPA Symbols and Graphemes used for Short and Long Vowels of Dinka

IPA	DINKA GRAPHEME	DINKA WORD	TRANSCRIPTION	GLOSS
a	a	dák	/dák/	‘smoking pipe’
a:	aa	ácaak	/àcà:k/	‘tick’
e	e	léc	/léc/	‘teeth’
e:	ee	wèel	/wè:l/	‘guinea fowls’
i	i	tìm	/tìm/	‘tree’
i:	ii	tíim	/tí:m/	‘trees’
o	o	lòk	/lòk/	‘rat’
o:	oo	nòòn	/nò:n/	‘grass’
u	u	wùm	/wùm/	‘nose’
u:	uu	dùùt	/dù:t/	‘crowd’
ɛ	ɛ	léc	/léc/	‘thanksgiving’
ɛ:	ɛɛ	Pèèi	/pè:i/	‘moon’
ɔ	ɔ	rók	/rók/	‘fence’
ɔ:	ɔɔ	kòòr	/kò:r/	‘elbow’

2.4 Voice Quality

According to the Dinka orthographic representation, a breathy vowel is marked with two dots above the vowel (V̇). This marking of the vowels is done in order to distinguish the breathy vowels from the other vowels.

Table 4 shows the IPA Symbols and Graphemes used for Dinka Breathily Voiced Vowels.

Table 4: IPA Symbols and Graphemes used for Dinka Breathy Vowels

IPA	DINKA GRAPHEME	DINKA EXAMPLE	TRANSCRIPTION	GLOSS
ɶ	ä	yác	/jɶc/	‘stomach’
ɶ:	ää	gäär	/gɶ:r/	‘writing’
ɷ	ë	lék	/lɷk/	‘information’
ɷ:	ëë	wèèth	/wɷ:t/	‘money’
ɨ	ĩ	tít	/tɨt/	‘magicians’
ɨ:	ĩĩ	tìt	/tɨ:t/	‘witchcraft’
ɔ̥	ö	cók	/cɔ̥k/	‘foot’
ɔ̥:	öö	ròòr	/rɔ̥:r/	‘men’
ɛ̥	ë	pèi	/pɛ̥i/	‘month’
ɛ̥:	ëë	ɲèèr	/ɲɛ̥:r/	‘grass cutting’
ɔ̥	ö	yɔ̥l	/jɔ̥l/	‘tail’
ɔ̥:	öö	dɔ̥r	/dɔ̥:r/	‘peace’

Adopted from Kuony and Duerksen (2000: 5).

The examples in (12) show that when a breathy vowel replaces a non-breathy counterpart, a word whose meaning is different is created. This means that breathy vowels in this dialect are phonemic.

(12 a) Words showing the difference between plain vowel /i/ and its breathy counterpart

/ɨ/

Dinka word	Transcription	Gloss
yìc	/jɨc/	‘truth’

yíc /jɪ́c/ ‘ear’

b) Words showing the difference between plain vowel /e/ and its breathy counterpart /ɛ/
e.g.

Dinka word	Transcription	Gloss
wél	/wél/	‘guinea fowl’
wɛ́l	/wɛ́l/	‘words’

c) Nouns showing the difference between plain vowel /ɛ/ and breathy /ɛ̤/

Dinka word	Transcription	Gloss
rɛ́c	/rɛ́c/	‘destruction’
rɛ̤c	/rɛ̤c/	‘fish’

d) Words indicating the difference between plain vowel /a/ and its breathy counterpart /a̤/.

Dinka word	Transcription	Gloss
mân	/mân/	‘his/ her mother’
m̩ân	/m̩ân/	‘hatred’

e) Nouns showing the difference between plain vowel /ɔ/ and its breathy counterpart /ɔ̤/.

Dinka word	Transcription	Gloss
tɔ̃ŋ	/tɔ̃ŋ/	‘spear’
tɔ̤ŋ	/tɔ̤ŋ/	‘saying good bye’

f) Words indicating meaning between non-breathy vowel /o/ and its breathy counterpart /o̤/.

Dinka word	Transcription	Gloss
lónj	/lónj/	‘whisper’
lõnj	/lõnj/	‘law’

2.5 Syllable Structure in Dinka

Dinka is a highly flexional language which is characterized by the inflected stems. It is not a fusional language as claimed by other linguists. According to Andersen (1992:2), most words are mostly monosyllabic. There are also disyllabic words with the structure of VCVC like in words such as *ajìth* /a.j.ì.t̥/ ‘hen’ ((Storch, 2005: 168).

2.6 Tone in Dinka

Tone can either be high, low and falling (Andersen 2001: 2). There are five distinctive tone patterns which are marked to represent pitch (tone) in Dinka language. They are as follows: low tone (`), high tone (´), mid tone (¨), rising (ˇ) and falling tone (^). Malou (1988:61) illustrates these tones in Dinka in example (13) below.

(13)

a)	Singular	Plural	Transcription	Gloss
	gém	gèm	/gèm/	‘cheek’
	tùj	túj	/túj/	‘horn’
b)	còl /còl/	cóol /cô:l/		‘charcoal’

The examples given in (13a) indicate two tonal types, i.e. a low tone and a high tone. In the first two forms of singular and plural, the singular form shows a high tone while in the plural form, the tone is low. In the second example, a low tone shows the singular form and a high tone gives the plural form of a noun. (13b) shows a falling tone in the plural form and a low tone in the singular of the word charcoal.

It should be noted that tone plays a crucial role in the noun plural formation in Dinka as seen from the above examples. There are no nouns available to the researcher to exemplify mid tone, rise-falling tones but they are available in other word classes of Bor dialect such as personal pronouns which fall outside the scope of this study.

2.7 Conclusion

There are 20 consonants in Dinka including a voiceless glottal fricative /h/. There are also 7 plain vowels and 6 breathy vowels. Among breathy vowels in Dinka, ‘u’ is a plain vowel. These 13 vowels can form words with vowel lengths, namely short, medium-long and long. The syllable structure of CV, CVC, and CVVC pattern is preferred. The word formation rules (WFR) involve the use of tone. There are three tones in nouns, namely low tone (`), high tone (´), and falling tone (^). Consonants and vowels as well as tone are very important in noun plural formation in Dinka.

CHAPTER THREE

VOWEL PROCESSES IN NOUN PLURAL FORMATION

3.1 Introduction

This chapter explores the vowel processes in noun plural formation in Bor dialect. The discussion focuses particularly on the structure of the root and the associated affixes which indicate the number (plural form). The analysis and explanation in this study are conducted within the framework of the lexical phonology. In this chapter, the researcher discusses in detail, vowel processes in the noun plural formation using bracketing convention in Level 1 of the lexical phonology.

3.2 Vowel Lengthening

Bor dialect is highly characterized by a nominal system with an underlying form whereby noun singular and its plural counterpart are marked by manipulating a word internal vowel or vowels. For instance, vowel is lengthened and accompanied by a tonal change which can either be low or high. Since tone aspect is dealt with in Chapter Five, it will not be discussed at length in this Chapter. Vowel lengthening process occurs in noun plural formation in Bor dialect.

There are nouns whose plurals are formed by vowel lengthening in which /i/ becomes /i:/ plus a change in tone as seen in (14) below.

14.	[[Root] +pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[p ^h iny] + pl]	/p ^h in/	>	[[p ^h iny] +aff]	[p ^h iny]	[p ^h i:ny]	‘plot’
	[[tim] + pl]	/t ^h im/	>	[[t ^h im] +aff]	[t ^h im]	[t ^h i:m]	‘tree’

In the example in (14), the short vowel is lengthened to form noun plural. A tone is also used to give a semantic distinction between the words, i.e. singular and plural forms. The

non-linearity and lack of suffixes motivates the use of vowel length (Ladd et al. 2009: 661). The only generalization on number marking is vowel length.

There are nouns in which /e/ becomes /e:/ in a word internal position plus a change in tone, e.g.

15.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[wél] + pl]	/wéɫ/	>	[[wèl] + aff]	[wèèl]	[wè:ɫ]	‘guinea fowl’
	[[áwèt] + pl]	/áwèt/	>	[[áwèt] + aff]	[áwéèt]	[áwê:t]	‘crane’

It is observed in the above examples that a high tone [H] in noun singular becomes low (L) tone in its plural form as shown in the first example, while in the second one, a low tone in the singular form becomes a falling tone in its plural form.

There are nouns in which /o/ becomes /o:/ in a word internal position plus a change in tone in the plural formation, e.g. a low tone in the noun singular form becomes a falling tone in the noun plural form.

16.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[thòk] + pl]	/t̥òk/	>	[[thòk] + aff]	[thóòk]	[t̥ô:k]	‘mouth’
	[[còl] + pl]	/còl/	>	[[còl] + aff]	[còòl]	[cô:l]	‘charcoal’

There are nouns in which /ɔ/ becomes /ɔ:/ in a word internal position plus a change in tone in the noun plural formation, e.g.

17.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[lón] + pl]	/lón/	>	[[lón] + aff]	[lòòŋ]	[lò:ŋ]	‘law’
	[[yòt] + pl]	/hòt/	>	[[yòt] + aff]	[yóòt]	[hò:t]	‘house’

There are nouns whose plurals are formed by /ɔ/ becoming /ɔ:/ in a word medial position without tonal change, e.g.

18.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[tòŋ] + pl]	/tòŋ/	>	[[tòŋ] + aff]	[tòòŋ]	[tò:ŋ]	‘spear’

Affixation takes place at level I of the Lexical Phonology where vowel lengthening causes sound change in the root. There are phonological rules that are triggered by this vowel process. It is also true that vowel lengthening involves the application of tone in the plural formed. Thus, there is an interaction between phonology and morphology.

Vowel lengthening falls within level I of word formation rule (WFR) in lexical phonology. Lexical phonology was used to show vowel changes in the noun plural formation. Vowel lengthening process causes a change in the root as explained in Example (14) - (18) above. The phonological rule that takes place in this vowel process of noun plural formation is represented by the rule below.

Rule 1

V → [+Long] / C-C#

Rule 1 states that a vowel is lengthened in between consonants. The nominative singular stem such as wél ‘guinea fowl’ is lengthened to form its plural counterpart wèèl.

3.3 Vowel Lengthening and Vowel Insertion

It is worth mentioning that in Bor dialect, some noun plurals are also formed by lengthening the word –final vowel followed by the insertion of a front vowel /i/ at the word final position in the root. This seems to be the only affixation that is regular. The examples in this section show how this occurs in the noun plural formation.

There are nouns whose plurals are formed by lengthening of /o/ followed by an insertion of /i/ at the word-final position plus a change in tone, e.g.

19.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[mònó] + pl]	/mònó/	>	[[mònó]+aff]	[mónòòì]	[mónò:i]	‘bread’
	[[òrò] + pl]	/òrò/	>	[[òrò]+aff]	[òròòì]	[òrò:i]	‘pole’

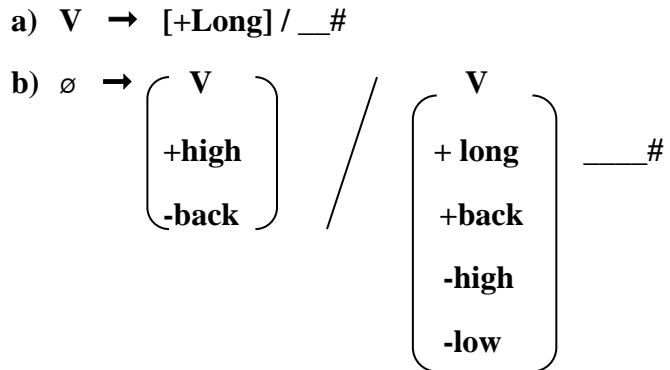
[[áwùró]+ pl] /áwùró/ > [[áwùró +aff] [áwùròoi] [áwùrò:i] ‘dough’

There are plurals which are formed by lengthening /o/ and insertion of /i/ at the same time at the word final position followed by a change in tone except in the word, ‘bòtò’ ‘pocket’, e.g.

20.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[bòtò] + pl]	/bòtò/	>	[[bòtò] + aff]	[bòtòði]	[bòtò:i]	‘pocket’
	[[dóyó] + pl]	/dójó/	>	[[dóyó] + aff]	[dóyòði]	[dójó:i]	‘type of fruit’
	[[álípró] + pl]	/álípró/	>	[[álípró] +aff]	[álípròði]	[álíprò:i]	‘needle’

The insertion of /i/ into the root takes place at level 1 and this triggers the lengthening of the stem-final vowel. This is explained in the following rule.

Rule 2



Rule 2 states that a vowel is lengthened at the end of a root followed by an insertion of a high front vowel /i/ at word finally so that a noun plural is formed.

3.4 Vowel Shortening

Vowel shortening is another process of noun plural formation. For example, some nominative plurals can be formed by shortening the word internal vowel in a stem

followed by a change in tone. Examples in this section show the nature of vowel shortening in noun plural formation.

The following are some of the nouns which become plurals by shortening the internal breathy vowel /ɨ:/ plus a change in tone, e.g.

21.	[[Root] + pl]	Trans.	>	[[Noun]+aff]	LR	PR	Gloss
	[[pɨ̀c] + pl]	/pɨ̀:c/	>	[[pɨ̀c] +aff]	[píc]	[pɨ́c]	‘stirring stick’
	[[álɨ̀k] + pl]	/álɨ̀:k/	>	[[álɨ̀k] +aff]	[áfík]	[álɨ́k]	‘bat’

The shortening of the breathy vowel /ɨ:/ is followed by a change in the tone in each case above. The first example shows that a low tone in the singular form changes to a high tone in the plural form while in the second case, a low tone on the second syllable becomes high tone in the noun plural form and this is a two syllable word as illustrated in (21) above.

There are nouns whose plurals are formed by shortening the vowel /ɔ:/ in the word internal position plus a change in tone, e.g.

22.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[ágóók] +pl]	/ágó:k/	>	[[ágóók] +aff]	[ágóók]	[ágòk]	‘baboon’
	[[ágòt] + pl]	/ágò:t/	>	[[ágòt] +aff]	[ágót]	[ágóʔt]	‘stick’

Dinka is one of the world languages that use tone in its morphological processes. In the above examples, a singular form has a long vowel. When forming a noun plural the word internal long vowel shortens and changes to a low tone in the first example while a low tone in the singular form of the second example changes to a high tone.

There are nouns whose plurals are formed by shortening the /o:/ in the word internal position, e.g.

23.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[ágóór] +pl]	/ágó:r/	>	[[ágóór]+aff]	[ágór]	[ágóʔr]	‘mongoose’

[[áboót] + pl] /áboót: t/ > [[áboót]+aff] [ábót] [áboót] ‘ant’

It is observed in the given examples above that there is no tonal change in the plural forms as the word internal vowel /o/ is shortened. The high tone in both the singular and its plural counterpart in the two examples is not changed.

There are nouns whose pluralisation involves shortening of a long back breathy vowel /ɔ:/ in word internal position, e.g.

24.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[lóm] +pl]	/lóm: m/	>	[[lóm]+ aff]	[lóm]	[lóm]	‘rib’
	[[ácóòt] + pl]	/ácóòt: t/	>	[[ácóòt] +aff]	[ácóót]	[ácóót]	‘hornless’

It is observed that in the above examples, there is a change in the tone in the second example from a falling tone to a high tone in the noun plural form.

There are nouns whose plurals are formed by shortening the back vowel /u/ in the word plus a change in tone, e.g.

25.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[kúúr] + pl]	/kúúr: r/	>	[[kúúr]+aff]	[kùr]	[kùr]	‘mountain’
	[[ácùùk] + pl]	/ácùùk: k/	>	[[ácùùk] +aff]	[ácúk]	[ácúk]	‘black ant’

The vowel shortening process is explained by the rule below.

Rule 3

V → [- long]/ C__C#

The rule states that an internal vowel of a stem is shortened between consonants in the plural form. The examples in (21) to (25) are taken care of by rule 3.

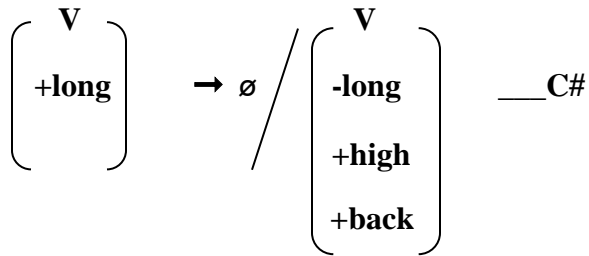
3.5 Vowel Deletion

There are nouns whose plurals are formed by deleting a long vowel /ɔ:/ in the word medial position plus a change in tone, e.g.

26.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[árúóór] + pl]	/árúó:r/	>	[[árúóór] +aff]	[árúr]	[árúr]	‘reed’
	[[rúóòn] + pl]	/rúó:n/	>	[[rúóòn]+aff]	[rùn]	[rùn]	‘year’

The vowel deletion process indicated above is illustrated by the following rule.

Rule 4



Rule 4 states that a long vowel /ɔ:/ is deleted between a high back vowel and consonant at the end of a word.

3.6 Vowel Alternation

In English, vowel alternations may distinguish between singular and plural. For example, the plural form of ‘tooth’ is *teeth* and of ‘foot’ is *feet*. Vowels alternate in the word internal position in the same manner as indicated by the examples in English. This process is referred to as ablaut (internal modification or stem modification or internal inflection) (Remijsen and Ladd, 2009: 5). The examples in this section illustrate this phenomenon.

There are nouns whose plurals are formed by changing the breathy vowel /ɛ/ to breathy vowel /a/ word medially followed by tonal change, e.g.

27.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[léi] +pl]	/lɛ́i/	>	[[léi] +aff]	[lǎi]	[lǎi]	‘animal’
	[[bény] + pl]	/bɛ́n/	>	[[bény]+aff]	[bâny]	[bâny]	‘leader’

[[cùény] + pl /cùḗṅ/ > [[cùény] +aff] [cùàny] [cùàṅ] ‘liver’

Rule 5

/ḗ/ → [ḗ]

Rule 5 states that a breathy vowel /ḗ/ becomes breathy /ḗ/ between consonants in the noun plural form.

There are nouns whose plurals are formed by changing /a/ to /ḗ/ in word medial position plus a change in tone in some of the words, e.g.

28.	[[Root] + pl]	Trans.	>	[[Noun] +aff]	LR	PR	Gloss
	[[màc] + pl]	/màc/	>	[[màc] + aff]	[méc]	[mḗc]	‘fire’
	[[bààì] + pl]	/bà : i/	>	[[béì] +aff]	[béì]	[bḗì]	‘country/home
	[[nyán] + pl]	/nán/	>	[[nyán] +aff]	[nyéṅ]	[nḗṅ]	‘crocodile’

The above vowel alternation can be summarised by the rule below.

Rule 6

$$\left\{ \begin{array}{l} a : \\ a \end{array} \right\} \rightarrow [ḗ]$$

The above rule states that /a :/ or /a/ in singular form changes to breathy vowel /ḗ/ in the plural form.

There are nouns whose pluralization involves an alternation of /i/ or /e / and /ḗ/ in word medial position plus a change in tone. The vowel /o/ changes to /i :/, e.g.

29.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[mìṅ] + pl]	/mìṅ/	>	[[mìṅ] +aff]	[mín]	[mḗṅ]	‘deaf’
	[[nyìn] + pl]	/nìn/	>	[[nyìn] +aff]	[nyín]	[nḗṅ]	‘eye’
	[[yìth] + pl]	/jìṭ/	>	[[yìth] +aff]	[yíth]	[jḗṭ]	‘well’

[[mèth] + pl] /mèt̩/ > [[mèth] + aff] [mìth] [m̩t̩] ‘child’

[[nhòm] + pl] /n̩òm/ > [[nhom] + aff] [nhĩm] [n̩̩:m] ‘head’

Rule 7

a) $\left\{ \begin{array}{c} \text{i} \\ \text{e} \end{array} \right\} \rightarrow [\text{i̩}]$

b) /o/ → [i̩:]

Rule 7(a) states that vowels /i/ and /e/ change to the breathy vowel /i̩/ in the noun plural form. There is also lengthening of /i̩:/ especially when the vowel /o/ in a singular form changes to plural as seen in rule 7(b).

It is seen from the data that most of the plurals are formed through a process of vowel alternation in the root or base. Akidah (2012: 100) notes that “some plurals forms may be predicted based on the noun patterns of the noun bases”. This is true of Bor dialect.

There are nouns whose plurals are formed by alternating /ɔ:/ or /ɔ/ with /ɔ̩:/ in word medial position plus a change in tone, e.g.

30.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[miɔ̀̀r] + pl]	/miɔ̀̀:r/	>	[[miɔ̀̀r] + aff]	[miɔ̀̀r]	[miɔ̩̀̀:r]	‘bull’
	[[cɔ̀̀r] + pl]	/cɔ̀̀:r/	>	[[cɔ̀̀r] + aff]	[cɔ̀̀r]	[cɔ̩̀̀:r]	‘blind’
	[[yɔ̀̀l] + pl]	/jɔ̀̀l/	>	[[yɔ̀̀l] + aff]	[yɔ̀̀l]	[jɔ̩̀̀:l]	‘tail’

Rule 8

$$\left\{ \begin{array}{l} \text{ɔ:} \\ \text{ɔ̣} \end{array} \right\} \rightarrow [\text{ɔ̣:}]$$

Rule 8 states that long back vowel /ɔ:/ or breathy vowel /ɔ̣/ becomes long breathy vowel /ɔ̣:/ in the noun plural form.

There are nouns whose plurals are formed by changing /e/ to /ẹ/ in word medial position, e.g.

31.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[dèŋ] + pl]	/dèŋ/	>	[[dèŋ] + aff]	[dèŋ]	[dèŋ̣]	‘rain’
	[lék] + pl]	/lék/	>	[[lék] + aff]	[lék]	[léḳ]	‘pestle’

Rule 9

$$/e/ \rightarrow [ẹ]$$

Rule 9 states that in the noun plural form, /e/ becomes breathy vowel /ẹ/.

There are nouns whose plurals are formed by changing a long breathy vowel /ạ:/ to /ẹ/

32.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[áyààŋ] + pl]	/áyààŋ/	>	[[áyààŋ]+aff]	[áyéŋ]	[áyéŋ̣]	‘flag’
	[[ámàà] + pl]	/ámàà:l/	>	[[ámààl] +aff]	[áméł]	[áméł̣]	‘sheep’

Rule 10

$$/ạ:/ \rightarrow [ẹ]$$

The rule states that a breathy vowel /ạ:/ in singular becomes breathy /ẹ/ in the plural form.

There are nouns whose plurals are formed by changing the last vowel of the syllable from /a/ to /ə/, e.g.

33.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[màlùàl] + pl]	/màlùàl/	>	[[màlùàl] + aff]	[máluèl]	[má'lùè'l]	'brown bull'
	[[lúák] + pl]	/lúák/	>	[[lúák] + aff]	[lúék]	[lú'èk]	'cattle byre'

Rule 11

/a/ → [ə]

Rule 11 states that the non-breathy vowel /a/ in the singular form changes to breathy vowel /ə/ in its plural form.

There are nouns whose plurals are formed by changing /ə/ to /e/ followed by a change in tone, e.g.

34.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[léc] + pl]	/léc/	>	[[léc] + aff]	[lèc]	[l'èc]	'tooth'
	[[bél] + pl]	/bél/	>	[[bél] + aff]	[bèl]	[b'èl]	'sugar cane'

Rule 12

/ə/ → [e]

Rule 12 states that a breathy vowel /ə/ changes to non-breathy vowel /e/ in plural form.

It is also observed that there is a change in tone, i.e. from high tone in the singular form to low tone in its plural.

There are nouns whose plurals are formed by changing the long vowel /a:/ to the long vowel /ε:/ word medially plus a change in tone, e.g.

35.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[ábáár] + pl]	/ábá:r/	>	[[ábáár] + aff]	[ábèèr]	[áb'è:r]	'orphan'

[[báár] + pl] /bá:r/ > [[báár] + aff] [béér] [bé:r] 'lake'

Rule 13

/a:/ → [ɛ:]

Rule 13 summarizes the notion that long vowel /a:/ becomes /ɛ:/ in the plural form. A change in tone is evident in the first example whereby a high tone is lowered to form the noun plural but the tone remains the same in the second example in both singular and plural forms.

There are nouns whose plurals are formed by alternating between /ui/ or /ue/ and /uɛ/ word internally plus a change in tone, e.g.

36.	[[Root] + pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[yuíth]+ pl]	/júíṭ/	>	[[yuíth] + aff]	[yuèth]	[júèṭ]	'arrow'
	[[kuèl]+ pl]	/kuèl/	>	[[kuèl] + aff]	[kuèl]	[kuèl]	'star'

Rule 14

$\left\{ \begin{array}{c} i \\ e \end{array} \right\} \rightarrow [ɛ]$

Rule 14 states that /i/ or /e/ in singular become /ɛ/ in the noun plural form.

There are nouns whose plurals are formed by a vowel /ɔ/, /ɔ:/ or /ɔ̃/ becoming /a/ or /a:/ or /ã/, respectively followed by a change in tone in some cases, e.g.

37.	[[Root] + pl]	Trans.	>	[[noun] +aff]	LR	PR	Gloss
	[[jòk] + pl]	/jòk/	>	[[jòk] + aff]	[ják]	[ják]	'devil'
	[[kòr] + pl]	/kò:r/	>	[[kòr] +aff]	[kààr]	[kà:r]	'elbow'
	[[gót] + pl]	/gót/	>	[[gót] +aff]	[gàt]	[gàt]	'grass-hopper'
	[[kóm] + pl]	/kóm/	>	[[kóm] +aff]	[kàm]	[kàm]	'insect'

Rule 15

/ɔ/ → [a]

Rule 15 states that /ɔ/ becomes /a/ in the noun plural.

Rule 16

/ɔ:/ → [a:]

Rule 16 explains that /ɔ:/ changes to /a:/ in plural form.

Rule 17

/ɔ̣/ → [ạ]

Rule 17 states that /ɔ̣/ becomes /ạ/ in the noun plural form.

The following are the nouns whose plurals are formed by changing vowels /ie/ or /iɛ/ to /ị/ in word medial position plus a change in tone except in the last case, e.g.

38.	[[Root]+ pl]	Trans. >	[[Noun] + aff]	LR	PR	Gloss
	[[liép] + pl]	/liép/ >	[[liép] +aff]	[líp]	[lǐ́p]	‘tongue’
	[[tiét] + pl]	/tiét/ >	[[tiét] +aff]	[tít]	[tǐ́t]	‘magician’
	[[ciéc] + pl]	/ciéc/ >	[[ciéc] +aff]	[cíc]	[cǐ́c]	‘bee’
	[[ábiéél]+pl]	/ábié:1/ >	[[ábiéél] +aff]	[ábíl]	[ábǐ́l]	‘lepers’

The vowel alternations involve tonal change in some cases. Thus, confirming the fact that Bor dialect has irregular morphological processes.

Rule 18

$$\left\{ \begin{array}{l} ie \\ iɛ \end{array} \right\} \rightarrow [ị]$$

Rule 18 states that the vowels /i e/ or /i ɛ:/ in the singular form changes to breathy vowel /i̤/ in its plural form.

There are nouns whose plurals are formed by irregular pattern of alternation of a given vowel in the word medial position plus a tone change, e.g.

39.	[[Noun Base] +pl] Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[yã̃m] + pl] /hã̃m/	>	[[yã̃m] +aff]	[yã̃̃m]	[hɔ̃:m]	‘thigh’
	[[dhó̃l] + pl] /d̃ó̃l/	>	[[dhó̃l] + aff]	[dhó̃l]	[d̃ó̃l]	‘road’
	[[thò̃k] + pl] /t̃ò̃k/	>	[[thò̃k] +aff]	[thò̃k]	[t̃ò̃k]	‘goat’
	[[dòm] + pl] /dòm/	>	[[dòm] +aff]	[dúùm]	[dú:m]	‘garden’
	[[ányú̃ɔ̃l]+pl] /á̃nyú̃ɔ̃l/	>	[[ányú̃ɔ̃l] + aff]	[ányó̃l]	[á̃nyó̃l]	‘maize’

Rule 19

/ã̃/ → [ɔ̃:]

Rule 19 states that /ã̃/ becomes /ɔ̃:/ in plural form.

Rule 20

/õ/ → [ɔ̃]

Rule 20 states that /õ/ changes to /ɔ̃/ in noun plural formation.

Rule 21

/ɔ̃/ → [ɔ̃]

Rule 21 states that /ɔ̃/ becomes /ɔ̃/ in the plural form.

Rule 22

/o/ → [u]

/o/ changes to /u/ in the plural form.

Rule 23

/uo/ → [o]

Rule 23 states that /uo/ becomes /o/ in plural form.

By looking at the examples above, there is no clear morphological pattern in the noun plurals formed. The alternation is accompanied by a change in tone in each case as illustrated by examples in examples (39) above.

There are also those nouns which are formed by alternating a long breathy vowel /a:/ in the singular with long back breathy vowel /ɔ:/ or /ɔ:/ in the plural plus a change in tone, . This is illustrated in (40) below.

40.	[[Root] + pl] Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[yáàr] + pl] /jâ:r/	>	[[yáàr] + aff]	[yór]	[jór]	'leaf'
	[[màcààr] + pl] /màcà:r/	>	[[màcààr] + aff]	[màcór]	[màcò:r]	'black bull'

Rule 24

/a:/ → $\left\{ \begin{array}{l} \text{ɔ:} \\ \text{ɔ} \end{array} \right\}$

Rule 24 states that long breathy vowel /a:/ becomes /ɔ:/ or /ɔ/ in the plural form.

The following are the nouns whose plurals are formed by changing the /uo/ vowels to /o/ word medially plus a change in tone in some examples, e.g.

41.	[[Root] + pl] Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[yúðòm] + pl] /júô:m/	>	[[yúðòm] + aff]	[yòm]	[jòm]	'bone'

[[túóóŋ] + pl] /túó:ŋ/ > [[túóóŋ] + aff] [tón] [tón] ‘egg’

Rule 25

/uó:/ → [o]

Rule 25 states that /uó:/ becomes /o/ in the plural form.

There are nouns whose plurals are formed by changing the /a/ or /a:/ in the singular form to /ε:/ or /ε/, respectively in the plural form plus a change in tone in some cases, e.g.

42. [[Root] + pl] Trans. > [[noun] +aff] LR PR Gloss
 [[ábál] + pl] /ábá1/ > [[ábál] +aff] [ábèè1] [ábè:1] ‘adulterer’
 [[áluáák]+ pl] /áluá:k/ > [[áluâak] + aff] [áluék] [áluék] ‘slave’

Rule 26

a) /a/ → [ε:]

b) /a:/ → [ε]

Rule 26 states that /a/ or /a:/ becomes /ε:/ or /ε/ in the plural form, respectively.

3.7 Vowel Insertion

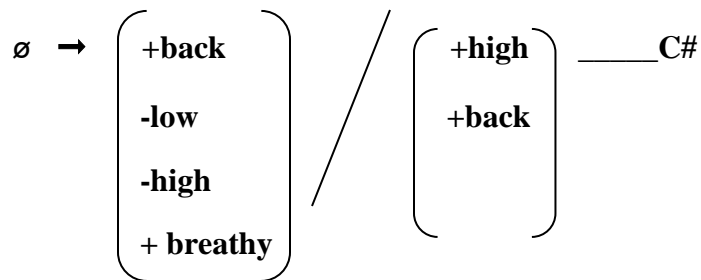
In Bor dialect of Dinka, no group or class of nouns can be generalized as ‘regular’. Stem-internal modification predominates in the noun plural formation. A vowel is inserted into the root to form noun plural. This is illustrated by the examples in (43) below.

There are nouns whose plurals are formed by inserting /ɔ:/ into the root plus a change in tone, e.g.

43. [[Root] + pl] Trans. > [[noun] +ɔ] LR PR Gloss
 [[dhuk] + pl] /d̥ùk/ > [[dhuk] +ɔ] [dhùòk] [d̥ùòk] ‘boy’

[[bùl] + pl]	/bùl/	>	[[bul] +ə]	[bùòl]	[bùòl]	‘drum’
[[bùk] + pl]	/bùk/	>	[[buk] +aff]	[bùòk]	[bùòk]	‘book’
[[lúk] + pl]	/lúk/	>	[[luk] +aff]	[lùòk]	[lùòk]	‘court hearing’
[[bút] + pl]	/bút/	>	[[but] +aff]	[bùòt]	[bùòt]	‘bush’
[[púl] + pl]	/púl/	>	[[pul] +aff]	[pùòl]	[pùòl]	‘pool’
[[wút] + pl]	/wút/	>	[[wút] +aff]	[wùòt]	[wùòt]	‘cattle camp’
[[kúl] + pl]	/kúl/	>	[[kúl] +aff]	[kùòl]	[kùòl]	‘pig’
[[núk] + pl]	/núk/	>	[[núk] +aff]	[nùòk]	[nùòk]	‘ankle’

Rule 27



The above rule says that a breathy vowel /ɔ̥/ is inserted in the root so as to form a plural form of a noun when there is a high back vowel.

Instead of being marked by affixes clearly, nominal inflections and derivations of noun plurals are encoded predominantly by segmental changes in the nucleus which involves a change of tone as well. For example, when an internal vowel of a root is a back vowel /u/, the breathy back vowel /ɔ̥/ is inserted into the root. This process of vowel insertion indicates interaction between morphology and phonology as illustrated in examples (43) above.

There are nouns whose plurals are formed by deleting /o/ and inserting /uɔ/ into the root plus a change in tone in some cases, e.g.

44.	[[Root] + pl]	Trans. >	[[Noun] +aff]	LR	PR	Gloss
	[[rók] + pl]	/rók/ >	[[rók] +aff]	[rùòk]	[rùòk]	‘forest’
	[[lòk] + pl]	/lòk/ >	[[lòk] + aff]	[lùòk]	[lùòk]	‘rat’

Rule 28

/o/ → [uɔ]

Rule 28 states that the vowel /o/ becomes /uɔ/ in plural formation.

3.8 Conclusion

The noun plural formation in Bor dialect is characterized by the inflected stems which are mostly monosyllabic. There are various vowel processes such as lengthening, shortening, alternation, insertion, and deletion. These vowel processes are accompanied by a change in tone in most cases as shown in each process discussed. The changes in vowels are non-linear as indicated by irregular pattern in singular and plural forms. These processes are summarised in Table 5 below.

Table 5: Vowel Alternation in the Singular and Plural form of Nouns

Singular	Plural
i	i:
e	e:
o	o:
ɔ	ɔ:
o	o: + i
ɔ	ɔ: + i

i:	i
o:	o
o:	o
ɔ:	ɔ
u:	u
uɔ:	u
ɛ	ə
a	ɛ
i	i
e	i
o	i
ɔ:	ɔ:
e	ɛ
ə:	ɛ
a	ɛ
ɛ	e
a:	ɛ:
i	ɛ
e	ɛ
o	a
ɔ:	a:
ɔ	ə
ie	i
iɛ	i
ə	ɔ:
ɔ	ɔ
ɔ	ɔ
o	u
uo	o
ə:	ɔ
ə:	ɔ
uo:	o

a	ɛ :
a :	ɛ
u	uɔ̃
o	uɔ̃

The summary in Table 5 shows that there is no clear pattern. It is very irregular.

CHAPTER FOUR

CONSONANT PROCESSES IN NOUN PLURAL FORMATION

4.1 Introduction

This chapter explores the consonant processes involved in the noun plural formation. The consonant phonemes play an important role in word formation as previously mentioned in Chapter Two. There is no consonant cluster in the syllable structures in Dinka in general, and in Bor dialect in particular. Although most words seem to be monosyllabic, there are a few words with more than one syllable as is seen in the examples.

4.2 Consonant Alternation in Noun Plural Formation

There are nouns whose plurals are formed by changing the consonant at the end of a word plus a change in tone as seen in (45) below.

45.	[[Root] +pl]	Trans.	>	[[Noun] + sfx]	LR	PR	Gloss
	[[ỵɨc] + pl]	/j̣ɨc/	>	[[ỵɨc] + th]	[ỵɨth]	[j̣ɨ́t̚]	‘truth’
	[[ỵɨc] +pl]	/j̣ɨ́c/	>	[[ỵɨc] + th]	[ỵɨth]	[j̣ɨ́t̚]	‘ear’

The consonant change is accompanied by a change in the tone in the plural form of the word. When a noun in its singular form ends in a voiceless palatal plosive /c/, this final consonant becomes a voiceless dental stop /t̚/.

There are nouns whose plurals are formed by the addition of the voiceless dental stop /t̚/ plus a change in vowel and tone, e.g.

46.	[[Root]+ pl]	Trans.	>	[[Noun] + aff]	LR	PR	Gloss
	[[róu] + pl]	/róu/	>	[[róu] +aff]	[ròth]	[ròt̚]	‘hippo’
	[[riàì] + pl]	/riàì/	>	[[riàì] + aff]	[riéth]	[rié́t̚]	‘vehicle’
	[[pióu] + pl]	/pióu/	>	[[pióu]+aff]	[pióòth]	[pióò:t̚]	‘heart’

[[ákèù] + pl] /ákèù/ > [[ákèù]+aff] [ákèèth] [ákè: t̥] ‘border’

[[ájùì] + pl /ájùì/ > [[ájùì]+aff] [ájùòòth] [ájùò: t̥] ‘hyena’

The voiceless obstruent /t̥/ is inserted accompanied by a change in tone in the vowel in some cases. There may also be alternation, deletion, and or lengthening of the vowel or vowels in the word.

There are nouns which are pluralized by inserting a consonant. In some cases, the last vowel is deleted and the remaining one shortens when a consonant is inserted. The examples are given in (47) below.

47.	[[Root] + pl]	Trans.	[Noun + sfx]	LR	PR	Gloss
	[[ràù] + pl]	/rà:u/	[[ràù] +p]	[ràp]	[ràp]	‘millet’
	[[jó] + pl]	/jò/	[[jó] + k]	[jòk]	[jòk]	‘dog’
	[[wà] + pl]	/wà/	[[wà] +t]	[wàt]	[wàt]	‘son’

The consonants that are inserted in (47) are the voiceless stops, that is, /p, k, t/.

4.3 Total Modification (Suppletion) of Consonants

A noun plural is formed as a result of a consonant change. Some nominative plurals are formed by suppletion. A complete modification of the root is illustrated by the examples given in (48) below.

48.	[[Root] +pl]	Trans.	>	[[Noun] +affix]	LR	PR	Gloss
	[[wéŋ] + pl]	/wéŋ/	>	[[wéŋ] + aff]	[yók]	[hók]	‘cow’
	[[mòc] + pl]	/mòc/	>	[[mòc] + aff]	[ròòr]	[rò:r]	‘man’
	[[rààn] +pl]	/rà:n/	>	[[rààn] +aff]	[kóc]	[kóc]	‘people’
	[[tìk] + pl]	/tìk/	>	[[tìk] +aff]	[diäär]	[dià:r]	‘women’
	[[nyà] + pl]	/nyà/	>	[[nyà] + aff]	[nyĩr]	[nyĩ:r]	‘girl’

As seen from the above examples, there is no relationship between the nominative singular and its plural counterpart in most cases except in the last word where a small relationship is seen. Therefore, there is completely no rule governing this process.

4.4 Insertion of Consonants

In the process of plural formation in Bor dialect, there are some nouns whose final consonants are inserted. In the examples in (49), it is noted that in the singular form, the final consonant is not pronounced but in the plural form, it is present.

49.	[[Root] + pl]	Trans. >	[[Noun] + tone]	LR	PR	Gloss
	[[ákùp] + pl]	/á'kù/ >	[[akùp] + tone]	[ákúp]	[á'kúp]	'basket'
	[[gùk] + pl]	/gù/ >	[[gùk] + tone]	[gúk]	[gúk]	'granary'
	[[thǒk] + pl]	/t̥hǒ/ >	[[thǒk] + tone]	[thǒk]	[t̥hǒ:k]	'goat'
	[[thǒk] + pl]	/t̥hǒ/ >	[[thǒ] + tone]	[thǒ]	[t̥hǒ:]	'goat'

It is visibly seen that the nouns in the nominative singular especially the voiceless velar stop /k/ as well as bilabial stop /p/ at the stem final position are elided. The orthographic form of the nouns in singular shows that the graphemes 'k' and 'p' are used in writing, but are absent in pronunciation. In the plural form, they are present in both writing and pronunciation. Thus, it is not clear whether the sounds are elided in the singular forms or inserted in the plural forms. In this study, I have chosen to treat them as cases of consonant insertion in the plural form. In the last two examples of (49), the plural form of the word 'goat' could either be [t̥hǒ:k] or [t̥hǒ:]. This is peculiar to Bor dialect only.

4.5 Conclusion

Consonants equally play an important role in noun plural formation in Bor dialect. They are usually alternated or inserted. In some cases there is total modification of the consonants involved. It is noted sometimes that the changes and insertions of consonants are accompanied by changes or deletion of the vowels preceding them. This shows that the vowel and consonant changes take place simultaneously in the noun plural formation.

CHAPTER FIVE

TONAL CHANGES IN NOUN PLURAL FORMATION

5.1 Introduction

We have already seen in Chapters Three and Four how noun plurals can be formed by manipulating the vowels and consonants. In this chapter, the tonal changes are discussed using the theory of Auto-segmental Phonology. Goldsmith (1990) posits two or more different tiers of phonological segments. He goes on to explain that in each tier there is a string of segments which differ with regard to specific features in them (Goldsmith 1990: 8).

Tone is generally referred to as a quality of somebody's voice which expresses emotion. Malou (1988: 57) offers some definitions of tone such as: "accent or inflection expressive of mood or emotion; the pitch of a word often used to express differences in meaning". However, there is no complete definition of tone which covers all its linguistic characteristics.

Like in many other Nilotic languages, tone (pitch contrast) plays a very important role in the noun plural formation. It is significant in marking number (singular and plural forms). Some of the tones that feature in this chapter are given below.

50.

[[˘]] L low tone

[^ˆ] H high tone

[^ˆ] HL falling tone

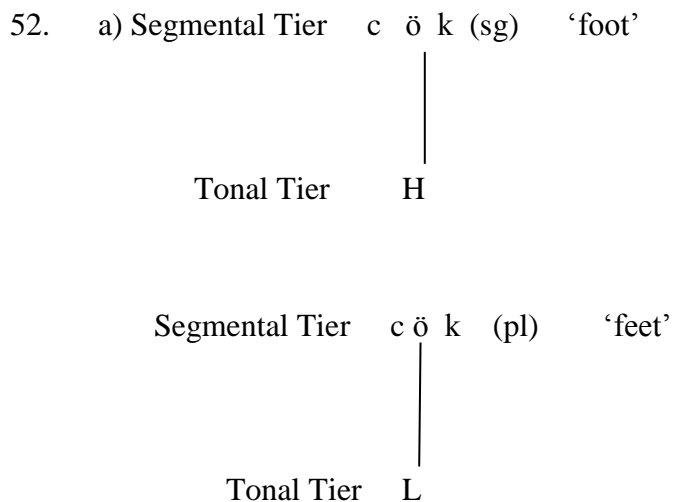
In Bor dialect, we find a high tone, low tone and a mid-tone and only occasionally do we find a falling tone as well as rising tone. Tone can be used to form noun plurals as seen in (51) below.

51.	Sg	Pl.	
	Cók /c _ó k/	còk /c _ò k/	‘foot’
	kók /k _ó k/	kòk /k _ò k/	‘arm’

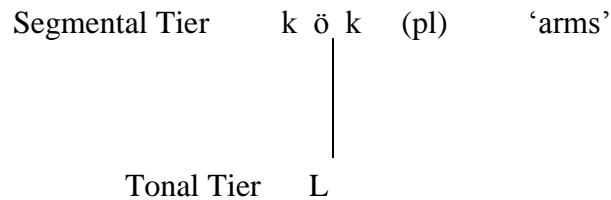
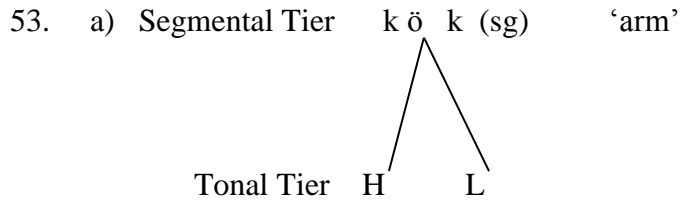
5.2 Tone Change

In some languages including Dinka, noun singular and its plural counterpart is differentiated by the tone alone. These tonal changes always have to be analyzed as tonal alternation (Katamba 1989:195).

Tones are represented on a separate tier and on this tonal tier; each segment must be specified for tone only (Goldsmith 1990:8). The segments on the other non-tonal tier are specified for all other features. Auto-segmental notations show tonal features that mark the difference between singular and plural forms. The features are shown on a different tier as represented in (52) below.

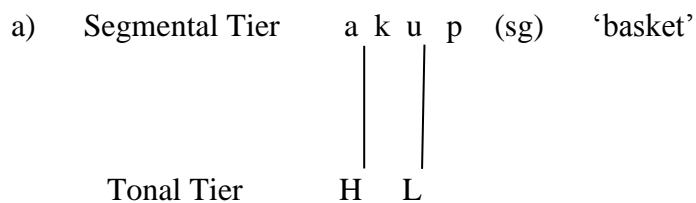
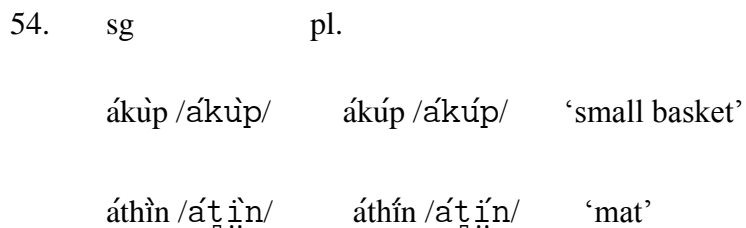


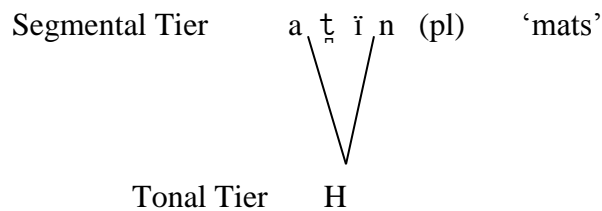
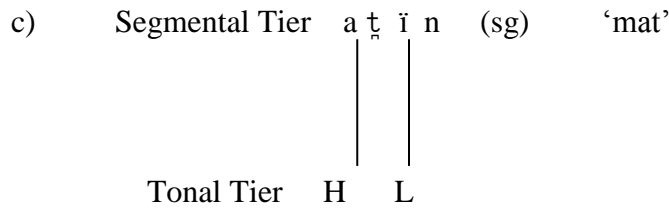
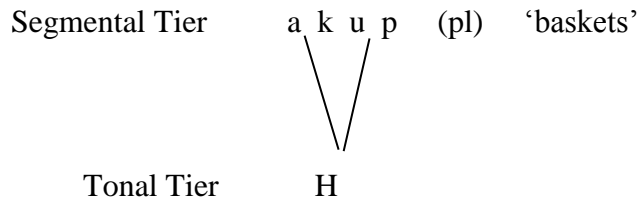
On the other hand, a high tone (H) indicates the singular in the above examples. On the other hand, plurals are formed by lowering of a pitch. The change in the pitch from high to low tone is also represented in (53) below.



When we look critically at the representations of nouns, we can say that the tones are level or register. The vertical lines are the normal association lines which map tones onto syllables.

In examples (52 and 53) above, there are the same number of vowels and tones which show one to one association. On the other hand, where the sound stream is divided into successive vowels, the number of tonal segments cannot match the number of vowels or syllable. In (54) below, we see a representation of two tones and two vowels in the noun plural formation. Two different tones are produced within two syllables of singular form. Consider the two syllable word below:





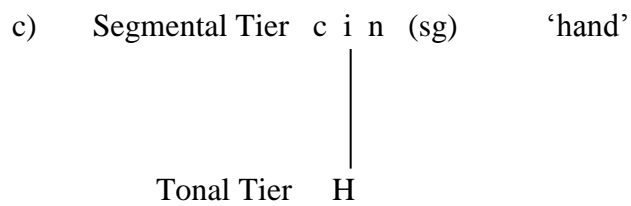
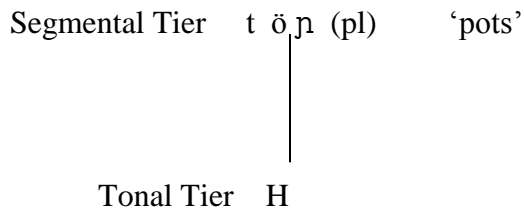
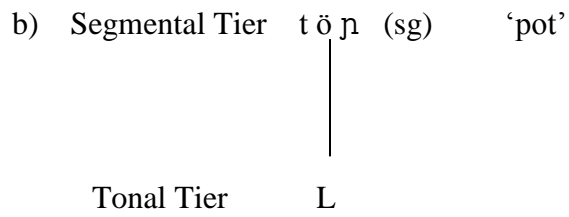
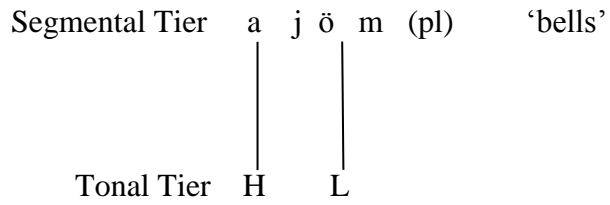
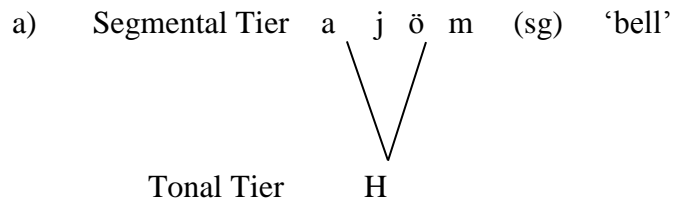
The singular forms in (54 (a) and (b) have the high tone on the first syllable and a low tone on the second, while the plural forms have a high tone only.

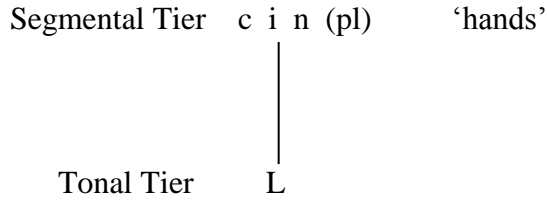
Goldsmith (1990: 9) in his auto-segmental phonological model, notes that a language is considered a tone language if tone is used to distinguish words or morphemes. According to Andersen (1992: 3), “tone is one of the phonological parameters involved in the noun plural formation such as vowel length, voice quality and a final consonant.”

Tone is used for distinguishing the singular and plurals in monosyllabic words with a back breathy vowel /ɔ̤/ and /i/ as illustrated in (55) below.

55.	Singular	plural	gloss
	áyóm /áj̣òm/	áyòm /áj̣òm/	'bell'
	cín /cíṇ/	cìn /cìṇ/	'hand'

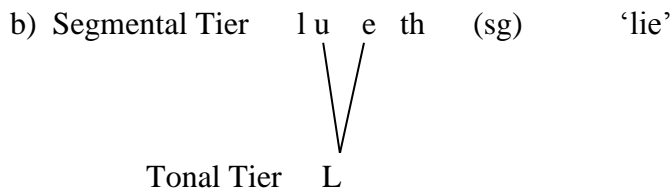
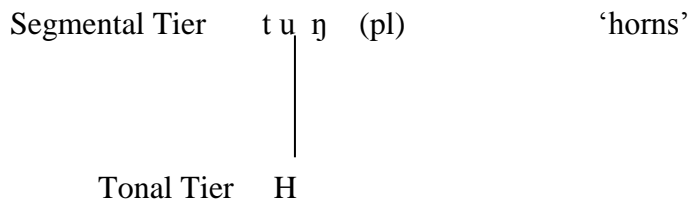
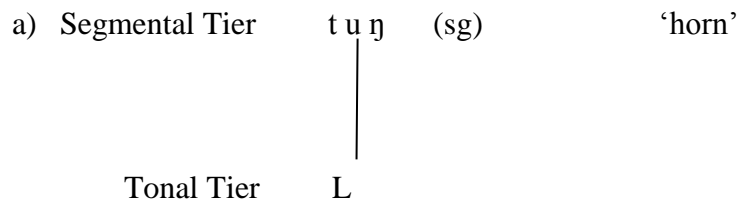
tõny /tõɲ/ tóny /tónɲ/ 'pot'

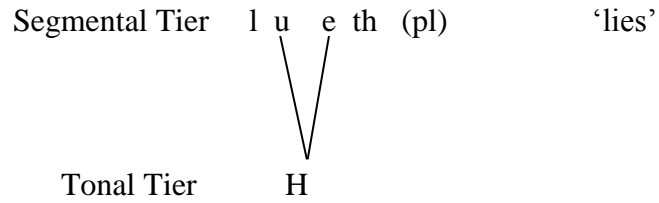




I would disagree with Gilley who says that “low tone marking would be helpful in identifying noun plurals in Dinka” (Gilley, 2004: 28). This may not be true for Bor dialect because there are some nouns whose plurals are formed by use of a high tone while low tone is used for marking the noun singular. The examples in (56) illustrate this phenomenon.

56. Singular	Plural	Gloss
tùŋ /tùŋ/	túŋ /túŋ/	‘horn’
lùèth /lùèṭ/	lúéth /lúéṭ/	‘lie’

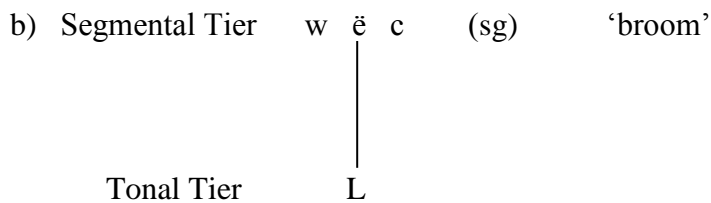
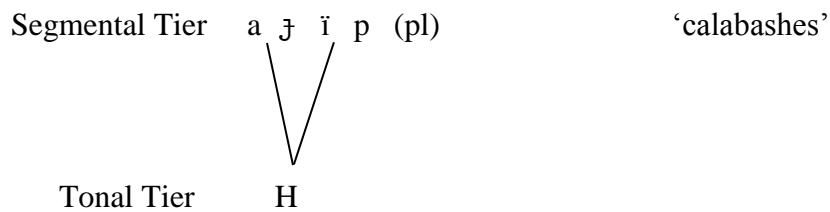
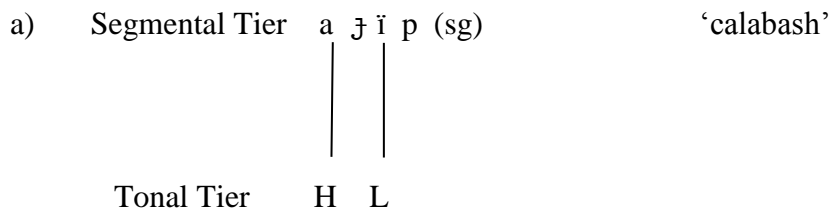


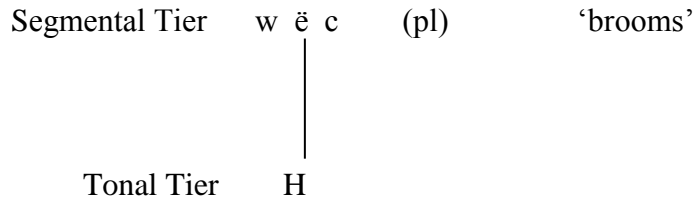


In the examples in (56), a high tone is marked on the plural forms while the low tone indicates the singular forms. The words are monosyllabic and with the same consonants in both noun singular and plural forms.

There are nouns whose plurals are formed by marking the tone on the breathy vowels /i̥/ and /e̥/.

57.	Singular	Plural	Gloss
	ájìp̥ /áɟìp̥/	ájíp̥ /áɟíp̥/	'calabash'
	wèc̥ /wɛ̥c̥/	wéc̥ /wɛ̥c̥/	'broom'

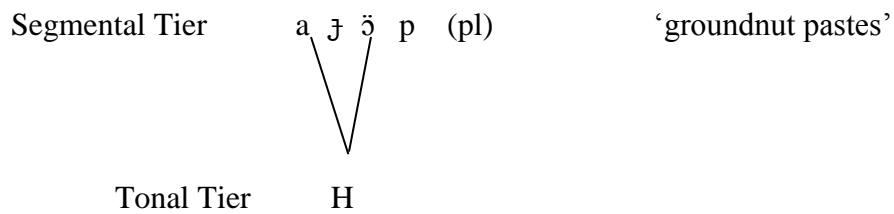
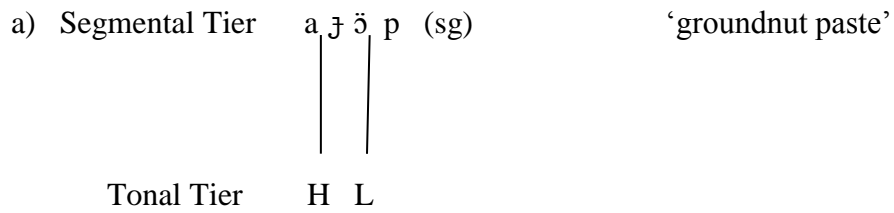


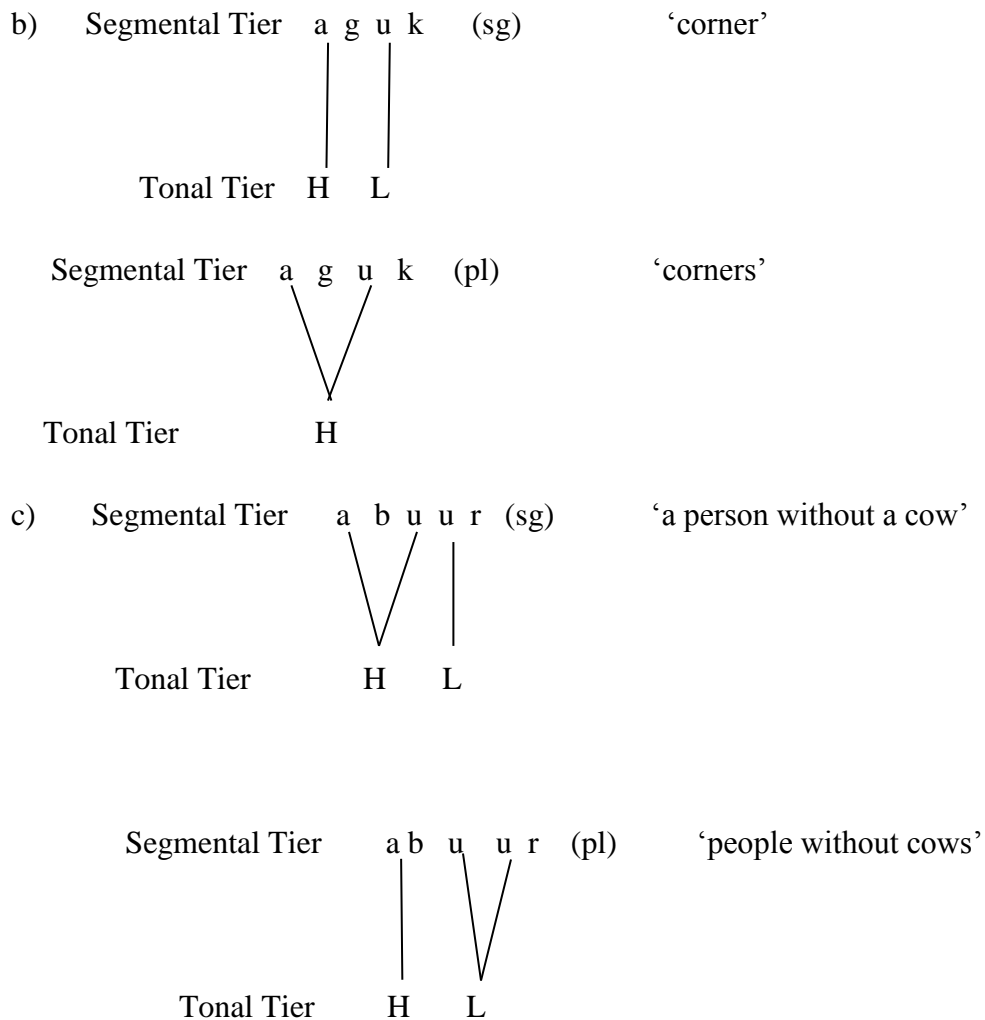


It is important to mention that a change in tone in the plural is independent of the vowel. The vowel does not change in these examples.

There are nouns whose plurals are formed by tonal changes in two-syllable words, e.g.

58.	Singular	Plural	Gloss
	ájòp /áʝòp/	ájóp /áʝóp/	'groundnut paste'
	ágùk /áǵùk/	ágúk /áǵúk/	'hidden area'
	ábùr /ábù:r/	ábùr /ábù:r/	'somebody without a cow'





5.3 Conclusion

Tone plays a very important role in the noun plural formation in Bor dialect. It is significant in marking number (singular and plural). Tone is one of the phonological parameters involved in the noun plural formation just as vowel length, vowel alternation, and voice quality and consonants alternation. It is marked on the words which are monosyllabic and disyllabic. The examples show that both the high tone and low tone are used in forming noun plurals.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of Findings

This section summarizes the outcome of the study in connection with the problem and objectives that it set to achieve. In this study, the processes of noun plural formation in Bor dialect is described using the postulations of the lexical phonology as a main theory and auto-segmental theory as a minor one.

Thus, this study sought to answer the questions: what vowel and consonant processes are involved in forming noun plurals, in which part of the noun does affixation occur, if any and finally, what tonal changes take place in the noun plural formation in this dialect?

The first objective of this study was to investigate the vowel processes involved in the noun plural formation. The researcher established that noun plurals are formed by different vowel processes such as vowel lengthening, vowel alternation, vowel shortening, vowel deletion and vowel insertion.

The second objective was to find out the consonantal processes that take place in the noun plural formation. The researcher arrived at the conclusion that some noun plurals are formed by consonant alternation, consonant insertion and a complete stem modification. These processes of noun plural formation are accompanied by a change in the vowel and tone of the root.

On the third objective which was set to examine the part of the noun plural where affixation occurs, the researcher established that the noun plural formation was irregular as most of noun plurals are formed by inserting a vowel or vowels into the root. Although this was the case in many examples, there were others that had morphological processes that seemed to carry regular patterns especially in the area of vowel insertion at the end of a word.

The final objective was set to investigate the tonal changes that take place in the noun plural formation in Bor dialect. The researcher arrived at the conclusion that tone plays a crucial role in the noun plural formation. There were tonal changes from high to low or low to high in the plural formation of monosyllabic nouns. In bisyllabic nouns, tone was also changed in forming plurals. In most nouns where plurals were formed through vowel and consonant processes, it is noted that there was a change in tone as well.

6.2 Conclusion

The analyses show that vowel lengthening, vowel and consonant alternations, vowel insertion, vowel deletion, vowel shortening, consonant insertion and total modifications of the roots are applied in the noun plural formation process. On the other hand, some noun plurals are formed by changing tone only. I conclude by saying that Bor dialect has an irregular morphology.

6.3 Recommendations

This study focuses on the noun plural formation in Bor dialect. I therefore recommend the same study on varieties of Dinka language spoken in South Sudan other than only Bor dialect. There is need to establish the areas of similarity and divergence among the dialects of Dinka.

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APPENDIX I: Bor dialect nouns

Singular	PR	Plural	PR	Gloss
piny	[pĩŋ]	píiny	[pí : ŋ]	‘plot’
tím	[tím]	tíim	[tí : m]	‘tree’
wél	[wél]	wèèl	[wè : l]	‘guinea fowl’
yòt	[hòt]	yóòt	[họ : t]	‘house’
thòk	[ṭòk]	thóòk	[ṭô : k]	‘mouth’
còl	[còl]	cóòl	[cô : l]	‘charcoal’
lón̄	[lón̄]	lòò̄	[lọ : ̄]	‘law’
ájìth	[ájìṭ]	ájìith	[ájìṭ]	‘hen’
tò̄	[tò̄]	tòò̄	[tò : ̄]	‘spear’
mélèk	[mɛlək]	mélèèk	[mɛlɛ : k]	‘king’
lɛi	[lɛi]	lài	[lɛi]	‘animal’
dòm	[dòm]	dúm	[dúm]	‘garden’
màc	[màc]	méc	[mɛc]	‘fire’
réc	[rɛc]	rec	[rɛc]	‘fish’
luák	[luák]	luék	[luɛk]	‘cattle byre’
mèth	[mèṭ]	mìth	[mìṭ]	‘child’
wɛt	[wɛt]	wél	[wɛl]	‘word’
dè̄	[dè̄]	dè̄̄	[dè̄]	‘rain’
mì̄	[mì̄]	mì̄̄	[mì̄]	‘deaf’
nyìn	[nìn]	nyì̄n	[nì̄n]	‘eye’
jòk	[jòk]	jâk	[jâk]	‘devil’
miòòr	[miò : r]	miöör	[miò : r]	‘bull’
lék	[lɛk]	lèk	[lɛk]	‘pestle’
léc	[lɛc]	lèc	[lɛc]	‘tooth’
kóm	[kóm]	kâm	[kâm]	‘insect’
thòk	[ṭòk]	thòk	[ṭòk]	‘goat’
yìth	[jìṭ]	yìth	[jìṭ]	‘well’
ábáár	[ábá : r]	ábèèr	[ábè : r]	‘orphan’
yàm	[hàm]	yòòm	[họ : m]	‘thigh’
còòr	[cò : r]	còòr	[cò : r]	‘blind’
bàài	[bà : i]	béi	[bɛi]	‘home’

kuèl	[kuèl]	kuèl	[kuèl]	‘star’
ámăăl	[ámă:l]	áméì	[áméì]	‘sheep’
gót	[gót]	gàt	[gàt]	‘grass hopper’
ányūol	[ányūol]	ányól	[ányól]	‘maize’
kòòr	[kò:r]	kaàr	[ka:r]	‘elbow’
nhòm	[nhòm]	nhìim	[nhì:m]	‘head’
nyán	[nyán]	nyéñ	[nyéñ]	‘crocodile’
bény	[béñ]	bâny	[bâny]	‘leader’
báár	[bá:r]	béér	[bé:r]	‘lake’
màluàl	[màluàl]	máluèl	[máluèl]	‘brown bull’
yǒl	[jǒl]	yóòl	[jò:l]	‘tail’
yuíth	[juíth]	yuèth	[juèth]	‘arrow’
áyăăñ	[áyă:ñ]	áyéñ	[áyéñ]	‘flag’
dhól	[dhól]	dhǒl	[dhǒl]	‘road’
yíc	[jíc]	yìth	[jìth]	‘ear’
yìc	[jìc]	yíth	[jíth]	‘truth’
ánùì	[ánùì]	ánùòòth	[ánò:t]	‘hyena’
kòu	[kòu]	kùòòth	[kùò:t]	‘thorn’
ánáú	[ánáú]	ánăăth	[ánă:t]	‘cat’
nyà	[nyà]	nyĩir	[nyĩ:r]	‘girl’
róu	[róu]	ròth	[ròth]	‘hippo’
rààu	[rà:u]	ràp	[ràp]	‘millet’
riài	[riài]	riéth	[riéth]	‘vehicle’
wěèth	[wè:t]	wèu	[wèu]	‘money’
jǒ	[jǒ]	jǒk	[jǒk]	‘dog’
wă	[wă]	wăt	[wăt]	‘son’
piúu	[piúu]	piòòth	[piò:t]	‘heart’
kèrèthánò	[kèrètánò]	kèrèthànòì	[kèrètánò:i]	‘christian’
mònó	[mònó]	mónòì	[mònò:i]	‘bread’
òrò	[òrò]	òròì	[òrò:i]	‘pole’
ákacà	[ákacà]	ákacàì	[ákacà:i]	‘donkey’
áwùró	[áwùró]	áwùròì	[áwùrò:i]	‘dough’
bòtò	[bòtò]	bòtòì	[bòtò:i]	‘pocket’
dóyó	[dójó]	dóyòì	[dójò:i]	‘fruit’

álípró	[álípró]	álípròì	[álíprò:i]	‘needle’
tìk	[tìk]	diààr	[dià:r]	‘woman’
mòc	[mòc]	ròòr	[rò:r]	‘man’
dái	[dái]	dòòc	[dò:c]	‘old woman’
rààn	[rà:n]	kóc	[kóc]	‘person’
wéŋ	[wéŋ]	γók	[hók]	‘cow’
dhùk	[dùk]	dhùòk	[dùòk]	‘boy’
bùl	[bùl]	bùòl	[bùòl]	‘drum’
bùk	[bùk]	bùòk	[bùòk]	‘book’
lúk	[lúk]	lùòk	[lùòk]	‘judgment’
bút	[bút]	bùòt	[bùòt]	‘bush’
púl	[púl]	pùòl	[pùòl]	‘pool’
pùùr	[pù:r]	pùòòr	[pùò:r]	‘hoe’
wút	[wút]	wùòt	[wùòt]	‘cattle camp’
kúl	[kúl]	kuòl	[kuòl]	‘pig’
rók	[rók]	ruòk	[ruòk]	‘forest’
lòk	[lòk]	lùòk	[lùòk]	‘rat’
núk	[núk]	nùòk	[nùòk]	‘ankle’
liép	[liép]	líp	[líp]	‘tongue’
tiết	[tiết]	tít	[tít]	‘magician’
ciéc	[ciéc]	cíc	[cíc]	‘bee’
áduòk	[áduòk]	áduùk	[ádu:k]	‘bowl’
ábiéél	[ábié:l]	ábíl	[ábíl]	‘leper’
áruòòr	[áruò:r]	árúr	[árúr]	‘reed’
rúòòn	[rúò:n]	rùn	[rùn]	‘year’
ádhùòm	[ádhùòm]	ádhúm	[ádhúm]	‘hole’
pìic	[pì:c]	píc	[pì:c]	‘stirring stick’
ruéény	[rué:ny]	ruéeny	[rué:ny]	‘thief’
álìk	[álì:k]	álík	[álì:k]	‘bat’
ágóók	[ágó:k]	ágók	[ágók]	‘baboon’
ágóór	[ágó:r]	ágór	[ágór]	‘mongoose’
ácààk	[ácà:k]	ácák	[ácák]	‘tick’
ábóót	[ábó:t]	ábót	[ábót]	‘ant’
pèèi	[pè:i]	pèi	[pè:i]	‘month’

mèèi	[mè:i]	méi	[méi]	‘root’
ácóót	[ácóót]	ácót	[ácót]	‘hornless’
kúúr	[kú:r]	kùr	[kùr]	‘mountain’
ácùùk	[ácùùk]	ácúk	[ácúk]	‘black ant’
cín	[cín]	cìn	[cìn]	‘hand’
kòk	[kòk]	kòk	[kòk]	‘arm’
cók	[cók]	còk	[còk]	‘foot’
áthìn	[átìn]	áthín	[átín]	‘mat’
áném	[áném]	ánèm	[ánèm]	‘spy’
áyóm	[ájóm]	áyòm	[ájòm]	‘bell’
tùṅ	[tùṅ]	túṅ	[túṅ]	‘horn’
ábûur	[ábû:r]	ábùùr	[ábù:r]	‘lack of cow’
ákùp	[ákùp]	ákúp	[ákúp]	‘basket’
tòny	[tòṅ]	tóny	[tòṅ]	‘pot’
yáàr	[jâ:r]	yór	[jór]	‘leave’
yuóòm	[júóm]	yòm	[jòm]	‘born’
tuóṅ	[túóṅ]	tóṅ	[tóṅ]	‘egg’
màcààr	[màcà:r]	mácóór	[mácó:r]	‘black bull’
ábál	[ábál]	ábèèl	[ábè:l]	‘adulterer’
áluáák	[áluâ:k]	áluék	[áluék]	‘slave’

APPENDIX II: MAP OF DINKA AREAS

