HAUSA AND YORÙBÁ NUMERICAL SYSTEMS: A MORPHOLOGICAL PRODUCTIVITY APPROACH

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DEDICATION

This research work is dedicated to my loving parent, late Malam Bashir Muhammad Bakori and Hajiya Zainab Bashir Musa Dageji who nurtured me to my present level in life. May Allah (SWT) reward them abundantly and give me the ability to make them happier. Ameen.

DECLARATION

I hereby declare that, this work entitled ‘Hausa and Yorùbá Numerical Systems: A Morphological Productivity Approach’ is the product of my research efforts, undertaken under the supervision of Professor Garba Kawu Daudu and has not been presented anywhere for the award of the same degree and that all source consulted are duly acknowledged.

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ABSTRACT

This work discusses the morphological productivity of Hausa and Yorùbá numerals based on word-based morphology theory where some morphological processes such as clipping, blending, compounding and reduplication were analyzed. The numerical system here is a product of interplay of morphological and phonological processes that are employed to derive various numerical entities of different quantities and magnitudes. Lexical items which represent the base numbers are characterized by various possible combinations to the cardinal numerical resources in order to build up an increasing system of counting by means of productive mechanism. The Word-Formation Rules here perform a unique operation on the word base to produce a new word where both the new word and the base share a morphological and semantic relationship. Observation technique is used in the process of data collection. The result of the analysis shows that the numeral in the Yorùbá language requires some arithmetic in a way that stimulates intelligence unlike Hausa which does not. Also Hausa has traditional and modern counting system while Yorùbá has many structures of counting.

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CHAPTER ONE

GENERAL INTRODUCTION

1.0 Introduction

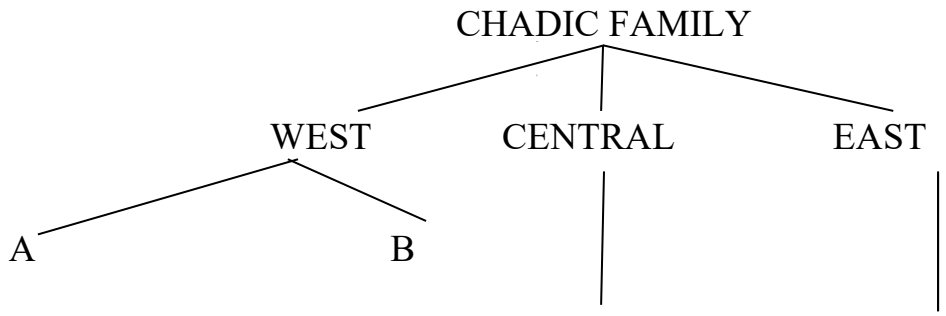
Linguistic analysis reveals that words have an internal morphological structure with bases and affixes recurring in different degrees which may be associated with a common core of meaning. Affixes may also convey a meaning or sub-serve to a particular grammatical function or else according to the cross linguistic variation in morphology. The study of morphology offers an important insight into how language works, revealing the need for different categories of words, the presence of word-internal structure, and existence of operations that create and modify words in various ways (O'Grady and Guzman, 2011). Similarly, words are more important in language as they carry meanings that are fundamental building blocks of communication.

1.1 The Hausa Language

The Hausa language belongs to the Chadic language family, which itself is a constituent member of the Afroasiatic phylum (Newman, 2000:1). It is also the most widely spoken member of the Chadic group, being the language that has millions of speakers in northern Nigeria (e.g. Kano, Katsina, Sokoto etc.) and some parts of southern Niger republic.

Hausa is perhaps the second must widely spoken language in Africa today exceeded only by Arabic and challenged only by Swahili (Jaggar, 2002). The Hausa Language is also transmitted in media broadcasting services in Nigeria and some African and other European Countries such as; B.B.C. London, V.O.A, Radio France etc. While the Kano dialect is regarded as the standard form of Hausa that used as communications tool in Media, Teaching and Printing Press Institutions. (Suleiman, 2017:14).

Genealogical Tree of Hausa:



Hausa	Bade	Kotoko	Kara
Bole	Ngizim	Tere	Somfai
Angas	Warji	Kilba	Bangla
Kare-kare	Miya	Bacama	Mokulu
Kanakuru	Siyanci	Mandara	Sokoro etc

(Newman, 1991 in Schuh, 1982).

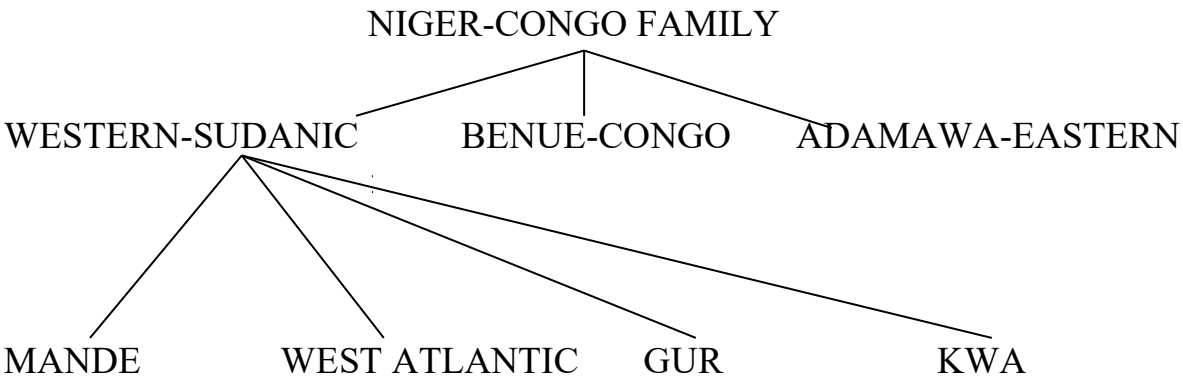
1.2 The Yorùbá Language

The Yorùbá[1] language is grouped among the Kwa family of Niger-Congo language as shown in the tree diagram below. It is a tonal language which has a geographical and historical related "Continue Dialect" (Bámgbóṣé, 1967:14). The Yorùbá language can also be identified as a spoken mother tongue in the south western part of Nigeria comprising of Ogun, Osun, Oyo, Ondo, Lagos, Ekiti, Kwara and some parts of Kogi state. But, the kingdoms of Yorùbá land are categorized into; Ijebu, Owo, Ilesha, Akoko and Egba in which the standard dialect of Yorùbá language is found under these kingdoms across Nigeria.

The Yorùbá language is also spoken in some African countries other than Nigeria such as; Benin Republic, Ghana, Togo, Cote D'ivoire, Sudan and Sierra lone. (Suleiman, 2015:2).

[1]For all Yorùbá examples, high tone (´) and low tone (`) are indicated while mid tone is unmarked. Long vowels are indicated to the affected vowels only (ọ and ẹ), hence -ọ 'long' versus -o 'short' and -ẹ 'long' versus -e 'short'.

Genealogical Tree of Yorùbá:



Mande	Fulani	(Voltaic)	**Yorùbá**
Malinke	Wolof	Mossi	Ibo
Bambara	Serer	Kabre	Ewe
Dyula	Dyola	Gurma	Fanti
Soninke	Tenne	Bariba	Nupe
Susu	Kissi	Senufo (etc)	Bassa
Kpelle	Gola		Urhobo
Vai	Balante (etc)		Edo
Loma (etc)			Idoma (etc)

(Katzner, 1992 in Omachonu, 2011).

1.3 Background of the Study

Hausa and Yoruba have made a various contacts with one another through many factors, such as colonization, religion and trade due to their geographical location where neither the Yoruba nor the Hausa can be said to be self-supported, there are some highly valued commodities produced in one area and their demand is in other area.

Similarly, the trade in kola-nuts, grains, cattle or horses as well as other raw-materials helped to joined the Hausa and Yoruba people together while the kola transportations to northern Nigeria from the Yoruba land for the need of elders and women. The counting system (i.e. addition, subtraction, multiplication etc) must be occurred between buyers and sellers during that transaction where the simple arithmetic of a language has been used. Moreover, the interpreters come for the interactions in order to simplify the complex numerals during the manipulations. The productivity of the numerals helps to learn the calculation in a simple way that this research focuses on.

1.4 Statement of the Problem

There are several morphological studies on Hausa and Yoruba languages. It is observed that the numerical system of our indigenous languages have been ignored and neglected and that most of them are becoming lexicalized or

unproductive. This research intends to unravel the various features of numerals in Hausa and Yoruba.

1.5 Research Questions

The following questions are answered in this research:

1) Why some morphological patterns are more productive than others?
2) Is there any lexicalization on numerical systems between these languages or not?
3) Which morphological process is usually applied on numerical systems of these languages?
4) Why the numeral systems of some languages are similar in the production of the lexical numerals from the ten-base and why in other languages are different?
5) Why full reduplication in numeral systems is more productive than partial reduplication, particularly in relation to the idea of distributions?

1.6 Aim and Objectives

The aim of this research is to analyze the morphology of Hausa and Yorùbá numerical system. The objectives of this research are as follows:

1) To find out why some morphological patterns are more productive than others.

2) To find out whether there is lexicalization on numerical systems between these languages.

3) To see how morphological processes are usually applied to these languages on numerical system.

4) To examine the numeral systems in the production of lexical numerals (from ten-base) of these languages and their differences to other languages.

5) To see how full or complete reduplication in numeral systems is more productive than the partial reduplication.

1.7 The Significance of the Study

The study will be of great importance in the field of morphology, particularly in the area of morphological productivity. It will also help in understanding the domain of morphological productivity and numerical system. However, this research is to help at documenting and archiving the traditional counting system which is severely endangered today being a very important aspect of our indigenous languages but it is no longer practicing by the speakers as they always operate the modern systems. The researchers as well as the student in this area may get easy access for further research especially from other languages.

1.8 The Scope and Limitation of the Study

The scope of this research is about the Numeral Systems of Hausa and Yoruba languages, where for the Hausa language the standard dialect had been used for the validity of this research, and for the Yoruba language the two major dialects (western and southern) were used in the examples and data presentation. Similarly, the research has been limited to the morphological productivity on numerals in order to see the productive and unproductive numerals within the word formation rules of the two languages.

1.9 The Numerical System

Numerals are among one of the first things we learn when learning a new language. The acquisition of numeracy starts from the counting base of the language that depends on the structure of a language (Mbah and Uzoigwe, 2013:73). Numerals are uniform because in many natural languages they comprise simple and complex expressions. Simple numerals are the easiest conceivable set of numerical expression in a language (e.g. one, two, three, four etc.). However, the simple numbers are preferred for having a 'cyclic' pattern of atoms that cannot be separated and also morphologically derived to form the complex elements of numerals that have the highest potential to make a continuous counting in each language. These can be in the form of addition, subtraction and multiplication. All

human languages count things because numeration is a universal phenomenon (Omachonu, 2013:512).

Furthermore, numeral systems of human languages differ in organization, mode of reduplication of higher numbers based on ones that are more basic and the grammatical devices utilized in the realization of counting. At times, the differences in the numeral systems of languages are based on the significant needs basically motivated by demands on what needs to be counted and at other times, they are simply based on the nature of language which is more philosophically explained beyond certain systematic reasons for variations that may be adduced (Ejeba, 2013:182).

Generally, a numeral can be described as a sign, mark or symbol used to represent a number. Even though, numeral system is a written system for expressing numbers, in linguistics, numerals are specific words in a natural language that represent numbers (Obikudo, 2013:27).

1.10 Types of Numeral Systems

There are three types of numerals: Ordinals, Cardinals and Distributive used to make an arithmetical operation in each language. The systems also depend on some rules on how to count things by the native speakers of a language.

1.10.1 Ordinal Numerals

Natural numbers are ordinals that are used to measure the "length" or "shape" of a set of construction. In linguistics, ordinal numbers are used to represent the *position* or *rank* in a sequential order. The order may be of size, importance or chronology. The ordinal numbers may be written in English with numerals and letters of suffixes (i.e. 1st 2nd 3rd 4th etc.).

1.10.1.1 The Ordinal Numerals in English

Example of ordinals series in English are: first, second, third, fourth, fifth, sixth, seventh, eighth, ninth, tenth etc. These are used in a variety of rankings, including *time* (e.g. the first hour, the second week, the third month of a year, second round, first quarter, second semester etc.), *space* (e.g. the first right, the second floor etc.), *position* (e.g. first winner, second person, third person etc.) and *quality* (first class ticket, first choice etc.). In Latin, the ordinal series have been specified as: primary, secondary, tertiary, quaternary etc.

1.10.1.2 The Ordinal Numerals in Hausa

In Hausa, ordinal numbers are used to indicate the *position* (e.g. nà[2] xaya 1st, nà biyu 2nd, nà ukù 3rd etc.), or to *measure* the group of people, animal or things

[2]For all Hausa examples, low tone is indicated with a grave accent (`), falling tone by a circumflex (∧) and high tone is left. Long vowels are indicated by doubling the affected vowel, hence -aa 'long' versus -a 'short'.

especially in division terms (e.g. rabi ½, rubu'i ¼, sulusi 1/3 etc.) and also specifying the *time* (e.g. sàu xaya 'once', sàu biyu 'twice', sàu ukù 'thrice' etc.).

1.10.1.3 The Ordinal Numerals in Yorùbá

The Yorùbá ordinal numbers are different from the ordinal numbers of Hausa language, where the initial consonant in a first syllabic replaced with '*k*' allomorph in the case of *position* by numerals (e.g. aja merin, meaning 4 dogs; while aja*k*erin 4th dog, omo meji 2 boys, but omo*k*eji 2nd boy etc.)

Ordinal numerals describe the position of objects in a sequential order apart from the first and last ordinal numerals (Obikudo, 2013:34).

1.10.2 Cardinal Numerals

In Mathematics, cardinal numbers, or simply cardinals are a generalization of the natural numbers used to measure the cardinality (size) of a set. The cardinality of a finite set is a natural number of an element to a set that transfinite the cardinal numbers to describe the sizes of infinite sets.

However, cardinals are considered basic in form used for counting and in describing quantity. For instance, the basic counting forms in Nkǫrǫǫ language consist of simple roots that include the numbers 1 to 10, 20 up to 400 (Obikudo, 2013:27).

Cardinals are used to count, as follows: one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen etc. The cardinal and ordinal numerals are also derived via the morphological processes of compounding in such language. In addition, the cardinal numerals also employ the morphological rules of multiplication, subtraction and addition. Nevertheless, the distributive numerals are derived via reduplication (Obikudo, 2013:38). We can also find out that the cardinal numerals can be divided into *simple* and *complex* numerals by considering the short and long words that represent the numbers we have in our languages when the speakers of a given language come across to a problem related to their numerical expressions.

1.10.2.1 Simple Cardinals

Simple cardinals are the easiest conceivable set of numerical expressions in a language, which are in morphemic structure and arbitrary found with phonological shape (see Mengden 2008, 2010 and Dixon 2002 in Mbah and Uzoigwe 2013). The arrangement of complex numerals shows that simple numbers are subdivided into bases numerals and atoms. Base is variously defined as a 'cyclic' pattern of numerals from which counting starts over a serialized multiplicand and the smallest continuously recurring ordered subsequence. But, atoms in numerals are morphologically simple elements of numerals in combination with bases or their multiples (Salzmann 1950:81, Stampe 1976,

Greenberg 1978, Mengden 2010 in Mbah and Uzoigwe, 2013:73). However, simple cardinals are numerals that are not derived i.e. numerals whose forms cannot be broken down into indefinable meaningful morphemes where the base numbers of each language are simply representing the basic cardinals (Mbah and Uzoigwe, 2013:73).

According to Newman (2000:379) the basic cardinal numbers in Hausa are from one to ten as follows:

1. Xaya 'one' 2. Biyu 'two' 3. Ukù 'three' 4. Huxu 'four' 5. Bìyar 'five'

6. Shidà 'six' 7. Bakwài 'seven' 8. Takwàs 'eight' 9. Tarà 'nine' 10. Goomà 'ten'.

From eleven to nineteen, the counting starts with *goomà* 'ten' and the connecting particle *shâa* followed by one to nine (1 to 9). However, *goomà* can be optional so that the counting can become simple as follows: 11= shâa xaya 'eleven', 12= shâa biyu 'twelve', 13= shâa ukù 'thirteen',

14= shâa huxu 'fourteen', 15= shâa bìyar 'fifteen' etc.

In Yorùbá, this group of cardinals consists of numerals from one to ten as follows:

1. ení 'one' 2. èjì 'two' 3. ẹ̀ta 'three' 4. ẹ̀rin 'four' 5. àrún 'five'

6. ẹ̀fà 'six' 7. èje 'seven' 8. ẹ̀jọ 'eight' 9. ẹ̀sán 'nine' 10. ẹ̀wá 'ten'.

While the second set of basic numerals in Yoruba consists of the following three numerals:

20 = ogún ‘twenty’

30 = *ọgbọ̀n* ‘thirty’

200 = igba ‘two hundred’ etc (Ajiboye, 2013:3).

The cardinal numbers are normally defined as counting while such numbers in language cannot be described as simple in the sense that only the lower numbers (i.e. 1 to 200) may be easy to understand, (Bámgbóṣé, 1967).

It can be observed that numeral system in a language can be found as complex words where the morphological analysis of such words may even pave way to understand the series of numbers in words.

Kayode (1997), in Suleiman (2014:2) observes that the first *atomic* numbers (1 to 10) are excluded from the operations of addition and subtraction in Yoruba counting system. They are as follows according to the other dialect of Yoruba language:

1-Òkan ‘one’ 2-Mèji ‘two’ 3-Mèta ‘three’ 4-Mèrin ‘four’ 5-Marú-ún ‘five’

6-Mèfa ‘six’ 7-Mèje ‘seven’ 8-Mèjo ‘eight’ 9-Mèsán-án ‘nine’ 10-Mèwàá ‘ten’.

As from eleven onward there is morphological switch so that *Mókànlá* is 'eleven', and *Mókàndínlógún* 'nineteen'.

1.10.2.2 Complex Cardinals

The complex cardinals are morphologically derived from the simple elements of the numeral systems that used to form the other numerals for counting in each language after its ten-base and the arithmetic operations of addition, subtraction and multiplication are also considered to be the processes of having the complex numerical expressions.

The numeral system becomes very complicated as one gets into higher numbers, i.e. from eleven to nineteen. Examples of Hausa complex cardinals are: (*goomà shâa xaya* 'eleven', *goomà shâa biyu* 'twelve', *goomà shâa ukù* 'thirteen', *ashirin dà xaya* 'twenty one', *ashirin dà biyu* 'twenty two', *ashirin dà ukù* 'twenty three'etc.). It can also be found in Yorùbá complex cardinals as follows: (*moókànlá* 'eleven', *meéjìlá* 'twelve', *mẹ́ẹ́talá* 'thirteen', *moókàndínlógún* 'nineteen', *meéjìdílógún* 'eigthteen', *meétàdínlógún* 'seventeen'.

Complex cardinals in Igala numerals system is structurally complex that presents quite some difficulties to the user and learner (Ejeba, 2013:183). The complex cardinals are also morphological account of numerals which are considered more complex structures. For instance, there are two views on using

numerals of this category; one is that, these numerals, though nouns have an internal structure of a sentence. But, the other view claims that the numerals consist of complex NP (Ajiboye, 2013:11).

1.10.3 Distributive Numerals

Distributive numerals are basically set of numerals that are derived from cardinal numerals via either partial or complete reduplication. For instance, Fulfulde distributive numerals are reflected via germination where the cardinals from 1 to 3 have the reduplicative pattern that entails the partial copying of the root and compounding. Examples:

	Numeral root	**Derived form**	**Gloss**
(1)	(a) *go'o-go'o*	*goggo'o*	'one by one'
	(b) *xixi-xixi*	*xixxixi*	'two by two' etc.

The distributive numerals also occur within noun phrases irrespective of the positions they occupy in a sentence.

Examples**:**

(2) (a) *Sukaave seendanaama mangoro goggo'o*

Children distributed mango one-one

‘The Children have been given one mango each’

(Muhammad & Alkali 2013: 59-60).

But, according to Ajiboye (2013:2) distributive of numerals occur in two forms; the base form and the multiple forms which undergo reduplication to form expressions of universal quantification, and it may be full or partial reduplication.

Examples:

	Base		**Copying**	**Derived**	**Gloss**
(3)	(a)	*ọ̀kan*	‘one’	*òkan òkan*	*òkòòkan*	‘one by one’
	(b)	*èjì*	‘two’	*èjì èjì*	*èjèèjì*	‘two by two’
	(c)	*ogún*	‘twenty’	*ogún ogún*	*ogoogún*	‘twenty by twenty’.

The above examples show that numerals in Yoruba language can either be fully or modified full reduplication as the case may be in the forthcoming examples of this research.

However, distributive numerals also express a group of the number specified and describe an alternating order in the Nkǫrǫǫ language either by partial or total reduplication of cardinal numeral. For instance, the first syllable of the cardinal numeral is reduplicated from numeral 1 to 6 in Nkǫrǫǫ; as follows:

	Cardinal Numerals		Distributive Numerals	Gloss
(4)	*gbərí*	'one'	*gbəgbərí*	'one by one'
	màmì	'two'	*màmàmì*	'two by two'
	tárú	'three'	*tátárú*	'three by three' etc.

For numerals 7 and above, the whole words of the cardinal numerals are partially and totally reduplicated as follows:

	Cardinal		Distributive	Gloss
(5)	*sənəmà*	'seven'	*sənəmà sənəmà*	'seven by seven'
	nínì	'eight'	*nínì nínì*	'eight by eight'
	sí	'twenty'	*sí sí*	'twenty by twenty' etc.

Distributive numerals may also modify the noun phrase where they occur in the phrase-final position through partial reduplication of the given numerals in words as seen in the sentences below;

(6) a. *Námá má jòkò màmàmì wá árú ní ké sùə*

Animals all two by two boat the enter

'All the animals entered the boat two by two (in twos)'

b. *Wá kíní jòkò gbəgbərí ké ómú àmìə làá*

We person all one by one go there reach or arrive

'All of us arrived there one by one' etc (Obikudo 2013:36-37)

1.11 Conclusion

The chapter discusses the general introduction of the study where a brief history of Hausa and Yoruba families of languages has been stated. The numeral system has been defined as well as the three types of numeral system; ordinal, cardinal and distributive were illustrated. The statement of the problem of this study has been outlined, research questions listed and followed by the aim and objectives of the research in relation to numeral system. The chapter further contains the significance of the study, the scope of the study and the limitation of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The chapter reviews some related works on the morphologies of Hausa and Yorùbá numeral systems. The review is based on the concept of morphological productivity and that of Hausa and Yorùbá numerals and the numerals of other languages. The chapter is divided into four; the first part reviews works on morphological processes, the second part reviews works on morphological productivity, the third part reviews works on Hausa and Yorùbá numerical systems and the fourth part reviews works on the numerical systems of some other languages.

2.1 The Morphological Processes

Morphology is an important aspect of language that is concerned with words and their internal structures. Matthews (1974:12) states that morphology is a branch of linguistics which is concerned with the forms of words in different uses and constructions. He also describes morphology as the study of the rules governing the formation of words in a language. Abubakar (2001:1) describes that morphology is the study of word formation. However, Matthews (1974) categorizes morphology into two main branches; namely, *lexical morphology* and

inflectional morphology, which is further divided into two smaller sub-fields, one is concerned with the process of *derivation* and the other is *compounding*. The three morphological processes are *affixation*, *reduplication* and *modification*. But, this research focuses on compounding, clipping, blending as well as reduplication processes as follows:

2.1.1 Compounding Process

Katamba, et al. (2011:128) defines compounding as a technique for word building in which there is the combination of two already existing words. With very far exceptions, the resulting compound word is a noun, a verb or an adjective. Examples:

	Verb	**Noun**	**Adjective**
(7)	spoon feed	greenhouse	nationwide
	overlook	oil well	blackboard
	dry clean	in-laws	sky blue etc (Katamba, 2011:128).

In the above examples, we can realize that most of the compounds are the rightmost morpheme that determines the category of the entire word. Thus, *greenhouse* is a noun because its rightmost component is a noun, *spoon feed* is a verb because *feed* belongs to this category, and *nationwide* is an adjective just as

wide is, while the other words should be illustrated as their counter parts of a grammatical class.

According to Ahmad (1994:14), a compound word is a combination of two or more independent words into a higher word unit. The word *bluebird* is a compound word which consists of *blue* and *bird,* but the combined words here do not show their surface meaning instead the deep meaning referred to a sample of a new brand car.

Ahmad (1994:15) also gives the semantic definition of a compound as a unit where the meaning of the whole cannot be deduced from the meaning of the elements separately. In other words, a compound is a combination of two or more words where the meaning of the unit is not identical with the meanings of the separate elements. Example: *blackboard, screwdriver, airplane, coffeemaker etc*. The above examples indicate that the arrangement of different words together does not necessary bring the same idea for a picture of the given words. For instance, *blackboard* 'a chalkboard' but not 'a board that is black', however, the *screwdriver* does not really means the screw has a driver but the meaning here copy the work of a driver.

Ahmad (1994) also defines compound as a combination of two or more words, or a word and a stem where the combination functions as a single unit. A

compound can be defined as a morphologically complex unit composed of two or more words (stems) that act as a single unit with a mostly non compositional meaning (Ahmad, 1994:18).

2.1.2 Clipping Process

Clipping is a morphological process in which new word is coined by shortening the existing one in accordance with the word formation rules. Shettima and Bulakarima (2012:33) maintain that the process of clipping may be seen as another form of modification because clipping involves the shortening of the base while still retaining the same meaning and still being a member of the formed word.

Back-Clipping:

	Full form	***Clipped Form***	***Gloss***
(8)	a. Qwaqwalwaa	qwalwaa	'brain'
	b. Hàjiijuwàa	jùwaa	'giddiness'
	c. Kuskurèe	kurèe	'mistakes' etc (Abubakar 2001:15).

	Full Form	***Clipped Form***	***Gloss***
(9)	a. Zàinabù	Aabù	proper names

b. Sulàimaanù Maanù proper names

c. Shamsùddiinì Diinì proper names etc (Sani, 2002:184).

Front-Clipping:

	Full form	***Clipped Form***	***Gloss***
(10)	a. Asiisiitaa	asiisii	'type of bird'
	b. Fàte fate	fàte	'type of vegetable food'
	c. Quli-quli	qulii	'groundnut cake' etc (Abubakar, 2001:15).
(11)	a. Tallafi	Talle	'personal name'
	b. Aadamu	Aadoo	'personal name'
	c. Abdullahi	Audu	'personal name' etc (Sani, 2002:184).

Sani (2002:184) and Abubakar (2001:15) argue that there are two types of clipping, namely back-clipping and front-clipping in Hausa. It is observed in Hausa that a personal name can undergo both front and back clipping and even more complex process as in example (11) above. Examples in English:

	Full Word	***Shortened Word***
(12)	a. Photograph	Photo
	b. Influenza	Flu
	c. Telephone	Phone etc (Syal and Jindal, 2013:93).

	Source	*New Word*
(13)	a. pantaloons	pants
	b. streptococcus	strep
	c. brother	bro etc.

See also the following examples from German language below:

	Source	*Shortened*	*Gloss*
(14)	a. Mathematik	Mathe	'math'
	b. Autobus	Bus	'bus'
	c. Bibliotek	Bib	'library'
	d. Extempore	Ex	'pop quiz' etc. (Denham and Lobeck, 2010:201).

From the above examples, we can realize that clipping may also occur at the beginning or at the end of a word or simply at both ends which depends on the morphological pattern of a language for maintaining its structure of words and their meanings.

In his work, Sani (2002:184) says that clipping at the beginning of a word in Hausa is the type of clipping where the deletion of the segment(s) occurs at the initial syllable of a word. Meaning that in Hausa, some parts of a word in nouns, adjectives, adverbs verbs and conjunctions/prepositions were clipped at their initial syllables as exemplified in examples (8) and (9) above.

Furthermore, Syal and Jindal (2013:93) indicate that some words are used in shortened form by subtracting one or more syllables from a word. This shortening sometimes occurs at the beginning of a word, at the end of a word, or at both ends of a word as exemplified in example (12) above.

Similarly, Katamba, et al. (2011:139) states that clipping is a process that shortens a polysyllabic word by deleting one or more syllables and some of the most common products of clipping are names which are popular especially in a casual speech where it has yielded forms like;

(15) a. *prof.* < *professor,* b. *fax* < *facsimile,* c. *fan* < *fanatic,* d. *van* < *caravan,* e. *mob* < *mobile crowd,* f. *demo* < *democracy,* g. *porn* < *porn corn,* h. *auto* < *automobile,* i. *zoo* < *zoological garden,* j. *pub* < *public house,* k. *candy* < *candidate* etc.

However, clipping is another process to create words from the existing words. Denham and Lobeck (2010:201) explain that clipping is a process of word formation where some syllables are omitted (rather than morphemes).

The process of clipping is making a word by omitting syllables in an existing word. Example:

(16) *rad* from *radical*.

But, other languages also use clipping to form new words (Denham & Lobeck, 2010).

2.1.3 Blending Process

Blending is a process where words are created from non-morphemic parts of two already existing items, usually the first part of one and the final part of the other (Katamba et al 2011:140). Examples:

	Full Form		***Blend Form***
(17) a.	Binary + digit	→	Bit
b.	Modulator + demodulator	→	Modem
c.	Naphthenic + palmitic	→	Napal etc.
(18) a.	Television and broadcast	→	Telecast
b.	Smoke and fog	→	Smog
c.	Breakfast and lunch	→	Brunch
d.	Motor and hotel	→	Motel etc

	Blend Form		***Full Form***
(19) a.	Ballute	<	balloon + parachute
b.	Daw	<	dove + hawk etc.

Accordingly, the blending process is a very productive source of word formation in many languages.

2.1.4 Reduplication Process

Abubakar (2000:5) says reduplication can be partial or complete. Reduplicated form is used to be partial when only one part of the base is repeated while it is complete when the base is repeated totally.

Martin (2010:38) further states that reduplication is a process of repeating a complete word or part of a word in order to form another word especially in producing the plural form which is very common in a morphological operation whereby part of the base or the complete base is copied and attached to the base.

Katamba, et al. (2011:128-137) says a morphological process in some languages involves reduplication, which is a grammatical or semantic contrast by repeating all part of the base to which it applies. Repetition of the entire base yields full reduplication while in contrast, partial reduplication copies only part of the base. In this case, some categories can undergo both complete and partial reduplication process such as adjectives, adverbs of place and adverb of time where the meanings are not always the same.

Syal and Jindal (2013:92) define reduplication as a morphological process where some words are formed out of two such elements that are almost alike and these elements might either be identical or only slightly different.

Below are the examples of reduplications in some languages:

Complete Reduplication in Hausa Language:

	Base	Gloss	Full/Modified	Gloss
(20)	i. Farii	'white'	fari-fari	'whitish'
	ii. Sanyii	'cold'	sanyi-sanyi	'somewhat cold' etc

(Abubakar, 2001:5).

Although, here we can see that Kanuri partial reduplication as a prefixal reduplication, as follows:

Partial Reduplication in Kanuri Language:

(21) bukin ⟶ bùbukin

'I eat' 'I eat continuously'

rukin ⟶ rurukin

'I see' 'I see many times'

gambukin ⟶ gagàmbukin

'I scratch' 'I scratch continuously' etc.

(Shettima and Bulakarima, 2012:21).

It has been observed that the full reduplications are those that duplicate their base as a whole. Example (21) above shown that there is a situation where the whole segment is repeated in Kanuri while in some instance the initial syllable is repeated as the case of partial reduplication concerned.

Examples of partial reduplication in Tagalog language:

Partial Reduplication:

(22) (i) Takbo ‘run’ tatakbo ‘will run’

(ii) Lakad ‘walk’ lalakad ‘will walk’ etc.

Katamba, et al. (2011:138).

Examples of Partial Reduplication in Hausa Language:

Partial Reduplication:

	Base	**Gloss**	**Reduplicated Form**	**Gloss**
(23)	a. zaunàa	‘to sit’	zazzàunaa	‘sit repeatedly’
	b. sanyii	‘cold’	sàssanyaa	‘very cold’ etc

(Abubakar, 2001).

The review that had been made on reduplication pointed out the relevance of reduplication as a morphological process and its productivity leads to the emergence of a new lexical item with semantic development.

2.2 Morphological Productivity

Productivity as a morphological phenomenon is the possibility which language users have to form and in principle uncountable number of new words unintentional, by means of a morphological process which is the basis of the form-meaning correspondence of some words they know. (Booij, 1977:4 in Bauer, 2001:13).

However deals with the number of new words that can be coined by using a particular morphological process which is ambiguous between the sense 'availability' and the sense 'profitability' (Bauer, 2001:211). The '*availability'* here relates to a morphological process that is potential for repetitive rule-governed morphological coinage, either in general or in a particular well-defined environment or domain, and it is determined by the language system. But, the '*profitability'* of a morphological process reflects the extent to which its availability is exploited in language use, and may be subjected to extra-systemic factors. In this case, a single morphological process has easily distinguishable meanings or sub-uses which may be assessed independently for both availability and profitability (Bauer, 2001:211). This means that the bases are useful to create another words as well, the existing word can also be modified to create another word through the word formation processes. The interaction of availability and profitability in morphological productivity is to constrain the number of words in the lexicon of the individual speaker which are coined according to the pattern provided by any particular morphological process.

The notion of productivity must make reference to the speaker's ability to form new words and to the conditions the language system imposes on new words. This assumes that the existence of morphological rules according to which complex words are structured or formed can easily observe that some rules are

often used to create new words. In another view, “the degree of productivity of a word formation rule can be seen as inversely proportional to the amount of competence that restricted to the word formation rule” (Booij, 1977:5) in Bauer (2001:12). In this position, we can find out that the word formation rule has its proper restrictions where the degree of productivity would naturally fall out. In view of these, the word formation rules have to be considered when forming a new word by any other process of morphology.

2.3 The Numerals of Some Languages:

It has been found that in languages other than Hausa and Yoruba their numeral system has the simple and complex operations probably from the base (1 to 5 or 1 to 9) to the higher numbers (i.e. from eleven to above) where the morphological productivity occurs in the formation of other numerals.

2.3.1 The Polish Numerals

Weselinska (1994) outlined the cardinal numbers of the Polish language as follows:

1 – 10

1- jeden, 2- dwa, 3- trzy, 4- cztery, 5- piec**,** 6- szesc, 7- siedem, 8- osiem,

9- dziewiec, 10- dziesiec.

The other numerals of the higher denominations in polish language are derived from the above bases mentioned after which some morphological activities occurred. Examples:

11 – 19

(34) (a) 11- *jedenascie* ‘eleven’, (b) 12- *dwanascie* ‘twelve’, (c) 13- *trzynascie* ‘thirteen’, (d) 14- *czterynascie* ‘fourteen’, (e) 15- *pietnascie* ‘fifteen’ etc.

1+10 **2+10** **3+10**

(35) (a) Jeden + dziesiec, (b) dwa + dziesiec, (c) trzy + dziesiec,

4+10 **5+10**

(d) cztery + dziesiec, (e) piec + dziesiec

The above manipulations show that the complex numerals are derived from the base ones (i.e. base-ten), depends on the operations of addition, subtraction or multiplication. But the polish numerals are in suffixation process for addition to the base from 11 to 19, while the multiplication occurs in the following examples;

(36) a. 30 = 3x10 *trzydziesci* ‘thirty’, b. 40 = 4x10 *czterdziesci* ‘fourty’,

c. 50=5x10 *piecdziesiat* ‘fifty’ etc.

Similarly, it can be noted that clipping occurs in the polish higher numbers at addition and multiplication operations. Linguistically, the speakers in Polish language are using some suffixes where to attach with the bases in the process of producing the other numbers which is different as the case of Hausa and Yoruba numerals.

2.3.2 The Fulfulde Numerals

Muhammad and Alkali (2013:53) analyze the structure of Fulfulde numerals and identified some of the morphological processes, such as reduplication, compounding as well as vowel shortening where the other numerals derived from the cardinal base 1 to 5 as follows:

1- *go'o* 'one', 2- *xixi* 'two', 3- *tati* 'three', 4- *nayi* 'four', 5- *joyi* 'five', as well as 10- *sappo* 'ten' which is another base that use to produce the higher denominations of Fulfulde numerals. However, the rest of cardinals, with the exception of 10, (i.e., the digits 6 through 9) are derived by an additive operation that adds 1 to 5 to produce 6, 7, 8 and 9 as follows:

(37) 6- *joyi go'o* 'six', 7- *joyi xixi* 'seven', 8- *joyi tati* 'eight', 9- *joyi nayi* 'nine' while numerals 2, 3, and 4 are added to cardinal 5, respectively. But 10- *sappo* 'ten' is a separate lexical item.

Accordingly, it has been observed that the entire Fulfulde numerical system is a trichotomous morphological structure with grades from simple to complex and more complex numeration as shown in example (37) above and (38) below:

(38) 11- *sappo i go'o* 'eleven', 12- *sappo i xixi* 'twelve', 13- *sappo i tati* 'thirteen',

14- *sappo i nayi* 'fourteen' etc.

Thus, *chappanxe xixi* means 2 tens = 20 'twenty' while the complexity in the formation of 10 to 20 is simply requires the productive conjunct ***i*** that signifies 'and' for the formation of other numerals. Morphologically, Fulbe numerals are derived from the bases where the affixation and compounding processes are taken place in different positions by changing their lexical items in accordance with the arithmetic operations.

The Fulfulde numerals are important to this review in the issue related to simple and complex numerals while the relevance of this research to the Fulfulde numerals is quit difference where it would go deep on morphological productivity that occurs in the higher denominations of arithmetic operations after the base-ten in Hausa and Yoruba numerals. But, in Fulfulde numerals there are base-five unlike in Hausa and Yoruba which operate the base-ten.

2.3.3 The Igala Numerals

Omachonu (2013:136) indicates that, the Igala numerals are categorized into two broad groups: the basics numerals (1 to 10, 20, 50, 200, 400 and 800) and the derivatives or non-basic whose derivational history is traceable to a combination of the basic numerals through some addition, multiplication or a combination of both processes. The basic numerals in Igala are in two forms as follows:

i. *Basic numerals* 1 to 10;

1- okà 'one', 2- èjì 'two', 3- ètā 'three', 4- èlè 'four', 5- èlu 'five', 6- èfe 'six', 7- èbie 'seven', 8- èjo 'eight', 9- èla'nine' 10- ègwa 'ten'.

ii. *Numerals*; (20, 50, 200, 400 and 800).

20 - ogwu/ogbo 'twenty', 50 - ooje 'fifty' etc.

Moreover, the higher denominations of arithmetic operations in Igala numerals are derived from these two sets of the base numerals. Examples:

(39) 12 - egweji 'twelve', 15 - egwelu 'fifteen', 19 - egwela 'ninteen',

21 - ogwuɲokeka 'twenty one', 23 - ogwuɲokemeta 'twenty three',

27 - ogwuɲokemebie 'twenty seven' etc.

It has also observed that there are simple and complex words in Igala numeral system where the complex ones are derived from the simple (base) 1 to ten while others are also derived from the second sets unlike in Hausa and Yoruba where the higher numerals are derived from the ten-base only.

2.3.4 The Tiv Numerals

Orkar (2005) states that, Tiv numerals consist of simple and complex numerals, the simple (base) have been categorized into two main groups (1 - 5 and 6 - 10) as follows:

1 – 5

1 – môm ‘one’ 2 – har ‘two’ 3 – tar ‘three’ 4 – nyin ‘four’ 5 – taan ‘five’

6 – 10

6 – teratar ‘six’ 7 – taan*kar*-uhar ‘seven’ 8 – nieni ‘eight’ 9 – tan*kar*-unyin ‘nine’ 10 – pue.

The Tiv language has complex numerals where the higher numbers are derived from the base. There are other sub-categories of base despite that 1 to 5 and 1 to 6 are used to manipulate for the higher denomination. In this case, the morpheme *kar* inserts in between the two words of the higher and the lower numbers. Examples are as follows:

11 – 19

(40) 11- pue*kar*-môm ‘eleven’, 12- pue*kar*-uhar ‘twelve’, 13- pue*kar*-utar ‘thirteen’, 14- pue*kar*-unyiin ‘fourteen’, 15- pue*kar*-utaan ‘fifteen’, 16- pue*kar*-ateratar ‘sixteen’, 17- pue*kar*-utaan*kar*-uhar ‘seventeen’, 18- pue*kar*-anieni ‘eighteen’, 19- pue*kar*-utaan-*kar*-unyiin ‘ninteen’.

The other numerals are derived from the following bases in Tiv counting system:

(41) 20- ikyundu ‘twenty’, 100- deri môm, ‘one hundred’, 200- deri uhar ‘two hundred’, 300, 400, 500, 600, 700, 800, 900 and 1000- dubu môm. All these are used to derive the other numbers by using the morpheme *kar* for coining the two or more numerals that give the birth to other numerals. This also shows that morphology plays a vital role in most of the numerals i.e. compounding process as the case of Tiv language in which it relates to this research where to compare the additional morpheme ‘*da*’ in the case of Hausa numerals, even though the basic numerals of the Tiv are in two groups unlike the single set in Hausa and Yoruba.

2.3.5 The Nupe Numerals

Alkali (2010:20) defines Nupe numerals as simple and complex which consist of many morphological features. He further explains that the system starts from the

two sets of their base numerals which include 1 to 5 as first set while the second set starts from 6 to 10. These show that the Nupe counting system consists two groups of basic numbers from where the higher numbers are extracted, unlike in Hausa and Yoruba numeral systems where they have only one set/group each (i.e. 1 to 10) as follows:

1 - 5

1 –inni ‘one’, 2 – guba ‘two’, 3 – guta ‘three’, 4 – gunni ‘four’, 5 – gutsun ‘five’

However, the other numerals here in the second group are derived from the first set as follows:

6 – 10

(42) 6 – gutswayin ‘six’, 7 – gutwaba ‘seven’, 8 – gutwota ‘eight’, 9 – gutwaani ‘nine’, 10 – guwo ‘ten’.

In Nupe language, numerals are derived in different methods which are very complex but simple to understand as the manipulation goes on. Similarly, the system used the morpheme *be* as connected particle for addition while the morpheme *din* is used for the subtraction and such morphemes serve as an infix between the two given words (numbers) as the case of compounding in forming the higher numbers from the base. There is situation where the *e* suffix occurs

especially at the lower numbers which considered as phonological conditions. Examples:

11 - 14

(43) 11 - guwo *be* nini ‘eleven’, 12 - guwo *be* gubae ‘twelve’, 13 - guwo *be* gutae ‘thirteen’, 14 - guwo *be* gunnie.

Similarly, the system has another two different bases that considered as unproductive as the normal circumstances found in the other numerals. They are as follows:

(44) 15 - gwegi ‘fifteen’ and 35 - rudin ‘thirty five’.

However, the other bases found in Nupe numerals are as follows:

(45) 20 - eshi ‘twenty’, 30 - gbanwo ‘thirty’, 40 - shiba ‘fourty’, 50 - arata ‘fifty’, 60 - shita ‘sixty’, 70 - adwani ‘seventy’, 80 - shini ‘eighty’ and 100 - shitsun ‘one hundred’.

But in the case of 90 - shini be guwe ‘ninety’, there is an extraction from the base of 80 - shini ‘eighty’ plus 10 - guwo ‘ten’ (80+10) after which some phonological changes occur while the morpheme *be* was inserted at the middle of the two existing words i.e. shini *be* guwe, (80+10) as compounding process.

2.4 Summary

It relates with this research especially the Yoruba numerals where addition and subtraction as well were used for the arithmetic operations, but it would vast to the issue of productivity in the numerals of these two languages.

Having gone through these works, it is clear that the respective scholars try to outline the Hausa numerical system. And from their works it is clear in some cases there are overlap; whereas in some cases they differ entirely depending on the perspective each of the three main cited scholars view Hausa numerical system.

In the works of Amfani for example, going by his analysis, even though he explains the two morphemes (*'shâa'* and *'dà'*) are used to form the higher numerals, he fails to identify the morphological processes in which such higher denominations can be formed. In Hausa numerals, it observed that the numerals are sometimes 'productive' or 'unproductive'. The productivity gives room for reduplication in the numerals. Even though the productivity functions in Hausa numerals, Amfani is unable to capture that in his illustration despite the major role this plays in regeneration of new word numerals in the Hausa language.

Bello on his part tries to come up with Hausa numerals grouping system. He groups them into four groups as Hausa traditional counting system. But going by this grouping, Bello's work can be observed to have some shortfall because the

grouping does not encompasses the entire Hausa traditional numerals. What this shows is that if we are to go by his grouping system, some of the traditional at *million*, *billion*, and *trillion* that are functional in Hausa numerals will be exempted. Similar to Amfani, Tumfafi is of the view that the Hausa traditional counting system can be grouped into different methods. However, instead of four groups given by Bello, Tumfafi extends such to almost ten methods. But he also fails to consider their morphological processes.

In the light of the above, it is clear that Hausa numeral systems are product of different bases and various morphological processes as well as its productivity in which the above works reviewed were not discussed while this work would be focused on. The numerals system consists of ten-base system where other higher numerals are extracted as in *goomà shâa xaya* 'eleven'. Here, we have *goomà* 'ten' and *xaya* 'one' *as* bases to form higher denomination of *eleven* with the insertion of *Shâa* morpheme. Furthermore, the numerical system cut across the borrowing from one language to the other. This is to say, in Hausa some numerals are extraction of other languages such as Arabic and English. This is an indication that the Hausa numerical system is transforming base on the trend of the time. Despite the fact that the traditional counting system exists, the use of modern counting system i.e. *million* brought about modernization in the system. Moreover, in Hausa morphological processes consist of reduplication (full and partial) that lead to

either being productive or unproductive of the new formed numerals. This is to say, reduplication process in numerals system lead to the emergence of new lexical items which could fall under distributive numerals.

2.5 Conclusion

In this chapter, it is clear that the Hausa Numeral System has ten-base system in which other numerals (the higher denominations) are extracted. Hausa numerals use one of the arithmetic operations (addition) where the higher numbers after base are formed. In the same numerical system, it is observed that, same language operates the loan words numerals that borrowed from Arabic language in some base numerals.

But, in the case of Yorùbá numerals, the review shows that, the language has addition, subtraction and multiplication as in its arithmetic operation. The Yoruba language also operates a ten-base system in its numerical system.

In the same vein, Hausa in relation to other languages reviewed such as Polish, Fulfulde, Tiv and Nupe show that there are some numerical correlations that exist between them. Hausa shares same numerical relationship with Tiv in terms of ten-base system; addition arithmetic operation system; morpheme insertion in word formation system; and loan words relationship. Whereas with Nupe as the case of Tiv, it is only in loan word relationship that they share

difference. Similarly, the correlation between Hausa and Polish is also identified. They have similar system in ten-base numerical operations, morpheme insertion and morphologically in clipping process. In the case of Fulfulde, there are similarities and differences between it and Hausa; in terms of addition after base in arithmetic operation system and morpheme insertion between two numerals for higher denomination, the two languages share similarities. But then differ in base system where Hausa operates the ten-base and Fulfulde uses five-base system.

On the other hand, it is evident from the review that Yorùbá numerals operate ten-base system with Hausa and other languages under review except Fulfulde which has only five-base system. Similar relationship is also identified in terms of morpheme insertion and addition system even though Yoruba has an extension of operating subtraction and multiplication system.

Finally, Hausa and Yorùbá numerals operate differently in terms of head-initial and head-final. While Hausa uses head-initial, Yorùbá on the other hand goes with head-final.

CHAPTER THREE

METHODOLOGY AND THEORETICAL FRAMEWORK

3.0 Introduction

This research has been conducted through the source of data and other relevant resource materials on the numerical system of Hausa and Yorùbá languages where the morphological productivity of a word-formation (i.e. from simple to complex words), and other morphological processes as well as their features have been presented.

3.1 Methodology

Different systematic methodologies are employed in finding results on problems in any given research. In this research, the observation method has been used. An assessment of relevant information is also carried out through consultation of related materials particularly on morphology, Hausa and Yorùbá numerals and other counting systems of some languages.

3.1.1 Source of Data

The data on this research are sourced from the previous works that reviewed in the above chapter in relations to numeral systems and morphology as well. Yorùbá native speakers are the source of Yoruba data, in addition to the researcher's

personal observation as a trained linguist who is a native speaker of Hausa which later authenticated by some academic researchers of Hausa and Yorùbá during conducting of this research work.

3.1.2 Data Collection Procedure

The documentary source of data has been used as procedure to obtain the data in this research, such as; textbooks, thesis, journals, conference papers, internet and other related materials through visiting some libraries and other important electronic websites for further reference.

3.1.3 Method of Data Analysis

The data is presented and analyzed by describing the morphological features of numerals. The lexical numerals under each morphological process are classified into eight groups in the chapter four below as presented in tables 1 to 8. Thus, the productivity of Hausa and Yorùbá numerals has been identified according to the word formation rules.

3.2 Theoretical Framework

Aronoff (1976) posits a theory which states that a new word is formed from another word through the operation of devices which he terms Word Formation Rules (henceforth WFR^S). The WFR perform a unique operation on the base

(which is a word) to produce a new word where both the new word and the base share morphological and semantic relationships while the meaning of the derived word is compositional, including part or all of the meanings of the existing word and the affix. For example, the WFR # *ish* can produce the adjective '*foolish*' from the noun '*fool*' therefore is the base of the operation of the WFR while the morphological operation involves the suffixation of # *ish* to the base '*fool*'.

The theory of Word Formation by Aronoff (1976:82) is used to analyze the data of this research. Theory of *word-based morphology* also argues that productive processes of derivational morphology does not seem to operate over anything other than words where some words cannot be processed morphologically productive to their counterparts as in (bibbiyar *, shisshida*, babbakwai*, unlike in xaixai, bibbiyu, hurhuxu) as the case of Hausa numerals.

The most important feature of Aronoff's theory is the assumption of word formation rules called *word-based morphology* that operates over words but not morphemes. However, among the forms and functions of these rules are bases (words). For instance, according to the WFR the suffix -*la* can produce the higher denomination of the Yorùbá numeral mèjìlá 'twelve' from the base mèjì 'two'. Therefore, the word-based is under the WFR while the morphological operation involves the suffixation of -*la* to the base. Examples:

(46) [mèjì] numeral = base 'two'

[(mèjì) numeral (-lá)] bound morpheme = mèjìlá 'twelve'

(46) [goomà-] numeral = base 'ten'

[(-xaya) numeral (-shâa-)] free morpheme = goomà shâa xaya 'eleven' etc.

3.3 Conclusion

This research is done by considering the above steps as well as some methods stated above in this chapter such as methodology, source of data, data collection procedure, methods of data analysis and frame work as well, where at the end the data presented in chapter four as result of the study or findings in which the researcher also identified the steps taken in this research to reach a successful documentation for this work on numerical systems on Hausa and Yorùbá languages.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.0 Introduction

In this chapter, the morphological productivity in numeral formation has been discussed in accordance with the processes that occur during the arithmetical operations in Hausa and Yorùbá numerals. The concept of morphological productivity has been considered through processing clipping, blending, compounding and reduplication according to the rules of word formation.

4.1 The Hausa Numeral System

Amfani (2013:239) states that "The Hausa traditional numeral system uses *base ten* for counting. Thus, Hausa has basic numerals *one* to *ten* and subsequent numeration'' i.e. eleven upward, is achieved through the manipulation of the basic numerals one to ten which are as follows:

1. xaya 'one', 2. biyu 'two', 3. ukù 'three', 4. huxu 'four', 5. bìyar 'five',

6. shidà 'six', 7. bakwài 'seven', 8. takwàs 'eight', 9. tarà 'nine', 10. goomà 'ten'.

Counting from 11 to 19 is achieved in Hausa through the addition of each of the basic numerals 1-9 to the basic numeral 10 by using the morpheme *shâa*. Amfani (2013:240) cites the counting as follows:

11 = goomà shâa xaya, 12 = goomà shâa biyu, 13 = goomà shâa ukù, 14 = goomà shâa huxu, 15 = goomà shâa bìyar, 16 = goomà shâa, shidà, 17 = goomà shâa bakwài, 18 = goomà shâa takwàs, 19 = goomà shâa tara

(Amfani, 2013:241).

He however, shows that the numeral 20 (twenty) is ‘two tens’ (i.e. goomà biyu) but not ‘ten and ten’ (goomà dà goomà* or goomà shâa goomà*). But, another operation starts from the base twenty as new lexical item (ashìrin).

Similarly, this research observed that the coming of Arabic loan words in Hausa language also affects the numeral systems to use the following Arabic forms:

Numeral	**Arabic**	**Hausa**
20	ishiruun	ashirin
30	thalaathuun	talaatin
40	arba’uun	arba’in
50	khamsuun	hamsin
60	sittuun	sittin
70	thaba’uun	saba’in

80	thamaaniin	tamaanin
90	tis'uun	casa'in.

Amfani (2013) further states that numerals twenty one to twenty nine (21-29) are presented as follows:

21- àshìrin dà xaya, 22- àshìrin dà biyu, 23- àshìrin dà ukù,

24- àshìrin dà huxu, 25- àshìrin da bìyar, 26- àshìrin da shidà,

27- àshìrin dà bakwài, 28- àshìrin da takwàs, 29- àshìrin da tara.

But, this shows that the above Arabic single lexical numerals can be used to produce the Hausa numerals from twenty one to ninety nine (21 to 99). The counting beyond twenty (20), adds to a new lexical item in between the two numerals *'da'* as introduced in the above table (i.e. from 21 to 29). Nevertheless, Hausa borrowed some lexical items from Arabic and English languages for the expansion of its numerical system at the higher (base) numbers such as;

(27) *àshìrin* 'twenty', *tàlàatin* 'thirty', *casa'in* 'ninety', and *mìliyàn* 'million',

bìliyàn 'billion', *tìrìliyàn* 'trillion' etc.

Before the introduction of the Arabic loanwords, twenty through ninety were expressed by multiples of ten using the form *gòomiyaa* (related to the current form

goomà ‘ten’), e.g., *gòomiya biyu* (two tens) ‘twenty’, *gòomiya huxu* (four tens) ‘forty’ etc. While in another archaic system, now essentially defunct, used the word hâuyaa ‘score’ (i.e., twenty) as a base, e.g., *hauyaa ukù dà goomà* (three twenties and ten) ‘seventy’ (i.e., three scores and ten) (Newman, 2000:379).

Bello (2002:192) explains that the Hausa counting system is highly influenced by Arabic language especially in the following numerals: 20, 30, 40, 50, 60, 70, 80, and 90. However, these terms have been nativized by Hausa speakers where this work points out that the Hausa numbers start from simple to complex (i.e. 1 to 100,000) and the above morphs *dà*, *bâ* and others are used to operate the addition, subtraction or multiplication as exemplified below:

(28) goomà *dà* xaya (10+1=11) ten *and* one ‘eleven’

hauyaa *bâ* xaya (20-1=19) twenty *minus* one ‘nineteen’

qililin *gidaa* biyu (12 x2=24) twelve *multiply by* two ‘twenty four’ etc.

According to Eves (1976) in Bello (2002), there are four ways or methods in Hausa traditional counting system called “grouping system” which traces the operation with the base ten, as follows:

(29) (a) 1 to 9 (gidan gwauro) ‘Unit’

(b) 11 to 20 (gidan goomà) ‘Ten’

(c) 21 to 100 (gidan xàri) ‘Hundred’

(d) 100 to 1000 (gidan dubu) ‘Thousand’

Tumfafi (2005:7), says traditionally the Hausa counting was a system that used *dà* morph which considered as connecting particle to the base ten; *goomà dà biyu* (10+2=12), *goomà dà ukù* (10+3=13), *goomà dà huxu* (10+4=14) but, it is not considered to be productive while we optionalized the numeral word ‘ten’ (*goomà*) and just mention the connecting particle together with the next number, *goomaà dà* xaya (*dà xaya**).

But, the *shâa* morph was added to the counting system from 11-19, thus, allowing the lexical item ‘*goomà’* to be optionalized from 11 – 19 as in *shâa xaya* ‘eleven’, *shâa biyu*, ‘twelve’ *shâa ukù*, ‘thirteen’ etc.

Tumfafi (2005:12) extends the Hausa traditional counting system further into ten groups as follows:

i. Xaya (zuwa) Tara = 1 to 9 ‘base ten’

ii. Goomà = 10 ‘ten’

iii. Qililin = 12 ‘dozen’

iv. Hauyaa = 20 ‘twenty’

v. Qwaryaa = 100 ‘hundred’

vi. Mètan/Jàkaa = 200 ‘two hundred’

vii. Dubuu = 1000 ‘one thousand’

viii. Zambàr = 1,000 000 ‘one million’

ix. Zambàr dubuu = 1,000 000 000 ‘one billion’

x. Malaalaa = maqarar qirgaa ‘infinity’, (cf: Bello, 2002:196).

4.2 The Morphological Productivity of the Hausa Numerals

The morphological productivity in Hausa numerals can be found in many cases of arithmetic operations from one level to another, where the high denomination can be derived from the base. The process of productivity also occurs in a situation where by one system cannot be maintained continuously in some instances while the other numerals are less productive. See the example (49) below about *shâa* morpheme in the Hausa arithmetic operations from 11 to 19, and *dà* morpheme that goes along with the other operation from 21 upward as an addition product in page (62) below.

In Hausa numerals there is a situation where the two or more words are merged together in the process of forming another words for the higher denominations through arithmetical operation of addition where the morphemes

'*shâa*' and '*dà*' become at the middle position of two or more numeral bases that also serve as linkers. Examples:

	Base		Compound Words	Gloss
(47)	goomà + xaya	(10+1)	goomà shâa xaya	'eleven'
	àshìrin + biyu	(20+2)	àshìrin dà biyu	'twenty two'
	tàlàtin + ukù	(30+3)	tàlàatin dà ukù	'thirty three'
	xàri+goomà+huxu	(100+10+4)	xàri dà goomà shâa huxu	'one hundred and fourteen' etc.

(48) ***Table*** **1: The Basic Sets of Hausa Numerals (Simple Cardinals):**

Symbol	Hausa number words	Gloss
1.	xaya	one
2.	biyu	two
3.	ukù	three
4.	huxu	four
5.	bìyar	five
6.	shidà	six
7.	bakwài	seven
8.	takwàs	eight
9.	tarà	nine
10.	goomà	ten

The productivity occurs after deriving the higher number in Hausa counting system by merging the two basic words together and through inserting either the morpheme '*Shâa*' or '*dà*' in between the two words for the formation of higher denominations while the complex cardinals are being produced in accordance with.

However, it has been observed that the long words are shortened in a language. In Hausa numerals, the two lexical items merged together by inserting the morpheme *shâa* (i.e goomà 'ten' and x*aya* 'one') where to produce *goomà shâa xaya* means 'eleven' (10+1=11), or 'ten' add 'one' which is the same as 'ten' plus 'one' that gives birth to eleven.

Similarly, by this computation we can observe how long words are shortened particularly in counting system where the base-lexical item *goomà* in Hausa can be deleted as in the following examples:

(49) ***Table* 2: The First Set of Complex Cardinals in Hausa Numerals:**

Numbers	**Hausa word numbers**	**Clipped words**	**Gloss**
11.	goomà shâa xaya	shâa xaya	eleven
12.	goomà shâa biyu	shâa biyu	twelve
13.	goomà shâa ukù	shâa ukù	thirteen
14.	goomà shâa huxu	shâa huxu	fourteen
15.	goomà shâa bìyar	shâa bìyar	fifteen
16.	goomà shâa shidà	shâa shidà	sixteen
17.	goomà shâa bakwài	shâa bakwài	seventeen
18.	goomà shâa takwàs	shâa takwàs	eighteen
19.	goomà shâa tarà	shâa tarà	nineteen

Accordingly, the deletion that occurs on such words above (i.e. *shâa xaya 'eleven'*) can be said to be morphologically 'productive', after the deletion occurs at the morphemes *goomà (ten)* that happened from 11 to 19 numerals in Hausa counting system.

Indeed, the coinage of Hausa numerals usually occurs in the second set of complex cardinals where the morpheme '*dà*' (and) links between the lexical item 'twenty' and all the nine-base of Hausa numbers. In this case, the '*dà*' morpheme can be used to any other base after the lexical item '*goomà*' (i.e *àshìrin (twenty), tàlàatin (thirty), àrbà'in (forty), hàmsin (fifty), xàrii (hundred), dubuu (thousand), mìliyàn (million), bìliyàn (billion)* etc.

(50) *Table* 3: The Second Set of Complex Cardinals in Hausa Numerals:

Number	Hausa word numbers	Clipped words	Gloss
21	àshìrin dà xaya	dà xaya	twenty one
22	àshìrin dà biyu	dà biyu	twenty two
23	àshirin dà ukù	dà ukù	twenty three
25	àshirin dà bìyar	dà bìyar	twenty five
27	àshirin dà bakwài	dà bakwài	twenty seven
29	àshirin dà tarà	dà tarà	twenty nine
31	tàlaatin dà xaya	dà xaya	thirty one
42	arba'in dà biyu	dà biyu	forty two
53	hamsin dà ukù	dà ukù	fifty three
112	xàri xaya dà goomà shâa biyu	xàri dà shâa biyu	one hundred and twelve
122	xàri xaya dà *àshìrin* da biyu *[3]	xàri dà *àshìrin* dà biyu *	one hundred and twenty two

[3] In most cases, there are some loan words from Arabic that cannot be deleted for clipping in Hausa numerals formation (i.e. ashirin, talaatin, arba'in, hamsin etc.)

2013	dubu biyu dà (goomà) shâa ukù	dubu biyu dà shâa ukù	two thousand and thirteen
2023	dubu biyu dà *ashirin* dà ukù*	dubu biyu dà *àshìrin* dà ukù *	two thousand and twenty three

In some instance, some words were deleted in order to merge the two or more words together where the new lexical item may be produced through fulfilling some certain morphological patterns in accordance with the word-formation rules WFR[s]. For instance, the year 2016 can be a long and complex word in Hausa, but it can be shortened by the speakers as; *dubu biyu dà shâa shidà (two thousand and sixteen)* instead of *dubu biyu dà goomà shâa shidà (two thousand and sixteen)*. Similarly, all the loan words from Arabic to Hausa numerals (i.e. *àshìrin, tàlàatin, arba'in* etc.) are to be coined to other numerals instead of deletion, unlike in the formation of other numerals attached to the based; goomà, xàri, dubu etc. The feature of compounding in Hausa numerals formation is a situation where any other word cannot be deleted after the base item '*goomà*' and the meaning is always maintained.

The following are numerals in Hausa *reduplication* process:

	Word Form Base	**Full**	**Partial**	**Gloss**
(51)	xaya	xaya-xaya	xaixai	one-one
	biyu	biyu-biyu	bibbiyu	two-two

ukù	ukù-ukù	uukù*[4]	three-three
huxu	huxu-huxu	hurhuxu	four-four
bìyar	bìyar-bìyar	bibbìyar*	five-five
shidà	shidà-shidà	shisshidà*	six-six
bakwài	bakwài-bakwài	babbakwài*	seven-seven
takwàs	takwàs-takwàs	tattakwàs*	eight-eight
tarà	tarà-tarà	tattarà*	nine-nine
goomaà	goomà-goomà	goggomà*	ten-ten

The presence of productivity on full reduplication makes the partial reduplication unproductive and the semantic meaning appeared to the numerals *biyu-biyu* (unproductive) that restricted by full reduplication while the same meaning to *bibbiyu* (productive) that popularly used in distribution.

In this case, the productivity in numeral formation can be found in some instance at reduplication process where the partial reduplication does not function on some word bases in Hausa numerals (1 to 10) in terms of distribution process as stated in example (51) above due to that, morphological productivity can be processed in Hausa numerals formation.

[4] Some words are becoming lexicalized in Hausa numerals-formation through reduplication process (partial) but unproductive as the native speakers are not familiar with such words. (e.i. shisshida, babbakwai, tattakwas etc.)

4.3 The Yorùbá Numerals

Ajiboye (2013:3) says that; "Numerals whose forms cannot be broken down into identifiable meaningful morphemes are the first group which consists of numerals from one to ten as *basic numerals*", they are as follows:

1. ení 'one' 2. èjì 'two' 3. ẹ̀ta 'three' 4. ẹ̀rin 'four' 5. àrún 'five'

6. ẹ̀fà 'six' 7. èje 'seven' 8. ẹ̀jọ 'eight' 9. ẹ̀sán 'nine' 10. ẹ̀wá 'ten'.

It appears that the second basic numerals have nothing in common other than being among other numerals that are in multiples of ten. It is observed that *ogún* and *igba* can be used in multiplication whereas *ọgbọ̀n* cannot (cf. Oduyoye, 1969) in Ajiboye (2013:3). Examples:

(30) a. 20 ogún 'twenty'

b. 30 ọgbọ̀n 'thirty'

c. 200 igba 'two hundred'

Apart from the numerals that appeared as base numerals in Yoruba, the remaining numerals were derived through some morphological processes where the higher denominations being produced. In fact, there are no other base numerals in Yoruba after *ogún, ọgbọ̀n* and any round figures above *igba* (200). (i.e. the long

forms from eleven to ninety nine (11 to 99) are based on the occurrence within the Yoruba numerals; *ọ̀kan* 'one' to *ẹ̀sán* 'nine').

According to Olubode (2013:190), the complexity of numeral derivation in Yoruba is due to many factors, including but not limited to what follows. The higher numbers are compounded from the cardinal forms and the process of compounding involves series of mathematical operations. However, the products of these operations are then subjected to complex phonological processes which produce forms that differ, sometimes radically, from their constituent bases. Yoruba also has a multiplicity of number scales or 'bases' (Olubode, 2013:190).

Accordingly, it was observed that the affixes (bound morphs) play some vital roles in the counting system of the Yoruba language. The prefixes and interfixes are signaling increase by or decrease by of a certain number. Examples:

	Base	***Suffix***	***Computation***	***Numerals***	***Gloss***
(31)	àádó	+ òta	= (60-10 = 50)	àádó-òta	'fifty'
(32)	ogó	+ èje	= (20× 7 = 140)	ogóòje	'one hundred and forty'

One of the sources of complexity in the numeral system is that number derivation in Yoruba is by compounding of the cardinal numbers, involving

several arithmetic operations; addition, subtraction or multiplication (Olubode, 2013:190). Examples:

(33) (a) *Addition:*

Moókànlá ‘one plus ten’ (1+10=11) ‘eleven’

Igba ólé métàlàá ‘two hundred plus three-plus-ten’ (200+3+10=213)

(b) *Subtraction:*

Meérìndínlógún ‘twenty less four’ (-4+20=16) ‘sixteen’

Aádórùn-ún ‘five twenties –less ten’ (-10+20x5=90) ‘ninety’

(c) *Multiplication:*

ogójì ‘two twenties’ (20x2=40) ‘forty’ etc

Oyebade (2013:331) states that, ‘‘Yoruba speakers use the arithmetical computation operations of addition, subtraction and multiplication to compute more numbers’’. However, the decimal numbers i.e. one to ten (1 to 10), ten to twenty (10 to 20), twenty to thirty (20 to 30) etc which exploit addition and subtraction with addition applied in one to four (1 to 4) in the decimal and subtraction in five to nine (5 to 9). But from thirty five numerals (35 to 49), a combination of mathematical operations is introduced; multiplication and

subtraction (35 to 39, 45 to 49, etc.), while multiplication and addition in (41 to 44 and 61 to 64 etc).

4.4 Morphological Productivity of the Yorùbá Numerals

According to the Yoruba numerical system, it has been observed that productivity occurs in some of the arithmetical operations such as addition, subtraction and multiplication. The morphology also plays a vital role in order to form other numerals in which the operation exists and expands to the higher numbers. However, the system shows that Yoruba numbers are count in different manipulations which in most cases make the system unproductive or not standard as it can change from one system to another.

(52) ***Table*** **4: The Basic Set of Yorùbá Numerals (Simple Cardinals):**

Numbers	**Yorùbá word numbers**	**Gloss**
1	ọ̀kan	one
2	mèjì	two
3	mẹ̀ta	three
4	mẹ̀rin	four
5	marù-ún	five
6	mẹ̀fà	six
7	mèje	seven
8	mẹ̀jọ	eight
9	mẹ̀sán-án	nine
10	mẹ̀wàá	ten

Like any other natural language, Yorùbá derives the complex cardinal numerals from the simple cardinal numerals (*base*) where the higher number can be produced in accordance with the system used. So, the Yoruba arithmetic operations can be set to have productive and unproductive system which depends on the sets of the basic numbers, example; from 1 to 4 in Yoruba numerals, the addition is used to produce the numerals at the hierarchy, where the remaining numbers from 5 to 9 are being manipulated through subtraction of the lower number from the lexical item ahead, e.g. 20, 30, 40, 50, 60, 70, etc as other base of counting operations that can be derived.

(53) ***Table*** **5: The Process of Word Formation in Addition of Yorùbá Numerals:**

Numbers	**Yorùbá number word**	**Clipped word**	**Literal meaning**	**Computation**	**Gloss**
11	òkanlélèwàá	moókànlá	one plus ten	1+10	eleven
12	mèjilélèwàá	mèjìlá	two plus ten	2+10	twelve
13	mẹ̀talélèwàá	mẹ̀talá	three plus ten	3+10	thirteen
14	mẹ̀rinlélèwàá	mẹ̀rìnlá	four plus ten	4+10	fourteen

The process of word formation that occurs in example 53, table 5 above is unproductive in the system of Yorùbá numerals-formation where deletion at the middle position of a word occurred. The Yorùbá numerals are also unproductive in

the compounding process where the two or more words are coined together to produce other meaningful idea that can help to solve an arithmetical operations.

(54) ***Table 6:*** **The Word Formation Process in Multiplication of Yorùbá Numerals (I):**

Numbers	**Yorùbá number word**	**Blend word**	**Literal meaning**	**Computation**	**Gloss**
40	ogún èjì	ogójì	two twenties	20×2	forty
60	ogún ẹ̀ta	ọgọ́ta	three twenties	20×3	sixty
80	ogún ẹ̀rin	ọgọ́rin	four twenties	20×4	eighty
100	ogún àrún	ọgọ́rùn	five twenties	20×5	one hundred
800	igba-ẹ̀rin	ẹgbẹ̀rin	four two-hundred	200×4	eight hundred
1000	igba-àrún	ẹgbẹ̀rún	five two-hundred	200×5	one thousand
2000	igba ẹ̀wàá	ẹgbẹ̀wá	ten two-hundreds	200×10	two thousand

Moreover, the operations in the table 6 above are not enough for solving the problem of calculation or manipulation in the Yorùbá language as the speakers combine the two arithmetic operations (i.e. subtraction and multiplication). In this case, the three lexical items are merged together. But, due to the lengthy and complexity of the existing word the clipping process plays a vital role in a situation where at least four syllables have been affected by deleting some of its parts in order to arrive at a new lexical item.

(55) ***Table 7*****: The Word Formation Process in Subtraction and Multiplication of Yoruba Numerals:**

Numbers	Yorùbá number word	blend word	Literal meaning	Computation	Gloss
50	mèwà**ád**inl**o**gún-è**ta**	àádọ́ta	ten reduced from three twenties	-10 + (20×3)	fifty
70	mèwà**ád**inl**o**gún-è**rin**	àádọ́rin	ten reduced from four twenties	-10 + (20×4)	seventy
90	mèwà**ád**inl**o**gún-a**rún**	àádọ́rùn	ten reduced from five twenties	-10 + (20×5)	ninety
110	mèwà**ád**inl**o**gún-è**fa**	àádọ́fà	ten reduced from six twenties	-10 + (20×6)	one hundred and ten

The BODMAS[5] logic used to be solved for the above computation. But blending has been identified as one of the word formation process. It is described as a process usually arrived at by cutting parts of two different words to form another, a product of which does not show transparent resemblance to the originals (Mathews, 1993, Bauer, 1983 and Abubakar, 2001) in Shettima and Bulakarima (2012:32). Consider the following examples:

(56) Euro (pe) and Asia Eurasia etc.

Accordingly, it is observed that blending can be seen as another process of word formation, more especially in Yoruba numerals where some morphemes are being deleted from the two existing words.

[5] It is the formula for arithmetic logics as Bracket off Division, Multiplication, and Subtraction (BODMAS).

(57) *Table 8*: The Word Formation Process in Subtraction of Yorùbá Numerals

Numbers	Yorùbá word number	Compound word	Literal meaning	Computation	Gloss
15	màrún dín ogún	mẹ̀ẹ̀dógún[6]	five reduced from twenty	-5 + 20	fifteen
16	mérìn dín ogún	mẹ̀ẹ̀rìndílógún	four reduced from twenty	-4 + 20	sixteen
17	métà dín ogún	meétàdílógún	three reduced from twenty	-3 + 20	seventeen
18	méjì dín ogún	meéjìdínlógún	two reduced from twenty	-2 + 20	eighteen
19	oókàn dín ogún	mókàndínlógún	one reduced from twenty	-1 + 20	nineteen

In this compounding process, the clipping occurs only on numeral '15' as others took the insertion of the allomorph (*l*) instead of deletion which shows that the unproductive system on subtraction operation in Yorùbá counting happened from 16 to 19 numerals.

[6] '*lo'* morpheme is missing as a result of the presence of clipping after compounding in the process to form meedogun 'fifteen' which is unproductive.

But, it has observed that the multiplication pattern of arithmetical operations in Yoruba numerals affects the structure of a word where the clipping process made the system productive for merging two lexical items together, after which one or more morphemes can be removed or deleted.

Meanwhile, another process of Yorùbá reduplication can be occurred in the Yorùbá numeral systems where the first syllable can easily be repeated according to the word-formation rules.

The following are numerals in Yoruba Reduplication:

	Base	**Full**	**Gloss**
(58)	okan	ókàn-ókàn	one-one
	meji	méji-méji	two-two
	meta	méta-méta	three-three
	merin	mérin-mérin	four-four
	marun	marùn-marùn	five-five
	mefa	méfa-méfa	six-six
	meje	méjé-méjé	seven-seven
	mejo	méjo-méjo	eight-eight
	mesan	mésàn-mésàn	nine-nine
	mewa	méwa-méwa	ten-ten

	Base	Partial	Gloss
(59)	meji	méjééji	two by two
	merin	méréérin	four by four etc.

4.5 Findings

From the above analysis, the findings in this chapter have answered all the research questions.

Thus, in a view to attest to this questions in affirmation or otherwise, it has proved that some morphological patterns are more productive than others. This is because the morphological patterns make no differences to that of productive in terms of rules guiding their formations; they are unproductive based on the language traditions by the native speakers.

Furthermore, it is realized that the numerical systems of both Hausa and Yorùbá have a distinctive lexicalization process in their numeracy. This lexicalization occurs in the process of forming a new word from the existing one as it appears in the analysis above.

In relation to morphological processes of the two languages, the analysis shows that both languages have different morphological processes in numerical formation. The Hausa morphological processes found under compounding, clipping and reduplication processes; whereas Yorùbá on the other hand has compounding, clipping, blending and reduplication processes.

With regard to production of lexical numerals, this analysis shows that while languages such as Hausa and Yorùbá have form their numerals from the ten-base system; other languages such as Fulfulde and Nupe differ in ten-base numerical system as theirs are formed through five-base system (1-5).

Lastly, the issue of reduplication versus productivity can be realized from the analysis that some numerical reduplication is more productive than the others. Numerals in full reduplication are more lexicalized than that of partial reduplication that is why some numerals are more productive than the others. They are also more productive because the analysis shows that, they are more fitted to the language rules as well as more accepted by the native speakers. In addition, the partial reduplication turns out to be unproductive even though the meaning remains the same based on the presence of productivity for full reduplication. (i.e *shisshida*, *bibbiyar*, *mewewa*, *mokokan* etc).

4.6 Conclusion

Word-formation processes are not restricted, and the most productive affixes seem to be subjected to certain structural constraints. Meaning, they have their own rules that governed their structural formation. Some affixes may only attach to the bases of a certain syntactic category or of a specific phonological or morphological make-up. (i.e *gomar*, *shidar*, *hudun*, *bakwan* etc). Semantic factors can also play a restrictive role, and the fashionableness of an affix is also dependant on extra-

linguistic influences. However, the numeral systems of these languages are morphologically different as head-initial for Hausa and head-final for Yoruba in which the higher denominations are derived from their base numbers according to the arithmetic operations that make the system productive or unproductive.

It is also observed that the most interesting point here is how the speakers of Yoruba language use clipping in order to shorten the long or complex words in Yoruba numerals.

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.0 Introduction

This chapter concentrates on the summary and conclusion of this research. The summary part gives a concise content of the research work. And thereafter a general perspective conclusion is given base on the findings.

5.1 Summary

The research examines the nature of numeral systems in Hausa and Yoruba. Thus, the different types of numerals used by the speakers of these languages have been identified where the various morphological processes and their productivity have been analyzed. It is observed that, most languages of the world operate base ten counting systems where Hausa and Yorùbá are inclusive. It has also been observed that, addition, subtraction, multiplication and division are the keys to operate or manipulate the numerals of these languages for their daily calculations. The research investigates on how the speakers used some different lexical items in the production of higher numerals from the base, it is also discovered that numerals in Yorùbá require some simple arithmetical operations that can stimulate our intelligence in relation to complex numerals. This might be one of the reasons why many people are facing difficulties in learning or manipulating the Yorùbá

numerals because it is to be noted that the derivations for Yorùbá numerals have become so increasingly complex and complicated at the level of the formation of higher denominations, particularly to the youth. The analysis also discovers that there are number of linguistic insights more especially in the structure of Yorùbá numerical system. But Hausa has traditional and modern counting patterns such as; *haûya* 'twenty' vs *ashirin* 'twenty' or *zambar* vs *miliyan* 'one million' etc. Another significant discovery of this research is the issue of the ten-base (1 to 10) numbers; either as a root or stem to the new forms (i.e. Hausa and Yorùbá). However, some languages such as Fulfulde, Tiv and Nupe operate the five-base (1 to 5).

5.2 Conclusion

This research observes that the numeral systems can be served as more authentic source of evaluation in any language. It should be noted that the numeracy is a very important aspect of any linguistic system. However, counting system is an integral and inseparable part of the grammar of any language because there is hardly for any meaningful linguistic discourse in a language that do not makes reference to quantity, size, time, distance and weight in definite numbers. This work has open up a new discovery of knowledge with regard to Hausa and Yoruba numerical systems. The outcome of the research contributes to the existing knowledge of language and linguistics. This work is of great importance to both the native speakers and the second language learners as it will improve their

language skills or usage. The research also serves as a contribution to the existing knowledge in view of little or no research conducted in this area. The native and the second language users would immensely improve the language usage as a result of this research. And on the other hand, other researchers and academic scholars stand to use this research work as a point of reference and a yardstick for further investigation.

5.3 Recommendations

This research work concentrates on the numerical system of the two languages under investigation. From the findings of the research work, it is realized that both Hausa and Yorùbá share some similarities and dissimilarities in numerical systems. The similarities center on ten-base system; while the partial differences depend on arithmetical operations. The similarities between the two languages are an indication of possible correlations that exist between languages even when they belong to different family language group. Thus, the relationship identified in numeracy may not be all as there are possible correlations in other bases or context such as syntactic, semantic, morphophonological, morphosyntactic and morphosemantic analysis. It is therefore recommended that other researchers can develop and focus on these areas undeveloped to explore more of these similarities as this will help in understanding more of interrelation of various languages within and outside of their family language group.

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