AN ACOUSTIC STUDY OF THE RHYTHM OF FULFULDE

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ABSTRACT

Fulfulde is a language widely spoken in West and Central African countries by people who call themselves Fulɓe, also known as Fulani in English. Considerable researche has been conducted on the phonology of the language, but there appears to be a dearth of research on rhythm, as none of the available literature discuss the rhythm of this language in any detail. This research is aimed at describing the acoustic correlates of the rhythm of Fulfulde in comparison with Nigerian English, and to provide the translated version of a phonetic text 'North Wind and the Sun' (IPA, 1999) which can serve henceforth as an instrument in the acoustic investigation of the language. Though this popular phonetic text has been in use for decades and has been translated into hundreds of languages, its Fulfulde version is so far not available. 10 speakers of Fulfulde and 10 speakers of Nigerian English were recorded. The normalized Pairwise Variability Index (Grabe & Low, 2002) and Varco V (Dellwo, 2006) values which are rhythmic indexes were used to measure the rhythm of the two languages. The findings show that the rhythm of Fulfulde is syllable-timed, but along the continuum, Fulfulde is more stress-timed than Nigerian English. The results raised further questions on the influence of native language on the rhythm of Nigerian English.

ABSTRAK

Fulfulde adalah sebuah Bahasa yang dituturkan oleh sebuah masyarakat yang dikenali sebagai 'Fulɓe' atau Fulani di dalam Inggeris di sekitar Afrika tengah dan barat. Beberapa penyelidikan telah dijalankan mengenai fonologi bahasa tersebut khususnya kepada iramanya yang merupakan sebuah aspek penting dalam fonologi memandangkan kajian terdahulu tidak memberi focus yang mendalam kepada aspek ini. Kajian ini bertujuan menerangkan korelasi akustik yang terdapat dalam irama Fulfulde dengan membandingkannya dengan Bahasa Inggeris yang dituturkan di Nigeria dan juga untuk menghasilkan terjemahan teks fonetik 'north Wind and the Sun' yang boleh dijadikan alat penterjemahan di dalam kajian akustik sesebuah bahasa. Melalui teks fonetik yang popular ini dan digunakan untuk berdekad dan diterjemah ke dalam berates Bahasa, versi Fulfulde masih belum dihasilkan. 10 pentutur Fulfulde dan 10 pentutur Inggeris Nigeria telah direkod dan diukur. Dua indeks irama, nPVI (Grabe & low, 2002) dan Varco V (Dellwo, 2006) telah digunakan untuk mengukur irama kedua-dua bahasa. Hasil kajian menunjukkan irama Fulfulde lebih mementingkan saat suku kata berbanding Bahasa Inggeris di Nigeria. Hasil kajian juga menimbulkan pertanyaan mengenai pengaruh Bahasa ibunda terhadap irama Bahasa Inggeris di Nigeria.

ACKNOWLEDGEMENT

Table of Contents

List of figures:

List of Tables

List of Abbreviations

BrE   British English

Cf.   Confer

DARE   Dictionary of American Regional English

IPA	International Phonetic Association
IPA	International Phonetic Aphabets
MalE	Malaysian English
NigE	Nigerian English
nPVI	Normalized Pairwise Variability Index
NWS	North Wind and the Sun
Varco V	Variance Coefficient
pl.	Plural
sg.	Singular
SgE	Singapore English
UNESCO	The United Nations Educational, Scientific and Cultural Organization

List of Appendixes:

Chapter 1

INTRODUCTION

1.1. Background of the Study

Fulfulde, the language of the Fulɓe is spoken in most West African countries and beyond. Fulɓe are the native speakers of Fulfulde language; also known as Fulani in Hausa and English, Peul in French, Peule in German. The Fulɓe (plural) and Pullo (singular) in Nigeria and other countries from Mali eastward call their language Fulfulde, though in Senegal and Guinea, the language is called Pulaar and Pulle respectively. These various names share the same root, thus 'Ful-/Pul-' from which came the German name for the language 'Ful' and the French Peul (Arnott, 1970). According to Paradis (2001, p. 21) "the area where Fulfulde is spoken is between 7th and 17th parallels and encompasses some 17 countries". Among the countries are Mauritania, Senegal, Gambia, Guinea, Mali, Burkina Faso, Niger, Nigeria, Chad, Cameroun, Central African Republic, Ghana, Guinea Bissau, Benin, Sierra Leone and Sudan (Girei, 2009).

Fulfulde is a lingua franca and in some cases a network language in the African countries where it is spoken. It is a network language in that, it is spoken by over a million people and used in mass media, and in some cases, recognized in school curriculum subsequent to the majority and official languages. Brann (1985) listed Fulfulde, Edo, Efik, Idoma, Igala, Ijo, Kanuri, Nupe and Tiv among the Nigerian network languages. Greenberg (1970) classified Fulfulde under the West Atlantic group of the Niger-Congo phylum. Though it is akin to Serer, Harris (1992) is of the opinion that Fulfulde is untypical to West Africa. Harris noted that Fulfulde is not a tonal language as the majority of West African languages, and has morphologically complex nominal and verbal systems

1

including middle and passive voice, which are uncommon grammatical features in West African languages.

Although it has been noted to be an African language with one of the widest geographical presence (Breedveld, 1995), the actual number of speakers of this language is yet to be confirmed. *The United Nations Educational, Scientific and Cultural Organization* (UNESCO), estimated the number of Fulfulde speakers in 1985 to be between 12 and 15 million (Paradis, 2001, p. 21). He further noted that Fulfulde speakers are widely scattered in small groups across West Africa, and therefore it is hard to assess their exact number.

Though perfectly intelligible, there is a wide range of linguistic diversity across the Fulfulde dialect continuum. This is owing to so many factors surrounding the lifestyle of the Fulɓe such as migration and language contact, geographical and ecological factors (Arnott, 1970). Considering these factors the most pertinent being the early, recent and present migrations, it would be extremely difficult to chart a clear-cut dialect boundary for the language. However, Arnott (1974) suggested a possible stylized representation of the dialects base on localities or groups within localities. This representation amounted to six Fulfulde dialect areas across West Africa; Futa Toro, Futa Jalo, Masina, Sokoto & Western Niger, Central Northern Nigeria and Adamawa dialects. In Nigeria, three Fulfulde dialects were identified; Sokoto, Central Northern Nigeria and Adamawa dialects. However, this dialect boundary can only serve practical purposes since there are intervening dialect areas (Girei, 2009) which according to Arnott (1974) approximates more or less to one of the six dialects identified. On this basis, Girei (2009) found several other varieties of Fulfulde spoken within an area hitherto classified by Arnott as a single speech area.

The existing literature on Fulfulde (e.g Arnott, 1967, 1970; Brackenbury, 1915; Labouret, 1952; Lacroix, 1968; Taylor, 1921, 1953) show that a lot has been done on the grammar

of the language. However, some of the available literatures did not discuss phonology, and those that were able to comment on the phonology (e.g McIntosh, 1984; Breedveld, 1995) did not discuss the rhythm of the language either. It therefore appears that none of the research conducted on Fulfulde phonology referred to the rhythm of the language. Through instrumental methods, the present study will investigate rhythmic aspect of Fulfulde in comparison with Nigerian English (henceforth NigE).

1.2.   Statement of Problem

It has been noted earlier that Fulfulde is spoken by nearly twenty million speakers in almost all countries of West Africa. Even with this number of speakers and a wide geographical presence, Fulfulde nevertheless shows some symptoms of endangerment. According to Hale (1992, p. 23) "language endangerment is an incidence of domination by a more powerful language". In this sense, most Nigerian languages, particularly in the north, will in varying degrees qualify as endangered by a widely spoken Hausa language. In some areas of northern Nigeria, for instance, Fulfulde was a major tool of communication in the18[th] and 19th centuries serving both as first language and lingua-franca. It was also regarded as the language of (Islamic) academics and governance (Azarya, 1993). This was due to its prestige as the language of Islamic scholars and that of the rulers of the region. But within the last century, Fulfulde has lost its relevance to Hausa which is the main language spoken in the region. For this reason, Fulfulde suffered a lot of loss in terms of speakers, socio-economic roles and academic interest. Base on the earlier definition, these could therefore be seen as symptoms of an eminent endangerment facing minority languages and more dangerously threatens their existence. Similarly, UNESCO (2003) states that there is a clear dwindling future of many languages in the world, making language survival dependent on the educated natives. On this basis,

3

a potentially endangered language (such as Fulfulde) requires academic attention to revitalize its linguistic and academic status and to safeguard such a language from extinction.

For centuries now, Fulfulde attracted the attention of scholars, as a result of which several studies were conducted on various linguistic aspects of the language. Early scholars of Fulfulde linguistics (e.g Arnott, 1967, 1970; Brackenbury, 1915; Labouret, 1952; Lacroix, 1968; Taylor, 1921, 1953) conducted several investigations into various structural aspects of the language. However, these investigations were more focused on lexical and morphological aspects as well as syntax and dialectology. Perhaps this could be the reason that Daudu (2005, p. 14) said "the most readily available study on Fulfulde is largely on morphology".

Nevertheless, there is some readily available literature on some aspects of Fulfulde phonology. Linguists such as Arnott (1969); Breedveld (1995); Klinghenheben (1963) and Westermann (1909) discussed the segmental and some of the suprasegmental features of the language. Other researchers who commented on Fulfulde phonology include Abba (1991); Gottschligg (1995, 1999); McIntosh (1984); Miyamoto (1989); Muhammed (1987); Mukoshy (1991) and Stennes (1967). Suprasegmental features discussed by some of these researchers include syllable structure, stress, intonation and some phonological processes with reference to the particular dialect(s) each of the researchers was concerned with. In a more recent study, Girei (2009) conducted an investigation on the Fulfulde dialects in Nigeria where phonological features were central to the variations he identified across the Fulfulde dialect continuum. However, it is very clear that none of these studies discussed in any detail, the rhythmic pattern of Fulfulde language. Thus rhythm, an important aspect of phonology, appears to have been excluded in the linguistic investigations on the language thus far.

Rhythm is understood to be a periodic recurrence of events, which are stress beats in stress-timed languages or syllables in syllable-timed languages (Gibbon & Gut, 2001). Impressionistic accounts (e.g Abercrombie, 1965, 1967; Pike, 1945) suggest that languages differ in their rhythm (syllable-timed and stress-timed). Giving Japanese as a classical example, Bloch (1950) came up with a mora-timed class of languages. In mora-timed languages however, the mora is perceived to be isochronous rather than syllables or stress beats. Crystal (1985) said the term stress-timed is used in phonetics to characterize the pronunciation of languages displaying a particular type of rhythm where syllables are said to occur in regular intervals of time as in French, also referred to as 'isosyllabism' (p. 495). It is opposed to stress-timed languages where stressed syllables are said to occur at regular intervals (p. 482). Mora, on the other hand, refers to a minimal unit of metrical time equivalent to a short syllable, a term that has come to be used in recent phonological theories which pay attention to prosodic factors (p. 198).

Abercrombie (1967) proposed the idea of isochrony where in syllable-timed languages such as French, "cheast pulses, and hence the syllables occur at equal intervals of time – they are isochronous" (p. 97). In contrast, stress-timed languages such as English are assumed to have regular recurring stress beats and varied syllable durations. Though studies on rhythm (e.g Dauer, 1987; Gibbon & Gut, 2001; Grabe & Low, 2002; Lehiste, 1977; Low & Grabe, 1995; Ramus, Nespor & Mehler, 1999; Roach, 1982) agree that languages differ in their rhythm, each of these researches have tried and failed to provide the basis for this dichotomy, because all the attempts to capture these differences acoustically are so far not satisfactory (Gibbon & Gut, 2001). However, Laver (1994) suggested that the concept of an approximately isochoronous rhythm in speech has been so tenacious in the history of phonology and phonetics, that it seems unlikely to be completely without foundation. Therefore, much research is needed and the general area of metrical structure is one of the most active fields in modern phonology (Laver, 1994).

Similarly, a substantial amount of research has been conducted both in an attempt to find the rhythmic correlates of various languages and to investigate languages that are yet to be classified in terms of their rhythm. Subsequent investigations (e.g Dauer, 1983; Roach, 1982) had refuted the isochrony model, suggesting that the inter-stress intervals and syllables are not of equal length both in stress- and syllable- timed languages. In view of this, researchers have developed various methods and metrics to discover the phonetic basis for this dichotomy and to classify languages in terms of their rhythm. For example, Low and Grabe (2002) conducted an investigation on some 18 languages, while Gut, Urua, Adouakou and Gibbon (2001) measured the rhythm of African tone languages involving Ibibio, Anyi and Ega. In the case of Fulfulde language, both European and African linguists (e.g Arnott, 1966, 1969; Breedveld, 1995; Girei, 2009; Klingenheben 1963; Muhammad, 1987; Westermann, 1909) discussed the phonology of the language, but to the best of the present researcher's knowledge, an *acoustic investigation* of the rhythm of the language is yet to be conducted.

In phonetic analysis, texts are used as instruments for recording and measurement, and for this reason various texts have been suggested by researchers to be used as instruments in comparing different languages and varieties of the same language. For instance, in the nineteenth century, Henry Sweet proposed a tale of a rat titled 'Arthur the Rat' used widely in the corpus of the Dictionary of American Regional English (DARE) to describe varieties of English (Deterding, 2006). Similarly, from 1912, the International Phonetic Association introduced a 113 words text known as 'The North Wind and the Sun' (henceforth NWS) which has been widely used in language descriptions, analysis and comparisons. The handbook of the IPA (1999) published 29 illustrations of this text and the IPA which have appeared in the Journal of the International Phonetic Association from 1989 to 1997, and several other translations of this text acompaned by descriptions of the IPA into several other languages have been published. Not only do there exist a

large number of descriptions of its rendition in several languages of the world (Deterding, 2006), but a number of transcriptions have been provided for several varieties of English. Among these, Ladeforged (1999) described Californian American English, Hillenbrand (2003) described Southern Michigan American English, while Watt and Allen (2003) and Roach (2004) provided a description of Tyneside British English and Received Pronunciation (RP) of the British English respectively. As far as I am aware, the Fulfulde of the NWS has not been provided, thus making it difficult to arrive at a standard text to be used in the phonetic analysis of the language. By implication, this would mean that there is so far no standard text that exist in Fulfulde which can be commonly used for research purposes. In this research, efforts have been made to translate the NWS into Fulfulde, a text that might be useful for the phonetic analysis of the language.

This study investigates the rhythm of Fulfulde language with a view to describing it and finding the rhythmic class Fulfulde may belong to. This piece of work is motivated by the desire to fill the gap that exists in the phonetic study of the language which in a way adds to the phonological knowledge of Nigerian indigenous languages.

1.3.   Research Questions

This study attempts to provide answers to the following questions:

    i.   What are the acoustic correlates of the rhythm of Fulfulde language?

    ii.   How does the rhythm of Fulfulde compare with the rhythm of Nigerian English?

    iii.   To what extent does the translated text of the 'North Wind and the Sun' lend itself to be used as an instrument in measuring rhythm?

1.4.   Purpose of the Study

Following the impressionistic classification of languages into rhythmic classes; syllable- stress- and mora- timed, several phoneticians focused on this subject by applying various strategies to provide an acoustic evidence for the dichotomy and to investigate languages that were not categorized. The purpose of this study is to conduct an acoustic investigation through most recent techniques as an attempt to provide further studies on the prosody of Fulfulde language. It is intended to provide a pioneer investigation on the acoustic study of the rhythmic pattern of the language. Thus, the success of this study adds to the body of knowledge, in that, it will pave a way to further investigation on the suprasegmental features of the language and that of other African indigenous languages.

1.5.   Objectives

This study aims at achieving the following objectives:

i.   To describe the rhythm of Fulfulde using instrumental methods.

ii.   To compare the rhythm of Fulfulde to that of Nigerian English.

iii.   To provide a Fulfulde version of the 'North Wind and the Sun' for the acoustic measurement of rhythm.

1.6.   Scope of the Study

The diversity of Fulfulde language poses a problem to linguists as the number of its dialects is yet to be ascertained (Breedveld, 1995). In some states of northern Nigeria alone, Girei (2009) identified about 34 varieties of Fulfulde. The subjects of this study

are speakers of the Adamawa dialect and therefore the rest of the dialects are not represented. The rhythmic variations that may exist within the dialect continuum, as found across some varieties of English are not taken into consideration. This is considered a limitation.

Furthermore, Daudu (2005) categorized Fulɓe into three major groups: those living in towns and cities (settled Fulɓe), those who are cattle rearers but are more of settled farmers (semi-settled Fulɓe) and the nomadic (migrant) Fulɓe. This research is mainly focused on the settled Fulɓe, because they are more accessible and have more tendencies of literacy which is one of the requirements for the respondents. The semi-settled and the nomadic groups are not included due to their way of life, low level of literacy, time and economic constraints.

Similarly, the supra-segmental features of a language consist of a number of phonological constraints which include; tone, stress, intonation and rhythm. However, this investigation focuses solely on measuring the rhythmic aspect of the language. Other supra-segmental features are not covered in this study.

1.7.   Organization of the Dissertation

This thesis is divided into five chapters. Chapter one explains introductory issues of the research including background of the study, objectives, statement of the problem, research questions and scope of the study. Chapter two contains a review of literature on Fulfulde, NigE and rhythm. The third chapter explains the methods used in data collection and data analysis. Chapter four presents the findings and discussion and chapter five presents the conclusion, summary, implications and limitations of the study.

Chapter 2

LITERATURE REVIEW

This chapter discusses the existing literature on Fulfulde, NigE and rhythm. The first section of the chapter discusses the language situation in Nigeria. The second section deals with a review of relevant literature on Fulfulde including a brief historical background on Fulɓe and Fulfulde. The segmental and suprasegmental aspects of Fulfulde phonology were also discussed. The third part of the chapter is a review of NigE including its definition, classification and the prosody. The fourth part discusses basic phonetic characteristics of speech sounds such as phonetic classification and the description of speech sounds. This is followed by sections on rhythm and rhythm metrics.

2.1. The Linguistic Situation in Nigeria

Though this study is purely on acoustic phonetics (sociolinguistics does not form part of it), it involves two distinct languages (Fulfulde and NigE) both spoken in Nigeria, a linguistically diverse country. It is therefore, useful to provide a brief picture of the linguistic situation in Nigeria. This would provide the basic information on the status and place of these languages in the Nigerian language situation.

Sociolinguists (e.g Brann, 1985) have described Nigeria linguistic situation as complex, and this is true to some extent. The most recent census conducted in 2006 estimates Nigeria's population to be about 150 million people. Similarly, the index of Nigerian languages suggests that over 400 languages are spoken in the country, thus making Nigeria not only the most populous African country, but one of the most diverse African

countries in terms of the number of spoken languages and complex linguistic situation (Awonusi, 1985). Nigeria is therefore, a multilingual nation with several languages that are not of unequal social and educational status. For this reason, Awonusi (1985) stated that linguistic hierarchy is a reality in the Nigerian situation and this portrays the level of inequality that exists among the languages.

For this reason, sociolinguists provided several forms of indices which are used in identifying the levels or status, functions, influence and other sociolinguistic roles of the various languages that co-exist in the Nigerian linguistic domain. Such indices take into consideration, various social, demographical and geographical situations of the languages. Factors used in such classification include: constitutional legitimacy and origin, population, spread and prestige. Each of these indices reveals different categories of the Nigerian languages. From the view point of nativity, Nigerian languages are categorized into two divisions, thus:

   i.   Non-indigenous or exoglossic languages. This include foreign languages (English, French and Arabic)

   ii.   Indigenous or non-exoglossic languages. These include all native Nigerian languages example Fulfulde, Hausa, Yoruba, Igbo, Igala and many more.

Similarly, Emenanjo (1985) followed Williamson (1983) by using the index of population and spread, origin and size to classify Nigerian languages into five categories:

   i.   3 exoglossic (foreign) languages which include English, French and Arabic.

   ii.   The 4 very large Nigerian languages which include Hausa, Yoruba, Igbo and Pidgin.

iii.   The 7 large Nigerian languages which include Fulfulde, Kanuri, Efik, Idoma, Igala, Ijo, Nupe and Tiv

iv.   Some 20 medium-size Nigerian languages

v.   Then 350 small-sized languages

From another perspective, Ejele (2003) considered the relative size of the languages, where he suggested three categories of Nigerian languages:

i.   Major Languages: Hausa, Yoruba an Igbo are considered Nigeria's major languages with high sociolinguistic functions serving as lingua francas in the majority of the regions. Noting however, that the role of Igbo and Yoruba is fast declining outside the domain where they are spoken, with Pidgin playing the role of Igbo in the south-eastern Nigeria.

ii.   Main languages: Second to the three major languages are network languages (Ejele, 2003). They are next in terms of population of speakers and spread. Some scholars refer to them as network languages. They are often used as mediums of instruction in nursery, primary and in some states at junior secondary classes. Speakers of these languages have a considerably fair attitude towards their languages.

iii.   Small Group Languages: These on the other hand are underdeveloped languages spoken by a relatively smaller number of people and existing in towns and villages or a few local government areas.

Bamgbose (2001, p. 2) used population and spread alongside other sociolinguistic factors as indices and suggested these categories of Nigerian languages:

i.   Decamillionaire languages – About 70% of the Nigerian population speak Hausa, Yoruba or Igbo which are considered as major Nigerian languages, either as first or second language or as the language of wider communication. These are languages which essentially possess several millions of speakers and are used local and regional lingua-francas. These languages are also considered as state or regional languages in their respective geographical domains.

ii.   Millionaire languages – These are languages with about a million speakers or more. They languages dominant within certain states of where they are spoken. Languages; Fulfulde, Tiv, Nupe, Ijo, Idoma, Efik/Ibibio, Igala, Edo and Kanuri from this group. The federal government media houses such as Federal Radio Corporation of Nigeria, The Voice of Nigeria and the Nigerian Television Authority, promote the development of these languages and accord them the status of network languages.

iii.   Minor languages- This category comprises all other hundreds of Nigerian native languages spoken as mother tongue. Such languages are literally the most severely endangered and are never used in any official function or being recognized as medium of instruction at any educational level. Several languages in this category have lost a considerable number of speakers and are fast approaching the stage of extinction. An example of these languages is the Koma language.

Similarly, languages have been classified based on constitutional legitimacy which provides three categories of the Nigerian languages:

i. Constitutionally recognized official languages – this category comprises four languages recognized by the 1999 constitution as official languages. These are English, Hausa, Yoruba and Igbo.

ii. Official languages that are recognized by public or government policy but are not accorded same status in the constitution. For instance, the 1998 Language Policy recognized French as an official language.

iii. State governments recognized official languages- languages recognized by state institutions to be used as an official language. For instance, the Borno state house of assembly recognizes Kanuri as an official language.

Awonusi (1990) states that the advent of statism, and government's power of jurisdiction in language policy and planning gave way to federal and state governments to recognize languages of their local communities as official languages of the states where they are spoken. Following Brann (1985), Awonusi (1990) considered a sociolinguistic and demographic indices and classified Nigerian languages into five levels:

i. Level V- this level is for English earlier categorized as exoglossic/foreign language. English serves both the purposes of national and international communication.

ii. Level IV- this level comprises Yoruba, Hausa and Igbo (the major Nigerian languages) that are spoken as lingua francas in their respective regions. In other words, they are referred to as the decamillionaires languages are serving as regional lingua-francas.

iii. Level III- in this category, Pidgin serves the role of lingua-franca in the eastern part of the country and is therefore separately categorized at this level since its role is restricted.

iv. Level II- this level comprises of the Nigerian network languages which include Fulfulde, Efik/Ibibio, Kanuri, Idoma, Tiv, Edo, Igala, Nupe and Ijo. These languages are used as medium of instruction at primary classes and in media.

v. Level I- this level comprises of the rest of the Nigerian languages. This group of languages was further classified into two groups: non-exoglossic or native languages which consist of the minority Nigeria languages and exoglossic or foreign languages mainly French and Arabic.

The classifications of Nigerian languages in the literature show that, in the context of the Nigerian sociolinguistic situation, Fulfulde has the status of a network or a millionaire language in Nigeria, while English serves as a national, official and a national lingua-franca. The index of origin places Fulfulde among the indigenous (non-exoglossic) languages while English is a non-indigenous (exoglossic) language. Base on Emenanjo's (1985) index of population and spread, origin and size, Fulfulde fall in the third category of seven major languages whereas English is in the first category. Similarly, in terms of the relative size of Nigerian languages, Ejele (2003) classified Fulfulde among the second category of languages referred to as main Nigerian languages. Similarly, Bamgbose (2001) placed Fulfulde among the millionaire languages, while in the index of constitutional legitimacy it is of the second category of languages. Awonusi (1990) puts all the network languages including Fulfulde in category II which is made up of the nine main Nigerian languages.

English in Nigeria is a dominant language which dominates all other indigenous languages. Since the colonial era, English has served as lingua-franca in Nigeria, followed by Hausa, Yoruba and Pidgin as regional lingua-francas in the north, west and eastern Nigeria respectively. However, it has been widely believed that the English enjoys wider

spread and attracts higher prestige than the indigenous languages. This situation is accompanied by the fact that English is recognized as the country's national and official language. Similarly, Awonusi (1990) described English as super-exoglossic with more dominance over French and Arabic which are foreign languages as well. Indeed, these and perhaps similar observations motivated Brann (1985) to state that:

> "from the point of view of the Nigerian language planner…then all languages are equal with some 50 being somewhat smaller, the 12 languages are more equal than the others whilst the 3 major languages are most equal with English still supra-equal" (p. 32).

Subsequently, Awonusi (2007) claimed that these indices show some supremacy and the hegemony of English with an emerging idea of linguistic hierachisation which gives English a dominant role over every Nigerian indigenous language. Awonusi suggested further that the linguistic hierarchisation assumes inequality in terms of prestige, social acceptance, status and constitutional rights of individual languages.

2.2.   Fulfulde

Generally, a substantial amount of research has been conducted on the grammar of Fulfulde. In the last two centuries, European linguists have conducted several studies on the language, and most recently, African and native linguists complemented these efforts by carrying out some research on various aspects of Fulfulde. The following sections present a review on the existing literature on Fulfulde in general and its phonology in particular.

2.2.1 Summary of Existing Literature on Fulfulde

Based on the existing literature on Fulfulde, several linguists have provided extensive description on various aspects of the grammar of the language as well as that of the histories surrounding the Fulɓe. Both early and recent studies on the grammar of Fulfulde cover some certain aspects of the language concentrating more on a specific dialect of the researcher's interest. Such studies include Girei (1994, 2000); Gottshiligg (1998); Klingenheben (1927, 1963) and Taylor (1921, 1953) on the Adamawa dialect, Arnott (1956, 1970, 1974) and Muhammad (1987) on the Gombe dialect, McIntosh (1984) and Daudu (1995) on the Kaceccere dialect, Leith-Ross (1921); Miyomoto (1989) and Westermann (1909) on the Sokoto dialect of Fulfulde. Similarly, the current study is concerned with the study of the rhythm of Fulfulde language as spoken in the Adamawa area, the native dialect of the researcher. Adamawa is probably the only area in Nigeria where Fulfulde enjoys the status of a major language as well as a lingua-franca (Girei, 2009). Therefore, speakers of Fulfulde Adamawa will be the subjects of this study and the analysis made on the data represents what is obtainable in this dialect.

However, the grammars mentioned earlier and indeed many more of their kind, are mostly based on some particular linguistic domains of the language. None of these researchers for instance, was able to discuss the entire units of the grammar of Fulfulde in his/her research. In their respective books, Taylor (1921) elaborated on the grammar of the language with reference to the Adamawa dialect, but Fulfulde phonology was completely ignored. Similarly, Klingenheben (1963) has substantially described the morpho-phonology of the same dialect, a book which till date serves as a major reference in the area of morphonology. Arnott (1970), on the other hand, is an idiolect based grammar focusing mainly on the nominal and verbal system of the Gombe dialect. Although it is a comprehensive and to some extent, one of the most prominent books in the field of

Fulfulde morphology, Arnott (1970) did not discuss in any detail, the phonology of the language.

Stennes (1967) is probably the only corpus-based grammar attempting to cover all the major aspects of the language, yet some apparent and significant innovations creeping into the Adamawa dialect of Fulfulde were not discussed. It is, however, a fact that these innovations for example the /v/ sound were used by speakers of the dialect (East, 1934; Girei, 2009; Taylor, 1921) and are nevertheless, part of the phonology of this dialect. In addition to this, Girei (2009) comprehensively studied the Fulfulde dialects in Nigeria, identifying major phonological, lexical and morpho-syntactic variations within the dialects. In the area of syntax, McIntosh (1984) investigated the syntactic structure as well as the verbal morphology of the language. Along this line, Daudu (2005) focused on the syntactic aspect of the language, concentrating more on the movement operations within the Government and Binding Theory. Considering these works and other existing literature on Fulfulde, one finds that morphology is more extensively discussed compared to other aspects of the language, particularly phonology.

In addition to the descriptions of Nigerian Fulfulde, some dialects of Fulfulde spoken outside the country have also been described. For instance, Gaden (1913) and Paradis (1992) studied the Mauritanian Pulaar, while Breedveld (1995) investigated the Maasina dialect of Fulfulde. Similarly, Sylla (1982) described the Guinean Fulfulde while Gottschligg (1992) analysed the Fulfulde dialect of Burkina Faso. From another perspective, Labatut (1982) comparatively described the Fulfulde dialects of Guinea, Senegal, Burkina Faso and Adamawa.

Considering lexicographical studies, Fulfulde is blessed with several dictionaries on specific dialects of the language. These include Taylor (1932) on the Adamawa dialect and Noye (1989) on the Cameroon variety of the same dialect. Similarly, St. de Croix

(1998) compiled a multidialectal dictionary of the language. Another lexicographical literature available in Fulfulde includes some pluridialectals such as De Wolf (1995); Seydou (1994) and Zoubko (1996).

2.2.2. Fulfulde and the Fulɓe

The meaning of the terms Fulfulde, Fulɓe and Pulaaku is often similar in the Fulɓe traditions. From the cultural perspective, the meaning of the term Fulfulde is much more than a name for the spoken language of the Fulɓe. It includes among other things, some unseen but highly valued and respected cultural values, identity and solidarity. For instance, Fulfulde has been in many ways equated with another different term pulaaku, which also like the former, received attention from various scholars though with varied definitions. Among the scholars, Breedveld (1995); Kirk-Green (1986); Taylor (1932); VerEcke (1986) and Zoubko (1980) defined Pulaaku in various ways, each of them basing his argument on the data acquired from their informants; the Fulɓe community among which the research was carried out.

For instance, Breedveld (1995) suggested that it will be very difficult to culturally define **pullo, pulaaku** and **Fulfulde** independent of the other. The reason according to her, was because the three terms are culturally interwoven such that none of the terms can function in its practical and cultural value without the other. This is the reason that Fulɓe are often heard saying 'barkaa **pulaaku** e **Fulfulde**' which means "for the sake of **Pulaaku** and **Fulfulde**". This is a very important and weighty statement among the **Fulɓe**, which carries strong sentiments enough to convince a **Pullo** in settling whatever kind of disagreement he/she might have.

Similarly, Girei (2009) defined Pulaaku as "a code of conduct or value system of the Fulɓe, while Fulfulde is the material culture within which the Pulaaku itself is enshrined and carried out along into the borne narrow of individuals and groups of the Fulɓe societies across the world" (pp. 11-12). Even with this lengthy and elaborate definition, the author acknowledged its incompleteness due to the magnitude of the meaning of the two terms and/or emotions derived once the terms are mentioned to a Pullo. It is therefore convenient to state that pulaaku is the core and centre of the Fulɓe values and culture, whereas, Fulfulde is the cover for both the language and the culture within which Pulaaku operates.

2.2.3. Brief History and Distribution of Fulɓe in Nigeria

According to De Wolf (1995), the Fulɓe are one of the largest ethnic groups of West Africa. They are found in almost all countries of West Africa with great majority of them living in Nigeria, Senegal, Gunea, Burkina Faso, Mali, Niger and Cameroon. They are also found in significant numbers in Mauritania, Gambia, Gunea Bissau, Ivory Coast, Togo, Benin, Chad and Sudan (Girei, 2009).

Historically, the Fulɓe arrived in Nigeria in two different periods and geographical entries. These were through the North-eastern and North-western roots. The North-eastern group came through the Dillara area of the Lake Chad basin (Sa'ad, 1970). As pastoralist, Lake Chad became so important for cattle rearing. Therefore, a large number of Fulɓe were attracted by the grazing potentials along the Chad Basin and subsequently migrated in large numbers and settled in the area. The lineages of this group of Fulɓe are currently found in Borno, Yobe, Adamawa and Taraba states. Some of these groups are partly or completely settled in villages and towns, while others still live a nomadic way

of life; migrating from one place to another in search of favourable grazing conditions for their cattle. In Adamawa and Taraba states, this group is generally considered by dialectologist as speakers of the eastern dialect (Arnott, 1970; Girei, 2009). Similarly, those in the other states are part of the speakers of the central Northern Nigerian dialect of Fulfulde (Arnott, 1970).

On the other hand, Fulɓe who are living in the North-western and Central Northern Nigeria entered through Agades now in the Republic of Niger. These groups are religiously oriented and therefore comprises mostly of clergy (Arnott, 1970; Girei, 2009). All members of these groups particularly those in Sokoto, Zamfara and Kabbi states have been lumped under the western dialect of the language with a presumably uniform speech form (Arnott, 1970).

2.2.4. Fulfulde Consonants

After the UNESCO 1966 conference at Bamako, Fulfulde has been described as a language with 27 basic consonants. Although there are slight variations, Fulfulde consonants have been said to be quite homogeneous throughout the Fulaphone (Girei, 2009). Due to contact with neighbouring languages such as Arabic, Hausa and other languages especially in the Adamawa area, foreign consonants have been incorporated into the phonemic inventory of the language. For example, the consonant /tʃ/ has been substituted with /ʃ/ in most positions in the Gombe dialect, while a new sound /v/ was introduced into the Adamawa dialect of Fulfulde, and /z/ has been realized in some loan words from Arabic and Hausa. Though some scholars of Fulfulde linguistics (e.g East, 1934; Girei, 2009; Gottschligg, 1995 and Taylor, 1921) commented on the new sounds, others (Arnott, 1969, 1970, 1992; Breedveld, 1995; McIntosh, 1984 and Stennes, 1967)

totally ignored these innovations and do not consider them as part of the phonemic inventory of the language. These sounds can therefore be treated as new innovations peculiar to the respective dialects where they occur. Indeed, considering the whole area where Fufulde is spoken, "[ʃ] is an uncommon variant of [tʃ]" (Arnott, 1969, p. 58), and so is [v] to [w] in the Adamawa dialect.

In the orthography, the affricates [tʃ], [dʒ] and the pre-nasalized affricate [ndʒ] are written as /c/, /j/ and /nj/ respectively. Similarly, [j] is written as /y/, the palatal [ɲ], palatalized glottal [ʔj] and glottal [ʔ] are written as /ny/, /y/and /'/respectively. All the rest of the consonants are written in the same form both in phonemic and orthographic writing. Table 2.1 shows the Fulfulde consonants without taking the innovated variants into consideration.

Table 2.1: Fulfulde Consonants

	BILABIAL	LABIO-DENTAL	ALVEOLAR	PALATO-ALVEOLAR	PRE-PALATAL	PALATAL	VELAR	GLOTTA	PALATALIZED GLOTTAL
Plosive	p b		t d				k g	ʔ	ʔj
Glottalized Plosive	ɓ		ɗ						
Pre-nasalized plosive	mb		nd				ŋg		
Fricative		f	s					h	
Affricate				tʃ dʒ					
Pre-nasalized Affricate					ndʒ				
Nasal	m		n			ɲ	ŋ		
Roll			r						
Lateral			l						
Approximant						j	w		

Adopted and modified from Dustan (1969, p. 58)

Below are examples of an occurrence of each consonant in a word. For each word, the phonetic transcription, orthographic representation and gloss are provided.

BILABIAL

Phoneme	Example	Orthographic	Gloss
/p/	/paːlɪ/	*paali*	
/b/	/baːlɪ/	*baali*	sheep (pl.)
/ɓ/	/ɓaːdɛ/	*ɓaade*	house
/mb/	/mbaːlu/	*mbaalu*	sheep (sg.)
/m/	/maːrɔːrɪ/	*maaroori*	rice

LABIO-DENTAL

Phoneme	Example	Orthographic	Gloss
/f/	/faːɓrʊ/	*faaɓru*	frog

ALVEOLAR

Phoneme	Example	Orthographic	Gloss
/t/	/tɔɓɓɛrɛ/	*toɓɓere*	a dot
/d/	/daːgɔ/	*daago*	mat
/ɗ/	/dɔʊdɪ/	*dowdi*	shade/shadow
/nd/	/ndɪjam/	*ndiyam*	water
/s/	/sɔnndu/	*sonndu*	bird
/n/	/nɔfru/	*nofru*	ear
/r/	/reːdʊ/	*reedu*	belly
/l/	/leʊrʊ/	*lewru*	moon/month

PRE-PALATAL

Phoneme	Example	Orthographic	Gloss
/tɕ/	/tɕaka/	*caka*	middle
/dʑ/	/dʑaingɔl/	*jayngol*	light
/ndʑ/	/ndʑamndɪ/	*njamndi*	metal/irion

PALATAL

Phoneme	Example	Orthographic	Gloss
/ɲ/	/ɲiːrɪ/	*nyiiri*	food
/j/	/yiːdɛ/	*yiide*	love

VELAR

Phoneme	Example	Orthographic	Gloss
/k/	/kaːfahɪ/	*kaafahi*	sword
/g/	/gaɲɔ/	*ganyo*	enemy
/ŋg/	/ŋgaːrɪ/	*ngaari*	bull
/ŋ/	/mbɪŋ/	*mbiŋ*	sound of drum beat
/w/	/weːndʊ/	*weendu*	pond

GLOTTAL

Phoneme	Example	Orthographic	Gloss
/ʔ/	/ʔɪbbɪ/	*'ibbi*	ficus tree
/h/	/hɔːrɛ/	*hoore*	head

PALATALIZED GLOTTAL

Phoneme	Example	Orthographic	Gloss
/ʔj/	/ʔjamɔl/	*y'amol*	question

Long Consonants

Length is a pronounced feature of Fulfulde consonants and it is phonemic. Except for fricatives, pre-nasalized affricates and nasal /ŋ/, all the rest of Fulfulde consonants can occur as long or short consonants. However, long consonants only occur in an intervocalic position after short vowels. Length is indicated orthographically, by doubling the consonant or by doubling the nasal symbol in pre-nasalized consonants. The examples below show the occurrence of long consonants in an intervocalic position. The phonetic transcription and orthographic representation as well as gloss are provided for each word.

BILABIAL

Phonetic	Transcription	Orthographic	Gloss
/pp/	/kɔppɪ/	*koppi*	knees
/bb/	/pɔbbɪ/	*pobbi*	hyenas
/ɓɓ/	/ɓɪɓɓɛ/	*ɓibɓe*	children
/mmb/	/bammbaːɗɔ/	*bammbaaɗo*	praise singer
/mm/	/ʥɛmma/	*jemma*	night

ALVEOLAR

Phonetic	Transcription	Orthographic	Gloss
/tt/	/wʊttʊdʊ/	*wuttudu*	side
/dd/	/sɛddɛ/	*sedde*	dry season

/ɗɗ/	/lɛɗɗɛ/	*ledɗe*	trees
/nnd/	/hɔnndʊkɔ/	*honnduko*	mouth
/nn/	/wɔnnɛrɛ/	*wonnere*	damage
/rr/	/tɔrra/	*torra*	suffering
/ll/	/pʊllɔ/	*pullo*	a Fulani

PRE-PALATAL

Phonetic	Transcription	Orthographic	Gloss
/tɕtɕ/	/dɔtɕtɕɛ/	*docce*	fire wood
/dʑdʑ/	/gʊdʑdʑɔ/	*gujjo*	thief

PALATAL

Phonetic	Transcription	Orthographic	Gloss
/ɲɲ/	/waɲɲɔ/	*wannyo*	joke
/ʔjʔj/	/maʔjʔjɛrɛ/	*ma'y'yere*	lightning

VELAR

Phonetic	Transcription	Orthographic	Gloss
/kk/	/hɔkkɛrɛ/	*hokkere*	lack of rain
/gg/	/lɛggal/	*leggal*	wood
/ŋŋg/	/ndɔŋŋgu/	*ndonngu*	inheritance

Glottal

Phonetic	Transcription	Orthographic	Gloss
/ʔʔ/	/feʔʔa/	*fe''a*	to cut

2.2.5. Fulfulde Vowels

Linguists (Arnott, 1956, 1966, 1974; Breedveld, 1995; Girei, 2009; Klinghenheben, 1963; McIntosh, 1984; Westermann, 1909) unanimously presented ten Fulfulde vowel phonemes, five of which are long, making pairs of short and long vowels. These are: *a, e, i, o, u,* short and *aa, ee, ii, oo, uu,* long. Vowel length in Fulfulde is phonemic (Girei, 2009), in that, a long vowel contrast with its short pair. Just as in consonants, the length in vowels is shown in the orthography by doubling the vowel symbol. Apart from the basic vowels, Fulfulde has a set of eight diphthongs: *aw, ew, iw, ow, ay, ey, oy and uy* (McIntosh, 1984). Apart from some variations in diphthongs, the vowel system of Fulfulde is comparatively uniform among most dialects of the language (Girei, 2009). Figure 2.1 shows Fulfulde vowels in the vowel quadlateral space.

Vowel Chart
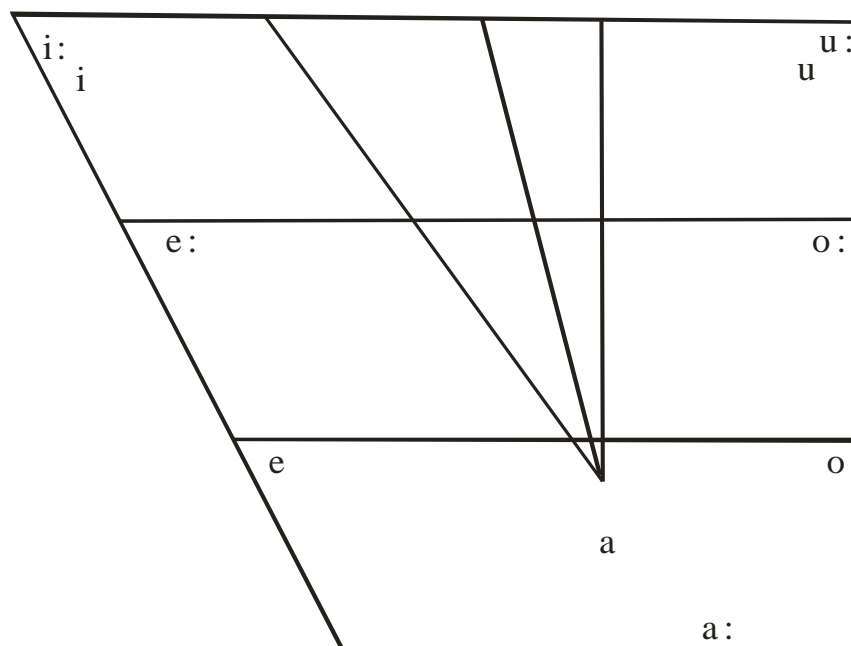
Figure 2.1: Fulfulde Vowels. Adopted from Dustan (1969, p. 63)

The examples below show the occurrence of Fulfulde vowels in words. Phonetic and orthographic representations and gloss are provided.

Vowel	Example	Orthographic	Gloss
/ɪ/	/ɗiɗi/	*ɗiɗi*	two
/iː/	/kiːta/	*kiita*	verdict
/ɛ/	/dɛbbɔ/	*debbo*	woman
/eː/	/weːndʋ/	*weendu*	pond
/a/	/paɗɛ/	*paɗe*	shoes
/aː/	/paːɓɪ/	*paaɓi*	frogs
/ɔ/	/kɔɗɔ/	*kodo*	guest
/ɔː/	/kɔːtɪ/	*kooti*	parasite
/ʋ/	/sʋnɔ/	*suno*	sadness
/uː/	/suːnɔ/	*suuno*	greed

Apart from the significance of vowel length, other phonetic information with regard to Fulfulde vowels would be needful. Short vowels /ɪ/ and /ʋ/ are of the same quality, but more lax than the long /iː/ and /ʋː/ while /a/ is higher than /aː/. Short vowels /ɛ/ and /ɔ/ are more open than their long equivalents. In this regard, Adam and Westermann provided the sequence: [eː] = [e], [e] = [ɛ], [oː] = [o] and [o] = [ɔ]. In the case of [a], it is higher than [aː]. The minimal pairs below exemplify the phonemicity of vowel length in Fulfulde.

Vowel	Example	Transcription	Gloss
/ɪ/	*hisa*	/hɪsa/	be free from harm
/iː/	*hiisa*	/hiːsa/	remember
/ɛ/	*fewa*	/fɛwa/	to lie
/eː/	*feewa*	/feːwa/	be cold
/a/	*haɓa*	/haɓa/	to fight
/aː/	*haaɓa*	/haːɓa/	be anxious

/ɔ/	soda	/sɔda/	cut down corn for harvest
/ɔː/	sooda	/sɔːda/	buy
/ʊ/	sura	/sura/	to prevent
/uː/	suura	/suːra/	to cover or protect

Diphthongs

Eight diphthongs are realized in most varieties of Fulfulde. They consist of a vowel followed by a glide. All diphthongs occur in both medial and final positions. In the Kaceccere dialect, and perhaps other sub-varieties, [ʊɪ] is restricted to only the medial position (McIntosh, 1984). Table 2.2 shows the diphthongs occurring in medial positions.

Table 2.3: Fulfulde diphthongs

Vowel	Orthographic	Example	Gloss
aɪ	ay	ɗayngol	Light
aʊ	aw	Sawru	Stick
eɪ	ey	Sey	Until
eʊ	ew	Lewru	moon/month
ɪʊ	iw	Siwtaaɓe	twins
ɔɪ	oy	Coyɗo	poor person
ɔʊ	ow	dowdi	shade/shadow
ʊɪ	uy	Muyɗo	patient person

However, long pairs of the diphthongs are possible in many sub-varieties in the central dialect area. This results into each long vowel being followed by a glide. In fact, in some cases, the short pair of a diphthong contrasts with its long pair. The Gombe variety is a typical example where all the eight diphthongs have long pairs. Thus the following sequences are possible in such varieties:

Vowel	Transcription	Orthographic	Gloss
/e:ʊ/	/fe:ʊndʊ/	*feewndu*	cold wind (as in the text)
/a:ʊ/	/'a:ʊre/	*aware*	planting seed
/e:ɪ/	/ge:ɪŋgal/	*geeyngal*	advert
/a:ɪ/	/ma:ɪde/	*maayde*	death
/ɪ:ʊ/	/ʔjɪ:ʊɗɔ/	y'iiwɗo	a girl at puberty
/ɔ:ɪ/	/lɔ:ɪrɛ/	*looyre*	sound made when vomiting
/ɔ:ʊ/	/pɔ:ʊɗam/	*poowdam*	hot water
/ʊ:ɪ/	/mʊ:ɪgal/	*muuygal*	courtship

In varieties where the long diphthongs are not possible, the length is shortened or a glottal stop occurs between the long vowel and the glide. For instance *geeyngal* will be realized as *geyngal* /geɪŋgal/, *feewndu* as *fewndu* /feʊndʊ/.

2.2.6. Syllable Structure

Researchers (Arnott, 1970; Breedveld, 1995; McIntosh, 1984 and Paradis, 1992) discussed the syllable structures obtainable in Fulfulde. According to Breedveld (1995), the syllable structures that are possible in Fulfulde nominal stems and verbal roots are: CV, CVC, CVVC, CVCC and CVV. Girei (2009) on the other hand asserts that the five

syllable structures are generally possible across the 'Fulaphone', a term used to refer to the whole area where Fulfulde is spoken and the generality of the Fulfulde dialects.

Stennes (1967) proposed the following description of the syllable structure in Adamawa dialect which is also valid for all Fulfulde dialects (Breedveld, 1995): The phonological shape of all syllables is CV(C) or consonants, vowel (where the vowel can be either short or long) with an optional final consonant. The most common syllable structures in Fulfulde (CV, CVV, CVC, CVVC, and CVCC) are exemplified below.

Syllable	Example		Phonetic	Gloss
CV	mi	m- i	['mɪ]	I
		C-V		
CVV	ndaa	nd- a- a	[ndaː]	take
		C- V- V		
CVC	war	w- a- r	[war]	come
		C- V- C		
CVVC	nyaam-na	ny- a- a- m- n- a	[ɲaːmna]	to feed
		C- V- V-C- C- V		
CVCC	winnd-e	w-i-n-nd-e	[wɪnndɛ]	empty house/residence

31

<center>C-V-C-C-V</center>

However, McIntosh (1984) claimed the unacceptability of both the CVVC and CVCC syllables in the Kaceccere dialect suggesting that the only words these structures are found in are: '*aan* 'you' for CVVC and *koyŋ* 'diminutive plural class suffix' for CVCC.

2.2.7. Stress

Although the lexical stress in Fulfulde is well established, the identification of stress placement has been rather a controversial issue among scholars (see Arnott, 1965; Breedveld, 1995 and McIntosh, 1984). The literature (e.g Arnott, 1969; Breedveld, 1995; McIntosh, 1984; Noye, 1974) provides various assumptions on the positions of stress placement in Fulfulde, in which case (McIntosh, 1984, p. 20) observes that; "the identification of stress in a word level is not a simple one". However, stress in Fulfulde does not change the grammatical category of a word, as for example, a verb to noun or vis-à-vis as obtained in English and some other stress languages. Stress in Fulfulde only extends the meaning of a word to another meaning as well as shifting the emphasis of the word in the same grammatical category.

Generally, stress placement rules vary for nouns and verbs. McIntosh (1984) provided some stress placement rules in nouns, and Breedveld (1995) upon confirming the rule provided by McIntosh proposed a rule that can account for stress placement in verbs. The following stress placement rules apply to nominals, and the last (fifth) rule apply to verbs only. The rules are; (1) stress occurs on the penultimate (the last non-final heavy) syllable with CVC or CVV structure, as in the following examples:

Example   Phonetic   Gloss

<center>32</center>

ɓa'leejo	[ɓaˈlɛːʥɔ]	dark skinned person
daneejo	[danɛˈʥɪːʥɔ]	light skinned person
banndiraawo	[banndɪˈraːwɔ]	ralative
soobaajo	[sɔːˈbaːʥɔ]	friend

(2) Where the penultimate syllable is weak, that is, it is not CVC or CVV, stress is pushed back to the preceding heavy syllable as in the examples below:

Example	Phonetic	Gloss
joodorgal	[ˈʥɔːɗɔrgal]	chair
njawdiri	[ˈnʥaʊdɪrɪ]	ram
daneeji'en	[daˈnɛːʥɪʔɛn]	the Fulɓe of the Daneeji clan
jaafun'en	[ˈʥaːfʊnʔɛn]	the Fulɓe of the Jaafun clan

(3) In the absence of a heavy syllable, stress falls on the first syllable irrespective of its structure, as in the examples below:

Example	Phonetic	Gloss
Kosngal	[ˈkɔsŋgal]	foot
Deftere	[ˈdɛftɛrɛ]	book
Binndirgol	[ˈbɪnndɪrgɔl]	pen
Ndiyam	[ˈndɪjam]	water
Y'iiy'am	[ˈʔjɪːʔjam]	blood

(4) The last syllable in nouns is extra-metrical and does not receive stress except in some loan words, as in the examples below:

Example	Phonetic	Source	Gloss
Ishirin	[ɪʃɪ'rɪn]	Arabic	twenty
Talaatin	[talaː'tɪn]	Arabic	thirty
Masardi	[masar'dɪ]	Hausa	maize

The primary concern therefore, is the simple stress assignment in the language which occur within poly-syllabic words. In this case, the stress may fall within the penultimate syllable, anti-penultimate or the first syllable, depending on the structure of the syllables in the words.

(5) Unlike in nouns, the last syllable in verbs is not extrametrical, thus it can receive stress.

Example	Phonetic	Gloss
Calminanaa	[tɕalmɪna'naː]	you should greet for
Nyamniraa	[njamnɪ'raː]	to feed with

(see Breedveld, 1995)

2.2.8. Intonation

Fulfulde is an intonational language and tone is not phonemic (McIntosh, 1984). On this aspect of Fulfulde, Arnott (1970) states that "Fulfulde is an intonational rather than a tonal language, in the sense that the main outline of the pitch contours of the sentence are

34

determined by the type of sentence rather than by the tonal characteristics of individual words or complexes" (p. 62). There are variations as to the way in which individual words fit into the sentence intonation patterns with individual words or types of words; the intonation pattern may be to some extent, affected by the presence or absence of some specific particles within the sentence. Though I will not discuss the various intonation patterns and the rules guiding the intonation of different sentences in the language in detail, it is worth noting that intonation patterns vary from one dialect to another (Arnott, 1969).

2.3.   Nigerian English

Over the centuries, Nigeria has experienced a long period of contact with several missionaries, colonialist and traders leading to what Igboanusi (2002, p. 2) describes as the "indigenization or nativization of English in the country". Before this time, Nigerians had their indigenous languages, but for interaction and communication purposes, they had to try to understand the strangers among them, it thus become a necessity to learn the foreign language. This inevitably led to the creative advancement of the English language and the evolution of some distinctive Nigerian forms and usages, attitudes and practical use of the English language…" Bamgbose (1995, p. 11).

By definition, NigE is the type of English spoken and written in Nigeria, which has become acceptable, or is in the process of becoming acceptable and intelligible among Nigerians (Jowitt, 1991). A variety of a language can be thought of as one of the many general and complete language systems, each having a substantial number of speakers and each possessing the characteristics that distinguish it from other systems without requiring it to be classified as a different language (Jowitt, 1991). It is in this sense that

NigE can be regarded as a distinct variety of English just as British (BrE), American (AmE) and other new varieties of English such as Malaysian English (henceforth MalE), Singapore English (SgE). The transformation of NigE into several forms and sub-varieties is occasioned by numerous factors similar to those identified in other new varieties of English such as MalE. Pillai, Don, Knowles and Tang (2010) stated that MalE is such a complex variety of English used by Malaysians of various ethnicity and different geographical and educational backgrounds, with different proficiency levels, being that, for some few Malaysians, English is a first language, whereas for a great majority, English may be used as a dominant home language or not being used at all at home. According to them, the extent of regular English usage among Malaysians depends on factors such as geographical location and profession. Researchers (Bamgbose, 1982, 1995; Eka, 1985 and Jowitt, 1991) have identified all of these factors mentioned in Pillai et al. as some of the factors to be considered in determining NigE as a distinct variety.

The diversity of NigE ranges from Pidgin to a close approximant of British English (henceforth BrE), with significant variations found in vocabulary, phonology, and syntax (Gut, 2001). This could be as a result of contact between English and Nigerian indigenous languages which Bamgbose (1971) estimated to be about 400 different languages. As such, NigE vocabulary contains a large number of words which are not found in the standard BrE or are used in ways peculiar to the Nigeria situation (Igboanusi, 2002). Moreover, Jowitt (1991) suggested that varieties themselves can be classified using various parameters, for example, National (AmE, BrE), Regional (Scottish, Queen's English) and so on. For this reason, it would important to review some existing discussions on the classification of NigE.

2.3.1. Classification of Nigerian English

Scholars (e.g Bamgbose, 1991, 1992; Eka, 1985; Jibril, 1986 and Udofot, 1997) attempted the classification of NigE based on various grounds among which are; native language of the speakers, formal education as well as the educational level of the speakers. In his classification, Bamgbose (1995) provided a spectrum of NigE in which he suggested five strands of the variety, thus:

Bamgbose (1995, p. 12)
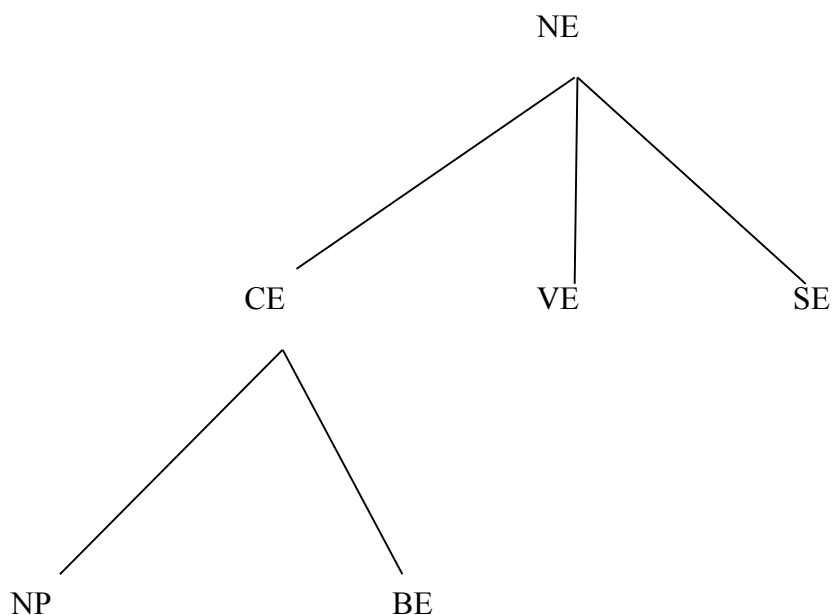
Figure 2.2: Classification of Nigerian English

NE= Nigerian English	SE= School English
CE= Contact English	NP= Nigerian Pidgin
VE= Victorian English	BE= Broken English

Udofot (1997) conducted a comparison between NigE speakers and a native BrE speaker and suggested three varieties of NigE. Udofot referred to the first variety (variety I) as non-standard NigE. This variety possessed a significant variation in prosody from

varieties II and III as well as BrE. Variety III on the other hand is a 'sophisticated' variety and has some systematic differences from British English and is spoken by people with at least a University education, or people who have special speech training. The difference between this variety and BrE is mainly in accentuation and intonation. The second Variety (variety II) which is referred to as Standard NigE stands in between varieties I and III. It is characterized by significant variations from both variety III and I mainly in intonation and accentuation, and is spoken by people with tertiary education. With regard to these classifications, what is found in the description of Bamgbose's SE is very close to what Udofot (1997) tagged as variety II or rather, the Standard NigE.

However, the question of what variety of NigE would exactly be regarded as the Standard NigE is still a moot point. According to Jowitt (1991, p. 32), the word 'standard' is an ambiguous expression, and that a standard variety of a language might mean "…that spoken by the majority of educated people" or one which "comes to a prescribed standard of excellence". In this study, we followed Bamgbose (1995); Gut (2001) and Udofot (1997) and viewed Standard NigE from the perspectives of acceptability, intelligibility and speakers' level of education. It can therefore be described as that variety of NigE spoken by educated people, which is internally and internationally acceptable and intelligible.

2.3.2. Prosody of Nigerian English

In recent times, arguments have been advanced, suggesting a standard variety of NigE which systematically differs from BrE as well as other emerging varieties of the language. Differences between NigE and the rest of the English varieties, BrE for example, have been suggested in all linguistic aspects including syntax, vocabulary, and phonology (Gut,

2001). Meanwhile, down to about 1980s, and for understandable reasons, not a great deal of attention was given to suprasegmentals in NigE (Jowitt, 2007). Since the mid- 1980s however, the suprasegmentals have begun to receive more scholarly attention. For instance, Amayo (1986) conducted a pioneer work which was exclusively concerned with the suprasegmentals, discussing the two basic pitch patterns; the fall and rise intonations of NigE. More substantial work on this aspect has been done by the Uyo School of NigE studies. The most prominent achievements include Eka (1985) and Udofot (1997) who came up with a pioneer study of the rhythm of NigE.

In a more recent investigation, Gut (2001) opines that NigE is spoken with a more syllable-timed rhythm than BrE. This was based on the impression that vowel reduction is less pronounced in the former making each syllable to be perceptually more equal in weight and length. Following metrics proposed by Ramus, Nespor and Mehler (1999) %V and ΔC, Gut (2001) found some variations between the rhythm of NigE and BrE in two different ways; the percentage of vocalic intervals is relatively higher for NigE than for BrE. This makes the rhythm of NigE more similar to Spanish, Catalan and Italian which were classified by Ramus et al. as syllable- timed. Second, the syllabification in NigE differs from BrE in two ways; there is a greater percentage of CV syllables in NigE than BrE, and there exist some differences in the ratio of closed and open syllables between the two varieties. The rhythm of NigE is therefore considered to be more syllable-timed than that of BrE. Similarly, the rhythm of NigE is said to be similar to the more syllable-timed varieties of English such as Singapore English (Grabe & Low, 2002).

In the area of intonation, Eka (1985) carried out an experiment involving undergraduates of the Universities of Calabar and Zaria as informants. Eka demonstrated the steady and so predictable tendency of NigE speakers falling nuclei or nuclear tones, with statements and rising nuclei with yes-no questions. The result of this study was further confirmed by

Jowitt (2000). Using undergraduate students as informants and the system proposed by O'Connor and Arnold (1973) in transcription, Jowitt analysed the intonation pattern in the read speech of 30 University undergraduate students. The basis of analysis in this study was the 'tone' that is, the pitch on the stressed syllable. Jowitt suggested that Nigerian undergraduates which he classifies as Variety II, rely heavily on a 'core' pattern which has a head beginning on high pitch, followed by a declination to the onset of the nucleus. Another finding of this investigation reported in Jowitt (2007) was that, for this 'core' pattern, many Nigerian female speakers use a very wide key, which effectively means starting the head on a very high pitch.

Wells (1982) suggested that the prosody of the speaker's native language is usually reflected in NigE intonation considering the fact that stressed syllables are usually produced with low tone. Similarly, results obtained in Gut (2001) show a vast difference in intonation between NigE and BrE. Such differences in pitch and tones could be the genesis of some existing proposals that NigE be treated as a tone language", which would make it impossible to capture the tonal structure through the conventional transcription systems designed for intonational languages. Gut was also of the opinion that NigE prosody is close to those languages that have tones associated with a grammatical rather than lexically contrastive function than to the use of tone in intonation languages.

Results from researches (e.g Atoye, 1991; Bobda, 1994, 1995, 1997, 2008, 2010 and Kuroje, 1985) show that stress placement in NigE is quite different from that of BrE. For instance, Bobda (2010) suggested that there are vast differences in strategies applied by NigE and Cameroon English (hence forth CamE) speakers in stress placement from that of British English speakers. Though speakers of these varieties are conversant with some of the traditions in stress placement, some new strategies which he calls *su-generis* are applied by speakers of NigE and CamE English in stress placement. However, findings

by Gut (2001), seems to contradict the early claims of such differences in stress placement between NigE and BrE. Though admitting to the simplicity of her data, Gut's finding compliments that of Udofot (1997) who also reported a higher rate of accentuation in NigE.

2.4. Speech Sounds

The fact that this study involves acoustic measurements of vowels, it would be important to review some basic characteristics of speech sounds and their acoustic patterns. The following sections explain the basic concepts and phonetic properties of speech sounds as well as some difficulties usually faced while measuring rhythm.

2.4.1. Acoustic Properties of Speech Sounds and Waveforms

Speech sounds are produced as a result of variations in air pressure that produce vibration (Roach, 2001) which is usually described in terms of wave motion. The pattern of a particular vibration can be shown by displaying its waveform. An acoustic wave is a longitudinal wave, in that the particles move in the same direction as the propagation of the wave. Therefore, a speech sound may have a high or lower frequency depending on the speed of its vibration. It is a high frequency when the vibration happens rapidly and a lower frequency when the vibration happens less rapidly. Another acoustic property of sounds is periodicity. The vibration of a periodic sound is regular, thus occurring in repeating pattern over and over, while that of aperiodic sound does not have such repeating pattern of vibration (Roach, 2001).

The energy employed in producing a speech sound is known as amplitude. Therefore, a sound produced with a large amount of energy is said to have high amplitude and the one produced with less amount of energy has low amplitude. For instance, the waveform for the word 'see' would have two parts where the first part for the fricative /s/, which is an

aperiodic sound**,** shows an irregular pattern, while the last part which is for the vowel /i:/ is periodic and has a more regular pattern in its vibration compared to the part for /s/.

2.4.2. Spectral Analysis

Spectral analysis is an act of breaking down a complex waveform into simple waveforms of different frequencies. Meanwhile, in analysing speech sounds, it is important (especially for a non-expert) to note that "phonetic sounds or phonemes should not be confused with letters of the alphabets used in spelling words (Ladeforged & Disner, 2012). In acoustic analysis, much can be discovered about sounds by looking at the result of a spectral analysis than by looking at the original waveforms captured by the microphone. In a spectrogram, the vertical axis shows the frequency scale, with the lowest frequency shown at the bottom. The vertical lines, that is, from left to right show the time axis with the beginning of the sound analysed being displayed at the left. Looking at the spectrogram, the degree of darkness of the markings shows the amplitude at different frequencies at a particular time (Roach, 2001).

For instance, looking at a spectrum for the word /si:/, the energy on the frequency range will almost be invisible at the lowest frequencies but greater towards the higher frequencies. Conversely, the energy in /i:/ would be concentrated in four narrow bands in the lower part of the spectrum. These narrow bands are known as formants. In essence, to measure the duration of the vowel /i:/ on a spectrogram, the beginning of the darker area from the left, on the time axis is considered the onset of the vowel, the end of the darker area on the right is the offset of the vowel.

2.4.3. Acoustic Description of Speech Sounds

The patterns which are referred to as physical properties of sounds can be accounted for under an acoustic description. Acoustically, Roach (2001, p. 42) mentioned four possible types of acoustic pattern through which all speech sounds are classified.

    i.   Periodic sound

    ii.   Aperiodic sound

    iii.   A mixture of periodic and aperiodic sound

    iv.   Silence

All categories of speech sounds can be described through these phonetic features. Since the methods of this study involve the measurement of vocalic intervals, vowels and vowel-like sounds such as approximants are discussed in relation to their acoustic properties, so these sounds can be identified by their acoustic features especially on the waveforms and spectrograms.

1. Vowels

Vowels are periodic sounds with a regular pattern of vibration and their spectrum have peaks of energy at different frequencies. This is formed by their high amplitude which makes concentrated narrow bands (formants) that are darker than that for most sounds except vowel like-sounds such as approximants. These peaks of energy (formants) are seen on the spectrogram as dark horizontal bars showing the regular pattern of vibration in their production (Roach, 2001). Thus measuring a vowel sound on the spectrogram involves the indentifcation of the formants.

Nevertheless, formants are different for every vowel. Although the relationship between vowel quality and the formants is not exact (Roach, 2001), acoustic phoneticians (e.g Ladeforged & Disner, 2012; Kent & Read, 2012) suggest that the quality of different

43

vowels can be analysed in relation to their formants. According to Ladeforged and Disner (2012), vowels differ based on three acoustic parameters: pitch, loudness and quality. The pitch of a sound depends on the rate of repetition of sound, while its loudness depends on the size of the variations in air pressure. But then, vowels can be produced at any pitch and intensity (loudness) within the range of speaker's voice (Ladeforged & Disner, 2012). Therefore, there is need to consider another acoustic property in distinguishing vowels than these two.

Differences in vowel quality are acoustically more complex, and are referred to as the differences in the shape of the sound waves as opposed to its repetition rate and size. Roach (2001) suggested that the formant with the lowest frequency (F1) corresponds with open/close vowels /i/ or /u/. The higher formant (F2) corresponds roughly to the front/back vowels where a high F2 is likely to be front vowels /e/ or /a/ while a low F2 may correspond to a back vowel /o/ or /a/. What is more important here is that the pitch and the loudness of the speaker's voice may have changed in producing a particular vowel but the quality of the vowel remains the same.

i. **Approximants**

Approximants are the opposite of stop consonants, in that, they do not involve any kind of closure of the vocal tract. Rather, they involve a kind of narrowing at some point (Ladeforged & Disner, 2012). English sounds [w j l r] are generally classified as approximants. An approximant is a relatively stable articulation in which the constriction is normally greater than in a vowel, but not greater enough to create turbulence at the point of constriction. All approximants are voiced and therefore cannot have turbulent excitation at the point of constriction. Approximants include glides /w/ and /j/ and liquids /l/ and /r/. The glide [w] is produced with a narrowing both at the lips and between the

44

lingual dorsum making the vocal tract configuration very similar to high-back vowel /u/. For the glide [j], the tongue assumes a high front position coming close to the pre-palatal position, thus making a vocal tract narrowing similar to that of the high-front vowel /ɪ/.

Liquids on the other hand are similar to both glides and stops. The English liquids are [r] and [l]. Their similarity to stops is dynamic in some phonetic contexts since the articulatory movements for [r] and [l] are quite rapid. The similarity to glides is in the sonority (resonant) quality, because both glides and liquids possess a well-defined formant structure associated with a degree of vocal tract constriction that is less severe than that for the obstruents, but more severe than for vowels (Kent & Read, 2002). In a set of comparison of minimal pairs, O'Connor (1957) and Lisker (1957) found that F1 frequency distinguishes the glides [w] and [j] from liquids [l] and [r] in the sense that glides have low F1, while liquids have higher F1.

In summary, approximants are produced with articulatory features similar to that for vowels. They are direct opposite of stops consonants, in that they do not involve any kind of closure of the vocal tract. Distinguishing approximants from vowels on the spectrogram is rather a difficult task because of their similarity in terms of articulation and formant characteristics (Tan & Low, 2013). Just like vowels, approximants are periodic sounds and have recognizable formants (Roach, 2001).

2.4.4. Some Difficulties in Spectral Analysis of Vowels

Though Roach (2001) considered it a fundamental principle in acoustic analysis that any kind of waveform, however complex it may be, can be broken down into simple waveforms of different frequencies, it is equally important to note that there are problems associated with measuring sounds on the spectrogram. While the demarcation between

some sounds are clear due to their different acoustic components, other sequences of sounds have much similar acoustic properties that make the spectral analysis rather difficult. For instance, periodic sounds such as vowels, approximants and to some extent nasals, have similar energy in their articulation. For example, when vowel /ɪ/ comes after an approximant /w/ and followed by a nasal /n/ as in the word /wɪnd/, measuring the duration of the vowel will certainly be problematic. The reason is that both the initial /w/ and the final /n/ are equally periodic sounds as /ɪ/. In this kind of sequences, it seems difficult to identify the onset and offset of the vowel formants on the spectrogram.

Possibly, it could be based on this acoustic fact, Tan and Low (2013) suggested that in measuring vowel durations, words with initial approximants or dark /l/ should be avoided where possible, arguing that the measurement of the vowel duration would be problematic. Deterding (2006) pointed out that the traditional acoustic fable, the NWS contains a number of problems for rhythm measurement, mainly because of the instances of consecutive strong syllables and the presence of an initial /w/ or /r/ in a syllable. This, according to Tan & Low (2013) resulted in problematic words such as *wind, were, which, was, when, warm, one, stronger, traveller, wrapped* and *around* in NWS and words in the *Wolf* passage like *was, once, watch, one, wolf, with, were, away, forest, raising, ran, rushed, tried, trick, threaten, racing, cried, trying* and words like *used* and *usual* which had initial /j/. In the Fulfulde version used in this research too, there are instances of initial approximants and prenasalized consonants in which measurement of vocalic intervals within the sequences is a bit problematic. Therefore this entails that measuring vowel duration requires avoiding the instances of such complicated sounds where possible, or taking a uniform and consistent decision on how to deal with such sounds across the speech sample. Such decisions as taken in this study are explained in chapter 3.

2.5.   Rhythm

Several researchers hold various opinions with regard to rhythm in language, and as such there are various definitions of this phenomenon from different perspectives and views. Similarly, various attempts have made to prove the rhythmic variation among languages. The following sections present a review on the definition of rhythm and some of the available rhythm metrics.

2.5.1   Defining Rhythm

The flow of most natural phenomena is characterized by rhythm. For instance, our heartbeats exhibit sequences of rhythmic pattern. Likewise, the waves of a sea and alternations between day and night are in a rhythmic pattern. When birds sing, we hear it in one kind of rhythm. Similarly, human languages are part of these phenomena characterized by a particular rhythmic pattern. The word *rhythm* originated from Greek, which literally means 'to flow'. Therefore, rhythm determines the flow of various natural phenomena. In his book, *The Laws* (book II: 93), Plato offered a general definition of rhythm by precisely stating that "rhythm is order in movement". Loyd James (1940) was the first to suggest the idea that languages have different forms of rhythm. James observed that, Spanish, when spoken flows in a rhythmic pattern similar to a machine gun, while English on the other hand have a kind of flow similar to the flow of messages in the Morse code.

In his explanation of rhythm, Roach (2001) said language has many things in common with music and one thing that is always found in music is rhythm. Considering the fact that phonetic theories of rhythmic phenomena has persisted for several decades, the most popular being the isochrony model which suggest a regular recurrence in time of some

given unit of speech (Laver, 1994), rhythm can therefore be seen as a pervasive attribute of all human languages. However, the existence of rhythm in all languages is no more debatable, the elements of speech responsible for it and the process and ways through which rhythm occurs is still a moot point. According to Laver (1994) the interaction of syllabic timing with stress and syllable weight gives speech a perceived rhythm, and different types of interactions lead to different perceptions of speech.

Nevertheless, the persistent view of rhythm in speech holds that all languages tend to be spoken in an isochronous way, with certain units of speech recurring on a regular basis. This idea was proposed by Pike (1945) suggesting that languages can be grouped rhythmically into two: syllable- and – stress-timed. Abercrombie (1967) strongly adopted this view and is often seen as one of the leading proponents of this model. According to Abercrombie, a language can either be syllable-or stress-timed. As far as Abercrombie (1967) is concerned, each of the languages of the world is in one way or the other, spoken with one form of rhythm or the other, thus a language must be spoken with either a syllable-timed or a stress-timed rhythm. In syllable-timed languages, the syllables are assumed to be equal and occur in an isochronous order, while in stress-timed languages, it is the stress beats that are isochronous rather than the syllables. Bloch (1950) suggested a third rhythmic class of languages known as mora-timed. For these languages, the perception of rhythm is constrained by considerations of syllable weight rather than stress (Laver, 1994). Japanese is a more cited example of mora-timed languages. Rhythm is one of the many prosodic features of a language. In phonetics and phonology, prosody is often called suprasegmental features.

Based on different views, several linguists provided various definitions of rhythm in speech. Laver (1994) described rhythm as one of the metrical factors of speech. Nord (1991) suggested that the perception of rhythm appears to be a nearly ubiquitous element

of our experience of sequences of events in the time domain. Roach (2001) related speech rhythm to that of music and was of the opinion that in speech rhythm, syllables take the place of musical notes or beats, and in many languages the stress beats determine the rhythm. Base on the model of isochrony, Grabe and Low (2002) viewed rhythm in speech as a case in which some type of speech units recur in an isochronous order. Similarly, White and Mattys (2007) opined that the source of rhythm is the repetition of perceptually similar elements; particularly syllables and stress beats. Loukina, Kochanski, Shih, Keane and Watson (2009) defined rhythm of speech as a subjective impression which is presumably derived from acoustic properties. In another view, Gibbon and Gut (2001, p. 1) defined rhythm as "recurrence of perceivable temporal patterning of…focal values and…non-focal values of some parameter as constituents of a tendentially constant temporal domain…". Considering the definitions of rhythm provided so far, it is evident that each of them is in one way or the other connected to the isochronous model suggested by Pike (1945) and Abercrombie (1967).

However, Bertinetto (1989) and Dasher and Bolinger (1982) advanced a view of rhythm which is radically opposed to that provided by Abercrombie (1976) and Pike (1945), and other researchers who hold similar views of isochrony. They are of the opinion that the idea and perception of various rhythmic patterns results from coexistence of particular phonological constraints in a given system. According to this model, the rhythmic variation between languages could not be viewed as a result of phonology but, as a result of the phonological properties of the languages (Ramus et al. 1999). In 1983, Dauer, a proponent of this model of rhythmic classification suggested that the traditional rhythm classes of languages (stress and syllable-timed) exhibit some different distinctive phonetic features. These among other features include:

i. Syllables: languages such as English, Dutch and Arabic are stress-timed. They are found to possess comparatively more complex syllables and as such, they have heavier syllables compared to syllable-timed languages.

ii. Vowels: stress-timed languages do have reduced vowels. This feature is prevalent in stress-timed languages because vocalic sounds are usually reduced in an unstressed syllable. This makes unstressed vowels to be shorter or completely deleted.

The assumption here is that, in stress-timed languages, some syllables are more salient than others, combined with vowels reduction base on the prominence of the syllable, whereas in syllable-timed languages, all syllables are indiscriminately salient with less or no instances of vowel reduction. Similarly, Laver (1994) who also subscribed to this view stated that the perceived rhythm is a property of speech emerging as a result of coincidence of the sonority of the segments, lexical stress and weight of the syllable obtainable in the grammar of the language, coupled with the use of the lexicon in that particular language.

Away from both of the views highlighted above, there exists a substantial difference in the perspective from which rhythm is viewed within the theories of Generative Grammar. Generative grammarians (e.g Liberman & Prince, 1977) suggest that stress is the element that is responsible for the perceived order in the flow of speech (rhythm), claiming a universal alternation of stressed and unstressed positions at various levels of speech hierarchy.

Given the brief definitions of rhythm in speech, it provides excellent reason for believing in rhythmic classes of languages (Ramus et al. 1999), and phoneticians would therefore assume that languages should vary in some relevant phonetic and phonological parameters. Both the impressionistic accounts (e.g Abercrombie, 1967 and Pike, 1945)

and the more phonologically-based accounts of rhythm (e.g Dauer, 1983, 1987) have been unable to provide a clear explanation of the perceptual processes of extracting speech rhythm from the acoustic signal (Ramus et al. 1999). Linguists (e.g Dauer, 1983; Miller, 1984) generally assume that all languages fall along a continuum and as such, they can be classified as either more or less stressed- or syllable- timed. However, several phoneticians have introduced instrumental methods to find a phonetic evidence for the rhythmic variations among languages, and to provide empirical data to support this claim.

Acoustic measurements are aimed at providing useful details about the phonology of a language right from the speech signal. Though the available rhythm metrics are far from being satisfactory in rhythmic classification (Dauer, 1987), some phoneticians opted to develop more effective empirical and instrumental methods that could reliably explain the rhythm of languages (Ramus et al. 1999). In view of this, a review of some existing rhythm metrics is relevant to this study.

2.5.2. Rhythm Indexes

In several attempts to find a linguistic basis for the rhythm of speech, phoneticians provided various acoustic metrics to measure rhythmic pattern of languages right from the speech signal. Some of the recent rhythm indexes include Dellwo (2006); Dellwo and Wagner (2003); Gibbon and Gut (2001); Grabe and Low (2002); Low, Grabe and Nolan (2000) as well as Ramus, Nespo and Mehler (1999). The advent of these metrics provided substantial support on the reality of the existence of rhythmic classes of languages. Rhythm indexes (e.g Dellwo, 2006; Dellwo & Wagner, 2003; Grabe & Low, 2002; Low et al. 2000; Ramus et al. 1999) depend on phonetic features such as vowels, lengthening and syllable complexity in measuring rhythmic variations across languages or between

varieties of the same language. These indexes measure rhythm by segmenting the speech into utterances and measuring the variability of the successive vocalic or consonantal intervals. The idea behind the successive variability is that vowel reduction is assumed to be greater in stress-timed languages, therefore vowel duration would significantly vary between strong and weak syllables. On the other hand, syllable-timed languages would have more complex consonant clusters, which influences the consonantal interval durations (Tan & Low, 2013).

Looking at the various metrics, Pairwise Variability Index (PVI), (Low et at. 2000) is a rhythm index which takes into consideration, the duration of adjacent segments in an utterance. In recent times, PVI has been used by researchers to measure various elements in the speech signal including vowels, consonants, syllables and foot. For a sequence of units of syllables of length *m*, for instance, the average of the absolute differences between adjacent units is calculated. PVI could be *raw* (*r*PVI) or *normalized* (*n*PVI), the former being calculated without normalization. As for nPVI, the mean differences obtained in successive durations are divided by the sum of interval durations of the syllables, the last step referred to as normalization. This reduces the differences in tempo across the utterance and between utterances (Gibbon & Gut, 2001), and is therefore used to cater for variations in speech rate. In summary, PVI (Low et al. 2000) calculates the variations in successive pairings of adjacent vowel durations in an utterance taking the absolute values and leaving the negative sign where it occurs (Tan & Low, 2013).

PVI values are closed ended, ranging between the limits of 0 and 200. In the lower limit, PVI value is zero if the difference between adjacent syllables is zero, then normalized difference is zero and the average multiplied by 100 is zero. This shows a case of perfect syllable-timing. The second case is the upper limit. Here, if the syllables in each pair have very different length of one approaching zero to all intent and purposes, and the other

being much longer, then the difference will be approximately the same as the duration of the longer syllable, and the average duration will be approximately half this, so the normalized difference will be approximately 2 and the average multiplied by 100 is 200; an instance of perfect stress-timing (Gibbon & Gut, 2001). Thus, the higher the PVI value obtained the more stress-timed a language is, and the lower the PVI value obtained the more syllable-timed a language is considered. According to Gibbon and Gut (2001), the underlying assumptions behind the PVI index are: (1) the rhythmic durational difference is associated with vowels rather than syllables, and (2) rhythm tends towards binary long-short alternation. The implication of this is that, there would be a certain level of vowel length distinction between strong and weak syllables in stress-timed languages, since vowel reduction tends to be prominent in such languages. In contrast, vowel reduction is less prominent in syllable-timed languages and as such, there is little or no such distinctions in the languages.

As discussed earlier, as a result of the variations in vocalic durations, stress-timed languages will produce higher PVI scores in the utterance. Conversely, syllable-timed languages result into producing lower scores since there is less instances of variations in vowel durations. While introducing the PVI model, Low et al. (2000) did a comparative measurement of intervocalic durations for Singapore English (henceforth SgE) and BrE, and the result showed a vast difference in the rhythm of the two varieties. BrE (stress-timed) had a comparatively higher PVI values than SgE (syllable-timed). Their results provided the basis for classifying BrE and SgE as stress- and syllable- timed respectively.

Subsequent to this achievement, Grabe and Low (2002) introduced a normalized version of the PVI known as nPVI. This measure aimed at accounting for other phonetic issues such as speech rate which was not taken care of in the previous model. Some eighteen languages were involved in this study, where the nPVI for the vocalic intervals and the

rPVI of consonants were measured. Among the eighteen languages are the prototypical stress- syllable- and mora-timed languages, and languages that were yet to be classified. The first category of languages includes Dutch, German and English (stress- timed). Similarly, Spanish and French represented the syllable-timed languages, while Japanese represented the mora-timed languages. Catalan and Polish were included to represent languages that are rhythmically intermediate. Three other languages Greek, Romanian and Estonian have not been classified before and were included in the study.

The result was that the stress- timed languages: English, Dutch and German produced comparatively greater values of nPVI compared to French and Spanish (syllable-timed) languages. The stress-timed languages had nPVI values ranging from 60 to 70, while the nPVI values for the syllable-timed languages range between 30 and 45. The nPVI scores obtained for Japanese which was hitherto classified as a separate class (Ramus et al. 1999) did not show a different class for the language, instead it produced nPVI values similar to that for syllable-timed languages. This may in a way, contradict the existence of the mora-timed class of languages. Similarly, the nPVI scores for the rhythmically intermediate and unclassified languages deviate from both classes (stress- and- syllable-timed), thus indicating an inconclusive classification of the languages.

Furthermore, Grabe and Low (2000) provided a comparison between the result of PVI and that of IM where significant intra-index similarities were recorded. However, it is not always possible to avoid apparent limitations in a particular study and in this study too, the number of speakers (one per language) may affect the reliability of the speech samples.

In another development, Dellwo (2006) proposed a rate-normalized metrics known as Varco C and Varco V. In Varco C, the standard deviation of consonantal interval durations is divided by mean of consonantal durations. The result is normalized by

multiplying it by 100. The same formula is applied in Varco V, with the only difference lying in calculating the vocalic durations instead of consonantal durations. Varco V therefore, equals the standard deviation of the intervals of vocalic durations which is divided by the mean vocalic intervals. This is also normalized by multiplying by 100. However, research (e.g Tan & Low, 2013) showed that, at all speech rates, Varco C was more robust in distinguishing languages than ΔC; German and English (stress- timed) versus French (syllable- timed). Meanwhile, Dellwo and Wagner (2003) did not find much consistency in correlation of %V with various speech rates, which means that normalization could not be applicable for %V.

Another much cited rhythm metric is that proposed by Ramus et al. (1999). Through these metrics, Ramus et al. investigated the rhythm of Dutch, English and Polish that are usually regarded as the classical stress-timed, Italian, Spanish, Catalan and French that are usually regarded as classical syllable-timed, and Japanese representing the mora-timed class. This metrics consider durational variation in three phonetic properties of a language. One of these is the standard deviation of the intervocalic durations which is symbolized as ΔV. Similarly, it involves the percentage vocalic durations in an utterance which considers the onset and offset of a vowel. This is symbolized as %V. The third index proposed by Ramus et al. is ΔC being the standard deviation of consonantal durations which takes into consideration, the beginning and the end of a consonantal segment. The result of their measurement suggested that combining ΔV with ΔC or %V could provide relevant measures of rhythmic variation or relatedness among languages.

However, researchers have identified some limitations with regard to the effectiveness of Ramus et al.'s metrics. Low et al. (2000) are of the opinion that the ΔC and ΔV only account for the overall average variation of intervals, ignoring the successive interval variations in an utterance which means that the metrics would not account for the

variations in speech that may arise from the successive intervals of speech segments. Similarly, Wagner and Dellwo (2003) opined that %V and ΔC are more of measuring the syllable complexity than it is to rhythm, since it is not found to be effective across the entire speech rate. Since Ramus et al. used a controlled speech to measure %V and ΔC, this could not be able to account for the rhythm of an uncontrolled speech, thus making it less effective in that sense.

In a close modification of the PVI, Gibbon and Gut (2001) and Gut et al. (2001) introduced another method which is referred to as Rhythm Ratio (RR). Gibbon and Gut applied RR in measuring the rhythm of Ibibio (spoken in Nigeria), BrE and NigE. In RR, each pair of adjacent syllables, the shorter is divided by the longer. The average of all the ratios is multiplied by 100. Thus, when the RR equals 100, it is a case of perfect syllable-timing. In other words, the lower the degree of syllable- timing, the lower the RR value. Gibbon and Gut found that BrE was more stress-timed than both Ibibio and NigE.

Several other researchers (e.g Asu & Nolan, 2005; Benton, Dockendorm, Jin, Liu, & Edmonson, 2007; Dellwo & Wagna, 2003; Gut, Urua, Adouaka & Gibbon, 2001; Lin & Wang, 2005 and Tan & Low, 2013) have used a combination of metrics to measure rhythm. Similarly, other phoneticians have studied the rhythmic variations among varieties of the same language. However, this will not be discussed in detail since this study is more focused on describing the rhythmic pattern of two distinct languages; Fulfulde and NigE and not varieties of the same language.

Furthermore, phoneticians have tried to identify the most effective metrics in discriminating rhythm among language groups. Among these studies, White and Mattys (2007) suggested that Varco V provides the most discriminative analysis among languages. Similarly, %V provides some insights into second language rhythm and the processes of adjustment between the L1 and L2. White and Mattys used ΔV, Δ1, Varco

V, Varco C, NPVI and CPVI to measure the rhythm of English L1 and L2, French L1 ans L2, Spanish L1 and L2 and Dutch L1 and L2. The hypothesis of their study was that the rhythm of the L2 for all the languages should fall between the speakers' L1 and the native rhythm of his L2. From the result of their measurements, Varco V provided the most reliable discrimination in terms of the rhythm of L1 and L2. However, White and Mattys (2007) found at the same time, that unlike nPVI, Varco C was not as effective in discriminating the rhythmic patterns of various languages.

Though in recent times, rhythm indexes such as (Dellwo (2006); Gibbon and Gut (2001); Grabe and Low (2002); Low et al. (2000) and Ramus et al. (1999) have become popular acoustic metrics especially in the area of rhythmic research, the use of these indexes is not without limitations. Researchers (Nolan & Asu, 2009; Tan & Low, 2013) rightly observed that these metrics, albeit useful are mainly focused on vocalic and consonantal durations, while Ferragne (2008, in Tan & Low, 2013) found that the PVI of mean syllable intensity and duration provides better discrimination of BrE accents or dialects than the PVI of vocalic or consonantal durations alone. Deterding (2001) argued that the conversational data he measured contained too many devoiced syllables and he therefore suggested the measurement of syllables rather than vowels.

Similarly, Nolan and Asu (2009) suggested that languages such as Estonian exhibit mixed qualities of both stress- and syllable- timing since the results of their investigation showed that BrE and Estonian share both similarities and differences in terms of rhythm. Nolan and Asu argued that it is basically difficult to determine rhythm, especially for languages such as Estonian based on a single parameter of duration. Therefore, they suggested the PVI measurement of the foot. They further argued that even in the constraint of duration, the notion of quantifying the rhythm of languages should be able to contain the rhythmic patterning that coexist in the language (Tan & Low, 2013). This is to simply say that

stress- and syllable- timing should not be viewed from the extreme end points of a continuum, but as an orthogonal dimensions which in a way, would enable a language to be both stress- and syllable- timed.

However, Tan and Low (2013) raised some limitations to Nolan and Asu's proposal of measuring the foot and the syllable, arguing that decision making with regard to the segmentation of the syllables and foot is a problem that cannot be avoided. This may result into some difficulties in comparison between languages, because basically, decisions on segmentation may differ according to the structure of the language. Furthermore, a foot begins with a stressed syllable and the difficulty in identifying the stressed syllable poses a question on the reliability of the identification of the foot. However, from the findings of the studies (e.g Barry et al., 2003; Dellwo & Wagner, 2003; Gibbon & Gut, 2001; Gut et al. 2001; Loukina et al., 2009; Low, 1998; Low et al., 2000; Low & Grabe, 2002 and White & Mattys, 2007) reviewed so far, it is evident that the rhythm of languages can be adequately categorized base on acoustic measurements of the durational domain alone. In view of this, it could be safe to suggest that rhythm metrics provide an objective way of measuring rhythm, thus making it possible to classify languages into different rhythmic classes.

Moreover, the advancements recorded in the instrumental study of the rhythmic pattern of languages, and to the fact that various researchers (e.g Dellwo, 2006; Gibbon & Gut, 2001; Grabe & Low, 2002; Gut, 2001; Gut et al., 2001; Low, 1998; Low et al., 2000; Loukina et al., 2009; Ramus et al. 1999; Tan & Low, 2013; Wagner & Dellwo, 2004; White & Mattys, 2007) used various metrics to investigate the rhythm of languages, the use of acoustic metrics appears to be a reliable method of determining the rhythm of languages. As such, rhythm metrics (nPVI and Varco V) are used in this study to describe the rhythm of Fulfulde.

2.6.   Summary

In this chapter, issues relevant to this study have been discussed with reference to the literature. First, the linguistic situation in Nigeria was reviewed where English is assumed to play a role of the national, official and lingua franca, as well as the language of instruction in the country. Several hundreds of Nigerian indigenous languages exist, and their categories as suggested by various sociolinguists is provided in section 2.1. Sections 2.2 through to section 2.2.8 provide a summary of the existing literature on Fulɓe and Fulfulde. Sections 2.2.2 and 2.2.3 discussed the history of the Fulɓe and their culture, whereas sections 2.2.4 through to 2.2.8 focused on the phonology of the language where consonants, vowels, syllable structure, stress and intonation were discussed. This is followed by sections on NigE where section 2.3.1 focused on the classification of NigE and 2.3.2 discussed the prosody of NigE in which syllables, rhythm, stress and intonation were discussed. Furthermore, the chapter provides discussions on the properties of the various classes of speech sounds in sections 2.4 through to 2.4.3, while section 2.4.4 focuses on the difficulties of sound measurement. The chapter closes with a review of rhythm and the rhythmic indexes.

RESEARCH METHODOLOGY

The previous chapter provided a review of literature of previous work done on Fulfulde, Nigerian English as well as rhythm. This chapter discusses the methodology used in the study. It includes explanations on the research design, selection of participants and their background information, instruments and materials used in the study, methods of data collection and data analysis.

3.1. Research Design

This investigation is an acoustic study aiming at identifying the rhythmic correlates of Fulfulde language and the rhythmic class it may belong to. In data collection, read speech of respondents were recorded. As for the data analysis, the normalized Pairwise Variability Indices (Grabe & Low, 2002) and Varco V (Dellwo, 2006) were used to calculate the intervocalic durations. The study is descriptive in nature since the result of the measurements will be used to describe the rhythm of the language.

3.2. Participants

An ideal source of linguistic data is from native speakers who use the language in their daily activities. Therefore, using a convenient random sampling technique, 10 native speakers of Fulfulde and 10 speakers of NigE were selected. One of the reasons for choosing male speakers was to avoid gender variability. Acoustically, there are some

differences between male and female speech, therefore the gender variability in the data is completely avoided by recording male speakers only. The second reason was that male speakers were more available during data collection which gives the researcher a chance to select more convenient samples from the recordings obtained. Similarly, there are issues of cultural restrictions and low level of educated female folk within the Fulɓe communities of our respondents. For these reasons, male speakers became the only option to explore for the purposes of data collection. None of the respondents reported any form of hearing or speech disorders and none of such symptoms were noticed during the study.

3.3.   Fulfulde Speakers

Table 3.1 provides background information for the selected Fulfulde speakers. All Fulfulde speakers were selected from Adamawa state of Nigeria, being the home of the Adamawa dialect of Fulfulde under investigation. Speakers were born and brought up within the Adamawa area; they spent most of their lives in the state, and are therefore native speakers of the dialect. Respondents were taught in Fulfulde during their junior primary classes. This is due to the educational policy in Nigeria as indicated by Nigerian Policy on Education (1979) which requires that the mother tongue (language of the immediate community) should be the medium of instruction at junior primary school (classes 1-3). Thus according to this policy, the language of instruction at this level of education is usually the language of the immediate environment.

However, the implementation or otherwise of this policy in all the primary schools across the state is not the concern of this study. Our interest is to be able to select respondents of equal Fulfulde backgrounds and expertise so that the data obtained can be comparable across the speakers. Since Fulfulde is a native language of most Fulɓe communities in

Adamawa state (particularly the communities where the respondents were selected), and based on the background information provided by each speaker, this policy holds true for all of them. Thus, the respondents learned Fulfulde from the age of 6 to 12 at the primary school level.

Table 3.1: Background of Fulfulde Speakers:

Speaker	Sex	Age	native language	Educational level	Course
A	Male	25	Fulfulde	B.A	M. com.
B	Male	27	Fulfulde	B.A	History
C	Male	28	Fulfulde	B.A	Religion
D	Male	24	Fulfulde	N.C.E	PES
E	Male	23	Fulfulde	B.A	Literature
F	Male	27	Fulfulde	N.C.E	SOS
G	Male	24	Fulfulde	B.A	T. arts
H	Male	29	Fulfulde	B.A	Hausa
J	Male	25	Fulfulde	N.C.E	IRS
K	Male	23	Fulfulde	B.A	Hausa

N.C.E: *National Certificate on Education*, BA: *Bachelors of Arts,* M.com: *Mass Communication,* PES: *Primary Education Studies,* SOS: *Social Studies,* T. Arts: *Theatre Art,* IRS: *Islamic Religion Studies*

Similarly, in Fulɓe communities where the respondents were selected, Fulfulde is taught as a subject alongside English and one of the three major Nigerian languages (Hausa, Igbo or Yoruba) at the senior primary classes (4-5). In the case of northern Nigeria,

English (national and official language), Hausa (the language of wider communication) are taught alongside a minority language base on the state policy. In this regard, all Fulfulde respondents were selected from Fulɓe communities where Fulfulde is the medium of instruction at the junior primary classes and is also taught as a subject in the upper primary classes. Furthermore, speakers were found to be very familiar with the standard Fulfulde orthography of the UNESCO (1966) conference.

Though the basic requirement for the respondents in this study is good reading ability in their respective languages, respondents in this research have higher qualifications. Among them, speakers D, and J, hold A level (NCE[1]) certificates, while the rest hold Nigerian University degrees. All respondents acquired their higher education in arts related subjects. Speakers A, B, C, E, and G, hold degrees in Mass Communication, History, Religion, Literature and Theatre Arts respectively. While speakers H, and K, both hold degrees in Hausa studies, speakers D, F, and J, hold NCE in Primary Education Studies, Social Studies and Islamic Studies respectively. All respondents had their education in Nigeria; none of them attended any school and at any level abroad. It is also to be noted that all respondents spent most of their lives within Nigeria and Adamawa state. All respondents are male adults with similar age, ranging from mid-twenties to thirty years. The average age for Fulfulde speakers is 25.

3.4. Speakers of Nigerian English

Speakers of NigE were selected and recorded here in Malaysia. All of the respondents had spent less than a year in Malaysia, or any other country outside Nigeria. Similarly, all of them are postgraduate students in Malaysian public Universities (University Malaya, University Putra, and University Technology Malaysia). Speakers A, B, C, F, G

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[1] Nigerian Certificate in Education

and H started their candidature in second semester; February, 2013 while speakers E, J, and K, started in the first semester; September, 2013.

As postulated in section 2.1, Nigeria is a multilingual country with several hundreds of native languages. The native speakers of these indigenous languages form the speakers of all the varieties of NigE discussed in section 2.3.2 above. However, unlike the written language in which the uniformity of the standard variety is less questionable, the spoken form of NigE is perhaps as complex as the linguistic situation of the country. This is more so as the issues of the influence of the various native languages on the spoken NigE is very much unavoidable, a reason that likely motivated Jibril (1986) to state that variety differentiation in NigE can be viewed from the perspective of the native language of the speaker. The implication is that, one is likely to find various accents within the assumed standard NigE, so that a Hausa native usually speaks differently from a Yoruba native, and the same scenario is what is usually obtained across the speakers of all the various indigenous languages.

By extension, this would mean that a phonetic data on standard NigE (being it spoken), that is collected from native speakers of only one indigenous language might not be as sufficient in representing the majority of the speakers of the standard NigE, as that which includes natives of the various languages. If for instance a data is collected only from native speakers of Hausa language, there is high tendency that such data will only contain the phonetic features of the standard NigE as spoken by Hausa natives, thereby neglecting the rest of the larger population of the speakers of this variety of English. Whereas, if the data consist of speech samples from natives of the three major languages or more, as done in this study, there is possibility of having a good representation of the groups of the speakers of the standard NigE. In addition, this study is focused on measurement of vowel durations to determine the rhythm of Fulfulde and the standard NigE, which means that different accents may tend to provide different measurements, and conclusions drawn

from the results of these measurements might be misleading if a good representation of the various accents is not taken into consideration. However, it was not possible in this research, as well as in a number of other similar investigations to record the native representatives of all the indigenous Nigerian languages (Gut, 2001; Gut et al. 2001). Nevertheless, it was feasible to strike a balance that can make a fair representation of the spoken form of the standard NigE. For instance, Bamgbose (2001, p. 2) estimates that over 70% Nigerians speak the three major languages (Hausa, Igbo and Yoruba). This percentage is further complimented by the language policy enshrined in the National Policy on Education 1978 which recommends; (1), that the child's mother-tongue or the language of the immediate environment be used as the medium of nursery and lower primary education, and (2) that in junior secondary school, a Nigerian child shall in addition to his mother-tongue, study any of the three decamillionaire languages. Furthermore, speakers of the ten Nigerian network languages, otherwise known as the millionaire languages (see section 2.1) form a large percent of the speakers of the standard NigE. It therefore appears that, a vast majority of the speakers of the standard NigE are either natives of the three major and ten network languages, or do at least use one of these as a language of wider communication or have learned it as a school subject. Thus, a non-homogeneous phonetic data that includes native speakers of the three major languages as well as some of the network languages may provide some kind of balance in the representation of the spoken form of the standard NigE, hence the non-homogeneous selection of the Nigerian English speakers.

In this regard, efforts were made to include native speakers of all the three major Nigerian languages (Hausa, Igbo and Yoruba) and three other network languages (Ibibio, Edo and Efik). First, the attempt to include native speakers of all the major languages was to provide a data that can respond to the diversity of the spoken standard NigE, and to gain insight on the assumption that varieties differentiation within NigE can be based on the

grounds of native language (Jibril, 1986) or formal education (Bambgose, 1982; Eka, 1985), so as to observe, if these differences would be evident in the result of this study.

Second, native speakers of Ibibio, Edo and Efik languages were included in Gut (2001) investigation on the prosody of the Standard NigE. Due to the non-availability of the native speakers of these languages at the time of recording, one speaker from each of the languages was recorded. Table 3.2 shows the background information on respondents for the Standard NigE.

Table 3.2: Background of NigE Speakers

Speaker	Sex	Age	native language	Education background
A	Male	30	Ibibio	B.sc
B	Male	32	Edo	B.sc
C	Male	29	Hausa	B.sc
D	Male	27	Hausa	B.sc
E	Male	24	Efik	B.A
F	Male	23	Yoruba	Master
G	Male	25	Hausa	Master
H	Male	26	Hausa	B.sc
J	Male	27	Igbo	B.sc
K	Male	27	Hausa	B.sc

B.Sc (*Bachelor of Science)* B.A (*Bachelor of Arts)*

The results of measurements from the various speakers with diverse linguistic backgrounds would help to observe if native languages may influence the rhythm measurements of NigE in particular. From the educational level point of view, a speaker of the Standard NigE should have a minimum of tertiary education, a criteria used by Udofot (1997) to classify the Nigerian variety of English. Both Udofot (1997) and Eka (1995) are of the opinion that speakers of a Standard variety of NigE usually have a minimum of tertiary education, a criteria also adopted by Gut (2001) as well as Gibbon and Gut (2001). In view of this, respondents in this study possessed a Nigerian University Degree and are observed to be competent in both read and spoken English. Speakers A, B, C, D, H, J, and K, hold Bachelors of Science (Bsc.) from various Nigerian Universities and are currently pursuing various postgraduate programs in Malaysia. Speakers F, and G, hold Master Degrees from Nigerian Universities and are Doctoral students in Malaysia. None of the speakers studied abroad and all of them lived all their lives in Nigeria. Respondents are of similar age ranging from mid-twenties to thirty years with an average age of 27.

3.5.   Instruments

In recording read speech for NigE, respondents were asked to read a fable; the "North Wind and the Sun". The English version of the text was published in the IPA (1999), and is a standard text from phonetic research (Grabe & Low, 2002). Though the NWS has been used in several phonetic researches over a long period of time, researchers say it is not without limitations. For instance, Deterding (2006) has pointed out that the NWS passage poses some phonetic problems for measuring rhythm. Deterding argued that though the passage has reasonably served its purpose, there are however, some problems associated with it. These according to him, include a number of instances of consecutive

strong syllables and initial approximants such as /w/ as in the word /wɪnd/ and dark /l/ as in /fəʊld/ suggesting that such sounds may pose some problem when measuring vowel duration. He therefore suggested a different passage.

However, Tan and Low (2013) have rightly observed that the *Wolf*, an alternative passage proposed by Deterding (2006) is no better, because it also has problems similar to those that are being avoided in the NWS. Tan and Low (2013) were of the opinion that both the *Wolf* (Deterding, 2006) and the "North Wind and the Sun" (IPA, 1999) pose similar problems in acoustic measurements. Tan and Low supported their argument by drawing instances of problematic words such as *wind, were, which, was, when, warm, one, stronger, traveller, wrapped* and *around* from NWS and words like *was, once, watch, one, wolf, with, were, away, forest, raising, ran, rushed, tried, trick, threaten, racing, cried, trying* and words like *used* and *usual* from the *Wolf*. However, these problems are considerably less in the NWS being that there is only one instance of dark /l/ as in /fəʊld/ and eleven problematic words that contain approximants as compared to about twenty of such words in the "Wolf" passage. Nonetheless, where these sounds occurred in NWS, a decision was taken in this study to consistently divide the approximant and the vowel sounds into two equal parts where one section is considered for the approximant and one for the following or preceding vowel as the case may be. This decision is taken to maintain consistency across the speakers and across utterances as segmenting and/or separating the vowel from the approximant is usually a difficult task and may trigger a sort of inconsistency in measurements.

Furthermore, the comparison of the rhythmic patterns of various languages depends on the total ratio of the vocalic and consonantal interval durations (Ramus, Nespor & Mehler, 1999), and the NWS text could possibly serve well for this purpose (Deterding, 2006). While acknowledging the limitations in the NWS, it was chosen in this study for two

reasons. First, the alternative passage (the Wolf) proposed by Deterding (2006) has same problems if not worse than those avoided in the NWS. Second, not only has the NWS long been in existence in phonetic research, it has also been used as an instrument in several researches that are related to the current investigation. For instance, it was used by Grabe and Low (2002) as an instrument in their pioneer investigation using the nPVI. Since the nPVI is the model of approach in this study, adopting the same instrument would be a right decision.

For Fulfulde language, a translated version of the NWS was used. The passage was translated by the researcher who is also a native speaker of the language with consultations from experts of Linguistics and Fulfulde studies. Experts involved in the translation are: Associate Prof. Garba Kawu Daudu Ph.D, Head of Fulfulde and Kanuri unit, Centre for the study of Nigerian Languages, Bayero University, Kano and Dr. Abubakar Umar Girei, former Head, Fulfulde Unit, University of Maiduguri, both in Nigeria. Both experts hold PhDs in Fulfulde linguistics and are seasoned scholars of Fulfulde and have in the past, provided many translations from other languages into Fulfulde.

Notwithstanding, most of the problems highlighted earlier with regard to the use of NWS are not completely avoided in the Fulfulde version. For instance, there are a number of occurrences of initial approximants in the text. While glides /j/ and /w/ occurred at the initial positions of three words in the text, thus; [jaːwɪ], [jaʊwaː]; and [wɪʔɪ], literal /l/ and rolled /r/ also appeared albeit not in the initial position. Again, a decision was taken to consistently divide the formants for both the approximant and the vowel into two parts as was done in measuring NigE. Figure 3.1 shows the formants for Fulfulde speaker D's pronunciation of the word [jaːwɪ].

Figure 3.1: Spectrum for the word 'yaasi' as pronounced by speaker D
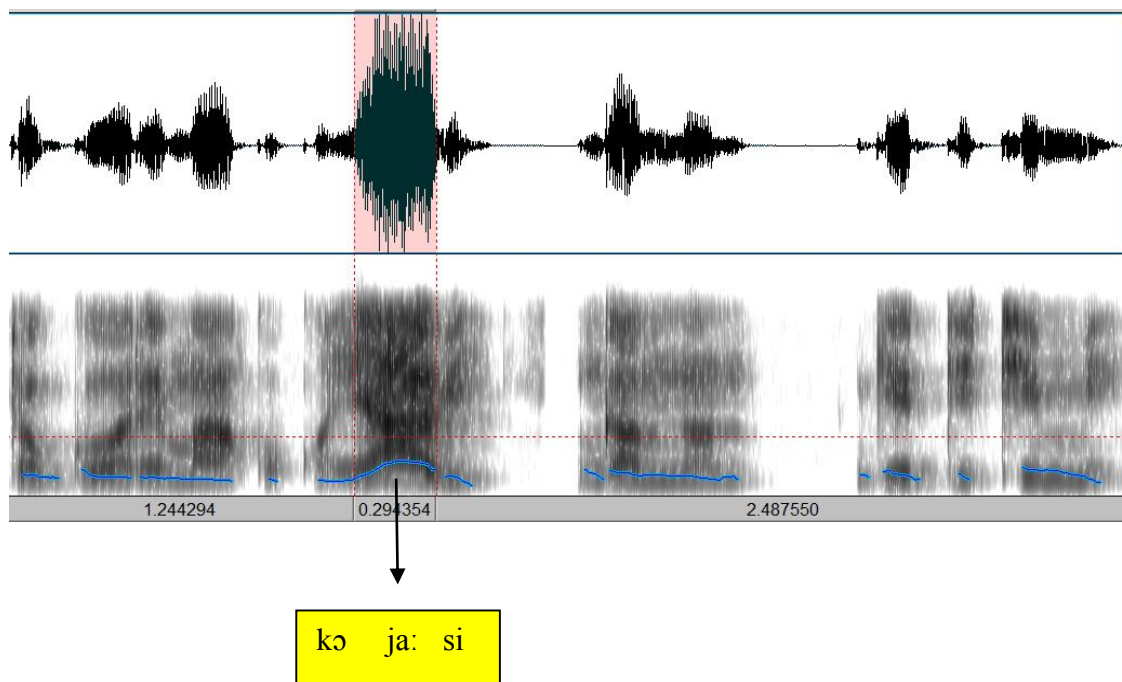
In figure 3.1 above, the formants for the glide /j/ followed by a long vowel /a:/ is hardly seperable and therefore, to maintain consistency, these formants were divided into two equal parts where the first part being for the glide and the second for the vowel.

Another problem that might be faced when using this text is the pre-nasalized Fulfulde consonants. Already, nasal sounds are periodic, that is, they are produced with certain level of energy making their spectral formants close to that for approximants and vowels in terms of amplitude. When a pre-nasalized consonant precedes or follows a vowel as in the word [nden], it will certainly pose some problems in identifying the onset and offset of the vowel or consonant. Of course, the spectral formants for the nasal consonant would clearer from that for the vowel, but identifying the end of the following plosive is somewhat challenging. However, this is tenable by looking at the features of a stop sound such as the release bust accompanied by listening aids. With five pre-nasalized consonants [mb, nd, ŋg, nʤ, ɲ], these sequences of sounds are common to Fulfulde. Though their occurrences were not too prevalent at syllable initial, these sounds are

unavoidable when using this text. In such cases, looking at visual formants alongside auditory aid would help in identifying the offset of the plosive sound which has next to it, the onset of the vowel. However, it is also advisable, as a matter of consistency, to divide the spectrum for the plosive and for the vowel into two as can be done for approximants and vowels. Figure 3.2 shows a spectrum of the word /nder/ as produced by speaker A.

Figure 3.2: Spectrum for the word 'nder' as produced by speaker A
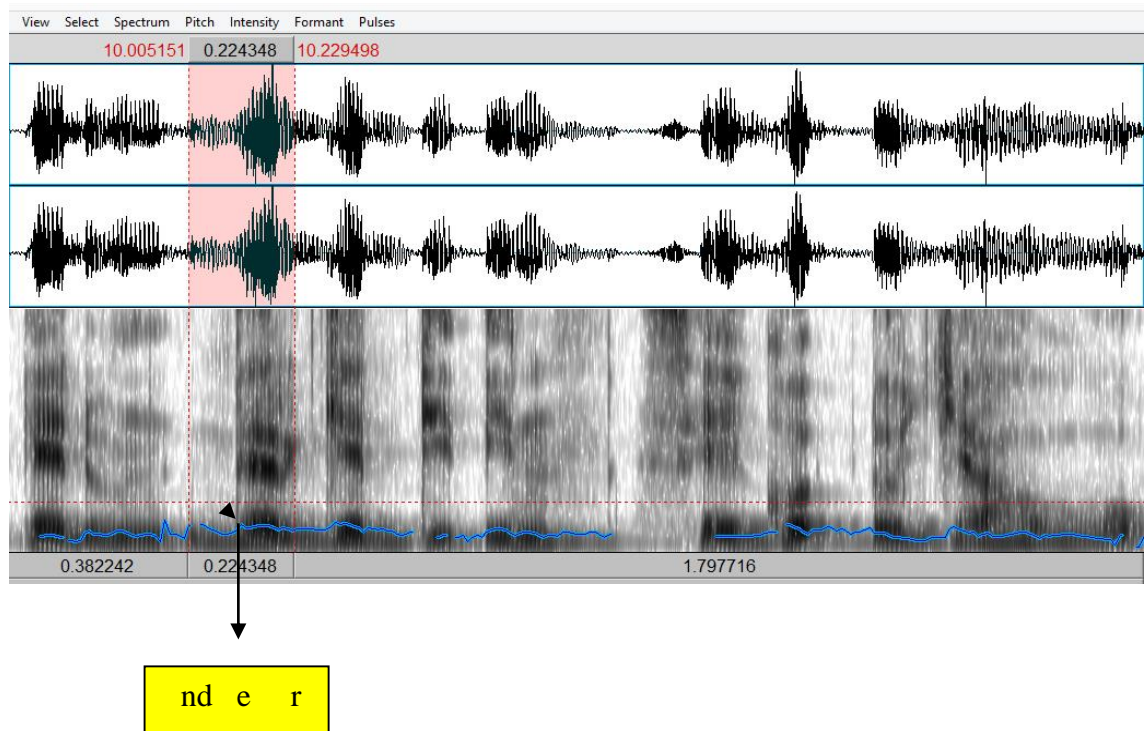
Being a stress language (see section 2.2.7), Fulfulde has stressed and unstressed syllables. The case of consecutive strong syllables is not totally avoidable in the text. Of course, there are a lot of alternations between strong and weak syllables probably due to the stress assignment rules for nominal stems and verbal roots in Fulfulde (see section 2.2.7 for details on stress assignment rules). However, there are also cases of consecutive strong syllables in the text and in this case all the vowels in the syllables were measured without any form of alteration.

Below are the orthographic version, the sentence to sentence and word to word translations of the text:

3.5.1. The Translated Text

Henndu Dabbunde e Naange

Henndu dabbunde feewndu e naange ngeddootirii dow moye ɓuri nyaaɗugo. Henndu wi'i ɓurii naange nyaaɗugo nden naange maa wi'i ɓurii henndu nyaaɗugo. E ɗum nder geddi ɗin sey jahoowo wari e ɓornii toggoore jaangol. Nde henndu e naange eewi jahoowo, sey naange e henndu mbi'i "yawwaa" hannde en ittay geddi". Artuɗo ɓortugo goɗɗo o'o toggoore maako fuu kanum ɓurin yaaɗugo. Ɗonni henndu fuɗɗi fuufuki peewol ngam ndu waɗa mo o ɓortoo toggoore maako. Nde o nani peewol henndu kam ɗon maa o ɓesdi taaraago nde. Ngam non sey henndu tampi no waɗa, tiiɗal maaru nafaay, doole maaru ndu munyi. Ɗon e ɗon naange fuɗɗi kuugal maage. Habaa, nde naange meeɗi fettoygo nguli maage kam, sey ɗon e ɗon jahoowo kam ɓortii toggoore maako ko yaawi. Ngam non geddi timmii, ɓe fuu ɓe ciwtake henndu goŋɗinii naange ɓurii ndu nyaaɗugo.

3.5.2. Sentence to Sentence Translation of the Text:

1a.   *Henndu dabbunde feewndu e naange ngeddootirii dow moye ɓuri nyaaɗugo*

1b.   "The (cool) north wind and the sun were disputing which was stronger"

2a.   *Henndu wi'i ɓurii naange nyaaɗugo nden naange maa wi'i ɓurii*

henndu nyaadugo.

2b.   "The north wind said he is stronger and the sun also said he is stronger"

3a.   *E ɗum nder geddi ɗin sey jahoowo wari e ɓornii toggoore jaangol.*

3b.   "While arguing, a traveler came along wrapped in a warm cloak"

4a.   *Nde henndu e naange eewi jahoowo, sey ɗum wi'i "yawwaa" hannde en*

       ittay geddi"

4b.   "When the north wind and the sun saw the traveler, they said "it is good that we

       will settle our dispute today"

5a.   *Artuɗo ɓortugo goɗɗo o'o toggoore maako fuu kanum ɓurin yaadugo.*

5b.   "The one who first force this man to take off his cloak should be

       considered stronger than the other"

6a.   *Ɗonni henndu fuɗɗi fuufuki peewol ngam ndu wada mo o ɓortoo*

       toggoore maako.

6b.   "Immediately, the north wind started blowing (its cold) to force him to take off

       his cloak"

7a.   *Nde o nani peewol henndu kam ɗon maa o ɓesdi taaraago nde.*

7b.   "The more he felt the cold of the wind the more he folds his cloak around him"

8a.   *Ngam non sey henndu tampi no wada, tiidal maaru nafaay, doole maaru*

       ndu munyi.

8b.   "For this reason, the north wind had nothing to do more as its efforts

       have failed

       and so it gave up the attempt"

9a.   *Ɗon e ɗon naange fuɗɗi kuugal maage.*

9b.   "There and then, the sun started its action"

10a.   *Habaa, nde naange meeɗi fettoygo nguli maage kam, sey ɗon e ɗon jahoowo*

       kam ɓortii toggoore maako ko yaawi.

10b.   "The sun shone out warmly, and immediately the traveler removed his

       cloak quickly"

11a.   *Ngam non geddi timmii, ɓe fuu ɓe ciwtake henndu goŋdinii naange ɓurii*

       ndu nyaaɗuki.

11b.   "So the argument has ended, both of them are at rest (because) the north wind

       was obliged to testified/confessed that the sun was the stronger of the two"

3.5.3. Word to Word Translation

Henndu	*dabbunde*	*feewndu*	*e*	*naange*
Wind	season of cold winds	cool it	and	sun

ngeddootirii	*dow*	*moye*	*ɓuri*	*nyaadugo*
disputed	on	who	posses more	power/strength

Henndu wi'i ɓurii naange nyaadugo

Wind said posses more sun power/strength

Nden naange maa wi'i ɓurii henndu nyaadugo.

Then sun too said posses more wind power/strength

E ɗum nder geddi ɗin sey jahoowo

And they in dispute it then traveler

wari e ɓornii toggoore jaangol

Came and wears dress cold

Nde henndu e naange eewi jahoowo,

when wind and sun saw traveler

sey ɗum wi'i "yawwaa" hannde en ittay geddi"

then they said exclamation! Today we remove dispute

Artuɗo ɓortugo goɗɗo o'o toggoore maako fuu kanum

The first make remove person this dress him all he is the one

ɓuri nyaadugo Ɗonni henndu fuɗɗi fuufuki

posses more power/strength immediately wind started blowing

peewol ngam ndu waɗa mo o ɓortoo toggoore maako.

Cold to it make him he take off dress his

Nde o nani peewol henndu kam

75

When   he   felt   cold   wind   intensifier

ɗon   maa   o   ɓesdi   taaraago   nde.

There   intensifier   he   more   fold/wrap   the (cloak)

Ngam   non sey   henndu   tampi no waɗa,   tiiɗal

For/because   of that   wind   lost what to do   efforts

maaru nafaay,   doole   maaru   ndu   munyi

its   did not work   oblige   its   it   gave up

Ɗon e ɗon   naange   fuɗɗi   kuugal   maage

Immediately   sun   started   work   its

Habaa,   nde   naange   meeɗi   fettoygo   nguli maage kam,

Intensifier   when   sun   began   to shine out   heat   it
intensifier

Sey   ɗon e ɗon   jahoowo   kam   ɓortii   toggoore maako.

Immediately   traveler   intensifier   took off   cloak   his

Ko   yaawi   Ngam non   geddi   timmii ɓe   fuu   ɓe

Quickly   because of this   dispute   over   they   both   they

ciwtake henndu   goŋɗinii   naange   ɓurii   ndu   nyaaɗuki.

rest   wind   confess   sun   more   it   strong

3.6. Recording Environment and Materials

Sound recording for phonetic study entails some methods and principles. The quality of recording usually affects the clarity of visual formants and the perceptual effectiveness of the researcher. To achieve maximum quality of recording, Fulfulde speakers were recorded in a sound-proof room in the studios of Radio Gotel, Yola. As an alternative to a sound-proof room, NigE speakers were recorded in a quiet room, fully carpeted and closed windows with all electrical devices switched off. In both environments, good recordings, suitable for measurements were achieved.

Another instrument required for recording is a suitable recorder. Ultra-sound recording gadgets in Gotel studio were used to record Fulfulde, while a computer with the capacity of recording at +_32,000 bits and a suitable microphone (Sensonic inbuilt microphone) was put in place for recording the speakers of NigE. Measurements were done using PRAAT version 5.3.63 (Boersma and David Weenink, 1992-2014).

3.7. Data Collection

Starting with their personal details, date and time of recording including a verbal *informed consent* where applicable, each participant was recorded reading the passage in his/her respective language. As said earlier, the two passages; the *'North Wind and the Sun"* and its Fulfulde version '*henndu Dabbunde e Naange'* were used to record the read speech. Speakers were given maximum time they needed to be conversant with the text and were asked to read only when they feel comfortable enough. Participants read through the microphone to the recorder or laptop as the case may be. To avoid technical problems during recording, we requested the services of the administrators of the sound-proof room. Recording for NigE was done in quiet rooms as it was difficult to obtain a sound-

proof room. Therefore some of the recordings were conducted in quiet classrooms, completely closed with all electrical appliances switched off. Other recordings were conducted in quiet and carpeted living rooms. 22,000 Hz recording sample was selected as it is recommended as suitable for phonetic research (Ladeforged, 2003). To safeguard the data for maximum authenticity, recordings were immediately saved as WAV files.

3.8.   Data Analysis

The read speech for each participant was segmented into utterances; each utterance was then placed on PRAAT version 5.3.63 (Boersma and David Weenink, 1992-2014) with which durations of successive vowels in each utterance were measured. Two rounds of measurements (with an interval of two weeks) were conducted by the same, for both the languages. A Pearson correlation of the measurement was conducted to test the inter-measurement reliability. The result (r=0.99) shows a high level of consistency in measurements.

The values obtained from measurements of the intervocalic intervals were calculated using the normalized Pairwise Variability Index (nPVI). PVI (Grabe & Low, 2002), takes into consideration the sequential variability of the vowels or consonants by averaging the durational difference between the consecutive vowels or consonantal intervals via this formula:

$$\text{nPVI} = 100 \left[\sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1})/2} \right| / (m-1) \right]$$

Where 'm' refers to the 'number of items in an utterance', 'd' refers to the 'duration of the kth item', (Grabe & Low, 2002, p. 3).

A second rhythm metric known as Varco V (Dellwo, 2006) was used to validate the results of the measurements. In Varco V, the standard deviation of vowels is divided by the mean vocalic interval multiplied by 100. Varco V is calculated via the following formula:

$$VarcoV = \frac{\Delta V}{\bar{V}} \times 100$$

Where ΔV refers to the standard deviation of the vocalic interval and v refers to the mean duration of the vocalic intervals.

In this investigation, the rhythm of Fulfulde will be described using nPVI (Grabe & Low, 2002) and Varco V (Dellwo, 2006) on two basis: The findings by Loukina, Kochanski, Shih, Keane and Watson (2009) show that the use of two rhythm metrics is more effective at classifying languages compared to the use of one, though they were not conclusive as to which pairs are most effective. At the same time, Loukina et al. (2009) suggested that the use of more than two different metrics may not necessarily provide a better measurement compared to the use of two. The second reason is that, White and Mattys (2007) found nPVI and Varco V to be more sensitive in classifying language groups and are very robust to variation in articulation rate than the rest of the metrics investigated in their study. On this basis, nPVI and Varco V were selected to be used in measuring successive vocalic durations such that the rhythm of Fulfulde can be described in comparison with NigE. Consonants are not measured since according to White and Mattys (2007), results for measures of interval variance in vowels are reproducible compared to consonants, while measures of variations in consonantal intervals varied in scores. This means that they would be subjective to the kind of linguistic material used in the measurement. Hence, consonants are more stable in languages, and vowels tend to provide more variations than consonants.

Chapter 4

FINDINGS AND DISCUSSION

This chapter presents the findings of the study. The first section of the chapter provides an analysis of the translated text. The second section shows the nPVI results for Fulfulde and NigE while the third section contains the Varco V results for both languages. This is followed by the sections that discussed the findings of the study.

4.1.   Analysis of the Translated Text

Deterding (2006) highlighted some certain phonetic issues to be considered in selecting a text as an instrument for measuring rhythm. In view of this, the translated text is analysed with regard to the issues raised so that its suitability for the study of rhythm can be weighed. Deterding (2006) had noted that some of the problems associated with the NWS were indeed carried over to the translated versions of the text in other languages. One of the arguments he raised on the problems associated with the popular phonetic text; the NWS was that some of the sounds of English were not included in the passage, while other segments had restricted occurrence.

Similarly, Deterding highlighted other complications such as initial approximants and consecutive stressed syllables, especially when it comes to measuring the rhythm of different languages or varieties of the same language. Other researchers (e.g Hiki, Kakita & Okada, 2011) were also of the opinion that the NWS passage lacks some important elements necessary for observation and measurement of a wider variety of issues

concerning English sounds. On this basis, Hiki et al. (2011) reviewed the Japanese version of the NWS text, which like the original English version, lacks some basic sounds and features of the Japanese language and therefore may lack the required suitability in measuring Japanese sounds. Their reviewed version was 30% longer than the original text and encompasses all the 16 Japanese consonants, their variants and allophones.

In the current Fulfulde translation, twenty six out of the twenty seven Fulfulde consonants have appeared with the exception of /ʔj/. The five short vowels and their five long pairs were most likely to occur naturally, since vowel length is phonemic in Fulfulde. Further observation and analysis show that all the basic vowels appeared in the text, and most importantly, most of these vowels occurred in more than three instances and at different syllable positions. However, three of the ten basic vowels occurred at two syllable positions rather than three. Though not as frequent as the basic vowels, seven of the eight Fulfulde diphthongs (Girei, 2009), have appeared with the exception of /ʊɪ/. Below is the transcribed version of the text.

henndʊ dabbʊnde e naːŋge

henndʊ dabbʊndɛ feːʊndʊ ɛ naːŋgɛ ŋgɛddɔːtiriː dɔʊ mɔjɛ ɓʊri ɲaːɗʊgɔ henndʊ wɪʔɪ ɓʊriː naːŋgɛ ɲaːɗʊgɔ ndɛn naːŋgɛ maː wɪʔɪ ɓʊriː henndu ɲaːɗʊgɔ ɛ ɗʊm ndɛr gɛddɪ ɗin sɛɪ dʑahɔːwɔ warɪ ɛ ɓɔrniː tɔggɔːrɛ dʑaːŋgɔl ndɛ henndʊ e naːŋgɛ eːwɪ dʑahɔːwɔ sɛɪ naːngɛ ɛ hɛnndu mbɪʔɪ jaʊwaː hanndɛ ɛn ɪttaɪ gɛddɪ artʊdɔ ɓɔrtʊgɔ gɔɗɗɔ ɔʔɔ tɔggɔːrɛ peːwɔl maːkɔ fuː kanʊm ɓʊriː ɲaːɗʊgɔ ɗɔn nɪ henndʊ fʊɗɗɪ fuːfʊkɪ peːwɔl ŋgam ndʊ waɗa mɔ ɔ ɓɔrtɔː tɔggɔːrɛ maːkɔ ndɛn ndɛ ɔ nanɪ peːwɔl hɛnndʊ kam ɗɔn maː ɔ ɓɛsdɪ taːraːgɔ ndɛ ŋgam nɔn sɛɪ hɛnndʊ tampɪ nɔ waɗa tiːɗal maːrʊ nafaːɪ dɔːle maːrʊ ndʊ mʊɲɪ ɗɔn e ɗɔn naːŋge fʊɗɗɪ kuːgal maːgɛ habaː ndɛ naːŋgɛ meːɗɪ fɛttɔɪgɔ ŋgʊlɪ maːgɛ kam sɛɪ ɗɔn ɛ ɗɔn dʑahɔːwɔ kam ɓɔrtiː tɔggɔːrɛ maːkɔ kɔ jaːwɪ ŋgam nɔn gɛddɪ tɪmmiː ɓɛ fuː ɓɛ tɕɪʊtakɛ ŋgam hɛnndʊ gɔɲɗɪniː naːŋgɛ ɓʊriː ndu ɲaːɗʊgɔ

81

Below is the list of Fulfulde vowels and their occurrences in the three word positions, thus initial, medial and final positions.

Vowel	Initial	Medial	Final position
/ɪ/	/ɪttaɪ/	/timmiː/	/warɪ/
/iː/		/tiːɗal/	/ɓʊriː/
/ɛ/	/ɛ/	/hɛnndʊ/	/naːngɛ/
/ɛː/	/ɛːwɪ/	/ mɛːɗɪ/	
/a/	/artʊɗɔ/	/warɪ/	/waɗa/
/aː/		/maːkɔ/	/maː/
/ɔ/	/ɔ/	/gɔɗɗɔ/	/maːkɔ/
/ɔː/	/ ɔʔɔ/	/dɔːle/	/ɓɔrtɔː/

Diphthongs

Initial	Medial	Final
/aʊ/	/jaʊwaː/	
/eʊ/	/feːʊndʊ/	
/ɪʊ/	/ tɕɪʊtakɛ/	

82

/ɔʊ/	/dɔʊ/
/aɪ/	/ɪttaɪ/
/eɪ/	/sɛɪ/
/ɔɪ/	/fettɔɪgɔ/
/ʊɪ/	

The inclusion of almost all the segmental elements of the language, particularly vowels, would be regarded as a kind of strength of the text as an instrument in this study. Since PVI, Varco V and many other rhythm metrics exploit vowel durations and intervocalic intervals in measuring speech rhythm, this text may be a suitable instrument in the study of rhythm as well as other related acoustic investigations. This is more so, considering the fact that the basic Fulfulde vowels had multiple occurrences in various syllable positions making it possible to examine these vowels in different speech context and word positions. Future investigations which may consider measuring Fulfulde consonants would find the text useful as 26 out of the 27 Fulfulde consonants occurred in the text, most of them at various syllable positions. Similarly, there are few occurrences of initial glides /w/ and /j/ in the Fulfulde version compared to such occurrences in the English version of the text, and literal /l/ and roll /r/ did not occur in initial position. Another strength found in using this text to measure rhythm is that, most of the syllables in the text alternate between weak and strong syllables.

4.2.   nPVI Results

Measurements were done for both Fulfulde and NigE. Table 4.1 shows the average nPVI values obtained for each speaker as well as the overall nPVI average for the speakers of both languages.

Table 4.1: Average nPVI obtained for Fulfulde and NigE speakers

Fulfulde		Nigerian English	
Respondent	**nPVI Scores**	**Respondent**	**nPVI Scores**
A	50.10	A	35.35
B	47.70	B	39.98
C	57.38	C	47.49
D	45.45	D	45.85
E	44.04	E	36.14
F	49.53	F	39.78
G	57.47	G	46.47
H	47.87	H	52.29
J	45.42	J	39.70
K	43.17	K	43.14
Average	**48.813**	**Average**	**42.619**
SD	**5.09**	**SD**	**5.39**

SD: *Standard Deviation*

As can be seen from Table 4.1, the nPVI values obtained for Fulfulde speakers were higher than that for NigE speakers except for speaker H, where the Fulfulde speaker had 47.87 while NigE speaker had 52.29. Though Fulfulde speakers produced varied nPVI scores, the difference between the average for speakers C, 57.38 and G, 57.47 compared to the average for the rest of the speakers is glaring. In this regard, subsequent follow up contact was made with these respondents in trying to find out if there are some linguistic details that were not provided in their background information during data collection, which may be responsible for this variation. However, these efforts did not yield any positive information to this effect.

Generally, this results show that the average nPVI values obtained for Fulfulde (*M* = 48.81, *SD* = 5.09) is higher than the average nPVI values obtained for NigE (*M* = 42.61, *SD* = 5.39). The two-tailed independent *t*-test (two-sample assuming equal variance) shows a marginal difference (t = 2.6, df = 18, p = 0.016; d = 1.23). Cohen's effect size value (d = 1.23) suggested a high practical significance. This implies that the rhythm of Fulfulde as spoken by the subjects of this study showed more variability in successive vowel durations compared to NigE.

4.3.   Varco V Result

The Varco V results are similar to the findings for the nPVI. The scores for Fulfulde and NigE speakers and the overall average for both languages are presented in Table 4.2. As can be seen from the Table, the Varco V scores obtained for all Fulfulde speakers were higher than that for their NigE counterparts except for NigE speakers G, and H.

Table 4.2: Average Varco V scores obtained for Fulfulde and NigE speakers

Fulfulde		Nigerian English	
Respondent	**Varco V Scores**	**Respondent**	**Varco V Scores**
A	41.274	A	27.35484
B	40.82621	B	34.86257
C	56.02977	C	35.69155
D	35.67439	D	34.62609
E	41.29477	E	27.35484
F	39.28238	F	31.81388
G	41.13413	G	37.28161
H	55.51486	H	45.38616
J	35.55954	J	28.49804
K	40.80634	K	33.12194
Average	**42.739639**	**Average**	**33.5992**
SD	**7.20**	**SD**	**5.45**

SD: *Standard Deviation*

This results indicate that the Varco V scores obtained for Fulfulde speakers (M = 42.74, SD = 7.20) is higher than the Varco V average for NigE (M = 33.56, SD = 5.45). An independent two-tailed t-test (two-sample assuming equal variance) showed a significant difference (t = 3.19, df = 18, p=0.005; d = 1.5). Cohen's effect size value (d = 1.5)

suggested a high practical significance. The difference found in this analysis suggest that there is more variation in the overall vowel duration in an utterance for Fulfulde speakers than for NigE speakers.

4.4.   Discussion

The average nPVI value obtained for Fulfulde (48.81) as compared to (42.61) for NigE suggest that both Fulfulde and NigE are syllable-timed, but along a continuum, Fulfulde exhibit more qualities of stress-timing compared to NigE. In PVI, scores tend to be higher when there are variations in adjacent vowels, therefore, the implication in these results would be that, Fulfulde is spoken with more varied vowel durations compared to NigE, in that, the nPVI values for all Fulfulde speakers except speaker H, was higher than the nPVI values for NigE speakers. This is even more evident in the overall mean, as the average nPVI for Fulfulde is higher than that for NigE. In other words, the difference in duration between adjacent vowels is relatively smaller in NigE than in Fulfulde. Figure 4.1 compares the nPVI averages obtained for Fulfulde and NigE.
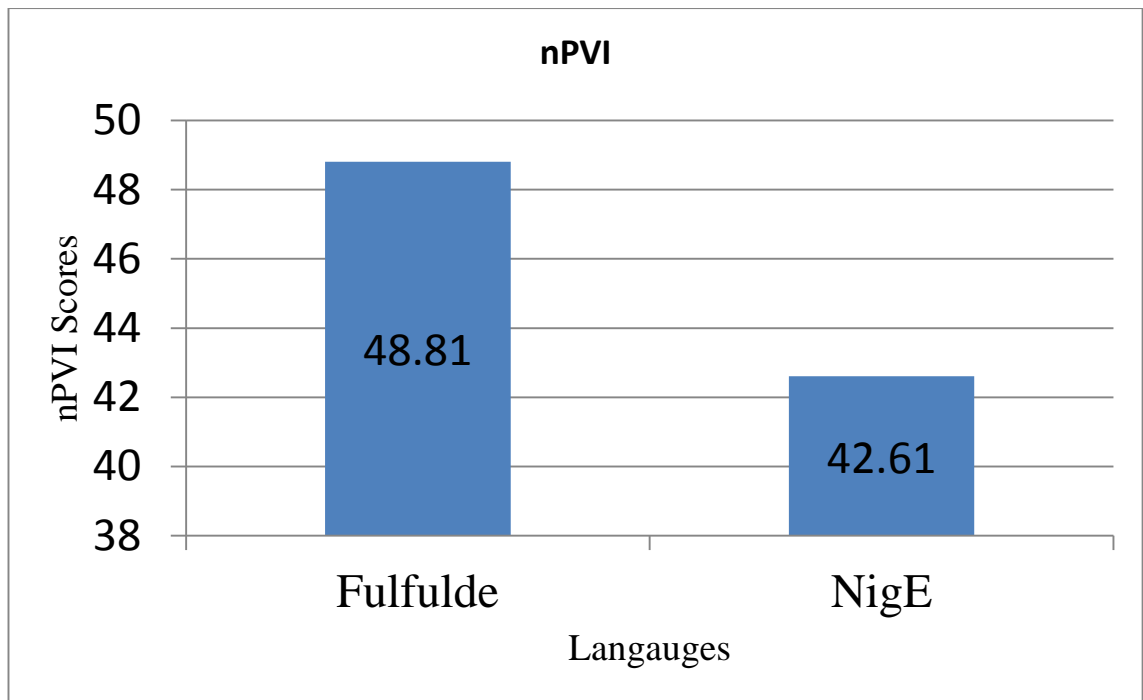
Figure 4.1: The nPVI average for Fulfulde and NigE

On the other hand, Figure 4.2 compares the Varco V averages for Fulfulde and NigE. In terms of Varco V, the results obtained for both languages are similar to the findings for nPVI. Apart from NigE speakers G, and H, all Fulfulde speakers produced higher Varco V scores compared to the rest of the NigE speakers. That means there are more variations in the overall vowel duration in an utterance for Fulfulde speakers than for NigE speakers.
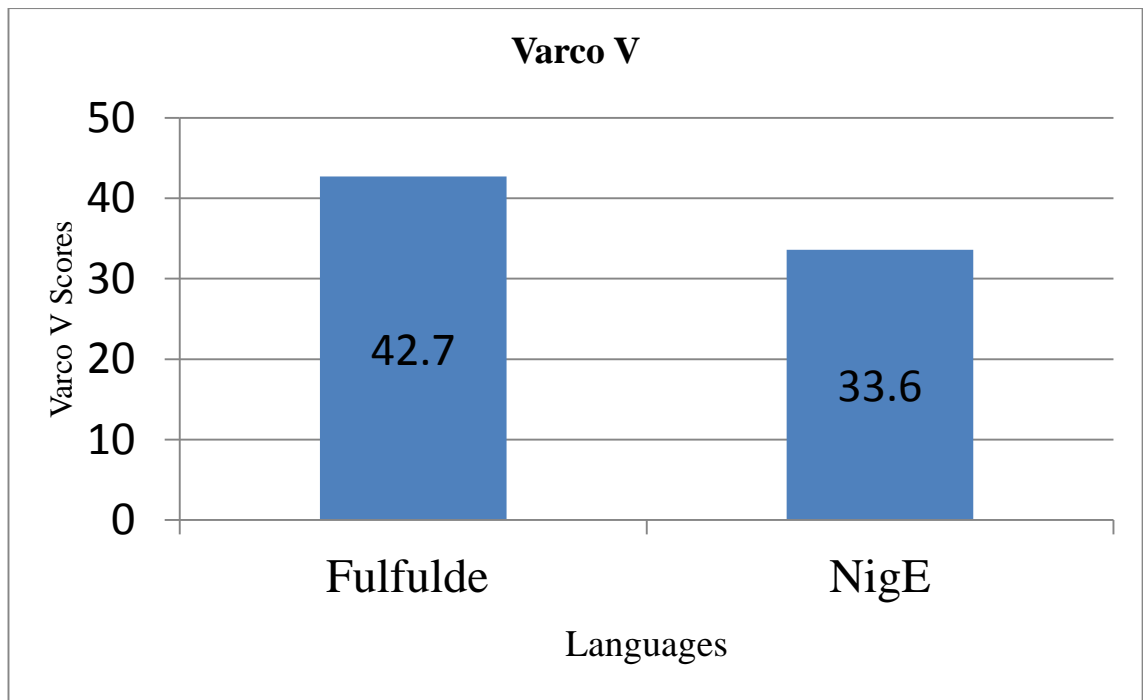
Figure 4.2: The Varco V average for Fulfulde and NigE

The higher mean for Varco V found in Fulfulde (42.73) compared to the mean for NigE (33.59) shows that NigE is more syllable-timed than Fulfulde. This is to say, if the standard deviation of vocalic durations in an utterance is taken into consideration, more variations are likely to be found in Fulfulde than in NigE.

In comparison with the findings of Grabe and Low (2002), the average nPVI score for Fulfulde shows that Fulfulde pairs with the syllable-timed French, and the mixed or unclassified languages such as Catalan, Polish, Romanian and Welsh, which in Grabe and Low, had nPVI values between 40 to 50. Gut et al. (2001) found that three African languages (Ibibio, Anyi and Ega) exhibit a syllable-timed rhythm. In comparison, the average for Fulfulde in the present study pairs with the averages obtained in both Rhythm Index (RI) and Rhythm Ratio (RR) for the three languages.

As for NigE, the average nPVI shown in Table 4.1 confirms earlier studies suggesting the rhythm of NigE to be syllable-timed. Both Udofot (1997) and Gut (2001) suggested that NigE shows features of syllable-timed rhythm which is in contrast to the prototypical

stress-timed varieties such as BrE. Both researchers opined that vowel reduction is less pronounced in NigE which leads to a perceptual impression of more equal weight and length of each syllable. Similarly, this investigation shows that pairs of consecutive vowels are similar in duration, thus making the nPVI scores for the speakers to be lower. In further comparison, the rhythm of NigE as spoken by the subjects of this study is similar to other varieties of English around the world. For instance, Tan and Low (2013) compared Malaysian English (MalE) with Singapore English (SgE) and in their results, the nPVI mean for MalE speakers in read speech was 41.21 while SgE speakers had a mean nPVI scores of 47.30 suggesting that both MalE and SgE are syllable-timed. In this perspective, it appears that the mean nPVI score for MalE (41.21) in Tan & Low is similar to the nPVI mean obtained in this study for NigE speakers (42.61). The Varco V scores for Fulfulde as well as that for NigE appear to be similar to the scores obtained for the syllable-timed French in Dellwo (2006), and other varieties of English such as MalE and SgE in Tan and Low (2013).

However, a closer examination of both the nPVI and Varco V scores for individual NigE speakers reveals some moot points. Figure 4.3 shows the variation in scores obtained for the speakers NigE in both nPVI and Varco V. The variation of scores of respondents who are native speakers of various Nigerian indigenous languages was glaring.
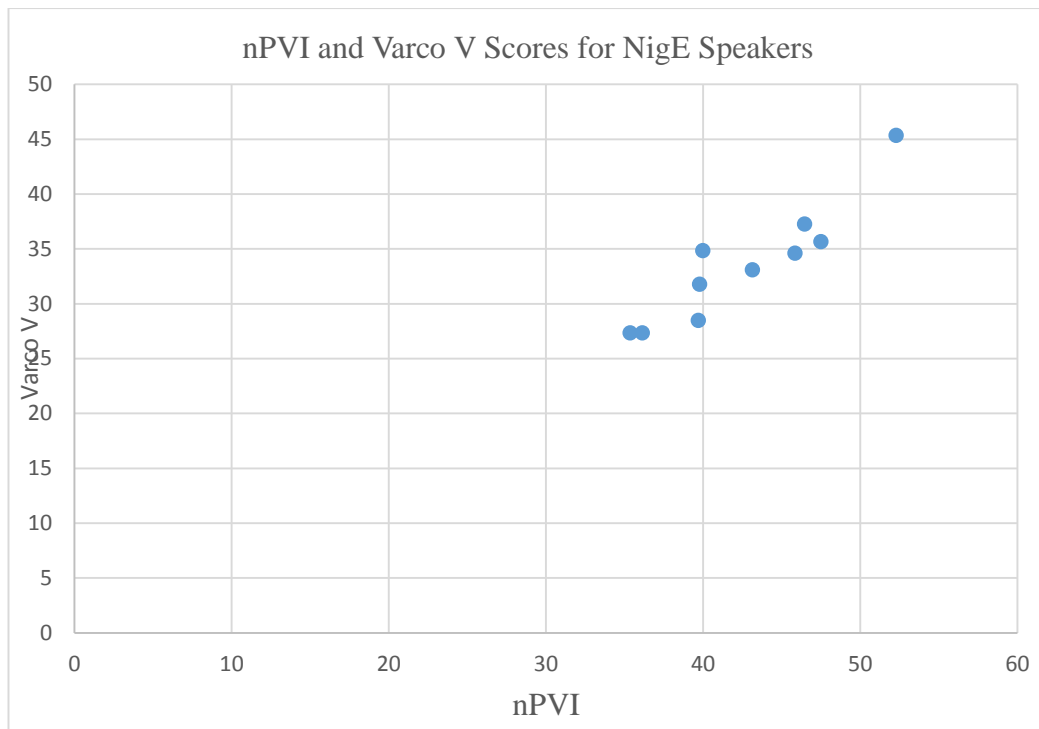
Figure 4.3: nPVI and Varco V Scores for NigE Speakers

For instance, the least nPVI score, 35.35 was produced by speaker A, an Ibibio native, while the highest scores 52.29 was produced by speaker H, a Hausa native. Conversely, it was interesting that speaker A, who is an Ibibio speaker produced similar scores with speaker E, who is an Efik native, noting that Ibibio and Efik are very similar languages to the extent that they can be confused by most laymen to be the same language. Similarly, speakers B, (Edo), F, (Yoruba) and J, (Igbo) produced similar nPVI scores. However, unlike Efik/Ibibio, Edo, Yoruba and Igbo languages are not closely related. On the contrary, none of the Hausa natives produced scores close to those produced by native speakers of other languages included in this study, as all of them had nPVI values ranging from 43 to 52.

However, the question of whether the native languages of the speakers were responsible for these variations is not investigated in this study. This might call for an in-depth investigation to find out, if acoustically, NigE could be treated from the perspective of

the native language. This assumption would be traced back to Jibril (1986) who opined that variety differentiation within NigE could be seen from the grounds of the native language of the speaker. Although this claim has not been acoustically verified so far, several researches have attempted to investigate the influence of first language (L1) on the rhythm of second language (L2) and some interesting findings are coming out of these investigations.

4.5. Summary

The results of this study and the discussions provided thereafter, form the whole of this chapter. The analysis of the translated text was provided with sentence to sentence and word to word translations, as well as discussions on its advantages and disadvantages in measuring rhythm. nPVI results (section 4.2) and Varco V results (section 4.3) for both Fulfulde and NigE were summarized in tables 4.1 and 4.2 respectively. These results were discussed in section 4.4 which is the last section of the chapter, where nPVI and Varco V results obtained for both Fulfulde and NigE were compared in figures 4.1 and 4.2 respectively.

Chapter 5

CONCLUSION

This chapter provides the summary of the research findings in relation to the research questions set for the study. It also contains a section on the limitation of the study and a section on the implication of this study to future research.

5.1.   Summary

The aim of this study was to use instrumental methods in describing the rhythm of Fulfulde in comparison with Nigerian English. To achieve this, three research questions were set to be answered, thus;

      i.   What are the acoustic correlates of the rhythm of Fulfulde?

Less variation of vowel duration is found in Fulfulde; therefore the rhythm is syllable-timed. The results presented in Tables 4.1 and 4.2 showed that the rhythm of Fulfulde can be described as syllable-timed especially when it is compared with the results of studies available in the literature (see section 4.4). The individual scores as well as the mean nPVI scores for Fulfulde speakers show that there is not much variation in adjacent vowels. The Varco V results confirm this as the normalized standard deviation of the vowels in an utterance tends to be low.

ii.   How does the rhythm of Fulfulde compare with the rhythm of Nigerian English?

Although the rhythm of Fulfulde is syllable–time, but if compared on a continuum, Fulfulde tends more towards stress-timed compared to NigE. In other words, the results of this study show that the rhythm of Fulfulde is less syllable-timed compared to the rhythm of NigE. Figure 4.3 compares both the averages of nPVI and Varco V obtained for Fulfulde and NigE.
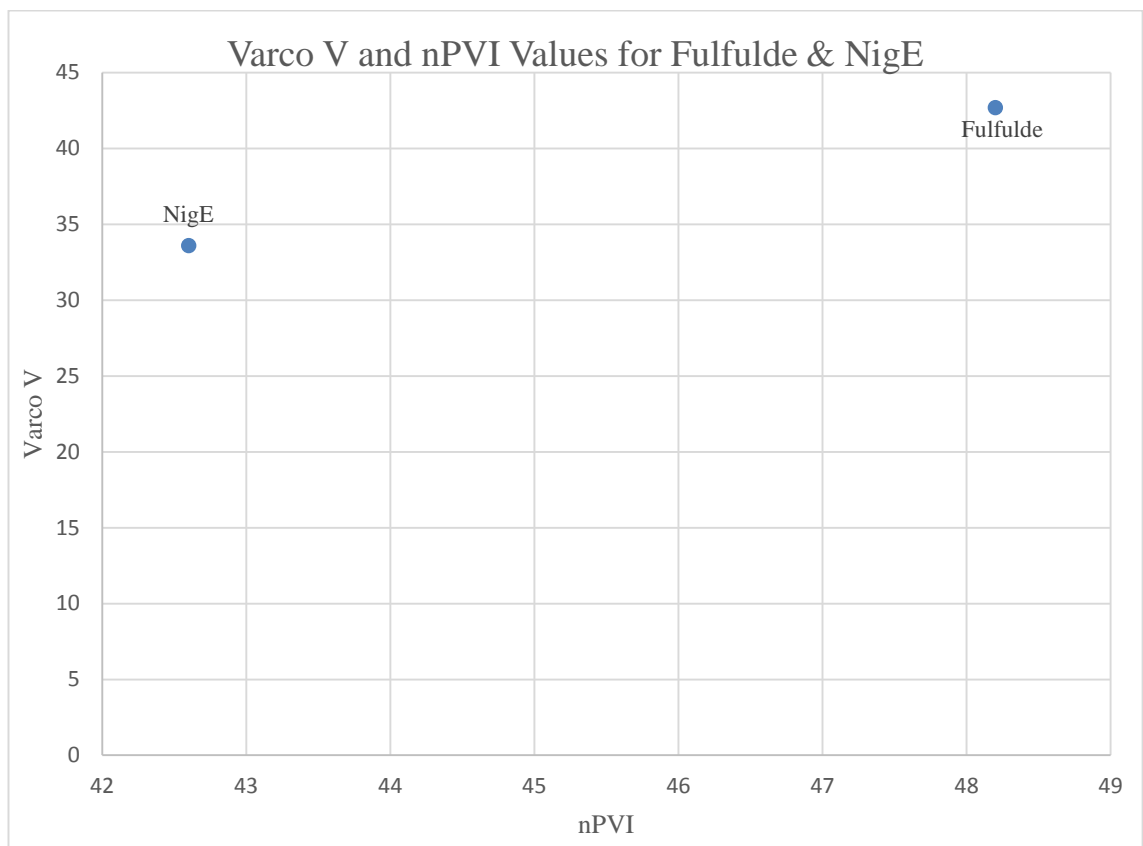
Figure 5.1: The nPVI and Varco V averages for Fulfulde and NigE

Comparing the mean nPVI (48.81) and mean Varco V (42.71) obtained for Fulfulde speakers, and mean nPVI (42.61) and mean Varco V (33.59) obtained for NigE speakers show that Fulfulde exhibit more tendencies of stress-timing than NigE. For nPVI, Fulfulde shows more variability of successive vowels, resulting in higher nPVI values than NigE. As for Varco, the standard deviation of the vowels that has been normalized

94

for speech rate shows that the overall variation of vocalic durations in an utterance is higher in Fulfulde than in NigE. Base on the rule that the higher the PVI or Varco V score, the more stress-timed a language is, it can be concluded that Fulfulde is more stress-timed than NigE.

    iii.   To what extent does the translated text lends itself to be used as an instrument in the study of rhythm?

The text 'Henndu Dabbunde e Naange' is found to be adequate for measuring rhythm as it contains almost all the vowels and consonants of Fulfulde with few initial approximants and few consecutive strong syllables. The translated 'North Wind and the Sun' has been analysed in terms of the occurrence of segmental features (vowels and consonants) of the language, sequences of approximants and alternations between strong and weak syllables. What was found was that the text can be adequately used as an instrument in measuring rhythm. This is because PVI, Varco V and other segmental based metrics rely on either vocalic or consonantal durations to measure the rhythm of a language.

When measuring vocalic durations, this text would be adequate to some extent, since all the 10 Fulfulde vowels have appeared several times and in various word positions. This would allow measurement of all the vowels as well as measuring them at various syllable positions. Similarly, all, except one of the 8 Fulfulde diphthongs have appeared in the text. The missing diphthong is /ʊɪ/ as in the word /wʊɪɓɛ/ "thieves". Thus the vowel inventory of Fulfulde is nearly covered such that it is made possible to measure almost all of the vocalic sounds in the language. Similarly, all the 27 Fulfulde consonants have appeared in the text except /ʔj/ as in the word /ʔjakka/ "to chew". Therefore, future studies that would take consonants into consideration will find the text applicable and useful as well. Problems associated with this text particularly in measuring rhythm include initial

approximants /w/ and /j/ in three words and some few cases of consecutive strong syllables.

5.2. Limitations

Just as it is true that any other research work has limitations, this investigation too is not without one. The first attempt made upon conceiving the idea of this study was to compare Fulfulde with Ibibio, another Nigerian native language, the rhythm of which was investigated by Gut et al. (2001). Unfortunately, this idea did not come to reality due to some unforeseen circumstances. Therefore, NigE, the rhythm of which was also described by Gut (2001) was chosen as the basis of comparison. Another limitation is the number of speakers recorded for the study which limits the speech samples used in the data.

Third, in measuring the rhythm of languages, researchers have considered various phonological constraints including consonants, syllables and vowels as well as different speech contexts such as read, spontaneous and semi-spontaneous speeches. In this study, only vowels and read speech were measured, thus consonants and other phonological features as well as other speech contexts were not considered. Similarly, this study only looked at rhythm from the perspective of timing which though is a necessary quality of rhythm but is not the only one. Fulfulde is a language with a very wide geographical coverage in Africa with several dialects some of which are yet to be documented. In Nigeria, three dialect areas were identified in the literature, but this study only covered the Adamawa dialect of the language, thus speakers of other dialects were not measured.

5.3. Implication for Further Research

In terms of acoustic study, a lot is yet to be invested in Fulfulde phonology. In fact, most works that are readily available on Fulfulde phonology are mainly perceptual and as far as I know, nearly all the descriptions provided so far are impressionistic. This investigation may have opened the door for acoustic analysis of Fulfulde phonology, both segmental and suprasegmental. Similarly, further research on the rhythm of the language may consider measuring other phonological features such as consonants and syllables by using various other rhythm metrics. Inter-dialectal investigation is also a feasible area for future research. As for NigE, the result of this study showed some variations among speakers of different native languages. Future research may aim at finding out if actually the rhythm of NigE can be acoustically measured based on the native language of the speaker.

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M A L A Y A
KUALA LUMPUR

Dear respondent,

You are invited to participate in the study on Fulfulde and Ibibio phonology. Please read the following information carefully.

1. The purpose of this research is to study some phonetic/phonological features of Fulfulde and Ibibio languages. You are nominated to participate in this study because you are a native speaker of Fulfulde/Ibibio.
2. If you decide to participate, you will be invited to Radio Gotel, Yola for the purpose of recording.
3. In the process of data collection, you are expected to read a particular passage in Fulfulde/Ibibio while we record your voice for measurements.
4. We understand that it may not be convenient for you to come to the venue, but this is important because it involves sound recording which needs some gadgets that are only available to us at the radio station.
5. For this reason, I will settle your transport fare or provide some incentives when needed. I will take care of other costs that may come your way while you are with us.
6. Any data obtained during this study is completely confidential and will only be used for the purpose of this study.
7. Your identity and all information you provide will be kept anonymous.
8. Your decision to participate or not will not prejudice your relationship with the researcher or his institution, and you are free to withdraw yourself at any point in time.
9. If you have any inquiry please contact AHMADU SHEHU (+60163731931, +2348038579762 or email ahmadshehu@siswa.um.edu.my)
10. You are please required to decide whether you want to participate or not. Your signature below indicates that you have read the above information and have independently decided and personally agreed to participate in the research.
11. You can withdraw freely from this research without penalty, damages or loss of benefit to which you were entitled before signing this form.

Sign………………………….   Date…………………

Name:……………………......

APPENDIX II

Henndu Dabbunde e Naange

Henndu dabbunde feewndu e naange ngeddootirii dow moye ɓuri nyaaɗugo. Henndu wi'i ɓurii naange nyaaɗugo nden naange maa wi'i ɓurii henndu nyaaɗugo. E ɗum nder geddi ɗin sey jahoowo wari e ɓornii toggoore jaangol. Nde henndu e naange eewi jahoowo, sey naange e henndu mbi'i "yawwaa" hannde en ittay geddi". Artuɗo ɓortugo goɗɗo o'o toggoore maako fuu kanum ɓurin yaaɗugo. Ɗonni henndu fuɗɗi fuufuki peewol ngam ndu waɗa mo o ɓortoo toggoore maako. Nde o nani peewol henndu kam ɗon maa o ɓesdi taaraago nde. Ngam non sey henndu tampi no waɗa, tiiɗal maaru nafaay, doole maaru ndu munyi. Ɗon e ɗon naange fuɗɗi kuugal maage. Habaa, nde naange meeɗi fettoygo nguli maage kam, sey ɗon e ɗon jahoowo kam ɓortii toggoore maako ko yaawi. Ngam non geddi timmii, ɓe fuu ɓe ciwtake henndu goŋɗinii naange ɓurii ndu nyaaɗugo.

APPENDIX III

The North Wind and the Sun

The North Wind and the Sun were disputing which was the stronger, when a traveller came along wrapped in a warm cloak. They agreed that the one who first succeeded in making the traveller take his cloak off should be considered stronger than the other. Then the North Wind blew as hard as he could, but the more he blew the more closely did the traveller fold his cloak around him; and at last the North Wind gave up the attempt. Then the Sun shone out warmly, and immediately the traveller took off his cloak. And so the North Wind was obliged to confess that the Sun was the stronger of the two.