



**LEXICAL AND GRAMMATICAL FUNCTIONS OF TONE IN RELATION TO ITS
BACKGROUND FACTORS:
A CASE OF PAYIRA VARIETY OF ACOLI**

BY

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DECLARATION

I, Obwona Byron, hereby declare that this is my original work, and that it has not been submitted for the award of a degree in any other university.

Sign: 

Date: 4.11.2022

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DEDICATION

I dedicate this work to my kind and loving mother, Mego Christine Langol.

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LIST OF ACRONYMS

ATR	-	Advanced Tongue Root
+ATR	-	Plus-Advanced Tongue Root
-ATR	-	Minus-Advanced Tongue Root
R1	-	Respondent One
R2	-	Respondent Two
R3	-	Respondent Three
R4	-	Respondent Four
UCLA	-	University of California Los Angeles
NCDC	-	National Curriculum Development Centre
Hz	-	Hertz
LH	-	Low-High
VC	-	Vowel-Consonant
FC	-	First Category
SC	-	Second Category
TC	-	Third Category
C1	-	Category One
C2	-	Category Two
C3	-	Category Three

ABSTRACT

This study addresses the broad question on the functions of tone with close attention to some of its qualities, that is, the background factors, in distinguishing lexical and grammatical items in the Payira variety of Acoli. The background factors investigated in the study were tone height, tone duration, and advanced tongue root hereafter referred to as ATR. Much as a number of scholars such as (Oyaro, 2020), (Okidi, 2016), (Malandra, 1955), (Swenson, 2015), and (Crazzolaro, 1935) had done commendable work in the study of Luo in general and Acoli in particular, limited literature is available on the lexical and grammatical roles of tone with regard to the aforementioned background factors in the Payira variety of Acoli. The general objective of this study was to examine the role of tone when it interacts with qualities like tone duration, tone height, and ATR as background factors in distinguishing lexical and grammatical items in the Payira variety of Acoli. Specifically, the study set out to describe the role of tone when it is affected by tone duration in distinguishing lexical and grammatical items in the Payira variety of Acoli, to describe the lexical and grammatical roles of tone when it interacts with –ATR and +ATR vowels in the Payira variety of Acoli, and to describe the role of tone height in the Payira variety of Acoli in distinguishing lexical and grammatical items. The study employed the descriptive research design; and a mixed-method approach to data collection and analysis: that is, qualitative and quantitative methods. Based on the findings of the study, tone in itself (high or low) was found to be insufficient in accounting for the various realizations of lexical and grammatical items in the Payira variety of Acoli. The underlying mechanism for the said variety of realizations of lexical and grammatical items in the Payira variety of Acoli according to this study were determined to be the inherent aforementioned background factors. And finally, the results attained attest to the fact that tone works in concert with other qualities like tone height, tone duration, +ATR and -ATR in distinguishing lexical and grammatical items in the Payira variety of Acoli. Suggestions are made on that note on areas that require further research which included the significance of stops and pauses in determining meaning, integration of tone and its markings in grammar, and using a bigger sample size to carry out a comprehensive study in Acoli entirely to ensure a dependable conclusion and a unified stand.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

Tone is one of the supra-segmental features inherent in languages. Much as tone is inherent generally in languages, some languages make use of it for lexical and grammatical functions. Hornby (2015), defines tone as the pitch of a syllable in speech. It is a phenomenon that has been studied widely especially in the field of linguistics for various reasons, but one outstanding reason for studying this aspect has been to gain insight into the mode of its operation in the various languages that use it for phonological functions. Tone is used in various languages as a mechanism for distinguishing the meaning of lexical items, grammatical items, and pronunciation.

A tonal language is a language in which differences in the meaning of words and/or sentences can be signaled by differences in pitch (Kaye, 1989). According to (Cayne, 1979), tonal languages are languages in which pitch variation and pauses give identical words/word forms different meanings. For Pike, as cited in (Sprig, 1977), “A tonal language may be defined as a language having lexically significant, contrastive but relative pitch on each syllable.”

There are a number of tonal languages in the world, which include among others Mandarin Chinese, Acoli, Cantonese, Vietnamese, and Burmese (Greenberg, 1955). These languages have and use different mechanisms of operation which generally make good use of the inherent background factors or qualities such as tone duration, voice quality etc.

Background factors in this case are the set of influences and environment, that is, information preceding the consideration of an event and helpful to a better interpretation of a problem (Cayne, 1979).

Acoli is a language that falls under the family of Luo languages predominantly spoken in northern Uganda (Acoli sub-region) in north-central Uganda and in Magui County in East

Equatorial State, South Sudan: its ISO code is 639-2 ach and 693-3 ach/Thur (Ethnologue, 2017). It is a tonal language, which, according to (Hinnesbusch, 2017), falls under the Western Nilotic languages of the Eastern Sudanic sub-group of the Nilo-Saharan family. Acoli is spoken by roughly 2.1 million speakers; about 1.47 million speakers in Acoli sub-region in Uganda (UBOS,

2016), and 650,000 people in Magui County, East Equatorial State in South Sudan (Ethnologue 2017).

Acoli as a language has got a number of varieties, with some being similar in nature, and others more varied. Geographically as well as genetically predisposed factors may be useful in trying to account for this variation. A number of varieties that are spoken around border areas like Agoro, Lamogi, Atiak, and so forth, are more compromised due to the influence of the border languages. Other varieties such as the ones spoken by Payira, Patiko, Paico, Bwobo and Alero clans have been least affected by external linguistic influence (Odonga, 2012).

Payira as a variety of Acoli was zeroed in on for this research as pointed out in the preceding paragraph because it is a more reliable variety of Acoli since it has not been much influenced by other languages. It is also the largest language variety in Acoli which falls within the central zone (Atkinson, 1999), but has received no (limited if any) attention in as far as the role of tone with regards to its background factor(s) is concerned in determining the lexicon and grammar of the language.

1.2 Background to the Study

Acoli being a language that falls under the Luo language family needs clarification on the background factors of tone that aid articulation and the various realizations of the grammatical and lexical items. This study highlights three background factors of tone that are found to be the most influential in the said articulation and realization. These background factors are tone duration, tone height, and +/-ATR vowels.

This, therefore, means that two seemingly identical words in the Payira variety of Acoli can actually mean different things depending on the tone of their vowels, that is, tone is used to distinguish meaning of words. In the Payira variety of Acoli tone plays a role in distinguishing lexical and grammatical items and meaning (NCDC, 2014) for example:

Lexical

kál	‘millet’	kàl	‘headquarters’
ráá	‘dry grass’	ràà	‘hippopotamus’

Grammatical

àbêdò ‘I am seated’ present perfective

àbédò ‘I sit all the time’ habitual

Meanwhile, Malandra (1955) calls one quality of the vowels in Acoli ‘open’ and the other ‘close’:

keto pronounced with ‘close e’ (phone. Keto) (to put)

keto pronounced with ‘open e’ (phone. keto) (to scatter)

The challenge is that only two realizations are dealt with as viewed from the examples above, that is, only tone is considered with one being high, as in *kal* /kál/ ‘millet’, and the other low as in *kal* /kàl/ ‘headquarters.’ This brings to question, what mechanism/factor is responsible for the following realizations *ngol* /ŋòl/ ‘disability’ *ngol* /ŋól/ ‘verdict’ *ngol* /ŋó:l/ ‘you cut’. The researcher being a native speaker of the language, quickly realized that a simple experiment shows that the /o/ in *ngol* /ŋó:l/ ‘you cut’ is longer than the /o/ in *ngol* /ŋól/ ‘verdict’ notwithstanding the fact that there are tone markings already on those items; which then follows that, the duration of tone is a quality which potentially plays a role in the lexical as well as grammatical realization in the Payira variety of Acoli language.

Noonan (1992) postulates that Lango, a language which shares over 80% of its vocabulary with Acoli has both +ATR and -ATR vowels. This is in tandem with the findings of (Crazzolaro, 1938) who also clearly made a distinction between +ATR and -ATR vowels in Acoli.

However, much as other subsequent scholars for instance (Malandra, 1958) in his work as shown in the following examples *keto* pronounced with ‘close e’ (phone. *keto*) (to put) *keto* pronounced with ‘open e’ (phone. *keto*) (to scatter) seemed to create a substantive distinction between the phonemes used that is, the /e/ in *keto* “to put” and *keto* “to scatter” as shown in the examples in the previous paragraph.

Much still needs to be done regarding the lexical and grammatical roles played by these qualities of being either ‘close’ or ‘open’ in concert with tone. This is because tone is not included by Malandra in the scope of his work in coming up with such qualities. This only makes the appreciation of Acoli as a tonal language more difficult, as it would seem like lexical or

grammatical items can be realized independent of tone which should be the basis for any form of analysis in any tonal language.

The quality of being either ‘open’ or ‘close’ posited in (Malandra, 1955) are exactly the same with the two vowel categories first postulated by (Crazzolaro, 1938) as shown below:

Table 1:-ATR Vowels in Acoli

	Front	Central	Back
near-close	ɪ		ʊ
mid-close	ɛ		ɔ
Open		a	

Table 2: +ATR Vowels in Acoli

	Front	Back
close	i	u
mid-close	e	o
open		ɑ

Therefore, it is clear that the quality of being ‘open’ or ‘close’ as postulated by (Malandra, 1955), and +ATR and - ATR vowels postulated by (Crazzolaro, 1938) are addressing the same issue, because, a simple reading of words made up of those vowels/qualities reveal that they only differ in nomenclature. The roles they play in a tonal language in as far as lexical and grammatical functions are concerned is left out. This is because no mention of their interaction with tone is made in both studies for instance, pointing out the fact that voice quality which is referred to as

close and open respectively, and ATR interact with say a high or low tone to bring about a particular lexical or grammatical distinction would be a plausible stance with regard to this particular study. It, therefore, means there is need to look at those background factor(s) and their interaction with tone to show the lexical and grammatical roles they play in the Payira variety of Acoli using a more reliable tool like Praat, as opposed to the methods used in the studies done so far using only traditional methods like bare-ear listening/impressions and transcription.

1.3 Statement of the Problem

Whereas a number of scholars such as (Swenson, 2015), (Okidi, 2016), (Malandra, 1955), (Crazzolaro, 1935) and (NCDC, 2014) have done commendable work in the study of Luo generally and Acoli in particular, not much is available in literature that examines the lexical and grammatical roles played by tone and its background factors in the Payira variety of Acoli. No description of the lexical and grammatical roles played by –ATR and +ATR vowels in the Payira variety of Acoli; description of tone duration in the Payira variety of Acoli in relation to how it distinguishes lexical and grammatical items, and finally description of tone height in the Payira variety of Acoli in relation to how it distinguishes lexical and grammatical items have been done. This is key because much as the mentioned factors, that is, +ATR and -ATR, tone height, and tone duration had been studied or identified in those previous studies, they were not examined in relation to tone and how they play a role in the lexicon and grammar of the language as the studies considered those qualities in isolation without relating it in any way to tone.

1.4 General Objective

The general objective of this study was to describe the functions of tone when it interacts with some of its background factors in the lexicon and grammar of the Payira variety of Acoli.

1.4.1 Specific Objectives

The specific objectives of the study were:

- I. To describe the lexical and grammatical functions of tone when affected by tone duration in the Payira variety of Acoli;
- II. To describe the lexical and grammatical functions of tone height in the Payira variety of Acoli;

III. To describe the lexical and grammatical functions of tone when influenced by –ATR and +ATR vowels in the Payira variety of Acoli.

1.5 Significance of the Study

The study was deemed significant because it will inform people’s understanding of the language (Acoli) as a tone language, and support autodidacts in their quest to learn the language. It will also provide pedagogical recourse in the course of instruction in schools by providing a reliable description of a key aspect of the language, that is, tone and its roles. This is because the study ably described tone height, tone duration, and +ATR and –ATR vowels in relation to the lexical and grammatical roles they play in the Payira variety of Acoli when they interact with tone. Lastly, the study pointed out the gaps that are still glaring in the language which can guide further research, for instance, the need for the incorporation of tone into the orthography of the language. This is through the suggestions made on aspects that should be included to ease the burden inherent in reading a tonal language.

1.6 Justification of the Study

This study was necessary because the preceding studies done on the language for instance (Swenson, 2015), (Okidi, 2016), (Malandra, 1955), and (Crazzolaro, 1935) addressed and applied tone in isolation without the integration of the background factors, or the lexical and grammatical roles they play in the Payira variety of Acoli. This study, therefore, streamlined the oversight and filled the gap by addressing the challenges that people face while reading materials in Acoli as in most cases they are unaware of the tone in use or the underlying background factor(s) at play.

1.7 Theoretical Framework

The study employed the Acoustic Theory of Speech Production. This theory was formulated by (Helmoltz, 1885). The theory maintains that the speech production process comprises two components. That is, the sound convolution as it is, and formation of phonetic quality. Some of the qualities being pitch, amplitude and frequency.

The second aspect of the theory states that phonetic quality of sounds is shown by formants (maximum of the speech signal spectrum). According to Bende (1974), ‘The peaks that are

observed in the spectrogram envelope are called formants.’ The formants were utilized in this study to measure tone height that is minimum and maximum pitch of a sound denoted by the formant.

Acoustic theory of speech production is therefore useful in revealing the physical phonetic properties of those speech sounds such as voice quality and pitch. Analysis of these phonetic properties of the sounds is useful in identifying visible evidence of the differences that exist between the sounds. For instance, pitch can be used to distinguish between low and high vowels.

The thesis in this theory was later developed into the Filter Model. The principle in this model states that pharyngeal action (source of sound) can be associated with the vocal tract resonance. The basic resonance chambers are therefore the pharyngeal resonance chamber and the oral resonance chamber. Modification of the resonance cavities results in harmonic clusters known as formants. The modification of sounds in the pharyngeal resonance chamber gives out some distinct qualities for each sound. This study especially utilized the quality of the sound being either creaky or not to distinguish between +ATR and –ATR vowels. This is because according to (Noonan, 1992) + ATR sounds are generally creaky and –ATR sounds are not.

The Acoustic Theory, therefore, sufficiently encapsulated and analyzed the three background factors working in concert with tone to bring about the lexicon and grammar of the Payira variety of Acoli in this study. This was especially made possible through the usage of Praat, which as initially pointed out, was purposely designed for acoustic analysis.

1.8 Scope of the Study

The scope of the study entails the study objectives, geographical and content scope, sampling method and the theoretical framework.

1.8.1 Depth (Objective(s))

The study examined the lexical and grammatical functions of tone when affected by its background factors in the Payira variety of Acoli. These background factors included tone height, tone duration, and advanced tongue root (+/-ATR).

1.8.2 Content Scope

The study covered the role of tone when it interacts with its background factors in distinguishing the lexicon and grammar of the Payira variety of Acoli. This was done by describing the functions of three background factors that is tone height, tone duration, and ATR.

1.8.3 Theoretical Coverage

The Acoustic Theory of Speech Production was used in the study because the study focused on aspects of sound which are acoustic in nature for instance pitch as denoted by the minimum and maximum height of the sounds under investigation, tone duration denoted by the duration of the vowel being measured, and voice quality as perceived by critical listening (the sound being creaky or not) in the course of analysis of the vowels involved. These qualities were analyzed using Praat, a software that was purposely designed for the analysis of sounds.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter presents the related literature reviewed, the gaps identified in the literature reviewed, and the questions that guided the study.

2.2 Background Factors

In consideration of what may be taken to be the background factors, Luo especially, has been highlighted due to its unique speaker variability into Advanced Tongue Root (ATR) articulation, shown by Jacobson's radiographic studies of three Western Nilotic languages: Shilluk, Dinka and Luo, (Jacobson 1978, 1980). Jacobson performed x-ray of speakers' vocal tracts and oral cavities as they produced the vowels found in their own sound inventory, in order to determine the articulatory mechanisms used in ATR vowels.

Jacobson (1978, 1980) concluded first that four different mechanisms were being used to create ATR distinctions: tongue height, tongue root advancement or retraction, dilation or constriction of the pharyngeal cavity, and laryngeal displacement. Second, he concluded that not only do speakers vary from language to language in which the mechanisms are used to produce ATR qualities, they may also vary among the speakers of the same language.

In contrast, Shilluk in Jacobson's study uses the mechanism of tongue advancement and laryngeal displacement. Dinka hardly utilizes these four mechanisms at all but alters voice quality of its vowels by modifying the sound source, i.e. vocal fold vibration. Luo speakers in contrast can be shown to use any of the four mechanisms to produce ATR feature distinctions, and articulation of ATR varies widely between speakers. This is a testament to the confusion that is still carried forward to this day in the language; as no specific mechanism can be pointed to as containing comprehensively the substantive factors responsible for the articulation and realization of lexical and grammatical items in the language (Luo).

2.3 Tone Bearing Unit (TBU)

As noted by Yuan (2004), "Tone is realized and synchronized with its tone bearing unit." This means that tone can only practically exist together with its bearing unit. If any effort at the analysis of tone is to be made; then tone cannot be analyzed in isolation from the unit that bears it.

The tone bearing unit is the moraic segment, or equivalently, the segment in the rime, whether it is a vowel or any consonant. This position is backed by the fact that in many languages, such as LuGanda (Clements 1986), the TBU is not the syllable, but the mora. Consider a case in LuGanda (Clements 1986):

- a. kùlábà 'to see'
- b. kùlábìká 'to be visible'
- c. kùlíNNá 'to climb' (N is palatal nasal)
- d. kùcóppá 'to become a pauper'

When you consider the examples above, especially c., you realise that the NN in kùlíNNá 'to climb' is treated as a mora. If the notion that the TBU can be a consonant sound is to be valid, then the mora referred to in example c. above, though being consonants, should bear the tone directly and not just by association. It is plain though from examples a. to d. above that tone cannot be directly marked on the consonant sound even if it is part of a mora.

The question is whether the TBU can be the syllable or the rime in other languages, as Yip (1989) and Bao (1990) suggest. It is possible that the TBU parametrically varies from language to language. There are three proposals, the syllable or the rime (e.g. Yip 1980, Bao 1990), the mora (Hyman, 1984), and the segment in the rime (Woo, 1969).

Much as tone is present in every language in the world, it does not necessarily make every language in the world a tone language. For a tone language like Mandarin the tone is confined to the syllabic vowel and any segment that may follow it in the syllable.' (Howie, 1976).

Auto-segmental phonology has great emphasis on the question of representation. The fundamental principle in (Goldsmith, 1976) governing tone vowel linkages is the well-formed-ness condition which states-

All vowels are associated with at least one tone;

All tones are associated with at least one vowel;

Association lines do not cross.

According to the theory, it is preferable to link an unassociated tone with a vowel.

Acoli is a tone language which has not been researched on specifically to establish whether it is a mora driven language or vowel driven language. This being the case, and the fact that it is impossible to mark tone directly on a consonant sound as seen in Luganda: I take the position of Yip (1989) that the syllable is the tone bearing unit. A syllable is marked by a vowel sound and as such, I will mark tone on the vowel of the syllable. This will allow each of the word forms being analyzed in this study to receive due attention.

Lastly, existing literature on Acoli as a language so far including the Acoli Dictionary written by Blackings mark tone on the syllable (vowel). I believe marking tone on the vowel sound is sufficient in carrying out analysis on tone in the language.

2.4 Tone Duration

The interaction of tone with tone duration is illustrated on the basis of Stegen’s investigation of Rangi (Bantu, ISO 639-3, Code F. 33), with the claim that “At syllable level, Rangi has Low, High, Fall and Rise tone categories. But the two contour tone patterns, Fall and Rise are only found on syllables with a long vowel (Stegen, 2002). It follows then, that, according to (cf. Odden, 1995), a syllable with a long vowel can accommodate a contour (two target) tone category, whereas a syllable with a short vowel cannot.

mùkùvù	‘naval’	ibátà	‘duck’
bàankà	‘room’	ibâandà	‘hut’

According to Swenson (2015) tone duration is also phonemic in Luo, with grammatical and lexical implications. Bert (2014) notes that tone duration, stress, and the segmental composition of the syllable affect tone in similar ways because all three may influence the degree of phonetic prominence. Bert (2014) further notes “Consider the combination of tone with a tone duration contrast. When two levels of tone duration (short, long) are crossed with sets of tone patterns, such a system represents a greater challenge, because both the production and perception of tone depends on duration.”

As noted by Yuan (2004), “Tone is realized and synchronized with its tone bearing unit.” Because the tone bearing unit of tone in Acoli is the syllable as marked by the specific vowel sound. The

length of the vowel was measured to determine the tone duration in a given context as can be seen on the items in Appendix III.

It is imperative to note that (NCDC, 2014), (Malandra, 1955), (Crazzolaro, 1938) and the various studies carried out on Acoli do not have the description of tone duration as an aspect of tone in Acoli that also play very important lexical and grammatical role. The examples seen below are what I have observed as a native speaker of the language to show that, much as tone duration has not received much attention in regards to its lexical and grammatical roles in the language, these roles are existent-

nyòm	(short)	‘marriage’
nyó:m	(long)	‘you marry’

The examples above clearly show that the word *nyòm* (short) ‘marriage’ differs from the word *nyó:m* (long) ‘you marry’ in two ways, the first one being in the inherent tone: one being low and the other one high; and as already pointed out, the former being shorter than the later. In this case, tone is working together with tone duration to create the grammatical realization from a noun *nyòm* ‘marriage’ to a verb phrase *nyó:m* ‘you marry’.

Malandra (1955) in his presentation on accent in Acholi language noted the following:

- a) The accent for a word with syllable vcv falls on the last vowel e.g.
abaa (father) oboo (lung)
- b) The accent for words with syllable cvc falls on the only vowel e.g.
ret ‘wound’ tic ‘work’
- c) The accent for words with syllable vcvc falls on the last syllable e.g.
olik ‘bat’ obwol ‘mushroom’
- d) The accent for words with syllable cvcv falls on the stem vowel e.g.
geno ‘to trust’ balo ‘to destroy’

- e) The accent for words with syllable *vcv* falls on the central vowel e.g.
adita ‘little basket’ *aboro* ‘eight’

The observation in regard to the accent and where it falls in these words are commendable, however, it would be proper to form minimal pairs in order to see what roles are played by the accent being talked about, for example:

oboo ‘lung’ *oboo* ‘person’s name’
obwol ‘mushroom’ *obwol* ‘has to do with deceit’

Let us assume that the accent falls on the same vowel: how then do we make a distinction between the two lexical items? This then requires the analysis of tone duration in relation to lexical and grammatical functions to be able to understand the difference between the minimal pairs.

(Malandra, 1955) further noted that there are certain number of words, mostly monosyllabic, which end in long or stressed vowel, which is written double. In the Standard Orthography, he states, doubling is recommended in only a selected list of nouns:

<i>aluu</i>	‘vapour’	<i>moo</i>	‘oil’
<i>coo</i>	‘porcupine’	<i>odii</i>	‘form of beer’
<i>coo</i>	‘guinea-worm’	<i>pii</i>	‘water’
<i>daa</i>	‘my grandmother’	<i>raa</i>	‘hipo’
<i>doo</i>	‘weed’	<i>taa</i>	‘tobacco’
<i>guu</i>	‘ironstone’	<i>too</i>	‘fox’
<i>koo</i>	‘bamboo’	<i>wee</i>	‘content of stomach’
<i>lee</i>	‘animal’	<i>woo</i>	‘noise’
<i>maa</i>	‘mother’	<i>yaa</i>	‘shea butter nut’

In the present work, however, according to (Malandra, 1955) final long vowels, where they occur, are consistently doubled for the sake of accuracy:

daa ‘to quarrel’ *aa* ‘to come’ *akakaa* ‘maliciously’

too ‘dead/to die’ oo ‘to arrive’ atataa ‘at random’
 coo ‘to wake’ oo ‘to get spilt’ oyoo ‘mouse’

When doubling is done for the sake of accuracy (I think he meant consistency), it becomes a matter of form with disregard to the content. It is still worth noting that the length of vowels in Acoli are:

1. Not only present in conditions of doubled sounds, there are lexical items which are written with single sounds but still have duration distinctions in their realizations for example *mot* ‘slow’ and *mot* ‘you greet’
2. Functional lexically or grammatically, even in cases where the sounds are doubled, there are functions that are played by the doubled sounds in light of tone in the language *coo* ‘to wake up’ and *coo* ‘guinea-worm’.

The points noted above only help to underscore the importance of carrying out a study on tone duration as a background factor in relation to the lexical and grammatical roles it plays in the Payira variety of the language.

2.5 Tone Height

There are a number of tone languages with varying degrees of height from the lowest to the highest height ranging from Low-low to High-high. Chinese has four tone types consisting of High, Low, Flat and Convex tones respectively (Wendy, 2014) which clearly denotes differences in height.

In Burmese, for instance, tone plays predominantly a lexical role, and is denoted in four major ways; that is low, high, creaky and checked respectively, with the tone duration ranging from long to extremely short (Gruber, 2011). The four ways in which tone is denoted in Burmese including the height they represent are:

Tone	Pitch
Low	low level
High	high, rise or fall
Creaky	high, sharp fall
Checked	highest

(Hyman, 2010) postulates the following as the symbols used in tone marking, especially in African tone languages:

High (H) tone: acute (´) accent

Low (L) tone: grave (`) accent

Mid (M) tone: macron (-)

HL falling tone: circumflex (^)

LH rising tone: hatchet (ˆ)

The markers presented above clearly indicate the fact that tone height in languages can range from High (H) to Low-High (LH) as presented by Hyman in a comprehensive view with regard to African tone.

In Lango, the closest language to Acoli in the sense that they share eighty-plus percent of their vocabulary, there are seen to be two level tones referred to as ‘high’ (and marked with an acute accent á) and ‘low’ (marked with a grave accent à), and a third one referred to as a ‘down-stepped high’ (Noonan, 1992).

Noonan further notes that there are therefore a number of significant tonal distinction in Lango in relation to tone height:

Tone	Height
Low	L
High	H
Down-stepped high	ˈH
Falling	HL
Falling down-step	HˈH
Rising	LH

In Acoli, however, according to (NCDC, 2014) there are two tone types High (H) and Low (L) respectively which can sometimes be realized as falling or rising tone, for example, the High falling tone (^) seen in (àbêdò) a combination of the two tones is marked on the vowel (ê). This is interesting and necessitates further interrogation to establish the tone height at play in relation to what role it plays in the lexical and grammatical realization of items in the Payira variety of Acoli.

2.6 Inventory of Luo and Acoli +/- ATR Tonal Vowels

According to Swenson (2015) Luo has an underlying nine vowel systems with ATR contrast in the high and mid vowels, and cross height ATR harmony, both characteristic of Western Nilotic languages. Many researchers have suggested similar ten vowel systems for Proto Nilotic (Hall et. al. 1975, Dimmendal 1988, Storch 2005, among others,) and Western Nilotic languages have not strayed very far away from this system, still typically retaining nine or ten vowel system (Hall et. al. 1974).

The underlying vowel inventory of Luo according to (Swenson, 2015) is-

(+ATR)		(-ATR)	
i	u	ɪ	ʊ
e	o	ɛ	ɔ
ʌ		a	

According to Noonan (1992) the –ATR vowels found in Luo generally seems to possess a creaky voice quality. This apart from the tongue root position creates a big distinction between the two categories that is +ATR and –ATR vowel categories.

He further states that Lango a close language to Acoli has two basic classes of vowels, the classes being:

Class A	Class B	
i	ɪ	high front
e	ɛ	mid front
ə	a	central
o	ɔ	mid, back, rounded
u	ʊ	high, back, rounded

He therefore, concluded that Lango has two sets of vowels. The first, referred to as [+ATR] (Class A) are produced with greater tongue height and more advanced tongue root than their [-ATR] counterparts (Noonan, 1992)

(NCDC, 2014) postulates that there are so far nine (9) contrastive vowels in Acholi: a, e, ë, i, ĩ, o, ö, u, ü. Generally speaking, according to the orthography, only five (5) vowels were used so far in the orthography preceding the 2014 revised version. It continues, however, that in the process of revising the orthography, additional vowels were discovered and they too, required specific writing rules. In the orthography, vowel sounds are categorized in two groups i.e. the (-ATR) and (+ATR):

Light vowels

ä ĩ
 ö ë
 ü

Heavy vowels

e i
 o u

It further observed that:

These different vowels have been recognized by linguists since at least the middle of the last century. The letters with superscripts/dots (dieresis) represent what has been variously called “open”, “light” and (-ATR) vowels. The vowel /a/ also belongs to this set. The remaining four vowels without the dots are the ‘heavy’ or (+ATR) vowels. We will use the terms ‘heavy’ and ‘light’ for these two sets of vowels. Using these letters will result in a much less ambiguous orthography. The four heavy vowels are: (e, i, o, u), and the five (5) light vowels are: (ä, ë ĩ, ö, ü), (NCDC, 2014)

Crazzolara (1938) contends that in Acoli/Luo, the sound represented by the vowel /a/ is a short /a/ sound (ă) like the /a/ in *about*; /e/ is a long /a/ sound (ā) as in *say* or *day*; /i/ is a long /e/ sound (ē) as in *bee*; /o/ is pronounced as a long /o/ (ō) as in *go*, as the sound in *out* or *about* (ô), or as a short /o/ (ö) as in *song*; and /u/ is either a short /u/ (ŭ) as in *ultra*, or a long /u/ (ū) as in *unit*.

Some of the examples given in his work are:

abila (ăbē’lă) shrine

jok (jôk) important god or spirit

got (gôt) rock or mountain outcrop

jago (jã'go) senior councilor of rwot

Another observation according to Malandra (1955) is that each vowel in Acoli has two pronunciation values, 'close' and 'open' (in the case of (a), 'normal' and 'centralized'), so that the reader must be careful to choose the right pronunciation in order to be understood. Thus:

koyo pronounced with 'closed o' (phone. koyo) 'the cold'

koyo pronounced with 'open o' (phone. kɔyɔ) 'to separate'

keto pronounced with 'close e' (phone. keto) 'to put'

keto pronounced with 'open e' (phone. kɛtɔ) 'to scatter'

culo pronounced with 'close u' (phone. culo) 'to pay'

culo pronounced with 'open u' (phone. cɔlɔ) 'to dilute'

gin pronounced with 'close i' (phone. gin) 'thing'

gin pronounced with 'open i' (phone. gɪn) 'they'

'Normal a'

cwari 'bug'

dyang 'cow'

'Centralized a'

cwari 'your husband'

dyangi 'cows'

Malandra also points out the fact that there are nine vowels in Acoli that is, a, e, i, o, u realized as either 'open' or 'close' respectively with the exception of /a/ which is either normal or centralized.

2.7 Gaps Identified from the Review of Related Literature

(Noonan, 1992) observed that –ATR vowels in Lango are generally creaky. This tends to be a quality that helps to distinguish the two vowel qualities that is +/- ATR of some tonal languages. It is important to note that both (Crazzolaro, 1938) and (Malandra, 1955) just like (Noonan, 1992) did handle the distinction between +/-ATR noting the common fact that +ATR vowels have

advanced tongue root, and that –ATR vowels do not. The challenge is that only mentioning the existence of the two vowel groups does not automatically point to the roles played by the two vowel groups in relation to tone, that is, lexical and grammatical functions played by those ATR qualities as they interact with tone, high or low in Acoli.

Oyaro (2020) looked at pitch level of +ATR and -ATR vowels sharing the same type of tone and later concluded that +ATR vowels generally have high tone and –ATR have low tone. It must be remembered that she sets out to determine phonemes and allophones in Acoli, but not to analyze the interaction between tone and other background factors in determining lexicon and grammar of the language which means the objectives of her study are not the same as those of this study.

She also looks at the lexical function that tone plays in the language. It is a known fact that tone plays lexical function in Acoli as a language. This makes it hard to see what new is being brought out regarding whether or not it is just tone or other factors are also involved in determining the lexicon in question.

Tone height as seen in the works of (Malandra, 1955) and (Crazzolaro, 1938) has clearly not been included in the scope of both studies. This is implausible because the studies paint a picture of the possibility of studying Acoli a tone language with complete disregard to tone. Much as tone should be the first aspect in any form of interrogation regarding the language.

Much as tone, that is, high and low has been pointed out in the (Acoli Language Orthography, 2014), no deliberate effort was made in the orthography to show the lexical and grammatical roles played by low or high tone. A delimited scope to the study with a clear methodology of how to go about the problem was also not included. This partly, probably, was because they did not have programs like Praat which is a more reliable (precise) and scientific program for measuring that quality in tone. This study intends to establish within its scope, the lexical and grammatical roles of tone height as a quality of tone in the Payira variety of Acoli.

Swenson (2015) notes that tone duration is also phonemic in Luo, with grammatical and lexical implications. However, he notes that the process is not well documented and is a subject for study on its own given the minimal and conflicting descriptions of tone duration in the research that was being conducted on Luo orthography.

Even (Malandra, 1955) in his presentation on accent and how it works in Acoli notes that the accent falls on the final long vowel for instance words with syllable *v cv* like *o boo* ‘lung’. One wonders then of the other words with syllable *v cv* like *o ola* ‘he or she has made me tired’ where does the accent fall and how do we distinguish the two long vowels? The reason being that even if they seem like the same vowel types, for instance all being long, it is clear to a native speaker of the language that the sounds found in the two positions are not the same, for instance, the long sound in *o boo* is pronounced with no particular break, but the pronunciation of the second word *o ola* requires a pause in between which creates a subtle distinction between the two ‘*o*’ sounds used which makes the first ‘*o*’ short and the following one longer in realization.

The challenge is that, as seen above, they did not establish how short and how long a vowel is in Acoli in a given context in relation to the lexical and grammatical roles it plays in the language.

2.8 Research Questions

- I. What are the lexical and grammatical functions of tone duration in the Payira variety of Acoli?
- II. Does tone height play any lexical and grammatical roles in the Payira variety of Acoli?
- III. What lexical and grammatical functions does +ATR or –ATR vowel qualities play in the Payira variety of Acoli?

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Overview

This section presents the research method(s), the instruments used in the study, the description of the research design, and data collection and analysis procedure.

3.2 Study Design

The study used a descriptive research design. The descriptive research function is heavily dependent on instrumentation for measurement and observation (Borg and Gall, 1989). This is seen through the utilization of experimentation in this research (after rigorously sorting, grouping and delimiting lexical and grammatical items) using Praat which helped in the measurement and analysis of results.

3.3 Study Approach

The study employed a mixed method which was both qualitative and quantitative in nature. It was qualitative through the use of detailed description to throw more light on areas that had not been clearly brought out through the use of Praat (tables and spectrograms) which were also used, but were more quantitative in nature.

3.4 Study Area

Payira Chiefdom spread across Acoli sub-region. It is found in Gulu, Kitgum and Nwoya. Acoli sub-region lies in the north central part of Uganda. The sub-region is made up of eight (8) districts currently- Gulu, Kitgum, Pader, Agago, Amuru, Nwoya, Omoro and Lamwo. It is about 360km away from Kampala the capital city of Uganda. The language spoken in the area is predominantly Acoli. However, only people from Anaka Town Council in Nwoya district participated in the study because people in the Town Council speak predominantly the Payira variety of Acoli.

3.5 Sampling Strategy and Sample Size

The study targeted speakers of the Payira variety of Acoli. These speakers were got from Anaka Town Council. The study used purposive sampling technique in order that only the people who

met the requirements for the study were used. This saved time as only selected individuals took part in the study and it ensured the collection of dependable data as the people who participated in the study were intentionally picked.

Twenty people who met the requirements stipulated in the study guide were recorded reading the controlled words. Out of the 20 people, 10 were male and 10 were female. After recording the 20 people reading the controlled words (see Appendix III) as guided by the gloss, four respondents were zeroed on for the final analysis in the study. This is because they were able to read the assorted words clearly and correctly. Hence, making them the most appropriate candidates.

The four respondents finally zeroed on in this study included two females and two male participants. These participants were chosen on the basis that they were all speakers of the Payira variety of Acoli, were literate, were able to read both Acoli and English language and had acquired at least Ordinary level Certificate of Education.

3.6 Background Qualities of Respondents in the Study

Twenty people who met the requirements stipulated in the study guide were recorded reading the controlled words. Out of the 20, 10 were male and 10 were female. After recording the 20 people reading the controlled words (see Appendix III) as guided by the gloss, 4 respondents (two males and two females) were zeroed on for the final analysis in the study. This is because they were able to read the assorted words with the least mistakes. Hence making them the most appropriate candidates.

Tables are used to summarize the various qualities considered as requirements for participation in the study. The qualities being sex, age, years spent in Anaka, and level of education. These qualities are summarized as follows:

Table 3: Sex

Sex	Number
Male	10
Female	10

The number of males and females used in the study was balanced (as can be seen in the table above) at 10 for each sex. This was deemed necessary in order for both sexes to be fairly

represented in the study. This also made the data comprehensive as both the male and female realizations were catered for in the study. Even the four respondents who were finally used in the study were balance with two males and two females.

Table 4: Age

No of Respondents	Age
7	19
4	32
6	50+
3	25

The above table shows the different age brackets of the respondents. It is clear from the above table that the age groups involved in the study catered for the youth and also for elderly people as it ranged from 19 to 50 and above. This also helped in that it provided a comprehensive representation across generations. So no particular age bracket was left out. This makes the findings fair with regard to demography.

Table 5: Years Spent in Anaka

No of Respondents	Years in Anaka
12	20
8	15

The people involved in the study spent at least 15 years in this particular location. This means the variety they speak is predominantly the Payira variety. Twelve people have spent 20 years in Anaka, and the remaining 8 have spent at least 15 years in Anaka.

Table 6: Level of Education

No of Respondents	Level of Education
2	University
6	Advanced level
12	Ordinary level

The summary on the table above shows the level of education of the respondents. The education level ranges from Ordinary level to University. This means that they all met the required level of education. It also means that all of them could read Acoli and English language. This was important because much as the words were in Acoli, the gloss for the words were in English.

The four respondents were finally selected because of the way they read the materials availed for recording. Generally, they were the most proficient and articulate in their reading. This made it easy for the recorded voices to be selected and analyzed using Praat.

The four respondents were more confident during the recording compared to the other respondents whose recordings were left out. As a result, their recordings had fewer instances of hesitation, pauses and other reading related challenges. This warranted the usage of the four respondents in this study.

3.7. Data Collection Methods

The methods used in the collection of the data analyzed in this study were basically audio recording and interview.

3.7.1 Interview

Interviews were conducted to establish the social and linguistic background of the participants in relation to where they come from, what variety of Acoli they speak, their abilities to read Acoli and English (in order that they would relate the words in Acoli to the gloss in English to ease the reading of the Acoli words given). The level of education they have attained was also considered to prepare and select the right participants for the recording sessions.

3.7.2 Audio Recording

Audio recordings were done using a computer with a Praat program installed on it. Participants were given the list of words/word forms as seen in Appendix III to read 10 minutes before the recording session, in order for them to familiarize themselves with the words. This was done to instill calm and confidence in the participants.

3.8. Data Collection Tools

The tools used in the collection of data for this study were computer and microphone.

3.8.1 Computer and Microphone

The controlled sample which consisted of only monosyllabic word forms were then read and recorded using a microphone connected to a computer with the Praat program installed on it. The

program was then adjusted to suit the recording of female and male voices respectively. The recordings were saved with each group having a different file name for easy identification.

3.9 Data Validity

The words used for analysis in this study were elicited from Acoli Bible and Acoli Dictionary. The words were carefully selected to cater for all the vowels in the Acoli vowel inventory. Since there are 10 vowels in Acoli, I decided to pick 10 words per word category making a total of 30 words.

In order to obtain valid data for the purpose of this study, the kind of words/items required for the study were delimited consisting of 10 words for each word category which brought the number of words to 30. These words were recorded for the analysis of tone height tone duration +ATR and -ATR. Each of the words used was monosyllabic with nasal and lateral consonants (l, n, m, ny and ng) preceding and following the vowel under investigation in each of the items.

In order to obtain quality sound in the process of recording a few adjustments in the Praat settings were made: the recording mode was set to mono sound track, the sampling frequency was set to 44100Hz which sufficiently records human speech sound, the pitch range was adjusted to 75-500Hz to enable pitch tracker reflect accurately the speakers voice, and the formant display was set to 5000Hz and 5500Hz for female and male voices respectively in order to display the actual formants of the speakers voice.

3.10 Data Processing and Analysis

The data elicited (word forms) were used to measure tone height and tone duration. This measurement was done using Praat which has got options to measure tone duration, tone height based on displays of the sound representations on spectrograms. In the process of selecting the sound range for the measurement of tone height which was recorded and later on presented as seen in the table of results, and duration as seen in the spectrogram displays, the sound quality of the vowel in each word form was critically perceived (auditory) to establish whether it was – or + ATR based on the perception of whether the sound was creaky or not. The results obtained through the spectrogram presentation was then scripted, that is, summarized in form of tables in Chapter 4.

The tables as seen in Chapter 4 contain the results of the analyses for the four respondents who were finally selected for the study. They are referred to as respondent 1, respondent 2, respondent

3 and respondent 4 or R1, R2, R3, and R4 respectively. Three contributions were analyzed with regard to tone duration and tone height, that is, tone length, minimum and maximum height of the respective tone item under investigation in this case vowel items. A table containing the word categories showing the qualities perceived in the course of selection of the sound range for the analysis; that is, the sound being either creaky or not which would qualify it to either be + or – ATR respectively was also included in a summary form.

The presentation was also arranged in a manner that the different word forms were grouped in three different categories referred to as First Category (FC), Second Category (SC) and Third Category (TC) respectively. The categories, as mentioned earlier on, are representative of lexical and grammatical groups; the First Category is made up of predominantly noun items, the Second Category is made up of verb and noun items and the Third Category contains predominantly phrasal verbs and noun forms.

+ATR and -ATR vowels were analyzed to show the lexical and grammatical roles they play in the Payira variety of Acoli by describing how lexical and grammatical items in the three categories change form depending on the ATR quality with which tone is used, be it high or low tone.

After the analysis using Praat, that is, the spectrogram displays of results and tabulation of the results, the results were then described and analyzed qualitatively in order to explain the results as viewed by the researcher, and to throw more light on facts that may have not been brought out clearly in the table and spectrogram presentation.

3.11 Research Procedure

A letter from the University was sought to introduce the researcher to the different people involved in the process of the research to help the researcher access certain confidential information where need arose, which built confidence in the research by explaining the purpose of the research to the participants. The participants who met the requirements for the study were then asked to read an arrangement of words in Acoli (as seen in Appendix III) guided by the gloss in English to get the exact word required for the study. Their readings were then recorded for analysis using Praat.

3.12 Ethical Considerations

All the participants in the study were briefed on the purpose of the study, the benefits they were to get from the study, and they were also assured about the fact that their rights to anonymity would

be guaranteed. They were also assured of the level of confidentiality with which their contributions would be treated, and their consent was sought signaled by the signing of the consent form found in Appendix I.

3.13 Limitations of the Study

A number of limitations can be attributed to this research; some of the most glaring being:

1. The first limitation of this research was the fact that it was carried out only on the Payira variety of Acoli which means it may not necessarily be comprehensively representative of the entire Acoli language with regard to the factors studied.
2. The categories under study were highly restricted to a few lexical and grammatical items, hence making the sample quite small.
3. The environments of the items under investigation were also highly restricted allowing only nasals and liquids to precede and follow the vowels under investigation which makes it impossible at this point to assert with certainty whether or not the vowels would be realized in the same way in those other possible environments.
4. The recording for the study was done from Anaka Town Council using speakers of the Payira variety of Acoli, however it should be noted that the Payira variety of Acoli is spoken in other parts of Acoli-land for instance Pader, therefore, it is a possibility, that, maybe, some geographical influence has created some distinctions between the same variety spoken in the different geographical areas.

CHAPTER FOUR PRESENTATION AND ANALYSIS OF DATA

4.1 Overview

This chapter contains the presentation of results as portrayed in the spectrogram images below, brief description of particular spectrogram images under each spectrogram image, and finally, the analyses of the results of the findings obtained from the Praat display also included afterwards in form of tables.

4.2 Findings According to Objectives of the Study

The findings of the study were presented in form of tables. The tables contained the results of the analyses for respondent 1, respondent 2, respondent 3 and respondent 4 referred to as R1, R2, R3 and R4 respectively in regard to tone duration and tone height; that is, minimum and maximum pitch of the respective word form under investigation, in this case, vowel items. Some spectrogram images of tone duration are included in this chapter. Meanwhile, the recorded results based on the measurement obtained from Praat regarding maximum and minimum pitch are also summarized in tables presented in this chapter.

The presentation also is arranged in a manner that the different word forms are grouped in three different categories referred to as First Category (FC), Second Category (SC) and Third Category (TC) respectively. The categories, as mentioned earlier on, are representative of lexical/grammatical groups; the First Category is made up of predominantly noun items, the Second Category is made up of verb and noun items and the Third Category contains predominantly verbs and noun forms.

Therefore, the four respondents who participated in the study gave their input in relation to the three categories aforementioned; and because each category has 10 word forms, the spectrogram presentation that follows shows the realization of the 10 items times the number of respondents which takes the total spectrogram figures to 40. Only 40 spectrogram images are included in the presentation, but the tables that are presented afterwards provides a summary of all the spectrogram images analyzed for tone height and tone duration.

+/- ATR vowels are analyzed based on the three-word form categories. The results of which are presented in form of summary tables indicating lexical and grammatical roles they play in the Payira variety of Acoli

4.3 Tone Duration

The measurements for tone duration denoted by the spectrograms in 4.3.1 are taken from Praat measurements done in the course of analyzing the vowels used in the study. The values of the tone duration are summarized in the tables following the spectrogram presentation.

4.3.1 Spectrograms

Below are the spectrogram displays for t, the tables of summary, and analysis of data presented on tone duration.

The spectrograms presented has four tiers, the first one at the top represents the voice recording for the different words, the second tier from above represents the selected vowel for the analysis of tone duration, the third tier represents the word that was recorded as seen by the word being written fully in the third tier which is the second last tier, and finally, the fourth tier, which is the last tier, represents the gloss for the different words shown in the third tier.

Each spectrogram has a highlighted section in the middle which denotes the selected vowel as can be seen in the third tier. The highlighted section has a recording of the length of the vowel as can be seen just above the first tier and below the last tier.

For example, the first spectrogram for the word *lim* /lim/ ‘wealth’ can be seen to show the three sounds that make the word *lim* ‘wealth’ separated into /l/, /i/, and /m/ in the third tier with the vowel /i/ appearing in the middle in the highlighted part of the spectrogram. The measurement of the sound is also reflected above the sound just above the first tier.

The measurement for the vowel /i/ in *lim* ‘wealth’ for the first spectrogram as shown on the highlighted middle part of the spectrogram is 0.144923 seconds. This method was used for the selection and measurement of the various vowels used in this study as presented in the various spectrograms as presented below:

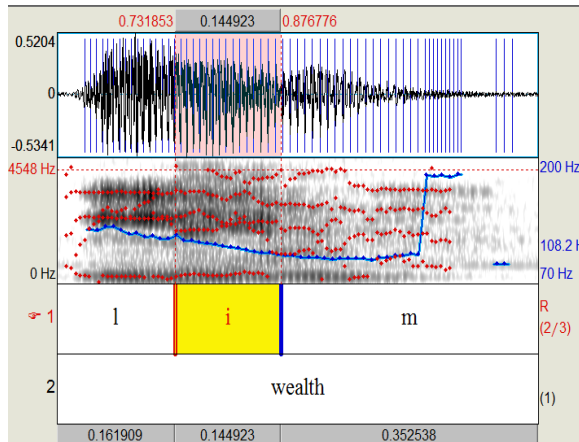


Figure 2: Spectrogram of vowel /i/ in lim 'wealth' for respondent 1

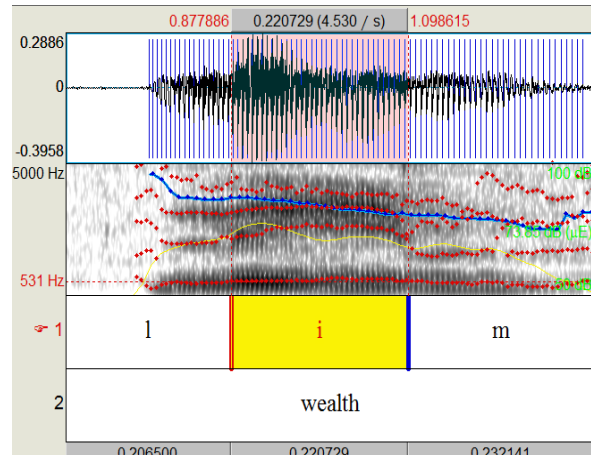


Figure 1: Spectrogram of vowel /i/ in lim 'wealth' for respondent 2

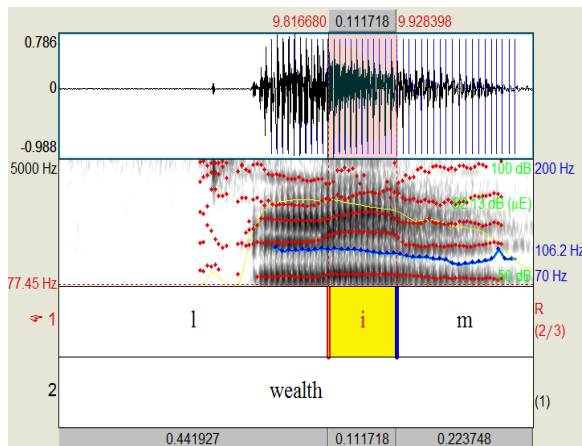


Figure 4: Spectrogram of vowel /i/ in lim 'wealth' for respondent 3

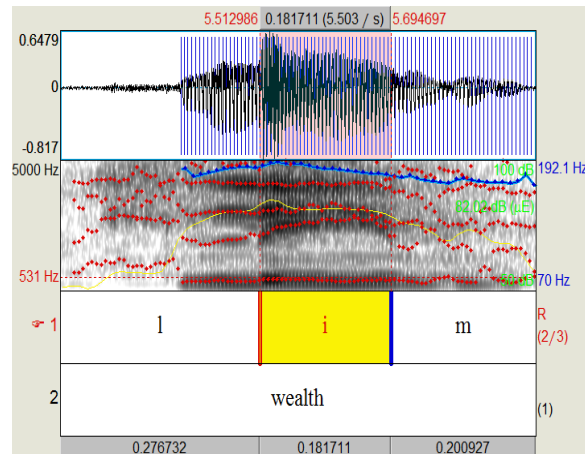


Figure 3: Spectrogram of vowel /i/ in lim 'wealth' for respondent 4

The highlighted parts on each of the spectrograms above show the measurements of the vowel /i/ for the four respondents. Figure 1 Spectrogram of vowel /i/ in *lim* /lim/ 'wealth' for respondent 1 shows tone duration of 0.144923 seconds, figure 2 spectrogram of vowel /i/ in *lim* /lim/ 'wealth' for respondent 2 shows tone duration of 0.220729 seconds, figure 3 spectrogram of vowel /i/ in *lim* /lim/ 'wealth' for respondent 3 shows tone duration of 0.111718 seconds, and figure 4 spectrogram of vowel /i/ in *lim* /lim/ 'wealth' for respondent 4 shows tone duration of 0.181711 seconds. The duration ranges from 0.111718 seconds to 0.220729 seconds.

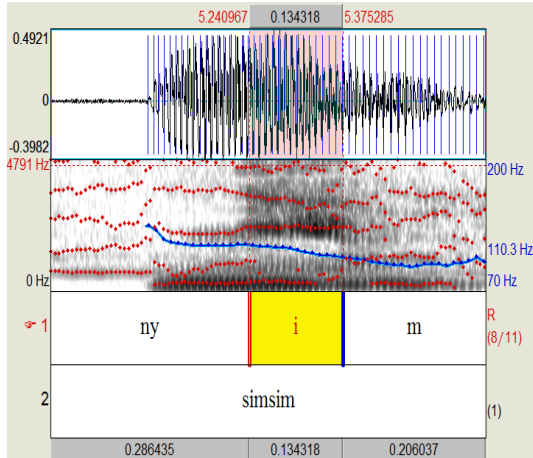


Figure 6: Spectrogram of vowel /i/ in nyim 'simsim' for respondent 2

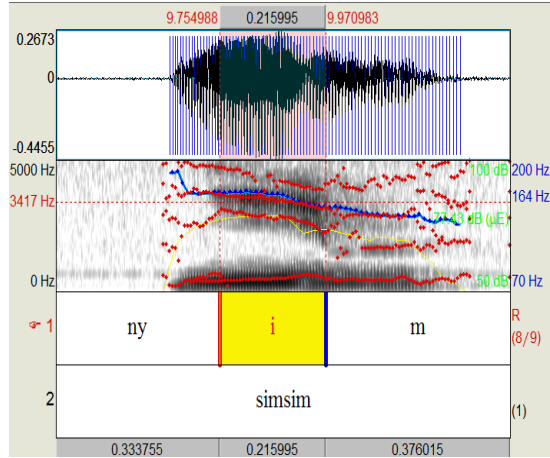


Figure 5: Spectrogram of vowel /i/ in nyim 'simsim' for respondent 1

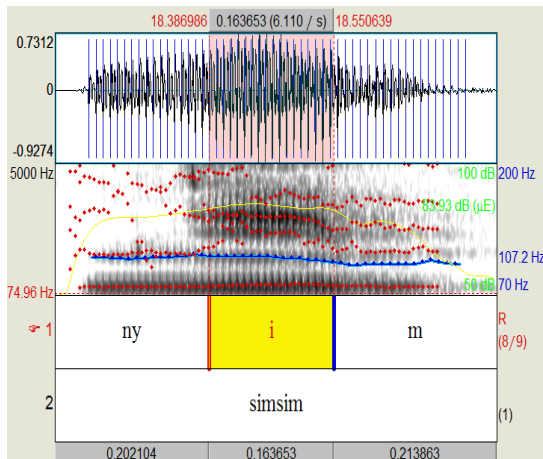


Figure 8: Spectrogram of vowel /i/ in nyim 'simsim' for respondent 4

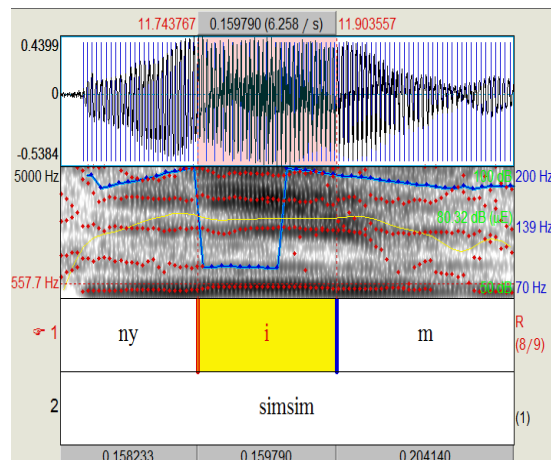


Figure 7: Spectrogram of vowel /i/ in nyim 'simsim' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /i/ for the four respondents. Figure 5 Spectrogram of vowel /i/ in nyim /ɲim/ 'simsim' for respondent 1 shows tone duration of 0.134318 seconds, figure 9 spectrogram of vowel /i/ in nyim /ɲim/ 'simsim' for respondent 2 shows tone duration of 0.215995 seconds, figure 7 spectrogram of vowel /i/ in nyim /ɲim/ 'simsim' for respondent 3 shows tone duration of 0.163653 seconds, and figure 8 spectrogram of vowel /i/ in nyim /ɲim/ 'simsim' for respondent 4 shows tone duration of 0.159790 seconds. The duration ranges from 0.134318 seconds to 0.215995 seconds.

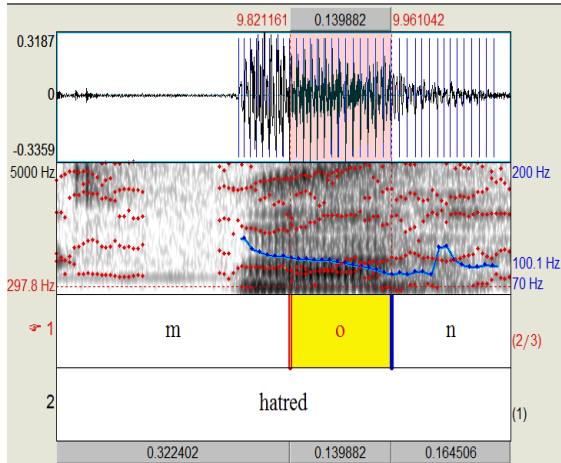


Figure 11: Spectrogram of vowel /o/ in mòn 'hatred' for respondent 2

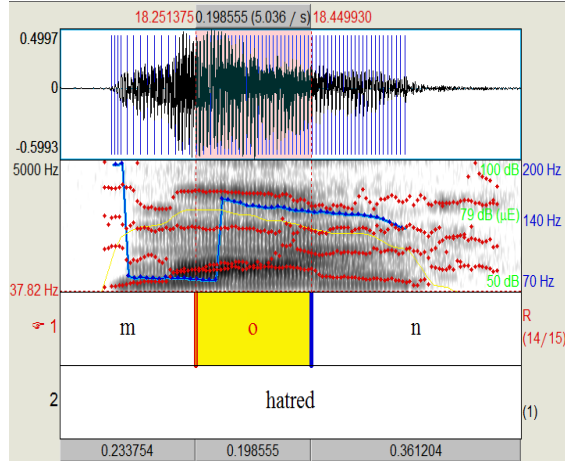


Figure 10: Spectrogram of vowel /o/ in mòn 'hatred' for respondent 1

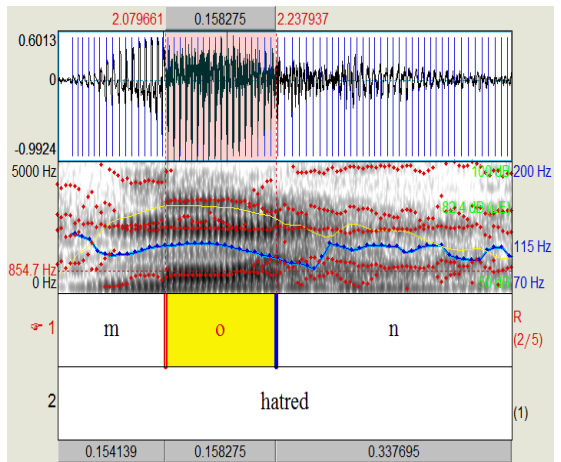


Figure 13: Spectrogram of vowel /o/ in mòn 'hatred' for respondent 4

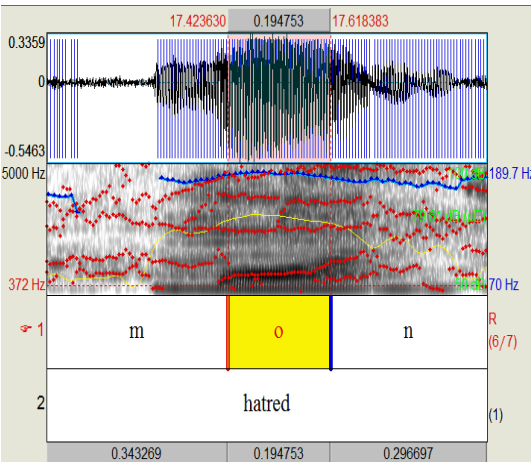


Figure 12: Spectrogram of vowel /o/ in mòn 'hatred' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /ò/ for the four respondents. Figure 9 Spectrogram of vowel /ò/ in mon /mòn/ 'hatred' for respondent 1 shows tone duration of 0.139882 seconds, figure 10 spectrogram of vowel /ò/ in mon /mòn/ 'hatred' for respondent 2 shows tone duration of 0.198555 seconds, figure 11 spectrogram of vowel /ò/ in mon /mòn/ 'hatred' for respondent 3 shows tone duration of 0.158275 seconds, and figure 12 spectrogram of vowel /i/ in mon /mòn/ 'hatred' for respondent 4 shows tone duration of 0.194753 seconds. The duration ranges from 0.139882 seconds to 0.198555 seconds.

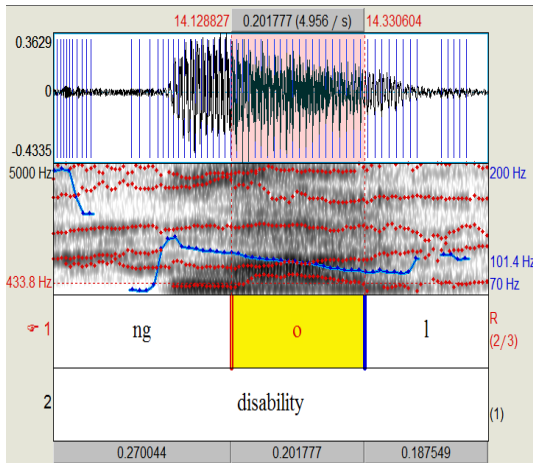


Figure 15: Spectrogram of vowel /o/ in ngòl 'disability' for respondent 2

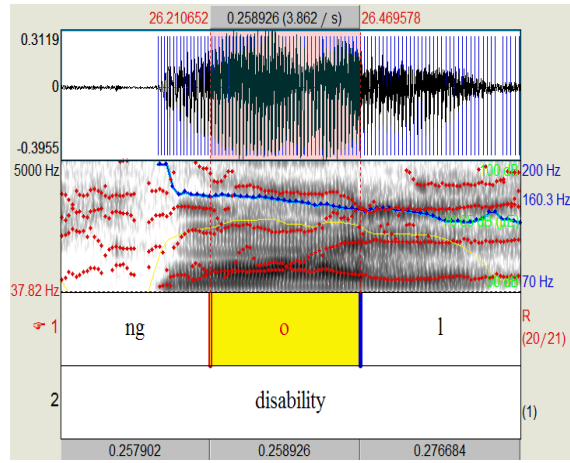


Figure 14: Spectrogram of vowel /o/ in ngòl 'disability' for respondent 1

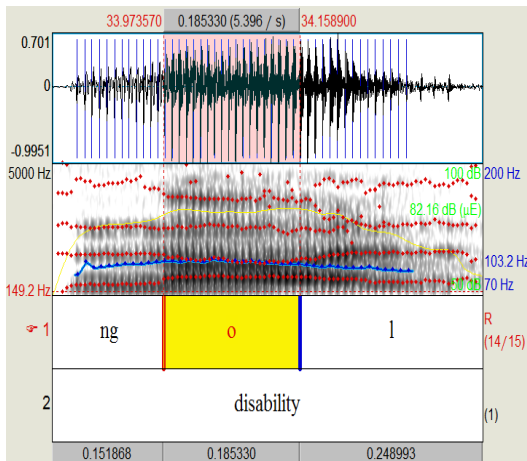


Figure 17: Spectrogram of vowel /o/ in ngòl 'disability' for respondent 4

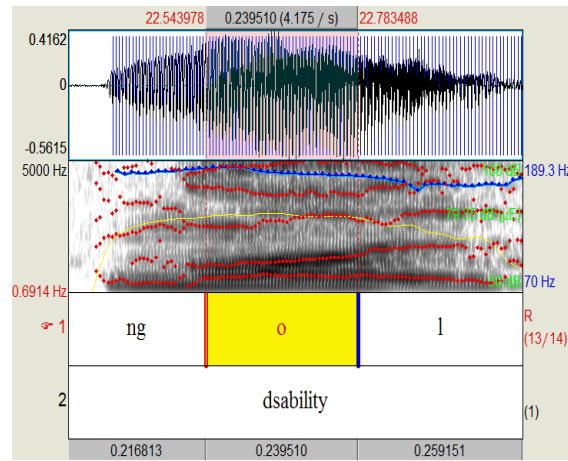


Figure 16: Spectrogram of vowel /o/ in ngòl 'disability' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /i/ for the four respondents. Figure 13 Spectrogram of vowel /ò/ in ngol /ηòl/ 'disability' for respondent 1 shows tone duration of 0.201777 seconds, figure 14 spectrogram of vowel /ò/ in ngol /ηòl/ 'disability' for respondent 2 shows tone duration of 0.258926 seconds, figure 15 spectrogram of vowel /ò/ in ngol /ηòl/ 'disability' for respondent 3 shows tone duration of 0.185330 seconds, and figure 16 spectrogram of vowel /ò/ in ngol /ηòl/ 'disability' for respondent 4 shows tone duration of 0.239510 seconds. The length ranges from 0.185330 seconds to 0.258926 seconds.

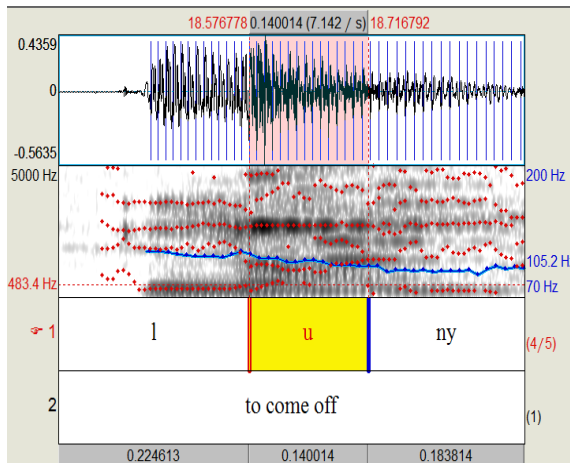


Figure 19: Spectrogram of vowel /u/ in lùnɿ 'to come off' for respondent 2

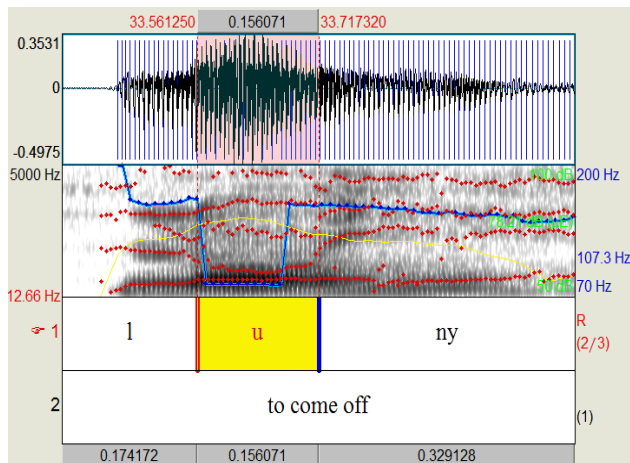


Figure 18: Spectrogram of vowel /u/ in lùnɿ 'to come off' for respondent 1

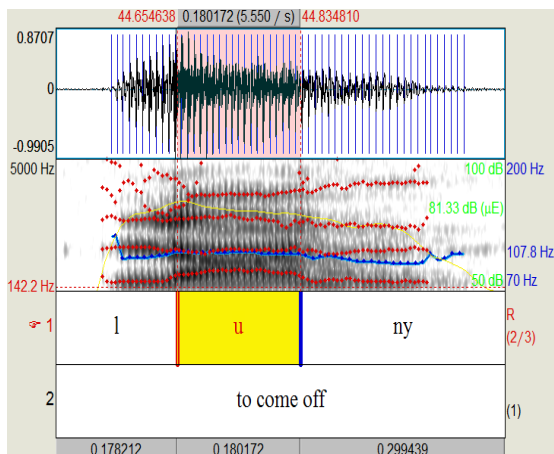


Figure 21: Spectrogram of vowel /u/ in lùnɿ 'to come off' for respondent 4

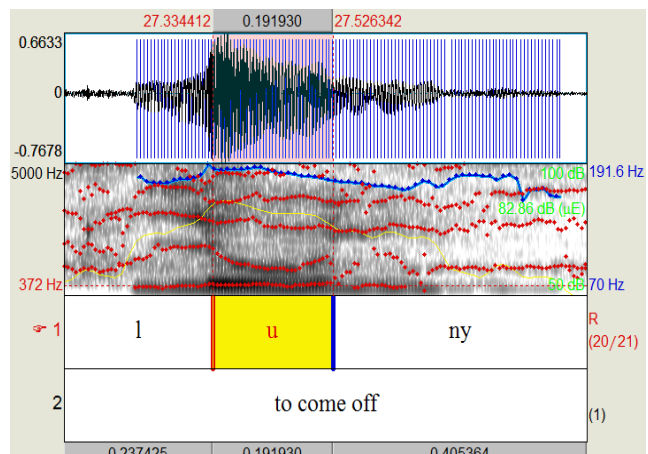


Figure 20: Spectrogram of vowel /u/ in lùnɿ 'to come off' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the vowels /ù/ for the four respondents. Figure 17 Spectrogram of vowel /ù/ in lùnɿ /lòɲ/ 'to come off' for respondent 1 shows tone duration of 0.140014 seconds, figure 18 spectrogram of vowel /ù/ in lùnɿ /lòɲ/ 'to come off' for respondent 2 shows tone duration of 0.156071 seconds, figure 19 spectrogram of vowel /ù/ in lùnɿ /lòɲ/ 'to come off' for respondent 3 shows tone duration of 0.180172 seconds, and figure 20 spectrogram of vowel /ù/ in lùnɿ /lòɲ/ 'to come off' for respondent 4 shows tone duration of 0.191930 seconds. The length ranges from 0.140014 seconds to 0.191930 seconds

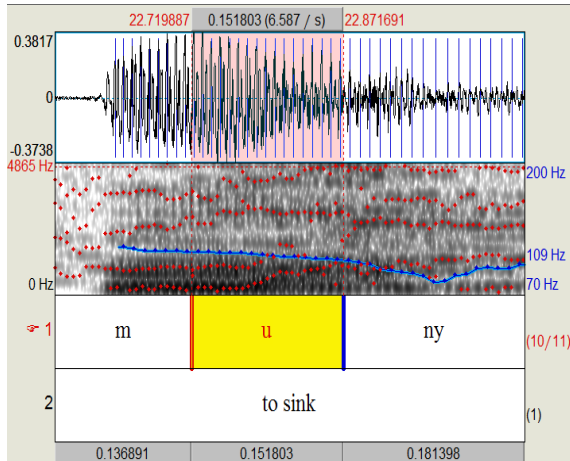


Figure 23: Spectrogram of vowel /u/ in mùny 'to sink' for respondent 2

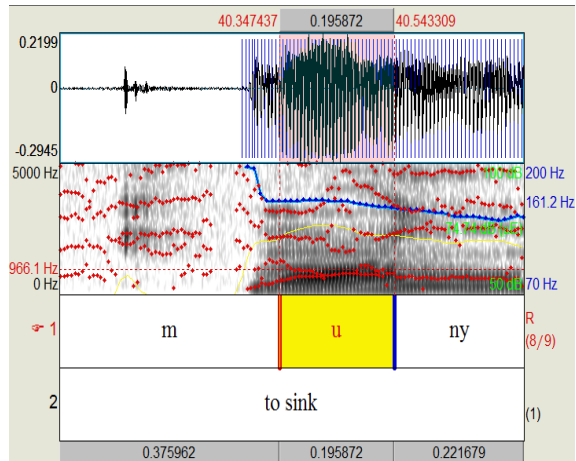


Figure 22: Spectrogram of vowel /u/ in mùny 'to sink' for respondent 1

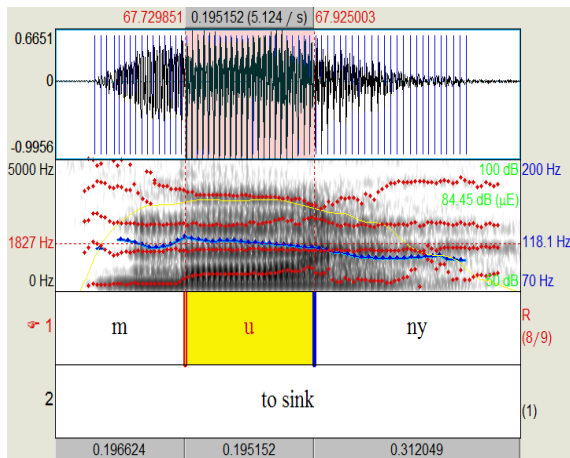


Figure 25: Spectrogram of vowel /u/ in mùny 'to sink' for respondent 4

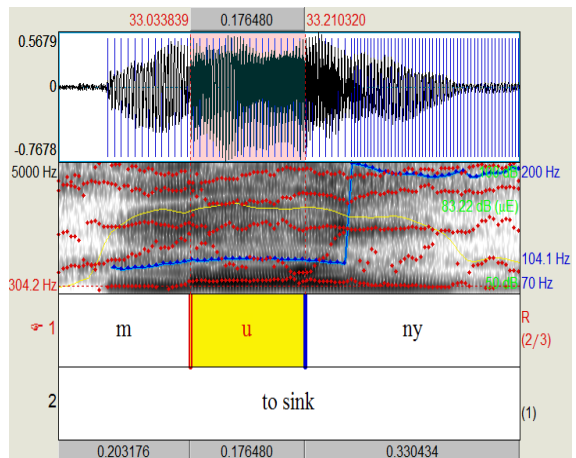


Figure 24: Spectrogram of vowel /u/ in mùny 'to sink' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /ù/ for the four respondents. Figure 21 Spectrogram of vowel /ù/ in *mùnny* /mùnny/ 'to sink' for respondent 1 shows tone duration of 0.151803 seconds, figure 22 spectrogram of vowel /ù/ in *mùnny* /mùnny/ 'to sink' for respondent 2 shows tone duration of 0.195872 seconds, figure 23 spectrogram of vowel /ù/ in *mùnny* /mùnny/ 'to sink' for respondent 3 shows vowel tone duration of 0.195152 seconds, and figure 24 spectrogram of vowel /ù/ in *mùnny* /mùnny/ 'to sink' for respondent 4 shows tone duration of 0.176480 seconds. The duration ranges from 0.151803 seconds to 0.195872 seconds.

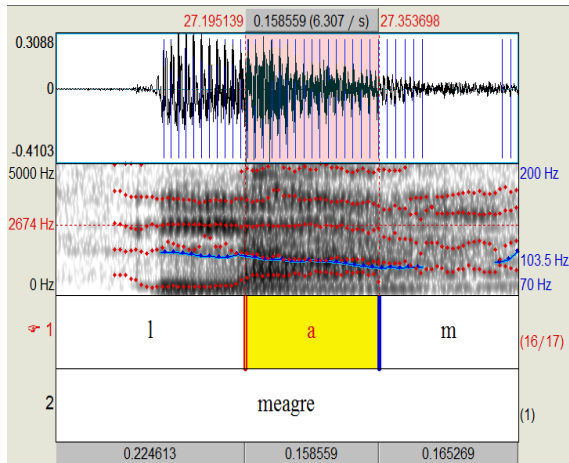


Figure 27: Spectrogram of vowel /a/ in làm 'meagre' for respondent 2

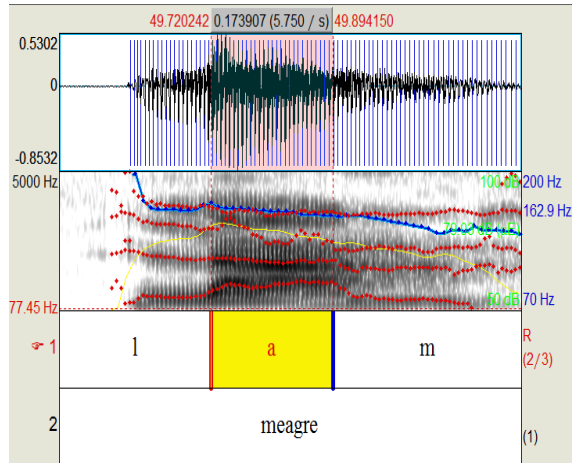


Figure 26: Spectrogram of vowel /a/ in làm 'meagre' for respondent 1

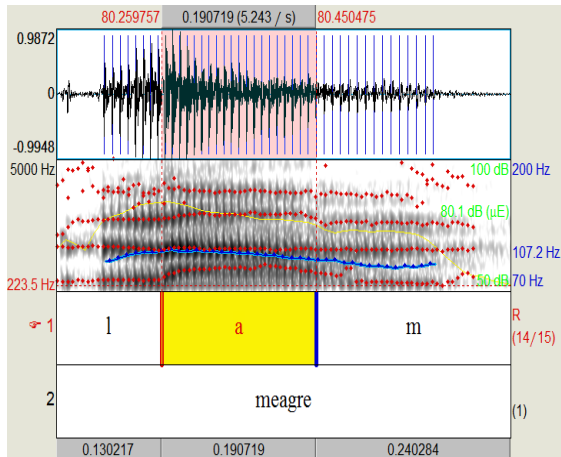


Figure 29: Spectrogram of vowel /a/ in làm 'meagre' for respondent 4

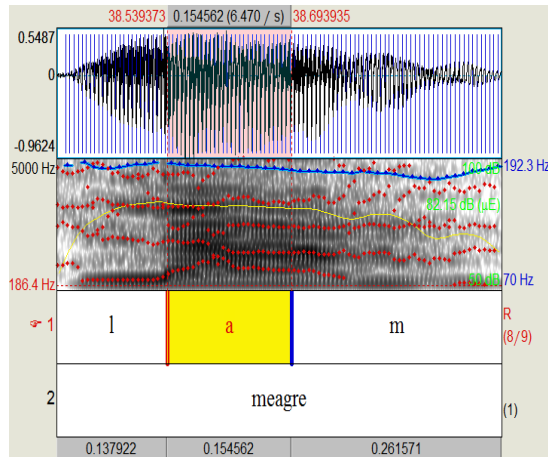


Figure 28: Spectrogram of vowel /a/ in làm 'meagre' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /à/ for the four respondents. Figure 25 Spectrogram of vowel /à/ in lam /là/ 'meagre' for respondent 1 shows tone duration of 0.158559 seconds, figure 26 spectrogram of vowel /à/ in lam /là/ 'meagre' for respondent 2 shows tone duration of 0.173907 seconds, figure 27 spectrogram of vowel /à/ in lam /là/ 'meagre' for respondent 3 shows tone duration of 0.190719 seconds, and figure 28 spectrogram of vowel /à/ in lam /là/ 'meagre' for respondent 4 shows tone duration of 0.154562 seconds. The duration ranges from 0.154562 microseconds to 0.190719 seconds.

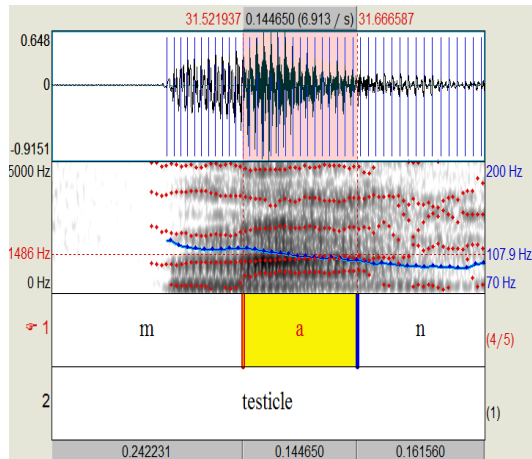


Figure 31: Spectrogram of vowel /a/ in mán 'testicle' for respondent 2

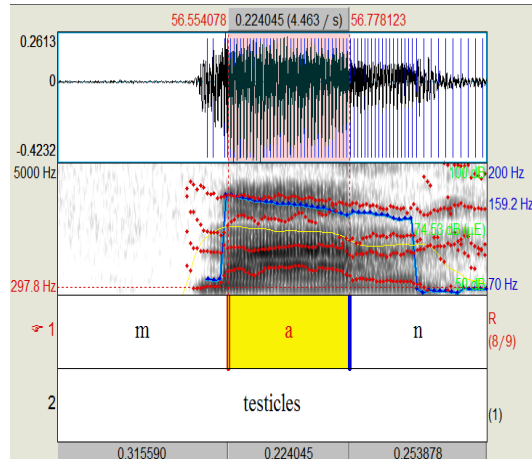


Figure 30: Spectrogram of vowel /a/ in mán 'testicles' for respondent 1

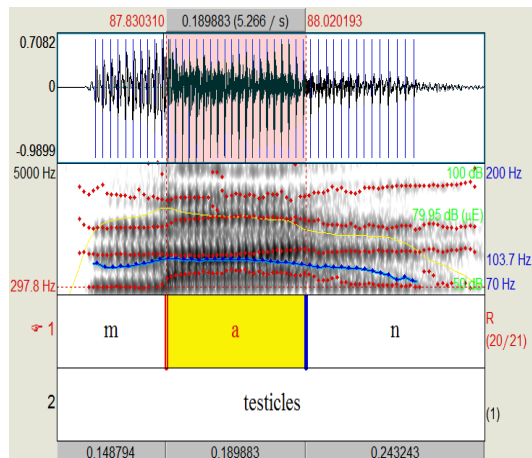


Figure 33: Spectrogram of vowel /a/ in mán 'testicles' for respondent 4

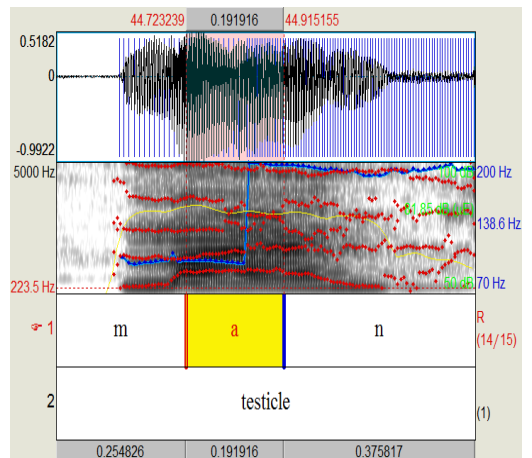


Figure 32: Spectrogram of vowel /a/ in mán 'testicles' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /à/ for the four respondents. Figure 29 Spectrogram of vowel /à/ in *man* /màn/ 'testicles' for respondent 1 shows tone duration of 0.144650 seconds, figure 30 spectrogram of vowel /à/ in *man* /màn/ 'testicles' for respondent 2 shows tone duration of 0.224045 seconds, figure 31 spectrogram of vowel /à/ in *man* /màn/ 'testicles' for respondent 3 shows tone duration of 0.189883 seconds, and figure 32 spectrogram of vowel /i/ in *man* /màn/ 'testicles' for respondent 4 shows tone duration of 0.191916 seconds. The duration ranges from 0.144650 seconds to 0.224045 seconds.

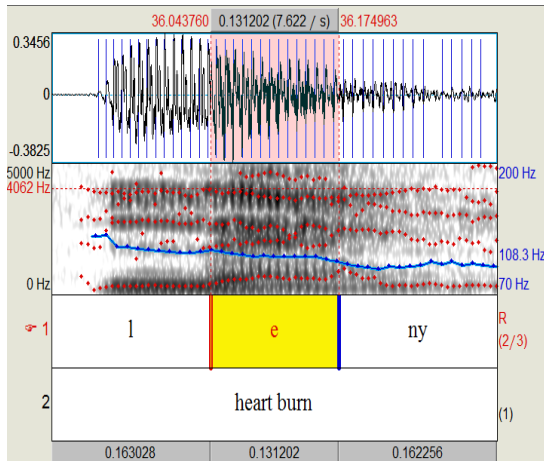


Figure 35: Spectrogram of vowel /e/ in lèny 'heart burn' for respondent 2

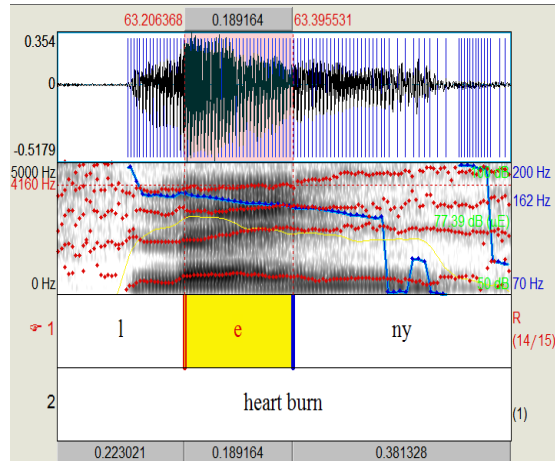


Figure 34: Spectrogram of vowel /e/ in lèny 'heart burn' for respondent 1

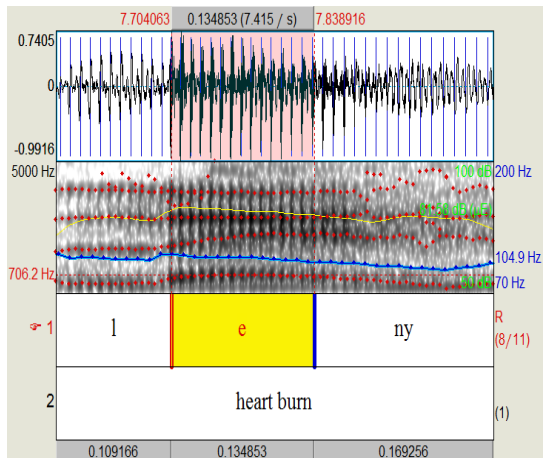


Figure 37: Spectrogram of vowel /e/ in lèny 'heart burn' for respondent 4

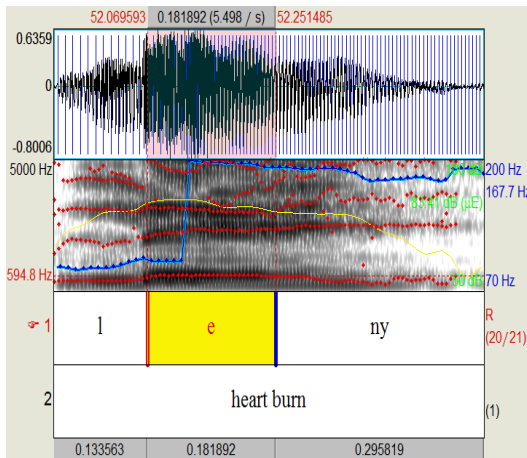


Figure 36: Spectrogram of vowel /e/ in lèny 'heart burn' for respondent 3

The highlighted parts on each of the spectrograms above shows the measurements of the tonal vowels /è/ for the four respondents. Figure 33 Spectrogram of vowel /è/ in lèny /lèp/ 'heartburn' for respondent 1 shows tone duration of 0.131202 seconds, figure 34 spectrogram of vowel /è/ in lèny /lèp/ 'heartburn' for respondent 2 shows tone duration of 0.189164 seconds, figure 35 spectrogram of vowel /è/ in lèny /lèp/ 'heartburn' for respondent 3 shows tone duration of 0.134853 seconds, and figure 36 spectrogram of vowel /è/ in lèny /lèp/ 'heartburn' for respondent 4 show tone duration of 0.181892 seconds. The duration ranges from 0.131202 seconds to 0.189164 seconds.

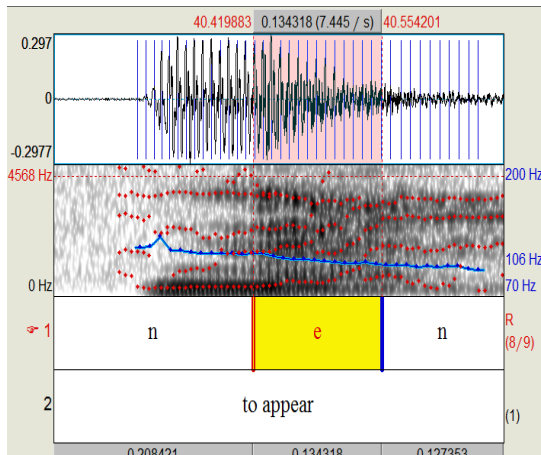


Figure 39: Spectrogram of vowel /e/ in nèn 'to appear' for respondent 2

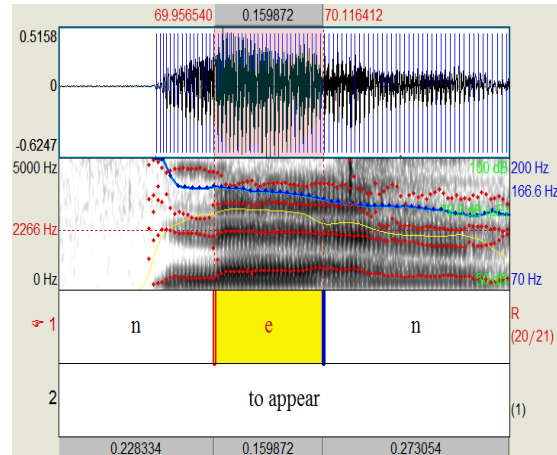


Figure 38: Spectrogram of vowel /e/ in nèn 'to appear' for respondent 1

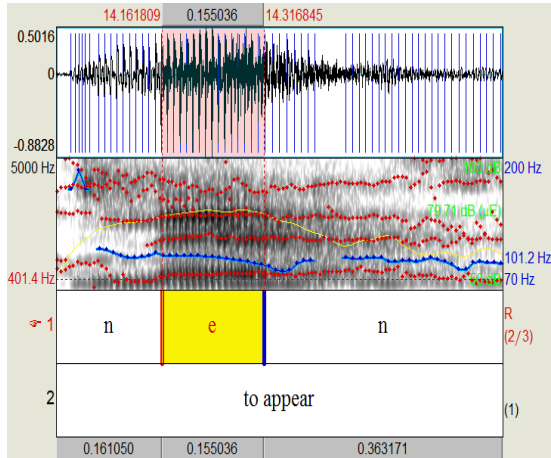


Figure 41: Spectrogram of vowel /e/ in nèn 'to appear' for respondent 4

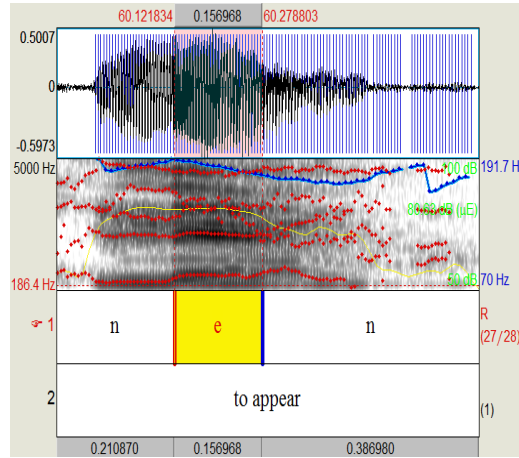


Figure 40: Spectrogram of vowel /e/ in nèn 'to appear' for respondent 3

The highlighted parts on each of the spectrograms above show the measurements of the vowels /è/ for the four respondents. Figure 37 Spectrogram of vowel /è/ in *nen* /nèn/ 'to appear' for respondent 1 shows tone duration of 0.134318 seconds, figure 38 spectrogram of vowel /è/ in *nen* /nèn/ 'to appear' for respondent 2 shows tone duration of 0.159872 seconds, figure 39 spectrogram of vowel /è/ in *nen* /nèn/ 'to appear' for respondent 3 shows tone duration of 0.155036 seconds, and figure 40 spectrogram of vowel /è/ in *nen* /nèn/ 'to appear' for respondent 4 shows tone duration of 0.156968 seconds. The duration ranges from 0.134318 seconds to 0.159872 seconds

Table 7: Summary of Tone Duration for the First Word Form Category

Item	Gloss	Tone Duration in Seconds				MS
		R1	R2	R3	R4	
lìm /lì:m/	'wealth'	0.14492	0.22073	0.11172	0.18171	
nyìm /nyìm/	'simsim'	0.13432	0.216	0.16365	0.19475	
mòn /mòn/	'hatred'	0.13988	0.19856	0.15828	0.19475	
ngòl /ŋòl/	'disability'	0.20178	0.20817	0.18533	0.23951	
lùny /lòŋ/	'to come off'	0.14001	0.15607	0.18017	0.19193	
mùny /mòŋ/	'to sink'	0.1518	0.19587	0.19515	0.17648	
làm /lám/	'meagre'	0.15856	0.17391	0.19072	0.15456	
màn /màn/	'testicles'	0.14465	0.22405	0.18988	0.19192	
lèny /lèŋ/	'heart burn'	0.1312	0.18189	0.13485	0.18189	
nèn /nèn/	'to appear'	0.13432	0.15697	0.15504	0.15697	
Average		0.14814	0.19322	0.16648	0.18645	0.17357

Tone duration for the first word category shown on the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1, the tone duration average for the first word category is 0.14814 seconds, the tone duration average for the second respondent or respondent 2 is 0.19322 seconds, the tone duration average for the first word category for the third respondent or respondent 3 is 0.16648 seconds, and the tone duration average for the first word category for the fourth respondent or respondent 4 is 0.18645 seconds. The average tone duration for the first word category for the four respondents is 0.17357 seconds

Table 8: Summary of Tone Duration for the Second Word Form Category

Item	Gloss	R1	Tone Duration in Seconds			R4
			R2	R3	R4	
lím /lím/	'visit'	0.13631	0.19856	0.14783	0.19364	
nyím /ním/	'front'	0.12505	0.252	0.18887	0.16165	
món /món/	'women'	0.1537	0.21734	0.17471	0.2562	
ngól /ńól/	'verdict'	0.2018	0.20817	0.21644	0.25404	
lúny /lúp/	'act of undressing'	0.15101	0.1838	0.18695	0.15205	
múny /múp/	'to swallow'	0.1681	0.21465	0.16223	0.16042	
lám /lám/	'curse'	0.1526	0.19587	0.18653	0.19024	
mán /mán/	'to go round'	0.1473	0.20795	0.19681	0.18252	
lény /lép/	'melt'	0.14187	0.22807	0.19645	0.16406	
nén /nén/	'to see'	0.15233	0.1999	0.19018	0.1995	
Average		0.15301	0.21063	0.1847	0.19143	0.18494

Tone duration for the second word category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone duration average for the second word category is 0.15301s, the tone duration average for the second respondent or respondent 2 is 0.21063s, the tone duration average for the second word category for the third respondent or respondent 3 is 0.1847s, and the tone duration average for the second word category for the fourth respondent or respondent 4 is 0.19143s. The average tone duration for the second word category for the four respondents is 0.18494s.

Table 9: Summary of Tone Duration for the Third Word Category

Item	Gloss	R1	Tone Duration in Seconds			R4
			R2	R3	R4	
lím /lí:m/	‘you visit’	0.2077	0.22747	0.17953	0.27871	
nyím /ní:m/	‘you heap’	0.21738	0.27234	0.18491	0.2547	
món /mó:n/	‘develop hatred’	0.24161	0.23478	0.24775	0.29193	
ngól /ŋó:l/	‘you cut’	0.25301	0.21197	0.22825	0.22851	
lúny /lú:ɲ/	‘you undress’	0.22571	0.18246	0.21393	0.25769	
múny /mú:ɲ/	‘you swallow’	0.20399	0.24417	0.17335	0.25972	
lám /lá:m/	‘you curse’	0.26466	0.2227	0.18516	0.23623	
mán má:n/	‘you go round’	0.23843	0.24417	0.20019	0.19922	
lény /lé:ɲ/	‘you melt’	0.22519	0.2066	0.25632	0.20239	
nén /né:n/	‘you see’	0.2742	0.23344	0.24928	0.21532	
Average		0.23519	0.22801	0.21187	0.24244	0.22938

Tone duration for the third word category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone duration average for the third word category is 0.23519s, the tone duration average for the second respondent or respondent 2 is 0.22801s, the tone duration average for the third word category for the third respondent or respondent 3 is 0.21187s, and the tone duration average for the third word category for the fourth respondent or respondent 4 is 0.24244s. The average tone duration for the third word category for the four respondents is 0.22938s.

Tone duration in the Payira variety of Acoli determines the various word categories. The duration in tone based on the results attained from the data presented and analyzed in chapter four shows that tone duration for monosyllabic words range from short, relatively long to long. The longest based on the data analyzed being the third category with an average length of 0.22938 seconds,

the second category having an average of 0.18494 seconds and the first category having an average length of 0.17357 seconds. Which makes the third category the longest in terms of duration, the second category follows in terms of duration and the first category the shortest on that note.

Based on the various duration of tone for the different lexical and grammatical categories aforementioned, it follows then that tone duration plays both lexical and grammatical functions in the Payira variety of Acoli as in:

The first category e.g. *lim* /lìm/ ‘wealth’ which is the shortest category and is a noun item, *lim* /lím/ ‘visit’ is verb and as observed above falls within the second longest category (which is the second category), and *lim* /lí:m/ ‘you visit’ which is more of a verb/noun clause is the longest in duration and falls within the third category.

Other qualities notwithstanding, tone duration makes the ultimate difference in the items highlighted above. This is because when you take for example lexical items *lim* /lìm/ ‘wealth’ and *lim* /lím/ ‘visit’ you realize that they differ in pitch as one is low and the other is high, but the difference in pitch on its own does not create the distinction that tone duration creates, in the sense that *lim* /lìm/ ‘wealth’ is shorter than *lim* /lím/ ‘visit’ according to the measurement taken using Praat.

When you examine the grammatical forms *lim* /lím/ ‘visit’ and *lim* /lí:m/ ‘you visit’ which are verb and verb clause respectively. You realize that both of them have high pitches or tone. Much as there may be a difference in the height of the tones involved, and much as ATR plays a role as well in the distinction of the items as *lim* /lí:m/ ‘you visit’ and *lim* /lím/ ‘visit’ are –ATR and +ATR respectively, tone duration makes the ultimate difference because *lim* /lí:m/ ‘you visit’ is longer than *lim* /lím/ ‘visit’ as presented in the second paragraph above.

This, therefore, is a testament to the fact that tone duration distinguishes a lexical item from a grammatical item as *lim* /lìm/ ‘wealth’ and *lim* /lím/ ‘visit’ are different lexical items; and *lím* /lím/ ‘visit’ and *lim* /lí:m/ ‘you visit’ are verb and verb clause respectively.

4.4 Tone Height

The measurements for tone height (pitch) summarized in the following table for the four respondents were recorded during the analysis (using Praat) of the different vowels used in this study as articulated by the different respondents. Therefore, the values presented in the table is

representative of the values which were arrived at as measured by Praat during the analysis of the recordings of the four respondents.

Table 10: Summary of Tone Height (Minimum Pitch) for the First Word Category

Item	Gloss	Tone Height (Minimum Pitch)				Hz
		R1	R2	R3	R4	
lìm /lìm/	‘wealth’	99.7199	149.854	103.306	184.306	
nyìm /ɲìm/	‘simsim’	103.83	153.68	102.583	87.8528	
mòn /mòn/	‘hatred’	89.9068	81.6509	104.733	186.081	
ngòl /ŋòl/	‘disability’	92.9691	151.753	100.808	184.864	
lùny /lòɲ/	‘to come off’	100.628	71.4449	105.948	183.29	
mùny /mòɲ/	‘to sink’	104.236	155.57	113.252	102.683	
làm /làɲ/	‘meagre’	97.447	158.777	101.395	188.718	
màn /màn/	‘testicles’	102.998	148.201	99.2908	87.6819	
lèny /lèɲ/	‘heart burn’	102.465	156.009	101.187	99.902	
nèn /nèn/	‘to appear’	101.132	159.515	94.7674	183.799	
Average		99.5332	138.645	102.727	148.918	122.456

Tone height (minimum pitch) for the first word category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone height average for the first word category is 99.5332 hertz, the tone height average for the second respondent or respondent 2 is 138.645 hertz, the tone height average for the first word category for the third respondent or respondent 3 is 102.727 hertz, and the tone height average for the first lexical and grammatical category for the fourth respondent or respondent 4 is 148.918 hertz. The average tone height for the first word category for the four respondents is 122.456 hertz.

Table 11: Summary of Tone Height (Maximum Pitch) for the First Word Category

Item	Gloss	Tone Height (Maximum Pitch) in Hz				
		R1	R2	R3	R4	
lìm /lìm/	‘wealth’	120.081	167.101	108.174	198.187	
nyìm /nìṁ/	‘simsim’	115.998	169.231	109.118	178.032	
mòn /mòn/	‘hatred’	105.869	171.564	119.369	191.408	
ngòl /ṅòl/	‘disability’	111.559	166.332	106.225	193.836	
lùny /lòṅ/	‘to come off’	113.237	171.912	109.028	196.815	
mùny /mò ṅ/	‘to sink’	112.883	163.695	124.25	105.2	
làm /lám/	‘meagre’	109.319	170.171	111.068	195.848	
màn /màn/	‘testicles’	114.594	168.48	105.808	212.112	
lèny /lèṅ/	‘heart burn’	114.134	169.475	108.22	211.448	
nèn /nèn/	‘to appear’	112.884	172.859	104.362	117.383	
Average		113.056	169.082	110.562	180.027	140.347

Tone height (maximum pitch) for the first word category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone height average for the first word category is 113.056 Hz, the tone height average for the second respondent or respondent 2 is 169.082 Hz, the tone height average for the first word category for the third respondent or respondent 3 is 110.562 Hz, and the tone height average for the first word category for the fourth respondent or respondent 4 is 180.027 Hz. The average tone height for the first word category for the four respondents is 140.347 Hz.

Table 12: Summary of Tone Height (Minimum Pitch) for the Second Word Category

Item	Gloss	Tone Height (Minimum Pitch) in Hz				
		R1	R2	R3	R4	
lím /lím/	‘visit’	130.078	171.79	115.887	108.705	
nyím /ɲím/	‘front’	131.918	180.912	118.019	109.706	
món /món/	‘women’	135.367	182.992	117.147	108.588	
ngól /ŋól/	‘verdict’	138.781	176.803	112.694	110.148	
lúny /lúp/	‘act of undressing’	134.708	179.665	109.14	108.021	
múny /múp/	‘to swallow’	139.092	177.625	121.223	111.231	
lám /lám/	‘curse’	131.377	178.878	116.553	108.842	
mán /mán/	‘to go round’	136.098	178.509	109.973	104.744	
lény /léɲ/	‘to melt’	135.999	175.841	113.792	111.545	
nén /nén/	‘to see’	136.704	185.945	108.746	110.681	
Average		135.012	178.896	114.317	109.221	134.362

Tone height (minimum pitch) for the second word category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone height average for the second word category is 135.012Hz, the tone height average for the second respondent or respondent 2 is 178.896Hz, the tone height average for the second word category for the third respondent or respondent 3 is 114.317Hz, and the tone height average for the second word category for the fourth respondent or respondent 4 is 109.221Hz. The average tone height for the second word category for the four respondents is 134.362Hz.

Table 13: Summary of Tone Height (Maximum Pitch) for the Second Word Category

Item	Gloss	Tone Height (Maximum Pitch) in Hz				
		R1	R2	R3	R4	
lím /lím/	‘visit’	132.708	187.274	120.158	114.463	
nyím /ním/	‘front’	136.172	188.186	121.691	113.037	
món /món/	‘women’	144.172	188.282	122.112	112.148	
ngól /ṅól/	‘verdict’	141.882	188.468	122.754	115.243	
lúny /lúp/	‘act of undressing’	139.23	189.678	117.804	117.15	
múny /múp/	‘to swallow’	150.488	186.928	135.352	118.533	
lám /lám/	‘curse’	133.966	187.607	128.737	115.452	
mán /mán/	‘to go round’	139.651	182.386	127.517	115.376	
lény /lép/	‘to melt’	141.682	183.549	120.717	117.383	
nén /nén/	‘to see’	142.84	192.311	114.714	114.137	
Average		140.279	187.467	123.156	115.292	141.548

Tone height for the second lexical and grammatical category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone height (maximum pitch) average for the second word category is 140.279Hz, the tone height average for the second respondent or respondent 2 is 187.467Hz, the tone height average for the second word category for the third respondent or respondent 3 is 123.156Hz, and the tone height average for the second word category for the fourth respondent or respondent 4 is 115.292Hz. The average tone height for the second word category for the four respondents is 141.548Hz.

Table 14: Summary of Tone Height (Minimum Pitch) for the Third Word Category

Item	Gloss	Tone Height (Minimum Pitch) in Hz				
		R1	R2	R3	R4	
lím /lí:m/	‘you visit’	102.92	147.051	108.675	181.403	
nyím /ní:m/	‘you heap’	108.182	76.3277	108.846	173.146	
món /mó:n/	‘develop hatred’	105.703	151.833	102.034	186.681	
ngól /ŋó:l/	‘you cut’	107.941	149.496	98.7254	188.461	
lúny /ló:p/	‘you undress’	109.77	145.534	101.838	167.354	
múny /mó:p/	‘you swallow’	108.611	152.876	106.701	86.0807	
lám /lá:m/	‘you curse’	106.51	146.322	101.522	185.407	
mán /má:n/	‘you go round’	108.227	150.452	100.978	183.806	
lény /lé:p/	‘you melt’	108.065	149.195	100.488	186.768	
nén /né:n/	‘you see’	108.521	154.937	95.122	183.729	
Average		107.445	142.402	102.493	172.284	131.156

Tone height (minimum pitch) for the third lexical and grammatical category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone height average for the first word category is 107.445Hz, the tone height average for the second respondent or respondent 2 is 142.402Hz, the tone height average for the third word category for the third respondent or respondent 3 is 102.493Hz, and the tone height average for the third word category for the fourth respondent or respondent 4 is 172.284Hz. The average tone height for the third word category for the four respondents is 131.156Hz.

Table 15: Summary of Tone Height (Maximum Pitch) for the Third Word Category

Item	Gloss	Tone Height (Maximum Pitch) in Hz				
		R1	R2	R3	R4	
lím /lí:m/	‘you visit’	110.045	156.476	109.886	198.723	
nyím /ní:m/	‘you heap’	112.522	78.2277	112.525	208.728	
món /mó:n/	‘develop hatred’	111.289	155.375	107.213	198.664	
ngól /ŋó:l/	‘you cut’	117.692	158.064	107.223	195.086	
lúny /ló:p/	‘you undress’	114.64	155.905	104.108	210.711	
múny /mó:p/	‘you swallow’	113.461	160.595	115.036	206.866	
lám /lám/	‘you curse’	113.872	161.256	107.628	197.081	
mán /mán/	‘you go round’	115.236	158.8001	112.613	193.306	
lény /lé:p/	‘you melt’	112.558	154.79	105.894	194.904	
nén /né:n/	‘you see’	114.254	163.219	103.823	189.631	
Average		113.557	149.323	108.595	199.37	142.711

Tone height (maximum pitch) for the third word category shown in the table above shows the different results attained from the different respondents who participated in the study, that is, respondent 1-4 respectively. For the first respondent or respondent 1 the tone height average for the third word category is 113.557Hz, the tone height average for the second respondent or respondent 2 is 149.323, the tone height average for the third word category for the third respondent or respondent 3 is 108.595Hz, and the tone height average for the third word category for the fourth respondent or respondent 4 is 199.37Hz. The average tone height for the third word category for the four respondents is 142.711Hz.

Tone height in the Payira variety of Acoli was realized in three ways for the three word categories in this study. The height in tone based on the results attained from the data presented and analyzed

in chapter four shows that tone height (pitch) for the monosyllabic lexical and grammatical items range from low, relatively high to high. The highest based on the data analyzed being the third category with an average minimum pitch of 131.156 Hz and an average maximum pitch of 142.711Hz, followed by the second category with an average minimum pitch of 134.362Hz and an average maximum pitch of 141.548Hz and the first category having the lowest average with a minimum pitch of 122.546Hz and a maximum pitch of 140.347Hz.

Tone height (minimum and maximum) pitch, therefore, distinguishes lexical and grammatical items in the Payira variety of Acoli; using the same examples used for the illustration of lexical and grammatical functions of tone duration, it is easy to see that tone height also distinguishes lexical and grammatical items in the Payira variety of Acoli, for instance:

The lexical item *lim* /lim/ ‘wealth’ has the lowest pitch and falls within the first category, and it is a noun item, *lim* /lím/ ‘visit’ is a verb and as observed above has the second highest pitch and falls within the second category; and *lim* lí:m/ ‘you visit’ which is more of a verb/noun clause has the highest pitch and falls within the third category.

On the above note, therefore, it is crystal clear that tone height plays both lexical and grammatical roles as *lim* /lim/ ‘wealth’ and *lim* /lím/ ‘visit’ are different lexical items with different tone heights as the latter has a higher pitch than the former; *lim* /lím/ ‘visit’ and *lim* /lí: m/ ‘you visit’ are verb and verb form respectively with the inherent difference determined partly by the fact that they have different tone heights, that is, the verb in this case is lower than the verb form in pitch.

4.5 ATR (+/-) Qualities

Advanced tongue root (ATR) in this study focused on the voice quality of the vowels that were recorded for analysis. The vowel sounds were perceived to be either creaky or not creaky. The creaky vowels are the –ATR vowels and the ones that are not perceived as creaky are the +ATR sounds.

The table below is indicative of the sounds used in the study presented by category i.e. first category, second category and third category. The quality of either being +ATR or –ATR is indicated for each sound as presented in the following table:

Table 16: First Category, Second Category, and Third Category with +/-ATR Qualities Indicated.

Item F.C	Gloss	A T R	Item S.C	Gloss	A T R	Item T.C	Gloss	A T R
lìm /lìm	‘wealth’	-	lím /lím/	‘visit’	+	lím /lí:m/	‘you visit’	-
nyìm /nì:m/	‘simsim’	-	nyím /nì:m/	‘front’	+	nyím /nì:m/	‘you heap’	-
mòn /mòn/	‘hatred’	-	món/ /món/	‘women’	+	món /mó:n/	‘develop hatred’	-
ngòl /nò:l/	‘disability’	-	ngól /nól/	‘verdict’	+	ngól /nó:l/	‘you cut’	-
lùny /lò:n/	‘to come’ off	-	lúny /lú:n/	‘act of undressing’	+	lúny /lú:n/	‘you undress’	-
mùny /mò:n/	‘to sink’	-	múny /mú:n/	‘to swallow’	+	múny /mó:n/	‘you swallow’	-
lám /lám/	‘meagre’	-	lám /lám/	‘curse’	+	lám /lá:m/	‘you curse’	-
màn /màn/	‘testicles’	-	mán á	‘to go round’	+	mán /má:n/	‘you go round’	-
lèny /lè:n/	‘heart burn’	-	lény /lè:n/	‘melt’	+	lény /lè:n/	‘you melt’	-
nèn /nèn/	‘to appear’	-	nén /nén/	‘to see’	+	nén /né:n/	‘you see’	-

The quality of being either + or – ATR in the word categories 1 to 3 as shown in the table above are derived from the selection of range taken for the analysis of tone height and tone duration; a close analysis through listening or perception indicates, as presented above using the +/- sign under the heading quality that the first and second categories of lexical and grammatical items made up

of nouns and verbs respectively are predominantly +ATR vowels, and the third category made up of verb phrases are predominantly –ATR vowels as denoted under the heading quality on the table above.

Based on the findings shown by the spectrogram analysis and perception in the course of analysis, the two vowel categories in Acoli that is +/- ATR tonal vowels play both lexical and grammatical roles as shown on the table below.

Table 17: Category 1, 2, and 3 with the Lexical and Grammatical Roles Respectively

Category 1	Item	Gloss	ATR Quality	Function	Word Class
	lìm /lìm/	wealth	-	lexical	Noun
	nyìm /ɲìm/	simsim	-	lexical	Noun
	lèny /lèɲ/	heartburn	-	lexical	noun
Category 2	Item	Gloss	ATR Quality	Function	Word Class
	lím /lím/	visist	+	lexical	Verb
	nyím /ɲím/	front	+	lexical	Verb
	lény /léɲ/	melt	+	lexical	Verb
Category 3	Item	Gloss	ATR Quality	Function	Word Class
	lím /lí:m/	you visit	-	grammatical	verb form
	nyím /ɲí:m/	you heap	-	grammatical	verb form
	lèny /lé:ɲ/	you melt	-	grammatical	verb form

An inspection of the table above with focus on the second and third categories reveal that the verbs for example *lim* /lím/ ‘visit’ and *leny* /léɲ/ ‘melt’ change grammatically to verb forms, that is, *lim* /lí:m/ ‘you visit’ and *leny* /lé:ɲ/ ‘you melt’ respectively. This happens because other factors (background) are at play apart from tone as both categories have high tones. The factors here being tone duration as the third category is perceived to be longer than the second category. The other background factor at play as presented in the table above is the ATR quality. This is because the second category of sounds is +ATR while the third category is –ATR.

The vowels in the second category are produced with the tongue root pushed forward +ATR while the vowels in the third category is produced with a retracted tongue root –ATR which means the items on the second category are produced with less constriction in the vocal tract than the third category which necessitates more constriction in the process of production hence making the third category creaky and the second one more sonorous: this underpins the grammatical differences.

It, therefore, follows that based on the summary table above, the quality of being +/-ATR plays both lexical and grammatical roles in the Payira variety of Acoli as category 1 is -ATR made up of noun items, category 2 is +ATR made up of verbs, and category 3 is -ATR comprising verb clauses.

This does not, however, mean that ATR operates in isolation from the other background factors like duration and pitch because the first category still inherently has the lowest average pitch and is the shortest category, the second category has the second lowest average pitch, and the third category also still inherently has the highest average pitch and duration.

This, then, means that much as ATR quality is imperative in the distinction presented on the table above, the rest of the qualities still play their roles. However, ATR stands out as explained above as it would be impossible to realize for instance the grammatical difference in the table above without the addition of the +ATR quality as the Second Category is +ATR and the Third Category is -ATR.

The average values in the tables presented above for the lexical and grammatical categories under investigation are summarized as below:

The First Category

Tone duration 0.17357s Minimum height 122.456Hz Maximum height 140.347Hz

The Second Category

Vowel length 0.18494s Minimum height 134.362Hz Maximum height 141.548Hz

The Third Category

Tone duration 0.22938s Minimum height 131.156Hz Maximum height 142.711Hz

Tone Duration	Minimum Height	Maximum Height
C1: 0.17357s	122.456Hz	140.347Hz
C2: 0.184.94s	134.362Hz	141.548Hz
C3: 0.22938s	131.156Hz	142.711Hz

It is clear then, from the summary above that category 1 has the shortest tone duration followed by category 2, and category 3 has the longest tone duration; it can also be noted that category 1 has the lowest minimum height followed by category 3, and category 2 has the highest minimum height; and category 3 has the highest maximum height, followed by category 2, and category one has the lowest maximum height.

The variation in length of the vowels in the three categories as already presented above clearly points to the lexical and grammatical functions played by tone duration in the Payira variety of Acoli. This is because the shortest vowel category is found with the noun class of words and the longest vowel category is that of verb clause (third category).

Again, because category 1 had the lowest minimum height and category 2 had the highest minimum height, it can be concluded that the different word categories in Acoli have variation in their physical qualities which denote grammar and lexicon in the language. This is because category 1 is made up of mostly noun items and category two is made up of verb items. Therefore, verbs have higher pitches or tone height than nouns in the Payira variety of Acoli.

CHAPTER FIVE

DISCUSSION, CONCLUSION, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

5.1 Overview

This chapter provides the discussion of findings, conclusion to the study, recommendations, and suggestions for further research derived from the findings of the study.

5.2 Tone Duration in the Payira Variety of Acoli and their Lexical and Grammatical Functions

Swenson (2015) postulated that tone duration had not been studied much with regards to its lexical and grammatical functions. Jacobson (1978, 1980) concluded first that four different mechanisms were at play in Luo, but did not handle any of the mechanisms in relation to lexical and grammatical functions in the Payira variety of Acholi. (NCDC, 2014), (Malandra, 1955) and (Crazzolaro, 1938) also generally did not include in their scope the contribution that tone duration makes in the lexicon and grammar of Acoli.

Jacobson (1978, 1980) describes the mechanism of production of the speech sound which includes constriction and dilation of the vocal cavity, and (Helmoltz, 1980) postulates the usage of peaks or formants and pitch in spectrogram analysis of sounds which is a concept utilized in measuring the tone duration in this study through the use of spectrogram.

Based on the studies cited in paragraph one above of this section, one fact that stands out is that tone as a background factor was not included in the scope of the various studies, which left a clear void. This particular study has made a contribution in filling that void by pointing out the lexical and grammatical functions of tone duration as a background factor in the Payira variety of Acoli. Some examples that can be seen as presented in Chapter 4 are *lim* /lím/ ‘wealth’ and *lim* /lím/ ‘visit’ you realize that they differ in pitch as one is low and the other is high, but the difference in pitch on its own does not create the distinction that tone duration creates, in the sense that *lim* /lím/ ‘wealth’ is shorter than *lim* /lím/ ‘visit’ according to the measurement taken using Praat.

5.3 Tone Height (Minimum and Maximum Pitch) and their Lexical and Grammatical Functions

No study as noted in the review of related literature had been carried out with the view of describing the lexical and grammatical functions of tone height as a background factor in the Payira variety of Acoli.

This study, first of all describes the lexical and grammatical functions of tone height in the Payira variety of Acoli. It further points out, as seen in the presentation and analysis of data in Chapter 4, the fact that the different word categories used in Appendix III of this study have distinct tone heights. The first word category comprising of predominantly noun items have the lowest tone height average with a maximum height average of 140. 347Hz followed by the second word category with predominantly verb items with a maximum tone height average of 141. 548Hz, and finally, the third word category comprising of predominantly verb/noun word forms having a maximum tone height average of 142. 711Hz.

This variation in tone height average for the three-word categories is a clear indication that nouns are the lowest in tone, followed by verbs and then verb forms. This was presented and analyzed with details in Chapter 4.

In this particular analysis, the Acoustic theory of speech production was used in the analysis of the word categories specifically through the application of Praat in the measurement of minimum and maximum pitch of the different word categories. This provided the readings which were presented in form of tables in Chapter 4.

5.4 +/- ATR Vowels and their Lexical and Grammatical Functions in the Payira Variety of Acoli

Various studies had varying conclusions regarding ATR qualities in Luo generally and Acoli specifically. Jakobson (1978, 1980) concluded first that four different mechanisms were being used to create ATR distinctions: tongue height, tongue root advancement or retraction, dilation or constriction of the pharyngeal cavity, and laryngeal displacement.

Second, he concluded that not only do speakers vary from language to language in which the mechanisms are used to produce ATR qualities, they may also vary among the speakers of the same language.

A quick view of the findings in (Oyaro, 2020) shows that she contends that all –ATR vowels have low tone. This view conflicts with what she presented in pages 83-84 specifically table 12 (b) which shows that both +/-ATR can carry a fall-rise tone. She postulates, ‘Pitch analysis for vowels with Fall-rise ATR vowels /ě/ +ATR /ě̃/ -ATR /ĩ/ +ATR /ĩ̃/ -ATR /ǒ/ +ATR /ǒ̃/ -ATR /ũ/ +ATR /ũ̃/ -ATR’.

As noted above, she boldly concludes that all –ATR vowels have low tone, while at the same time purporting that fall-rise tone can also accompany both +/- ATR vowels.

Swenson (2015) in his work for example *gero* /gér-ǎ/ ‘to build’ which shows that a –ATR vowel can also carry a high tone. But when Oyaro (2020) makes a bold claim that all –ATR vowels can only have low tone, it only points to the fact that she only looked at a few lexical items without considering grammatical ones.

If you consider *suko* /sók-ǎ/ ‘to braid’ you realize that Swenson is quite consistent because the transcription shows that the /ó/ in *suk* /Sók/ is a –ATR sound and yet it carries a high tone. So in Luo, as it stands, both +/- ATR vowels can carry high and low tone depending upon the context of investigation.

This study, therefore, rejects the notion postulated by Oyaro (2020) by pointing out, especially in the third category that the tone at play is a high tone as opposed to a fall-rise tone that she claims for example the sound /ǒ̃/ -ATR’ is what I have established to be /ó:/ which is a –ATR sound with a long high tone which is seen in the third category predominantly made up of grammatical items as can be seen in Appendix III.

It should also be noted that Oyaro (2020) only looks at lexical function of tone in her study leaving out its grammatical function. I don’t see anything new there, because it is common knowledge that tone plays both lexical and grammatical functions in Acoli. The important thing would then be to look at other factors at play in concert with tone.

It is also noteworthy that Oyaro (2020) focused primarily on determining sounds in Acoli (phonemes and allophones) but not the lexical and grammatical functions of tone and its background factors in the Payira variety of Acoli. This means she used ATR qualities to determine specific sounds but not to denote lexical or grammatical functions in the Gulu Variety of Acoli that she studied.

The last aspect that is also noteworthy is the fact that Oyaro (2020) only used lexical items in her analysis, grammatical items clearly being outside her scope of study. It would have been better to state specifically that low tones are associated generally with –ATR vowels in lexical items as she didn't consider grammatical items in her study. Because when it gets to grammatical items as shown in Appendix III, Category Three, even high tones can have –ATR qualities. This is the reason why she presents /cũl/ 'pay' as a 'verb' instead of the verb form 'you pay' which would be a grammatical form not a lexical item had she included the grammatical functions of ATR in her scope of study.

This study ably fills the lacuna pointed out above by clearly showing which qualities are at play in Acoli in as far as the determination of lexical and grammatical items is concerned by identifying tone duration, tone height and ATR as the background factors that work in concert with tone.

Both lexical and grammatical functions of tone and its background factors are handled in this study which had added new knowledge in this area as no study had been done before in Acoli that sought to describe the background factors and their roles in concert with tone in the Payira variety of Acoli.

5.5 Conclusion

A number of observations can be made from the findings and analysis of this research in relation to the set objectives:

Tone works in concert with three key qualities namely, +/-ATR (which has a lot to do with voice quality); tone duration and tone height. As has been presented in the background and study findings, results presented for analysis clearly shows that only one quality, for instance tone height operating in isolation does not bring out the various possible realizations that are possible in the language in relation to lexicon and grammar.

This, therefore, means that there is need for combining the applicable qualities on a case by case basis in order that the desired lexical or grammatical realization may be made for instance *lim* /lím/ 'visit' and *lim* /l:ím/ 'you visit' are verbs and verb forms, it is realized that three background factors are at play, because when you see the tones involved, you realize that they are all high tones much as they vary in height hence tone height is at play in this case, but ATR qualities are also at play

as the verb form above and the verb form are both -/+ATR respectively, and lastly the verb form referenced above is longer in its duration based on the length of the tone involved. The qualities presented in the background of the study and the presentation of results are not only inherent in the language but are also indispensable in the operation of grammar, and lexicon distinction in the language.

Tone height in the Payira variety of Acoli are distinct for the different word categories analyzed, that is noun, verb and some verb and noun forms. This is because a close inspection of the assorted lexical and grammatical items used for analysis clearly indicates that the different word groups used have different tone heights for instance it is realized that the maximum tone height average for the first category comprising of predominantly noun items is 140. 347Hz, the maximum tone height average for the second category comprising of verb items predominantly is 141. 548Hz, and the maximum tone height average for the third category is 142. 711Hz.

On that note, therefore, it is clear that noun items have the lowest maximum tone height average followed by verb items, and verb forms as presented in the above paragraph have the highest tone height average. This means that tone height is inherent in all the word categories in the Payira variety of Acoli, and should be treated as such because the height difference at play clearly contributes to the existence of the different lexical and grammatical items.

Tone duration also varies in the Payira variety of Acoli depending on the word category in question as verbs have been noted to be longer in duration than nouns. This is seen in the average length presented in the presentation of results which shows that verbs have the average length of 0.184.94s, and nouns have the average length of 0.17357s. This means that inherently, verbs are longer than nouns going by the length of the tonal vowel involved, therefore, much as the other factors may be at play, it is prudent to take keen interest in tone duration as an inherent background factor that helps in distinguishing lexicon items in the Payira variety of Acoli.

Tone duration plays both lexical and grammatical functions in the Payira variety of Acoli as a variation in the duration of tone inherently denotes a distinction between lexical and grammatical items as seen in the discussion of findings which shows that the first category made up of

predominantly noun items has the average tone duration of 0.17357s, the second category comprising of predominantly verbs has the tone duration of 0.184.94s, and the third category predominantly made up of verb and noun forms has the average tone duration of 0.22938s.

The fact that different word categories as seen in the presentation of results show variation in tone duration is a testament to the inherent existence and importance of tone duration in distinguishing lexicon and grammar in the Payira variety of Acoli. This is because nouns are seen to be the shortest word category, followed by verbs which brings about lexical difference, and verb items are shorter than verb forms which is a grammatical aspect.

And lastly, tone height also plays both lexical and grammatical functions in the Payira variety of Acoli as it helps in creating a distinction between lexical and grammatical items as well: this is also evident in the height difference between the different lexical and grammatical items in the assorted word categories used in the study, for instance the first word category is made up of predominantly noun items and has the lowest maximum height of 140.347Hz, the second word category made up of predominantly verbs has the second highest maximum height of 141.548Hz, and the third word category which is made up of predominantly verb and noun forms has the highest maximum height of 142.711Hz.

Taking for instance, the following examples: *lim* /lìm/ 'wealth' *lím* /lím/ 'visit' and *lim* /lí:m/ 'you visit' which are noun, verb, and verb form respectively, it is clear then that the tone height plays both lexical and grammatical roles as the first example is a noun item *lim* /lìm/ 'wealth' and the second example is a verb item *lim* /lím/ 'visit', this is lexical function; and the second example being a verb item *lim* /lím/ 'visit', and the third one a verb form *lim* /lí:m/ 'you visit' denotes grammatical function.

The functions noted above, lexical or grammatical are attributed to the variations in tone height presented in the first paragraph of this particular conclusion above. This is important because it shows clearly that tone height is key as a background factor that should be considered when dealing with tone in the Payira variety of Acoli.

5.6 Recommendations

A number of recommendations are worth making in relation to what this particular research has accomplished in as far as the set objectives of the study are concerned:

1. The background factors of tone be included and stressed in the analysis of tone by scholars as it has got some functions that are inherent within tone systems that may never be ably explained unless they are strictly and specifically catered for; for instance, that of Payira a variety of Acoli.
2. Acoli orthography be revised to include a representation of the background factors to ease the burden of reading and avoid guess-reading which is a common practice in the reading of the language.
3. Tone system which is representative of the various categories of lexical/grammatical items found in the language as denoted in the Payira variety be developed.
4. The Ministry of Education and Sports should in conjunction with the designers of Acoli language school curriculum should develop a curriculum that includes the background factors of tone even at lower primary level of education as the thematic curriculum would allow the teaching of these concepts at that level in order that children may be grilled on the rich complexities of tone early enough.
5. Further research should be done on the grammar of Acoli with the prime objective of establishing the word categories found in the language.

5.7 Areas for Further Research

Some very interesting areas that were beyond the scope of this research are of utmost importance in as far as comprehensive representation is concerned in the Payira variety of Acoli. Some of the areas highly recommended for further research are:

1. The significance of stops and pauses in determining meaning in the Payira variety of Acoli.
2. A bigger sample size be used to collect data and carry out a study in the entire Acoli Language in order to learn whether or not the findings of this study can be generalized to encapsulate the entire Acoli language or not.
3. A grammar of Acoli be studied with the view of integrating tone in it, and showing clearly its grammatical functions.

4. A study be carried out with the view of looking at the tone markings that are most comprehensive and representative of the background factors of tone in the Payira variety of Acoli.

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APPENDICES

Appendix I: Informed Consent Form

You are invited to participate in an academic research on the topic: ‘Lexical and Grammatical Roles of Tone in the Payira Variety of Acoli’. Your participation in this research will be twofold, one you will be interviewed by the researcher to establish your social, historical and linguistic background, and two, the researcher will require you to read (pronounce) from a list of words and phrases in Acoli which will be recorded.

Participation

The decision to participate in this research project is purely dependent on your informed consent; you can also decide to discontinue your participation in the project whenever you so wish; you will be free to make inquiries on aspects you don’t understand in the course of the study; and, you will not be required to pay for your participation in the study, and you will also not be paid for your participation in the study, however, some form of appreciation in terms of transportation refund and airtime may be provided.

Confidentiality

Your right to anonymity will be respected in the study. The data elicited from you will strictly be used for the purpose of this study only.

Acceptance

I.....agree that I have read and understood the content of this consent form. I, on that note, willingly consent to participate in this study.

Sign: Date:

Witnessed by:

Sign: Date:

ResearcherSign: Date:

Appendix II: Interview Guide

The research will be guided by a number of questions that will cover the ideal qualities to be considered in the people to be involved in the research:

Requirements for Participation in the Study

The people involved in the study should be native speakers of Acoli;

They should at least have attained ordinary level certificates;

They should be adults as per the Constitution of Uganda;

They should speak the Payira variety of Acoli as their native variant;

They should be literate, that is, should be able to read and write Acoli;

Questions

1. What is your name?
2. How old are you?
3. What is the level of your education?
4. Which part of Acoli sub region do you come from?
5. Are you a native speaker of the Payira variety of Acoli language? Yes/No
6. Are you able to read well writings in Acoli? Yes/No

Thank you for your participation in the study.

Appendix III: Word Categories for Tone Duration, Tone Height and +/-ATR Analysis

Item	Gloss	Item	Gloss	Item	Gloss
F.C		S.C		T.C	
lìm /lìm/	‘wealth’	lím /lím/	‘visit’	lím /lí:m/	‘you visit’
nyìm /jìim/	‘simsim’	nyím /jím/	‘front’	nyím /jí:m/	‘you heap’
mòn /mòn/	‘hatred’	món /mòn/	‘women’	món /mó:n/	‘develop hatred’
ngòl /ηòl/	‘disability’	ngól /ηòl/	‘verdict’	ngól /ηó:l/	‘you cut’
lùny /lùj/	‘to come’ of	lúny /lúj/	‘act of undressing’	lúny /lú:j/	‘you undress’
mùny /mùj/	‘to sink’	múny /múj/	‘to swallow’	múny /mú:j/	‘you swallow’
lám /lám/	‘meagre’	lám /lám/	‘curse’	lám /lá:m/	‘you curse’
màn /màn/	‘testicles’	mán /mán/	‘to go round’	mán /má:n/	‘you go round’
lèny /lèj/	‘heart burn’	lény /lèj/	‘melt’	lény /lé:j/	‘you melt’
nèn /nèn/	‘to appear’	nén /nén/	‘to see’	nén /né:n/	‘you see’