INTONATION IN EKEGUSII, ITS INTERACTION WITH INFORMATION STRUCTURE AND HOW IT IS PERCEIVED BY NATIVE SPEAKERS

BY

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DECLARATION

DECLARATION

I declare that this thesis is my own original work and has not been presented for a degree in any other university or any other award.

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ii

DEDICATION

To my late parents, Elder Ezekiel Komenda Ongwae (1934-2017) and Mama Agnes Kemunto Komenda (1945-2021); my wife, Caro and the children, Toby, Deveney and Ezzy.

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Last but not least, this thesis could not have been without the sacrifice from members of my family: My wife, who understood why I had to be away from home on many occasions to work on the thesis; my children: Toby for answering many of the questions his younger sister, Deveney, asked about the progress of my work and Ezzy, for always distracting me by sitting on my laptop whenever I worked on the document in our house: I had to look for an alternative working space. It only worked while my mother lived (Mum, in my heart you will always be). I had to get back to our house. You now changed tactic: you refused to go to bed until I shut down the laptop.

HONOUR AND GLORY BE TO THE ALMIGHTY LORD!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND SYMBOLS

ABBREVIATIONS

AF:	Argument Focus
A-M:	Autosegmental- Metrical
CF:	Contrastive Focus
Cumul Perc:	Cumulative Percentage
DCT:	Discourse Completion Task
DP:	Determiner Phrase
EC:	Effort Code
F:	Female
F0:	Fundamental Frequency
FC:	Frequency Code
H:	A high lexical tone
H%:	High boundary tone
H-:	An intermediate phrase end tone
IF:	Information Focus
IPA:	International Phonetic Alphabet

IR: Identification Rate

IQR: Interquartile Range

IS: Information Structure

L: A low lexical tone

L%: Low boundary tone

M: Male

NF: Neutral Focus

PC: Production Code

PCT: Production Completion Task

PES: Partial Eta Squared

PF: Predicate Focus

Std Dev: Standard Deviation

ToBI: Tones and Break Index

SYMBOLS

ː Phonetic length

ˆ A falling tone

´	A high tone
`	A low tone
|	A minor intonation phrase boundary
‖	A major intonation phrase boundary
↓	Downdrift
↑	Upstep
%	A boundary tone
0	A break index that shows a very close degree of strength between words.
1	A break index that indicates a small pause between wods
3	A break index that indicates an intermediate phrase end
4	A break index that shows an intonation phrase end

ABSTRACT

The work presented in this thesis is a description of the structure of intonation and its interaction with information structure units, perception and interpretation in Ekegusii. This description was aimed at meeting the following objectives: to identify and describe the phonetic structure of intonation phrases in Ekegusii; to analyse how intonation encodes focus in Ekegusii utterances and to investigate Ekegusii native speakers' level of precision in the perception of intonation phrases in the language. Consequently, 3744 utterances were analysed following the basic principles of the Autosegmental-Metrical Theory. Data were analysed at the production and perception levels. At the production level, 24 purposively selected participants read aloud utterances presented to them. The utterances of each one of them were recorded and fed into a speech analysis software, PRAAT. The recorded data were used in the description of the structure of intonation phrases in Ekegusii. This structure, the research has established, consists of boundary intonemes and F0 fluctuations. The major finding in this part is that all Ekegusii utterances, irrespective of the lexical tones, have final L%, L-L% and H-L % boundary intonemes but could be distinguished by the differences in the gradient of declination and the F0 fluctuations associated with them. Findings also indicate that polar interrogative sentences were pronounced at the highest F0, 211 Hz. These were followed by the constituent interrogatives, 202 Hz; the imperative sentences, 201 Hz and the echo interrogatives, 194 Hz. Declarative paratones were articulated at the lowest F0, 185 Hz. In addition, results have shown that participants had different F0 registers with findings indicating that children and the advanced-aged participants had higher F0 registers (242 Hz and 205 Hz, respectively) than the youth (185 Hz) and middle-aged participants (163 Hz). An overall decrease in F0 with advancement in age upto the middle-aged period before an increase at the advanced-aged period for both male and female participants was observed. Equally, female speakers produced utterances at higher F0 registers than their male counterparts did across all the age categories. The female children's pitch register was 249 Hz while the male children's was 233 Hz. The female youth's register was 223 Hz while their male conterparts' was 147 Hz. The middle-aged females spoke at 211 Hz while their male counterparts at 119 Hz. The advanced-aged female participants spoke at 231 Hz while the advanced-aged males spoke at 183 Hz. The female participants' F0 bottom line was 184 Hz while their top line was 244 Hz. The male participants' F0 bottom line was 157 Hz and the top line 179 Hz. The average F0 register for the female participants was 218 Hz while the male participants' was 168 Hz. The study equally found out that two intonation strategies were used to signal focus in Ekegusii. These were F0 fluctuations and rephrasing. The argument, predicate, contrastive and sentence focus structures were articulated at different F0s (199 Hz, 198 Hz, 196 Hz and 195 Hz, respectively). Focus was also signalled through the insertion of an intermediate intonation phrase to the left or right of the focused constituent. This intermediate intonation phrase was marked with an H- or L-tone. In terms of perception and interpretation of intonation types, the study has established that the echo interrogative utterances were the easiest to identify while the polar interrogative ones posed the greatest challenge to interpret. The contrastive focus structure also presented the greatest challenge to interpret while the predicate focus posed the least challenge to the participants. Again, female participants had a higher identification rate than their male counterparts. The male participants seemed to concentrate more in correcting the utterances given than classifying them. They also gave arbitrary responses. This study is invaluable in acoustic phonetics research especially in tone languages.

CHAPTER ONE
INTRODUCTION TO THE STUDY

1.1 Background to the Study

This study, which is on intonation in Ekegusii, presents a description of intonation structure, native speaker perception and interpretation and its influence on the information structure unit of focus in the language. Ekegusii is a tonal Eastern Bantu language that according to the Kenya National Bureau of Statistics (2019) is spoken by about 2.5 million people. Approximately 2.2 million of these speakers reside in Kisii and Nyamira Counties. About another 300,000 people speak the language in other regions in the world (Lewis, 2009). Ekegusii speakers make up 6 % of Kenya's 40,046,566 people (CIA, 2010). Ekegusii is mainly spoken between the eastern shores of Lake Victoria and the eastern branch of the Great Rift Valley and is surrounded by Nilotic languages: Kalenjin to the North and partly to the East; Maa to the East and partly to the South East and Dholuo to the West and South East.

Ekegusii is classified as an E.10 language (Lewis, 2009). Guthrie (1967) labels it as E.42 and is closely related to Logooli (E.41), Luhya (E. 32), and Kuria (E. 43). Cammenga (2002: 21) points out that Kuria, which is spoken to the South of Gusii, is the most closely related to Ekegusii. All these are Bantu languages. However, research and documentation on the intonation structure of nearly all the above languages is scanty. This makes a study of intonation in Ekegusii timely. It is expected that such a study will pave way for a comparative analysis of the intonation patterns of the languages closely related to Ekegusii.

Cammenga (2002: 29) speculates that Ekegusii has eight dialects. He, however, lists only seven: Getutu, North Mugirango, Bassi, Wanjare, Majoge, Nyaribari and South Mugirango. As a native speaker of Ekegusii, I consider these as Ekegusii clans and not the dialects of the language. The study adopts Bosire's (1993), observation that Ekegusii has two dialects: Rogoro (Northern) and Maate (Southern). The Rogoro dialect is the dominant dialect and is considered the standard form. This is the form used in written works like Ebiblia Enchenu, 'the Holy Bible' and hymn books and in the teaching of Kikwetu in rural schools in lower primary. The dialect is spoken in Getutu, North Mugirango, Bassi, Wanjare, Majoge and Nyaribari. The Maate dialect is spoken by majority of the occupants of Gucha South district, specifically in South Mugirango. Speakers of the Rogoro dialect refer to this dialect as, Ekegirango Maate and regard it as distinct from the Rogoro dialect. This study is a first attempt at investigating the realization of intonation contours and their influence on information structure units in Ekegusii.

Intonation, the subject of this study, is a suprasegmental aspect of language, which is used to convey post-lexical meanings (Caron & Izre'El, 2011; Ladd, 2008). According to Fox (2002), Clark, Yallop and Fletcher (2007), suprasegmental aspects, also called prosodic features, are features of spoken language, which are not easily identified as discrete segments but extend over larger stretches of speech. Crystal (2003) defines intonation as the distinctive use of patterns of pitch while Hirst and Di Cristo (1998) term intonation as the melody of speech. Roach (2009) sees intonation as a means of conveying information in speech. Following Beckman and Venditi (2010), this study regards intonation as pitch contours produced at phonologically specified points in an utterance and serves to contrast and organize information structure units.

Studies investigating the place of intonation in grammar (Alzaidi, 2014; Baird, 2014; Wang and Xu, 2006; Liu and Xu, 2005 among others) show that intonation contributes to information packaging in language. However, both tonal and non-tonal languages differ on such usage. According to Anyanwu (2008), tonal languages are those that employ tone (variation of pitch at syllable level), in addition to vowels and consonants to contrast lexical and grammatical meaning. Tonal languages can either be tone or pitch accent languages.

Tone languages have lexical or grammatical distinctions manifested by contrast in tonal patterns while pitch-accent languages have accent manifested by pitch-levels. Pitch-accent languages mark each word with a specific tonal melody whose alternation leads to a change in the meaning of a word. Yip (2002) indicates that more than half of the languages in the world are tonal. These are found in South East Asia and Japan, Africa, Papua New Guinea, the Swedish-Norwegian continuum and the Americas. Ekegusii, the subject of this study, is a tone language. Each tone bearing unit, in the language, is marked with a specific tone and substituting one distinctive tone for another on a particular word or morpheme causes a change in its denotative meaning. For example, the lexical items presented in the pitch tracks below have the same phonetic forms but differ in meaning because of the contrastive tones.

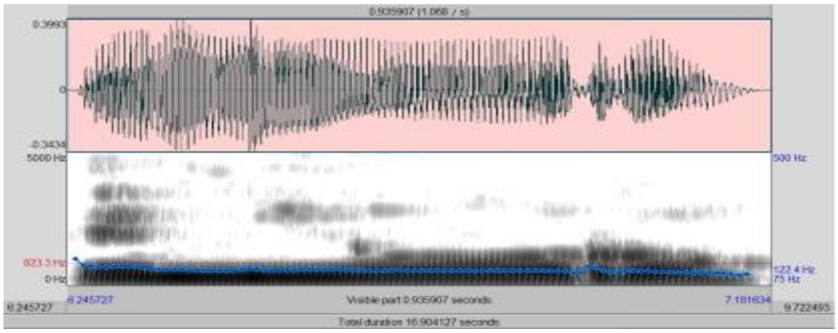

Figure 1.1: PRAAT window for the utterance /é-míóɾò/ ‘nose’

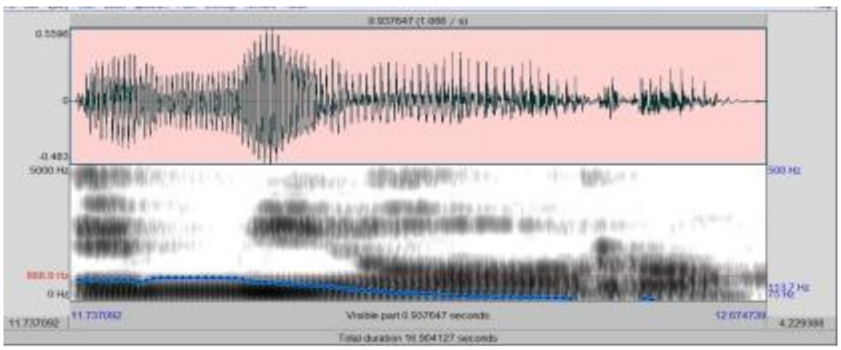

Figure 1.2: PRAAT window for the utterance /é-míóɾò/ ‘pangas’

From Figure 1.2 we note that the utterance /é-míóɾó/ meaning ‘nose’ is said with the vocal cords vibrating at a fundamental frequency range of about 122.4 Hz but /é-mìòɾò/ meaning ‘panga’, is said with the vocal cords vibrating at an F0 range of about 113.7Hz as shown in Figure 1.2. Equally, the word *eseese* can mean either ‘difficult situation’ or a ‘persistence cough’. In each case, the vocal cords vibrate at different F0 rates as Figures 1.3 and 1.4 show.

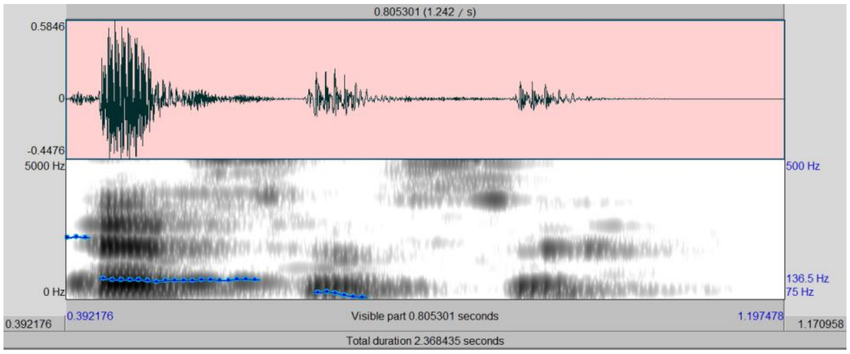

Figure 1.3: PRAAT window for the utterance /έ-sέέsέ/ 'Difficult Situation'

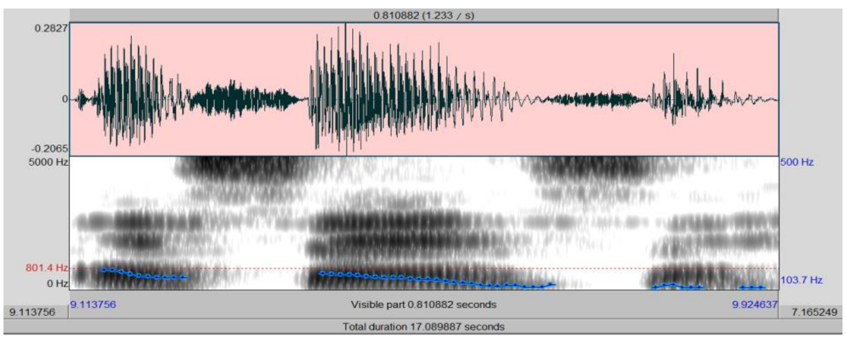

Figure 1.4: PRAAT window for the utterance /έ-sέὲsὲ/ 'Persistent Cough'

Figure 1.3 records an F0 range of 136.5 Hz for the word /έ-sέέsέ/ meaning 'difficult situation'. Figure 1.4 shows that the same word was articulated at an F0 range of 103.7 Hz when it means /έ-sὲὲsὲ/ 'persistence cough'. Similarly, the word /eŋkoɾo/ changes meaning with variation in F0 as the figures below show.

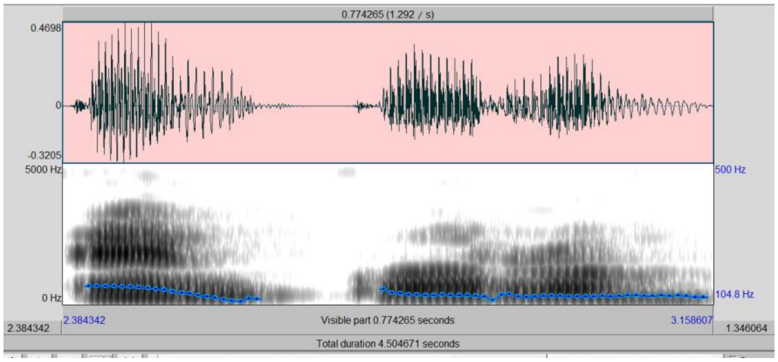

Figure 1.5: PRAAT window for the utterance /éŋkòɾò/ ‘heart’

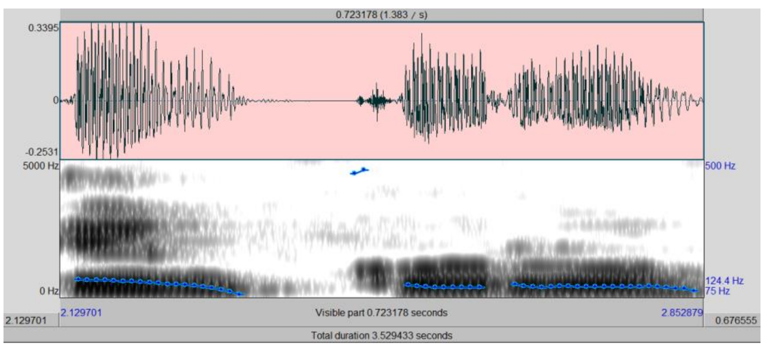

Figure 1.6: PRAAT window for the utterance /êŋkóɾó/ ‘old’

The readings from the pitch tracks in Figure 1.5 and Figure 1.6 above show that the word *enkoro* can mean /éŋkòɾò/ ‘heart’ in which case it is said at an F0 range of 104.8Hz. It can also mean /éŋkóɾó/ ‘old’ when said at an F0 range of 124.4 Hz. The above examples demonstrate that tone, in Ekegusii, is semantically significant for they have demonstrated a meaning change due to tonal alternations. The differences in the F0 values are the most physical indicators of how a change in tone signals a change in meaning.

Most of the description of pitch in Ekegusii has largely centred on tone (Bickmore, 1999; Nash, 2011; Whiteley, 1960). The role of intonation in the language has not received any documented attention so far. Given that all tonal languages also use intonation (Roach, 2009), though in a slightly more limited form than in non-tonal ones (Gussenhoven, 2004), made the research reported in this thesis timely and necessary. The research has demonstrated that intonation in Ekegusii is important in distinguishing utterance types and contributes to the communicative value of an utterance by signaling its information structure. This is in line with Calhouns (2012) observation that speech is impossible without prosodic aspects like pitch. Equally, as noted in Alzaidi (2014), the information structure of an utterance in language is influenced by the intonation pattern of that language. Therefore, due to the central role of intonation in language, this study set to investigate the intonation structure of different utterances and its influence on the structuring of the utterances in Ekegusii. The information structure unit evaluated in this study is focus, which relates to that constituent in the information packaging of an utterance that the speaker assumes the listener cannot predict or recover at the time of the discourse.

1.2 Statement of the Problem

Pitch variation is an indispensable aspect of communication as it helps the speaker and listener to correctly convey and interpret the messages coded in their utterances. Without correct pitch variation, it might be difficult for speakers to convey and listeners to understand the meanings of some utterances. This will eventually lead to some misunderstandings in communication. For example, the Ekegusii utterance /*ómòòntò óɣòkórá éɲáŋí nêsêsé*/, in the same phonetic form, can express different meanings depending on whether it is said as a declarative, thus, stating a fact or giving an opinion or as an interrogative sentence in which case it will be uttered to seek a response. It can also be used to bring out the meaning, ‘somebody is wedding a dog’ or it can be used metaphorically to mean, ‘anybody wedding is a dog.’

Equally, a simple utterance like */ntwaaγeendete/* can also have various interpretations depending on the speaker's intent in uttering. It can be said as */ntwááγéèndété/* to bring out the meaning of 'we went'in the recent past or as */ntwâγèèndété/* still with the meaning 'we went,' but in the remote past. The same structure can be said as an interrogative sentence */ntwâγèèndêtè/ ' did we go'* to elicit some response. All these nuances of utterance type and meaning are an integral part of Ekegusii. However, such structures are only ambiguous in the written forms. Speakers of Ekegusii resolve the ambiguity simply by varying their pitch alone. Therefore, correct use of pitch variation at utterance level (intonation) must be considered in interpreting Ekegusii utterances.

However, studies analyzing pitch variation in Ekegusii have mainly focused on the use of pitch for lexical and grammatical purposes (tone), precluding the role of pitch at long utterance level, that is, intonation, and its influence on information structuring. Such studies have also been phonological rather than phonetic in approach in spite of the major advances and the increased interest lately witnessed in the phonetic analyses of the intonation systems of world languages, using available modern acoustic tools like PRAAT. The researcher suspected that intonation in Ekegusii has distinct defining features, just as it is in the much researched stress languages, which deserve independent, thorough and accurate description. This study, therefore, sought to address the above concerns for there is a dearth of knowledge on what characterizes intonation patterns in Ekegusii; how intonation conveys different shades of utterance meaning which native speakers can perceive and interpret accurately and the influence of intonation on information structure units in Ekegusii. Gesura (2014), while investigating the syntactic encoding of information structure in Ekegusii, recommends for research on the interaction between information structure and pitch in the language in order to show how they affect each other. It is expected that this study will give an understanding of not only the Ekegusii's intonation structure and use but will also how different modules of the language interact with one another. This statement of the problem can be summarised in the following research questions:

1. What characterizes the phonetic structure of intonation phrases in Ekegusii?
2. How does intonation encode focus in Ekegusii utterances?
3. How are intonation contours in Ekegusii perceived by native speakers?

1.3 Research Objectives

The objectives of the study were to:

1. Describe the phonetic structure of intonation phrases in Ekegusii.

2. Analyse how intonation encodes focus in Ekegusii utterances.

3. Investigate Ekegusii native speakers' level of precision in the perception of intonation phrases in the language.

1.4 Research Assumptions

The analyses carried out in this study were based on the following hypotheses:

1. Most Ekegusii intonation phrases have a rising F0.

2. Ekegusii encodes the focus structure of utterances through intonation.

3. Native speakers of Ekegusii do not vary in their perception of Ekegusii intonation phrases.

1.5 Rationale and Justification for the Study

Current literature in the field of intonation shows that there is renewed interest in establishing the relationship between the placement of intonation boundaries and information structure. How intonation encodes information structure units like focus and interpretation of utterances has been widely investigated in a number of Romance languages (Alzaidi, 2014). Results from such studies show that there are cross-linguistic variations in the use of intonation. However, studies on the interaction between intonation and other aspects of grammar in the three hundred plus Bantu languages (Nurse and Phillipson, 2003) are scarce. This study was thus a quest for an understanding of the nature and use of intonation in a Kenyan Bantu language. The main contribution will be the provision of linguistic knowledge, especially on how intonation encodes focus. Such work is expected to be of use to researchers and grammarians working in the field of intonation, information structure and communication.

A study of intonation in Ekegusii is expected to have practical pedagogical implications in classroom practice in terms of the achievement of Ekegusii oral fluency. As Levis and Pickering (2004) observe, intonation is key to effectiveness in spoken language. This study is expected to be relevant to learners in grades 1-3 where Ekegusii is used as a language of instruction and of study. Insights of how intonation functions in Ekegusii discourse will aid in the understanding of the reasons behind variability in the realization and interpretation of utterances which is expected to improve the learners' communication. This is expected to assist teachers of Ekegusii in assessing the reading fluency of their learners. Ekegusii learners' awareness of the importance of intonation in conveying utterance meaning will make them effective readers and speakers of not only Ekegusii but also English, the medium of instruction in upper primary and secondary school levels.

A consideration of the characteristics of intonation in Ekegusii will also provide comparative quantitative data for the analysis and modeling of intonation structures of related languages. A broad intonation typology of world languages will be made possible when all or most languages are taken into consideration. Fox (2002) observes that an adequate phonological framework for intonation can only be provided when the intonation features not only of languages, such as English, which have been thoroughly described from the early decades of the 20th Century onwards, but also of languages of different prosodic types, including languages with tone, tonal accent, and pitch accent. Cammenga (2002: 22) also notes that before any linguistic comparative studies are done, sufficient description and analysis of the individual languages to be compared is a prerequisite. Since comprehensive and systematic descriptions of the nature and use of intonation in languages closely related to Ekegusii are scarce, as far as literature reviewed is concerned, this study becomes timely.

1.6 Scope and Limitations of the Study

The study was limited in scope to the description of the substance and function of intonation in the Rogoro dialect of Ekegusii. This dialect was preferred because its description will lay the basis for a comparative analysis with the Maate dialect and other related languages.

Though the study was limited to the description of intonation use in Ekegusii, a brief description of the general phonology of Ekegusii, especially the pitch patterns was given. This was done in order to show how pitch in Ekegusii encodes both lexical and grammatical tone and intonation. However, emphasis was given to the overall pitch contours common to each utterance type and not on the interaction between features of level tones (H and L). It's the nature of boundary tones that have been described to reveal the intonation patterns of whole intonation phrases.

Both phonological and phonetic accounts of intonation in Ekegusii have been carried out in this study. These according to Hirst, Di Cristo and Espesser (2000) correspond to the concrete and abstract analytical manifestations of intonation. In this study, analyses of acoustic and perceptual features of Ekegusii utterances have been described to reveal the concrete (phonetic) manifestations of intonation in Ekegusii. At the acoustic level, the study has given a measure of the modulation of fundamental frequency (F0) and the pitch-range variation in utterances spoken by Ekegusii native speakers of different ages and sex. Instrumental physical measures of the rising and falling curves of native speakers' utterances were provided to highlight the structure of intonation phrases in Ekegusii. An intonation phrase, following Reed (2009) was taken to be a stretch of speech uttered under a single coherent intonation contour.

A perceptual account of intonation entailed an investigation on the native speakers' ability to detect pitch changes and classify the stimuli behind it. The question of whether age and sex have an effect on the perception and interpretation of different paratones and focus structures was investigated to show how speakers of the same language vary in discriminating intonation features.

At the phonological level, the influence of intonation on information structure has been investigated. The study, however, does not consider all the information structure units. It is the interaction between the phonetic aspects of intonation and focus marking in Ekegusii that have been examined. Two categories of focus: information focus and contrastive focus (Gesura, 2014; Zimmermann and Onea, 2011; Lambrecht, 1994) were considered in order to show the overall location of intonation in the grammatical system of Ekegusii. Aspects of syntactic and morphological marking of focus were partially considered for the researcher felt they were far beyond the scope of this study.

1.7 Definition of Terms

Declination: This refers to the gradual decline in voice in the course of an utterance.

Default tone: The term is used in studies of tone to refer to a low tone assigned to a toneless mora by the Defaul Tone Assignment Rule.

Fundamental frequency: This denotes the rate of vibration of the vocal cords. It specifically refers to the number of complete repetitions of variations in air pressure per second.

Information structuring: This refers to the ordering or packaging of elements of a proposition to meet the immediate communicative needs of the interlocutors with the goal that they be well understood by the addressee (Féry & Krifka, 2008).

Intonation: Intonation is the use of pitch variation to convey meanings of utterances.

Intoneme: The term is used in this study following Ladd (1996) to refer to a minimal unit of distinctive intonation contour associated with a particular function.

Paratone: The term has been used to refer to a complete speech that is an equivalent of an utterance type. A paratone corresponds to an intonation phrase.

Pitch: This is an auditory sensation of tonal height (perceived as higher or lower) and related to the rate of vocal cords vibration at different points in the utterance (Gussenhoven, 2004).

PRAAT: PRAAT is a computer speech recognizing programme that automatically transcribes speech into text.

Prosodic focus: This is a phonetic means of highlighting part of an utterance that is used to convey new or contrastive information against the rest of the constituents. A focused constituent is what the speaker considers to be the centre of attention.

Tone: The term is used in tone languages to refer to pitch variation at the syllable level that reflects lexical or grammatical meaning (Roach, 2009).

1.8 Literature Review

This section gives a review of literature on the basis of intonation, pitch variation in Bantu languages and pitch variation in other languages of the world.

1.8.1 The Basis of Intonation

Intonation can be defined variously. Pierrehumbert (1980) notes that intonation is the use of phonological pitch variation for non-lexical purposes or for the expression of phrasal structure and discourse meaning, independent of the words. Wu (2000) indicates that intonation should be perceived as a sequence of pitch levels comprising different registers. According to Zerbian and Etienne (2008), intonation is traditionally used to refer to meaningful alternations in pitch across the sentence.

Fox (2002) points out that the intonation of an utterance should be regarded as a continuous and continually varying pitch pattern. The author also indicates that intonation has a number of characteristics which sets it apart from other prosodic features. Among these characteristics is that intonation is meaningful while the other prosodic and non-prosodic features merely serve to distinguish meaning in different linguistic items but are not inherently meaningful. Intonation is different in the sense that a falling intonation, for example, can often be assigned meanings such as “statement” or “complete,” while a rising intonation may be given meanings such as “question” or ‘‘incomplete.’’ The second characteristic is that intonation has structure. The author observes that the distinctions intonation makes are often not discrete, but constitute a gradient.

According to Gussenhoven (2004), intonation can be analyzed at the acoustic and auditory levels. The acoustic analysis entails an examination of fundamental frequency curves of an utterance and pitch-range variation. The author notes that F0 is what is heard as the changing pitch of speech and can be established automatically through pitch trackers. Auditory level analysis of intonation involves an examination of the perception and interpretation of intonation contours. He also reveals why speakers vary their intonation, what these variations mean and how they are integrated into a language’s grammar. He notes that intonation is used to express people’s feelings and encode information structure of sentences; it is sensitive to syntactic categories like “argument’’ and “predicate”; it appears to have different phonetic forms in different segmental conditions and is integrated with lexical tone distinctions in tone languages. The author also observes that, most tone languages will have some form of structural intonation and even tonally quite tense tone languages have intonation boundary tones, causing questions to end at higher fundamental frequencies than statements. The above observations were important in this study, as we have used them to investigate both the acoustic and auditory properties of intonation in Ekegusii.

House (2004) discusses the production and perceptual characteristics of intonation incorporating three biological constraints: Frequency Code (FC), an Effort Code (EC) and a Production Code (PC). The Frequency Code is an explanation of the similarities across languages in the expression of sentence mode (the use of the rising or high question intonation and falling or low statement intonation). The FC is used for the contrast of affective meanings like masculinity, dominance, assertiveness, confidence and protectiveness versus femininity, submissiveness, friendliness, insecurity and vulnerability. The Effort Code is concerned with the interpretation of prominence of peaks marking important parts of expressions for focus or information packaging. The Production Code is used for phrasing. It correlates intonation contours of breath groups with meanings such as continuation or signaling of new topics. The three codes were important in our study. The FC informed the analysis of the perception and interpretation of intonation meaning; the EC was important in investigating the interaction between intonation and information structure unit of focus and the PC was followed in the evaluation of the variability among participants in the production of intonation contours in Ekegusii utterances.

Vermillion (2004) presents a methodological technique: the use of the prosodic completion tasks (PCTs) to investigate the phonetics and phonology of intonation. To determine the meaningful contrasts of speakers' tonal manipulations, the writer advocates for the use of experiments measuring a listener's perceived meaning of intonation. The writer also advocates for the use of production experiments to analyse the production of intonation in speech. The writer compares the use of PCTs and Discourse Completion Tasks (DCTs) in analysing intonation. A PCT attempts to elicit the speakers' means of conveying meaning. A PCT gives a scene, two conditions and two test items, which will elicit a lexical response. In a DCT, the speakers are given a scene or the background information, such as what the previous speaker had said. The scene also specifies the setting, and the speaker's relationship with one another. A specific feeling or emotion, which the speaker is then supposed to convey through his/her response, is also prompted. Vermillion's (2004) approach is important in this study in its methodological and theoretical aspects. Our study has followed both the PCTs and DCTs to analyze the auditory and acoustic properties of intonation. The use of the signal processing system, PRAAT (Boersma and Weenink, 2001, 2012), was adopted in transcribing the acoustic properties of intonation in Ekegusii. The use of the Tones and Break Indices (ToBI) transcription system (Pierrehumbert, 1980) as described in Vermillion (2004) was adopted in this study to indicate the degree of juncture between words in the speakers' renditions of the utterances given.

Hirschberg (2006) illustrates the interaction between intonation and pragmatics in English. She notes that intonation patterns play a significant role in interpreting and determining the illocutionary force of an utterance. The above observations were relevant in our analyses of the structure of intonation in different types of utterances in Ekegusii and how intonation influences focus in the language.

1.8.2. Studies of Pitch Variation in Bantu Languages

Research studies on Ekegusii pitch changes (Whiteley, 1960; Bickmore, 1999; Cammenga, 2002 and Nash, 2011) have shown that at the lexical level, the high and low tones in Ekegusii distinguish word and grammatical meanings. Whiteley (1960) points out that tone in Ekegusii distinguishes tenses, which are segmentally identical but semantically distinct. Evidence of studies investigating Ekegusii pitch variation beyond the syllable level have not been undertaken. As already mentioned, pitch aspects of Ekegusii are only recorded in the presentation of level tones. Therefore, an adequate understanding of pitch modulations at utterance level in Ekegusii will bridge this descriptive and analytical gap.

Jones, Louw, & Roux, (2001) give an account of the acoustic properties of statements and yes-no questions in Xhosa. On the basis of the recorded tokens of mother tongue speakers, they measured duration, pitch and intensity (loudness) for statements and corresponding questions. This study was important to our research in terms of the methodological approach adopted. The use of PRAAT to measure the acoustic fundamental frequencies has been adopted using Ekegusii data. However, more utterance types were considered for an exhaustive account of Ekegusii intonation structure.

Zerbian & Etienne (2008) have investigated the phonetics of intonation in South African Bantu languages: isiZulu, isiXhosa, isiNdebele, Sesotho, Setswana, SeSotho saLeboa, Xitsonga and TshiVenda. They give a description of how duration, fundamental frequency and intensity interact in these languages. Their study indicates that the duration of segments is modified owing to changes in phonological boundaries and / or alternations in discourse prominence. Durational alternations due to syntactic and pragmatic factors are aspects of intonation. Two pragmatic factors that are commonly reflected in intonation are the signalling of sentence type and the encoding of information structure. They also note that focus influences tone at sentence level. The above observations were investigated in this study and were found to hold for Ekegusii.

Downing (2008) investigates the role of intonation in three Bantu languages, Chichewa, Chitumbuka and Durban Zulu. The author observes that length, loudness and pitch are the primary prosodic correlates of intonation prominence. Though the study concentrates only on the function of intonation, it greatly informed this study, which has first described the nature of intonation contours before evaluating their influence on information structure. The aspects of prosodic phrasing and how intonation marks utterance edges, discussed in Downing (2008), have been investigated using Ekegusii data.

1.8.3. Studies of Intonation in other Languages

Nkamigbo (2012) presents a phonetic analysis of tone in Igbo. The researcher examines the acoustics of Igbo tone as well as the interaction between tone and intonation in the language. The findings of the study show that pitch perform the grammatical function of distinguishing declaratives from interrogatives in Igbo. The study reveals that tone is a high pitch on the initial pronominal element of the declarative while in the interrogative, there is a very rapid fall in pitch. This study was important to our investigations on the methodological approach used. The author uses a word list, frequency graphs and sound spectrograms in his analyses. In this study, however, the word list was substituted by an utterance list as explained in Section 1.9.2. The use of only two adult male native Igbo speakers was modified to include children, the young, the middle-aged and advanced-aged male and female Ekegusii native speakers.

Pierrehumbert (1980) evaluates the nature of intonation contours in English following the Autosegmental-Metrical (A-M) model. The study identified two level tones (H and L) for English and three tonal categories: pitch accents (e.g., H +L…), boundary tones (H %, %L), and phrase tone (H). The tones were subject to phonetic implementation to generate F0 contours. While English is tonally impoverished in lexical contrasts, it has many subtle F0 distinctions at the sentence level with grammatical and pragmatic contexts. Though

Pierrehumbert's (1980) observations are based on a stress language, a study of Ekegusii, a tonal language, will help reveal the idiosyncrasies of intonation in a language rich in using pitch for lexical contrasts as well.

Gussenhoven (2000) gives a historical background of the characterization of the notion of "possible prosodic structure" as distinct from an account of the phonetic details of intonation contours. The author observes that the speaker's psychological condition and communicative purpose influence the overall pitch range of an intonation system. This observation was relevant in our study in the investigation of the native speakers' variability in the perception and interpretation of utterance type and focus condition based on intonation.

Jun & Fougeron (2000) provide a phonological model of French intonation with two tonally defined prosodic units: accentual phrase and intonation phrase. Relevant to the analysis of Ekegusii intonation are the observations about intonation phrases in French, which are marked by a major continuation rise or a major final fall, final lengthening and optional pause. The authors also investigate the nature of complex boundary tones, represented as L-H% and H-L%. This introduces two more boundary tones in French, in addition to the simple boundary tones, L% and H%. The observations made on French will be significant in this study as it will also examine the characteristics of boundary tones in various intonation phrases.

Gussenhoven (2002) points out that intonation meaning in English is located in two components: the phonetic implementation and the intonation grammar. The phonetic implementation is widely used for the expression of universal meanings. Intonation meaning is both universal and language specific. The universal part is exercised in the phonetic implementation, while the language specific meaning is located in the intonation morphology and phonology. Speakers control the phonetic implementation of linguistic expression for social positioning and the expression of the meaning of their utterances. The observations made by this author were relevant especially in the investigation of the effect of sex and age in the realization of fundamental frequency contours for different intonation phrases in Ekegusii.

Veliz (2004) examines intonation patterns of different speech acts in English. The findings show that intonation plays a role in determining the illocutionary force of different utterances. Hirschberg (2006) also makes the same findings for English. Their observations for English were relevant in our analyses which have evaluated intonation structure in different intonation phrases in Ekegusii.

Erteschik-Shir (2007) notes that information structure units determine word order and interact with intonation in language. Equally, Ndungu (2015) indicates that information structure units can be manifested in aspects of prosody (intonation). Previous studies on the interaction between intonation and information structure units in world languages indicate that there are cross-linguistic variations (Alzaidi, 2014). It is the nature of the interaction between intonation and the information structure unit of focus in Ekegusii that has been given formal description in our research.

Na Zhil, Hirst & Bertinetto (2010) give a description of the prosody of spontaneous speech in standard Chinese (Beijing). The writers note the intertwined relationship between Chinese lexical tones and intonation in a raw F0 contour. Our study benefitted from the above observations in terms of the methodological approach of using conversational recordings extracted from spontaneous conversation corpus. The writers' consideration of sex perspectives in intonation was also taken into account in our analyses. Their use of utterances neutral in emotion formed the basis of the sampling of the sentence material used in our study.

Mirzayan (2010) presents an account of the intonation phonology of Lakota, an indigenous North American language within an Autosegmental-Metrical approach. The description of intonation is based on acoustic analysis of native speakers' declarative and interrogative utterances drawn from narratives and semi-spontaneous speech. The researcher indicates that a Lakota utterance can be organized into three levels of supra-lexical prosodic structure; the intonation phrase, the intermediate phrase and the prosodic (Phonological) word. Just like the analysis of Lakota, we have examined the nature of pitch at intonation phrase boundaries in Ekegusii and given an analysis of the fundamental frequencies of utterances within A-M Theory.

Caron & Izre'El (2011) analyse the interaction between tone and intonation in Zaar, a Chadic tone language. They note that tones in the language are important in identifying lexemes, but also play a role in the morphosyntactics of the language too. The writers further observe that surface tones undergo variation which can be heard when listening to recordings of natural speech. The role of pitch in Zaar intonation is observed in the variation between post-lexical tones as they are perceived and transcribed by the native speaker and their acoustic realization as represented by prosogram. Our study benefitted from the above observations in terms of the methodological approach used, which was, listening to recordings of natural speech to generate data for the analyses.

Mahadan and Jaradat (2011) investigate functions of intonation in Irbid. They note that intonation changes the interpretation of an utterance by virtue of its structure and is needed to determine the illocutionary function of an utterance. This study informed our investigations which have given an account of how intonation influences information structure in an utterance in Ekegusii. Equally, similar to their study, the Autosegmental-Metrical Theory has been followed to represent intonation contours. The methodological approach used in their study was also adopted in our research as respondents were asked to sort and rank various intonation contours in Ekegusii.

1.8.4 Theoretical Framework

In order to answer the research question on what characterizes the phonetic structure of intonation phrases in Ekegusii, the Autosegmental–Metrical Theory (A-M) was adopted. Equally, the question on how intonation encodes focus in the language was addressed by using the Information Structure Model. A description of the basic tenets of these theories used in this study is given in sub-sections 1.8.4.1 and 1.8.4.2.

1.8.4.1 Autosegmental–Metrical Theory

Pierrehumbert (1980) proposed the Autosegmental–Metrical (A-M) Theory for the analysis of American English intonation. The theory has, however, been used for the analysis of other languages, such as, Chinese (Aijun, 2002); German (Grice et al., 2005); Japanese (Venditti, 2005); Serbo-Croatian (Godjevac, 2005); Egyptian Arabic (Hellmuth, 2006); Lakota (Mirzayan, 2010); Standard Chinese (na Zhil, Hirst and Bertinetto, 2010); Irbid (Mahadan and Jaradat, 2011); Hijazi Arabic (Alzaidi, 2014), among others.

The theory splits an intonation representation into tonal and segmental tiers (Ladd, 2008). In the tonal tier, the autosegments are identified while in the segmental tier an utterance is analyzed metrically. In our study, the metrical aspect of the theory entailled assignment of relative prominence to elements within the intonation phrases. The association of tones with this metrical structure represents the autosegmental aspect.

Pierrehumbert (1980) identifies autosegments as pitch accents (those associating with stressed syllables in the segmental tier) and edge tones (those associating with edges of phrases). Her system of notation identifies an intonation contour as a sequence of pitch accents and edge tones. Phrase accents and boundary tones make up an edge tone. Since Ekegusii is a tone language, the research has examined the structure of boundary intonemes that are associated with the end of an intonation phrase and the intermediate intonation phrase ends. Intonation phrase-end boundary intonemes are marked using the H %, L %, L-L %, L-H % or H-L % notation as shown in Figure 1.7 using the utterance in (1).

1. /nɛ̀ɛ́ɾɛ́ nómòmínú mónò/ ‘He/ she is very complicated.’

Figure 1.7: An Autosegmental-Metrical presentation of /nɛ̀ɛ́ɾɛ́ nómòmínúú mónò/ ‘he/she is very complicated’

From Figure 1.7 above it should be noted that the utterance in (1) starts with a % L boundary intoneme and ends in a L% boundary intoneme. In the notation, the part labelled ‘tonal’ represents the tones tier while that marked ‘phonetic’ represents the phonemic tier. The main development in the Autosegmental-Metrical framework adopted in the representation of intonation in Ekegusii in this study is the Tones and Break Index (Beckman and Ayers, 1994; Beckman, 2005). The Tones and Break Index (ToBI) is based on two relative levels: low and high and was found to be suited to the phonetic analyses of Ekegusii intonation meaning for the language postulates both high and low tones in its lexical items as expressed in chapter two of this study. According to Beckman (2005), ToBI captures prosodic events in a spoken utterance to show patterns that mark syllables as more prominent than neighbouring syllables because of their intonation, and patterns that mark phrasing within sequences of words. For example, the Ekegusii utterance in (1) above has the word /nómòmínú/ 'complicated' being more prominent than /nɛ̀ɛ́rɛ́ / 'he/she' and / mónò/ 'very'. A prominent syllable in a word is marked with either L* or H* as the diagram above shows.

Beckman (2005) observes that ToBI consists of four symbolic parallel tiers reflecting multiple components of prosody. The tiers include the tones tier that indicates an autosegmental transcription of the lexical tones, the phonetic transcription tier that provides an IPA transcription of the utterance, the words tier that shows the orthographic form of an utterance, and a break-index tier that uses the numerals (0-4) to indicate the perceived strength of the juncture or disjuncture between adjacent words. To meet the requirements of the analysis of intonation features in Ekegusii, we posited a fifth symbolic tier, the intonemes tier. This was done in order to account for the boundary intonemes and distinguish them from the lexical tones marked in the tones tier. Information in the intonemes tier was extracted from the pitch curve after an utterance recording in PRAAT. These tiers are presented in Figure 1.8 below using the same utterance in Figure 1.7 and in (1).

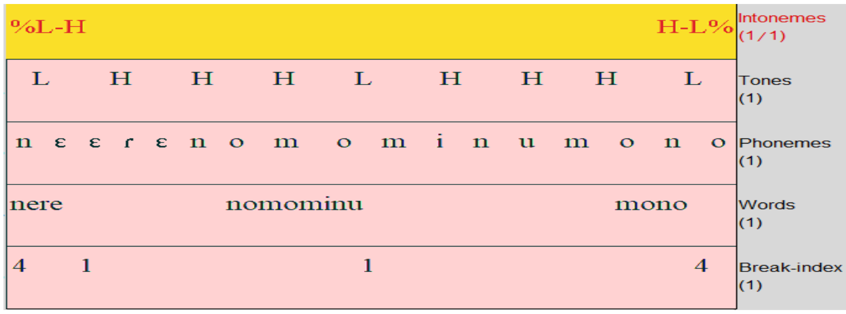

Figure 1.8: A ToBI transcription panel for /nɛ̀ɛ́ɾɛ́ nómòmínú mónò/ ‘he/she is very complicated’

In Figure 1.8, the % L-H and H-L%, in the intonemes tier represent final intonemes, also called boundary intoneme. The H-L % shows a falling final boundary intoneme. The H and L in the tones tier represent high and low lexical tones. The phonetic transcription tier, on the other hand, contains information about the phonemic segmental properties of an utterance. It can also give information on prosodic features like segment length. The orthographic tier, also called the words tier provides a transcription of a language’s orthographic system. The break index tier, on the other hand, gives information in terms of a hierarchy of perceived disjuncture between adjacent words. The number 4 at the beginning and end of the utterance shows an intonation phrase-end while 1 shows an ordinary internal word juncture. These numbers represent the metrical structure of the utterance. The break-index tier uses four values (0-4).

A 0-break index shows disjuncture between words that have been closely grouped phonetically by the application of fast-speech process. The 0 break index is reserved for the case when two words are produced so that the boundary between them is indeterminate. This is the case, for instance, in the Ekegusii utterance /násíβíá ómwáánά òjé/ ‘she washed her baby’ where there is merging of the final vowel /á/ of /*násíβíá/* ‘she washed’ and the initial vowel /ó/ of /*ómwáánά/* ‘child’ to produce the prosodic constituent [násíβíɔˆɔmwáánά] ‘she washed the child’. In the same utterance, there is the merging of the final vowel /á/ of /ômwáání/ 'child' and the initial vowel /ò/ in /òjé/ 'her' to produce the prosodic constituent [ômwáánɔˆɔjé] 'her child'. Prosodic constituents separated by 0 are perceived to be a single unit though intonation evidence may indicate they are distinct. Break index 1 is used to show ordinary phrase-internal prosodic word and disjuncture. It indicates a greater degree of disjuncture than 0 and is usually associated with at least a small pause between prosodic elements. Break index 3 indicates an intermediate phrase boundary end, with phrase accent and break index 4 shows a full intonation phrase end, with boundary tone. Figure 1.9 below also shows a full A-M representation of the polar interrogative utterance in (2).

2. /βàʧíɾè kwòòjìà έŋɔ̀ː mbὲ/ 'Have they come to take the cow?'

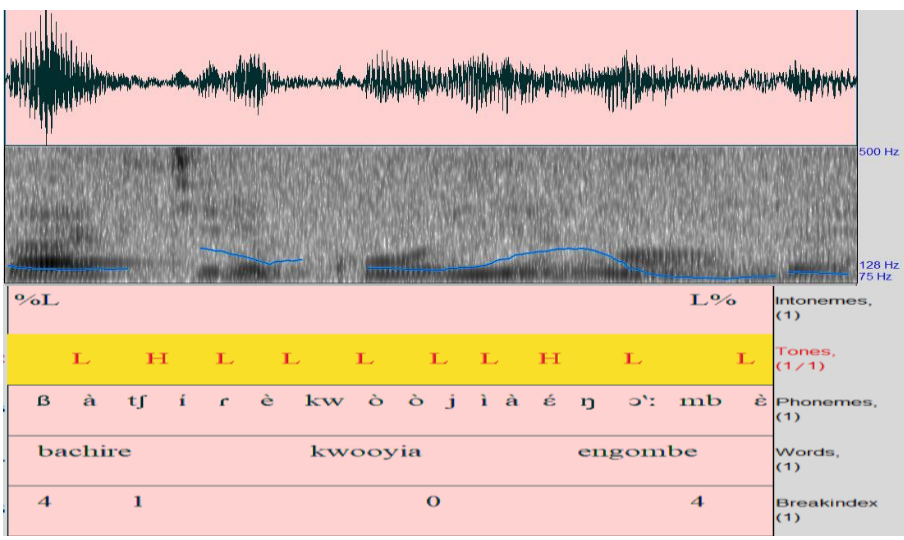

Figure 1.9: A ToBI transcription of the paratone /βàʧíɾè kwòòjìà έŋɔ̀ːmbὲ/ 'have they come to take the cow?'

Figure 1.9 displays two windows in the A-M transcription of an utterance. The upper window shows the audio waveforms and pitch (F0 contour) of the utterance. At the end of the blue line we have the F0 value of the articulation, 128 Hz. The lower window shows the ToBI transcription. The intonemes tier indicates that the utterance was said with an initial low boundary intoneme, marked as % L, and a final L% boundary intoneme. The break-index tier shows a full intonation phrase-end marked by the break indices 4 at the beginning and end of the utterance and an ordinary phrase internal disjuncture between the first and second word. However, the second and last word are said as if they are a single word as marked by the 0 break-index. The analysis of the production of intonation presented in Chapter 3 and Chapter 4 in this thesis followed this annotation system.

1.8.4.2 Information Structure

Our analysis of the influence of intonation on other aspects of Ekegusii grammar like information structure is couched in Lambrecht's (1994) model of information structure (IS). This model has been successfully used in the syntactic analysis of information structure in Ekegusii (Gesura, 2014) and in the description of the interaction between intonation and information structure in Hijazi Arabic (Alzaidi, 2014) among others.

According to Lambrecht (1994:5) IS refers to ‘‘...that component of sentence grammar in which propositions as conceptual representations of states of affairs are paired with lexico-grammatical structures in accordance with the mental states of interlocutors who use and interpret these structures as units of information in given discourse contexts’’.

In this framework, an utterance is structured into two parts: a pragmatic presupposition and a pragmatic assertion. A pragmatic presupposition is the set of propositions lexicographically evoked in a sentence that the speaker assumes the hearer already knows or is ready to take for granted at the time the sentence is uttered. A pragmatic assertion, on the other hand, is the proposition expressed by a sentence that the hearer is expected to know or take for granted because of hearing the sentence uttered (Alzaidi, 2014). This therefore shows that the presupposition gives information shared between the speaker and the hearer and the pragmatic assertion indicates new information. This given-new information dichotomy is used in our study to identify two categories of IS in Ekegusii: Information focus (IF) and contrastive focus (CF).

The term focus is used in literature to denote the item in the structure that carries unpredictable and non-recoverable information at the time of the discourse. According to Sauermann et al., (2011), a focus item is associated with intonational prominence and duration. Focused elements are interpreted as being informative and what in focus is new information in the sense that the speaker presents it as not being pragmatically recoverable from preceding discourse. It is also unpredictable and cannot be taken for granted at the time of speech (Alzaidi, 2014). The focus is what makes an utterance an assertion.

Information focus, following Lambrecht (1994), denotes the element of information whereby the presupposition and the assertion differ from each other. For example, the Ekegusii utterance /náʧíèté ɣòkwáːní màɣókóɾó/ 'I went to greet my grandmother' is analysed as shown in (3).

3. a. /ŋàí ɣwáːʧíèté íɣòɾó/ 'Where did you go yesterday?'

b. /náʧíèté ɣòkwáːní màɣókóɾó/ 'I went to greet my grandmother.'

c. Pragmatic Representation of (b):

Sentence: /náʧíèté ɣòkwáːní màɣókóɾó/ 'I went to greet my grandmother'

Presupposition: /náʧíèté ɣòkwáːní/ x 'I went to greet x'

Assertion: x= /màɣókóɾó/ 'x = my grandmother'

Focus: /màɣókóɾó/ 'my grandmother'

In this study, four types of information focus conditions are investigated to find out how they interact with intonation. These are sentence focus, argument focus, predicate focus and contrastive focus. Sentence focus structure is where the entire clause is within the focus domain. The argument focus structure is characterized by the focusing of a single constituent, for example, a noun phrase. The predicate focus structure refers to those structures where the predicate is within the focus domain. Contrastive focus (also known as 'identificational' or 'corrective' focus) describes an information unit that carries unpredictable information that stands in a contrastive relationship with other informational units (Lambrecht's, 1994; Alzaidi, 2014; Baird, 2014; Gesura, 2014). A typical context that requires a contrastive focus is in correction or clarifying cases as demonstrated in (4) below.

4. /níŋó óɣwâːkà/ /nôŋáù/ 'Who beat you? Is it Ong'au?'

b. /táɾì òŋáù óŋâkà, [ŋˈkémùntò]/ $_{CF}$. 'It is not Ong'au who beat me; it is Kemunto'.

In 4 (b) above, the pragmatic presupposition is 'X was beaten by Ong'au' while the pragmatic assertion is 'it is Kemunto'. The item *Kemunto* carries unpredictable information that indicates 'contrastive focus.' In this study, both IF and CF were identified by the question- answer congruence.

1.9 Methodology

This section gives a description of the research design and the techniques of data collection and analysis.

1.9.1 Research Design

In order to describe what characterises the phonetic structure of intonation phrases in Ekegusii, how intonation encodes focus and the level of precision in native speakers' perception and interpretation of intonation phrases, a mixed methods research design was used. A descriptive research design was adopted in describing the structure, and perception as well as the interaction between intonation and the information structure role of focus in Ekegusii. A qualitative design (Creswell, 2003; Kothari, 2004) was also followed since part of the data collected like the phonetic structure of intonation phrases in Ekegusii were non-numerical. A quantitative design was adopted in order to give a descriptive statistics analysis of how participants realised the intonation feature of fundamental frequency and their perception and interpretation of intonation phrases. A comparison of F0 means for the different participants in each utterance and focus type was done to show how age and sex relate to the rate of vocal folds vibration. Quantifiable percentages of how participants of different age groups and sex interpreted and perceived various intonation contours were also calculated to establish the influence of these social variables on intonation in Ekegusii. The study has used data in the form of intonation phrases to describe the intonation patterns for various utterance types in Ekegusii and what they project in terms of focus marking.

1.9.2 Data Collection Procedures

Data were collected from Ekegusii native speakers of varied ages and sex through elicitation, semi-structured interviews as well as native speaker intuition. Forty-eight native Ekegusii speakers were purposively drawn from the Rogoro dialect of Ekegusii spoken in Kisii and Nyamira counties to participate in the collection of data in this study. Twenty-four of these took part in the production of intonation while the other twenty-four participated in the perception and interpretation of intonation.

The participants were categorized into four age groups; namely, children (9-13years), the youth (17-25 years), middle-aged (40-50 years) and advanced-aged (above 60 years). There were six participants from each age group and this constituted the sample for the study. This number was considered adequate for Ladefoged (1997:137-166) suggests that the ideal number of speakers for a quantitative phonetic study is six males and six females (12 participants). In addition, Sadat-Tehrani (2007), Alzaid (2014), and Baird (2014) obtained reliable results by using fewer participants (8 and 16) in their studies. The minimum age of the participants was nine years. This age limit was considered ideal because as Lintfert and Mobius (2013) observe intonation contours produced below the age of five prove difficult to annotate using the ToBI systems. Again, to avoid the readings of the fundamental frequencies of one age group running into another, some age categories were skipped as the categorization above shows. There was an equal representation of male and female participants in the sample selected for the study. Collecting data from participants of varied age and sex was considered important following Ladefoged and Johnson’s (2015: 254) observation that, “the pitch of voice usually indicates whether the speaker is male or female and, to some extent what his or her age is’’. This procedure, therefore, enabled the researcher to account for inter-and intra-speaker variability in the realization of intonation contours.

Taking cognizance of the fact that the researcher is a competent native speaker of Ekegusii, native speaker intuition was followed in formulating an utterance list, which was used to collect data for the description of the phonetic structure of intonation phrases in the language. The utterance list had utterances picked from naturalistic settings such as Egesa FM radio conversations. Twenty utterances including declaratives, polar interrogatives, constituent interrogatives, echo interrogatives and imperatives were used in the study. The utterances in list differed in their syntactic type. This variation was preferred in order to check on the interaction between intonation structure and utterance type. There were four utterances in each category as shown in (5) to (9).

5. Declarative utterances

a) /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgù/ 'S/he united them to be husband and wife.'

b) /táɾέtὲtí kéːndé pí/ 'S/he did not bring anything.'

c) /βàʧíɾé kwòːjìá έɲɔˈːmbὲ/ 'They have come to take the cow.'

d) /ómòːntó óɣòkóɾá ὲɲáːŋgí nêsêsé/ 'Somebody is wedding a dog.'

6. Polar interrogative utterances

a) /nàβàβwáːtáníà kóβá ómòsàʧá nó ómò꜌kúːŋgù/ Did 'S/he united them to be husband and wife?'

b) /tàɾɛ́tɛ́tí ké:ndé pì/ 'Didn't s/he bring anything?'

c) /βàʧĩɾè kwò:jià ɛ́ŋɔ˺:mbɛ̂/ 'Have they come to take the cow?'

d) /ómò:ntó óɣòkǒɾà éɲá:ŋgí nêséèsè/ 'Is somebody wedding a dog?'

7. Constituent interrogative uterrances

a) /ŋàí kwá:ɾêŋgé/ 'Where were you?'

b) /ndìɾìɾí kwá:mótɛ̀βɛ́tìè/ 'When did you tell him/her?'

c) /níŋò kwá:ɲòɾâ móɣò:ndó/ 'Whom did you find in the farm?'

d) /ní:ŋkì βákóɾè:ɾà/ 'Why are they crying?'

8. Echo interrogative utterances

a) /kwá:βàβwá:tànìà kóβà kí/ 'You joined them to be what?'

b) /kwá:ɣè:ndà àɾàɾì/ 'You went where? ;

c) /kwà:éɾéríà ŋò/ 'You gave whom?

d) /òɣà:ntómá ɾíɾéɾí/ 'You sent me when?

9. Imperative utterances

a) /kòɾá émèɾémô jàó óɣê:ndé/. 'Do your work and go away'

b) /ɣàkí mbwá:téɾè ékèmóní ékíó/ 'Please, hold that cat for me.'

c) /óɾê:ndé títôúméɾáná âɣóté / ' Take care we don't meet'

d) /mòé ɛ́ɣɛ́tɔ̂nó kjâːjé βwáːŋgò/ ‘ Give him/ her his/her pot immediately’

The participants were given the above utterances written on a piece of paper and instructed to say them aloud according to the labels provided as they could in natural speech. They were allowed to make three repetitions in the production of each of the utterances. This enabled both the participants and the researcher to choose the utterance that closely represented natural speech. Through this procedure, 1440 utterances (24 participants *20 utterances* 3 repetitions) were collected for the analysis of intonation features in Ekegusii.

Each participant’s pronunciation was recorded using a mono sound recorder at a sampling frequency of 44100 Hz or 44.1 kHz in PRAAT. This frequency is considered the standard, provides quality sampling values and has been successfully used in other acoustic studies like Minazhen (2008), Fery (2017), Mose and Mecha (2019) among others. The recorded data was then saved as WAV files and later opened as a long sound file for automatic pitch tracking using PRAAT superimposed commands that extracted the waveforms and voice fundamental frequencies.

The researcher also formulated an interview schedule with short dialogues to collect data for the analysis of the interaction between intonation and focus in Ekegusii. The interview schedule had simulated question-answer tasks. Participants were asked a question eliciting either a broad, narrow or a contrastive focus in their responses. The prompt questions in the dialogues set the context for an answer with information or contrastive focus structures. From these, we obtained data for the analysis of four focus types; namely, sentence, argument, predicate and contrastive focus. Participants’ responses were also recorded in PRAAT and saved as wav files in a computer for later pitch tracking.

To obtain data for the analysis of the perception and interpretation of intonation to meet the study's third objective, another set of twenty-four participants were given utterance recordings of the first set of 24 native speakers who had participated in the intonation production tasks. These participants were asked to sort and rank the utterances played to them from a computer in terms of perceived utterance type and focus elements following the pitch change cues they hear. The participants for this exercise had not heard the utterances before this task.

1.9.3 Data Analysis

To find answers to the research questions, we carried out analyses of intonation at both the phonetic and phonological levels. The phonetic level entailed an analysis of the phonetic structure of intonation phrases and the perception and interpretation of intonation contours. The phonological level involved an analysis of the intonation contours associated with different focus conditions.

To account for the phonetic structure of intonation phrases, acoustic measurements of varied intonation phrases were done using a signal processing software, PRAAT. A spectrogram analysis automatically extracted the waveforms and fundamental frequency values of the participants' utterance-by-utterance pronunciations. Auto- pitch graphs were used to present the pitch patterns of different utterances. The intonation patterns were manually marked in the annotated PRAAT textgrids, which were created by specifying the names of the tiers. Five tiers marked as intonemes, tones, phonemes, words and break-index were used in the annotation. Intonemes were identified by observing the pitch curves and labelled boundary intoneme marker (%... and …% for the initial and final intonemes, respectively). Tones were identified by ear based on the A-M model and labeled in the tones tier in the ToBI annotation system using the H and L symbols. For example, an acoustic analysis for the Ekegusii intonation phrase /níŋkì èkíò ókórìà/ ‘what is that you are eating?’ said by a 44-year-old male extracted from PRAAT is represented in Figure 1.10.

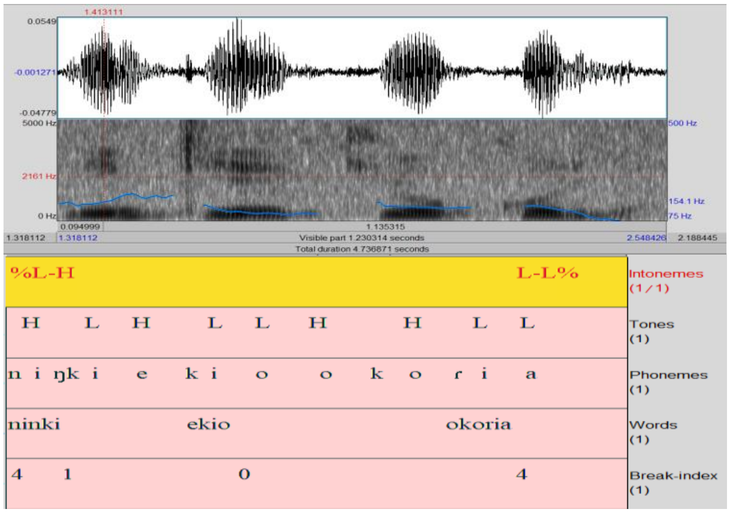

Figure 1.10: An auto-pitch graph of the paratone /níŋkì ékìò ókórìà/ ‘what is that you are eating?’

The blue line in the upper window in Figure 1.10 shows that the paratone is said at an F0 range of about 154.1 Hz. Again, the pitch curve shows that there is a continued downtrend in pitch in the course of the paratone. The intonemes tier indicates that the utterance was articulated with initial % L-H and final L-L % boundary intonemes. The break-index tier in the lower window shows the metrical structure of the utterance was 4104. This convention has been used throughout the study to label targets at intonation phrase boundary locations following the conventions of the ToBI intonation system as outlined in Section 1.8.4.2.

At the phonological level, we investigated how intonation encodes the informational role of focus. The researcher’s own interpretation of which intonation features correlated with which focus constituents in Ekegusii utterances formed the basis of such analyses. The analysis of information structure roles was couched in Lambrecht's (1994) IS model. Target utterances used here were found to differ in terms of focus structures: sentence focus, predicate focus, argument focus and contrastive focus. This variation enabled the researcher to investigate the interaction between intonation features and focus structures.

Using SPSS (IBM version 22.0), we examined the influence of age and sex on the F0 production in Ekegusii. Since we had two independent variables (age and sex) and one dependent variable (F0), and given that there were different participants in each of our groups, we used a two-way between-groups analysis of variance (ANOVA) to establish the individual and joint effect of age and sex on the F0 output. Tests of between-subjects-effects were done to show the main and interactional effects[1] of age and sex on F0. Descriptive statistics carried out also gave data on the means, standard deviations, numerical frequencies and percentages in the participants' F0 production and interpretation of intonation contours. This information is presented in tables.

1.9.4 Conclusion

This chapter has laid the background of the study by indicating the place of intonation in the Ekegusii grammar; stated the objectives of the study that were: to describe the phonetic structure of intonation phrases in Ekegusii, analyse how intonation encodes focus in Ekegusii and investigate the level of precision in the native speaker's perception and interpretation of

[1] As Pallant (2016:290) points out, ''an interaction effect occurs when the effect of one independent variable on the dependent variable depends on the level of the second independent variable''. In our analysis, we were interested in finding out whether the influence of age on the F0 range was different for males and females. For instance, F0 decreasing with age in males while it increases for females. The main effect, on the other hand, is the simple effect of one independent variable, for example, sex with all the age groups, on the dependent variable.

intonation contours in Ekegusii. The key terms used in the study have also been defined. In addition, literature on intonation in general and in Bantu languages and other languages of the world has been reviewed as well as the theoretical framework of A-M and the information structure models. In the chapter, we have also described the data collection and the procedures of data analysis. In Chapter Two, we give a brief description of the basic phonology of Ekegusii.

CHAPTER TWO
THE BASIC PHONOLOGY OF EKEGUSII

2.1 Introduction

In the preceding chapter, we have given an account of the place of intonation in grammar and the aspects of intonation that were investigated in this study. In this chapter, we give an overview of the basic concepts in Ekegusii phonology that had a bearing on the transcriptions done in the following chapters. First, there is a brief discussion of the segmental phonology of Ekegusii including the vowel and consonant inventories of the language. This is then followed by an analysis of the tonal structures in Ekegusii. The analyses in this chapter were done as they provided the basis for later accounts of the intonation structures of Ekegusii utterances.

2.2 Segmental Phonology

Ekegusii segments can be divided into vowels and consonants. A description of the phonemic and phonetic status of these segments has been given in the pioneering works by Whiteley (1960) and later by Cammenga (2002), Nash (2011) and Komenda (2015) among others.

2.2.1 Ekegusii Vowels

Ekegusii vowels can be described at both the phonemic and phonetic levels. According to Whitely (1960), there are seven phonemic vowels in Ekegusii. These vowels according to Komenda (2015) have a phonemic length contrast. This means that all the seven vowels occur phonemically as either short or long. Arranged along the high-low and front-back dimensions that relate to the vertical height and the horizontal position of the tongue respectively, Ekegusii vowels are displayed in Table 2.1. Vowel length is indicated by repeating the short vowel.

Table 2.1: Ekegusii vowel inventory

	Front		Back	
	Short	Long	Short	Long
High	i,	ii	u,	uu
Mid-high	e,	ee	o,	oo
Mid-low	ɛ,	ɛɛ	ɔ,	ɔɔ
Low	a	aa		

The examples in 10 illustrate the occurrence of the vowels in Table 2.1.

10	Vowel	Phonemic form	Orthographic form	Gloss
	/i/	/éγèsìβì/	egesibi	strap
		/γòsìβà/	gosiba	to tie
	/ii/	/éɣèsíiβí/	egesiibi	songbird
		/γòsììβà/	gosiiba	to take a sip
	/e/	/émèɾì/	emeri	roots
		/ɛ́kɛ̀ɾò/	ekero	spike
	/ee/	/émèèɾì/	emeeɾi	ship

	/ɛ́kɛ̀ɛ́ɾò/	ekeero	curved palm
/ɛ/	/ɛ́sɛ̀sɛ̀/	esese	difficult situation
	/ɛ́ɛ́ndɛ̀ɣɛ́/	endege	jingle
/ɛɛ/	/ɛ́sɛ́ɛ̀sɛ́/	eseese	tuberculosis
	/ɛ́ɛ́ndɛ́ɛ̀ɣɛ́/	endege	aeroplane
/a/	/ɣwéékánà/	gwekana	to click
	/ómòɣàkà/	omogaka	aloe vera
/aa/	/ɣwéékáànà/	gwekaana	to deny oneself
	/ómòɣáàkà/	omogaaka	elder
/ɔ/	/ámɔ`βà/	amoba	mushrooms
	/éénkɔ`ɲé/	enkonye	mud fish
/ɔɔ/	/âmɔ́ɔ́βá/	amooba	timid
	/éénkɔ`ɔ`ɲé/	enkoonye	to help me
/o/	/kòɾá/	kora	dredge
	/βòɾá/	bora	disappear
/oo/	/kòôɾà/	koora	thresh
	/βòòɾà/	boora	say

/u/	/ékèβùɾùγò/	ekeburugo	cooking stick
	/kùɾá/	kura	scratch
/uu/	/kúúɾá/	kuura	shout
	/éγèsúùmù/	egesuumu	hutch

The examples in (10) indicate that the short vowels in Ekegusii can occur freely in all positions in a word while the long vowels do not have as much freedom of distribution for they only occur in the roots of words. It is also worth noting that orthographically phonemic long vowels in Ekegusii are written as double letters while short vowels are orthographic single letters. Equally, the data above show that the short and long vowels make a phonemic contrast between Ekegusii words. For example, the lexemes /é-γè-sìβì/ 'strap and /é-ɣè-síìβí/ 'songbird' only differ on the vowel length in the stem. The same is noted in the forms /é-mè-ɾì/ 'roots' and /é-mèè-ɾì/ 'ship'; /kùɾá/ 'scratch the ground' and /kúúɾá/ 'shout'; /έέ-ndὲγέ/ 'jingle' and /έέ-ndέὲγέ/ 'aeroplane'; /kòɾá/ 'dredge' and /kòôɾà/ 'thresh'and /á-mɔ`-βà/ 'mushrooms' and /â-mɔ́ɔ́-βá/ 'timid'.

The vowels in Table 2.1 can be distinguished by the use of distinctive feature specifications. According to Cammenga (2002), Ekegusii vowels can be described using the features [HIGH], [LOW], [BACK] and [ATR]. The [+HIGH] vowels like /i/ and /u/ are produced with the tongue being close to the roof of the mouth while the [+LOW] vowel like the Ekegusii /a/ is produced with the tongue farther from the roof of the mouth. The [+BACK] vowels /u, o, ɔ/ are produced by retracting the body of the tongue from the neutral position. This distinguishes them from the [-BACK] vowels /i, e, ε, a / in whose production the tongue is not retracted from the neutral position. The feature [+ATR] designates vowels produced when the tongue is drawn forward while [-ATR] vowels are produced with the tongue retracted (Mathews, 2003). True to Cammenga's (2002) observation, Ekegusii mid vowels /e, ɛ, o, ɔ/ are [-ATR] contrary to the specification of mid vowels in other languages that are [+ATR]. The phonetic effect of this is that Ekegusii mid vowels are produced at a lower segmental height than in most other languages (Cammenga, 2002). Therefore, mid vowels in Ekegusii, /e, o, ɛ, ɔ/, are best identified by the distinctive features [-HIGH, -LOW and -ATR].

Each of the vowels in Table 2.1 is fully described using the feature matrices in Table 2.2.

Table 2.2: Distinctive feature analysis of Ekegusii vowels

FEATURE	VOWEL						
	i	e	ɛ	a	ɔ	o	u
HIGH	+	-	-	-	-	-	+
LOW	-	-	-	+	-	-	-
BACK	-	-	-	-	+	+	+
ATR	+	+	-	-	-	+	+

The feature matrix in Table 2.2 above shows that the features [HIGH] and [LOW] identify two vowel heights: high and low. Although Nash (Nash, 2011) distinguishes three vowel heights by positing the feature [MID], we felt that this is redundant because the mid vowels can be adequately specified by the feature combination [-HIGH, -LOW] as already pointed out. The feature [BACK] helps to distinguish two vowel categories, that is, the back and front vowels.

The feature ATR distinguishes vowels articulated with an advanced tongue root [+ATR] from those produced with a retracted tongue root [-ATR]. The seven short vowels in Ekegusii can, thus, be economically described as shown below.

Vowel	Feature Specification
/i/	[+HIGH, -BACK, +ATR]
/e/	[- HIGH, -BACK, +ATR]
/ɛ/	[- HIGH, -BACK, -ATR]
/a/	[+ LOW, -BACK, -ATR]
/ɔ/	[-HIGH, +BACK, -ATR]
/o/	[-HIGH, +BACK, +ATR]
/u/	[+HIGH, +BACK, +ATR]

There are phonological and morphophonemic processes that affect these vowels. They are discussed briefly in sub-section 2.2.3. Sub-section 2.2.2, briefly discusses the consonants in Ekegusii.

2.2.2 Ekegusii Consonants

In this sub-section, an overview of Ekegusii consonants is given. Just like in the description of vowels, Ekegusii consonants can be described at both the phonemic and phonetic levels. An inventory of the phonemic consonants in Ekegusii is displayed in Table 2.3. The labels on the vertical arrangement indicate the manners of articulation while those in the horizontal axis indicate the places of articulation in Ekegusii.

Table 2.3: An inventory of Ekegusii phonemic consonants

Manner of articulation	Place of articulation				
	Bilabial	Alveolar	Post-alveolar	Palatal	Velar
Nasal	m	n		ɲ	ŋ
Plosive	p	t			k
Fricative	β	s			γ
Glide				j	
Flap		ɾ			
Affricate			ʧ		

Table 2.3 reveals the following. First, the symbols in the chart form the phonemic consonant inventory in Ekegusii. Second, Ekegusii makes a phonemic contrast in 12 consonants. These fall into two natural classes of seven obstruents and six sonorants. The seven obstruents include three voiceless plosives, namely /p, t, k/; three fricatives: two voiced, namely /β, γ/ and one voiceless one, /s/. This implies that Ekegusii prefers more voiceless obstruents than voiced ones. According to Anyanwu (2008) some languages have preference for either more voiceless or voiced obstruents or an equal number of voiceless and voiced obstruents. We also noted that

Ekegusii has an equal number of fricatives and plosives. The sonorants in Ekegusii include the four nasals, /m, n, ɲ, ŋ/; one approximant, /j/ and one liquid, /ɾ/. Third, the phoneme /p/, just as noted in Cammenga (2002) and Nash (2011), only occurs in few ideophones in Ekegusii and in words borrowed from either English or Kiswahili. The lexemes in (11) illustrate the occurrence of /p/ in such words.

11. /pɔ́ɾɔ́ɣɔkɔ́/ 'the sound of food dropping into the stomach,'

/ʧàpí/ 'a container fully filled'

/pí/ 'completely'.

/épàsâkà/ from Kiswahili pasaka 'passover'

/épìɣìpìɣì/ from Kiswahili pikipiki 'motorcycle';

/ɾípèɾà/ from Kiswahili pera 'guava'

/ésìpɔ́ːnʧì/ from English 'sponge';

/píɾàdîsò/ from English 'paradise';

/ʧípáŋíɾí/ from English 'bangles'

Although the phoneme /p/ is retained in the examples provided in 11, in the speech of old people, the /p/ is realized as the voiced bilabial fricative [β] such as in, [eβasaka] 'passover,' [βaɾadiso] 'paradise,' [éɾòβíà] 'rupee,' /ʧíβàŋíɾí/ 'bangles'.

Fourth, the palatal glide /j/ has both a phonemic and phonetic status. The phonemic form appears in the syllable onset position only as illustrated by the lexical items in (12). The dots in the examples given mark syllable boundaries.

12. a) [ékà.jáː.mbá] ‘rattle’

b) [é.jáː.ŋgá] ‘cloth’

c) [é.kɔ`ː.jɔ́] ‘hoe’

d) [ɾî.jɔ`.jɔ`] ‘goose’

The other phonemic consonants have their orthographic presentation as shown below.

Phoneme	Orthography	Phonemic Form	Orthographic Form	Gloss
/m/	<m>	/émôːndò/	emondo	gizzard
/n/	<n>	/énùːŋgú/	enung’u	club
/ɲ/	<ny>	/éɲònì/	enyoni	bird
/ŋ/	<ng’>	/éŋòòmbè/	eng’ombe	cow
/t/	<t>	/ésìɣìtì/	esigiti	ewe
/k/	<k>	/ékènòkó/	ekenoko	steeped flour
/ɣ/	<g>	/éɣèténí/	egeteni	wooden stool
/β/	<b>	/ékèóβíɾíá/	ekeobiria	rhino
/s/	< s>	/sókóɾó/	sokoro	grandfather

/ɾ/	<r>	/ɾítíèɾìò/	ritierio	hone
/ʧ/	<ch>	/ʧíòɾá/	chiora	flash floods
/j/	<y>	/ékèɣújè/	ekeguye	jacana (lilly trotter)

Following insights from Katamba (1989), the Ekegusii consonantal phonemes discussed above can be distinguished using the distinctive feature matrix presented in Table 2.4.

Table 2.4: Distinctive feature analysis of Ekegusii consonants

FEATURE	CONSONANT PHONEME												
	m	n	ɲ	ŋ	p	t	k	β	s	ɣ	j	ɾ	ʧ
SON.	+	+	+	+	-	-	-	-	-	-	+	+	-
VOICE	+	+	+	+	-	-	-	+	-	+	+	+	-
NASAL	+	+	+	+	-	-	-	-	-	-	-	-	-
CONT.	-	-	-	-	-	-	-	+	+	+	+	+	-
ANT	+	+	-	-	+	+	-	+	+	-	-	+	-
COR	-	+	+	-	-	+	-	-	+	-	+	+	+

From Table 2.4 above, we make the following observations. First, the features [SON], [CONT] and [NASAL] define the manners of articulation. The [+ SON] identifies Ekegusii nasals and the approximants as belonging to a natural class of segments with a high sonority index. The [-SON] identifies the stops, fricatives and affricates. [+CONT] defines fricatives and approximants while the [- CONT.] defines nasals and oral stops. The [+ NASAL] designates all the nasal segments while [-NASAL] identifies all oral segments.

Second, following Chomsky and Halle (1968: 304), the features [ANT] and [COR] define cavity features of the primary stricture type. [+ANT] sounds are produced with an obstruction that is located in front of the palate-alveolar region of the mouth; [-ANT.] sounds are produced without such an obstruction. [+ANT] sounds are bilabial and alveolar while the [-ANT] identifies the post-alveolar, palatal and velar sounds. On the other hand, [+COR] sounds are those produced with the blade of the tongue raised from its neutral position; the [-COR] sounds are produced with the blade of the tongue in neutral position. In Chomsky and Halle (1968:306) version the [+ COR] sounds include dental, alveolar, palato-alveolar and liquids articulated with the blade of the tongue. Uvular, labial, velar and palatal consonants are [-COR]. However, this study takes Katamba's (1989:42-44) version, which acknowledges that the Chomsky and Halle's (1968) distinctive feature model in the SPE system have been modified since 1968. Therefore, the palatal sound /j/ in Ekegusii is treated as coronal given that in its articulation, the blade of the tongue does not remain in the neutral position. Since Ekegusii does not have liquids and dental consonants, the [+COR] segments are the alveolar /n, t, s, ɾ/ and the post-alveolar affricate /ʧ/. [- COR] segments, on the other hand, define the articulation of labial, velar, uvular and palatal consonants, / m, p, k, ŋ, γ, ɲ, j/.

Third, the feature [VOICE] distinguishes the voiced from the voiceless segments. A [+VOICE] sound is produced with a glottal setting consistent with vocal folds vibration while a [-VOICE] sound is produced without vocal folds vibration. It should be noted that Ekegusii does not make a phonemic contrast between the voiced and voiceless sounds in the same point and manner of articalation. Data in Table 2.3 indicate that where there is a voiced phonemic consonant sound there is no voiceless counterpart in the same cell and vice versa.

Apart from the sound segments discussed above, Ekegusii also has nasal clusters. In this, the initial part of an oral consonant sound is combined with a nasal sound to produce an NC cluster. As Chacha (2008) notes, the N in such a configuration is any nasal unspecified for place of articulation and C is any oral consonant that combines with the nasal segment to form the cluster. Such a cluster, according to Anyanwu (2008), functions as a unit in marking the syllable onset. Attested cases of nasal clusters in Ekegusii include [mb], [nt], [nd], [ns], [ŋk], [ŋg] and [ɲʧ]. The examples in (13) below illustrate their occurrence in Ekegusii words.

13.	Pre-nasal	Orthography	Phonemic Form	Orthographic Form	Gloss
a)	[mb]	<mb>	/éɲâːmbú/	enyambu	chameleon
			/ómòɣòːmbà	omogomba	barren
b)	[ns]	<ns>	/êːnsáɣáɾá/	ensagara	lizard
			/êːnsìɲò/	ensinyo	place
			/êːnsémó/	ensemo	abreast/near
c)	[nt]	<nt>	/êːntíɾá/	entira	anthrax
			/ʧîːntɛ̀ŋɛ̀/	chintenge	ability

d)	[nd]	<nd>	/êːndáɣéɾà/	endagera	food
			/êːndòɾò/	endoro	bitter
e)	[ɲʧ]	<nch>	/êːɲʧèɾà/	enchera	path
			/ôːɲʧòmè/	onchome	intelligent
			/êːɲʧàɾà/	enchara	hunger
f)	[ŋk]	<nk>	/ʧîːŋkɔ́ɾɔ́/	chinkoro	buds/hearts
			/êːŋkòòŋgò/	enkongo	champion
			/óβòɣêːŋkì/	obogenki	backbiting
g)	[ŋg]	<ng>	/ɛ̂ːŋgɛ̀ɾ ɔ`/	engero	music
			/êeŋgwàːnsé/	ngwanse	ones
			/éːŋgéɣú/	ngegu	ashore
			/éːmbóːŋgí/	embongi	weevil

Data in (13) reveals that nasal clusters in Ekegusii only occur at the syllable onset positions. Cases of nasal clusters in the coda positions were not observed. This was expected because Ekegusii is a CV-syllable structure language. In addition, the examples show that the nasal and the following consonant share the same point of articulation. The clusters, therefore, have a nasal that is homorganic with the following consonant. The only exception to this was the nasal cluster [ɲʧ] whereby the nasal and the following consonant do not share the same point of articulation. Equally, the nasal clusters [mb], [nd] and [ŋg] are derived from the underlying forms /nβ/, nγ/, and /nɾ/ through the consonant strengthening processes of defricativisation and fortition as discussed in sub-section 2.2.3.5. Another observation made from the examples in (13) is that nasal clusters in Ekegusii are not restricted to any single word class. They are attested in nouns, verbs, adjectives, adverbs, pronouns and even conjunctions. At the suprasegmental level, the data shows that the nasal segment seems to lower the tone of the preceding vowel so that we end up with a falling tone in the vowel before the NC cluster.

Again, Ekegusii data show that sometimes a nasal may precede a nasal-plus-consonant cluster. This is restricted to word-initial positions. In such a situation we have two nasals following each other producing complex segments of the type N_1N_2C (whereby N_1 is the first nasal and N_2 is the second nasal which assimilates to the following consonant to produce the NC clusters as already explained. The exemples in (14) illustrate this phenomenon.

14.	a) [mm]	<mm>	[m`mbwá:tá]	'I catch'
	b) [nn]	<nn>	[ǹnsúná]	'I pinch'
	c) [ŋŋ]	<ng>	[ŋ`ŋátá]	'I starve'
	d) [ɲɲ]	<ny>	[ɲ`ɲáŋá]	' I hate'

Examples in (14) above indicate that the sequence of a nasal following another nasal only occurs at the beginning of an Ekegusii word. The first nasal in such a sequence is syllabic for it forms the nucleus. Apart from being syllabic, such a nasal also carries a low tone. The low tone suggests that the nasal functions just like other word-class prefixes do in similar positions in Ekegusii words.

As already pointed out, vowels occurring before nasal clusters in Ekegusii are phonetically long. We further illustrate this phenomenon with the examples in (15).

15. a) /ékèɾándí/ [ékèɾáːndí] 'calabash'

b) /ʧínúmbà/ [ʧínúːmbà] 'coils at the hem of a dress'

c) /έγὲtɔ`ŋgà/ [ὲγὲtɔ`ːŋgà] 'bushel'

d) /éγètíntí/ [éγètíːntí] 'ribbon worn round the head'

e) /éγèʧémbéné/ [éγèʧéːmbéné] 'great great grand-child'

f) /έndὲrέmà/ [έːndέrέmà] 'Indian spinach'

g) /óβòsónsótó/ [óβòsóːnsótó] 'chyme'

The data in (15) above demonstrate the lengthening of vowels before nasal clusters. This affects all the seven short vowels whether in root-initial or root-medial positions. We therefore conclude that glide formation, vowel raising, vowel deletion and prenasalisation derive phonetically long vowels in Ekegusii.

It should be noted that there are still more segments in Ekegusii, which are realized through the operation of phonological processes, some of which are morphologically conditioned, as briefly discussed in Sub-section 2.2.3.

2.2.3 Ekegusii Phonological Processes

In this sub-section, we discuss some of the phonological processes, which have a strong bearing on the paratones discussed in chapters three and four. These processes include glide formation, vowel raising, vowel deletion and consonant strengthening.

2.2.3.1 Glide Formation

The morphological process of affixation in Ekegusii affects the phonetic environment of a vowel. Komenda (2015) notes that through affixation, for example, the front close vowel, /i/ in the prefix when it is followed by a non-close vowel /ɔ, a, e, o / or a vowel with the opposite horizontal [+BACK] tongue position feature, namely /u/, in the root, surfaces as the palatal glide [j]. Equally, the vowel /u/ preceding a non-close vowel surfaces as the labial-velar glide [w]. Vowels following the derived glides lengthen (Vː). This is done in order to preserve the internal syllable structure and to compensate for the lost vowel as the examples in (16) show. The dashes in these examples and those that follow mark morpheme boundaries.

16.	a) /é-kì- ɔ́ ɾɛ́/	[ékjɔ́ ːɾɛ́]	'royal crown'
	b) /rì-àɣáɣá/	[rjàːɣáɣá]	'crab'
	c) /é-kì-éβúndí/	[ékjéːβúúndí]	'mimosa pudica'
	d) /ɾí-òɣá/	[rjòːɣá]	'flower
	e) /é-βì-úŋúɾíètá/	[éβjúːŋúɾjèètá]	'tadpoles'
	f) /ó-mò-òβò/	[ómwòːβò]	'makhamia hildebrenditi'

g) /ó-mù-ɔ̂γɔ` / [ómwɔ̂ːγɔ`] 'cassava'

The data in (16a-d) illustrate the formation of the palatal glide [j] from the close vowel /i/ when it is followed by the vowels /ɔ, a, e, o / in the roots of the nominals. In (16e), the front close vowel /i/ in the prefix /-βi-/ is followed by the back close vowel /u/, which also creates a conducive environment for the formation of the palatal glide. Data presented above further show vowels that occur after the derived glide surface as phonetically long. The data in (16f and g) illustrate the formation of the labial-velar glide when the vowel /u/ precedes a non-high vowel (either /e/ or /a/). In such phonetic environment, /u/ is glided to [w] and the vowel that follows the derived glide lengthens to surface as phonetically long [eː] or [aː].

2.2.3.2 Vowel Raising

Ekegusii data indicate that when the front close-mid vowel, /e/, in the prefix is followed by a root that begins with a non-close vowel, it is raised to [i] before it glides to [j] and the second vowel in the hiatus surfaces as long. Similarly, the back close-mid vowel, /o/, is also raised to [u] before it is glided to [w] when it is followed by a non-high vowel. The data in (17) below exemplify this process.

17.	a) /é-kè-àγé/	[ékìàγé]	[ékjàːγé]	'granary'
	b) /é-kè-òɾé/	[ékìòɾé]	[ékjòːɾé]	'skull'
	c) /é-mè-òβò/	[émìòβò]	[émjòːβò]	'makhamia hilderbrenditi'
	d) /é-mè-ɔ`tɔ´ɾɔ´/	[émìɔ`tɔ´ɾɔ´]	[émjɔ`ːtɔ´ɾɔ´]	'copper jingles worn on hands'
	e) /ó-mò-àγà/	[ómùàγà]	[ómwàːγà]	'whirlwind'

f) /ó-ɾò-éɾúé/ [óɾùéɾúé] [ɔ´ɾwɛ̀ːɾwɛ́] 'spitting cobra'

g) /ó-mò-òŋò/ [ómùòŋò] [ômwóːŋó] 'pumpkin'

From the examples above, we realize that the vowels /a/, /o/, /e/ and /ɔ/ in the root surface as phonetically long when they follow the mid vowel /e/ and /o/ in the prefix. However, this only happens after the mid vowels have been raised to [i] and [o], respectively in the intermediate form before they are glided to [j] and [w].

Through glide formation, therefore, the labial-velar [w] and the palatal [j] glides are derived from the high and mid vowels /u, o/ and / i, e /, respectively.

2.2.3.3 Vowel Deletion

Deletion is another phonological process in which a sound segment is lost in some phonetic environment (Anyanwu, 2008). The commonest type of deletion in Ekegusii is elision of vowels in word-medial position. Elision of vowels in Ekegusii is therefore of a syncope type. For example, Ekegusii pre-root open vowel /a/ preceding a non-close vowel gets elided. In an Ekegusii CV_1+ V_2C configuration (where C is a consonant, V_1 is the first vowel and V_2 is the second vowel in the hiatus) V_1 is deleted thus yielding CV_2C schema. The deletion of V_1 triggers the lengthening of the V_2. The examples in (18) below exemplify the derivation of long vowels after /a/ deletion.

18. a) /á-βà-óníà/ [áꜜβóːníà] 'sellers'

b) /á-βà–éγéní/ [áꜜβéːγéní] 'believers'

c) /ḿmbà-é-rótʃ-è/ [ḿꜜmbéːrótʃè] 'they see themselves'

The examples above indicate that a pre-root open vowel /a/ occurring before a non-close vowel in a hiatus is deleted. This in turn leads to the lengthening of the vowel that follows. The motivation for this is to maintain the syllable count in the words. The downstep of H tones observed in the data is triggered by the floating L tone left behind by the deleted segments.

2.2.3.5 Consonant strengthening

Two consonant strengthening processes observed in Ekegusii are defricativisation and fortition. Both processes involve the increase of the degree of stricture. Ekegusii data shows that the two processes are trigerred by prenasalisation. Defricativisation affects the two voiced continuants /β, γ/, which change to the voiced non-continuants [b, ɡ] respectively whenever they are prenasalised as the examples in (19) show.

19.	a) /énβèβà/	[éːmbèβà]	'rat'
	b) /énγɔ́ kɔ́ /	[éːŋɡɔ́ kɔ́]	'hen'

In 19a, the [mb] cluster has the nasal [m] derived from the alveolar nasal /n/ in the underlying form after assimilating to the point of articulation of the bilabial fricative /β/. The voiced continuant (fricative) /β/ also becomes non-continuant (it gets defricativised) to surface as the bilabial plosive [b] to make it homorganic with the derived nasal stop [m]. Similarly, in the cluster [ŋɡ], homorganic nasal assimilation turns /n/ to [ŋ] and defricativisation turns /γ/ to [ɡ]. Therefore, in the process of defricativisation, as Cammenga (2002:88) puts it, there is a rightward spreading of the feature specification [-CONT) of the nasal to the consonantal element.

In fortition, according to (Anyanwu, 2008), a ‘weak’ sound is changed to a ‘strong’ one. For example, a fricative or approximant may be changed to a stop. In this process, there is the strengthening or hardening of a sound segment as opposed to the weakening process of lenition. In Ekegusii, fortition occurs when the alveolar approximant /ɾ/ is changed to the alveolar stop [d] in the NC cluster [nɾ]. The examples in (20) illustrate this process.

20.	a) /éβùńɾò/	[éβùːndò]	‘soil’
	b) /énɾàɣèɾà/	[éːndàɣèɾà]	‘food’
	c) /énɾúɾúmé/	[éːndúɾúmé]	‘epilepsy’

From the data in (19) and (20), we should realize that, in Ekegusii, [g], [b] and [d] are allophones of /γ/, /β/ and /r/, respectively.

2.3 Tone in Ekegusii

In this sub-section, the occurrence and function of the tonal aspects of pitch in Ekegusii are explained. As already pointed out, Ekegusii is a tone language. This means that the language uses tone for making lexical and grammatical contrasts. This use of tone in Ekegusii has been described in Whiteley (1960), Bickmore (1999), Cammenga (2002), Elwell (2008) and Nash (2011). A brief overview of their work is given in sub-sections 2.3.1 and 2.3.2 below.

2.3.1 Tonal Patterns in Ekegusii

Whiteley’s (1960) pioneering work distinguishes four levels of tone in Ekegusii. These are high, low, fall, and rise. Cammenga (2002) commenting on Whiteley’s work notes that to a limited extent it is only the high and low tones that are lexically distinctive in Ekegusii. Data analysed in this study have shown the existence of low, high and falling tones. There has not been any demonstration of rising tones in Ekegusii. The study, therefore, adopts Elwell's (2008) position that only low and high tones make lexical contrasts in Ekegusii, just as in most other Bantu languages.

Nash (2011) has discussed the presence of tone in Ekegusii nominals and verbals. The researcher notes that the tone bearing units in an Ekegusii nominal, for example, can have either a low or a high tone in the underlying form. A morphosyntactic analysis of Ekegusii nouns shows that they are arranged into 17 classes (Cammenga, 2002). The classes have a pair of prefixes attached to the nominal stem to indicate whether it is singular or plural. The class prefix, therefore, gives a blueprint of the grammatical category of number agreement between the nominal stem and the class prefix. In some classes, there is a pre-prefix before the class prefix. This is an augment vowel, which is usually a copy of the prefix vowel. This yields the structure shown below.

Pre-prefix-Class prefix- Stem

The above schema can be illustrated using the word /é-γè-sàkù/ 'tribe' where the vowel /-é-/ is the pre-prefix, /-γè-/ is the class prefix and /-sàkù/ is the nominal stem. The examples in (22) and (23) show that pre-prefixes bear a high tone while the prefixes and nominal stems bear either a low or high tone. This is exemplified in (22) and (23).

22. a) {ó-mò-ɾèm-ì} 'farmer'

b) {á-mà-tò} 'leaves,

c) {é-γè-sàkù} 'tribe'

From the data in (22), it should be pointed out that the pre-prefixes {ó-}, {á-} and {é-}) are high-toned. As Nash (2011) observes, in Ekegusii, prefixes like {-mo-}, {-ma-} and {-γe-} are toneless in the underlying form. However, these prefixes get assigned a default (low) tone to surface with a low tone. A default tone, according to Nash (2011), is one that is assigned to a mora that is not associated with a tone in the underlying form through the application of the Default Tone Assignment Rule (Yip, 2002). The rule states that a mora not associated with a tone is assigned a low (default) tone (Goldsmith, 1990). For example, the prefix in the word {ó-mo-ɾèm-ì} 'farmer,' which is underlyingly toneless, is, through derivation assigned a default tone to surface with a low tone, thus the surface form {ó-mò-ɾèm-ì}. All the stems in (22) bear low tones while those in (23) below bear a high tone.

23. a) {ó-mò-kérà} 'a sheep's tail'

b) {é-kè-βákí} 'hawk'

c) {ó-mò-són-í} 'tailor'

Just as it was noted in (22), the data in (23) show that the pre-prefixes (ó-, é- and ó) are underlying high-toned while the prefixes (-mò-, -kè- and -mò-) are underlying toneless but surface with a default low tone. However, the TBUs in the roots are all high-toned. The examples in (22) and (23) therefore show that Ekegusii short vowels can bear either L or H tones. Long vowels in the stem of Ekegusii words can also bear either a short or long vowel as illustrated in (24).

24. a) {é-kè-βù:sí} 'cat'

b) {á-βà-tà:tá} 'fathers'

c) {é-kè-βíːɾá} 'cow shed'

d) {ɛ́-kɛ`-ɾɛ́ːŋg-ɔ´} 'measure'

Earlier observations about the pre-prefixes and prefixes hold in the examples above. However, the phonemic long vowels /-ùù-, -àà-/ in the stems in 24 (a-b) bear low tones while the long vowels /- íí-, -ɛ́ɛ́-/ in 24 (c-d) bear high tones.

Nash (2011) notes that vowels in Ekegusii nominals can bear either rising (LH), or falling (HL) tones. These sequence of HL or LH tones in the same syllable form contour tones. The author gives the example of the word {é-kè-γùsìí} 'ekegusii' as having a rising tone in the final double vowel /ìí/. However, a close analysis of this example reveals that the two vowel segments at the end of the word form different syllables {é.kè.γù.sì.í} with the first vowel in the syllable /sì/ bearing a low tone and the second one /í/ bearing a high tone. Data used in this study have not shown any clear presence of rising tones in Ekegusii. The presence of falling tones, has on the other hand, been witnessed in both short and long vowels as the examples in (25) attest.

25. a) /ɾîjó/ 'hide'

b) /ómòsâʧà/ 'man'

c) /éːndùɾûʧè/ 'sling'

As shown in the examples above, the vowels /í, â, û/) bear a falling tone represented as HL. These are regarded as contour tones because they display a noticeable pitch movement from one tone to another.

Data have further indicated that Ekegusii verbs display similar tonal processes as the nouns. According to Cammenga (2002), an Ekegusii verb is morphologically either tensed or non-tensed. The non-tensed verbs mark the infinitives and imperatives while the tensed verbs are finite verbs. Both forms occur in the syntax together with various affixes. The affixes extend the minimal structure of the verb, which typically consists of the root and the final vowel (FV). Various affixes in verb forms add both morphological and semantic content to the root.

A non-tensed (infinitive) verb in Ekegusii consists of at least the class 15 prefix (/ko/) and a verb stem. The class prefix is an infinitive marker while the verb stem carries the morphological and semantic core of the verb and a final vowel. The prefix /ko/ has its allomorph [γo-] due to the voicing dissimilation rule common in Bantu languages called Dahl' Law. This structure may be used with or without a focus (f) constituent {n-, na- or iN-, which is prefixed to the class marker as shown in (26).

26. a) {ń-kò-mìɲìk-à} [ŋkómìɲòkà] 'I run'

f-15-stem-fv

b) {ín-kò-ɾ-à} [ìŋkóɾá] 'I do'

f-15-stem-fv

An Ekegusii infinitive can be used as a gerund, that is, a verbal noun. In such a case, it is augmented with a pre-prefix /o/ and syntactically marked (a) as demonstrated in 27.

27. {ó-kò-miɲòk-à} [ókòmiɲòkà] 'the activity of running'

a- 15-stem-fv

The augments in Ekegusii infinitival verbals, just like the pre-prefixes in nominals, bear high tones while the class prefixes are toneless underlying but surface with low tones through the application of the default low assignment rule. The stems can contain either a high, low or falling tone as data in (28) indicates.

28.	a) {ó-kò-tùn-à}	[ó-γò-tùn-à]	'to taste'
	b) {ó-kò-tènèŋ-à}	[ó-γò-ténêːŋg-à]	'to be rich'
	c) {ó-kò-sèγèèt-à}	[ó-γò-sèγèèt-à]	'to incite'
	d) {ó-kò-tóm-á}	[ó-γò-tóm-á]	'to kick'
	e) {ó-kò-símék-á}	[ó-γò-símék-à]	'to plant'

The sets in (28) reveal that the stems in (a, b and c) bear low tones while those in (d and e) bear high tones. The final tone in the stem is also copied to the final vowel such that if the stem is low-toned, the final vowel is also low-toned and vice versa.

Long vowels in the infinitival forms in Ekegusii also bear either only LL or HH target tones as data in (29) show.

29.	a) {ó-kò-ɾààm-à}	[ókòɾàːmà]	'to abuse'
	b) {ó-γò-sèɾèèt-à}	[óγòsèɾèːtà]	'to thatch'
	c) {ó-γò-káán-èr-à}	[óγòkáːnèrà]	'to deny for'
	d) {ó-γò-sííɾ-á}	[óγòsìːɾà]	'to support'

The data in (29) above demonstrate that the long vowels in the stems in (a, b) are low-toned (LL) but those in (c, d) are high-toned (HH).

Ekegusii stems that begin with a vowel might induce the gliding of the prefix vowel in the version explained in sub-section 2.1.3. The prefix vowel is thus de-syllabified and therefore loses the ability to bear tone. However, the tone associated with it remains due to its stability and independence from the segments. Such a tone is said to be floating. A floating tone gets re-associated to the next TBU through docking. Floating tones lead to downstep as illustrated in the examples in (30).

30.	a) {ó-kò-át-á}	[óꜜγwáːtá]	'to divide'
	b) {ó-kò-áòɾ-á}	[óꜜkwáːóɾá]	'to yawn'

The infinitives in (30) above reveal that the prefix vowel /o/ becomes non-syllabic by a gliding rule and thus loses its ability to carry tone. The low tone associated with this vowel survives and floats. Due to vowel compensatory lengthening, the stem-initial vowel becomes phonetically long. The H-tone in the stem-initial vowel then relinks with the derived vowel to also surface as H-toned. This creates a HH tone in the stem. The floating Ḷ-tone of the glided prefix vowel also spreads to the nearest TBU resulting in (ḶHH). The first H-tone in the sequence created is however lower than the second H-tone that follows it. The floating Ḷ- tone causes the lowering of the first H-tone in the stem. This process has been termed downstep. As will be demonstrated in Chapter 3, the lowering effect created by downstep has a terracing effect that leads to the declination observed in all types of Ekegusii utterances.

Just like in the infinitival forms discussed above, finite verb morphemes can also bear high tones or are toneless underlyingly. Insights from Bickmore (1999) indicate that a finite verb in Ekegusii has the following morphological structure:

Subject marker-Tense/Aspect marker-Object marker-[$_{STEM}$ Root-Extension-Tense/Aspect] - Final Vowel.

Following insights from Nash (2011) and the examples in (31), the subject markers are toneless; the tense markers and verb roots are either high-toned or toneless and the object markers, extensions and the final vowel are toneless. The stems either can bear high tones or are toneless.

31.	a) {tò-γà-tìmòk-èɾ-à}	[tòγàtìmòkèɾà]	'we rested for' '
	b) {tò-γà-tákún-èɾ-à}	[tòγàtákúnèɾà]	'we chewed for'
	c) {tó-ó-kò-mìɲòk-èɾ-à}	[tóókómìɲòkèɾà]	'we ran for'

In (31a), the stem /-timok-/ is toneless but gets assigned default low tones to surface as [-tìmòk-]. The TBUs in the stem in (31b) are high-toned. In both cases the subject marker /to/, the past continuity marker /ɣa/, the applicative /eɾ/ and the final vowel /a/ are toneless in the underlying form. They receive low tones through the default low tone application rule to surface as low-toned. The prefix /ko/ in (31c) is underlying toneless but surfaces with a high tone. It receives its high from the preceding tense marker /-ó-/ through rightward tone spreading.

2.3.2 The Functions of Tone in Ekegusii

In sub-section 2.3.1, we have demonstrated that in Ekegusii, the TBUs surface with either low or high tones. The L and H tonal distinctions in Ekegusii have either lexical or grammatical functions. At the lexical level, words with the same phonetic and morphological forms are distinguished semantically with the variation on tone alone. The items in (31) exemplify the use of tone to mark lexical contrasts in Ekegusii.

(32)	a)	[ókòɾóká]	'to vomit'	vs	[ókòɾòkà]	'to name'
	b)	[ókòβáɾá]	'to shine'	vs	[ókòβàɾà]	'to count'
	c)	[ókwàː]	'to carry a child on one's side'	vs	[óꜜkwáː]	'to pluck leaves'
	d)	[ókwàːɾà]	'to spread'	vs	[óꜜkwáːɾá]	'to scratch'
	e)	[óɣòtáːɾá]	'not to spread'	vs	[óɣòtàːɾà]	'to take a walk'
	f)	[ɣέːtá]	'to disturb'	vs	[ɣὲːtà]	'the hearth'
	g)	[ɣòtéːɾá]	'flowing (river) gently'	vs	[ɣòtèːɾà]	'to be stuck'
	h)	[ɣɔ`tέːɾá]	'to sing'	vs	[ɣɔ`tέːɾá]	'not to winnow'

From the above examples, we conclude that lexical items with similar forms can vary in semantic content with a shift in tone. This proves that Ekegusii makes semantic distinctions on its lexical items on the bases of phonemic vowel length (discussed in sub-section 2.1.1) and tonal variations. This use of tone makes Ekegusii share its pitch characteristics with languages such as Standard Chinese (Mandarin), with four tonal contrasts; Cantonese, with nine tonal contrasts (Ladefoged and Disner, 2012) and Igbo (Anyanwu, 2008).

Apart from making lexical contrasts, tone in Ekegusii also has a grammatical function. It, for example, differentiates various past tense forms as expressed by words which are segmentally similar. It should be noted that from the moment of speaking, Ekegusii can distinguish up to four degrees of past tense. These are the early today past, the recent past, the remote past and the habitual past.

The earlier today past tense marks an activity that occurred or a state obtaining to early today. Cammenga (2002) calls this the hodiernal past. This is explained by the data in (33).

33. a) /mbá-á-têɾ-á/ 'They sang'

b) /mbá-á-ɾêm-á/ 'They dug'

c) /mbá-á-sôm-á/ 'They read'

The recent past marks an activity that occurred during or within the past few days or even last few weeks as the data in (34) illustrate.

34. a) /mbá-á-téɾ-èt-é/ They sang'

b) /mbá-á-ɾém-èt-é/ 'They dug'

c) /mbá-á-sóm-ét-é/ 'They read'

The remote past designates an activity that occurred at any time before the recent past as demonstrated in (35).

35. a) /mbá-à-tèɾ-ét-é/ ‘They sang’

b) /mbá-à-ɾèm-ét-é/ ‘They dug’

c) /mbá-à-sòm-ét-é/ ‘They read’

The habitual past marks regular occurrences in the past. This is marked by the morpheme {a} placed after the subject marker as exemplified below.

36. a) /mbá-à-téɾ-á/ ‘They sang’

b) /mbá-à-ɾém-á/ ‘They dug’

c) / mbá-à-sóm-á/ ‘They read’

In (36) and (33) we have shown that the habitual past and the hodiernal (earlier today) past use verbs with similar morphological configurations but realizing different tonal patterns. For example, the word /mbá-à-téɾ-á/ ‘they sang’ with the L-tone on the tense morpheme /-à-/ marks the habitual past. The same word /mbá-á-têɾ-á/ with the H-tone on the tense morpheme /-á-/ signals the early today past tense. The habitual past stems are also high-toned while the earlier past stems have falling tones. Equally, in (34) and (35) we have shown that the recent past and remote (far) past also have morphologically similar verb forms but different tonal patterns. Roots expressing the recent past are high-toned while those expressing the remote past are low-toned. Again, the recent past tense marker /á/ bears a high tone while the remote past tense marker /à/ has a low tone. Therefore, to indicate which past is referred to, native speakers of Ekegusii only vary their tone of voice.

In addition, the habitual tense can also be distinguished from the perfect aspect by tone. For example, the present habitual is differentiated from the present perfect using tone as the examples in (37) show.

37. Present habitual / Present perfect

ìn-nsún-á	'I pinch'	nà-à-sún-ìɾ-è	'I have pinched'
ìn-ndók-á	'I vomit'	nà-à-ɾók-ìɾ-è	'I have vomitted'
ò-ɾáám-á	'S/he abuses'	ò-ɾáám-ìɾ-è	'S/he has abused'

From the left-hand side in (37), we observe that there is a high tone assigned to the TBU after the verb root. However, on the right-hand side, the TBU in the extension /–ir / after the verb root and in the final vowel bear a low tone. The implication of this is that the habitual aspect in Ekegusii is characterized by the use of a grammatical high tone after the verb root. This grammatical high tone is also called the suffixal high (Bickmore, 1999) and should be differentiated from the lexical high for it affects TBUs following the verb root in the habitual aspect only.

Similarly, the habitual past is distinguished from the past perfect on the basis of tonal patterns. The lexical items in (38) accounts for this phenomenon.

38. Habitual past / Past perfect aspect

/ná-à-βún-ét-é/	'I broke regularly'	/ná-áβún-èt-é/	' I had broken'
/ ná-à-sèɾ-ét-é/	'I thatched regularly	/ná-ásêɾ-ét-é/	' I had thatched

This use of tone for expressing grammatical meaning in Ekegusii has also been recorded in other tone languages like Edo (Ladefoged and Johnson, 2015) and Etulo (Anyanwu, 2008).

The analyses in this sub-section, therefore, show that Ekegusii tone plays a central role in expressing meaning. Data presented in this study has shown that tone in Ekegusii distinguishes lexical and grammatical meaning. Dictionary meanings of lexical items, and different tenses and aspects are expressed by tonal variations. Various verbal extensions and a grammatical high tone were identified as markers of the grammatical categories of tense and aspect in Ekegusii. The analyses have revealed that the H and L in Ekegusii are target tones within a syllable. Tone therefore has a major role in the language contrary to the marginal role that Cammenga (2002) gives it.

2.4 Conclusion

This chapter has given a brief description of the basic segmental and post-segmental processes in Ekegusii. At the segmental level, we have illustrated that Ekegusii has both phonemic and phonetic vowels. The language makes a phonemic contrast between seven short and seven long vowels. The short vowels include four front vowels /i, e, ɛ, a/ and three back ones /o, u, ɔ/. The phonemic long vowels are presented as /iː, eː, ɛː, aː, oː, uː, ɔː/. Any of the seven short vowels is lengthened after glide formation, vowel raising or vowel deletion. It has also been revealed that there are 13 phonemic and 9 derived consonants. The latter include seven prenasalised consonants, [mb, ns, nt, nd, ʧ, ŋk, ŋg]. Uniquely for Ekegusii, apart from the prenasalised stops, there is also a prenasalised fricative [ns] and syllabic nasals in the word-initial positions. Derived consonants are realized in the language through phonological processes like glide formation, vowel deletion, defricativisation and fortition.

On tone in Ekegusii, the investigations have shown that Ekegusii has two categories of tones; namely, level tones and contour tones. Three level tones: high, low and the downdrift high were identified in the language. It was noted that Ekegusii only has a falling contour tone. The study has also shown that tone in Ekegusii is a distinctive feature that distinguishes lexemes and grammatical categories like tense and aspect. It is assumed, in this study, that the interaction of distinctive tones in Ekegusii utterances have an effect on the overall intonation patterns of those utterances. With this in mind, the next chapter presents and discusses data on the intonation patterns attested in different sentences in Ekegusii.

CHAPTER THREE

THE STRUCTURE OF INTONATION PHRASES IN EKEGUSII

3.1 Introduction

In the previous chapter, we described the interaction between the segments and tones that exist in Ekegusii. In this chapter, we discuss how tones interact with intonation related features in the three common types of simple paratones marked as declarative, interrogative and imperative as displayed in sets (5) to (9). The analysis in this chapter was aimed at revealing the realisation of intonation features like F0, the intonemes, declination and final lowering. The analysis also sought to establish whether age and sex had an influence in the production of those features in the different paratones and whether the differences noted were statistically significant. Using the SPSS tool, descriptive statistics were carried out. This enabled us to calculate the F0 means for each male and female participant in each paratone. Through this, we statistically demonstrated the inter- and intra-speaker variability in the production of F0. Age, sex and paratone type, therefore, formed the independent variables while the F0 values constituted the dependent variable.

This chapter is structured as follows: Section 3.2 presents an analysis of the intonation patterns of the simple declarative paratones. Section 3.3 gives an analysis of the intonation patterns of the interrogative paratones including the polar interrogatives, the constituent interrogatives and the echo interrogatives. Section 3.4 describes the intonation of the imperative paratones. Through this analysis, the realisation of the initial and final intonemes and fundamental frequency ranges in Ekegusii is revealed.

3.2 Intonation Patterns of Declarative Paratones in Ekegusii

In this section, the intonation features of simple declarative paratones are discussed. A simple declarative paratone is one that consists of one intonation unit (Caron, 2015) and can either be affirmative or negative. In Ekegusii, the affirmative declaratives have the syntactic structure of Subject -Verb - Object. Negative declarative paratones in Ekegusii are marked by the addition of the negative affix /ta/ or /ti/ to a verb (Cammenga, 2002). For example, an affirmative paratone can be changed to a negative one using the negative morpheme {ta} as shown in (37) and (38).

37. /ómòíséké âámóá ómòmùɾá éɣètùmá/ ‘The girl gave the boy maize.’

38. /ómòísèké támóètí ómòmùɾá éɣètùmá/ ‘The girl did not give the boy maize.’

The simple declarative utterances in (5) were used to generate data for the analyses in this sub-section. The pronunciation of those paratones is displayed in the pitch tracks extracted from PRAAT. Only one male and one female speaker from each age group will be used for the description of the intonation features of the declarative paratones save for the F0 variations. For example, a 75 year-old male produced the utterance in 5a, /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgù/, as shown in Figure 3.1.

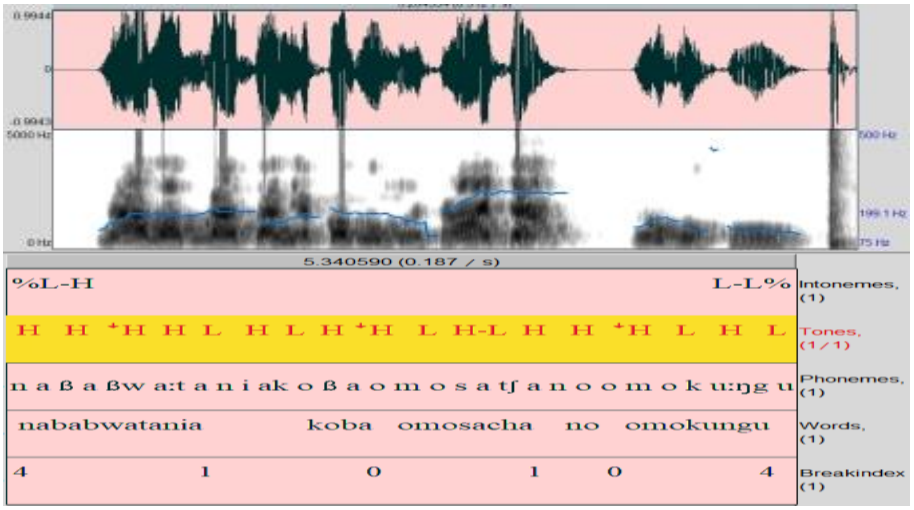

Figure 3.1: Audio waveform, F0 contour and ToBI label for /náβáβwá:tánìá kòβá ómòsâʧá nó ómòkú:ŋgù/ produced by a 75-year old male

From Figure 3.1, we note that this geriatric male participant, M1A, produced the utterance with his vocal folds vibrating at an F0 range of 199.1 Hz. The intonemes tier indicates that the utterance has an upward pitch adjustment initial boundary intoneme marked by % L-H and a low terminal intoneme marked as L-L%. In addition, there was downdrift of H tones in a sequence of HH. Apart from downstep and downdrift of H tones, there is a gradual lowering of the pitch over the course of the whole intonation unit. The pitch curve in the upper window shows that each successive tone in the utterance is produced at a lower level than the preceding one in a process called declination (Ladefoged, 2015). A further rise in the intonation before it eventually comes down was witnessed towards the end of the utterance. Eventually, at the end of this paratone there is a final lowering that produces the final boundary intoneme, L-L%.

The break index tier in Figure 3.1 shows that there is an intonation phrase boundary at the utterance-initial and terminal positions marked by the break index of 4. A normal word juncture boundary shown by the break index of 1 is kept between the words / náβáβwá:tánìá/

‘he/she united them’ and /kòβá/ ‘to be’ and between /ómòsâʧá/ ‘husband’ and /nómòkúːŋgú/ ‘wife’. The break index of 0 between the words /kòβá/ ‘to be’ and /ómòsâʧá/ ‘man’ indicates minimal juncture between the words. This is due to the deletion of the final vowel /á/ in the word /kòβá/ ‘to be’. A 0-break index is also noted between the words /nó/ ‘and’ and /ómòkúŋgú/ ‘wife’ as a result of the merging of the two similar vowel segments at the boundary between the two lexical items.

A 46-year-old male participant, M2O, produced the same utterance at a lower F0 than the 75-year old male. The pitch track from M2O’s pronunciation is presented in Figure 3.2.

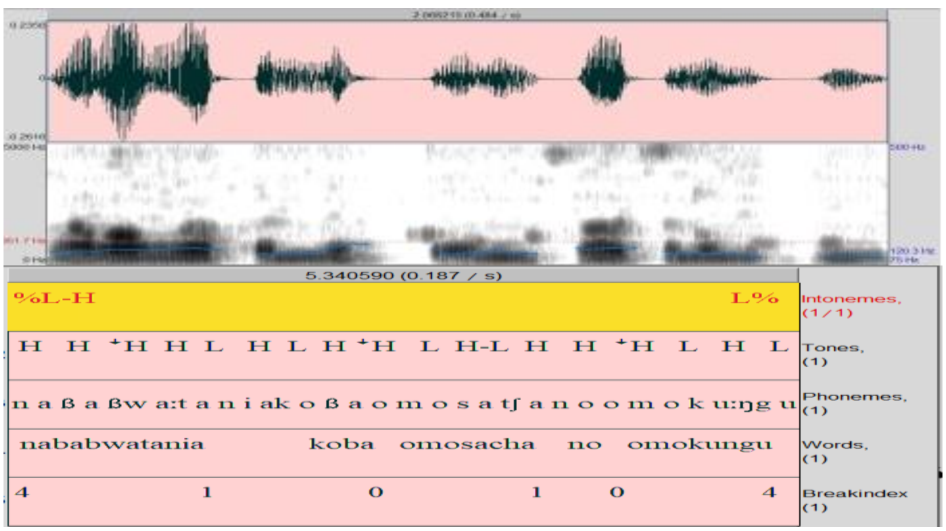

Figure 3.2: Audio waveform, F0 contour and ToBI label for /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgù/ produced by a 46-year old male

The windows above indicate that this middle-aged participant produced the utterance at a fundamental frequency range of 120.3 Hz. This value is lower than that of the 75-year old male. This participants’ pitch ceilling was also lower than that of the advanced-aged male one. However, similar to the advanced-aged male participant’s pronunciation displayed in Figure

3.1, Figure 3.2 also indicates a downward lowering of pitch in the course of the paratone. Intonation patterns of upward pitch adjustment at the utterance onset, marked by %L-H initial boundary intoneme, downdrift of H tones in a sequence of HH tones and a final L% boundary intoneme were equally recorded in this rendering of the utterance. The Tones and Break Index transcription in the above window also displays similar disjuncture between words as those noted in M1A's rendition. However, differences were noted in the pitch ceilling where

A 20-year old male participant, M2Y, produced the utterance with the same initial and terminal intonemes. However, his vocal folds vibrated at an F0 of about 135 Hz. This value is slightly higher than what the middle-aged participant realized (120.3 Hz) but is lower than that of the advanced-aged participant (199.1 Hz). This reveals that younger male participants produced the utterance at higher F0s than an older one. This is further revealed in the 11 year-old male's production of the same paratone as presented in Figure 3.3.

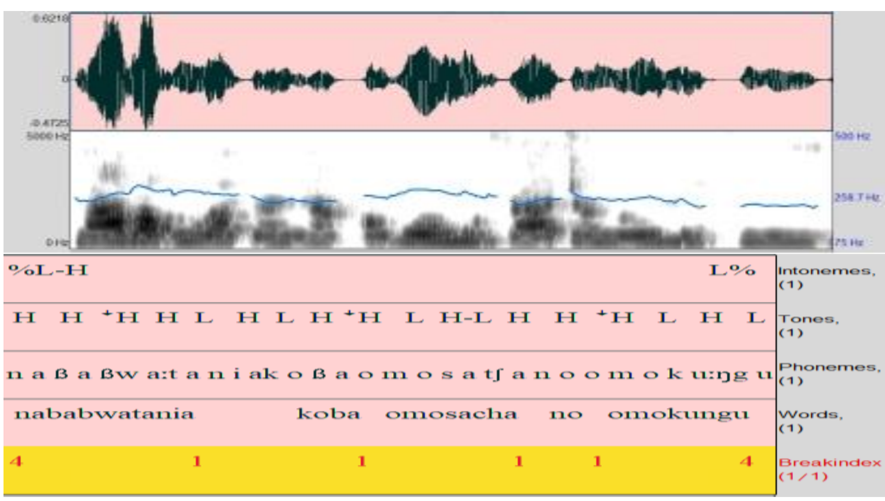

Figure 3.3: Audio waveform, F0 contour and ToBI label window for /náβáβwáá:tánìá kòβá ómòsâʧá nó ómòkú:ŋgù/ produced by an 11-year old male

From Figure 3.3, we noted that this male child, M3C, articulated this utterance with the vocal folds vibrating at 258.7Hz. This is the highest fundamental frequency produced for this paratone among the male participants. M3C also produced the utterance at a higher pitch ceiling than the middle-aged participant as shown in the pitch curve in the upper window of the transcription shown in Figure 3.3. Just as it was observed in the other male participants, this male child had an initial raising intoneme, % LH, and a terminal fall intoneme, L % as shown in the intoneme tier. It is also noted that M3C produced this declarative paratone with a general downward lowering of pitch. At the same time, a H-tone in a HH sequence following a L-tone underwent downdrift. Although this male child participant produced similar intonemes as those of other male participants, his word junctures were slightly different. The participant maintained a normal internal word juncture between the words as shown in the break-index tier. This is partly due to the lack of deletion of segments in his rendering of the utterance.

In short, the analyses have indicated that an Ekegusii male child produced the highest F0 in the declarative paratone analysed while a middle-aged male produced the lowest F0. The advanced-aged male also produced a higher F0 than the middle-aged and young participant. This shows that the F0 value of a male Ekegusii speaker decreases with age. However, at the advanced age period, the F0 value increases once more.

To establish whether the female participants displayed similar patterns in the production of the declarative paratone /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/ as their male counterparts, we also describe their pronunciation in what follows. A 61 old female, F1A, for example, produced the utterance as displayed in the pitch track in Figure 3.4.

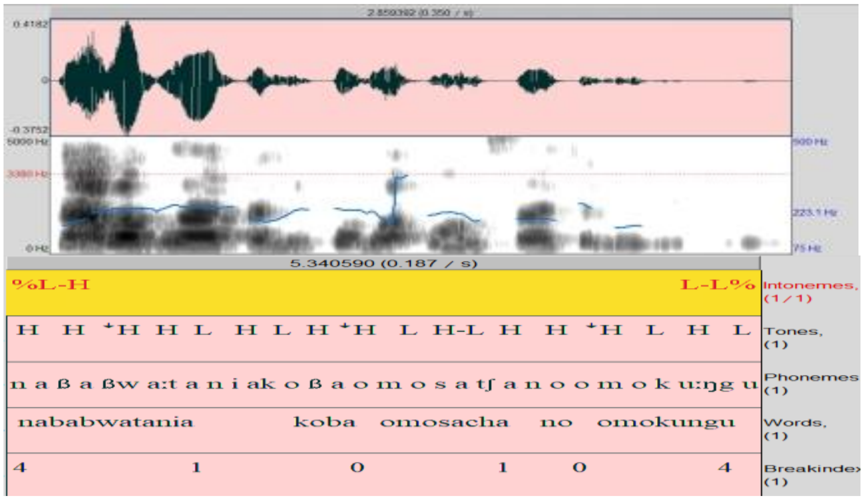

Figure 3.4: Audio waveform, F0 contour and ToBI label window for /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgù/ produced by a 61-year old female

Figure 3.4 above reveals that F1A produced the utterance with the vocal cords vibrating at 223.1 Hz. It also reveals that there was the downdrift of the H-tones due to a preceding low, L, or falling tone, H-L, in the sequence LHH or H-LHH. A high tone in a HH sequence was also downstepped. However, the motivation for this was not clear. After downdrift, the following H tones were realized at a lower level than the preceding ones. This induced the utterance's declination steepness. The final additional lowering effect resulted in the L-L% boundary intoneme as displayed in the intoneme tier.

The break-index tier in Figure 3.4 above shows similar characteristics as those of the advanced-aged male participant. Both M1A and F1A produced the utterance with a 4 1 0 1 0 4 break indices. Following the ToBI (Beckman, 2005) transcription system, this means that there was a boundary break index of 4 at the initial and terminal points of the intonation unit and an ordinary word juncture between /náβáβwáːtánìá/ 'he/she united them' and /kòβá/ 'to be' and /ómòsâʧá/ 'husband' and /nó/ 'and' as marked by the break index of 1. The 0-break index between the words /kòβá/ ‘to be’ and /ómòsâʧá/ ‘husband’ and between /nó/ ‘and’ and /ómòkúŋgú/ ‘wife’ shows a very close inter-word juncture.

The same utterance produced by a 48 year-old female participant, F1O, is displayed in the pitch track in Figure 3.5.

Figure 3.5: Audio waveform, F0 contour and ToBI label window for /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/ produced by a 48-year old female

As can be seen in Figure 3.5, F1MA produced the paratone at a fundamental frequency of about 210.8Hz. This value is less than the one recorded by the 61 year-old female in Figure 3.4. Both FIA and F1MA participants recorded similar patterns of word junctures. The overall declination pattern noted in F1A’s pitch track is also observed in F1O. However, differences can be seen in the steepness of the declination with the middle-aged female having a steeper declination towards the end of the paratone. The declination recorded here is also due to downdrift since all H-tones preceded by H-tones are lowered in the sequence LHH and H-

LHH. With this trend, the H-tones at the beginning of the paratone are realised at a higher pitch ceilling than those towards the end.

A young female participant, F2Y, realized a higher F0 than the advanced-aged and the middle-aged female participants as shown in Figure 3.6.

Figure 3.6: Audio waveform, F0 contour and ToBI label window for /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/ produced by a 20-year old female

Figure 3.6 indicates that F2Y produced the utterance at an F0 of 236 Hz. This value, as already noted, is higher than what the middle-aged (210.8 Hz) and the advanced-aged (223.1 Hz) participants produced. The pitch curve in the intonemes tier indicates that the utterance was produced with a general lowering of pitch in the course of the paratone. Although the H tones at the beginning of the paratone are higher than the ones towards the end, the gradient of the lowering is less steep compared to the advanced-aged and middle-aged female participants. Again, the articulation of the paratone by this female youth lacks the additional final lowering witnessed in the other participants discussed early. This reveals that there are inter-speaker variations in the production of intonation in Ekegusii.

Female children produced the highest F0 for the same paratone. A nine year-old female child, F1C, for example, pronounced the paratone with the vocal folds vibrating at about 265.5Hz as shown in Figure 3.7.

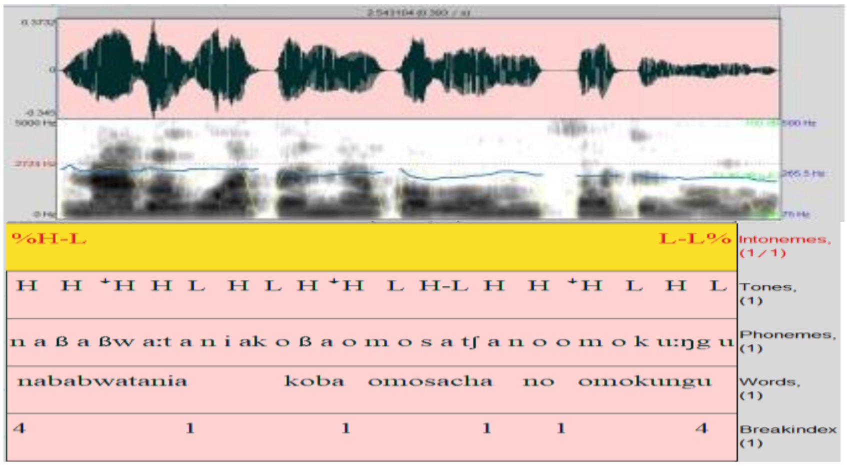

Figure 3.7: Audio waveform, F0 contour and ToBI label window for /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/ produced by a 9-year old female

Figure 3.7 above indicates that F1C had an initial H-tone at the beginning of the paratone. This process has been termed reset and has the effect of increasing the distance to an upcoming L-tone resulting in the initial %H-L boundary intoneme. This is similar to what the young female participant produced. Equally, in F1C's pronunciation, the tones at the beginning are higher than those that occur later in the utterance. This has a lowering effect in the course of the paratone. The additional final lowering produced the L-L% final boundary intoneme. A similar pattern was produced by the other female participants discussed in this section. However, unlike the other female participants reported earlier, F1C realised an ordinary internal-word juncture throughout the utterance as marked by the break index of 1. This shows that this participant did not delete vowels in the word boundaries, as was the case in the other participants. This pattern was also observed in the male child's articulation.

Based on the pitch tracks above, two major conclusions were drawn: First, downdrift and a general left-to-right progressive downward lowering in pitch characterized the pronunciation of the paratone. As a result, both the H and L tones at the beginning of the paratones are higher than they are at the end. Accounting for this phenomenon, Gussenhoven (2004), notes that at the beginning of an utterance, a speaker's subglottal air pressure will be higher than towards its end. The communicative exploitation of this process is what Gussenhoven (2004) refers to as the production code, which associates high pitch with utterance beginnings and low pitch with utterance ends. The effect of this is a phonological process called declination (See also Caron, 2015; Ladefoged and Johnson, 2015; Fajobi, 2011, and Fox, 2007). Declination in Ekegusii declarative paratones occurs in the phonological environment of downdrift and final lowering. In this way, Ekegusii shares its intonation patterns for declarative paratones with most other tone languages like Hausa (Ladefoged & Johnson, 2015) and Akan (Kugler, 2016). However, in some other tone languages, declination takes a different form. For example, in Luganda, the L–tones remain at almost the same level throughout the utterance so that the declination affects only the H-tones at the beginning of the utterance (Ladefoged and Johnson, 2015). Downstrends, according to (Fajobi, 2011) is an indicator of the falling intonation characteristic of declarative intonation for tone languages. It was also noted in this study that declarative intonation is signalled by a lower F0 than in the interrogative intonation as the discussion in sub-section 3.2 shows.

Second, there were age and sex-related variability in the production of F0 for the utterance analysed. Participant's variation in F0 production is attributed to the size, length and tension of the vocal folds (Ladefoged and Johnson, 2015). According to Ladefoged and Disner (2012), children's vocal folds are shorter and thinner than the adult ones, which are longer and massive due to maturation. Consequently, children's vocal folds vibrate more quickly, producing higher fundamental frequencies than adults do.

It should be noted that the F0 differences observed were based on data from 8 of the 24 participants. Therefore, to remove individual differences and make generalisations based on the pronunciation of all the simple declarative paratones, a general linear analysis was carried out using the SPSS software. The SPSS outputs given compared the F0 means for the four age groups in each of the simple declarative utterances. Results indicated that participants pronounced the utterances at varied fundamental frequencies. For example, the output in Table 3.1, based on the paratone /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/, indicate that children recorded the highest F0, followed by the advanced-aged and the youth. The middle-aged participants pronounced the utterance at the lowest F0. Equally, females in each age group recorded higher F0s than males.

Table 3.1: Comparison of F0 means for the utterance /náβáβwá:tánìá kòβá ómòsâʧá nó ómòkú:ŋgú/

Age	Sex	N	Mean	Std. Dev
Children	F	3	237.933	27.01783
	M	3	218.467	35.94946
	Total	6	228.200	30.37459
Youth	F	3	213.367	24.63013
	M	3	137.833	5.92143
	Total	6	175.600	44.36517
Middle-aged	F	3	196.133	13.72492
	M	3	106.760	14.31443
	Total	6	151.447	50.53304
Advanced-aged	F	3	199.200	20.74873
	M	3	167.067	38.80133
	Total	6	183.133	32.92699
Total	F	12	211.658	25.54776
	M	12	157.532	48.97595
	Total	24	184.595	47.15507

As can be seen from Table 3.1 above, children produced the utterance at a mean F0 range of 228.2 Hz. The advanced-aged participants produced it at 183.1 Hz while the youth produced it at 175.6 Hz. The middle-aged participants had a mean F0 range of 151.5 Hz. Readings from the column labeled standard deviation show that the middle-aged group had F0 scores that dispersed the most from the mean as shown by a high standard deviation value while children's F0s scores dispersed the least from their mean as their standard deviation value is the lowest. We also noted that the difference in F0 between the children group and the youth was about 52.6 Hz while that between the youth and the middle-aged group was about 24.2 Hz and that between the middle-aged group and the advanced-aged group was about 31.7 Hz. The implication of this is that major changes in the F0 range of a speaker occurred during the youthful ages.

The pronunciation of the above paratone shows an F0 lowering trend with advancement in the age of the participant. However, at the advanced-age period, the F0 of both the male and female participants starts to increase. These age variations in the F0 production for this utterance are graphically presented in Figure 3.8.

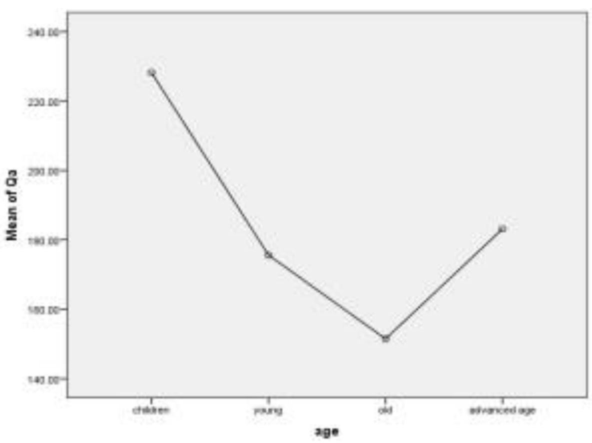

Figure 3.8: Age differences in the production of the declarative paratone /náβáβwːátánìá kòβá ómòsâʧá nó ómòkúːŋgú/

From Table 3.1, it was also observed that there were sex differences in the F0 production for the same utterance. The average F0 range for females was 211.7 Hz and that of males 157.5

Hz. Females, therefore, produced higher F0 ranges than their male counterparts across the four age groups. With aging, a male's testosterone increases and the laryngeal cartilages and vocal folds grow in size and length. The longer and thicker vocal folds together with a larger resonant chamber makes a male's F0 to drop compared to that of a female. The sex variability in the production of the utterance /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/ 's/he united them to be husband and wife' is also graphically presented below.

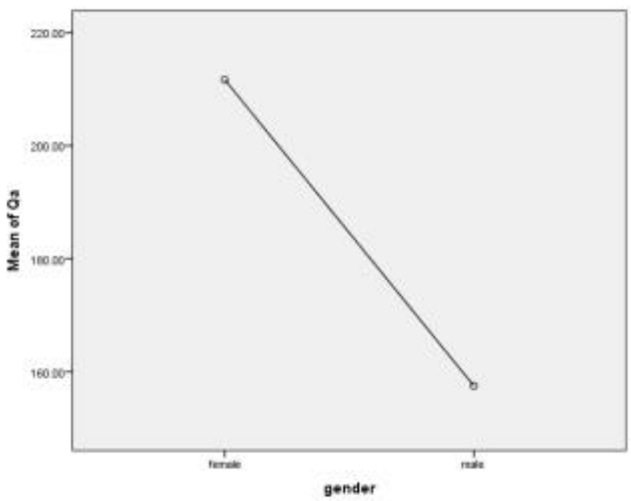

Figure 3.9: Sex differences in the production of the declarative paratone/náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/

Figure 3.9 indicates that females produced the highest F0 range for this utterance while the males produced the lowest. Apart from the differences in the mean F0 between males and females, Table 3.1 also shows that males had a higher standard deviation than females. This indicates that males had F0s dispersed more above and below their mean than females in producing this paratone. Similar patterns of variance are noted in all the utterances analysed in this chapter as displayed in the summary tables. Studies in other languages like isiZulu (Kuun, et al, 2005:2), however, indicate that females have higher variance in their nominal F0 range than males. This declarative utterance, we can conclude, was produced at an average F0 range of about 184.6 Hz.

A comparison of means for the negative declarative utterance /táɾɛ́tɛ̀tí kéːndé pí/ 'S/he did not bring anything,' equally reveals inter- and intra-speaker variability in the F0 realisation. The male and female participants recorded diverse F0 values. Equally, children, the youth, the middle-aged and advanced-aged participants recorded different F0s. These differences are summarized in Table 3.2.

Table 3.2: Comparison of F0 means for the utterance /táɾɛ́tɛ̀tí kéːndé pí/

Age	Sex	N	Mean	Std. Dev
Children	F	3	234.1	31.4
	M	3	216.0	36.7
	Total	6	225.1	32.1
Youth	F	3	215.6	39.4
	M	3	144.0	26.5
	Total	6	179.8	49.4
Middle-age	F	3	194.3	14.1
	M	3	100.4	14.3
	Total	6	147.4	53.0
Advanced-aged	F	3	218.5	15.0
	M	3	168.1	43.8
	Total	6	193.3	40.2
Total	F	12	215.6	27.5
	M	12	157.1	51.6
	Total	24	186.4	50.3

From Table 3.2 above we note that children produced the utterance at an F0 range of 225 Hz. This was the highest F0 range for this utterance. The advanced-aged group produced it at the second highest pitch range of 193 Hz while the youth produced it at an F0 range of about 180 Hz. The middle-aged group once more had the least F0 range of 147. Results have further shown that the highest F0 range for this utterance, 234 Hz, was produced by female children while the lowest, 100 Hz, was produced by the middle-aged males. These differences are graphically presented in Figure 2.10.

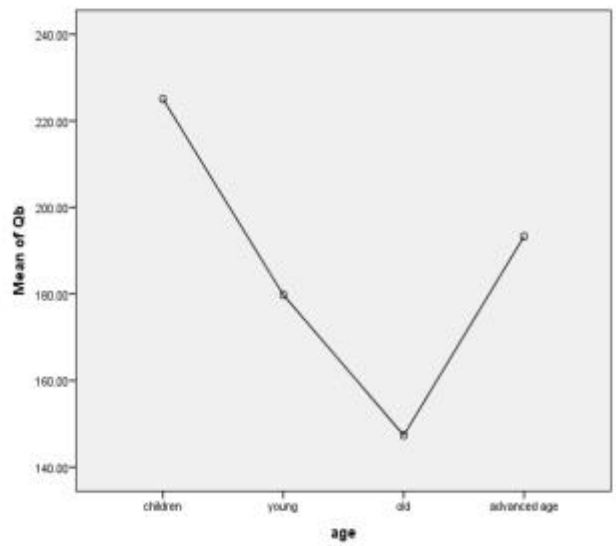

Figure 3.10: Age differences in the production of the utterance /táɾέtὲtí ké:ndé pí/

Equally, in the pronunciation of the utterance, there were sex variations in the F0 ranges. Female participants produced the utterance at an F0 range of about 216 Hz while the males had an F0 range of about 157 Hz. The highest F0 range for females was 234 Hz while the lowest was about 194 Hz. Among the male participants, children produced the highest F0, 216 Hz, while the middle-aged males produced the lowest F0, 100 Hz. Similar to the observations made in the earlier utterances, the female participants' highest and lowest F0 ranges were higher than those of the male ones. Such differences are visually presented in Figure 3.11.

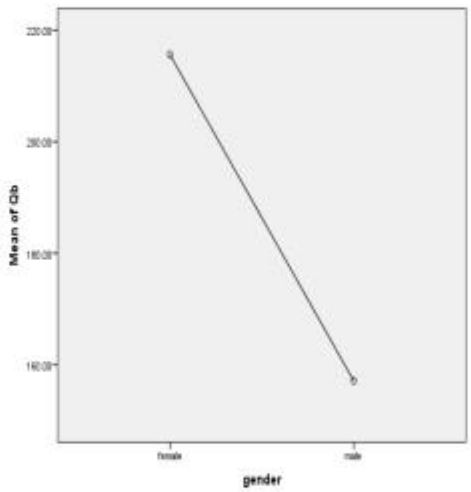

Figure 3.11: Sex differences in the production of the utterance /táɾɛ́tɛ̀tí kéːndé pí/

Overall, the utterance /táɾɛ́tɛ̀tí kéːndé pí/ was produced with the vocal folds vibrating at an F0 of about 186 Hz. This value is slightly higher than the 185 Hz recorded in the articulation of the paratone /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/. The summary that follows, displays the mean F0 production for another declarative paratone /βàʧîɾé kwòːjìá ɛ́ŋɔʼːmbɛ̀/ 'They have come to take the cow'.

Table 3.3: Comparison of F0 means for the utterance /βàʧĩɾé kwò:jìá ɛ́ŋɔ˺:mbɛ̀/

Age	Sex	N	Mean	Std. Dev
Children	F	3	234.867	34.75030
	M	3	212.500	30.60605
	Total	6	223.683	31.74596
Youth	F	3	213.833	32.28395
	M	3	128.267	15.46491
	Total	6	171.050	52.04866
Middle-aged	F	3	194.467	12.20874
	M	3	106.647	7.93363
	Total	6	150.557	48.97452
Advanced-aged	F	3	196.867	12.20055
	M	3	165.967	47.73440
	Total	6	181.417	35.46003
Total	F	12	210.008	27.36276
	M	12	153.345	49.02657
	Total	24	181.677	48.42744

From the above summary, we once more note that children produced the paratone at the highest F0 of 224 Hz. The advanced-aged participants at 181Hz followed them. The youth, on the other hand, articulated it at 171 Hz while the middle-aged group had the lowest F0 range of 151 Hz. This systematic trend further reveals age and sex variability in the F0 production in the pronunciation of the utterance. Figure 3.12 is a visual presentation of these differences.

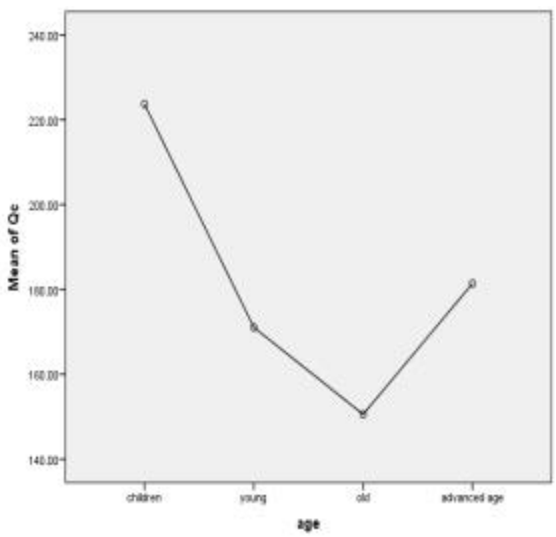

Figure 3.12: Age differences in the production of the utterance /βàʧĩ́ré kwòːjìá ɛ́ŋɔ'ːmbɛ̀/

Table 3.3 also indicated that female participants had higher F0s than the male ones. The highest F0 in this utterance for females was 234.9 Hz. The female children produced this. Among the female participants, the middle-aged females produced the lowest F0, 194.5 Hz. Male children at 212.5 Hz produced the highest F0 for the male participants, while the middle-aged males at 106.5 Hz produced the lowest. Generally, the female mean F0 range was 210 Hz while that of males was 154 Hz. We display these sex differences in Figure 3.13.

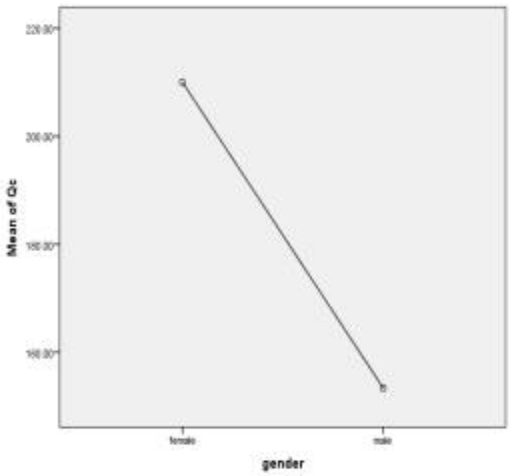

Figure 3.13: Sex differences in the production of utterance /βàʧĭɾé kwòːjìá ɛ́ŋɔ̀ˈːmbɛ̀/

Figure 3.13 reveals that females produced this utterance at higher F0 than the males. These results are similar to those reported earlier and the ones in Table 3.4 based on the utterance /ómòːntó óγòkóɾá èɲáːŋgí nêsêsé/ ‘Somebody is wedding a dog’.

Table 3.4: Comparison of F0 means for the utterance /ómòːntó óɣòkóɾá èɲáːŋgí nêsêsé/

Age	Sex	N	Mean	Std. Dev
Children	F	3	236.5	29.86341
	M	3	221.4	39.87133
	Total	6	229.0	32.58262
Youth	F	3	217.3	38.38958
	M	3	140.4	13.35003
	Total	6	178.9	49.32888
Middle-aged	F	3	182.9	14.32701
	M	3	103.4	6.79836
	Total	6	143.2	44.71433
Advanced-aged	F	3	209.2	10.03809
	M	3	173.2	35.45011
	Total	6	191.2	30.51343
Total	F	12	211.5	29.83079
	M	12	159.6	51.10352
	Total	24	185.5	48.75440

Table 3.4 reveals that there are age and sex variability in the F0 production of this paratone. Just like in the other paratones, children realized the highest F0 of 229 Hz. The advanced-aged group produced the second highest F0, 191 Hz. The youth group had an F0 of 179 Hz while the middle-aged participants had the lowest F0, 143 Hz. We also observe that the female participants had their highest F0 of 237 Hz produced by the female children while the male

children produced the male participants' highest F0 of 221 Hz. The middle-aged females produced the lowest F0 for females, 183 Hz, and middle-aged males produced the lowest F0, 103 Hz. In Figure 3.14, we display the age differences noted in the F0 production for this paratone.

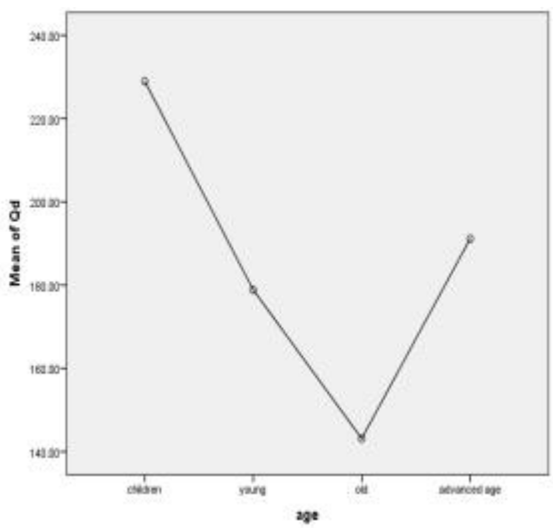

Figure 3.14: Age differences in the production of utterance /ómòːntó óγòkóɾá èɲáːŋgí nêsêsé/

Table 3.4 also indicates that there were sex variations too in the F0 production of this utterance. Females once more realized a higher F0, 211 Hz, than males, 160 Hz. This was expected for Ladefoged and Disner (2012: 20) observe that ''women and children produce higher pitch ranges than men'' because their ''vocal folds can be stretched so that they become longer and thinner'' than men's and consequently vibrating more quickly. The sex variations noted in the study are graphically shown in Figure 3.15.

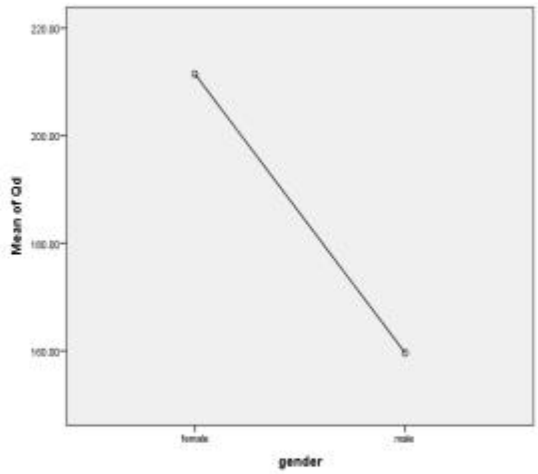

Figure 3.15: Sex differences in the Production of the Utterance /ómòːntó óɣòkóɾá èɲáːŋgí nêsêsé/

Though the analysis above has shown that there are age and sex differences in the production of F0 in declarative paratones in Ekegusii, the question on whether the variations noted are large enough to be considered statistically significant has not been addressed. As a result, a test of between-subjects effects was carried out in order to asses the interaction and main effects (Pallant, 2016) of age and sex on the production of F0. The results obtained are displayed in Table 6.1 (Appendix 6). The test was based on a pairwise comparison of the estimated marginal means of the participants' F0 ranges. Results in Wilks' Lambda show that age and sex had a main effect of .010 and .004 respectively. Since the mean difference is significant at < .05 levels (Pallant, 2005) and the probability values reported here are less than the alpha target, it can then be concluded that there was a statistically significant main effects of age and sex on the realization of the F0 value of a declarative utterance. However, the interaction effect of age and sex did not reach statistical significant in the production of F0 (P= .198). This value is greater than the proposed alpha level of <.05. From the column labeled F, it can be established that sex has a larger F-ratio (6.413) than age (2.761). This large F-ratio implies that there was more variability between the sexes than within the sexes in the realization of F0.

Having established a statistically significant variation in the realization of F0 for declarative utterances among the different age groups and sexes, we also set to establish the effect size of the results obtained. Using the commonly used eta squared statistics for effect size given in the column labelled Partial Eta Squared; we established from Wilks' Lambda that the magnitude of the differences in the means for age was .446 and that for sex .664. These, in Cohen's (1998) terms, as explained in Pallant (2005), would be considered very large magnitudes given that .01 indicates a small effect; .06 a moderate effect and .14 a large effect.

In summary, the descriptive statistics above reveal that the voice fundamental frequency in the pronunciation of an Ekegusii declarative paratone is influenced by the age and sex of the speaker. Generally, results have shown that children produced the highest F0 in all the four declarative utterances (228, 225, 224 and 229 Hz). They were followed by the advanced-aged participants (183, 193,181, and 191) and the youth (176, 180, 171 and 179 Hz), respectively. The middle-aged participants pronounced the four paratones at the lowest F0 (152, 147, 151 and 143 Hz). This shows that an Ekegusii speaker's F0 decreases with advancement in age upto the middle age period before it increases once more at the advanced age period for both males and females. These results are similar to Awan and Mueller's (1992) findings that indicate that fundamental frequencies are lower in older speakers than in younger ones. The lowering of F0 with age, according to Linville (2001), is a result of the vocal folds getting less elastic and thus unable to perform as they do in younger people. According to Gussenhoven's (2004:80) frequency code, 'lower pitch suggests that the organ producing the vocalization is smaller.' This explains why children and women achieve faster vibration rates and high fundamental frequencies as they speak.

The high F0 recorded in the advanced-aged participants is attributed to vocal cords atrophy and tissue stiffening associated with aging. Similar findings have been reported in Chatterjee, et al. (2011), Torre and Barrow (2009), Watson and Munson (2007), among others. As Linville (2001) observes, as one gets old, the framework cartilages of the larynx turn to bone (ossify) and the vocal folds become thinner resulting in a higher sounding pitch. This age-related voice changes were responsible for the high fundamental frequencies recorded in the advanced-aged participants. Though Chatterjee et al. (2011) observe that the F0 of advanced-aged male speakers increases while that of the advanced-aged female ones does not change or becomes lower, Ekegusii data have shown that the F0 of both the advanced-aged males and advanced-aged females is higher than that of the middle-aged and youth groups.

Based on the estimated marginal F0 means, we show in the set below the ranking of the different age groups in F0 production.

Children	227 Hz
Advanced-aged	187 Hz
Youth	176 Hz
Middle-aged	148 Hz

In terms of sex, generally, female participants across the four age groups pronounced the utterances at higher mean, minimum and maximum voice fundamental frequencies than their male counterparts. Analyses have shown that the maximum mean F0 range for females was 216 Hz while the minimum was 210 Hz. On the other hand, the male participants' maximum F0 range was 160 Hz while the minimum was 153 Hz. The average female F0 range for the declarative utterances can, therefore, be said to be about 212 Hz while that of the males about 157 Hz. The effect of sex in the mean voice F0 production of the four declarative utterances is given in the set below.

Female children	236 Hz
Male children	217 Hz
Female young	215 Hz
Female advanced age	206 Hz
Female middle age	192 Hz
Male advanced age	169 Hz
Male young	138 Hz and
Male middle age	104 Hz

Apart from sex differences in F0, variations were also noted in the tonal patterns of the utterance final boundary tones. Results show that males terminated their utterances with an L-L% boundary tone while females end their utterances with an H-L% boundary tone. Equally, differences between the sexes were also recorded in the dispersion of F0s from the mean for the two groups. Results have shown that the male participants had a higher standard deviation in all the four utterances than their female counterparts. This shows that F0 values for male participants dispersed more above and below their mean than the females.

Similar sex differences in the F0 production of the declarative utterances as revealed in this study have also been reported in Bengali (Chatterjee, et al., 2011) and in the Parisian, French and American English speakers (Pepiot, 2014). According to Titze (1989) such sex differences are due to the differences in the size and length of the vocal folds. The author notes that adult male vocal folds are bigger than adult female vocal folds by 60%. In addition, the adult male vocal tract is 15% longer than female's. Gussenhoven (2004) also notes that the size of the male larynx is almost twice that of the female and at puberty, the male vocal tract is some 3.5cm longer than the female one. These bigger, longer and more massive vocal folds in men result in slower vibrations and consequently lower F0 in males.

In conclusion, the analysis in this section has shown that the pronunciation of the simple declarative paratones is characterized by declination which is an effect of initial intonemes like downdrift and terminal intonemes like the final fall. In addition, there is a decrease in F0 for both males and females from the children through the youth to the middle age groups. However, the F0 increases once more with the advanced age group. On average, the utterance /náβáβwáːtánìá kòβá ómòsâʧá nó ómòkúːŋgú/ was produced by the participants at an F0 of 185 Hz; /táɾέtὲtí kéːndé pí/ at 186 Hz; /βàʧĭɾé kwòːjìá έŋɔ̀ːmbὲ/ at 182 Hz and /ómòːntó óɣòkóɾá èɲáːŋgí nêsêsé/ at 186 Hz. From this summary, we calculated the average F0 for an Ekegusii declarative utterance to be about 185 Hz. The realization of the intonation features of declarative paratones discussed in this section were compared with those of interrogative paratones described in section 3.3.

3.3 Intonation of Interrogative Paratones in Ekegusii

In this section, we describe the intonation patterns of the interrogative paratones in 6 to 8 and then compare them with those of the declarative paratones discussed in Section 3.1. An interrogative paratone is one that is used to ask a question or request for information. In Ekegusii, this type of paratone may or may not have an interrogative word. Those without an interrogative word, such as /nàβàβwáːtáníà kóβá ómòsàʧá nó ómò꜔kúːŋgù/ 'did s/he unite them to be husband and wife?' /tàɾɛ́tɛ́tí kéːndé pì/ 'didn't s/he bring anything?'/βàʧĭɾè kwòːjìà ɛ́ŋɔˈːmbɛ̂/ 'have they come to take the cow?'/ómòːntó óɣòkŏɾà éɲáŋgí nêséèsè/ 'is somebody wedding a dog?' have the same sound sequences as the declarative paratones in (5). To distinguish between the declarative and interrogative use of such utterances, one should consider the intonation cues provided in their articulation. Interrogative utterances of this kind are answered by simply saying /éé/'yes' or /jàjà/ 'no'. Since the answers to these interrogatives stand in the two polarities of yes and no, they have been referred to as polar or yes-no interrogatives.

The interrogative utterances in Ekegusii with question words are of two types. There are those that place the interrogative word at the utterance-initial position and those that place it at the utterance-final position. The interrogative words in Ekegusii include /níŋkì/ 'what/why', /níŋò/ 'who/m', /ŋàí/ 'where', /ndìɾìɾí 'when' and /ŋàkí/ 'how'. Interrogative utterances with such question words have their answers in the form of declarative utterances. In this study, such interrogatives were referred to as constituent interrogatives. Ekegusii interrogatives with the interrogative word in the final position echo what the utterance is about. We have referred to utterances of this kind as echo interrogatives. Utterance-final interrogative words in Ekegusii are usually the shortened forms of the constituent interrogative words. Both the interrogatives that front the interrogative word and those that place the interrogative word in the utterance final position are pragmatically similar for they elicit responses in the form of declarative statements. For example, the constituent interrogative utterance in (39) and the echo interrogative utterance in (40) will both require a response that identifies some location.

39. /ŋàí kwáːmóɲôɾá/ ‘where did you find him/her?’

40. /kwáːmòɲòɾà áí/ ‘you found him/her where?’

The analysis of interrogative intonation is structured as follows. In 3.3.1, polar interrogative intonation patterns are discussed. Threafter, a discussion of constituent interrogative intonation will be done in 3.3.2 and the echo interrogative intonation in 3.3.3.

3.3.1 Intonation of Polar Interrogatives in Ekegusii

The analysis in this sub-section describes the intonation patterns of polar interrogatives in Ekegusii. Just like in the analysis of declarative paratones, the influence of age and sex in the production of polar interrogative paratones is taken into account. For example, the pitch track in Figure 3.16 below shows an advanced-aged male’s pronunciation of the paratone /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòꜜkúːŋgù/ ‘Did s/he unite them to be husband and wife?’

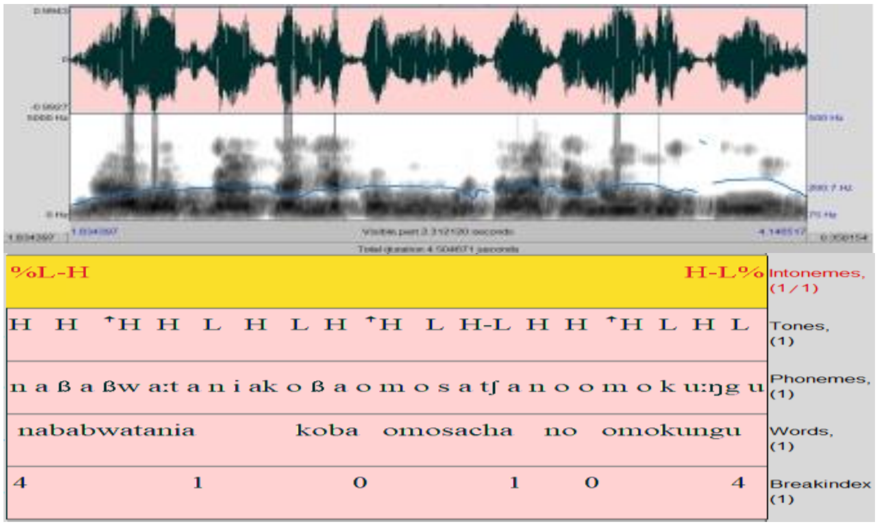

Figure 3.16: Audio waveform, F0 contour and ToBI label windows for the polar interrogative /nàβàβwá:táníà kóβá ómòsàʧá nó ómòꜜkú:ŋgù/ said by a 75-year old male

Figure 3.16 indicates that the 75-year old male, M1A, pronounced the utterance at an F0 range of 200.6Hz. As already noted in Section 3.1, the same speaker produced the declarative form of this utterance at an F0 range of about 177.9 Hz. This shows that in the interrogative pronunciation, the vocal folds vibrated faster than in the declarative intonation. Another difference noted in the polar interrogative pronunciation is that the terminal H-tones are higher than the initial H ones. However, similar to the declarative pronunciation, the participant had a final lowering. This resulted in H-L % terminal intoneme for the paratone. In line with the ToBI transcription system, the final boundary intoneme is marked by an index value of 4 in the break index tier. The H-L% final boundary intoneme is similar to what the middle-aged male, M2O, participant produced for this utterance as shown in Figure 3.17.

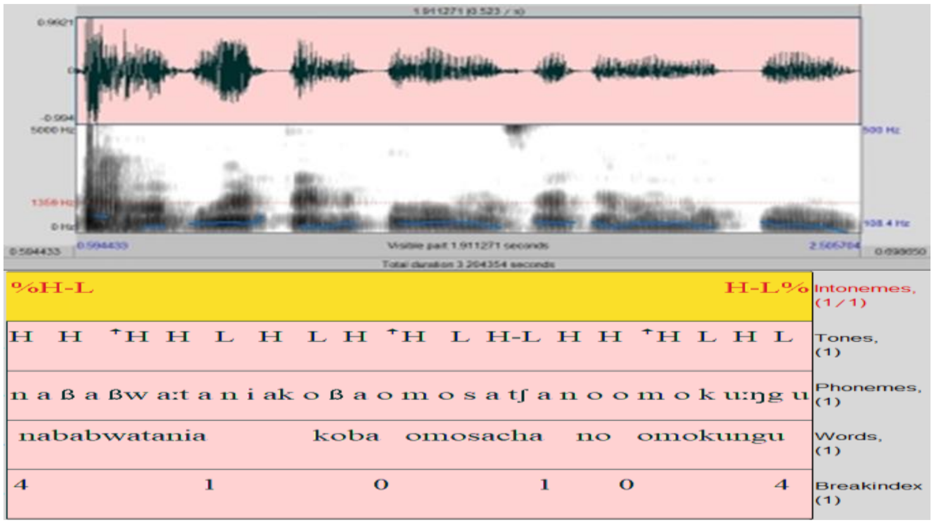

Figure 3.17: Audio waveform, F0 contour and ToBI label window for the polar interrogative /nàβàβwáːtáníà kóβá ómòsàʧá nó ómò⁺kúːŋgù/ said by a 46-year old male.

The pitch track above shows that the 46-year old male participant produced the utterance at an F0 of about 128.3Hz compared to the 120.3 Hz that he realized in producing it as a declarative. Again, compared to the advanced-aged participant and an 18-year old youth, this middle-aged participant produced the lowest F0. The pitch curve in Figure 3.17 also indicates that though there is declination in the course of the paratone, its steepness is less than what was observed in the declarative paratone pronunciation by the same participant. In Figure 3.18, we present the 18-year old youth's pitch track for the same paratone.

Figure 3.18: Audio waveform, F0 contour and ToBI label window for the polar interrogative /nàβàβwá:táníà kóβá ómòsàʧá nó ómòꜜkú:ŋgù/ said by an 18-year old male

From Figure 3.18, we see that the 18 year-old male, M2Y, produced the utterance with an L% final boundary intoneme. This is different from the advanced-aged and middle-aged's H-L% final boundary tone for the same utterance. This indicates that there can be intra-variability in the same participants' production of polar interrogative intonation patterns in Ekegusii. In addition, it was observed that the youthful participant had the vocal folds vibrating at an F0 range of about 141.1Hz in this interrogative utterance compared to the declarative pronunciation of 135.3 Hz. This shows that the pronunciation of an interrogative utterance has the vocal folds vibrating at a higher rate than in the declarative production. Again, this youth had a higher F0 than that of the middle-aged participant. As with the other male participants, this male youth had a slightly less steep declination pattern than was recorded in the declarative rendition.

The patterns observed above are compared to a male child's production of the same paratone. As Figure 3.19 shows, the 11 year old, M3C, produced the highest F0 for this paratone.

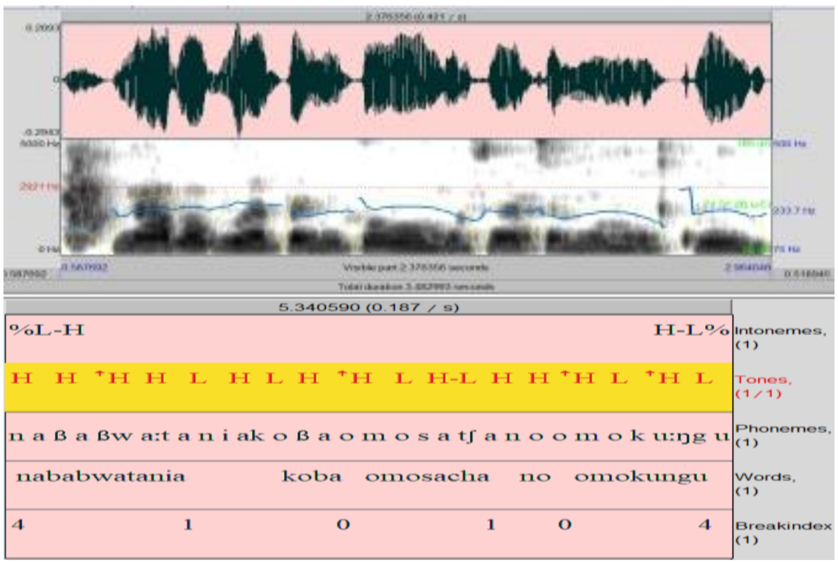

Figure 3.19: Audio waveform, F0 contour and ToBI label window for the polar interrogative /nàβàβwá:tánía kóβá ómòsàʧá nó ómòꜛkú:ŋgù/ said by an 11-year old male

From the windows above, we note that M3C produced the utterance at an F0 of about 282.7 Hz. This F0 was the highest among the male participants discussed in this sub-section. We also note that M3C had a higher F0 when saying the paratone as an interrogative than when he said it as a declarative, 258.7 Hz. Thirdly, there was a H-L% boundary intoneme at the utterance end. In addition, this participants' pronunciation shows upstepping of high tones in the sequence HHL. We also realised that the last high tone acquired an extra high pitch before a sharp fall to produce the H-L% boundary intoneme.

As already observed, participants of different age groups and sex have anatomic differences in their vocal folds and given that these differences are physically reflected in their voice F0 ranges, the discussion that follows compares the male and female participants' pronunciations of the polar interrogative paratone /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúːŋgù/ ‘did he/she unite them as husband and wife?’

Figure 3.20 shows the the advanced-aged female participant’s pitch track for the production of this utterance.

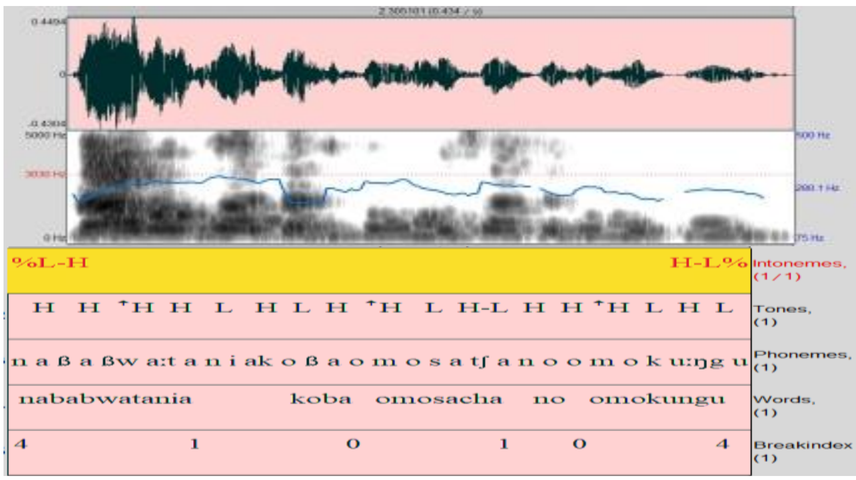

Figure 3.20: Audio waveform, F0 contour and ToBI label window for the polar interrogative /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúːŋgù/ said by a 61-year old female

The pitch track in Figure 3.20 shows that the 61year-old female, F1A, produced the utterance at an F0 of 280.1Hz. The same participant produced this utterance as a declarative at an F0 of 223.1. The implication of this is that an utterance with the same sound segments can be pronounced in Ekegusii as an interrogative or as a declarative. The F0 range seems to be the major intonation feature that distinguishes the usage. A high F0 signals that more is expected from the listener. Readings from the tones tier also show that this female had similar upstepped H-tones as those of the male participants in the sequence of HH. From the intonemes tier, it was noted that there was a H-L% a final boundary intoneme similar to that of the advanced-aged and male child participants. A 48-year old female pronounced the same paratone at a lower F0 as Figure 3.21 indicates.

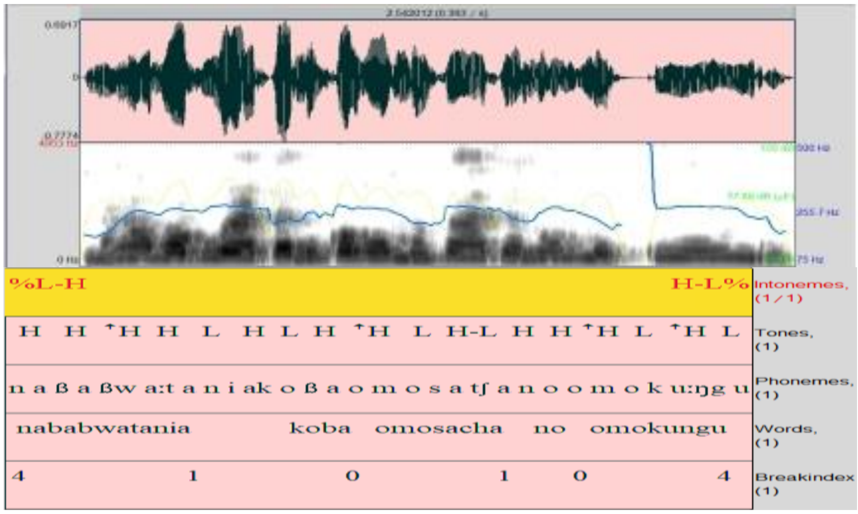

Figure 3.21: Audio waveform, F0 contour and ToBI label window for the polar interrogative /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúːŋgù/ said by a 48-year old female

Figure 3.21 shows that this participant had the vocal folds vibrating at 255.7 Hz in producing the paratone. This F0 value is higher than the 210.8Hz she realized when the same utterance was said as a declarative. The tonal tier indicates that the second last syllable of the word /ómòkúŋù/ 'wife,' acquired an extra high tone. This was also observed in the 11-year old male participant's pronunciation as displayed in Figure 3.19. This process is called upstep. Similar cases of upstep in polar interrogative utterances were also recorded in Engenni (Katamba, 1989) where a high tone is raised when followed by low tone. However, the case reported here is unique in the sense that the upstepped high tone is preceded by a low tone. The motivation for this kind of upstep was not clear from the data analsed.

Figure 3.22 shows that a young female participant produced this utterance with a progressive downward lowering of her voice in its course. The same pattern was observed in the same participant's declarative rendition.

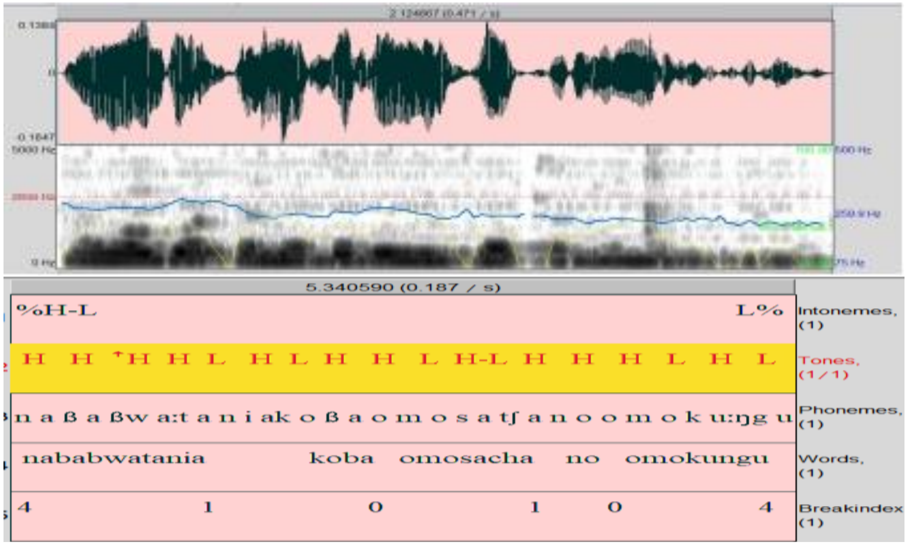

Figure 3.22: Audio waveform, F0 contour and ToBI label window for the polar interrogative /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúːŋgù/ said by a 20-year old female

As Figure 3.22 reveals, the 20-year old participant produced the utterance at a fundamental frequency of 259.9 Hz. This F0 is higher than what she produced in the declarative intonation rendering (236.1 Hz). Again, each successive H and L tones were realized at a lower height in the course of the utterance. This pattern has been referred to as declination. A difference, however, is noted in that the gradient of the decline is less steep in the polar interrogative pronounciation than in the declarative one. For this participant, therefore, a difference in F0 and steepness of the declination gradient distinguishes the declarative and interrogative forms.

The highest F0 produced by the female participants for the paratone in 5a was that of the 9-year old female child. Her vocal folds vibrated at 278 Hz in producing the utterance. In addition, as it was in the other participants, her F0 was higher in the interrogative pronunciation than in the declarative production where the child had 265.5 Hz. Figure 3.23 displays this participant's pronunciation of the paratone.

Figure 3.23: Audio waveform, F0 contour and ToBI label windows for the polar interrogative /nàβàβwá:táníà kóβá ómòsàʧá nó ómòkú:ŋgù/ said by a 9-year old female

From Figure 3.23, we noted that all H-tones before low tones in the series HHL are raised. Consequently, the H tones at the end of the utterance are slightly higher than the H tones at the beginning. Equally, a high tone before a final lowering at the end of the utterance was noted in the second last syllable. This was also recorded in the middle-aged female participant.

Overall, the analysis above has revealed that a polar interrogative utterance in Ekegusii is pronounced with a H-L%, L%, or L-L% utterance final intoneme. The final boundary tone was preceded by an H tone. This shows that polar interrogative intonation in Ekegusii lacks an H% final boundary tone characteristic of rising intonation in yes–no interrogatives in stress languages like English. The same findings were reported in Sheng (1990) and Sicoli (2007) in their analyses of Mandarin and Zapotec, respectively where they noted that many tonal languages do not show final rising intonation boundary tones for yes-no interrogatives. These researchers observe that the higher pitch for questions in tonal languages is detectable at the part of an utterance with the most significant higher pitch contrast to its statement counterpart. Findings reported in this study have indicated that yes-no interrogative intonation is signalled by an upstepped H-tone in the penultimate syllable, a less steep slope of declination and higher fundamental frequency than in declarative utterances.

Since the analyses above were based on individual participants' pronunciations, in the discussions that follow, a summary of the mean F0 production by considering all the 24 participants is presented. Through this, an account of the inter- and intra-speaker variations in F0 production in each of the polar interrogative utterances is given. Results from the analysis show that age and sex influenced the F0 production in the polar interrogatives. A comparison of the mean F0 values of the declarative and polar interrogative utterances is discussed in Section 3.1 to establish the effect of utterance type on the F0 production. Table 3.5 gives a summary of the mean F0 production for the utterance /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúːŋgù/.

Table 3.5: Comparison of means for the polar interrogative pronunciation of /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúŋgù/

Age	Sex	N	Mean	Std. Dev
Children	F	3	257.4000	23.83086
	M	3	238.4667	42.05310
	Total	6	247.9333	32.28143
Youth	F	3	227.5000	32.85925
	M	3	147.6333	16.87671
	Total	6	187.5667	49.59261
Middle age	F	3	236.5000	26.94290
	M	3	115.5333	11.11590
	Total	6	176.0167	68.77262
advanced age	F	3	245.6333	30.17156
	M	3	191.4000	27.91039
	Total	6	218.5167	39.47280
Total	F	12	241.7583	27.03474
	M	12	173.2583	53.61637
	Total	24	207.5083	54.29990

From Table 3.5, we note that there was variability in the F0 production by the participants. This was determined by the age differences. The children pronounced the paratone at 248 Hz, the youth at 188 Hz, the middle-aged at 176 Hz and the advanced-aged group at 218 Hz. The F0 values obtained in this paratone show that the children realized the highest F0 while the middle-aged participants had the lowest values. Again, although we have already indicated that younger speakers produce higher fundamental frequencies than the older ones, in this paratone, the middle-aged female's F0 of 237 Hz was higher than the young female one's 228 Hz. A graphic account of the above age variations in the production of this utterance is presented in Figure 3.24.

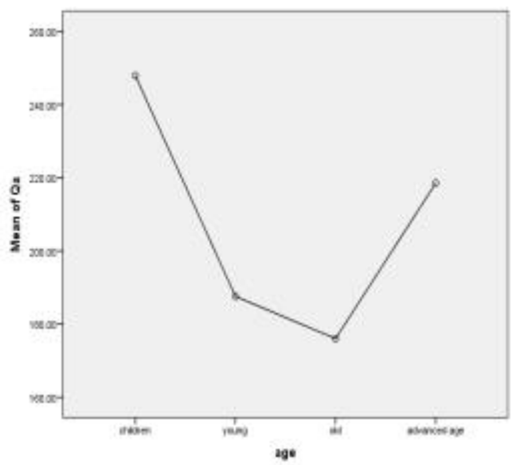

Figure 3.24: Age variation in the pronunciation of the polar interrogative /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúŋgù/

As Figure 3.24 indicates, there is a decrease in the F0 value with advancement in age from the children to the youth and to the middle-aged groups before they once more increase in the advanced-aged group.

Apart from the age differences in the pronunciation of the utterance, Table 3.5 further shows that there were sex-related differences. Female participants produced the utterance at an average of 242 Hz and male ones at about 173 Hz. This shows that the female participants had a 68.5 Hz higher F0 than the male participants. Again, female children produced the paratone at the highest F0, 257 Hz while the middle-aged males had the lowest F0, 116 Hz. The female group’s highest F0 for the utterance was 257 Hz and their lowest was 228 Hz. The male participants, on the other hand, had their highest F0 at 239 Hz and lowest at 116 Hz. A graphic presentation of these sex differences is in Figure 3.25.

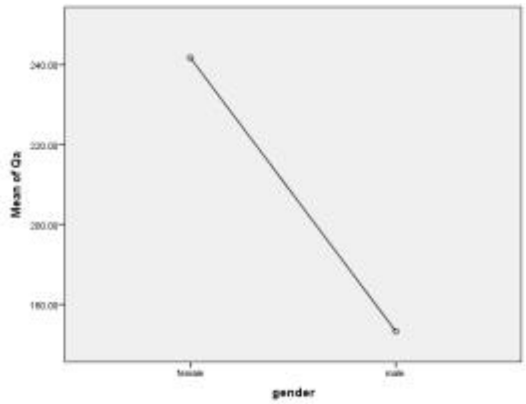

Figure 3.25: Sex variation in the pronunciation of the polar interrogative /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúŋgù/

In short, this polar interrogative was produced at an F0 of 208 Hz. This F0 value is higher than the 185 Hz that was obtained when the same string of words were articulated as a declarative. Similar sex and age differences were recorded in the negative utterance / tàɾέtέtí kéːndé pì/ ‘didn’t he/she bring anything.’

Table 3.6: Comparison of means for the polar interrogative pronunciation of /tàɾɛ́tɛ́tí kéːndé pì/

Age	Sex	N	Mean	Std. Dev
Children	F	3	253.5	27.02227
	M	3	243.6	41.64425
	Total	6	248.6	31.85572
Youth	F	3	233.1	38.62089
	M	3	150.4	17.62735
	Total	6	191.7	52.65649
Middle-Age	F	3	226.9	37.39857
	M	3	124.0	11.43328
	Total	6	175.4	61.53222
Advanced-Age	F	3	267.1	51.38511
	M	3	189.5	10.39824
	Total	6	228.3	53.89246
Total	F	12	245.1	37.67744
	M	12	176.9	51.26909
	Total	24	211.0	56.13290

From Table 3.6, we realise that the advanced-aged females produced the paratone /taɾeteti kende pi/ at the highest F0 of 267 Hz. This contrasts with the earlier cases in which it was the female children who produced the utterance at the highest fundamental frequency. However, children still produced the highest average F0 of 248.6 Hz followed by the advanced age's

228.3 Hz, the young group’s 191.7 Hz and the middle-aged group’s 175.4 Hz. Similar to earlier observations made in this study, the middle-aged males produced the lowest F0 of 124 Hz. Figure 3.26 graphically shows the age-related differences in the production of the paratone.

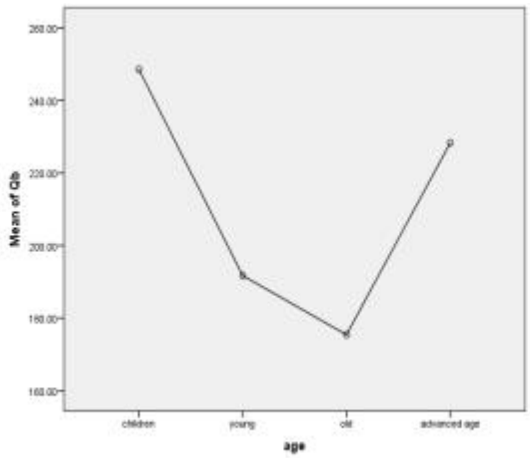

Figure 3.26: Age variation in the pronunciation of the polar interrogative /tàɾɛ́tɛ́tí kéːndé pì

Figure 3.26 shows that children pronounced the paratone at the highest F0 followed by the advanced-aged group. The youth and the middle-aged groups pronounced it at the least fundamental frequency. Sex differences were also noted in the production of this utterance as Figure 3.27 shows.

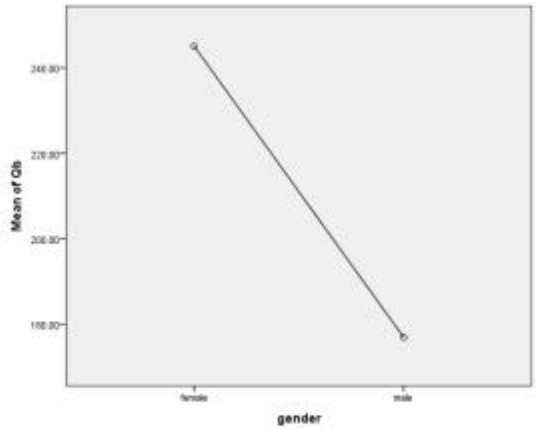

Figure 3.27: Sex variation in the pronunciation of the polar interrogative /tàɾɛ́tɛ́tí ké:ndé pì/

Figure 3.27 indicates that females had a higher F0, 245 Hz, than males, 177 Hz. The lowest F0 produced by the females was about 227 Hz while the highest was as already noted 267 Hz. The highest F0 produced by the male participants was about 244 Hz while the lowest was about 124 Hz. The average F0 for this paratone was 211 Hz. This paratone was, therefore, pronounced at a higher F0 than the 186 Hz realised when it had a declarative rendition. Table 3.7 presents a summary of the mean F0 for the polar interrogative paratone /βàʧĭɾè kwòːjìà έŋɔ̀ːmbɛ̂/ 'have they come to take the cow?'

Table 3.7: Comparison of means for the polar interrogative pronunciation of /βàʧĩɾè kwòːjìà έŋɔ˞ːmbɛ̂/

Age	Sex	N	Mean	Std. Dev
Children	F	3	251.600	28.61660
	M	3	233.900	33.45549
	Total	6	242.750	29.48320
Youth	F	3	221.333	33.40604
	M	3	149.766	18.71265
	Total	6	185.550	46.07588
Middle-Age	F	3	210.467	12.61441
	M	3	130.233	6.04511
	Total	6	170.350	44.82726
Advanced-Age	F	3	255.333	32.97064
	M	3	197.967	26.21266
	Total	6	226.650	41.19402
Total	F	12	234.683	31.32515
	M	12	177.967	46.89728
	Total	24	206.325	48.58319

As with the other polar interrogative paratones analysed, from Table 3.7 we realize that there were age variations in the F0 production for the paratone. For example, children pronounced the paratone at a mean F0 of about 243 Hz; the youth at 186 Hz; the middle-aged at 170 Hz and the advanced-aged at 227 Hz. This is consistent with earlier findings which have indicated that children produce the highest F0 followed by the advanced-aged and the youth with the middle-aged group producing the lowest F0s.

In terms of sex, Table 3.7 reveals that females produced the utterance at an F0 of 235 Hz and the males at 178 Hz. This is also similar with earlier findings that have shown female participants producing Ekegusii paratones at higher F0s than the male ones. Again, the advanced-aged females pronounced this paratone at the highest F0 of 255 Hz and the middle-aged males did it at the lowest F0 of 130 Hz. This is different from what was noted in the declarative rendition of the same utterance where the female children produced the highest F0. The implication of this is that advanced-aged females have their vocal folds vibrating at a higher rate when asking a polar question than when they are making a declaration. Table 3.7 equally shows that the middle-aged females produced the lowest F0, 211 Hz, in the female participants. On the other hand, the male participants pronounced the paratone at the lowest F0 of about 130 Hz and the highest F0 of 234 Hz. In general, the participants pronounced this paratone at 206 Hz. This F0 is higher than the 182 Hz recorded in its declarative pronunciation.

Table 3.8 presents a summary of the mean F0 output for the paratone /ómòːntó óγòkǒɾà éɲáːŋgí nêséèsè/ ‘Is somebody wedding a dog?

Table 3.8: Comparison of means for the polar interrogative pronunciation of /ómòːntó óɣòkŏɾà éɲáːŋgí nêséèsè/

Age	Sex	N	Mean	Std. Dev.
Children	F	3	262.867	27.35184
	M	3	250.833	40.51127
	Total	6	256.850	31.60941
Youth	F	3	242.067	50.19973
	M	3	149.967	7.58705
	Total	6	196.017	59.79761
Middle-Aged	F	3	229.967	9.61058
	M	3	132.533	2.19621
	Total	6	181.250	53.72942
Advanced-Aged	F	3	274.133	69.15174
	M	3	211.700	31.72964
	Total	6	242.917	59.03278
Total	F	12	252.258	42.49112
	M	12	186.258	54.34122
	Total	24	219.258	58.41348

From Table 3.8, we note that children produced the paratone at an F0 of 257 Hz; the youth at 196 Hz; the middle-aged at 181 Hz and the advanced-aged at 243 Hz. Children, therefore, produced it at the highest F0 followed by the advanced-aged and the youth. The middle-aged group produced the least F0. The small standard deviations recorded in the young males and the middle-aged males indicate that there was no great variation from the expected mean in these groups' F0s. The large standard deviation in the advanced-aged females shows that there was great variability of their F0 from the mean. This indicates that the group's deviation from the expected mean was high. Figure 3.28 further illustrates this age variability.

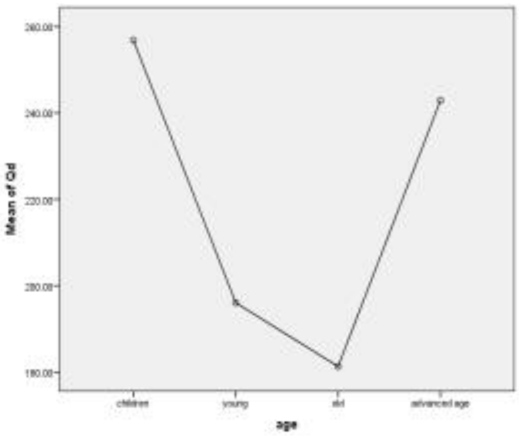

Figure 3.28: Age variation in the pronunciation of the polar interrogative /ómòːntó óɣòkǒɾà éɲáːŋgí nêséèsè/

In terms of sex, we noted that females produced the same paratone at an F0 of 252 Hz and the males at about 186 Hz. The highest F0, 274 Hz, was produced by the advanced-aged females while the lowest, 133 Hz, by the middle-aged males. The male children had the highest F0 among the males. The average F0 for this polar interrogative was 219 Hz. This is higher than the 186 Hz that the participants produced in the same paratone as a declarative.

From the descriptive statistics above, we have demonstrated that the age as well as the sex of the speaker influences the F0 value of an utterance. To find out whether the differences noted were by chance or had statistical significance, once more a test of between-subjects effects was carried out. Results in Table 6.2 (Appendix 6) indicate that the main effects of age and sex on the F0 were statistically significant (P= .034 and .001 for age and sex respectively). Since these values are less than the alpha value of .05, it means that both age and sex were important factors in the determination of F0 in an Ekegusii polar interrogative paratone. The output from the results obtained has also shown that the interactional effect of age and sex is not significant in determining the fundamental frequency of the interrogative paratones. The probability (P) value for the interactional effect of age and sex is .243, which is greater than the alpha value of .05.

Table 6.2 also indicates that the actual influence of age and sex on the realization of F0 in polar interrogative paratones was very large. Results show that the PES is .728 for sex and .395 for age. These values show a large strength of association between the independent variables (age and sex) and the dependent variable (F0 value) on the results obtained. This follows Pallant's (2005) criteria for determining effect size (also called strength of association) as explained in Section 3.2. The large F-ratio of 8.696 in the sex variable shows more variability between the sexes than within the sexes in the realization of F0. The small F-ratio for the age variable of 2.217, on the other hand, indicates that there was less variability between the age groups than within the age groups.

Our analysis of the polar interrogative paratones has revealed the following. First, there were age-related variations in the voice fundamental frequency production in polar interrogative paratones in Ekegusii. Just as it was noted with declarative utterances, children produced the highest rate of vibration of their vocal folds in the polar utterances. A drastic lowering of F0 from the children to the young participants and to the middle age groups has been noted across the paratones analysed. However, there was an increase in the F0 range with the advanced age group. Second, female participants in the advanced age realized the highest mean F0. This was in contrast from the declarative intonation where female children had the highest F0. This trend was recorded in almost all the polar paratones. It is only in 9a where the female children recorded the highest F0.

Third, there were sex variations in the realization of F0 in the polar interrogatives. The mean F0 for the female participants ranged from a low of 225 and a high of 260 Hz, while that of male participants ranged from a low F0 of 126 Hz and a maximum of 242 Hz. As was observed in the declarative utterances, females, across the four age groups, realized higher fundamental frequencies than the males. The average mean F0 for females in the four utterances was about 244 Hz while that for males was 179 Hz. Again, similar to what was noted in the declarative paratones, males had a higher standard deviation than females in the articulation of polar interrogatives. According to Gussenhoven (2002), a higher F0 is indicative of submissiveness or non-assertiveness in the speaker. The low standard deviation for female participants indicates that they were more consistent in their F0 production than the males. A summary of the mean F0 production by the different groups of participants led us to rank them as follows:

Advanced-aged female	260 Hz
Female children	256 Hz
Male children	242 Hz
Female youth	231 Hz
Middle-aged female	226 Hz

Advanced-aged male	196 Hz
Male youth	150 Hz
Middle-aged male	126 Hz

Fourth, intonation is higher in the polar interrogative paratones than in the declarative ones, which have the same phonetic configuration. For example, /nàβàβwáːtáníà kóβá ómòsàʧá nó ómòkúːŋgù/ was articulated at an F0 of 185Hz as a declarative and 208 Hz as a polar interrogative. /tàɾέtέtí kéːndé pì/ was pronounced at 186 Hz as a declarative but at 211 Hz as a polar interrogative. /βàʧĩɾè kwòːjìà έŋɔ'ːmbɛ̂/ was articulated at 182 Hz as a declarative but at 206 Hz as an interrogative /ómòːntó óɣòkǒɾà éɲáːŋgí nêséèsè/ was produced at 186 Hz as a declarative and 219 Hz as a polar interrogative. Therefore, declarative utterances were produced at an average F0 of about 185 Hz and the polar interrogative ones at 211 Hz. Following Ladefoged's (2003) observation that when a speech sound goes up in frequency, it also goes up in pitch (intonation), we conclude that polar interrogative utterances are articulated at a higher pitch than the declarative ones. Similar results have also been recorded in Persian (Sadat-Tehranii, 2007) where the author notes that yes/no questions realize higher F0 than declaratives.

This section has accounted for the intonation patterns of the polar interrogatives in Ekegusii. Results have indicated that the distinction between a declarative and a polar paratone can be made on the basis if variation in the voice fundamental frequency. Furthermore, the age and sex of a speaker determine the F0 production in a polar interrogative just like it was noted in the declarative paratones. To illustrate further that the voice F0 in Ekegusii is related to utterance type, we discuss the intonation of constituent interrogatives in sub-section 3.3.2.

3.3.2 Constituent Interrogative Intonation

In Sub-section 3.3.1, we accounted for the realization of the intonation patterns of polar interrogatives in Ekegusii with results showing that a polar interrogative is pronounced at a higher F0 than a declarative one. In the current sub-section, we analyse the intonation features of the constituent interrogatives /ŋàí kwáːɾêŋé/ 'where were you?', /ndìɾìɾí kwáːmótɛ̀βɛ́tìè/ 'when did you tell him/her?' /níŋò kwáːɲòɾâ móɣòːndó/ 'whom did you find in the farm?'and /níːŋkì βákóɾèèɾà/ 'why are they crying?' These interrogatives require an answer, which names the place, time, person and reason for the interrogative, respectively.

To account for the pitch patterns of the constituent utterances, audio waveforms, F0 values and ToBI labels for the constituent interrogative /níŋò kwáːɲòɾâ móɣòːndó/ 'whom did you find in the farm?' are displayed in the pitch tracks that follow. Four male and four female participants produced these. In Figure 3.29, a 64-year old male participant's pronunciation of the utterance is given.

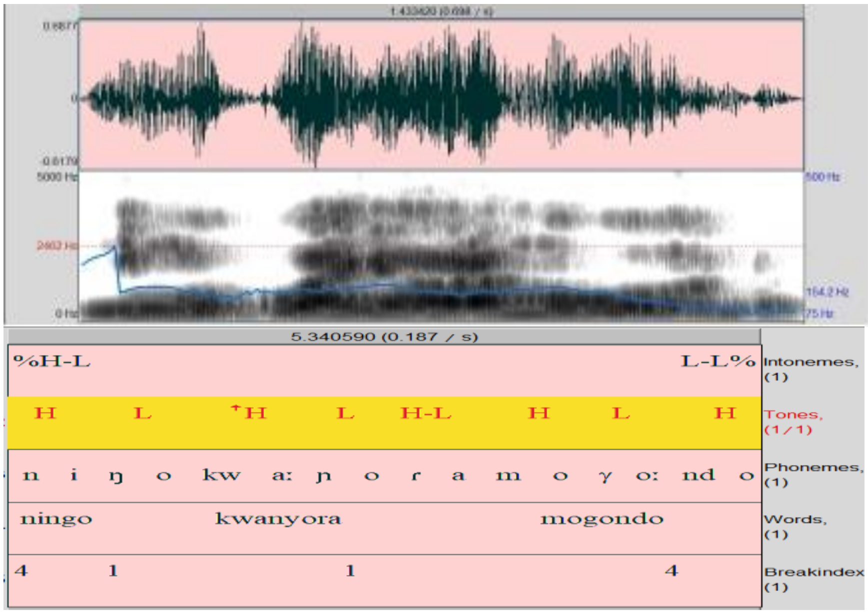

Figure 3.29: Audio waveform, F0 and ToBI transcription for /níŋò ꜛkwáːɲòɾâ móɣòːndó/ said by a 64-year old male

The pitch curve in Figure 3.29 reveals that M2A produced the constituent interrogative utterance at 154.2 Hz. There is also a gradual fall in pitch towards the end of the utterance. The intonemes tier indicates that there were %L-H initial and L-L% final boundary intonemes in the articulation of the utterance. These intonemes were similar to those in the declarative utterances in set 5. The participant also pronounced the utterance at a higher F0 than the 44-year old middle-aged participant, M1O, whose pronunciation is presented in Figure 3.30.

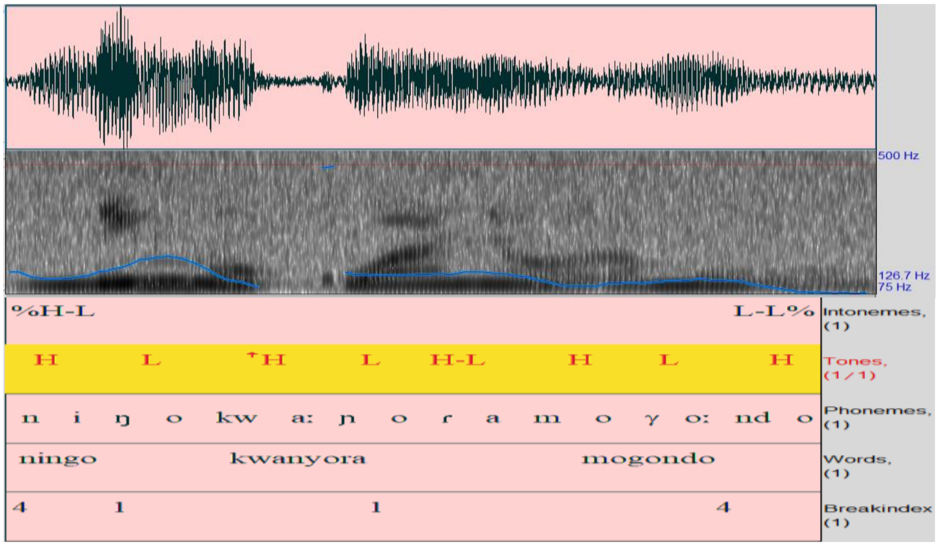

Figure 3.30: Audio waveform, F0 contour and ToBI transcription for /níŋò ꜛkwááɲòɾâ móɣòòndó/ produced by a 44-year old male

From Figure 3.30, we observe that M1O pronounced this utterance with similar initial and final intonemes as M2A. In the pronunciation, there is upstep recorded in the second syllable of the word /kwááɲòɾâ/. The participant also produced the utterance with word boundary break indices of 4 1 1 4. However, M1O differed with M2A in that the former pronounced the paratone at an F0 of 126.7 Hz while the latter produced it at 154.2 Hz. This shows that age determined the F0 realisation of the utterance. This observation is further illustrated by the analysis of the seventeen-year old male participant's articulation of the same utterance. As Figure 3.31 indicated, this young participant, M1Y, recorded an even higher F0 than the middle-aged and the advanced-aged participants did.

Figure 3.31: Audio waveform, F0 contour and ToBI transcription for /níŋò ꜛkwááɲòɾâ móɣòòndó/ said by a 17-year old male

Figure 3.31 reveals that M1Y spoke the utterance with an initial %H boundary intoneme and final L-L% boundary intoneme. Again, similar to the advanced and middle-aged participants, there was upstep of high tones in the sequence of HHL tones. This was witnessed in the second syllable of the word /kwááɲòɾâ/. The pitch curve in the upper panel shows that M1Y produced this utterance at an F0 of 156 Hz. This shows that M1Y's vocal folds vibrated at a higher rate than those of the middle-aged and advanced-aged participants. This rate was however slower than that of the eleven-year old male as shown in Figure 3.32.

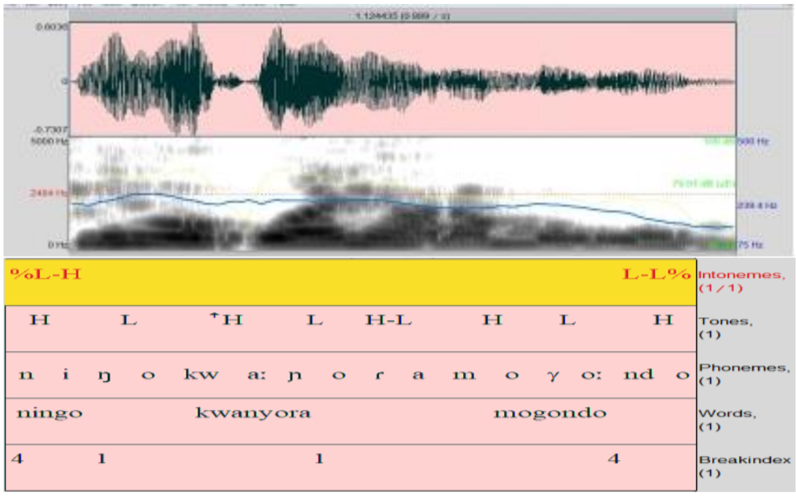

Figure 3.32: Audio waveform, F0 contour and ToBI transcription for /níŋò ꜛkwááɲòɾâ móɣòòndó/ said by an 11-year old male

The pitch curve in the upper window of Figure 3.32 shows that the eleven-year old male pronounced the utterance at an F0 of 239.4 Hz. This was the highest F0 in all the male participants. Equally, there was a general lowering of tones in the course of the utterance leading to the L-L% boundary intoneme as shown in the intonemes tier and the declination gradient displayed in the upper panel of Figure 3.32 above.

The analysis of the male participants' pronunciation of the constituent utterance /níŋò kwááɲòɾâ móɣòòndó/ has revealed the presence of upstepped tones, a general declination similar to what was recorded in the declarative utterances and differences in F0 production. In what follows, the female participants' articulations of the same utterance are analysed. Figures 3.33 to 3.37 display the windows produced by the female participants in the same age groups as the male ones considered above.

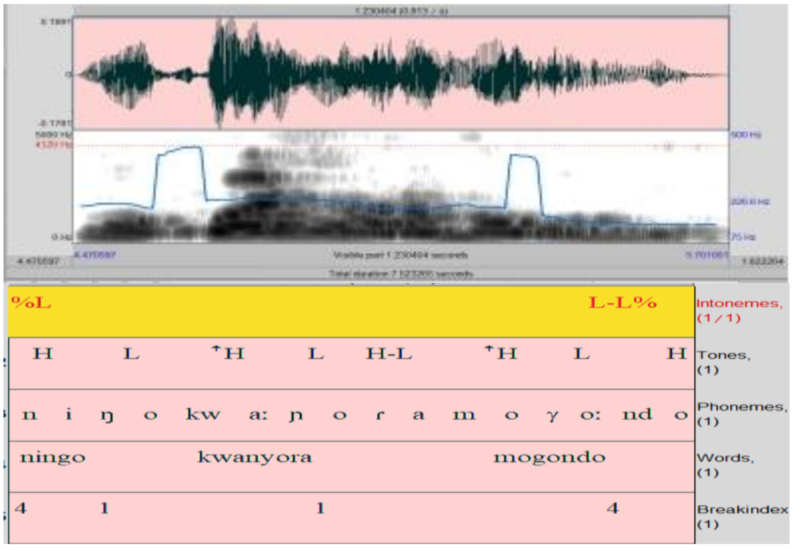

Figure 3.33: Audio waveform, F0 contour and ToBI transcription for /nǐŋò kwáːɲòɾâ móɣòːndó/ said by a 70-year old female

The pitch curve in Figure 3.33 shows that the 70-year old female participant, F3A, produced the utterance at an F0 of 226.6 Hz. In addition, the pitch curve shows that unlike the other participants, this female participant had upstep in the first syllable of /kwáːɲòɾâ/ 'you found' and in the first syllable /mó/ of the word /móɣòːndó/ 'farm'. The upstep observed in the pronunciation is further illustrated in Figure 3.34, which was also drawn in Praat.

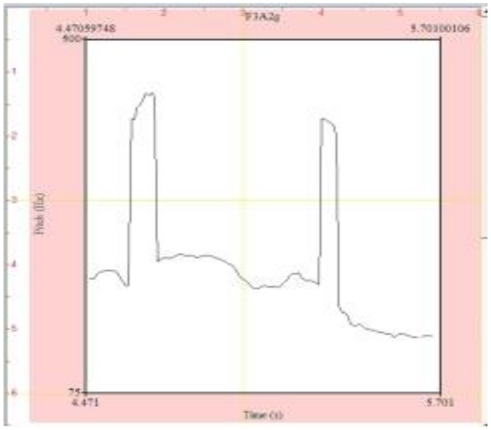

Figure 3.34: PRAAT picture for /nĭŋò kwáːɲòɾâ mǒ γ òːndó/ said by a 70-year old female

The intonation patterns in Figure 3.34 above vary with those of the 43-year old female whose pronunciation of the same utterance is displayed in Figure 3.35.

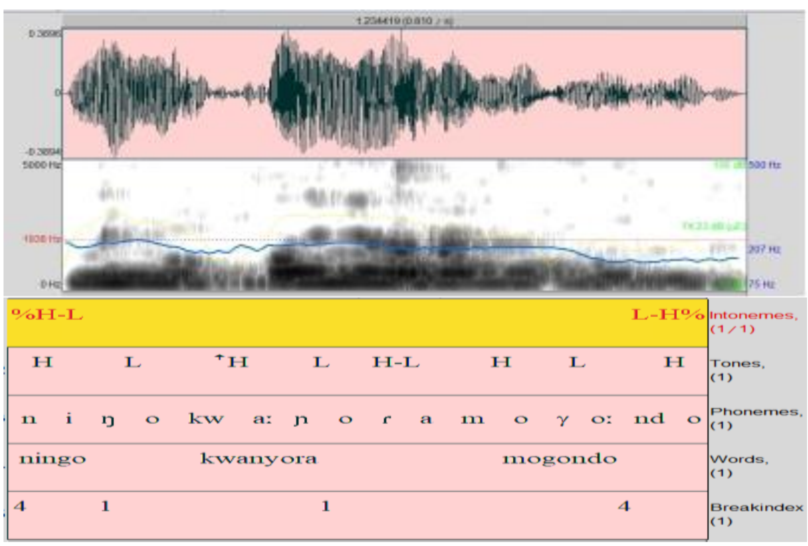

Figure 3.35: Audio waveform, F0 contour and ToBI transcription for /níŋò ꜛkwáːɲòɾâ móγòːndó/ said by a 43-year old female

The pitch curve in Figure 3.35 shows that the middle-aged female produced the paratone at an F0 of 207 Hz and with a relatively stable tonal height except for the fall towards the end of the utterance. The fall is kept to the end of the utterance except for a small rise. The final intoneme is L-H%. There was also an upstepped tone in the word /ꜛkwáːɲòɾâ/. A 21-year old youth produced the same paratone as presented in Figure 3.36.

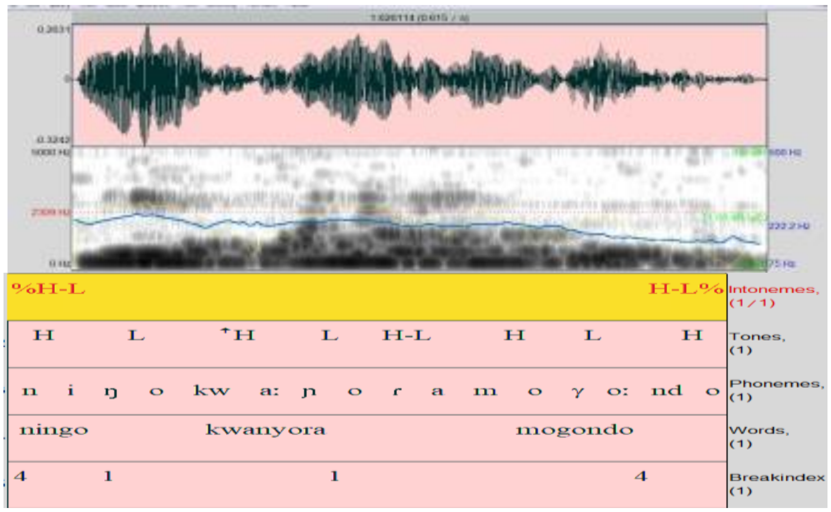

Figure 3.36: Audio waveform, F0 contour and ToBI transcription for /níŋò ꜛkwááɲòɾá móɣòòndó/ said by a 21-year old female

As the pitch curve in Figure 3.36 shows, this female participant produced the paratone at 222.2 Hz. This value is higher than that of the middle-aged female although both had their pitch heights relatively kept high except towards the end of the utterance where the pitch slightly falls. There is also a slight rise before a final lowering effect resulting in a H-L% boundary intoneme. These intonation-related features were also recorded in the 11-year old female participant's pronunciation shown in Figure 3.37.

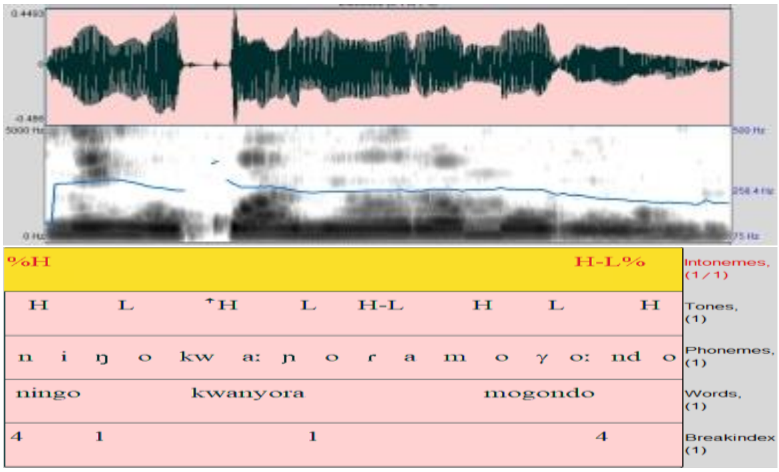

Figure 3.37: Audio waveform, F0 contour and ToBI transcription for /níŋò ꜛkwá:ɲòɾâ móɣò:ndó/ said by an 11 year-old female

The pitch curve in Figure 3.37 indicates that the 11 year-old female pronounced the paratone at an F0 of 258 Hz. This is the highest F0 produced in this utterance by the female participants, which shows that the female participants had a decrease in F0 with advancement in age. Similar to the other female participants, this participant had %H initial and H-L % final intonemes in her pronunciation of the utterance.

From the analyses above, it was noted that the advanced-aged male and female participants produced higher F0s than the middle-aged and youth group while children produced the highest F0s. This variation is an indication of how individual speakers manipulate what Gussenhoven (2004) calls the production code differently. Apart from differences in age, there were also sex differences in the pronunciation of the utterance / níŋòꜛkwá:ɲòɾâ móɣò:ndó/. Results have shown that female participants produced the utterance with their vocal cords at higher rates of vibration than their male counterparts did as revealed through differences in the F0s produced.

Having illustrated that age and sex influenced the intonation patterns of the utterance / níŋò ꜛkwáːɲòɾâ móɣòːndó/, we also wanted to establish the statistical significance of the F0 variations observed by taking into account all the four constituent interrogative paratones as produced by all the 24 participants. To this end, descriptive analyses were done for each constituent utterance. A summary of mean F0 outputs is presented in tables that compare different ages and sexes. For example, in Table 3.9, we show results for the paratone /ŋàí kwáːɾêŋé/ ‘Where were you?’

Table 3.9: Comparison of means for the utterance /ŋàí kwáːɾêŋé/

Age	Sex	N	Mean	Std. Dev
Children	F	3	257.3333	41.84977
	M	3	239.4667	38.43596
	Total	6	248.4000	37.24589
Youth	F	3	222.5000	27.97213
	M	3	137.5667	17.65002
	Total	6	180.0333	51.00673
Middle-aged	F	3	216.3000	5.30189
	M	3	113.9333	13.65662
	Total	6	165.1167	56.82892
Advanced-aged	F	3	239.3000	20.07087
	M	3	184.6000	21.05778
	Total	6	211.9500	35.15871
Total	F	12	233.8583	28.57776
	M	12	168.8917	54.37691
	Total	24	201.3750	53.90527

The following observations can be made from Table 3.9. First, children produced the utterance at the highest F0 of 248 Hz. The advanced-aged group at 212 Hz; the youth at 180 Hz and the middle-aged at 165 Hz followed them. A graphic presentation of these age variations displayed in Figure 3.38 indicates that the F0 range of the participants decreased with advancement in age before it again increased at the advanced-aged group.

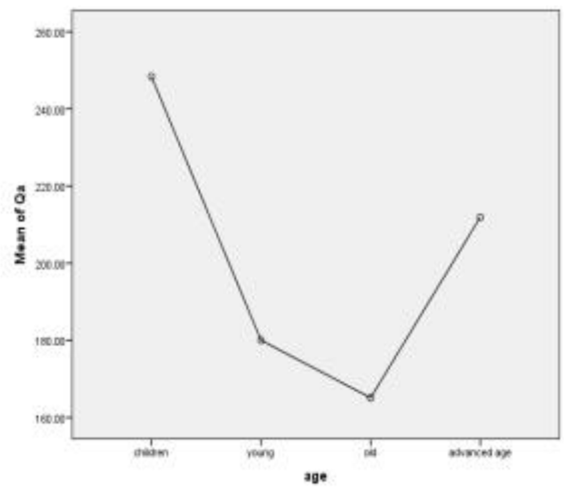

Figure 3.38: Age variability in the F0 production of the utterance /ŋàí kwáːɾêŋé/

From Figure 3.38, we note that the greatest variation in F0 was between the children and the youth groups and between the middle-aged and the advanced-aged groups but the F0 difference between the youth and middle-aged groups is small. This observation is correct because from Table 3.9 we also noted that the standard deviation margin between the children and youth is 13.76 while that between the youth and the middle-aged groups is 5.82. The deviation is largest, 21.67, between the middle-aged group and advanced-aged one.

From Table 3.9 we also observed that there were sex differences in the F0 production of the utterance. Children produced the highest F0 for the female group, 257 Hz, while the middle-aged ones produced the lowest F0, 216 Hz. Similarly, male children had the highest F0, 240 Hz, while the middle-aged males had the least F0, 114 Hz. On average, females produced this paratone at an F0 of 234 Hz and males at 169 Hz. The eight participants could, therefore, be said to have produced this paratone at the highest and lowest fundamental frequencies of 257 Hz and 114 Hz, respectively.

For a generalised account of the 24 participants' pronunciation of the four constituent interrogative paratones, we present in the tables that follow a summary of the mean F0 production. Table 3.10 is based on the paratone /ndìɾìɾí kwáːmótɛ̀βɛ́tìè/ 'When did you tell him/her?'

Table 3.10: Comparison of means for the utterance /ndìɾìɾí kwáːmótɛ̀βɛ́tìè/

Age	Sex	N	Mean	Std. Deviation
Children	F	3	254.7	43.25425
	M	3	233.7	38.82555
	Total	6	244.2	38.52352
Youth	F	3	227.4	35.70075
	M	3	135.5	12.91369
	Total	6	181.5	55.73626
Middle-aged	F	3	208.4	7.85005
	M	3	108.3	18.87459
	Total	6	158.3	56.31297
Advanced-aged	F	3	242.8	41.36557
	M	3	178.8	25.83763
	Total	6	210.8	46.67974
Total	F	12	233.3	34.96969
	M	12	164.1	54.23425
	Total	24	198.7	56.93596

Table 3.10 indicates that children produced the paratone at 244 Hz, the youth at 181 Hz, the middle-aged at 158 Hz and the advanced-aged at 211 Hz. This shows that children had the highest F0, followed by the advanced-aged, the youth and the middle-aged, respectively. A graphic presentation of the age differences is presented in Figure 3.39.

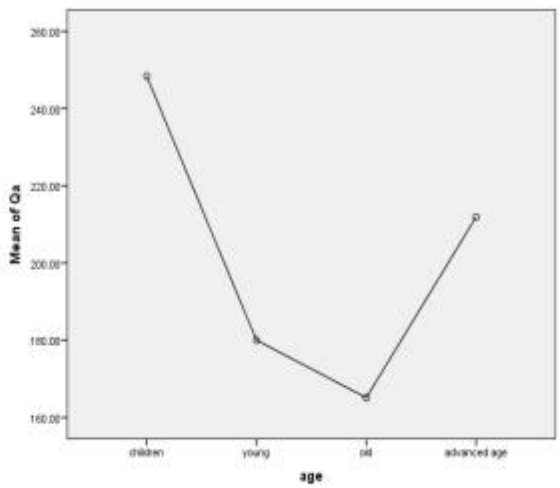

Figure 3.39: Age variation in the pronunciation of the tterance /ndìɾìɾí kwáːmótɛ̀βɛ́tìè/

From Figure 3.39, we realize that there was greater variability between the children and the youth groups and between the middle-aged and advanced-aged groups in the F0 output. Lesser variability between the youth and middle-aged groups was also recorded here.

The pronunciation of the utterance also displayed consistent sex differences. Female participants pronounced the paratone at 233 Hz and the male at 164 Hz. There were minimal variations among the middle-aged females in the production of the utterance. This is shown by the small standard deviation of 7.9 for this group. It was also noted that the highest F0, 255Hz, for the utterance was produced by female children while the lowest, 108 Hz, by the middle-aged males. The male group’s highest F0 was 234 Hz while the female group’s lowest F0 was 208 Hz. The above sex differences are graphically illustrated in Figure 3.40.

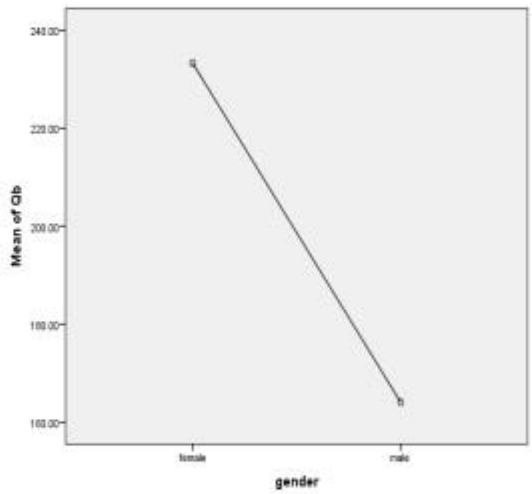

Figure 3.40: Sex variation in the pronunciation of the utterance /ndìɾìɾí kwáːmótɛ̀βɛ́tìè/

The mean summary statistics for the utterance /níŋò kwáːɲòɾâ móɣòːndó/ ‘whom did you find in the farm?’as presented in Table 3.11 further demonstrates the age and sex variations in the pronunciation of an Ekegusii constituent interrogative.

Table 3.11: Comparison of means for the utterance /níŋò kwáːɲòɾâ móɣòːndó/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	255.567	48.97064
	Male	3	249.433	49.51831
	Total	6	252.500	44.17420
Youth	Female	3	226.633	34.26577
	Male	3	139.300	14.82329
	Total	6	182.967	53.34494
Middle-Age	Female	3	209.900	18.52107
	Male	3	114.800	18.38450
	Total	6	162.350	54.64074
Advanced-Age	Female	3	235.733	16.16581
	Male	3	182.900	26.84753
	Total	6	209.317	35.07503
Total	Female	12	231.958	32.49175
	Male	12	171.608	59.41142
	Total	24	201.783	56.06381

Table 3.11 shows that children produced the utterance at the highest F0 of 253 Hz while the middle-aged participants produced it at the lowest F0 of 162 Hz. The youth and the advanced-aged groups produced it at 183 Hz and 209 Hz, respectively. This shows a recurrent trend where the F0 decreases from the children to the young and middle-aged groups before it once more increases with the advanced-aged group. This age-related variations are captured in

Figure 3.2.26. From Table 3.2h, we also note that the highest F0 for this utterance, 256 Hz, was produced by female children while the lowest, 115 Hz, was produced by the middle-aged males. Again, female participants' lowest F0 for the utterance was 210 Hz while the highest was 256 Hz. On the other hand, male participants' lowest F0 was 115 Hz and the highest 249 Hz. The differences noted in F0 for females and males further reveal that the intonation pattern of an Ekegusii constituent interrogative is influenced by the sex of the speaker. The age and sex variability in the production of the utterance /níŋò kwáːɲòɾâ móɣòːndó/ are graphically displayed in figures 3.41 and 3.42, respectively.

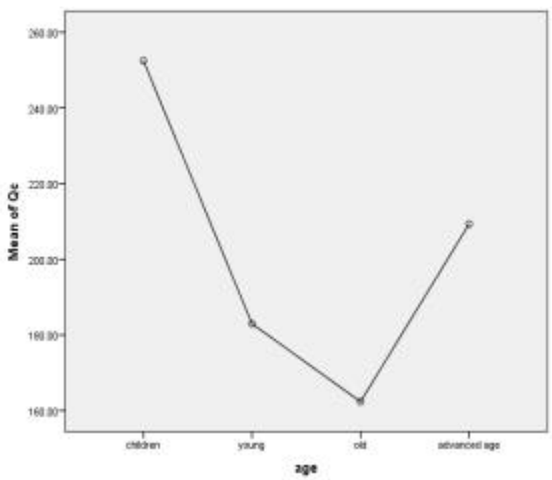

Figure 3.41: Age variation in the pronunciation of the utterance /níŋò kwáːɲòɾâ móɣòːndó/

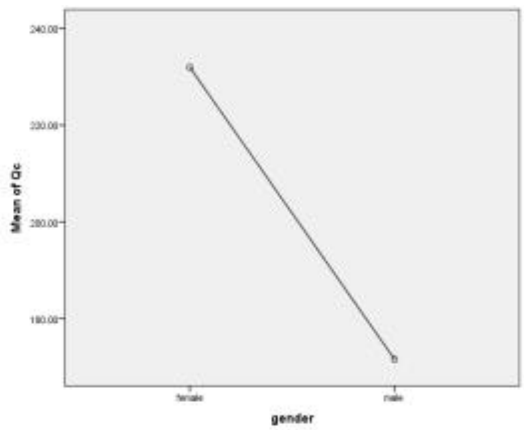

Figure 3.42: Sex variation in the pronunciation of the utterance /níŋò kwáːɲòɾâ móɣòːndó/

From Figure 3.42, we can see that female participants pronounced the paratone /níŋò kwáːɲòɾâ móɣòːndó/ ‘whom did you get at the farm’ at 232 Hz and males at 172 Hz. This further shows that the female vocal folds vibrated at a higher rate than the male ones in the articulation of this utterance. Similar to the analysis of the paratone above, in Table 3.12, we present a summary of the mean F0 for /níːŋkì βákóɾèːɾà/ ‘why are they crying?’

Table 3.12: Comparison of means for the utterance /níːŋkì βákórèːɾà/

Age	Sex	N	Mean	Std. Dev
Children	F	3	253.833	29.20571
	M	3	238.867	55.88572
	Total	6	246.350	40.71456
Youth	F	3	229.233	37.72987
	M	3	142.200	13.35627
	Total	6	185.717	53.97419
Middle-Aged	F	3	228.733	23.20460
	M	3	105.267	10.25784
	Total	6	167.000	69.50306
Advanced-aged	F	3	233.400	14.24395
	M	3	201.933	56.68865
	Total	6	217.667	40.78778
Total	F	12	236.300	25.76957
	M	12	172.067	64.22008
	Total	24	204.183	58.02050

Table 3.12 indicates that children produced the utterance at the highest F0 of 246 Hz followed by the advanced-aged group at 218 Hz and the youth at 186 Hz. As it has been the trend, the middle-aged participants pronounced the utterance at the lowest F0 of 167 Hz. We also noted that female participants produced the paratone at 236 Hz and males at 172 Hz. The female participants'highest F0 was 254 Hz while the lowest was 229 Hz. On the other hand, male

participants' highest F0 was 239 Hz and the lowest 105 Hz. Such age and sex-related variations in the pronunciation of this paratone are further visually illustrated in Figures 3.43 and 3.44.

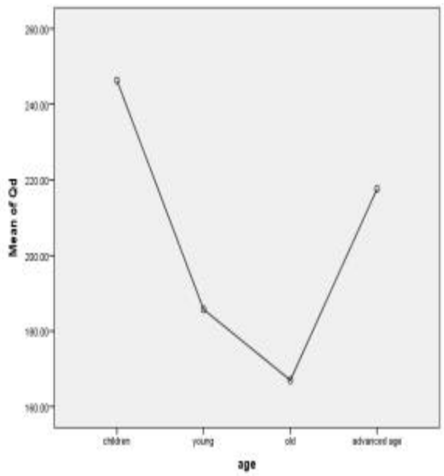

Figure 3.43: Age variation in the pronunciation of utterance /níːŋkì βákóɾèːɾà/

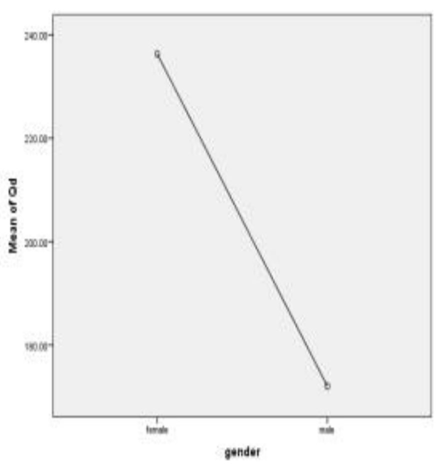

Figure 3.44: Sex variation in the pronunciation of the utterance /níːŋkì βákóɾèːɾà/

Given the F0 differences noted between the participants in the articulation of the constituent interrogative utterances, we also set out to find out the level of significance of these variations. A test of between-subject effects output in Table 6.3 (Appendix 6) indicates that the main effects of age and sex were statistically significant in the realization of the F0. The probability level was .033 for age and .001 for sex. These values are less than the alpha value of .05. This indicates that age and sex had a statistically significance effect on the F0 value of a constituent interrogative in Ekegusii. The low p-value for sex shows it was a better indicator of the influence of sociological factors in intonation variation than age. We also noted that the interactional effect of age and sex was not significant in the realization of F0 in the constituent interrogative paratones. The level of significance was .366. This is higher than the alpha value of .05. The higher F-ratio recorded for sex, 10.286, than for age, 2.227, and age and sex combined, 1.134, further proves that there was more variability between the sexes than there was within the sexes. To establish the effect size of the results obtained, we considered the values recorded in the column labelled 'Partial Eta Squared'. As can be seen from this column, age and sex had partial eta squared of .396 and .760 respectively. The values show that there was a large effect size of the independent variables (age and sex) on the F0 results obtained in the four constituent utterances.

A summary of the F0 grand marginal means for the four constituent interrogatives analysed in this sub-section indicates that: /ŋàí kwáːɾêŋé/ 'where were you'was pronounced at an average F0 of 201 Hz; /ndìɾìɾí kwáːmótɛ̀βɛ́tìè/ 'when did you tell him/her' at 199 Hz; /níŋò kwáːɲòɾâ móɣòːndó/ 'whom did you find at the firm' at 202 Hz and /níːŋkì βákóɾèːɾà/ 'why are they crying' at 204 Hz. From these summary statistics, we conclude that a constituent interrogative in Ekegusii is said at an average F0 range of 202 Hz. This value is less than the polar interrogative F0 of 211 Hz but is higher than the declarative intonation of 185 Hz. Findings in this section have therefore shown that a constituent interrogative is produced at a lower F0 than a polar interrogative one. It, however, is produced at a higher F0 than a declarative paratone. In sub-section 3.3.3, the intonation patterns in the echo interrogative paratones are examined.

3.3.3 Intonation Patterns in Echo Interrogative Utterances

In the preceding sub-sections, we have accounted for the intonation patterns of polar and constituent interrogatives. In this sub-section, we discuss the intonation patterns of echo interrogative paratones. An echo interrogative is one that repeats part or all of what somebody has just said. This is usually done when the listener has not clearly heard or understood what was said or because it is too surprising to be believed. These interrogatives can also be asked when one wants to confirm what they have heard. Because of their nature, echo interrogatives are referred to as amabori y'okoiranereria in Ekegusii. These have the interrogative words, /ki/ 'what', /aɾaɾi/ 'where', /ŋo/ 'whom/who' and /ɾiɾeɾi/ 'when' at the utterance-final position. The echo interrogative paratones analysed in this study were /kwáːβàβwáːtànìà kóβà kí/ 'you joined them to be what?' /kwáːɣèːndà àɾàɾì/ 'you went where?' /kwàːéɾéɾíà ŋò/ 'you gave to whom? and /òɣàːntómá ɾíɾéɾí/ 'you sent me when?'

The acoustic analysis of the echo interrogative utterances was based on the pronunciation of the utterance /kwàːéɾéɾíà ŋò/ 'you gave to whom?' by four male and four female participants. In Figure 3.45, we display a 64-year old male's pronunciation of the utterance.

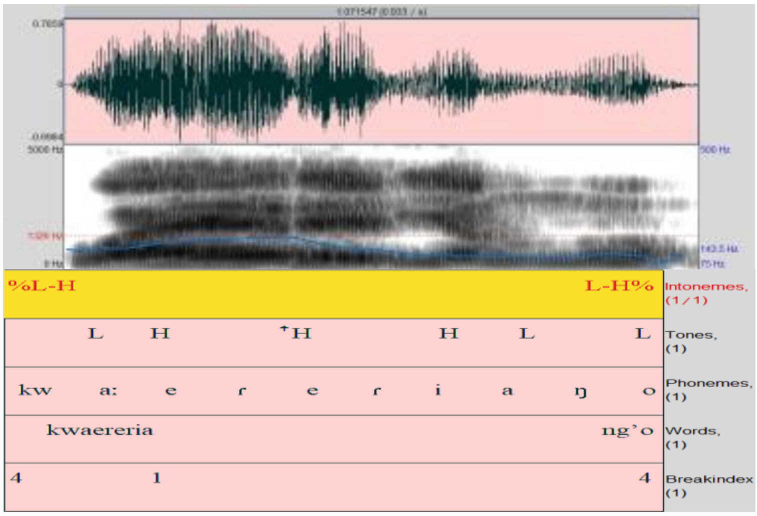

Figure 3.45: Audio waveform, F0 contour and ToBI transcription for /kwàːéɾéɾíà ŋò/ said by a 64-year old male

The upper window in Figure 3.45 shows that after the initial %L intoneme, there is a general fall in the pitch curve towards the end of the utterance in a process that has been described as declination. However, the fall is interrupted at the end of the utterance by a small rise, which makes the utterance to have a L-H% final intoneme. The tones tier shows a case of upstep in the syllable /ɾé/of the first word. This process was also observed in the polar interrogatives in this study. The F0 range for this participant was 143.5 Hz. The patterns above are compared with a middle-aged participant's rendition of the same utterance as shown in Figure 3.46.

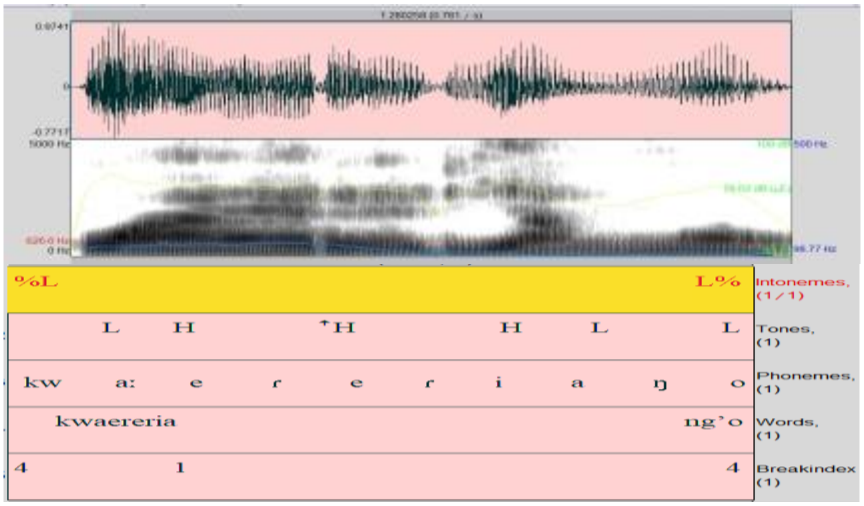

Figure 3.46: Audio waveform, F0 contour and ToBI transcription for /kwàːéɾéɾíà ŋò/ said by a 44-Year old male

From Figure 3.46 above we realize that the middle-aged participant pronounced the utterance at an F0 range of 98.7 Hz. This means that the participant's vocal folds vibrated at a lower rate than those of the advanced-aged one in Figure 3.45. A male youth participant pronounced the utterance at a higher F0 of 139.7 Hz while an 11-year old male participant pronounced the same utterance at the highest F0 range of 208.1 Hz as shown in Figure 3.47.

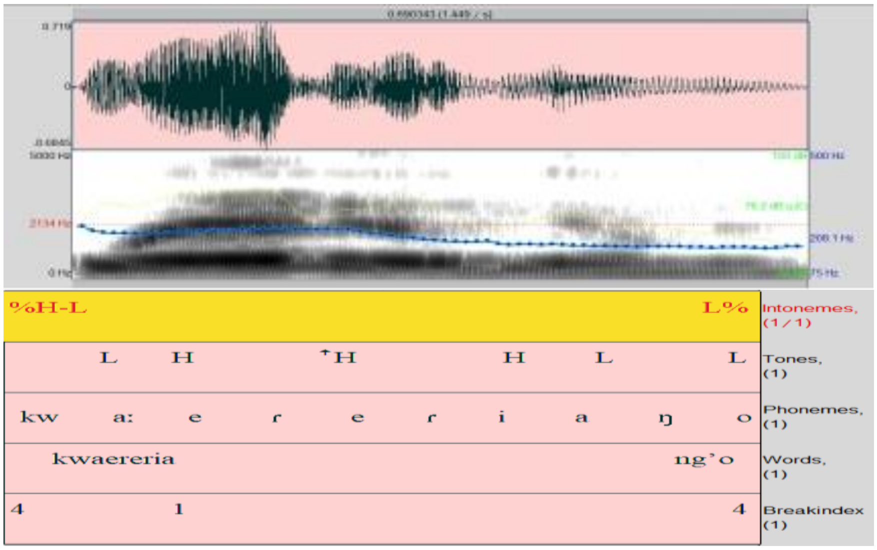

Figure 3.47: Audio waveform, F0 contour and ToBI transcription for /kwàːéɾéɾíà ŋò/ said by an 11-year old male

As the pitch track above reveals, the male child produced the utterance with an initial %H-L and final L% boundary intonemes. The H in the %H-L intoneme is interpreted as a kind of interruption of the expected downtrend in the course of the utterance. From the intonemes' tier, we note that this participant also had a final L% intoneme. The same was observed in the middle-aged participant's pronunciation.

The analyses of the echo interrogative intonation patterns for the male participants provided above confirm earlier findings in this study that the intonation pattern of an Ekegusii utterance is determined by the speaker's age. Similar age variations were also noted in the female participants' production of the same utterance. However, the female participants produced the paratone at higher fundamental frequencies than the male ones. For example, an advanced-aged female participant, F3A, produced this paratone at 205 Hz; a middle-aged participant, F3O, at 194 Hz; a youthful female at 218 Hz and a female child, 11 years old, had the highest F0 of 257 Hz as figures 3.48 - 3.50 show.

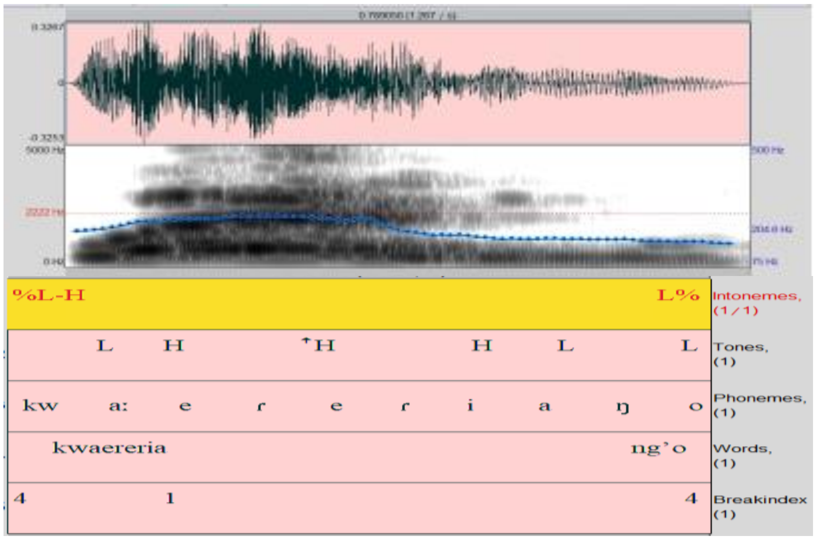

Figure 3.48: Audio waveform, F0 contour and ToBI transcription for /kwàːéɾéɾíà ŋò/ said by a 70-year old female

Figure 3.48 reveals that this advanced-aged female participant produced the utterance with a downward lowering of pitch and with a L% boundary intoneme. The pitch curve in the upper window indicates that the participant produced the utterance at 204.6 Hz. These patterns are compared to the middle-aged female participant's articulation as displayed in Figure 3.49.

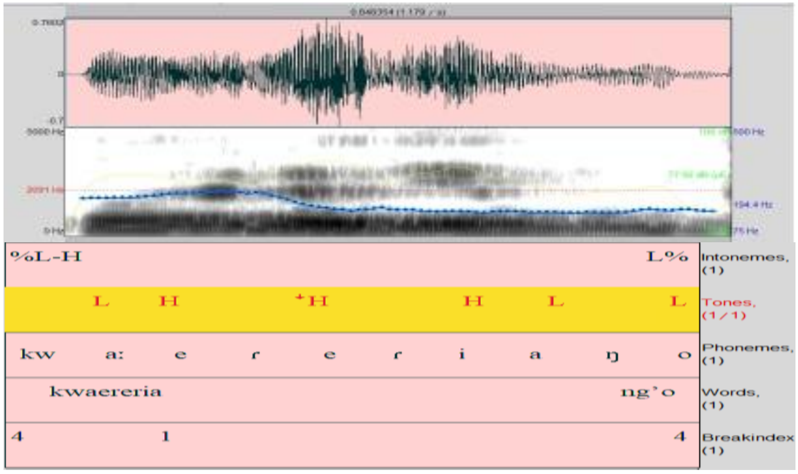

Figure 3.49: Audio waveform, F0 contour and ToBI transcription /kwàːéɾéɾíà ŋò/ said by a 43-year old female

The pitch curve in Figure 3.49 above shows that the middle-aged female participant articulated the utterance at 194.4 Hz and an initial %L-H and final L% intonemes. There was also a general decline in pitch in the course of the utterance. In the HH sequences, there was downdrift in the second H tone similar to what was observed in the declarative intonation. A female child produced the same utterance at the highest F0 as shown in Figure 3.50.

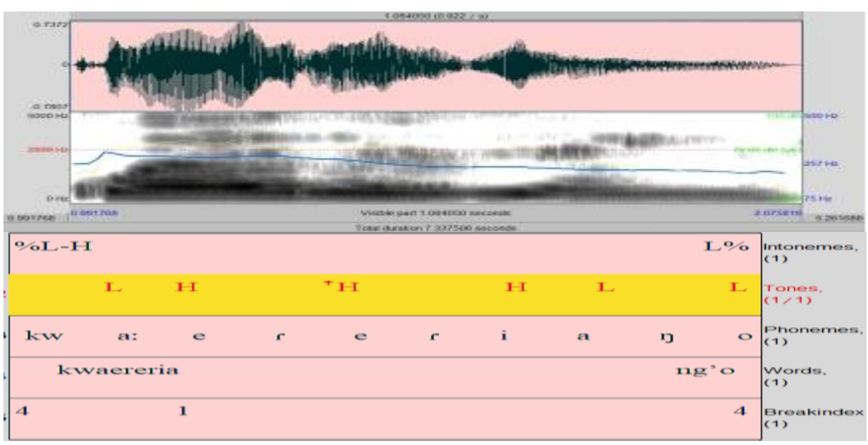

Figure 3.50: Audio waveform, F0 contour and ToBI transcription for /kwàːéɾéɾíà ŋò/ said by an 11-year old female

As shown in Figure 3.50, the 11-year old female participant pronounced the utterance at 257 Hz. This value was among the highest F0s produced in the articulation of Ekegusii utterances. The pitch curve indicates a sharp gradient of declination towards the utterance's end. However, there is a slight rise at the end of the utterance, culminating in the L-H% intoneme.

Following the observations above, we conclude that participants had F0 differences in the pronunciation of echo interrogative utterances. With this in mind, we present a summary of the F0 means for all the 24 participants in the production of the four echo interrogative paratones. This is meant to statistically show how the different age and sex groups varied in the pronunciation of the echo interrogative paratones. In Table 3.13, we display the F0 means for the utterance /kwáːβàβwáːtànìà kóβà kí/ 'you joined them to be what?'

Table 3.13: Comparison of F0 means for the utterance /kwáːβàβwáːtànìà kóβà kí/

Age	Sex	N	Mean	Std. Dev.
Children	F	3	257.400	36.24969
	M	3	246.067	57.81914
	Total	6	251.733	43.60471
Youth	F	3	227.233	33.50438
	M	3	143.567	18.08323
	Total	6	185.400	51.76729
Middle-aged	F	3	223.933	14.99378
	M	3	121.000	11.99291
	Total	6	172.467	57.67182
Advanced-aged	F	3	219.633	12.28712
	M	3	215.567	39.99054
	Total	6	217.600	26.55274
Total	F	12	232.050	27.43980
	M	12	181.550	61.87375
	Total	24	206.800	53.44475

From Table 3.13 we noted that children produced the paratone at 252 Hz, the youth at 185 Hz, the middle-aged at 173 Hz and the advanced-aged at 218 Hz. This shows that the children pronounced the paratone at the highest fundamental frequency. The advanced-aged, the youth and the middle-aged groups, respectively, followed them. These age differences are graphically presented in Figure 3.51.

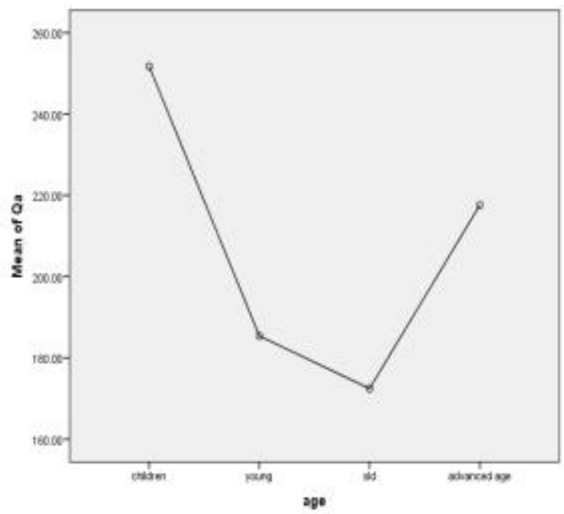

Figure 3.51: Age variation in the pronunciation of /kwá:βàβwá:tànìà kóβà kí/

In the pronunciation of the paratone, we also noted that the highest F0, 257 Hz, was produced by female children while the lowest, 121 Hz, by the middle-aged males. Female participants produced the utterance at 232 Hz and the male ones at 207 Hz. The advanced-aged females produced the lowest F0, 219 Hz. The male participants' highest F0, 246 Hz, was produced by the male children whereas the lowest, 121 Hz, was produced by the middle-aged males. As Figure 3.52 further illustrates, males and females consistently varied in their F0 production in this paratone.

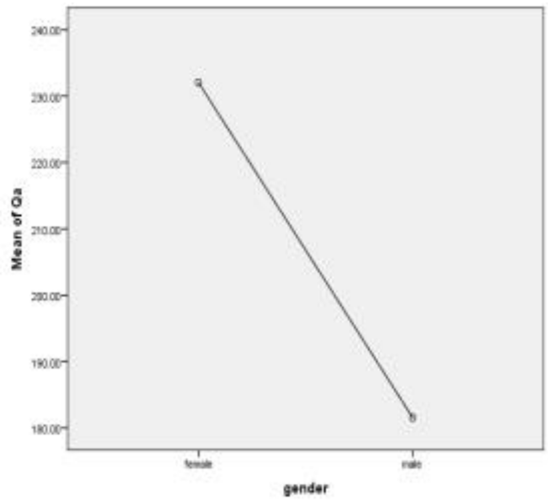

Figure 3.52: Sex variation in the pronunciation of /kwáːβàβwáːtànìà kóβà kí/

On average, the paratone /kwáːβàβwáːtànìà kóβà kí/ was produced at an F0 of about 207 Hz. In Table 3.14, we present a summary of the F0 means for the utterance /kwáːɣèːndà àɾàɾì/ ‘you went where?

Table 3.14: Comparison of means for the utterance /kwáːɣèèndà àɾàɾì/

Age	Sex	N	Mean	Std. Dev
Children	F	3	237.900	40.77070
	M	3	220.567	36.94270
	Total	6	229.233	36.06853
Youth	F	3	218.600	27.30000
	M	3	128.400	5.33948
	Total	6	173.500	52.44361
Middle-Age	F	3	195.567	14.61517
	M	3	106.800	11.96370
	Total	6	151.183	50.06545
Advanced-aged	F	3	204.367	11.71424
	M	3	154.567	21.04978
	Total	6	179.467	31.24322
Total	F	12	214.108	27.94714
	M	12	152.583	48.50383
	Total	24	183.346	49.86166

Table 3.14 reveals that the children group produced the paratone at the highest F0, 229 Hz. The advanced-aged group at 180 Hz and the youth at 174 Hz followed them. The middle-aged group pronounced the paratone at the lowest F0 of 151 Hz. These age-related variations are further illustrated in Figure 3.53.

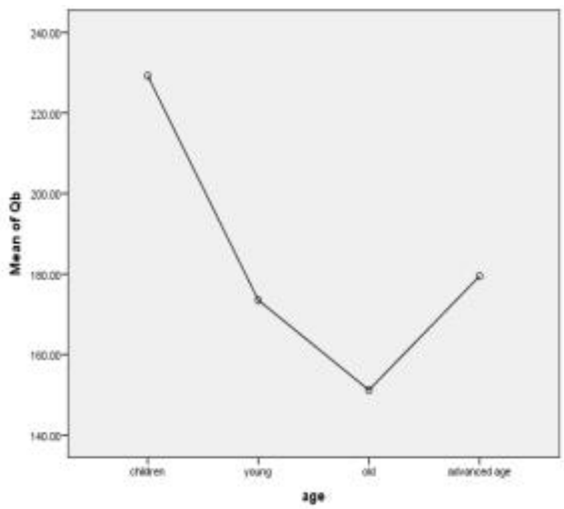

Figure 3.53: Age variation in the pronunciation of /kwáːɣèːndà àɾàɾì/

Another observation made from Table 3.14 is that the highest F0, 237 Hz, for the paratone was produced by the female children while the lowest F0, 107 Hz, was produced by the middle-aged males. The female lowest F0, 195 Hz, was produced by the middle-age group. The male group's highest F0 was 221 Hz and was produced by the male children. In this paratone, it is the middle-aged female participants and not the advanced-aged females as witnessed in the pronunciation of /kwáːβàβwáːtànìà kóβà kí/, that produced the lowest F0 in the female group. On average, female participants produced the utterance /kwáːɣèːndà àɾàɾì/ at an F0 of 214 Hz and the males at 153 Hz. These sex differences are graphically displayed in Figure 3.54.

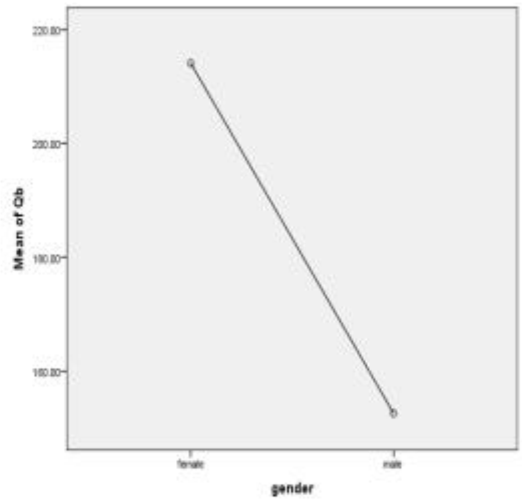

Figure 3.54: Sex variations in the pronunciation of /kwáːɣèːndà àɾàɾì/

Figure 3.54 indicates that the female participants produced the utterance at higher F0s than the males. This is consistent with earlier findings in this study, which have indicated that the sex of the participant influences the F0 production of an utterance. Lastly, the average F0 for this utterance was 183 Hz.

Based on the pronunciation of /kwàːéɾéɾíà ŋò/ ‘you gave whom,’ Table 3.15 displays a summary of the mean F0 as produced by the 24 participants.

Table 3.15: Comparison of means for the utterance /kwàːéɾéɾíà ŋò/

Age	Sex	N	Mean	Std. Dev.
Children	F	3	249.433	37.72351
	M	3	226.200	38.57810
	Total	6	237.817	36.42073
Young	F	3	217.200	22.11086
	M	3	133.267	5.75702
	Total	6	175.233	48.18978
Middle-aged	F	3	215.933	25.03304
	M	3	105.833	18.19954
	Total	6	160.883	63.40153
Advanced-aged	F	3	211.367	5.86032
	M	3	161.1000	15.30621
	Total	6	186.233	29.41888
Total	F	12	223.483	26.79212
	M	12	156.600	50.57143
	Total	24	190.042	52.28203

From Table 3.15, we observed that children produced the utterance with the vocal folds vibrating at 238 Hz, the youth at 175 Hz, the middle-aged at 161 Hz and the advanced-aged at 186 Hz. Figure 3.55 graphically demonstrates the differences in age in the pronunciation of the utterance.

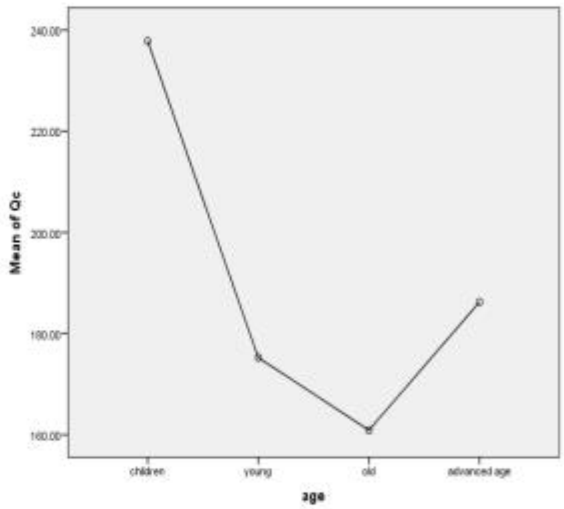

Figure 3.55: Age variation in the pronunciation /kwàːéɾéɾíà ŋò/

Figure 3.55 shows that there is a decrease in F0s from the children to the youth and the middle-aged participants. The F0s, however, increase in the advanced-aged participants. Equally, we note that the difference between the highest and lowest F0 is wider in the children than in the other participants in this utterance.

Table 3.15 also indicates that female participants produced the utterance at 224 Hz and the males at 157 Hz. In both cases, female and male children groups produced the paratone at highest F0s of 249 and 226 Hz, respectively, while the advanced-aged females and the middle-aged males produced the lowest F0s (211 Hz and 106 Hz, respectively). These sex differences are graphically displayed in Figure 3.56.

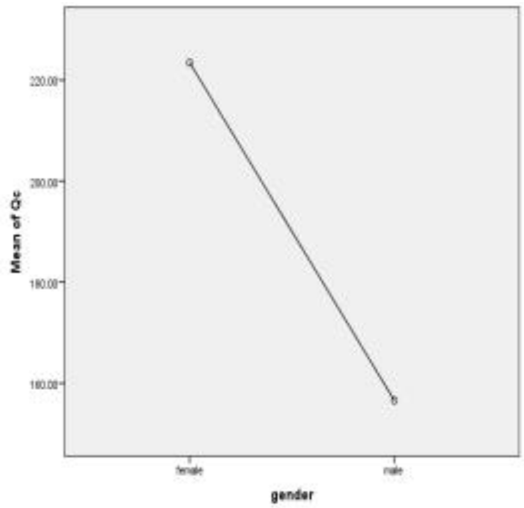

Figure 3.56: Sex variation in the pronunciation of /kwàːéɾéɾíà ŋò/

Overall, the paratone /kwàːéɾéɾíà ŋò/ was produced at an average F0 of 190 Hz. In Table 3.16, we present a summary of the mean F0 for the echo paratone /òɣàːntómá ɾíɾéɾí/ ‘you sent me when?

Table 3.16: Comparison of means for the utterance /òɣàːntómá ɾíɾéɾí/

Age	Sex	N	Mean	Std. Dev
Children	F	3	255.300	28.53051
	M	3	234.167	58.93711
	Total	6	244.733	43.00017
Youth	F	3	228.133	39.75643
	M	3	133.967	7.16194
	Total	6	181.050	57.55827
Middle-aged	F	3	204.767	13.70851
	M	3	116.400	6.60908
	Total	6	160.583	49.34817
Advanced-aged	F	3	225.533	21.09084
	M	3	166.667	32.28658
	Total	6	196.100	40.42875
Total	F	12	228.433	30.03923
	M	12	162.800	55.18513
	Total	24	195.617	54.87999

Table 3.16 equally illustrates that age and sex influence the F0 fluctuations during the production of an echo paratone. We can see once more that children uttered the paratone at the highest F0 of 245 Hz. The F0 declined with the youth who pronounced the paratone at 181 Hz. It further went down with the middle-aged participants who produced it at 161 Hz. The pitch of

the paratone, however, went up with the advanced-aged group, 196 Hz. A graphic presentation of the age differences is shown in Figure 3.57.

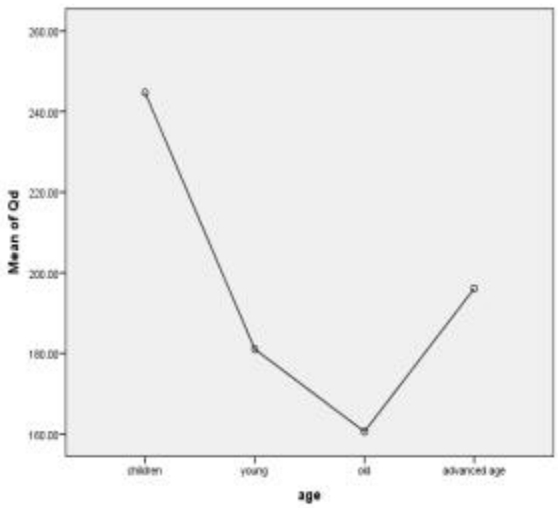

Figure 3.57: Age variation in the pronunciation of /òɣàːntómá ɾíɾéɾí/

In terms of sex, it was realized that female participants produced the utterance at 228 Hz while the male ones uttered it at 163 Hz. The female children produced it at the highest F0 of 255 Hz while the middle-aged females produced it at the lowest F0 of 205 Hz. The male group's highest F0, 234 Hz, was produced by the children while the male participants' lowest F0, 116 Hz, was produced by the middle-aged group. Such sex variabilities are also graphically presented in Figure 3.58.

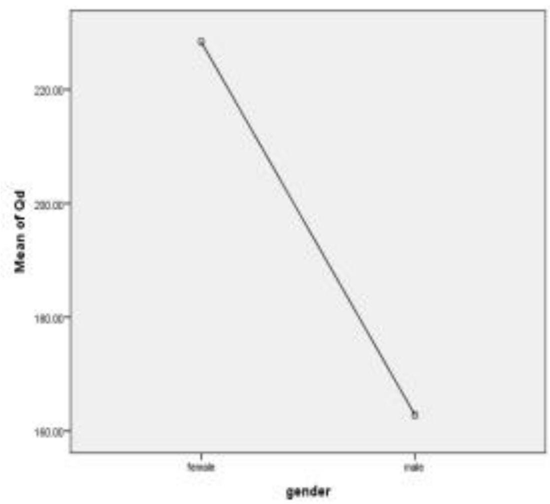

Figure 3.58: Sex variation in the pronunciation of /òɣàːntómá ɾíɾéɾí/

From the above observations, we concluded that the paratone /òɣààntómá ɾíɾéɾí/ was produced at an average F0 of 196 Hz. In the ranking below, we summarise the variations in the participants' pronunciation of the echo interrogative paratones analysed in this study.

Female children	250Hz
Male children	232Hz
Female youth	223Hz
Advanced-aged female	215Hz
Middle-aged female	210Hz
Advanced-aged male	175Hz
Male youth	135Hz

Middle-aged male 113Hz

The summary above indicates that there is a general decline in F0 from the female children through to the middle-aged males. This trend has been observed to be the same in all the interrogative utterances analysed in this study. It is also clear from the above ranking that female participants had higher F0s than the male ones. In short, from the marginal grand means for the echo interrogative utterances, it was noted that /kwáːβàβwáːtànìà kóβà kí/ was pronounced at an F0 of 207 Hz; /kwáːɣèːndà àɾàɾì/ at 183 Hz; /kwàːéɾéɾíà ŋò/ at 190 Hz and /òɣàːntómá ɾíɾéɾí/ at 196 Hz. From these we conclude that an echo interrogative paratone in Ekegusii is produced at an average F0 of 194Hz.

To verify whether the age and sex variations noted in the F0 production for the echo interrogative paratones analysed in this study were statistically significant, a test of between-subjects effects was conducted. Results presented in Table 6.4 (Appendix 6) indicate that the level of significance for age was .001 and that for sex was .000. Both values were less than the alpha value of .05, confirming that both the age and sex had a significant impact on the production of F0. A .000 significance level shows that the real probability value was less than .0005. This is extremely smaller than the alpha .05 indicating that there was a significant difference between the sexes in the production of the F0. Unlike in the other utterance types, the interactional effect of age and sex was also significant in determining the F0 production in an echo interrogative. There is a sig. value of .006 for the age and sex combined. From the values presented in the Partial Eta Squared column, we also established that the effect size of age and sex on F0 were very large. The PES values obtained for age and sex were .511 and .857, respectively. The value for the merged effect of age and sex was .462.

On account of the Ekegusii interrogative paratones described, the following findings emerge: First, there is an overall declination, also called tone terracing, in the course of all the interrogative paratones. This process is triggered by the downdrift and downstepping of H-tones. A similar observation has been recorded in other languages such as Yoruba, Sotho, Luo, Akan and GG'nda (Kugler, 2016). The process lowered the pitch of an interrogative paratone in Ekegusii just like it did in the declarative paratones. Co-occurring with downstep in Ekegusii interrogatives is upstep, which raises the pitch of any H-tone immediately following another H-tone. In Ekegusii interrogative paratones, an upward pitch range shift at some part of an utterance characterizes an interrogative. Such findings were also reported in Yoruba (Connel & Ladd, 1990) where interrogatives have been found to exhibit higher pitch range than declaratives. Second, the declination gradient for the interrogatives is less steep than that of declaratives. Third, a low intonation unit terminal boundary tone, L%, was reported in all interrogative paratones.

Generally, in this section we have demonstrated that interrogatives in Ekegusii are produced at higher fundamental frequency than declaratives. Within the interrogative utterances, we have shown that the F0 ranges vary across the different interrogatives. Section 3.4 describes and compares the intonation of imperative paratones with those of declarative and interrogative paratones in Ekegusii.

3.4 Intonation of Imperative Utterances in Ekegusii

In Sections 3.2 and 3.3, we have investigated the intonation features of declarative and interrogative utterances. Results have revealed that we can distinguish interrogative and declarative utterances in Ekegusii based on the speaker's voice fundamental frequency.

Further, Ekegusii speakers pronounce both declarative and interrogative utterances in Ekegusii with a downtrend pattern of declination with a difference noted in the steepness of the gradient of their declination. In this section, we examine the intonation patterns of imperative utterances in Ekegusii.

An imperative utterance is one that instructs, makes a request or an order, threatens, or offers an invitation or advice. Such a paratone can give a directive to the addressee by asking or telling them to do or not to do something. According to Cruse (2000), order has the pragmatic intention of eliciting an action on the part of the hearer aggressively; request elicits an action on the part of the hearer politely while threat indicates that the speaker will harm someone especially if they do not do what the speaker wants. Mahadin and Jaradat (2011) have argued that threatening is an act by which the speaker commits himself or herself to some harmful action towards the hearer in the future. The imperative paratones analysed in this study as set out in (12) were: /kòɾá émèɾémô jàó óɣêːndé/, 'do your work and go away' /ɣàkí mbwáːtéɾè ékèmóní ékíó/, 'please, hold that cat for me' /óɾêːndé títôúméɾáná âɣóté / 'take care we don't meet' and /mòé ɛ́ɣɛ́tɔ̂nó kjâːjé βwáːŋò/ 'give him/ her his/her pot immediately'.

Structurally, the above utterances begin with an imperative verb and lack an overtly marked subject. The subject is assumed, however, to be the person addressed marked in Ekegusii by the pronoun /ájè/ 'you'. The paratones /kòɾá émèɾémô jàó óɣêːndé/ 'do your work and go away' and /mòé ɛ́ɣɛ́tɔ̂nó kjâːjé βwáːŋò/ 'give him/her his/her pot immediately' express an order; /óɾêːndé títôúméɾáná âɣóté/ 'take care we don't meet' issues a threat while /ɣàkí mbwáːtéɾè ékèmóní ékíó/ 'please hold that cat for me,' makes a request. Like in the analyses of the declarative and interrogative paratones, we show in this sub-section how individual participants vary in the pronunciation of imperative paratones in Ekegusii. To show the audio waveforms, F0 and the juncture or disjuncture between words in the pronunciation of imperative paratones, we display the pitch tracks for the paratone /kòɾá émèɾémô jàó óɣê:ndé/ 'do your work and go away' from four male and four female participants. Figure 3.59 displays the pitch track from a 65-year old male.

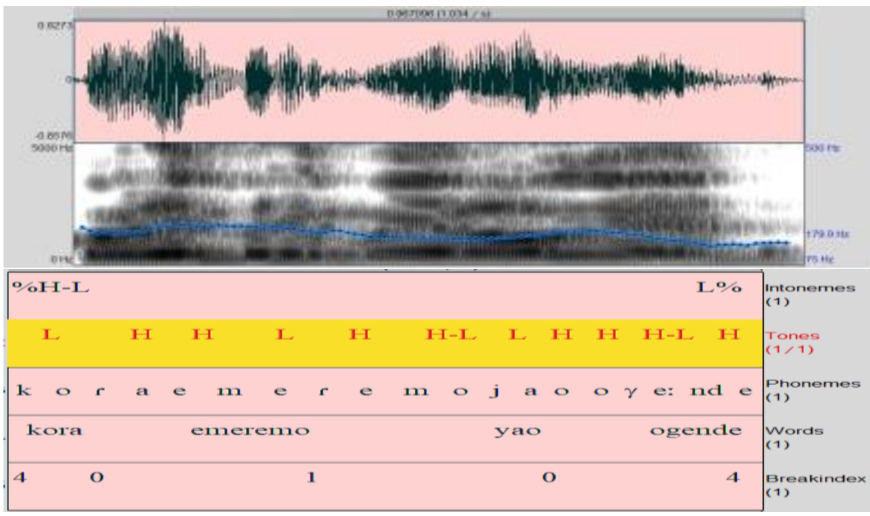

Figure 3.59: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê: ndé/ said by a 65-year old male

Figure 3.59 indicates that the 65-year old male pronounced the paratone at 180 Hz. He also pronounced the utterance with %H-L initial and an L% terminal boundary intonemes. The pronunciation also had the general downtrend of declination in the course of the paratone. From the break index tier, we realized that the utterance was pronounced with an ordinary internal word juncture marked by 1 and a minimal inter-word juncture marked by 0 between the words /kòɾá/ 'do' and /émèɾémô/ 'work' and /jàó/ 'your' and /óɣê:ndé/ 'you go', respectively. The overall metrical structure of the utterance was 40104. These observations are compared with those of the 46 year-old male's pronunciation of the same paratone as shown in Figure 3.60.

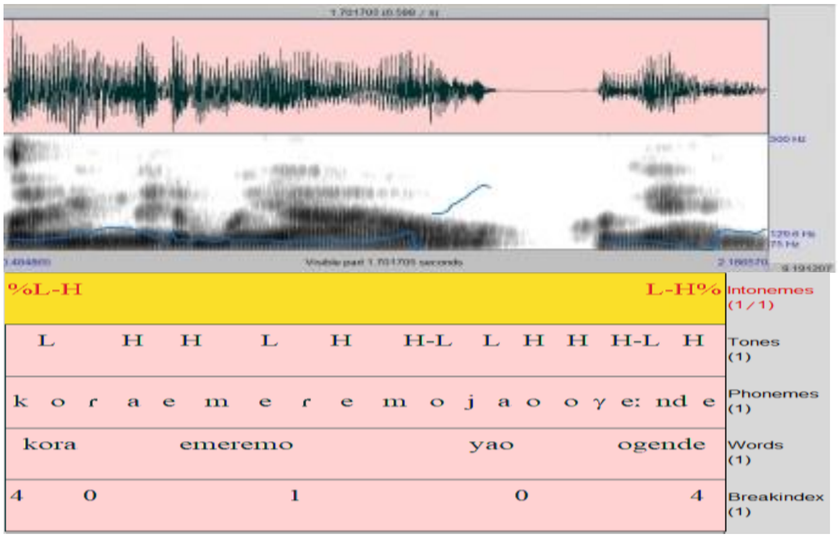

Figure 3.60: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê:ndé/ said by a 46-year old male

The pitch curve in the upper window of Figure 3.60 indicates that this middle-aged participant had the vocal cords vibrating at 129.9 Hz as he produced the paratone. There were also falling tones in the last syllable of the word /émèɾémô/ 'work' and the second syllable of the word /óɣêndé/ 'you go' as the tones tier shows. A general downtrend was also recorded in the pitch contour except the slight rise at the end of the utterance that gives it a final L-H % boundary intoneme. The break-index tier shows that the utterance had a 40104 metrical structure. A 17-year old participant's pronunciation of the same utterance as shown in Figure 3.61 was at a higher fundamental frequency than that of the 46-year old participant.

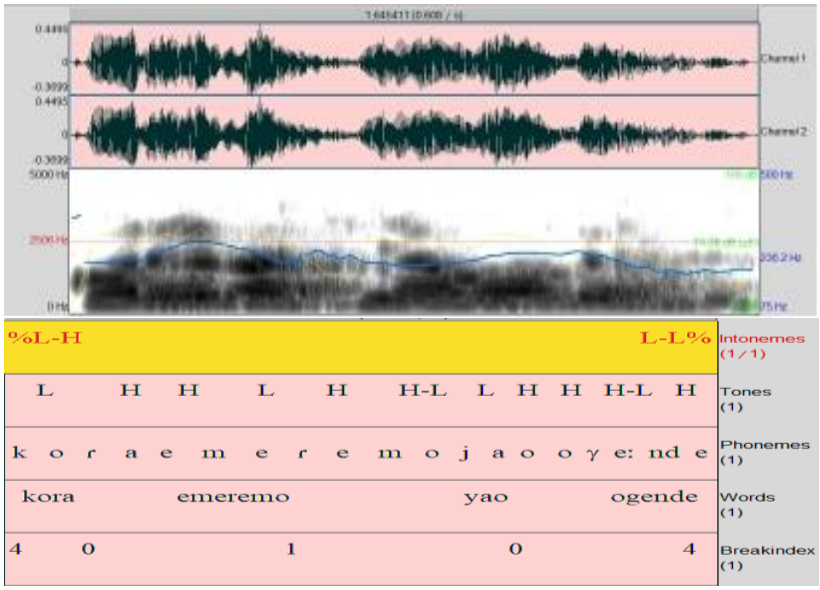

Figure 3.61: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê:ndé/ said by a 17-year old male

Figure 3.61 shows that the 17-year old male produced the utterance with the vocal cords vibrating at 236.2 Hz. This value is higher than that of the 46-year old male and even surprisingly higher than the 204.8 Hz that the 13-year old male child produced. This explains why we did not find age to be a statistically significant factor in determining the F0 realization in an imperative utterance in Ekegusii. As shown by the blue line in the upper window, this participant's pitch contours had a higher ceiling than those of the middle and advanced-aged participants. Though differing in the F0 values, the male participants seemed to realize a similar pattern in the overall declination. These trends are further exemplified by the male child's pronunciation of the paratone as the pitch track in Figure 3.62 shows.

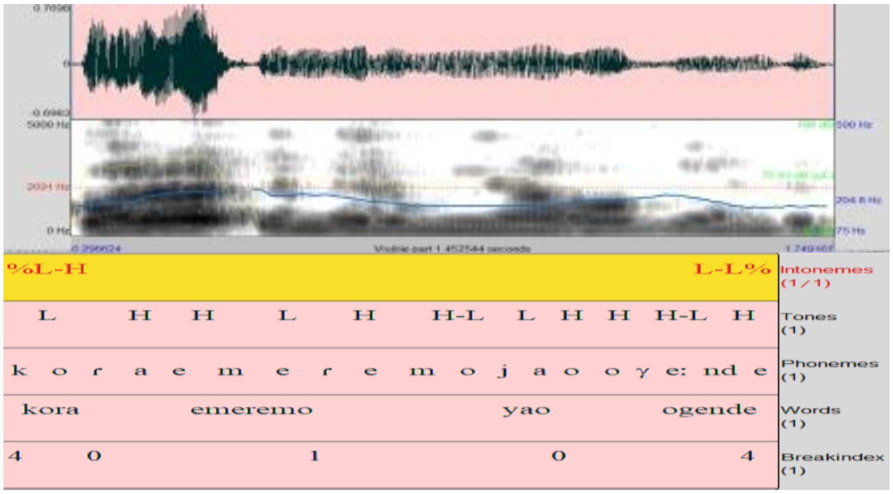

Figure 3.62: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê:ndé/ said by a 13-year old male

Through the pitch tracks in Figures 3.59 to 3.62, we have demonstrated that the male participants pronounced the imperative paratone with the characteristic L% or L-L% boundary intonemes and a 40104 metrical structure. Participants also realised varied F0 in their articulation. The above intonation patterns were compared with those of the female participants. This was done in order to find out whether similar trends like those observed in the declarative and interrogative utterances where female participants realized higher F0s than their male counterparts could emerge. In Figure 3.63, we show how a 62-year old female produced the utterance /kòɾá émèɾémô jàó óɣê:ndé/.

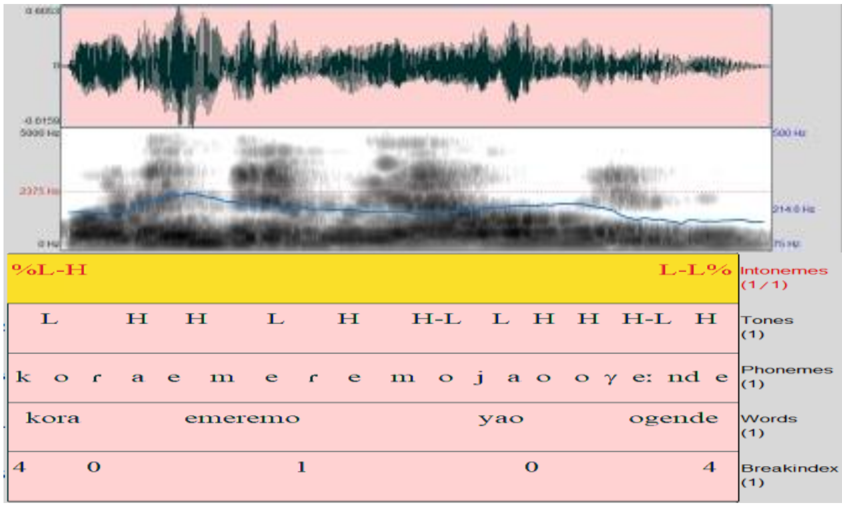

Figure 3.63: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê:ndé/ said by a 62-year old female

The advanced age female participant represented in Figure 3.63 pronounced the paratone at 215 Hz and with a general declining pattern of pitch. There was also a final lowering at the end of the paratone culminating in the L-L% boundary intoneme. A 40104 metrical pattern similar to that of the male participants was also recorded as shown in the break-index tier. Similar intonation features were also observed in the middle-aged female participant's pronunciation shown in Figure 3.64.

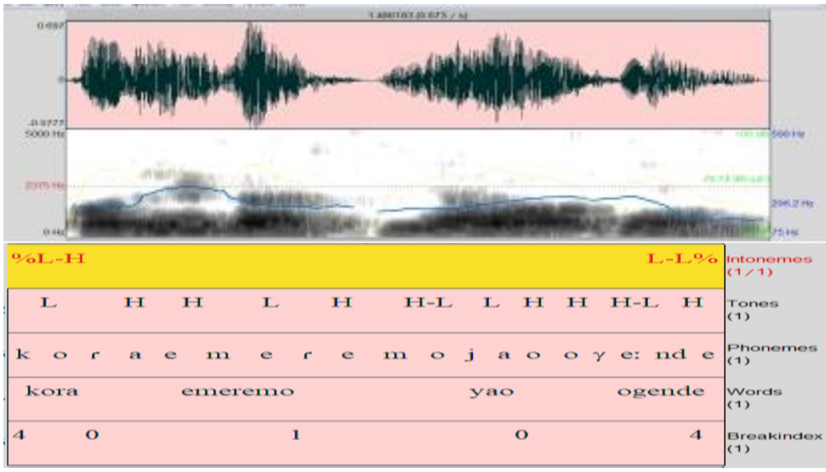

Figure 3.64: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê:ndé/ said by a 49-year old female

The pitch track above shows that the 49-year old female pronounced the paratone with the vocal cords vibrating at 206 Hz and with an initial % L-H and final L-L % boundary intonemes. There was also a 40104 metrical structure in the articulation of the utterance. Figure 3.65 shows the pronunciation of the same utterance by an 18-year old female participant.

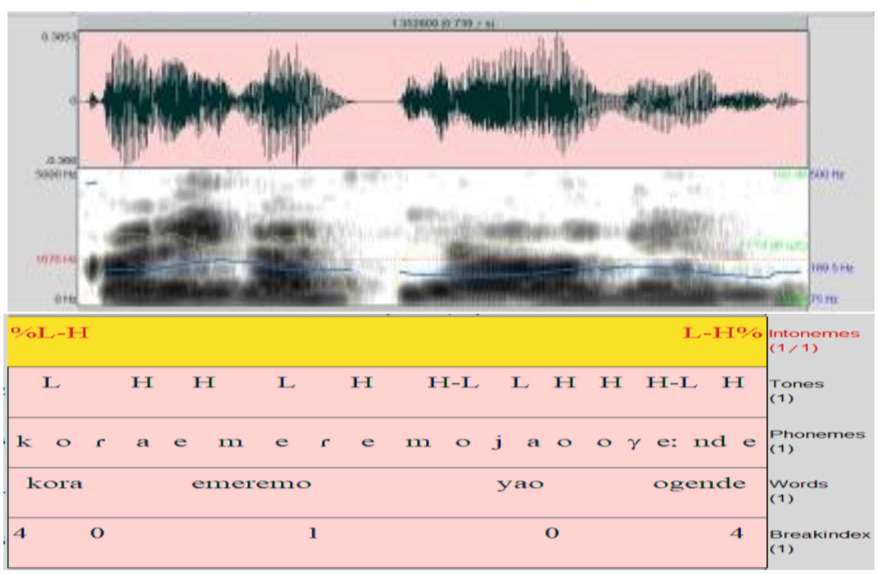

Figure 3.65: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣêndé/ said by an 18-year old female

As Figure 3.65 reveals, the 18-year old youth articulated the paratone at 190 Hz. Unlike what has been observed in the advanced-aged and middle-aged female participants, this participant had their articulation culminating in an L-H % boundary intoneme. The L-H% final intoneme was equally observed in the 46-year old male as shown in Figure 3.60. In both cases, it can be argued that the final lowering effect is neutralised in the articulation. In Figure 3.66, we display a 13-year old's pronunciation of the same paratone.

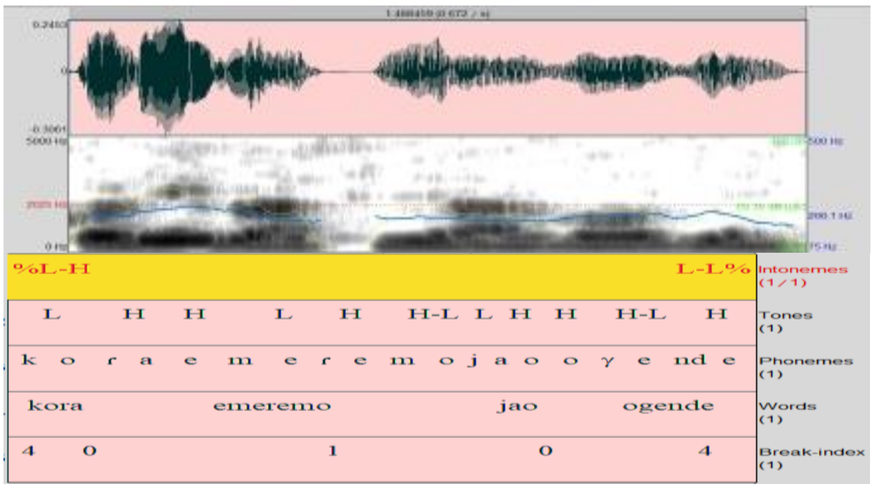

Figure 3.66: Waveforms, F0 contour and ToBI transcription for /kòɾá émèɾémô jàó óɣê:ndé/ said by a 13-year old female

From Figure 3.66, we noted that the female child articulated the paratone at an F0 of 206 Hz. This value is higher than that of the female youth participant but is similar to that of the middle-aged female. The participant also pronounced the utterance with a general left-right declination and a final lowering. However, the gradient of the final lowering was steeper in this participant in comparison with the other female participants. This shows individual speaker differences in the realization of the intonation patterns of even the same utterance.

From the pitch tracks of the female participants' pronunciation, we noted that they all produced the utterance with a final lowering except the female youth who had a slight final rise. All the female participants, like their male counterparts, also produced the paratone with a downward trend culminating in L % and L-L % final intonemes. The female participants also produced the paratone at different fundamental frequencies with the advanced-aged female articulating the paratone at the highest F0 followed by the middle-aged then the child then the female youth who had the lowest F0. Unlike the male participants' articulation, the middle-aged females and female children articulated the paratone at the same F0. The reason for this was not clear. In effect, this affected the calculation of the statistical significance of age on the F0 of an imperative utterance in Ekegusii. Again, unlike in the declarative and interrogative paratones where the children produced the highest F0s, the advanced-aged female participant produced the imperative utterances at the highest F0.

The general implication of the analyses above is that the female participants produced the imperative paratone /kòɾá émèɾémô jàó óɣêndé/ 'do your work and go away' at higher F0s than the male participants. To further illustrate this observation, we provide in Table 3.17 a summary of the mean F0 output from the 12 male and 12 female participants.

Table 3.17: Comparison of means for the utterance /kòɾá émèɾémô jàó óɣê:ndé/

Age	Sex	N	Mean	Std. Dev
Children	F	3	242.333	32.74238
	M	3	230.867	44.37165
	Total	6	236.600	35.43738
Youth	F	3	214.467	34.47352
	M	3	167.667	60.04518
	Total	6	191.067	50.74062
Middle-aged	F	3	196.800	8.14125
	M	3	127.433	16.04691
	Total	6	162.117	39.66149
Advanced-aged	F	3	224.800	22.50600
	M	3	153.633	25.93633
	Total	6	189.217	44.62167
Total	F	12	219.600	28.50308
	M	12	169.900	52.55193
	Total	24	194.750	48.51534

As Table 3.17 shows, there were age differences in the articulation of this utterance in that the children group pronounced it at an average F0 of 237 Hz; the youth at 191 Hz; the middle-aged at 162 Hz and the advanced-aged at 189 Hz. This shows that children produced the utterance at the highest F0; followed by the youth, the advanced-aged and the middle-aged groups respectively. A graphic presentation of the influence of age in the F0 production is given in Figure 3.67.

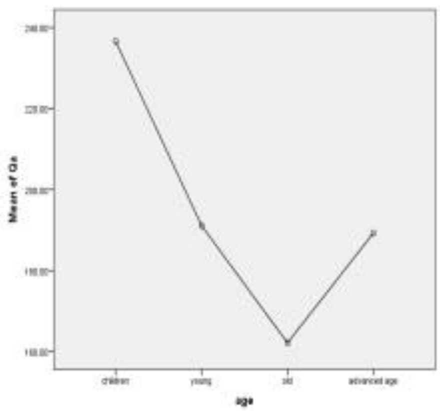

Figure 3.67: Age variation in the pronunciation of /kòɾá émèɾémô jàó óɣêːndé/

Table 3.17 also indicates that the female participants articulated the utterance at an average F0 of 220 Hz while the male ones did it at 170 Hz. Equally, the female highest F0, 242 Hz, was produced by the children while the lowest F0, 197 Hz, was produced by the middle-aged participants. The male children produced the highest F0, 231 Hz, in the male participants. On the other hand, the middle-aged males produced the lowest F0, 127 Hz. Figure 3.68 is a graphic display of this sex variability.

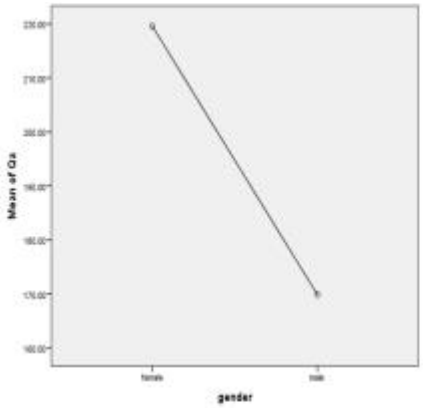

Figure 3.68: Sex variation in the pronunciation of /kòɾá émèɾémô jàó óɣê:ndé/

Following the F0 values presented in Table 3.17, we conclude that the participants produced utterance /kòɾá émèɾémô jàó óɣê:ndé/ ‘do your work and go away’ at an average F0 of about 195 Hz. In Table 3.18, we present a summary of the F0 means for the request imperative paratone /ɣàkí mbwá:téɾè ékèmóní ékíó/ ‘please hold that cat for me.’

Table 3.18: Comparison of F0 means for the utterance /ɣàkí mbwáːtéɾè ékèmóní ékíó/

Age	Sex	N	Mean	Std. Dev
Children	F	3	246.867	30.64381
	M	3	238.933	42.96991
	Total	6	242.900	33.66102
Youth	F	3	227.000	41.00585
	M	3	174.300	64.55796
	Total	6	200.650	56.32824
Middle-aged	F	3	212.933	7.45743
	M	3	120.167	18.40824
	Total	6	166.550	52.34011
Advanced-aged	F	3	237.967	29.18516
	M	3	162.400	29.57313
	Total	6	200.183	49.02687
Total	F	12	231.192	28.57756
	M	12	173.950	57.36817
	Total	24	202.572	53.09764

From Table 3.18, we realize that children articulated the utterance at 243 Hz, the youth at 201 Hz, the middle-aged at 167 Hz, and the advanced-aged at 200 Hz. Contrary to what was noted for the paratone /kòɾá émèɾémô jàó óɣêndé/, the summary in Table 3.18 shows that the advanced-aged females produced the utterance at an F0 of 238 Hz. The female youth articulated it at 213 Hz. The male youth had a higher F0, 174 Hz, than the advanced-aged males, 162 Hz. The above findings reveal that the F0 of an utterance is not only determined by the age or sex of the speaker but also by the individual speaker's manipulation of the speech production apparatus. The influence of age on the articulation of the /ɣàkí mbwáːtéɾè ékèmóní ékíó/ 'please hold that cat for me' is also presented in Figure 3.69.

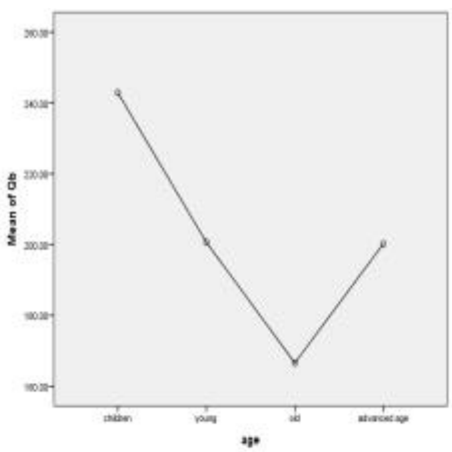

Figure 3.69: Age variation in the pronunciation of /ɣàkí mbwáːtéɾè ékèmóní ékíó/

A second observation made from Table 3.18 is that female and male participants varied in the pronunciation of the paratone. The female participants articulated it 231 Hz and the male ones at 174 Hz. The female and male children produced the paratone at the highest F0, 247 Hz and 239 Hz, respectively while the middle-aged females and males articulated the paratone at the lowest F0, 212 Hz and 120 Hz, respectively. These sex differences are exemplified in Figure 3.71.

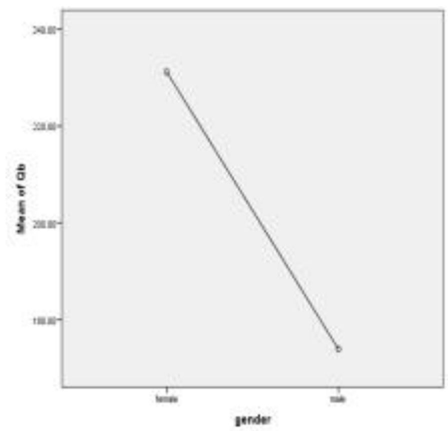

Figure 3.70: Sex variation in the pronunciation of /ɣàkí mbwáːtéɾè ékèmóní ékíó/

From the above observations, it can be concluded that the above paratone was produced at an average F0 of about 203 Hz. This F0 is higher than what was recorded for the order paratone whose mean F0 is presented in Table 3.69. The request F0 was however lower than what was produced for the threat imperative paratone /óɾêndé títôúméɾáná âɣóté/ whose mean F0 is summarized in Table 3.19.

Table 3.19: Comparison of F0 means for the utterance /óɾê:ndé títôúméɾáná âɣóté /

Age	Sex	N	Mean	Std. Dev.
Children	F	3	253.367	40.55642
	M	3	242.633	44.63601
	Total	6	248.000	38.59326
Youth	F	3	221.233	39.94012
	M	3	176.700	51.15926
	Total	6	198.967	47.74891
Middle-aged	F	3	220.267	34.36311
	M	3	113.733	15.70679
	Total	6	167.000	63.05407
Advanced-aged	F	3	247.367	60.83891
	M	3	190.767	41.09870
	Total	6	219.067	55.83242
Total	Female	12	235.558	41.48528
	Male	12	180.958	59.08617
	Total	24	208.258	57.18817

From Table 3.19, we noted that children produced the paratone at an F0 of 248 Hz; the youth at 199 Hz; the middle-aged at 167 Hz and the advanced-aged at 219 Hz. This showed that unlike in the articulation of the request paratone, the advanced-aged group articulated the threat paratone at a higher F0 than the youth group. However, similar trends in the production of highest and lowest F0 values were noted since the children produced the utterance at the highest F0, 253 Hz and the middle-aged group the lowest F0, 167 Hz. Figure 3.71is a graphic display of the age differences.

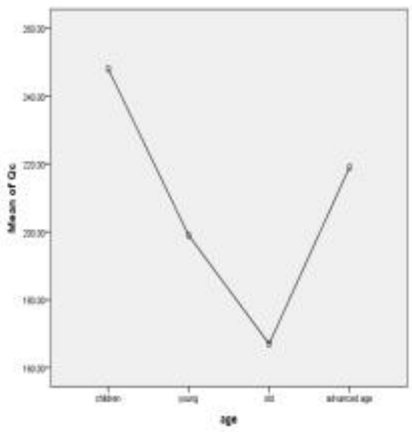

Figure 3.71: Age variation in the pronunciation of /óɾêːndé títôúméɾáná âɣóté /

Again, female participants pronounced the utterance at 236 Hz and males at 181 Hz. The female highest F0, 253 Hz, was produced by the children while their lowest, 220 Hz, by the middle-aged group. Similarly, the male participant’s highest F0, 243 Hz, was also produced by the children group while the lowest F0, 114 Hz, by the middle-aged males. These sex-based variations are displayed in Figure 3.72.

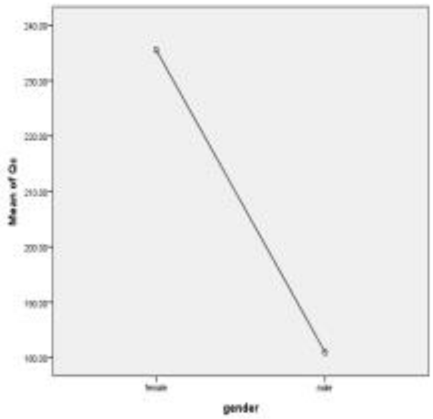

Figure 3.72: Sex variation in the pronunciation of /óɾê:ndé títôúméɾáná âɣóté /

Overall, we conclude that this utterance was produced at an F0 range of 209 Hz. This was the highest F0 in the articulation of the imperative paratones analysed in this study. The summary in Table 3.20 shows the mean F0 for another order paratone /mòé ɛ́ɣɛ́tɔ̂nó kjâ:jé βwá:ŋò/ ‘give him/her her pot immediately’.

Table 3.20: Comparison of means for the utterance /mòé έγέtɔ̂nó kjâːjé βwáːŋò/

Age	Sex	N	Mean	Std. Dev
Children	F	3	246.800	36.50164
	M	3	233.267	41.34021
	Total	6	240.033	35.65808
Youth	F	3	219.433	33.74157
	M	3	171.467	56.00521
	Total	6	195.450	48.99256
Middle-aged	F	3	205.833	16.93881
	M	3	114.300	8.26559
	Total	6	160.067	51.53254
Advanced-aged	F	3	233.900	24.48408
	M	3	166.533	18.14837
	Total	6	200.217	41.62948
Total	F	12	226.492	29.45908
	M	12	171.392	53.78519
	Total	24	198.942	50.89784

From the summary above, we noted that children produced the utterance with the vocal cords vibrating at 240 Hz; the youth at 196 Hz; the middle-aged at 160 Hz and the advanced-aged at 200 Hz. As the graph in Figure 3.73 further illustrates, there were age differences in the articulation of the utterance.

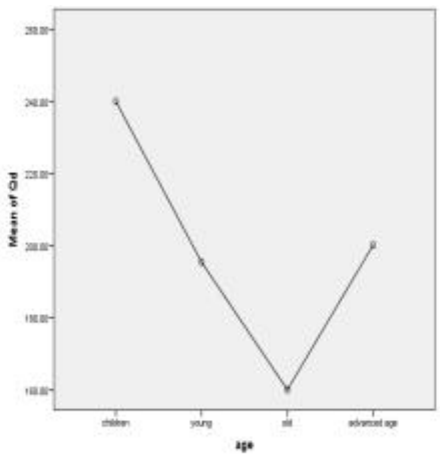

Figure 3.73: Age variation in the pronunciation of /mòé έγέtɔ̂nó kjâːjé βwáːŋò/

What Figure 3.73 reveals about the articulation of the utterance is that there was a drastic drop in F0 from the children through the youth and middle-aged groups. This, however, increased with the advanced-aged group to a level slightly higher than that for the youth group.

From Table 3.17, we also noted that the female participants pronounced the paratone at an average F0 of 227 Hz and the male ones at about 171 Hz. The highest F0 for the female, 247 Hz, and male participants, 233 Hz, were produced by the children groups while the lowest F0 for both the female, 206 Hz, and male, 114 Hz, were produced by the middle-aged groups. These sex variations are graphically displayed in Figure 3.74.

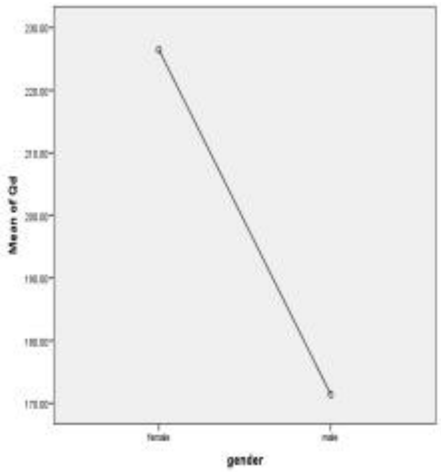

Figure 3.74: Sex variation in the pronunciation of /mòé ɛ́ɣɛ́tɔ̂nó kjâːjé βwáːŋò/

In short, the paratone /mòé ɛ́ɣɛ́tɔ̂nó kjâːjé βwáːŋò/ 'give him/her his/her pot immediately' was produced at an F0 range of about 199 Hz. Based on the analyses carried out in this sub-section we conclude that children articulated the order paratones with their vocal cords vibrating at about 238 Hz; at 243 Hz in the request paratone and 248 Hz in the threat utterance. The youth group articulated the order paratones with the vocal cords vibrating at 193 Hz; the request paratone at 201 Hz and the threat paratone at 199 Hz. Likewise, the middle-aged group pronounced the paratones at 161Hz, 167 Hz and 167 for order, request and threat respectively. The advanced-aged group also produced the paratones at 195 Hz, 200 Hz and 219 Hz for order, request and threat repectively. From these observations, we concluded that, on average, children had the highest F0, 243Hz. They were followed by the advanced-aged, 205 Hz; the youth, 198Hz, and the middle-aged, 165 Hz, in the imperative intonation.

Results of the analyses of imperative paratones have equally shown that apart from the age-related differences in the pronunciation of these paratones, there were also sex-related differences, especially in the voice F0. Once again, female participants pronounced the imperative paratones at higher fundamental frequencies than the male ones. For example, the female participants articulated the order imperatives at 223 Hz while the male ones did it at 170 Hz. For request, the female participants pronounced it at an F0 231Hz while the male ones at 174 Hz. Females also had a higher F0 for the imperative expressing threat, 236 Hz, than the males, 181 Hz. Generally, female children articulated the four imperative paratones at the highest F0, 253Hz, while the middle-aged males had the lowest, 114 Hz. The findings have also indicated that there was a higher standard deviation in the male group than in the female group. This shows that the high and low F0 values for the male participants varied more from the mean than they did in the female participants. The female participants were, therefore found to be more homogeneous in their F0 production than the male ones.

Given the age and sex variations in the F0s recorded for each paratone, we also set out to establish whether such variations were statistically significant or they occurred by chance. The tests of between-subject effects output in Table 6.5 (Appendix 6) show that the significance level for age was .088. This value was greater than the alpha .05. This means that age did not have a statistical significant effect in determining the F0 range in an imperative utterance. This is so because as early noted a middle-aged female and and a female child produced the paratone /kòɾá émèɾémô jàó óɣêndé/ ‘do your work and go away’ at the same F0. We also note that the sig. value for sex is .025. This implies that sex was a statistically significant factor in determining the F0 of an imperative paratone. The interaction effect of age and sex had a P value of .464. This also means that the interactional effect of age and sex was not statistically significant in determining the F0 of an imperative utterance. Readings from the partial Eta Squared column show that the value for age is .347 and for sex is .551. Following Cohen’s

(1998) guidelines, these values indicate that whereas age had a large effect size, sex had a very large effect size on the results.

Based on the estimated grand marginal means, we have established that different imperative intonation phrases in Ekegusii can be distinguished on variation of fundamental frequency. Results have shown that the order paratone was pronounced at the lowest F0, 197Hz, followed by request, 203Hz, while threat had the highest F0, 208 Hz. This shows that an Ekegusii speaker raises his or her pitch more when threatening than when ordering somebody. From the grand marginal F0 values, we concluded that an imperative paratone in Ekegusii is articulated at an average F0 about 201Hz. This was lower than the F0 attained in the polar interrogative and the constituent interrogative intonation but is higher than the echo interrogative and declarative intonation.

Considering the estimated grand marginal means for the different intonation phrases analysed in this chapter, Ekegusii paratones are classified into five levels of intonation shown as:

Level one for statements	185 Hz
Level two for echo interrogatives	194 Hz
Level three for imperatives	201 Hz
Level four for constituent interrogatives	202 Hz
Level five for polar interrogatives	211Hz

The bar graph in Figure 3.75 gives a visual account of the ranking above.

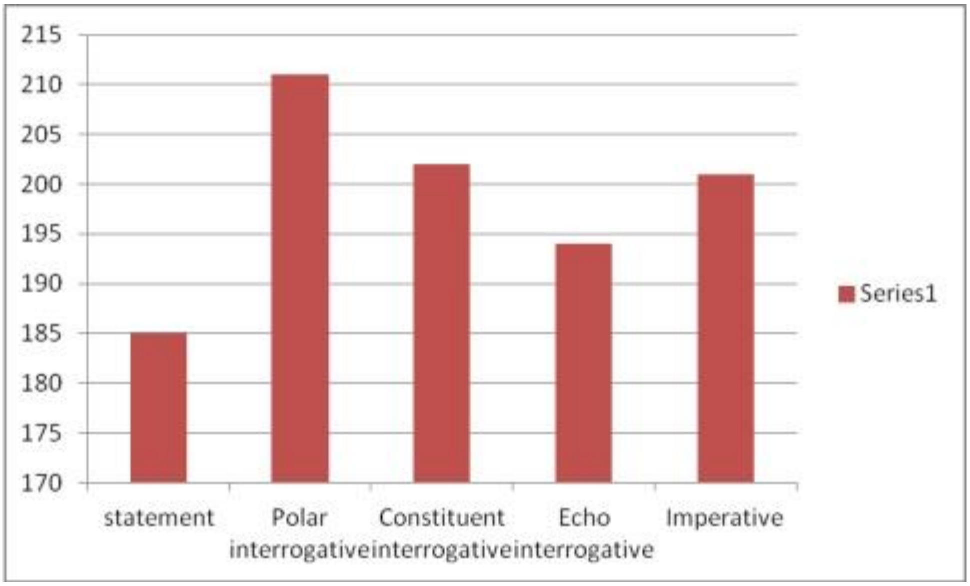

Figure 3.75: Ranking of utterance types against F0 ranges

The F0 differences noted in Figure 3.75 are consistent with Gussenhoven (2004) and Downing's (2008) observation that utterance level prosody is conditioned not only by syntactic factors but also by pragmatic ones. Pragmatic factors, such as the speaker's desire to ask a question, make a declaration, or direct a command, influence the realization of the fundamental frequency ranges in their speech.

3.5 Conclusion

The analyses in this chapter have revealed that the intonation phrase type, the speaker's age and sex determine an Ekegusii speaker's fundamental frequency. Findings have shown that participants pronounced the declarative, interrogative and imperative intonation phrases presented to them at varied F0 values. The polar interrogative intonation phrases were articulated at the highest F0 of about 211 Hz and declarative intonation phrases at the least F0 of about 185 Hz. Constituent interrogative intonation phrases were articulated at 202 Hz; the inperative ones at 201 Hz and the echo interrogative intonation phrases at 194 Hz. Since the polar interrogative intonation phrases and the declarative intonation phrases used in this study had the same phonetic form in terms of sound segments, findings have indicated that a difference in pitch (F0) is the primary cue that can be used to distinguish them. In addition to a higher F0, polar interrogative phrases displayed a characteristic upward pitch range-shift (H-raising) at some syllable while the declarative ones had a general downward pitch range-shift and a low F0. Similarly, constituent interrogative intonation phrases were distinguished from their echo interrogative counterparts in that they were articulated at a higher F0.

Analyses have also indicated that, on average, children articulated the intonation phrases given at an F0 of about 242 Hz; the youth at 185Hz; the middle-aged participants at about 163 Hz and the advanced-aged ones at about 205 Hz. This has shown that children spoke at the highest mean F0, followed by the advanced-aged and the youth while the middle-aged participants spoke at the least F0. A decrease in the fundamental frequency of an utterance from the children to the youth and then to the middle-aged participants before an increase in the advanced-aged group for both males and females has been the general trend observed in this study. Results have shown that the transition from the children group to the youth had a drop of 57 Hz in F0 while the transition from the youth to the middle age period had a drop of 22 Hz in F0. However, the transition from the middle age to the advanced age period saw an increase of 42 Hz in F0. The implication of such observations is that the greatest change in F0 occurred in the transition from childhood to youth and the least during the transition from youth to the middle age period.

In addition, findings from the analyses of the different intonation phrases have shown that there were sex differences in the realization of F0 in the four age groups. For example, an Ekegusii male child's voice vibrated at 233.4 Hz while that of a female child at 255 Hz. A male youth's vocal folds vibrated at 147 Hz while a female youth at 223.2 Hz. The F0 values obtained for Ekegusii youths' articulations seem to be higher than those observed in Fery (2017) where the writer notes that young men speak at 130 Hz and young women at 220 Hz. Analyses have shown that Ekegusii middle-aged male participants speak at 117.4 Hz and middle-aged female participants at 211.4 Hz. Following observations by Crystal (2010) that the F0 of the adult male voice is 120 Hz and the female voice 220 Hz and assuming that an adult speaker is equivalent to a middle-aged participant in this study, then, it means that an adult Ekegusii speaker's F0 range is lower than the limits observed in the languages analysed by Crystal (2010). However, this value is higher than what was observed in Swedish (Pegoraro-Krook, 1988). The advanced-aged males had their vocal folds vibrating at 183 Hz and the advanced-aged females at 231 Hz. This implies that the advanced-aged male participants had a higher F0 increase (65.6 Hz) than their female counterparts (19.6 Hz) did.

The above results reveal that F0 is high in children's speech. However, with growth, the F0 values decrease until the middle age period before they increase at the advanced age period for both sexs. The male children had a higher decrease in F0 (86.4 Hz) than the female children (31.8 Hz). Equally, the transition to middle-aged period saw the male youth have a higher drop in F0 (29 Hz) than the female youth (11.8 Hz). In addition, during the advanced age period, the male participants displayed a higher increase in F0 (65.6 Hz) compared to their female counterparts (19.6 Hz). On average, female participants spoke at 228.6 while the male ones spoke at 170.6 Hz. Although Ekegusii female speakers spoke within the 190-250 Hz F0 range established by Brinton (2000) for female speakers across languages, the male speakers' F0s were higher than the 100-150 Hz that the author establishes for the male speakers. The above findings can also be related to Fajobi's (2011) description of Yoruba intonation where the author notes that the F0 of a male voice in speech does not normally exceed 300 Hz and that of a female may not be higher than 500 Hz.

The above findings are in line with Ladefoged's (2006) observesation that intonation is highly coloured by individual variation. Ladefoged and Johnson (2015) have also observed that variation of an individual's voice can indicate whether the speaker is male or female and, to some extent, what their age is. A study by Chatterjee, et al. (2016) on the effects of age and sex on the voice range profile in Bengali adult speakers, equally, indicates that there is a significant difference in F0 of males and females. This has been supported by our research findings that have shown male participants displaying greater variation in the F0 changes than the female ones across the different age groups. The analyses in this chapter have not just demonstrated that Ekegusii has F0 based intonation and that the age and sex of a speaker influences the F0 output but have also established each individual Ekegusii speaker's F0 pitch range. With this in mind, the next chapter analyses the interaction between intonation and the expression of the information structure unit of focus.

CHAPTER FOUR
INTONATION AND FOCUS MARKING IN EKEGUSII

4.1 Introduction

In the previous chapter, an account of the intonational tones in different Ekegusii paratones is given. The findings have shown that the intonation pattern of an Ekegusii utterance is influenced by intonational tones through downdrift, downstep, upstep, declination and extra final lowering. In addition, the participant's age and sex determined the realization of the F0 value in each of the paratones analysed. In the current chapter, an analysis of the relationship between intonation and the information structure role of focus in Ekegusii is provided. This analysis was motivated by findings from early studies, which have shown that languages use different strategies to mark information structure units. For example, Selkirk (2002), Hedberg and Sosa (2007) report that American English mark information focus using a mono-tonal [H*] pitch accent and contrastive focus with a bi-tonal [L+H*] while Frota (2000) shows that European Portuguese marks contrastive focus by [H*+L] and information focus by [H+ L*] pitch accents. In Korean (Lee and Xu, 2010), Turkish (Ipek, 2011) and Lebanese Arabic (Chahal, 2001), on the other hand, focus is marked by lengthening (longer duration).

As already indicated in Sub-section 1.8.4.2, two categories of information structure, namely information focus (IF) and contrastive focus (CF), form the basis of the analysis in this chapter. The information structure roles considered in our analyses are sentence focus, argument focus and predicate focus as discussed in sections 4.2, 4.3 and 4.4, respectively. The contrastive focus structures are described in Section 4.5.

4.2 Sentence Focus

The analyses in this section are based on the sentence-focus structure, which according to Lambrecht (1994) is also called ‘neutral,’ ‘presentational,’ or ‘thetic-,’ focus. Fery (2017) sees this type of focus as ‘all new,’ ‘broad,’ or ‘wide’ focus. In this study, the terms sentence focus (SF) and neutral focus (NF) are used interchangeably. The SF has the entire clause in focus. This means there is both a new argument and a new predicate. Kirk (2012) observes that the sentence-focus structure is a neutral clause taking the form of a declarative sentence and is an answer to a question like ‘what happened?’ or ‘what is happening?’ Utterances with SF do not have any single word in focus. According to Ladd (2008), the neutral focus exhibits neutral word order and neutral intonation. In the analysis given in this chapter, Alzaidi’s (2014) observation, that a SF clause is pragmatically neutral in interpretation and has no presupposition structure, was adopted.

The target utterances analysed for neutral focus are given in 41a, 42a, 43a, 44a, 45a and 46a.

41. (a) /ómòtòká nàɾínêtè nîγó óɲôɾá ómòβásòkànò/ ‘The vehicle got an accident.’

42. (a) /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/ ‘Moraa has delivered a baby boy.’

43. (a) /ŋ́ kéɾéβí óŋêːntá ômwáːná ójé/ ‘Kerebi has strangled a child.’

44. (a) /ómòkûŋú ómwáːká ómòsâʧá óɾòé/ ‘A woman slapped the man.

45. (a) /nôómóíséké óɾúsíà óβòɾìtò/ ‘The girl aborted.’

46. (a) /ŋ́ kèmùːntó óŋâká έtεˆγὲ/ ‘Kemunto kicked me.’

The above utterances were derived from the question-answer contexts in line with the IS framework as explained in Sub-section 1.9.2. Given that the utterances were similar in terms of their information packaging, we have narrowed the phonetic and phonological descriptions to utterance 41a and 42a. The IS derivation and statistical analyses of the other utterances are given in appendix 7. In all the derivations, the focus part is marked NF to show neutral focus.

41 (a) i. Context question: /níŋkì kwáːɲôɾéɾwáː émêɾèmò/? 'What made you get late for work?'

ii. Answer: [ómòtòká nàɾínêtè nîγó óɲôɾá ómòβásòkànò]$_{NF}$ 'The car I boarded was involved in an accident'

Presupposition: ——————————

Assertion: /ómòtòká nàɾínêtè nîγó óɲôɾá ómòβásòkànò/, 'The car I boarded was involved in an accident'

Focus: /ómòtòká nàɾínêtè nîγó óɲôɾá ómòβásòkànò/, 'The car I boarded was involved in an accident'

Focus domain: Clause

The IS schema in 41a, following insights from Lambrecht (1994), shows that the proposition that answers the context question has a pragmatic assertion but lacks a pragmatic presupposition. According to Lambrecht (1994:52), a pragmatic presupposition is ''The set of propositions lexicogrammatically evoked in a sentence which the speaker assumes the hearer already knows or is ready to take for granted at the time the sentence is made''. The lack of pragmatic presupposition in the Ekegusii example above emanates from the fact that the subject NP, /ómòtòká nàɾínêtè/ ‘the car I boarded’ is not a topic referent for the assertion /ómòtòká nàɾínêtè nîɣó óɲôɾá ómòβásòkànò/ ‘the car I boarded was involved in an accident’ nor can it be predictable or recoverable in the context of the utterance made. In this derivation, the pragmatic assertion presents information, which the hearer is expected to know because of hearing the sentence uttered. The assertion coincides with the focus, which means that the subject, /ómòtòká nàɾínêtè/, ‘the car I boarded’ and its predicate, /óɲôɾá ómòβásòkànò/, ‘got an accident’ form the domain of new information. This domain is the focus of the sentence and extends over the entire proposition. In the AM-Theory, the pragmatic assertion is presented in the pitch track in Figure 4.1, which was produced by a young female participant labelled F2Y.

Figure 4.1: Pitch track for the NF utterance /ómòtòká nàɾínêtè nîɣó óɲôɾá ómòβásòkànò/ produced by F2Y

From Figure 4.1, we note that F2Y produced the utterance as one intonation phrase. At the same time, high tones in the sequence HH are downstepped. An overall declination of pitch in the course of the utterance and final lowering are also noticeable in the pronunciation. The utterance final boundary intoneme is H-L%. These phonological patterns are similar to those noted in the pronunciation of the declarative paratones discussed in Section 3.1. From the top panel we note that the pitch range for this participant was about 233 Hz. A young male participant in the same age group, M1Y, pronounced the same utterance at a lower F0 as shown in Figure 4.2.

Figure 4.2: Pitch track for the NF utterance /ómòtòká nàɾínêtè nîɣó óɲôɾá ómòβásòkànò/ produced by M1Y

As Figure 4.2 shows, M1Y pronounced the utterance at an F0 of about 142 Hz. This shows that the female and male participants produced the utterance at different F0 ranges. Apart from such sex differences, there were also age-related variations in the pronunciation of the proposition.

Table 4.1 presents a summary of the mean F0 production of this utterance by all the 24 participants.

Table 4.1: Comparison of F0 means for the NF utterance /ómòtòká nàɾínêtè nîɣó óɲôɾá ómòβásòkànò/

Age	Sex	N	Mean	Std. Dev
Children	F	3	236.433	12.85198
	M	3	224.767	12.71233
	Total	6	230.600	13.09748
Middle-aged	F	3	204.367	4.61122
	M	3	116.533	1.45717
	Total	6	160.450	48.20543
Advanced-aged	F	3	197.667	13.53896
	M	3	143.533	10.12143
	Total	6	170.600	31.51863
Youth	F	3	230.667	8.46719
	M	3	142.867	8.08290
	Total	6	186.767	48.65658
Total	F	12	217.283	19.48271
	M	12	156.925	43.16550
	Total	24	187.104	44.97824

From Table 4.1 we note that children produced the utterance at the highest F0 range of 230.6 Hz; they were followed by the youth who produced it at 186.8 Hz and the advanced-aged group at 170.6 Hz. The middle-aged participants had the least F0, 160.5 Hz. This indicates that there were consistent age differences in the F0 production of this NF utterance. These differences are further graphically displayed in Figure 4.3.

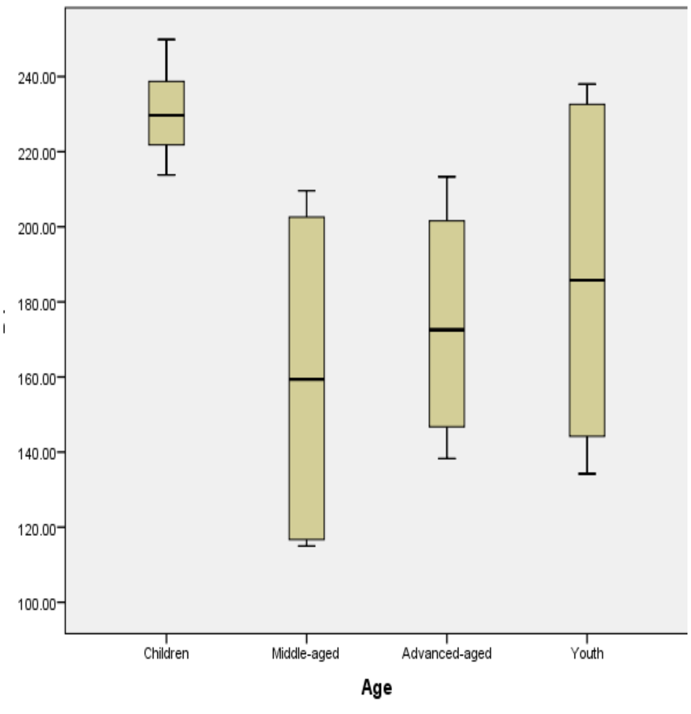

Figure 4.3: Age-related distribution of F0 scores for /ómòtòká nàɾínêtè nîγó óɲôɾá ómòβásòkànò/.

From the graphs in Figure 4.3, we observe that children pronounced the utterance with a minimum F0 of about 218 Hz, a maximum F0 of about 250 Hz and a median of about 230 Hz. The youth group had the second highest F0 at 230 Hz, 138 Hz and 185 Hz for the highest, lowest and median, respectively. The advanced-aged group was third with the highest F0 of about 215 Hz, lowest F0 of about 140 Hz and a median of about 174 Hz. The middle-aged group produced the utterance with their vocal folds vibrating at the least F0. Their highest F0 was about 205 Hz; the lowest about 118 Hz and the median about 160 Hz. The size of the boxes in Figure 4.3 above correlates with the interquartile range (IQR). The children's group had the smallest box, which should be interpreted to mean that they had a small IQR. The big boxes for the middle-aged and youth groups, on the other hand, indicate a large IQR for these groups. A small IQR reveals that the F0 scores were less dispersed while a big IQR shows that the F0 scores were more spread. The length of the whiskers projecting from the boxes is an indicator of the distribution of F0 scores between the highest and lowest from the median F0. For instance, we can see that the middle-aged group had the smallest size of projecting whiskers. This indicates that these participants had the smallest range of F0 scores between the highest and lowest from the median.

Another observation made from Table 4.1 is that male and female participants produced the utterance at varied F0s. For instance, the middle-aged females produced the utterance at higher F0s than the advanced-aged females but the middle-aged males produced it at lower F0s than the advanced-aged males. The sex variations are graphically displayed in Figure 4.4.

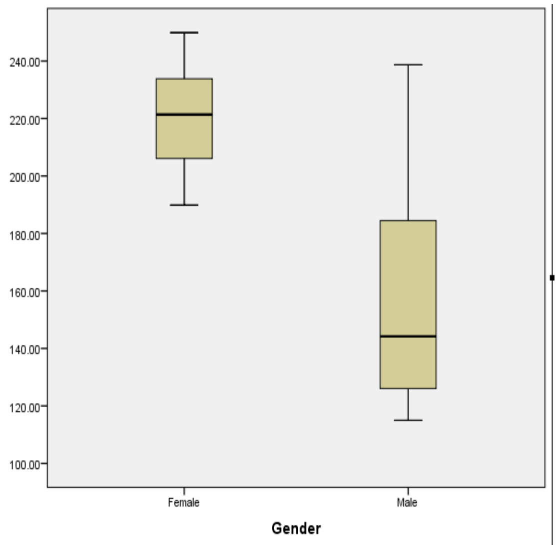

Figure 4.4: Sex-related distribution of F0 scores for /ómòtòká nàɾínêtè nîγó óɲôɾá ómòβásòkànò/

Figure 4.4 indicates that the female participants produced the utterance at higher F0 values than their male counterparts did. The highest F0 for the female participants was about 243 Hz while their lowest F0 was about 202 Hz. Their median F0 was about 217 Hz. Figure 4.4 also reveals that the median is in the middle of the box and the whiskers are about the same height on both sides of the box, which means that the distribution of scores was symmetric for the female participants. On the other hand, the highest F0 for the male group was about 230 Hz, the lowest 120 Hz and the median about 157 Hz. For the male participants, it was also noted that the whisker is shorter on the lower end of the box and the median is closer to the bottom of the box. This indicates that the F0 scores had a positive skew for the male participants as the lower F0 values were centred more towards the median than the higher values. The large size of the upper whisker for males shows that there were more of the higher F0 scores than the lower ones. The small size of the box for the female participants shows that the interquartile range for the females is smaller than that of males. The implication of this is that the female F0 scores dispersed less from the median. In short, based on the auditory and acoustic analysis above, the research establishes that the utterance /ómòtòká nàɾínêtè nîɣó óɲôɾá ómòβásòkànò/, 'the car I boarded was involved in an accident,' was produced at an average pitch range of about 189 Hz.

In order to explore the statistical significance of the age and sex differences in the F0 production for the utterance above, tests of between-subjects effects were carried out. The output in Table 7.6 (Appendix 7) indicates that the interactional effect of age and sex was not statistically significant in determining the F0 production (P= .090). The main effects of age and sex indicate that whereas age was statistically significant in determining the F0 in the neutral focus type (p= .030), sex was not (p=.058). The results also indicated that the mean scores difference between the groups were very large for both the main effect of age (PES=.689) and sex (PES=.942) and the interactional effect of age and sex (PES=.552).

Equally, utterance 42a has both the subject and the predicate under focus and was derived within the Information Structure framework as shown below.

42a i. Context question: /níŋkì áβàŋìnà βákóìɾìɾìàtèɾà/ 'Why are the women ululating?'

ii. Answer: [ímòɾáá óíβòɾá ômwáːná ómòmùɾá]$_{NF}$. 'Moraa has given birth to a baby boy.'

Presupposition: ——————————————

Assertion: /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/ 'Moraa has given birth to a baby boy.'

Focus: /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/ 'Moraa has given birth to a baby boy.'

Focus domain: Clause

Just as it was observed in the derivation of 41a, the schema provided in 42a, following Lambrecht's (1994) IS, shows that there is a pragmatic assertion but no pragmatic presupposition. This is so because neither the subject NP nor the predicate has information that the hearer already knows or is ready to take for granted on hearing the sentence uttered. Again, the subject NP /ímòɾáá/ 'Moraa' is neither a topic referent nor an open proposition to which truth-value can be attached. The pragmatic assertion, /ímòɾáá óíβòɾá ômwáání ómòmùɾá/ 'Moraa has given birth to a baby boy' coincide with focus. The domain for the focus constituent is not any one single element but rather the whole clause. This clause, in Fery's (2017) approach of IS, provides new information. F2Y pronounced the focus clause as shown in Figure 4.5.

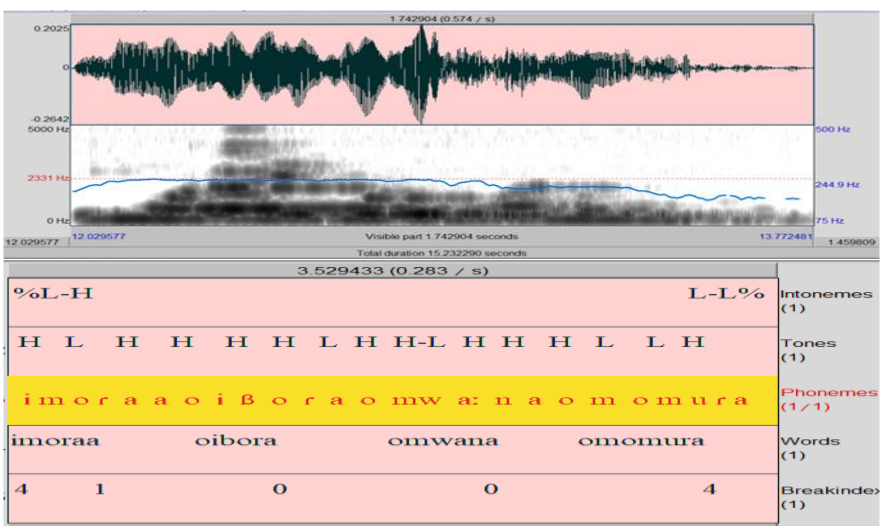

Figure 4.5: Pitch track for the utterance /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/ produced by F2Y

Following the main arguments of the A-M Theory that intonation structure be presented in terms of hierarchically ordered tiers, Figure 4.5 shows the two continuous audio recording of the utterance in the upper window. This window shows that F2Y pronounced the SF utterance at an F0 of 244.9 Hz. The lower window, which shows the symbolic strings, reveals that the utterance was articulated as one intonation phrase with a %L-H, initial intoneme and an L-L%, final intoneme. Although the utterance has H final tone, the pitch curve in the upper window reveals that it ends in a L-L % boundary tone. Again, the H final tone is lower than even the preceding L tones. The break index tier shows an ordinary phrase-internal word end marked by the index value of 1 between the words /ímòɾáá/ 'moraa' and /óíβòɾá/, an indeterminate boundary between the words /óíβòɾá/ 'gave birth' and /ômwáání/ 'child' and between /ômwáání/ 'child' and /ómòmùɾá/ 'boy' and an intonation phrase-end marked by the index value of 4 at the end of the utterance.

Given that participants pronounced this utterance at varied F0 ranges, a summary of the F0 means produced by the 24 participants is presented in Table 4.2.

Table 4.2: Comparison of F0 means for the NF utterance /ímòɾáá óíβòɾá ômwáánáa ómòmùɾá/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	248.900	22.16506
	Male	3	238.400	11.73584
	Total	6	243.650	16.87255
Middle Age	Female	3	189.400	23.05385
	Male	3	120.633	4.53909
	Total	6	155.017	40.49061
Advanced Age	Female	3	205.767	1.96554
	Male	3	159.133	36.98166
	Total	6	182.450	34.65549
Youth	Female	3	243.400	6.57951
	Male	3	144.900	10.35905
	Total	6	194.150	54.50610
Total	Female	12	221.867	29.63902
	Male	12	165.767	49.21445
	Total	24	193.817	48.98497

Data in Table 4.2 above show declining F0 ranges with age. Children once more produced the utterance at the highest F0 range. The youth and the advanced-aged participants followed them. The middle-aged group had the least F0. The highest F0 for the utterance was produced by the female children while the lowest by the middle-aged males. Apart from such age differences, there were also sex differences noted in the F0 ranges. The female participants had higher F0s than the male ones. On average, the utterance was produced at an F0 of about 194 Hz. The distribution of F0 scores for the different age groups for the utterance /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/, 'Moraa has given birth to a baby boy,' is graphically displayed in Figure 4.6.

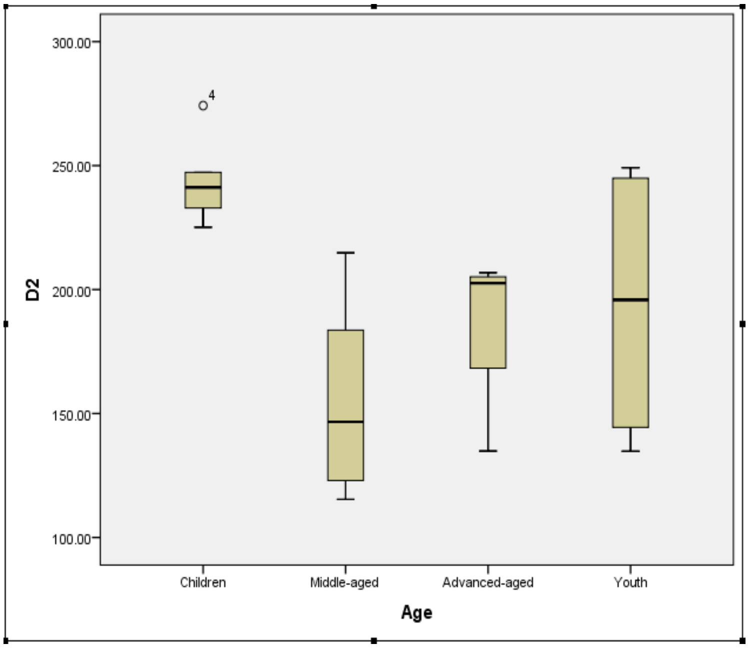

Figure 4.6: Age-related distribution of F0 scores for /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/

Figure 4.6 shows that in the children group, the median was in the middle of the box. However, there were F0 values considered much higher than the majority of the F0 scores. This is shown by the little circle with the number 4 attached above it in the upper end of the children box. The number tells us that the higher F0 scores for the children extended 4 box lengths from the edge of the box. Such values, following Pallant (2005), are considered outliers. Since such scores were not extreme scores, they were considered as being within the range of possible scores in the children's F0 production. From the middle-aged participants' box plot, it should be noted that the median is closer to the bottom of the box and the whisker on the bottom of the box is shorter than the one on the top of the box. This means the F0 scores had a right-skewed distribution for these participants. On the other hand, the median is closest to the top of the box in the advanced-aged participants whose upper whisker is also shorter than the lower one. This shows that the advanced-aged participants had their F0 scores negatively skewed. Though the median for the youth group is in the middle of the box, their F0 scores were also skewed negatively since the whisker on the upper end of the box is shorter than the one on the bottom. The different sizes of the boxes reveal differences in the interquartile ranges (IQR). The children's short box relates to their small IQR while the youth's longer box relates to a large IQR. Given that children participants had the smallest IQR, then it means their F0 scores were less dispersed. The youth's highest IQR points to the fact that their F0 scores were more spread than in the other age groups.

Figure 4.7 displays the distribution of F0 scores for females and males in the same utterance.

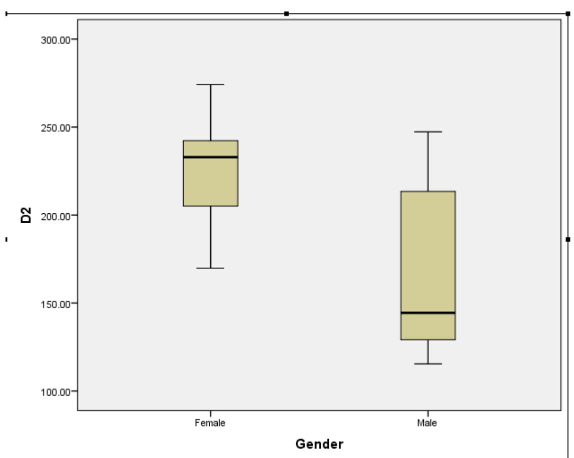

Figure 4.7: Sex-related distribution of F0 scores for /ímòɾáá óíβòɾá ômwáánáˊ ómòmùɾá/

Figure 4.7 indicates that the median for the female F0 scores is closer to the top end of the box while that for the male participants is closer to the bottom end of their box. In addition, the whisker on the lower end in the male participants is shorter than that on the upper end while the whiskers on both the lower and upper ends for the female participants are almost the same. The implication of this is that while the female participants' scores were negatively skewed those of male participants had a positive skew. From the lengths of the boxes in Figure 4.7, we can also conclude that female participants had their F0 scores less dispersed than the males.

In conclusion, three findings emerged from the analyses in this section. First, a sentence focus utterance in Ekegusii was produced as a single intonation phrase. There was no intermediate intonation phrase as was witnessed in the argument and predicate focus structures discussed in Sections 4.3 and 4.4. Second, a sentence focus utterance in Ekegusii was produced with gradual declination and downstep of H tones occurring after other H tones. As already pointed out in Chapter 3, declination is a phonological characteristic of all declarative utterances in Ekegusii. This means, therefore, that a sentence focus structure in Ekegusii is a declarative utterance. Third, there were age and sex variations in the F0 production of the sentence focus structures. Roughly, participants uttered a sentence focus utterance in Ekegusii at an average F0 of 195 Hz. The above observations form the basis of comparison with the other information focus structures discussed in Sub-sections 4.3 and 4.4.

4.3 Argument Focus

This section presents an analysis of the intonation features of the narrow information focused constituents occurring in the utterance-initial position. Literature has shown that narrow information focusing can be realized either to the left or right-hand side of an utterance. Those that occur to the left fall under the argument focus (AF) and those occurring to the right fall under the predicate focus (PF). The AF is also referred to as 'identification focus.' This type of focus adds a new argument to the predicate of the utterance and was taken in this study to represent the marked form. The predicate focus, discussed in section 4.4, is the unmarked form. The AF occurs when the domain of the proposition focus is its argument.

To prompt focus in the sentence-initial argument, six question-answer pairs were used. The context questions were marked by Ekegusii question words like /níŋkì/ 'what' or /níŋò/ 'who' to indicate that something or somebody did something. The target constituents were the leftmost noun phrases. These have been marked in square brackets and bear an AF (argument focus) mark. Constituents without an AF mark represent given information as the examples 41b, 42b, 43b, 44b, 45b, and 46b show.

41b. [nómòtòká nàɾínêté]$_{AF}$ óɲôɾá ómòβásòkànò. '[It is the car I boarded] that was involved in an accident.'

42b. [ímóɾáá]$_{AF}$ óíβóɾà ômwáːná ómòmùɾá. '[It is Moraa] that delivered a baby boy.'

43b. [ŋˊkéɾêβí]$_{AF}$ óŋèèntá ômwáːná òjé. '[It is Kerebi] that strangled her child.'

44b. [nómòkúːŋgú]$_{AF}$ óâkà ómòsâʧà óɾòé. '[It is the woman] that slapped the man.'

45b. [nómóíséké]$_{AF}$ óɾùsíá óβòɾìtò. '[It is the girl] that aborted.'

46b. [ŋkémùːntó]$_{AF}$ óŋâká έtεˆγὲ. '[It is Kemunto] that kicked me'

Again, since all the propositions above were similar with respect to their information structuring features, 41b and 42b were used for the illustration of IS and A-M presentation. The derivation and articulation of the other propositions with argument focus is given in appendix 8.

41b i. Context question: /níŋkì kjááɲôɾá ómòβásòkànò/? 'What got an accident?'

ii. Answer: / [nómòtòká nàɾínêté]$_{AF}$ óɲôɾá ómòβásòkànò/ ‘[It is the car I boarded] that was involved in an accident.’

iii. Pragmatic presentation of (ii)

Presupposition: x / óɲôɾá ómòβásòkànò/, ‘x got an accident’

Assertion: x= /nómòtòká nàɾínêté/ ‘x= the car I boarded.’

Focus: [nómòtòká nàɾínêté] ‘[the car I boarded]’

Focus domain: Noun phrase

In the IS analysis, the presentation in 41b (ii) is interpreted as an open proposition in that it is not the truth value in it that is of concern but rather its assumed availability on the mental state of the addressee at the time it is uttered. This open proposition, unlike the proposition in 41a, consists of a pragmatic presupposition and a pragmatic assertion. In Lambrecht’s (1994) terms, a pragmatic presupposition refers to the information part of the sentence that is assumed to be shared between the speaker and hearer and is lexicogrammatically evoked. The speaker in (41bii), has assumed that the hearer has the knowledge, that is, already knows that there is something which was involved in an accident. This knowledge is assumed to be recoverable from the context question, which indicates that there is something /kjááɲôɾá ómòβásòkànò/ ‘was involved in an accident’. The pragmatic assertion identifies that something to be /ómòtòká nàɾínêté/ ‘the car I boarded’. This information cannot be taken for granted at the time of speech. It forms what the speaker presents as new information that the hearer was not expected to predict or recover on hearing the proposition in (41bii) uttered. Therefore, /ómòtòká nàɾínêté/, ‘the car I boarded’ has a focus relationship to the proposition /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/ ‘it is the car I boarded that was involved in an accident’since its inclusion in the utterance makes it a piece of new information. The difference between the proposition in (ii) and the pragmatic presupposition is the assertion /nómòtòká nàɾínêté/ ‘the car I boarded’. Following Fery (2017), the presupposition x /óɲôɾá ómòβásòkànò/ represents the ‘given’ information while the the assertion /nómòtòká nàɾínêté/ ‘the car I boarded’ represents the ‘new’ information. It should be noted too that, syntactically, the focus constituent is embedded in a cleft construction using the dummy subject /nó/ ‘it is’.

Figure 4.8 presents the pitch track for a female youth’s pronunciation of the proposition /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/.

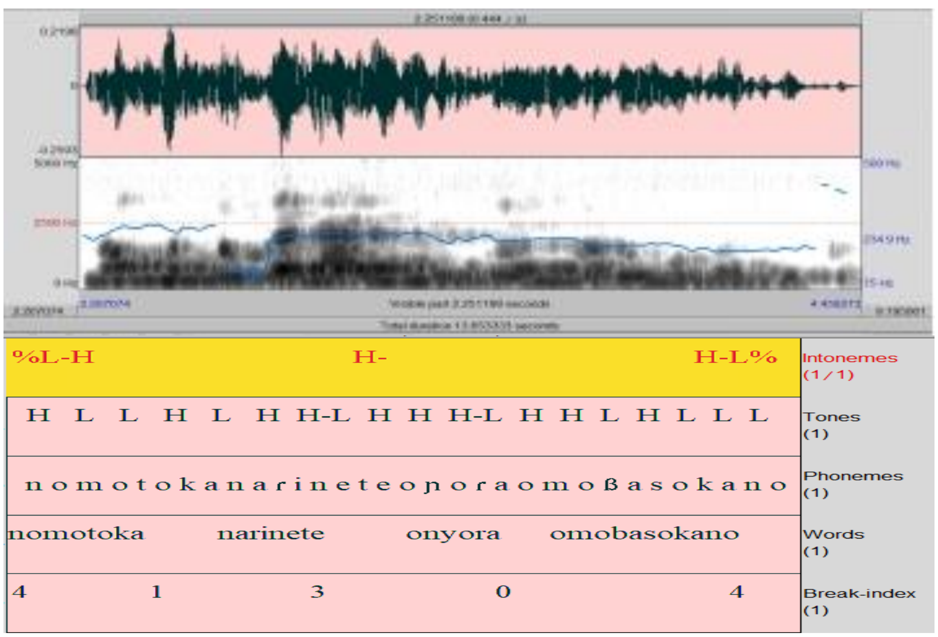

Figure 4.8: Pitch track for the AF utterance /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/ produced by F2Y

From Figure 4.8 we note the following. First, the female youth, F2Y, articulated the utterance at an F0 range of about 235 Hz. The same participant pronounced this utterance at an F0 of 233

Hz in the NF condition. This means that the AF is produced at a higher F0 than the NF. Second, there is an intermediate intonation phrase break after the NP /nómòtòká nàɾínêté/ ‘the car I boarded’. This intermediate intonation phrase is marked as H- in the intonemes tier. Following the ToBI trascription annotation (Beckman, 2005), this intermediate intonation phrase is also marked with a break index of 3 in the pitch track. In Ladefoged (2005) approach, the break within an intonation phrase is marked using a single vertical line while the utterance-end is marked using double vertical lines in the phonetic transcription. Therefore, the Ekegusii utterance above is marked as, /nómòtòká nàɾínêté|óɲôɾá ómòβásòkànò||/ ‘It is the car I boarded| that was involved in an accident||/. In terms of phrasing, this means that the Ekegusii AF utterance has two intonation phrases. Ladefoged (2005) observes that when this happens, the first intonation phrase (focused constituent) ends in a continuation rise that signals that the speaker is going to say more to complete the utterance. In the A-M Theory (Beckman, 2005), this is interpreted as the insertion of a boundary tone after the focused NP. This process is called rephrasing and has been observed in a Bantu language like Chichewa (Downing and Pompino-Marschall, 2004).

The pronunciation of the focus constituent alone, /ómòtòká nàɾínêté/, ‘the car I boarded’ in both the AF and NF conditions is illustrated in the pitch tracks in Figure 4.9. These were produced by the female youth, F2Y.

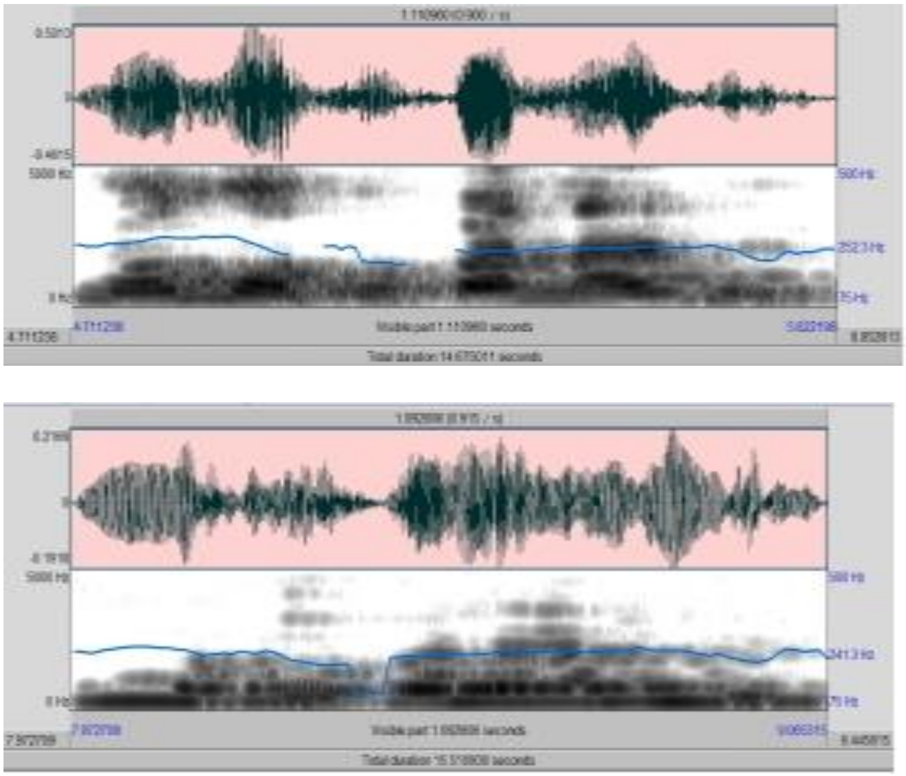

Figure 4.9: Pitch tracks for the AF and NF production of /ómòtòká nàɾínêtè/ by F2Y

As shown in the top pitch track in Figure 4.9, the constituent, /ómòtòká nàɾínêtè/, ‘the car I boarded’ was produced by F2Y at an F0 of 252 Hz in the argument focus condition. However, it was produced, as shown by the bottom pitch track, at 241 Hz in the NF condition. This implies that an initial-argument focus constituent in Ekegusii is characterised by a higher F0 than the same constituent in the NF construction. Equally, analysis of the post-focus constituents shows that they were produced at a lower F0 than the focus one. This implies that intonation influences the focus structure of an utterance.

Consistent to findings in Section 4.2, a phonetic description of the proposition /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/, ‘it is the car I boarded that was involved in an accident’ shows that there were age and sex variations in the F0 production. A summary of the mean F0 production by the 24 participants is contained in Table 4.3.

Table 4.3: Comparison of F0 means for the AF utterance /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/

Age	Sex	N	Mean	Std. Dev
Children	F	3	241.100	11.79322
	M	3	232.433	14.68412
	Total	6	236.767	12.82243
Middle-aged	F	3	208.100	19.60306
	M	3	120.600	14.04244
	Total	6	164.350	50.29377
Advanced-aged	F	3	194.233	3.80832
	M	3	156.233	14.55827
	Total	6	175.233	22.88621
Youth	F	3	230.300	9.65971
	M	3	148.067	3.47035
	Total	6	189.183	45.50646
Total	F	12	218.433	21.95737
	M	12	164.333	44.63477
	Total	24	191.383	44.12390

Table 4.3 indicates that participants varied in their F0 production. For example, children produced the utterance at the highest F0 while the middle-aged produced it at the lowest.

Children also had the smallest standard deviation, 12.82; followed by the advanced-aged, 22.89; and the youth, 45.51, groups. The middle-aged group had the highest standard deviation, 50.29. This gives the impression that children varied less in the production of the highest and lowest F0 than the advanced-aged and the youth participants with the middle-aged participants displaying the widest disparity between their highest and lowest fundamental frequency. A visual presentation of the age differences is contained in Figure 4.10.

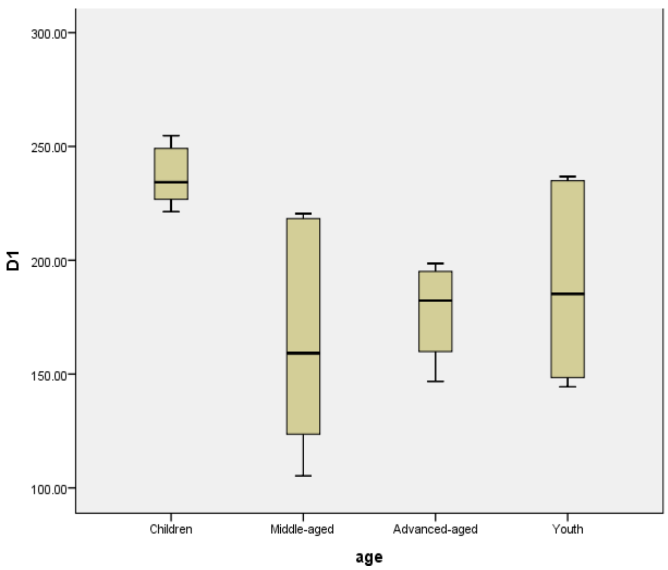

Figure 4.10: Age-related distribution of F0 scores for the AF utterance /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/

From Figure 4.10 we note that the interquartile range smallest in children, followed by advanced-aged and the youth. It is largest in the middle-aged group.

Table 4.3 also shows that male and female participants varied in the F0 production of /nómòtòká nàɾínêtè óɲôɾá ómòβásòkànò/ 'it is the car I boarded that got an accident'. Female participants recorded higher F0s (218 Hz) than the male ones (164 Hz). Females also had a smaller standard deviation (21.96) than their male counterparts (44.64) did. This suggests that female participants were more harmonious than the males in the production of F0. Figure 4.11 graphically displays the sex differences in F0 scores distribution for the utterance /nómòtòká nàɾínêtè óɲôɾá ómòβásòkànò/ ‘it is the car I boarded that was involved in an accident’.

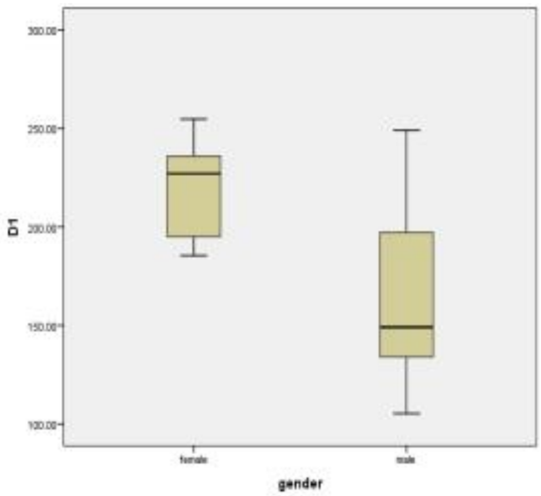

Figure 4.11: Sex-related distribution of F0 scores for /nómòtòká nàɾínêté óɲôɾá ómòβásòkànò/

As Figure 4.11 reveals, the boxplot for the female participants is smaller than that for the male ones. This also means that the interquartile range is smaller in females than in males, which means that female participants had their high and low F0 scores less spread from the median than in the male participants. Secondly, the female participants’ higher F0 values are closer to the median than the lower F0 values while in the male participant, lower F0 values are closer to the median than the higher values. Overall, the mean F0 for the utterance is about 191 Hz. This is slightly higher than what was realised when the same participants pronounced the same utterance in the neutral focus condition (189 Hz).

In (42b), the context question asks for information about who gave birth to a baby boy. The answer /ímòɾáá óíβòɾá ômwáːná ómòmòɾá/ 'it is moraa that gave birth to a baby boy'has its information structure as shown in (42biii).

42b i. Context: /níŋò óíβóɾà ômwáːná ómòmùɾà/? 'Who gave birth to a baby boy?'

ii. Answer: / [ímòɾáá] $_{AF}$ óíβòɾá ômwáːná ómòmùɾá/ '[It is Moraa] that gave birth to a baby boy.'

iii. Pragmatic presentation of (ii)

Presupposition: x /óíβòɾá ômwáːná ómòmùɾá/ 'x gave birth to a baby boy'.

Assertion: x= / ímòɾáá/ 'x=it is Moraa'

Focus: /ímòɾáá/ 'It is Moraa'

Focus domain: Noun phrase

The above presentation shows that the context question in (i) sets the proposition that somebody gave birth to a baby boy and the answer in (ii) not only acknowledges this proposition but also asserts that it is /mòɾáá/ who did so. The speaker in (ii) repeats the phrase /óíβòɾá ômwáːná ómòmùɾá/, which had been uttered in the context question in (i). In Lambrecht's (1994) IS, the repeated phrase forms the 'given' information. The speaker in (ii), however, does not just repeat what is contained in (i) but also gives the additional information that /ímòɾáá/ 'it is Moraa' and not any other person who did it. The expression /ímòɾáá/ 'it is Moraa,' is the focus of the proposition. Such expressions, according to Fery (2017), indicate the presence of alternatives, which are relevant for their interpretation. It should also be noted that the argument focus constituent /ímòɾáá/ is, syntactically, embedded in a cleft construction using the syntactic expletive pronoun /í/, ‘it’. A similar expletive /nó/ ‘it is’ was used in (41b) to introduce the argument focus /ómòtòká/ ‘car’.

The proposition /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/ ‘it is Moraa that gave birth to a baby boy’ produced by the young female participant, F2Y, is analysed in the A-M Theory as displayed in the pitch track in Figure 4.12.

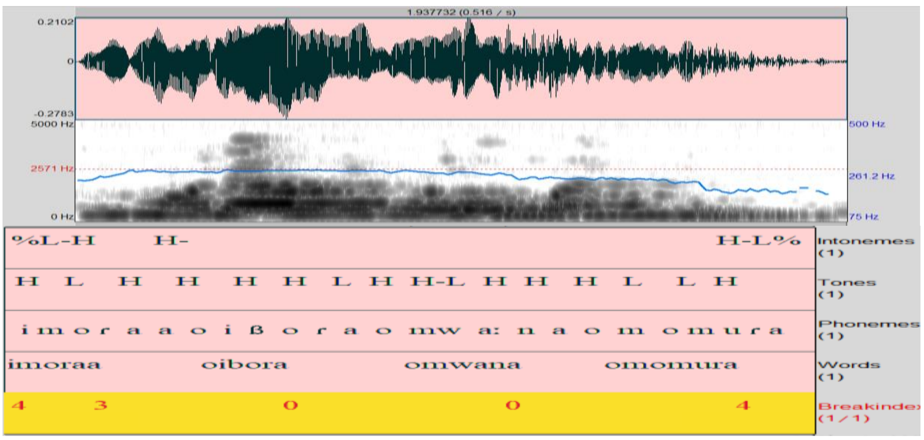

Figure 4.12: Pitch track for the AF utterance /ímòɾáá óíβòɾá ômwáːná ómòmùɾá/ produced by F2Y.

Following the basic tenets in the A-M Theory, Figure 4.12 shows that the focused constituent, /ímòɾáá/, forms an intermediate intonation phrase, which is marked by the break index of 3 in the break-index tier. This intermediate phrase ends in a high tone marked as H- in the intonemes tier. The intonemes tier also shows that the utterance ends in H-L% boundary tone. In isolation, this constituent was produced at an F0 of 280 Hz. The same constituent was produced at an F0 of 261 when it was in the neutral focus structure as shown in Figure 4.5. This further shows that an argument focused constituent in Ekegusii is produced at a higher F0 than the same constituent in a non-focus structure. Figure 4.12 equally shows that the focus constituent forms a minor intonation phrase. As already indicated, this ends in an H- tone. This indicates that an intonation phrase break is inserted after the focused constituent. Within the IS framework, this is transcribed as, /ímòɾáá| óíβòɾá ômwááná ómòmùɾá||/ ‘it is Moraa that gave birth to a baby boy’. The single vertical line after /ímòɾáá/ shows that this constituent forms a minor intonation phrase while the double vertical lines at the end of the transcribution signals a full intonation phrase. This means that the entire utterance is produced as two intonation phrases, that is, an intermediate intonation phrase and a full intonation phrase.

Given that participants varied in their F0 output for the utterance /ímòɾáá óíβòɾá ômwááná ómòmùɾá/ ‘it is Moraa that gave birth to a baby boy,’ Table 4.4 presents a summary of the F0 production by all the 24 participants.

Table 4.4: Comparison of F0 means for the AF utterance /ímòɾáá óíβòɾá ômwáánáá ómòmòɾá/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	247.9667	13.47454
	Male	3	247.9667	10.68753
	Total	6	247.9667	10.87725
Middle Age	Female	3	215.9667	33.51199
	Male	3	120.3000	11.01454
	Total	6	168.1333	56.95070
Advanced Age	Female	3	197.1667	4.25245
	Male	3	147.6333	24.05833
	Total	6	172.4000	31.22211
Young	Female	3	251.7667	10.66130
	Male	3	147.4667	3.78594
	Total	6	199.6167	57.57383
Total	Female	12	228.2167	28.68198
	Male	12	165.8417	52.32815
	Total	24	197.0292	52.13430

The mean F0 statistics in Table 4.4 above indicates that children produced the utterance at 248 Hz, the youth at 200 Hz, the middle-aged at 168 Hz and the advanced-aged at 172 Hz. Equally, the female youth produced the utterance at the highest F0. This is different from what was observed in the pronunciation of 41b, where the female children produced the utterance at the highest F0. In addition, similar to early observations made in this study on the F0 production, female participants produced the utterance at a higher F0, 228 Hz, than the male ones did, 197 Hz.

Figure 4.13 and 4.14 present a visual inspection of the age and sex distribution of F0 scores for the argument focus utterance /ímòɾáá óíβòɾá ômwáːná ómòmòɾá/ ‘it is Moraa that gave birth to a baby boy’.

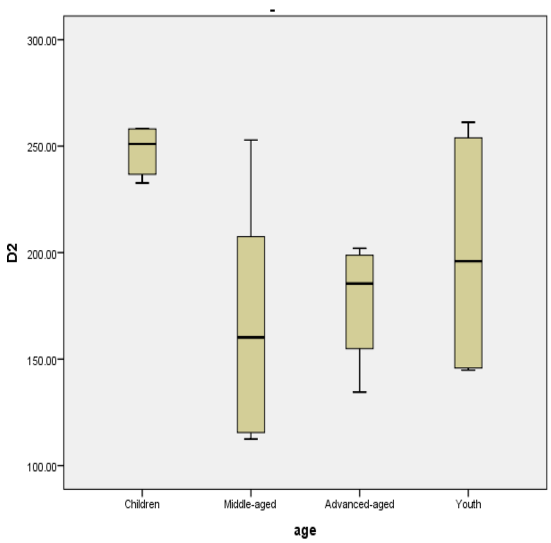

Figure 4.13: Age-related distribution of F0 scores for the AF utterance /ímòɾáá óíβòɾá ômwáːná ómòmòɾá/

Figure 4.13 shows that children and the advanced-aged groups had F0 scores that were negatively skewed. This is shown by the short whiskers on the upper end of the box than the lower end. The middle-aged and youth groups, on the other hand, had a shorter whisker on the lower end of their boxes than the upper end. This indicates that their F0 scores had a positive skew.

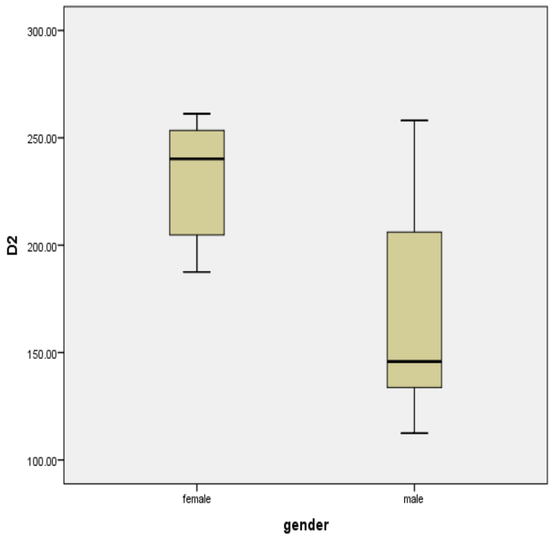

Figure 4.14: Sex-related distribution of F0 scores for the AF utterance /ímòɾáá óíβòɾá ômwáání ómòmòɾá/.

Figure 4.14 shows that the female participants had their median F0 score close to the top of the box. They also had a shorter whisker on the upper end of the box than on the lower end. On the other hand, the male participants had their median F0 score closer to the bottom of the box. Equally, their whisker on the lower end of the box was shorter than the one on the upper end of the box. These observations mean that the female participants had negatively skewed F0 distributions while the male ones had positively skewed scores.

To find out whether the differences in F0 between males and female in both the children, the youth, middle-aged and advanced-aged participants' in all the utterances with argument focus (41b, 42b, 43b, 44b, 45b and 46b) were statistically significant, tests of between-subjects effects were carried out. Results in Table 8.6 (Appendix 8) show that the main effect of age and sex were statistically significant (P= .001 and .000 for age and sex, respectively). However, the interactional effect of age and sex was not statistically significant since the p-value obtained (.060) is higher than the alpha .05. It was also established that the magnitude of the differences in the means was very large for age, sex and the interaction of age and sex. Readings from the partial eta squared column show that age had an effect size of .658, sex .983 and the interaction effect was .496. According to Cohen's (1988), this indicates a very large effect size given that an effect size can range between 0 and 1. A very large effect size denotes that the differences noted between the sex groups and among the different age groups, in the F0 production, were not because of chance.

In toto, the analysis of the AF structure has revealed that the argument focus structures have the leftmost subject NPs under focus and, like in French (Alzaid, 2014), are expressed through cleft constructions. In addition, the argument focus structures were articulated at an average F0 of about 201 Hz, which indicates that these structures were articulated at a higher F0 than the sentence focus structures. Results have also shown that a constituent in the AF structure forms an intermediate intonation phrase that ends in a small rise marked by an H- tone in the tones tier and an index value of 3 in the break-index tier. This implies that an argument focus proposition is realised as two intonation phrases. Equally, the analyses have shown that there were age and sex differences in the realization of the F0 ranges for the AF condition. Generally, for each utterance type, children had the highest F0 values and less dispersion of F0 scores from their median F0. The youth, the advanced-aged and the middle-aged groups, respectively followed them. This further indicates that the F0 production of an utterance in Ekegusii decreases with age from the children to the youth and the middle-aged participants before it again increases with the advanced-aged group. Again, female speakers realized higher F0s than their male counterparts.

In this section, a description of the intonation features of the AF structures in Ekegusii has been given. Section 4.4 describes the intonation primitives in the predicate focus.

4.4 Predicate Focus

In Section 4.3, the intonation features of the initial argument focus structure have been described. Findings have indicated that an utterance with AF is produced as two intonation phrases and that there are F0 differences between an AF and a NF utterance. In this section, we describe the intonation primitives in the predicate focus structure. The predicate focus type is also called 'categorical focus.' According to Lambrecht (1994), this type of focus is the unmarked pragmatic articulation and occurs when the predicate (verb and its complements: objects, complements, locative and temporal adverbs) is the focus domain and the subject argument is marked as a topic and therefore excluded from the focus domain. The subject argument falls within the presupposition. The analysis of the predicate focus in the current study was based on the IS derivations for the propositions marked PF in 41c, 42c, 43c, 44c, 45c and 46c.

41c. /ómòtòká nàɾínêtè [nîγó ôɲôɾá ómòβásòkànò]$_{PF}$. 'The car I boarded was involved in an accident.'

42c. /mòɾáá [nîγó áíβòɾá ômwáːná ómòmùɾá]$_{PF}$. 'Moraa delivered a baby boy.'

43c. /kéɾɛβí [nîγó áŋɛ́ɛ́ntá ômwáːná òjé]$_{PF}$. 'Kerebi strangled her child.'

44c. /ómòkûːŋgú [nîγó ámwâːká ómòsâʧà óɾòé] $_{PF}$/. 'The woman slapped the man.'

45c. /ómòíséké [nîγó áɾûsíá óβòɾìtò]$_{PF}$/. 'The girl aborted.'

46c. /kèmùːntó [nîγó áŋâká ɛ́tɛ̂γɛ̀]$_{PF}$ ‹Kemunto kicked me’

In each of the derivations for the propositions above, the predicate is made up of more than one word (two, three or four words). Following Chen (2011), this should be treated as a form of broad focus. Consequently, the PF constructions were compared to the other broad focus structures in the sentence focus. As already done in the NF and AF conditions, the analysis of the PF condition was also restricted to the utterances in 41c and 42c. The audio outputs for the other predicate focus utterances are given in Appendix 9.

41c. i. Prompt Question: /níŋkì kjáːβêɾá ómòtòkà kwàːɾínêtè /? What happened to the car you boarded?

ii. Answer: /ómòtòká nàɾínêtè nîγó [ôɲôɾá ómòβásòkànò]$_{PF/}$ ‘The car I boarded was involved in an accident.’

iii. Pragmatic representation of (ii)

Presupposition: x happened to /ómòtòkà/

Assertion: ‘‘x= ôɲôɾá ómòβásòkànò ‘x=was involved in an accident’

Focus: ‘‘ôɲôɾá ómòβásòkànò’’ ‘was involved in an accident’

Focus domain: Verb Phrase

The prompt question in (4ci) presupposes that something happened to /ómòtòkà/ ‘the car’. In Lambrecht’s (1994) IS account, the presupposition evoked in the answer is that / ómòtòkà/ ‘the car’ is pragmatically available as a topic for comment x. This topic is excluded from the focus domain for the speaker in (ii) assumes the hearer can recover this from the context question in (i). In the IS model, the topic NP /ómòtòká nàɾínêtè/ constitutes the shared or given information and the pragmatic assertion, /ôɲôɾá ómòβásòkànò/ 'was involved in an accident,' establishes the aboutness relation between the topic referent and the event marked by the VP predicate. The assertion therefore forms the new information in the sense that it cannot be recoverable from the context question. This constituent provides the information the question in (i) asks for and thus forms the focus of the utterance as it also provides a set of alternatives. The assertion is a verb phrase consisting of the lexical verb /ôɲôɾá/ 'was involved' and the object noun phrase, /ómòβásòkànò/, 'an accident' and is introduced by the dummy /nîγó/.

The phonetic characteristics of F2Y's pronunciation of /ómòtòká nàɾínêtè ôɲôɾá ómòβásòkànò/, 'the car I boarded was involved in an accident,' is displayed in Figure 4.15. The windows in the pitch track were developed in line with Pierrehumbert's (1980) A-M Theory to show the waveforms, fundamental frequency values, and the ToBI transcription system.

Figure 4.15: Pitch track for the PF utterance /ómòtòká nàɾínêtè nîɣó ôɲôɾá ómòβásòkànò/ produced by F2Y

Figure 4.15 shows that F2Y produced the utterance at an F0 of 239 Hz. The same participant produced the same structure at 233 Hz when in the neutral focus condition. This indicates that there is an increase in F0 when a speaker focuses some part of an utterance than when the whole utterance is under focus. An auditory analysis of the above articulation indicated that the utterance was pronounced with the insertion of an intermediate intonation phrase to the left of the focus phrase, such that the utterance is transcribed as, /ómòtòká nàɾínêtè nîɣó |ôɲôɾá ómòβásòkànò||/. In the ToBI annotation system, the intermediate intonation phrase is marked as L- in the intonemes tier and by 3 in the break-index tier. The implication of this observation is that predicate focusing, just like the argument focusing, induces the rephrasing of a proposition. Further prove that focus has an effect on the intonation of a proposition can be obtained from a consideration of the F0 of the focus phrase in isolation. The pitch tracks in Figure 4.16 compare the PF and NF pronunciation of the predicate /ôɲôɾá ómòβásòkànò/ 'was involved in an accident.' The panel at the top indicates its pronunciation under the PF while the one at the bottom shows its articulation under the NF.

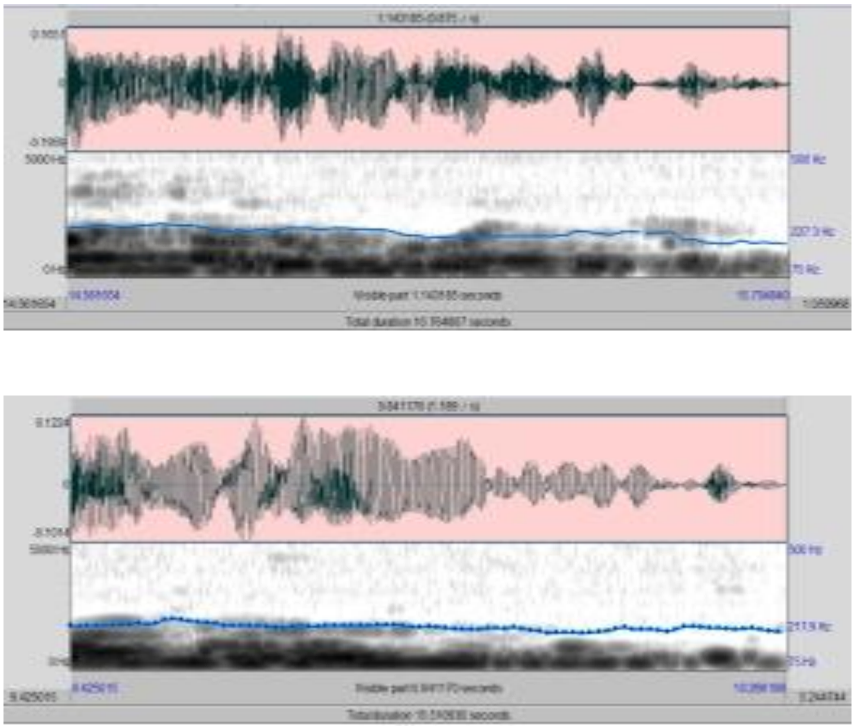

Figure 4.16: Pitch tracks for the PF and NF pronunciation of /ôɲôɾá ómòβásòkànò/

From the pitch tracks in Figure 4.16, it is noted that the predicate focus was produced at 227 Hz but at 218 Hz in the NF structure. The analysis of the the pre-focus constituent, /ómòtòká/, 'the car' shows that it was produced at a higher F0 than the PF focus constituent. This reveals that when the predicate is under focus there is a lowering in F0. The conclusion to be drawn from this is that the realization of the F0 of an utterance in Ekegusii is influenced by its information structuring. These results are similar to research findings from West-Germanic and some Romance languages (Chen, 2011) where pitch variation has been shown to provide a phonetic clue to focus condition.

Since the analysis above has indicated that participants realised different F0s in their articulations, Table 4.5 presents a summary of the mean F0 production for the utterance /ómòtòká nàɾínêtè ôɲôɾá ómòβásòkànò/ 'the car I boarded was involved in an accident'.

Table 4.5: Comparison of F0 means for the PF utterance /ómòtòká nàɾínêtè ôɲôɾá ómòβásòkànò/

Age	Sex	N	Mean	Std. Dev
Children	F	3	237.967	15.03208
	M	3	236.167	9.54690
	Total	6	237.067	11.30551
Youth	F	3	235.900	12.51080
	M	3	138.400	12.01998
	Total	6	187.150	54.51857
Middle-aged	F	3	214.467	14.39247
	M	3	129.500	7.95424
	Total	6	171.983	47.68612
Advanced-aged	F	3	213.067	20.12569
	M	3	155.833	22.21944
	Total	6	184.450	36.63598
Total	F	12	225.350	18.11270
	M	12	164.975	45.66158
	Total	24	195.163	45.87999

Table 4.5 shows that children articulated the utterance with their vocal folds vibrating at an average F0 range of 237 Hz; the youth at 187 Hz; the middle-aged participants at 172 Hz; and

the advanced-aged ones at 185 Hz. Inconsistencies were noted in this utterance's articulation in that the female youth produced the utterance at a higher F0, 236 Hz, than the advanced-aged females (213) while the advanced-aged males had a higher F0, 156 Hz, than the male youth participants (138 Hz). Following earlier findings in sections 4.1 and 4.2, it was expected that the advanced-aged female participants would pronounce the utterance at a higher F0 than the middle-aged females. Results however, show that the middle-aged females had a higher F0 of 215 Hz than the advanced-aged ones, 213 Hz, ones. This is a further pointer to the fact that intonation features are under individual speaker's control and are not always to be attributed to a group of speakers. Again, unlike in the argument focus condition where the middle-aged participants displayed the highest variability in their F0 output, in this utterance with PF structuring it is the youth that have the highest variation. This is shown by the high standard deviation of 54.5.

Table 4.5 also shows that female participants produced the utterance at a higher F0 (225 Hz) than the male ones (165 Hz). The male participants, however, had a higher standard deviation (45.67) than the females (18.11). This was unexpected given that in each of the age groups (except the advanced-aged) the female participants had higher standard deviations than the male ones. To show the distribution of F0 scores in the different age and sex groups, the boxplots in Figure 4.17 and 4.18 were developed. As already pointed out, the length of the boxes represents the variable's interquartile range while the whiskers extending from the boxes on either side go out to the variable's smallest and largest values.

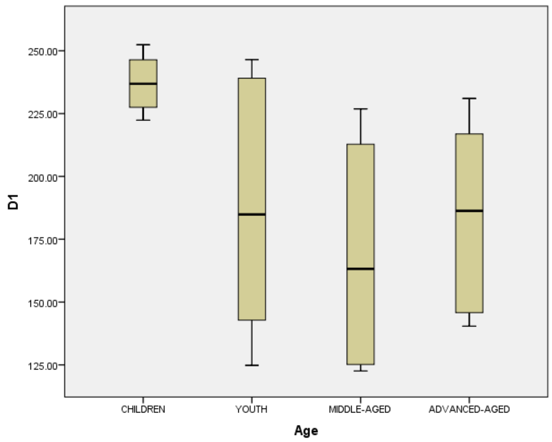

Figure 4.17: Age-related distribution of F0 scores for /ómòtòká nàɾínêté nîγó ôɲôɾá ómòβásòkànò/

Figure 4.17 shows that the interquartile range was smallest in children followed by the advanced-aged participants but was largest in the youth and middle-aged groups. The small interquartile range for the children implies that they varied less in their F0 production.

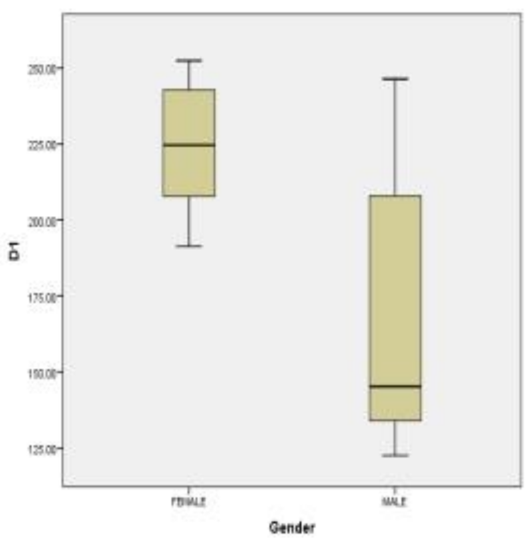

Figure 4.18: Sex-related distribution of F0 scores for /ómòtòká nàɾínêté nîγó ôɲôɾá ómòβásòkànò/

The distribution of scores in terms of sex as displayed in Figure 4.18 indicates that the interquartile range was smaller in females than in males. This reveals that females had less variability in their F0 production. The different sizes of the boxes in both Figure 4.17 and 4.18 provide a visual indication of how the F0 production varied according to age and sex. An overall account of the proposition, /ómòtòká nàɾínêtè ôɲôɾá ómòβásòkànò/ 'the car I boarded was involved in an accident' indicates that it was articulated at an average F0 of about 196 Hz.

The derivation of /mòɾáá nîγó áíβòɾá ômwáːná ómòmùɾá/ 'Moraa delivered a baby boy,' which is also articulated with the predicate under focus is schematically represented in (42c).

42c. i. Prompt Question: /níːŋkì mòɾàà àkòɾà/? 'What did Moraa do?'

ii. Answer: /mòɾáá nîγó [áíβòɾá ômwáːná ómòmùɾá]$_{PF}$. 'Moraa delivered a baby boy.'

iii. Pragmatic Presentation of (ii)

Presupposition: /mòɾàà nîγó àkòɾà/ x 'Moraa did x'

Assertion: x= /áíβòɾá ômwáːná ómòmùɾá/ 'x=delivered a baby boy'

Focus: /áíβòɾá ômwáːná ómòmùɾá/ 'delivered a baby boy'

Focus domain: verb phrase

In the schema above, the relevant presupposition evoked in the response to the context question is that /mòɾáá/ 'Moraa' is pragmatically available as a topic for comment x. /mòɾáá/ is thus available in the addressee's mind at the time of speech. In Fery's (2017) IS perspective, /mòɾáá/ expresses the given information. In producing the proposition /mòɾáá nîγó áíβòɾá ômwáːná ómòmùɾá/ 'Moraa delivered a baby boy,' the speaker presupposes that Moraa did something and that that something is /áíβòɾá ômwáːná ómòmùɾá] ‘delivered a baby boy’. áíβòɾá ômwáːná ómòmùɾá is the comment made about Moraa that stands in a contrastive relation with the proposition in (i) in that it cannot be recoverable from the context question. In IS terms, it forms the pragmatic assertion, which provides new information and thus the focus of the utterance in (42cii). Similar to (41c), this focus constituent is a predicate phrase and is introduced by the dummy word /nîγó/. The pronunciation of the proposition in (42cii) by F2Y is displayed in Figure 4.19.

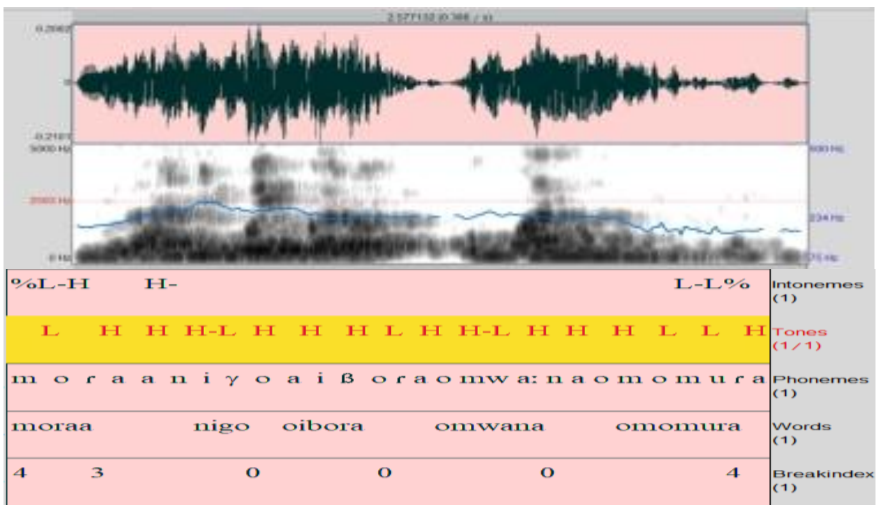

Figure 4.19: Pitch track for the PF utterance /mòɾáá nîγó áíβòɾá ômwáːná ómòmùɾá/ produced by F2Y

As shown in the continuous phonetic record in the upper window in Figure 4.19, F2Y produced the utterance at an F0 of 234 Hz. The same participant produced the same utterance at 245 Hz in the neutral focus structure, an indication that a PF structure has a lower F0 than the neutral focus one. In addition, the intonemes tier, in the lower window, shows that the utterance is articulated as two intonation phrases. The first one is an intermediate intonation phrase marked by a break index value of 3 in the break-index tier and an H- intoneme in the intonemes tier.

The second one is the full intonation phrase marked with a falling boundary tone, L-L%, despite the utterance having a H lexical tone in the last syllable. In Ladefoged's (2005) approach, the intermediate intonation phrase is marked by a single vertical line while the full intonation phrase is marked by a double vertical line as, /mòɾáá| nîγó áíβòɾá ômwáání ómòmùɾá||/. The articulation of the constituent /áíβòɾá ômwáání ómòmùɾá/ 'delivered a baby boy' by F2Y in both the PF and NF is presented in the pitch tracks in Figure 4.20. The pitch track at the top shows the articulation of the PF while that at the bottom represents articulation in the NF condition.

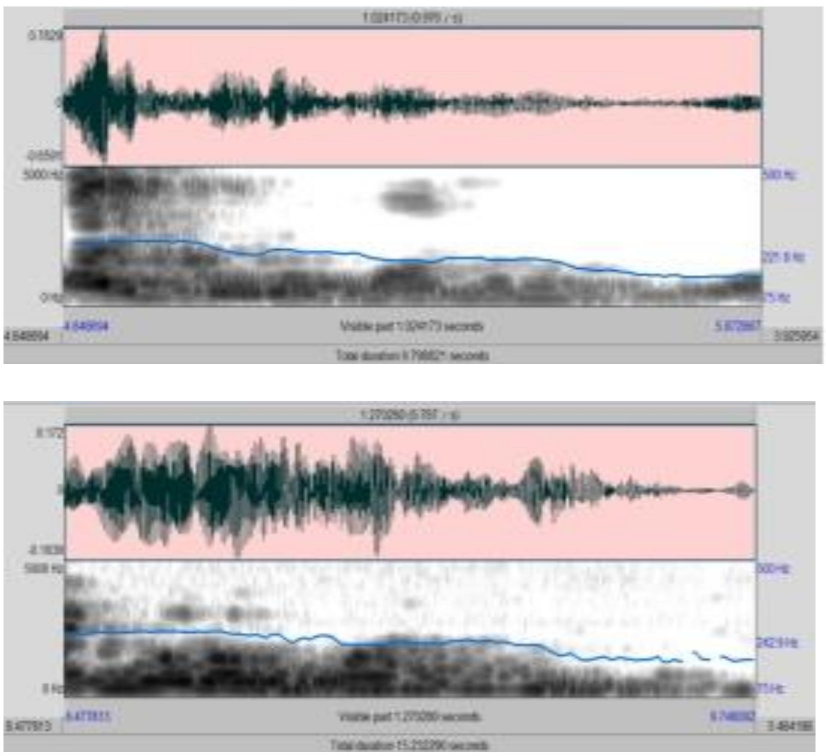

Figure 4.20: Pitch tracks for the PF and NFconstituent /áíβòɾá ômwáání ómòmùɾá/

Figure 4.20 indicates that the PF structure was pronounced at about 222 Hz while the NF one was done at about 242 Hz. There was also a steeper gradient of declination in the articulation of the PF than in the NF. The analysis of the pre-focus words / mòɾáá nîɣó/ 'Moraa did x' revealed that they were articulated at an F0 of 277 Hz. This was found to be higher than the F0 for the focus constituent (222 Hz). This suggests that PF induced F0 lowering in this utterance. Due to individual differences noted in the F0 range production of Ekegusii utterances, a summary of the 24 participants' mean F0 production for the proposition /mòɾáá nîɣó áíβòɾá ômwáːná ómòmùɾá/ is given in Table 4.6.

Table 4.6: Comparison of F0 means for /mòɾáá nîɣó áíβòɾá ômwáːná ómòmùɾá/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	252.9000	7.43572
	Male	3	235.0000	19.86228
	Total	6	243.9500	16.61454
Youth	Female	3	232.7667	16.58443
	Male	3	140.7667	11.98722
	Total	6	186.7667	52.02590
Middle Age	Female	3	193.7667	13.52122
	Male	3	126.5333	2.56970
	Total	6	160.1500	37.84002
Advanced Age	Female	3	214.1667	19.30656
	Male	3	162.5667	45.84652
	Total	6	188.3667	42.29216
Total	Female	12	223.4000	26.17410
	Male	12	166.2167	48.79851
	Total	24	194.8083	48.16176

Table 4.6 shows that children produced the utterance an F0 range of about 244 Hz; the youth at 1187 Hz; the middle-aged at 160 Hz and the advanced-aged at 188 Hz. Female children produced the utterance at the highest F0 (253 Hz) while the middle-aged male produced it at the lowest F0 range (127 Hz). Unlike in the pronunciation of utterance 41c (ii) where the youth group realized a higher F0 than the advanced-aged group, in 42c (ii), the advanced-aged group pronounced the utterance at a slightly higher F0 (188 Hz) than the youth (187 Hz). Similar to 41c (ii), female participants produced higher F0 (223 Hz) than males (171 Hz) in 42c (ii).

The distribution of F0 scores for the different age and sex groups in the production of the utterance /mòɾáá nîɣó áíβòɾá ômwáːná ómòmùɾá/ 'Moraa gave birth to a baby boy' is presented in Figure 4.21 and 4.22.

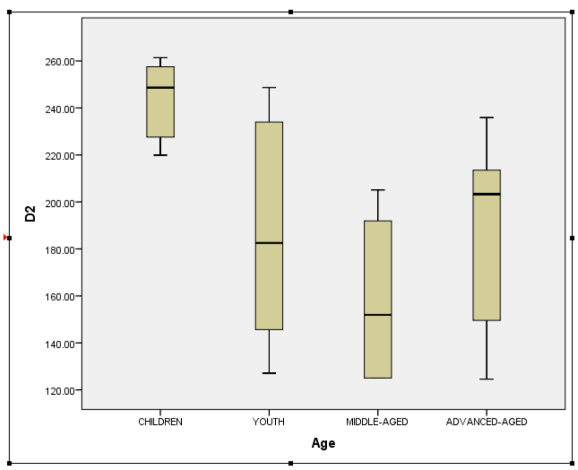

Figure 4.21: Age-related distribution of F0 scores for /mòɾáá nîɣó áíβòɾá ômwáːná ómòmùɾá

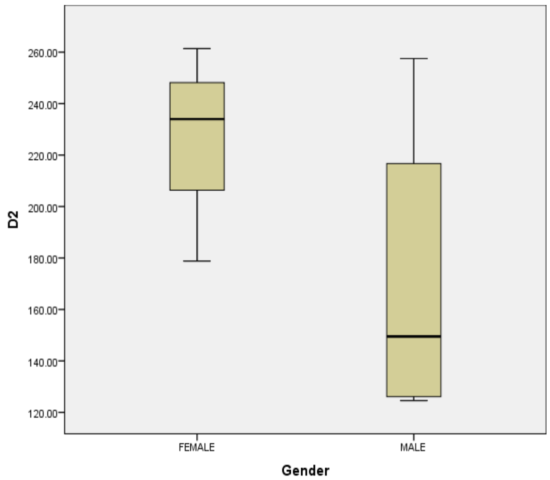

Figure 4.22: Sex-related distribution of F0 scores for /mòɾáá nîγó áíβòɾá ômwáːná ómòmùɾá/

Having established that the age and sex of the participant influence a speaker's fundamental frequency in a predicate focus propositions, the study also sought to find out whether the differences noted here were statistically significant. Results from the test of between-subjects effects in Table 9.6 (Appendix 9) shows that the interactional effect of age and sex was statistically significant in influencing F0 in the predicate focus (P=.001). Given that the interaction effect was statistically significant, an analysis of simple effects was done by running separate one-way ANOVA for age and sex. Results obtained indicate that the main effects of age and sex were also statistically significant (P= .005 and .000 for age and sex, respectively).

A comparison of the grand marginal means for each of the five utterances in the NF and PF conditions revealed that utterance 41a was produced at 187 Hz while 41c was produced at 195 Hz. Utterance 42a was articulated at 194 Hz but 42c at 195 Hz. Utterance 43a and 43c were both pronounced at 193 Hz. Utterance 44a was articulated at 199 Hz but 44c at 203 Hz. 45a was produced at 199 Hz but 45c at 207 Hz and 46a was done at 198 Hz while 46c was articulated at 199 Hz. On average, therefore the predicate focus utterance had a slightly higher F0 (198 Hz) than the neutral focus utterance (195 Hz). Similar results, where the predicate focus has higher F0s than the neutral focus, have been reported in Hijazi Arabic (Alzaid, 2014) where the F0 peaks of the words occurring within the predicate focus have been found to be higher than the F0 peaks of the same words under neutral sentence focus structure. We therefore conclude by reiterating our earlier assertion that focus leads to changes in the intonation patterns of an utterance in Ekegusii. In Section 4.5, we further demonstrate the influence of intonation on information structuring by describing the contrastive focus structure.

4.5 Contrastive Focus

In this section, an analysis of the intonation primitives in the contrastive focus structures is done. As already pointed out, a contrastive focused constituent is one that corrects or clarifies what has erroneously been assumed in a previous utterance. Ekegusii data have shown that contrastive focus is signaled through cleft sentences and occurs in a negative utterance. The negated utterance is a correction of the context question which takes a wrong assumption on the cause of the action expressed in the verb. Six contrastive focus structures in 41d-46d were used in the analysis with illustrations drawn for 41d and 42d. The derivation of the rest of the structures is displayed in Appendix 10. The contrastive focus constituent in the derivations is enclosed in square brackets and marked CF.

41d. /tóéɾètí ámàβútá [òóɲôɾá ómòβásòkànò]$_{CF}$/ ‘It did not run short of fuel but was involved in an accident’

42d. /táɾí ômwáːná ômóíséké áíβòɾá [nômwáːná ómòmùɾá]$_{CF}$/ ‘She did not deliver a baby girl but a baby boy.’

43d. /kɛ̀ɾɛ́βí tásîβètí ômwáːná ójé [nîγó âmóŋɛ̂ːntá]$_{CF}$/ 'Kerebi did not wash her child but strangled him / her.'

44d. /ómòkûːŋgú tásêɾètí ómòsâʧà [àmwáːká óɾòé]$_{CF}$/ 'The wife did not chase the husband but slapped him.'

45d. /ómòíséké táɲôɾétí ômwáːná [áɾûsia óβòɾìtò]$_{CF}$/ 'The girl did not deliver but aborted.'

46d. /táɾí òŋáù óŋâkà ɛ́tɛ̂γɛ̀ [íŋkèmùːntò]$_{CF}$/ 'It is not Ongau who beat me but Kemunto'

The derivation of /tóéɾètí ámàβútá òóɲôɾá ómòβásòkànò/ ' it did not run short of fuel but was involved in an accident' within IS is as shown in the schema that follows.

41d. i. Context question: /ómòtòká nóéɾá ámàβútà/? ''Did the vehicle run short of fuel?''

ii. Answer: /tóéɾètí ámàβútá [òóɲôɾá ómòβásòkànò]$_{CF}$ / 'It did not run short of fuel but was involved in an accident'.

iii. Pragmatic representation of (ii)

Pragmatic presupposition: [ómòtòká ôéɾá ámàβútá] 'the car ran short of fuel'

Pragmatic assertion: [òóɲôɾá ómòβásòkànò] 'it was involved in an accident'

Focus: [òóɲôɾá ómòβásòkànò] 'it was involved in an accident'

Focus domain: clause

In (41di), the speaker in the context question assumes that /ómòtòká óéɾá ámàβútà/ 'the vehicle ran out of fuel'. The answer in (41dii) does not only negate the assumption in (41di), /óéɾá ámàβútà/ 'it ran out of fuel' but also adds the information that /òóɲôɾá ómòβásòkànò/ 'it was involved in an accident'. Following Lambrecht's IS and insights from Fery (2017), the Ekegusii clause /óéɾá ámàβútà/ 'it ran out of fuel' is the pragmatic presupposition while /òóɲôɾá ómòβásòkànò/ 'it was involved in an accident' is the pragmatic assertion. In the IS framework, the pragmatic assertion carries unpredictable information that stands in a contrastive relationship with other constituents in (41dii) including /óéɾá ámàβútà/ 'it ran short of fuel'. In Fery's (2017) analysis, the clause /òóɲôɾá ómòβásòkànò/ 'it was involved in an accident,' is forms the new information in that it cannot be taken for granted at the time of speech. In uttering (41dii), /tóéɾètí ámàβútá òóɲôɾá ómòβásòkànò/ ''It did not run short of fuel but was involved in an accident,' the speaker asserts that the alternative proposition expressed by the speaker in (41di), /ómòtòká ôéɾá ámàβútá/, is not true. The information in the pragmatic assertion therefore is a correction of what the speaker in the context question erroneously assumes to be the situation. The propositions in (i) and (ii) therefore stand in a contrastive relationship with each other. It should also be noted that a CF constituent in Ekegusii is embedded in a negative clause construction. In the Ekegusii example given above, negation is morphologically signaled by the morpheme {-ti} in the word {tó-éɾè-tí} 'it did not run short of'.

According to leading linguists like Fery (2014), a CF structure has its own syntactic and prosodic characteristics and therefore forms an independent category of IS. Consequently, the pitch track in Figure 4.23 displays the intonation features of a young female participant's articulation of the proposition /tóéɾètí ámàβútá [òóɲôɾá ómòβásòkànò]$_{CF}$/.

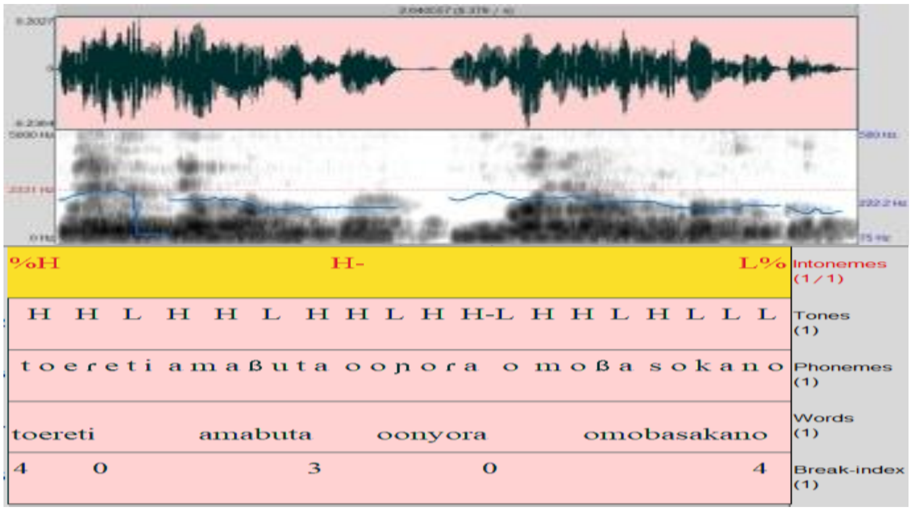

Figure 4.23: A summary of the mean F0 production for the utterance /tóéɾètí ámàβútá òóɲôɾá ómòβásòkànò/

Figure 4.23 reveals that the utterance was produced at an F0 range of 222 Hz. Following insights from Beckman's (2005) ToBI transcription, the lower panel in Figure 4.23 shows that the constituent /tóéɾètí ámàβútá/ forms an intermediate intonation phrase as the markings in the intonemes tier and the break-index tier show. The intonemes tier shows that the phrase /tóéɾètí ámàβútá/ ends in an H- intoneme. The break-index tier marks this minor intonation phrase with a break-index value of 3. The full intonation phrase is marked by an L% final intoneme. This means that CF is characterised by an insertion of an intonation phrase boundary to the left of the focused constituent. The phonological implication of this is that the proposition in (41dii) is said as two intonation phrases, which in Ladefoged's (2005) description are phonetically marked with a single and double vertical lines, respectively, as /tóéɾètí ámàβútá | òóɲôɾá ómòβásòkànò ‖/. The single vertical line marks the end of a minor intonation phrase while the double vertical lines mark the end of a full intonation phrase. The analyses further revealed that the focus constituent, /òóɲôɾá ómòβásòkànò/ 'it got an accident,' was produced on its own at an

F0 of about 219 Hz. The same constituent in the NF structure was pronounced at a marginally lower F0 of about 218 Hz. The pre-focus constituent /tóéɾètí ámàβútá/ was articulated at an F0 of 219 Hz. This value is the same as that of the focused constituent. Focusing therefore did not have an effect in the F0 output for this utterance in F2Y's pronunciation. However, in the other utterances (42d, 43d, 44d, 45d and 56d), constituents bearing a CF mark are articulated at a lower F0 than the non-focused ones. Here, Ekegusii is different from other languages like Japanese (Pierrehumbert and Beckman, 1988) that manipulate F0 to mark focus. Whereas in Japanese focused constituents receive increased tonal pitch, Ekegusii results have shown that focused constituents receive lowered F0s.

Table 4.7 gives a summary of the F0 output in the utterance /tóéɾètí ámàβútá [òóɲôɾá ómòβásòkànò]$_{CF}$/ 'it did not run short of fuel but got an accident' for all the 24 participants.

Table 4.7: Comparison of F0 means for the CF utterance /tóéɾètí ámàβútá òóɲôɾá ómòβásòkànò/

Age	Sex	N	Mean	Std. Dev.
Children	F	3	248.000	9.70618
	M	3	235.633	9.21376
	Total	6	241.817	10.84074
Youth	F	3	223.067	13.52085
	M	3	138.400	15.58300
	Total	6	180.733	48.17459
Middle-aged	F	3	198.067	18.29791
	M	3	120.000	10.73918
	Total	6	159.033	44.81494
Advanced-aged	F	3	207.533	12.84225
	M	3	158.933	35.68113
	Total	6	183.233	35.83036
Total	F	12	219.167	23.03134
	M	12	163.242	49.24022
	Total	24	191.204	47.21417

Table 4.7 shows that participants of different age groups and sex vary in the F0 production for the proposition in 41d (ii). Children produced this utterance at the highest F0. They were followed by the youth, the advanced-aged and middle-aged groups, respectively. In addition, female participants produced higher F0 values than the male participants did. Equally, we note

that the children, youth and middle-aged males had a smaller standard deviation than females in similar age groups. However, a difference was noted in the advanced-aged group where males had a higher standard deviation than the females. As already indicated, a higher standard deviation is a signal that the F0 values were staggered more below and above the mean in the identified groups. Therefore, in this utterance, female children, youth and middle-aged participants had greater variability than their male counterparts did.

A visual presentation of the age and sex variations is further illustrated in Figure 4.24 and 4.25. As already indicated, the F0 ranges for the different groups are signalled by the whiskers, which extend upwards from the boxes to the highest F0 values and downwards to the lowest F0 values produced by each group of participants in their articulation of the given structures. The bold line in the middle of the boxes marks the median F0 values. The median value was deemed important as it shows the distribution of the F0 scores in each age group.

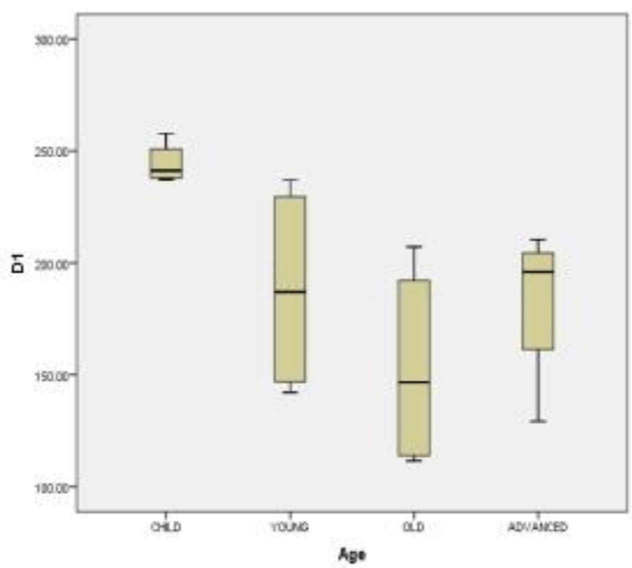

Figure 4.24: Age-related distribution of F0 scores for /tóéɾètí ámàβútá òóɲôɾá ómòβásòkànò/

From Figure 4.24, we note that children had less variation in their F0 production of this focus structure. This is shown by the small size of the box plot for the children. Again, we note that children's minimum F0 was closer to the median than the maximum F0. The youth and middle-aged participants had the largest variation in their F0 production as shown by the long boxes. The advanced-aged participants had their high F0s closer to the median than the low F0s. This implies that the advanced-aged's scores had a right skew.

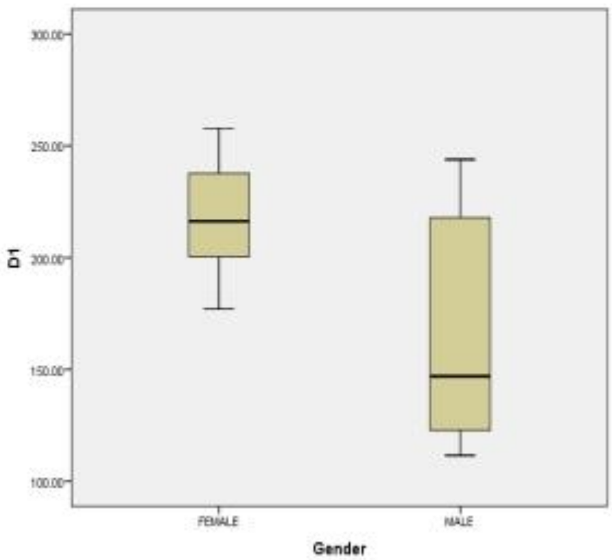

Figure 4.25: Sex-related distribution of F0 scores for /tóéɾètí ámàβútá òóɲôɾá ómòβásòkànò/

Figure 4.25 shows that female participants differed less than their male counterparts in their production of the utterance. This is revealed by the the small size of the box and the short distance from the median for both the high and low F0 values by the female participants. To evoke contrastive focus, the utterance in 42d is also embedded in the question-answer context as shown below.

42d i. Context question: /mòɾáá náíβòɾá ômwáːná ómòísékè/? ‘Did Moraa give birth to a baby girl?’

ii. Answer: /táɾí ômwáːná ômóíséké áíβòɾá [nômwáːná ómòmùɾá]$_{CF}$/ ‘It is not a baby girl she gave birth to but a baby boy.’

iii. Pragmatic representation of (ii)

Pragmatic presupposition: /mòɾáá náíβòɾá [ômwáːná ómòísékè]/ ‘Moraa gave birth to a baby girl’

Pragmatic assertion: [nômwáːná ómòmùɾá] ‘it is a baby boy’

Focus: [nômwáːná ómòmùɾá] ‘it is a baby boy’

Focus domain: Clause

The derivation in (42d) reveals that in uttering the utterance in 42dii, /táɾí ômwáːná ômóíséké áíβòɾá [nômwáːná ómòmùɾá]/$_{CF}$, ‘It is not a baby girl she gave birth to but a baby boy,’ the speaker asserts that the alternative expressed by the speaker in (42di), /mòɾáá náíβòɾá ômwáːná ómòísékè/ ‘Moraa gave birth to a baby girl’ is false. This means that the pragmatic assertion, /nômwááná ómòmùɾá/ ‘it is a baby boy’ carries unpredictable information standing in contrastive relationship with other constituents including /mòɾáá náíβòɾá ômwáːná ómòísékè/ ‘Moraa gave birth to a baby girl’. The pitch contours associated with the articulation of /táɾí ômwáːná ômóíséké áíβòɾá nômwáːná ómòmùɾá/ ‘She did not give birth to a baby girl but a baby boy’ by F2Y are presented in the six hierarchically ordered tiers in Figure 4:26.

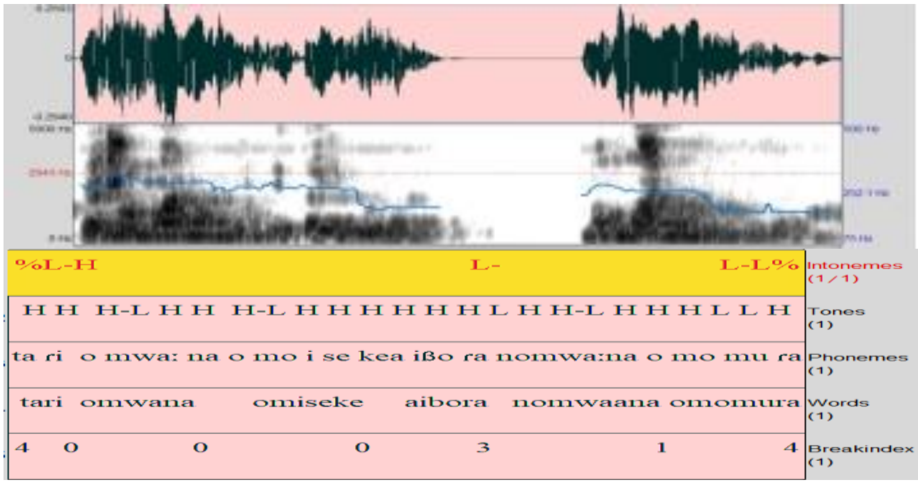

Figure 4.26: Pitch track for the CF pronunciation of /tárí ômwáːná ômóíséké áíβòɾá nômwááná ómòmùɾá/ produced by F2Y

From the audio-recording of the utterance shown in the upper panel in Figure 4:26, F2Y produced the utterance at an F0 of 252.1 Hz. Again, the intonemes tier and the break-index tier in the lower panel show that the utterance was articulated as two intonation phrases, that is, an intermediate and full intonation phrase. The intermediate phrase is marked by an L- intoneme and an index value of 3. The full intonation phrase, on the other hand, is marked by the L-L% final boundary intoneme as the pitch curve shows. In Ladefoged's (2005) approach, this intonation structure is shown as */tárí ômwáːná ômóíséké áíβòɾá|nômwáːná ómòmùɾá||/*. Further analysis of the focus constituent alone reveals that it was produced at an F0 of 232 Hz. The same constituent was produced at 229 Hz in the neutral focus structure. This implies that a CF structure is articulated at a slightly higher F0 than the neutral focus one. However, unlike (41d), the non-focused constituent in 42d was produced at a higher F0 (266 Hz) than the focused one. This is similar to the results obtained in the argument and predicate focus structures in sections 4.2.2 and 4.2.3 where there was F0 lowering at the focused constituent in the utterances.

Table 4.8 gives a summary of the age and sex differences in the F0 production of the contrastive focus utterance /táɾí ômwáːná ômóíséké áíβòɾá nômwáːná ómòmùɾá/ ‘She did not give birth to a baby girl but a baby boy’

Table 4.8: A summary of F0 means for the utterance /táɾí ômwáːná ômóíséké áíβòɾá nômwáːná ómòmùɾá/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	252.0667	30.31919
	Male	3	240.3000	17.55790
	Total	6	246.1833	23.07704
Youth	Female	3	237.1667	26.29949
	Male	3	134.0333	12.20751
	Total	6	185.6000	59.39040
Middle-aged	Female	3	207.3000	28.90208
	Male	3	123.6667	8.96902
	Total	6	165.4833	49.64544
Advanced-age	Female	3	216.8667	5.15978
	Male	3	166.4667	42.38070
	Total	6	191.6667	38.61537
Total	Female	12	228.3500	27.94685
	Male	12	166.1167	51.93671
	Total	24	197.2333	51.71025

The results presented in Table 4.8 above show a similar trend in the mean F0 production for the four groups of participants as that observed in (41d). As was also observed in (41d), female participants had a larger standard deviation than their male counterparts except for the advanced-aged group where the males had a larger SD (42.4) than the females (5.2). The proposition was produced at an F0 of 197 Hz. To explore the distribution of scores on the F0 production for the different age and sex groups, the graphs in Figure 4.27 and 4.28 were generated.

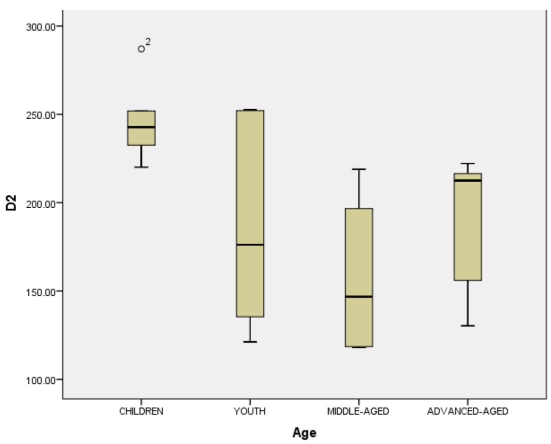

Figure 4.27: Age-related distribution of F0 scores for /táɾí ômwáːná ômóíséké áíβòɾá nômwáːná ómòmùɾá/

Similar to the findings in Figure 4.6, Figure 4.27 shows that there were F0 scores for the children group that were well above the majority of the recorded F0 scores. These are marked by the number 2 above a small circle at the top of the children's boxplot. This number shows that these F0 scores extended 2 box lengths above the edge of the box. As Pallant (2005) indicates, SPSS defines such scores as outliers since they extend more than 1.5 box lengths from the edge of the box. In the example above, the outliers were at the upper F0 scores. However, they were not regarded as extreme scores since they still fell within the range of possible scores for this age category. Despite such outliers, Figure 4.27 shows that the children's box was the shortest. This indicates that they had the smallest interquartile range, which means that the children had less variability in their F0 production. The youth, on the other hand, had the longest box, which shows that they had the largest interquartile range and therefore the greatest variability in their F0 production. Figure 4.28 gives a visual inspection of the differences between male and female groups in F0 distribution for the same utterance.

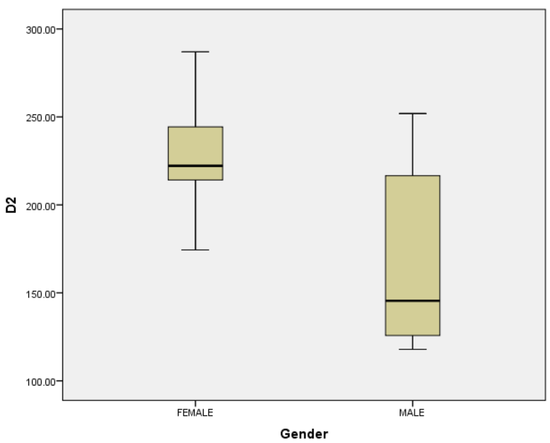

Figure 4.28: Sex-related distribution of F0 scores for /táɾí ômwáːná ômóíséké áíβòɾá nômwáːná ómòmùɾá/

The boxplot in 4.28 apart from showing that females produced higher F0s than males also reveals that females had less variability in their F0 scores than males in the articulation of the utterance. This is revealed by the female participants' shorter box compared to the male one's longer one.

The analyses of the CF have also shown that there are age and sex differences in the production of F0s. A close inspection of the average F0 production for the different age group has revealed that children produced an utterance with contrastive focus at the highest F0, 245Hz; followed by the advanced-aged group, 187 Hz; the youth, 186 Hz; and the middle-aged group, 166 Hz.

At the same point, the female respondents generally had higher F0, 227 Hz, than their male counterparts, 165 Hz.

Having established age and sex differences in the production of F0 for the different focus conditions, the investigations set out to establish whether such differences reached statistical significant levels. Results obtained from the test of between-subjects effects in Table 10.6 (Appendix 10) shows that there was a statistically significant main effect for age group and sex on the realization of F0 in the contrastive focus structures (P-value for age. = .001 and for sex =.000). Both these values are smaller than the alpha value of .05. The interaction effect of age group and sex was, however, found not to have a statistically significant effect on F0 (P= .193). However, the effect size of the results obtained was very large in each case. The partial Eta Squared for age is .656; sex, .854; and that for age and sex is .427.

The analyses of the six utterances with contrastive focus have shown that, on average, a contrastive focus constituent is articulated at a lower fundamental frequency than when the same constituent is in a neutral focus structure. A CF constituent is also pronounced at a lower F0 than the pre-focused constituents in the same utterance. This makes Ekegusii different from other languages like Chichewa which according to Downing and Pompino-Marschall (2013) have focus leading to systematic raising of F0 within the phonological phrase containing the focused element.

In summary, the analyses have shown that the contrastive focus condition was produced at an F0 range of about 196 Hz. On the other hand, the neutral focus was produced at an F0 of 195 Hz; the argument focus at 199 Hz and the predicate focus at 198 Hz. This shows that the subject argument focus was articulated at the highest F0, followed by the predicate focus, contrastive focus and neutral focus structures. This observation is visually illustrated in Figure 4.29.

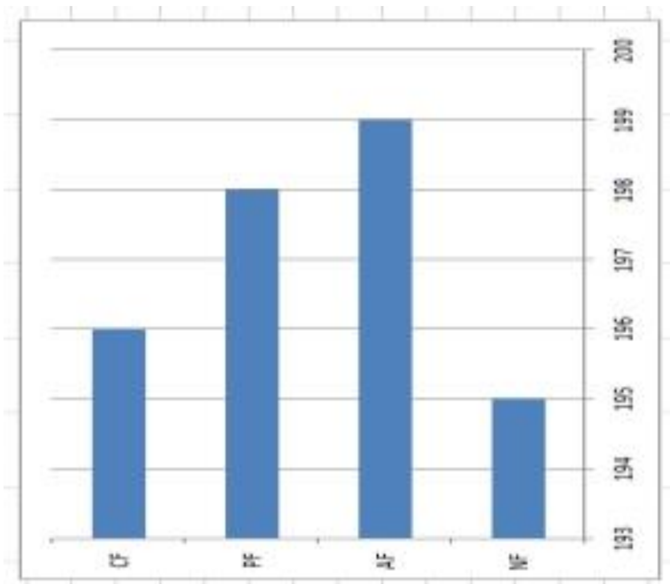

Figure 4.29: Comparison of focus types against F0 production

As shown in Figure 4.29, the propositions with focused constituents were produced at a higher F0 than those without any element under focus. Equally, the argument focus structure was produced at a higher F0 than the predicate and contrastive focus. This means that, in Ekegusii, the subject noun phrase is articulated at higher F0 than the predicate (verbal group). The same observation has been recorded in Hijazi Arabic (Alzaidi, 2014) where nouns in the language are produced at a higher F0 than verbs.

The overall conclusion drawn from the analyses of focus structures is that Ekegusii uses F0 modulation as the primary prosodic means of marking focus in addition to the insertion of an intermediate intonation phrase boundary-end to the left or to the right and boundary intonemes at the end of utterances. Findings have shown that the type of focus structure determines the insertion of the intermediate intonation phrase. Results have revealed that the predicate and contrastive focus structures had the intermediate intonation phrase break-end inserted to the left while the argument focus structures had the intermediate phrase inserted to the right. In this way, Ekegusii is similar to Japanese (Pierrehumbert and Beckman, 1988) and Chichewa (Zimmerman and Onea, 2011), which also rely on F0 manipulation and an insertion of an intonation phrase boundary before or after the focus constituent in marking focus. Ekegusii, however, differs from West Germanic languages like English and German that realize focus by using a nuclear pitch accent (H*L) or languages like Hausa and Hungarian that rely on syntactic re-ordering to mark focus (Zimmerman and Onea, 2011; Baumann et al., 2007). In German and English, for example, discourse-new constituents as well as contrastively focused items are accented while discourse-old constituents are de-accented (Fery and Samek-Lodovia, 2006). Equally, in Turkish, just like in German and English, prominence is not marked by F0 variations (Gunes, 2013) like it is done in Ekegusii.

Following Wagner and Watson (2010) and the analysis in this study, the researcher concludes that intonation structure encodes the information structure of an utterance and that in the A-M Theory, focus constituents are identified with reference to their fundamental frequencies and the insertion of intermediate and boundary intonemes. The analyses have established that variation in F0 distinguishes the sentence, argument, predicate and contrastive focus conditions.

4.6 Conclusion

The analyses in Chapter 3 demonstrated that the type of utterance and the age and sex of the Ekegusii participant determined the variation in F0. The analyses in Chapter 4 have additionally shown that apart from the age and sex of the participant, F0 is also influenced by the information structure of the utterance. Results have revealed that differences in F0 are one of the means of distinguishing the NF, AF, PF and CF types. It has been demonstrated that an utterance with neutral focus was pronounced at 195 Hz; one with argument focus at 199 Hz; that with the predicate in focus was articulated at 198 Hz; while the one with contrastive focus was pronounced at 196 Hz. This reveals that the argument focus utterance was produced at the highest F0 while the neutral sentence focus utterance was produced at the lowest F0. Individual participants also displayed variation in the articulation of different focus structures. Analyses have shown that children articulated the focus structures at an average F0 of 237 Hz, the youth at 186 Hz, the middle-aged at 164 Hz and the advanced-aged participants at 178 Hz. Female participants also achieved higher fundamental frequencies (220 Hz) than the male ones (162 Hz), during the articulation of the focus structures. The participants also differed in the distribution of F0 scores with the youth having their F0 scores spread more than all the other age groups. The children, on the other hand, had their scores spread less. Apart from producing different focus structures at higher F0s, female participants had their F0 scores dispersed less than their male counterparts did.

In addition to the F0 variations, the study has also established that Ekegusii uses syntactic means like clefting and negative constructions and morphological markers like {nó} {í} to signal focus. Cleft constructions, signaled by the morphemes, {nó} and {í}, 'it is' were mainly used in the argument focus structures while negatives constructions were used in the contrastive focus structures. This shows that Ekegusii uses mixed strategies in focus marking, including prosodic, syntactic and morphological strategies unlike other languages like Hausa, Wolof, English and German (Zimmerman and Onea) that rely on only one strategy.

Results have also shown that intonation has an effect on the phrasing structure of an Ekegusii proposition. Findings have shown that focus constituents are followed or preceded by an intermediate intonation-phrase break that is marked by a H intoneme. This is different from the intonation phrase final boundary tones that were marked as either L%, L-L%, or H-L%. Having, thus, described the production of intonation features in Chapter 3 and shown the interaction between intonation and information structure in Chapter 4, Chapter 5 investigates the individual speakers' level of precision in identifying utterance and information structure types based on intonation.

CHAPTER FIVE

THE PERCEPTION OF INTONATION BY EKEGUSII NATIVE SPEAKERS

5.1 Introduction

In Chapters 3 and Four of this study, we have analysed the production of intonation in Ekegusii. Findings have indicated that native speakers of the language vary in their production of intonation features. In this chapter, an investigation of the perception of intonation by native speakers of Ekegusii is done. An analysis of the perceptual account of intonation was deemed necessary in this study for as Hirst et al. (2000) have observed, ''…an intonation model without support from perception is not complete''. Data for the analysis of the perception of intonation reported in this chapter came from the production tasks done in Chapter 3 and 4.

To establish how well an intonation type was perceived and interpreted and whether native speakers varied in this process, we carried out another set of tasks where participants' identification rates are compared. This was meant to reveal the psychological operations in the participants' minds as they interpretated and attributed meaning to the utterances they heard. According to Yuan (2011), different intonation types have either a high or low identification rate. A high identification rate suggests that the intonation type was easy to recognize while a low identification rate would indicate that the intonation type confused the listeners. To compute the identification rate for each paratone, we took the ratio of the correct responses and divided it by the expected total correct responses for the 24 participants.

Sound files for 44 utterances representing different paratone and focus intonation types were played to twenty-four participants. These were instructed to carefully listen to the utterances and identify the intonation phrases and focus type. One thousand and fifty six (1,056) responses obtained from the 24 participants were used in the analysis. The scores obtained on the individual items were summed across participants and presented in frequency tables. The tables indicate the appropriate frequencies and total proportional percentages: percentage, valid percentage and cumulative percentage. The 'percent' column shows the percentage of all the responses, including the missing cases in each category. The 'valid' percent column presents the percentages of only the non-missing cases in each category of participants. The frequency tables in this study show that the percent and valid percent columns give identical percentages. This is so because there were no missing values for the variables in the investigated. The cumulative percent column represents a running total of the percentage occurring across a set of responses. The total is designed to increase until it reaches the highest value of 100 percent.

5.2 The Perception and Interpretation of the Paratone Type

In this subsection, we investigate the influence of age and sex on the perception and interpretation of the intonation of declarative, interrogative and imperative paratones. Results are presented in the form of tables that show a summary of the utterances (token), responses (correct, wrong and undecided), the frequency of the correct, wrong and undecided responses, the correct, wrong and undecided percentage identification rate, the valid and cumulative percentage interpretation of the utterances by the 24 participants. A response was judged correct if it correlated on a one to one fashion to the original recorded utterance and wrong if it did not correlate correctly with the original utterance. The researcher who had formulated and labelled the original utterances made the decision on whether a response was correct or wrong. On the other hand, a response was classified as undecided if the respondent did not place it in any of the categories given.

Table 5.1 shows the perception and interpretation of the declarative utterances. These were labelled as 1a, 1d, 1f and 1h in the utterance list presented to each participant as shown in Appendix 5.

Table 5.1: The perception and interpretation of the declarative paratones

Token	Response	Frequency	Percent	Valid Percent	Cumul. Percent
1a	Correct	21	87.5	87.5	87.5
	Wrong	3	12.5	12.5	100
	Total	24	100	100	
1d	Correct	20	83.3	83.3	83.3
	Wrong	4	16.7	16.7	100
	Total	24	100	100	
1f	Correct	19	79.2	79.2	79.2
	Wrong	5	20.8	20.8	100
	Total	24	100	100	
1h	Correct	17	70.8	70.8	70.8
	Wrong	6	25.0	25.0	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	

Table 5.1 shows that all the correct interpretations of the declarative paratones were above chance level (50%) as data were distributed in the 70.8% and 87.5% interval. On average, the participants' percent correct identification of the target declarative intonation was 80.2% and

the wrong identification was 18.75%. A small percentage, 1.05%, was unable to place the paratone in any of the categories given. This means that most of the participants could easily recognise the declarative intonation. However, one participant was undecided in judging the intonation type.

Since the declarative and polar interrogative intonations, in this study, were analysed using utterances with the same sound sequences, the researcher investigated the level of precision in identifying declarative intonation using Yuan's (2011) assumptions of discriminability measure (A) as captured in the formula:

$$A' = 0.5 + [(H-FA)*(1+H-FA)] / [4*H (1-FA)].$$

In the formula, A refers to the measure of discriminability (i.e. the ability to discriminate between declarative and polar interrogative intonations), H denotes the hits rate (i.e. the percentage of declarative intonation correctly identified) and FA indicates the false alarm rate (i.e. the percentage of question intonation wrongly identified as declarative). From Table 5.1, we establish that the percentage of declarative intonation, which was correctly identified (H) was 80.2 %. Equally, Table 5.3 shows that the percentage of question intonation, which was wrongly identified (FA) was 19.775%. Therefore, the measure of discriminability for the declarative paratones was calculated as:

$A' = 0.5 + [(80.2-19.775) * (1+ 80.2- 19.775)] / [4* 80.2 (1- 19.775)] = -0.11624$. Following Yuan's (2011) suggestion that scores near 1 indicate high discriminability while 0.5 indicates chance performance, the discriminability measure of -0.11624 for the declarative intonation was close to 1. This indicates that declarative utterances received a high performance measure. It was not a chance performance.

Differences in age and sex were noted in the interpretation of this intonation type as shown in Table 5.2.

Table 5.2: Age and sex variations in the perception and interpretation of declarative intonation

Participant	Response	Frequency	Percent	Valid Percent	Cumul. Percent
Children	Male correct	7	29.2	29.2	29.2
	Male wrong	5	20.8	20.8	50
	Female correct	10	41.7	41.7	91.7
	Female wrong	2	8.3	8.3	100
	Total	24	100	100	
Youth	Male correct	8	33.3	33.3	33.3
	Male wrong	4	16.7	16.7	50
	Female correct	9	37.5	37.5	87.5
	Female wrong	3	12.5	12.5	100
	Total	24	100	100	
Middle-aged	Male correct	10	41.7	41.7	41.7
	Male wrong	2	8.3	8.3	50
	Female correct	10	41.7	41.7	91.7
	Female wrong	1	4.2	4.2	95.8
	Female undecided	1	4.2	4.2	100
	Total	24	100	100	
Advanced-aged	Male correct	12	50	50	50
	Female correct	10	41.7	41.7	91.7
	Female wrong	2	8.3	8.3	100
	Total	24	100	100	
Total	Male correct	37	38.6	38.6	
	Male wrong	11	15.3	15.3	
	Female correct	39	40.7	40.7	
	Female wrong	6	8.3	8.3	
	Female undecided	1	4.2	4.2	

Table 5.2 shows that the level of precision in the identification of the declarative paratones seemed to increase with age in males but remained the same (83. 4 %) in the females except for the female youth who had a lower level of correct interpretation (75%). Because of this, children ended up with a marginally higher percentage, 70.9 %, correct identification than the youth, 70.8%. The middle-aged and advanced-aged groups had 83.4 % and 91.7 % correct percentage identifications, respectively. Male children had 58.4% correct responses and 41.6 % wrong ones while the female children had 83.4 % correct identifications and 16.6 % wrong ones. This shows that female children judged the declarative paratones better than their male counterparts did. A similar trend in the sex variability was observed in the youth group where the female youth had 75% and 25 % correct and wrong judgements, respectively, while their male counterparts had 66.6 % and 33.4% correct and wrong identifications. There seemed to be no disparity in the correct identification of the declarative paratones for the middle-aged group for the percentage correct identification was 83.4% for both. However, a small percentage of the female participants (8.4 %) were undecided on classifying one type of the declarative intonation. Cumulatively, majority, 95.8%, of the middle-aged participants made a decision on the type of paratone presented to them. It was also noted that all the attempts by the advanced-aged males were correct while 83.4% of the female attempts were correct and 16.6 % were wrong. On average, female participants were slightly better, 81.4%, than the male ones, 77.2 %, in the perception and interpretation of the declarative paratones.

To establish how well the declarative paratones were identified, identification rates were computed. From the frequency column in Table 5.2, it was realized that the correct responses for the declarative paratones were 77. The expected total correct responses were 96 (that is, 24 participants * 4 declarative paratones). Therefore, the identification rate for the declaratives paratones was 0.80208333 (77/96). This rate was higher than that for the polar interrogative paratones as contained in Table 5.3. The polar interrogative paratones used in the analysis were labelled as 1b, 1e, 1g and 1i in the utterance list presented to the participants as shown in Appendix 5.

Table 5.3: The perception and interpretation for the polar interrogative paratones

Token	Response	Frequency	Percent	Valid Percent	Cumulative Percent
1b	Correct	18	75	75	75
	Wrong	5	20.8	20.8	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
1e	Correct	18	75	75	75
	Wrong	5	20.8	20.8	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
1g	Correct	20	83.3	83.3	83.3
	Wrong	4	16.7	16.7	100
	Total	24	100	100	
1i	Correct	19	79.2	79.2	79.2
	Wrong	5	20.8	20.8	100
	Total	24	100	100	

Table 5.3 shows that the correct interpretation for the polar interrogative paratones distributes in the 75%-83.3%. On average, these paratones were 78.125% correctly and 19.775% wrongly interpreted. We also noted that 2.1% of the participants were unable to judge the intonation type of some of the polar interrogative paratones. This shows that the polar interrogative

intonation posed a greater challenge to the participants in identifying than the declarative intonation. Results also show that the wrong and undecided percentages were higher for the polar interrogatives than in their declarative counterparts.

As can be seen in Table 5.4, participants also varied in their perception and interpretation of the polar interrogative paratones.

Table 5.4: Age and sex differences in the perception of the polar interrogative intonation

Participant	Response	Frequency	Percent	Valid Percent	Cumulative Percent
Children	Male correct	6	25	25	25
	Male wrong	4	16.7	16.7	41.7
	Male undecided	2	8.3	8.3	50
	Female correct	8	33.3	33.3	83.3
	Female wrong	4	16.7	16.7	100
	Total	24	100	100	
Youth	Male correct	9	37.5	37.5	37.5
	Male wrong	3	12.5	12.5	50
	Femalecorrect	8	33.3	33.3	83.3
	Female wrong	4	16.7	16.7	100
	Total	24	100	100	
Middle-aged	Male correct	10	41.7	41.7	41.7
	Male wrong	2	8.3	8.3	50
	Female correct	11	45.8	45.8	95.8
	Female wrong	1	4.2	4.2	100
	Total	24	100	100	
Advanced-aged	Male correct	12	50	50	50
	Female correct	11	45.8	45.8	95.8
	Female wrong	1	4.2	4.2	100
	Total	24	100	100	

Table 5.4 reveals that male children had 50% correct and 33.4% wrong identification of the polar interrogative utterances. 16.6% of the male children had difficulties interpreting the polar interrogative utterances. They therefore did not place the polar interrogative paratones in any of the categories presented. All the female children, on the other hand, made a decision on the paratone type presented to them with 66.6 % of their responses being correct and 33.4 % wrong. For the youth, male participants were better (75%) in correctly interpreting the polar interrogative paratones than the female ones (66.6%). On the other hand, in the middle-aged group, female participants made a better judgement, (91.6% correct and 8.4 % wrong interpretations) than males (83.4% correct and 16.6% wrong interpretations). Again, just like it was observed in the declarative paratones, all male participants in the advanced-aged group correctly identified the polar interrogatives. However, 8.4% of the female participants' responses were wrong while 91.6 % were correct.

From the results above, we clearly see a consistent increase in the level of correct interpretations of the polar paratones from the children to the advanced-aged groups for the male participants. Though the same increase is seen in the female groups, it remains at the same percentage for the middle and advanced-aged groups. Both had 91.6 % correct responses. These results have the implication that the discrimination abilities improve with age, which this study attribute to language exposure. The results indicate a better response performance from those participants who have used Ekegusii for a longer period than those who have only used it for a shorter period. Overall, the identification rate for the polar interrogative paratones was 0.78125 (75 correct responses / 96 expected responses). Participants, therefore, achieved 78.125% correct perception of the polar interrogative utterances. This implies that all the correct interpretations of the polar interrogative intonation were above chance level.

Based on the responses from all the 24 participants, a computation of the discriminability measure for the polar interrogative utterances was carried out following insights from Yuan's (2011:16) formula, repeated below.

A'=0.5+ [(H-FA)*(1+H-FA)] / [4* H (1-FA)]. As already pointed out, A refers to the measure of discriminability (i.e., the ability to discriminate between interrogative and declarative intonation in this study), H is the hits rate, which in this study shows the percentage of polar interrogative intonation correctly identified and FA is the false alarm rate, that is, the percentage of declarative intonation incorrectly identified. Referring to the summary in Table 5.1 and Table 5.3, H=78.125 % and FA= 18.75 %., Consequently, A'=0.5+ [(78.125-18.75)* (1+ 78.125- 18.75)]/ [4*78.125(1-18.75)] = -0.14627. The -0.14627 discriminability measure for the polar interrogative intonation should be considered a high score given that it is close to 1. This discriminability score indicates that the participants' performance in the interpretation of the polar interrogative intonation was above chance level. The implication of this performance in this study is that participants actually perceived interrogative intonation features and used them to interpret and distinguish polar interrogatives from declarative ones.

The differences in the discriminability measures between polar interrogative intonation and declarative intonation have revealed that declarative utterances were perceived better than the polar interrogative ones. Declarative intonation had a higher A than the polar intonation. This implies that polar interrogative intonation was harder to identify than the declarative intonation. Similar findings have been reported in Ma et al. (2011) where the identification accuracy for Cantonese questions and statements is described with results showing that statements were easier to identify than questions.

Compared to the polar interrogatives, constituent interrogative paratones whose summary is presented in Table 5.5 had a higher interpretation level. The utterances used for analysis of the constituent intonation were coded as 1j, 1l, 1n and 1p in the list presented to the participants as shown in Appendx 5.

Table 5.5: Perception and interpretation for the constituent interrogative paratones

Token	Response	Frequency	Percent	Valid Percent	Cumululative Percent
1j	Correct	19	79.2	79.2	79.2
	Wrong	5	20.8	20.8	100
	Total	24	100	100	
1l	Correct	21	87.5	87.5	87.5
	Wrong	3	12.5	12.5	100
	Total	24	100.0	100.0	
1n	Correct	19	79.2	79.2	79.2
	Wrong	5	20.8	20.8	100
	Total	24	100.0	100.0	
1p	Correct	19	79.2	79.2	79.2
	Wrong	4	16.7	16.7	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	

Table 5.5 indicates that the constituent interrogative intonation was, on average, 81.3% correctly identified; 17.7%, wrongly identified; and 1.1%, unidentified. Results contained in Table 5.6 show the age and sex differences in the perception and interpretion of the constituent utterances.

Table 5.6: Age and sex differences in the perception and interpretation of the constituent interrogative intonation

Participant	Response	Frequency	Percent	Valid Percent	Cumulative Percent
	Male correct	11	45.8	45.8	45.8
Children	Male wrong	1	4.2	4.2	50
	Female correct	7	29.2	29.2	79.2
	Female wrong	4	16.7	16.7	95.8
	Female undecided	1	4.2	4.2	100
	Total	24	100	100	
Youth	Male correct	6	25	25	25
	Male wrong	6	25	25	50
	Female correct	9	37.5	37.5	87.5
	Female wrong	3	12.5	12.5	100
	Total	24	100	100	
Middle-aged	Male correct	12	50	50	50
	Female correct	12	50	50	100
	Total	24	100	100	
Advanced-aged	Male correct	11	45.8	45.8	45.8
	Male wrong	1	4.2	4.2	50
	Female correct	10	41.7	41.7	91.7
	Female wrong	2	8.3	8.3	100
	Total	24	100	100	

Table 5.6 shows that the middle-aged participants had a 100% correct identification of the constituent interrogative paratones. The advanced-aged group, which had 87.5% correct identification and the children with 75% correct interpretation followed them. The least level of identification precision was that of the youth group who achieved 62.5% correct interpretation of the constituent utterances. There were inconsistencies in the sex outputs across the four age groups. For instance, male children had a higher percentage of correct responses, 91.6%, while the female counterparts had 58.4%. The female youth, on the other hand, had a higher correct identification percentage, 75%, than the male youth who had 50%. In addition, the male advanced-aged participants had higher correct percentage identification, 91.6%, than their female counterparts, 83.4%. The identification rate for this paratone was 0.8125 (78/96). This means that the constituent interrogative utterances had a higher identification rate (IR) than the polar interrogative and declarative paratones. However, the constituent interrogative utterances' IR of 0.8125 was lower than that of the echo interrogative utterances, which had an IR of 0.84375. Results from the analysis of the perception and interpretation of the echo interrogative utterances are presented in Table 5.7. These utterances were marked 1c, 1o, 1r and 1u in the utterance list as shown in Appendix 5.

Table 5.7: Perception and interpretation of the echo interrogative paratones

Token	Response	Frequency	Percent	Valid Percent	Cumulative Percent
1c	Correct	21	87.5	87.5	87.5
	Wrong	3	12.5	12.5	100
	Total	24	100	100	
1o	Correct	17	70.8	70.8	70.8
	Wrong	7	29.2	29.2	100
	Total	24	100	100	
1r	Correct	23	95.8	95.8	95.8
	Wrong	1	4.2	4.2	100
	Total	24	100	100	
1u	Correct	20	83.3	83.3	83.3
	Wrong	4	16.7	16.7	100
	Total	24	100	100	

Table 5.7 reveals that the echo interrogative paratones had on average 84.35% correct interpretation and 15.65% wrong interpretation. Unlike the other paratones, it should be pointed out that all the participants made a decision in classifying the echo interrogative paratones; there were no participants that were undecided in classifying the echo interrogative paratones. Again, it should be noted that the echo interrogative paratones had the highest correct identification frequency and rate. The total correct frequency was 81 and the identification rate was therefore 0.84375 (that is, 81/96).

As shown in Table 5.8, participants varied in their perception and interpretation of the echo interrogative utterances. The variations noted are attributed to the age and sex of the participant.

Table 5.8 Age and sex differences in the perception and interpretation of the echo interrogative utterances

Participant	Response	Frequency	Percent	Valid Percent	Cumul. Percent
Children	Male correct	9	37.5	37.5	37.5
	Male wrong	3	12.5	12.5	50
	Female correct	8	33.3	33.3	83.3
	Female wrong	4	16.7	16.7	100
	Total	24	100	100	
Youth	Male correct	6	25	25	25
	Male wrong	6	25	25	50
	Femal correct	10	41.7	41.7	91.7
	Female wrong	2	8.3	8.3	100
	Total	24	100	100	
Middle-aged	Male correct	11	45.8	45.8	45.8
	Male wrong	1	4.2	4.2	50
	Female correct	12	50	50	100
	Total	24	100	100	
Advanced-aged	Male correct	12	50	50	50
	Female correct	12	50	50	100
	Total	24	100	100	

Table 5.8 shows that despite all participants making a decision in classifying the echo paratones, there were differences in their level of precision in doing this. The advanced-aged

participants had a 100% correct identification of the paratones. The middle-aged participants had 95% correct identification while the children had 70.8 % and the youth had the least level of precision, 66.7%, in interpreting the echo paratones. Similarly, all the middle-aged females had a 100% correct identification of the paratones but their male counterparts had a slightly lower correct identification rate of 91.6%. Male children proved to be better in interpreting the paratones with 75% correct responses than their female counterparts who achieved 66.6 % correct interpretations. Despite such age and sex differences, the echo interrogative paratones were the easiest to identify. They were followed by the imperative paratones whose summary is given in Table 5.9. Imperative utterances were labelled as 1k, 1m, 1q and 1s in the list that was presented to the participants as shown in Appendix 5.

Table 5.9: The Perception and interpretation of the imperative paratones

Token	Response	Frequency	Percent	Valid Percent	Cumul.Percent
1k	Correct	20	83.3	83.3	83.3
	Wrong	3	12.5	12.5	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
1m	Correct	20	83.3	83.3	83.3
	Wrong	4	16.7	16.7	100
	Total	24	100.0	100.0	
1q	Correct	17	70.8	70.8	70.8
	Wrong	7	29.2	29.2	100
	Total	24	100.0	100.0	
1s	Correct	22	91.7	91.7	91.7
	Wrong	2	8.3	8.3	100
	Total	24	100	100	

From Table 5.9, we note that participants made, on average, 82.3% correct and 16.7 % wrong interpretations of the imperative utterances presented to them. 1.05% of the participants were unable to classify one of the paratones in this category. The total correct frequency of identification for the imperatives was 79. Therefore, the imperative paratones' correct identification rate was 0.82. This IR, as already indicated, is the second highest after the echo interrogatives.

In terms of age, results contained in Table 5.10 show that the middle-aged participants had a 100% correct identification of the imperative intonation. The advanced-aged participants who had 87.5% correct responses and the youth with 79.2% followed them. The children group had the least correct identification, 62.5%. In addition, on average, male participants seemed to interpret the imperative paratones better, 85.4 %, than their female counterparts, 79.2 %. A disparity, however, was noted in the youth category where the female youth made more correct responses, 83.4 %, than the male ones, 75%. These disparities are displayed in Table 5.10.

Table 5.10: Age and sex differences in the perception and interpretation of the imperative intonation

Participant	Response	Frequency	Percent	Valid Percent	Cumul.Percent
Children	Male correct	9	37.5	37.5	37.5
	Male wrong	3	12.5	12.5	50
	Female correct	6	25	25	75
	Female wrong	6	25	25	100
	Total	24	100	100	
Youth	Male correct	9	37.5	37.5	37.5
	Male wrong	2	8.3	8.3	45.8
	Male undecided	1	4.2	4.2	50
	Female correct	10	41.7	41.7	91.7
	Female wrong	2	8.3	8.3	100
	Total	24	100	100	
Middle-aged	Male correct	12	50	50	50
	Female correct	12	50	50	100
	Total	24	100	100	
advanced-aged	Male correct	11	45.8	45.8	45.8
	Male wrong	1	4.2	4.2	50
	Female correct	10	41.7	41.7	91.7
	Female wrong	2	8.3	8.3	100
	Total	24	100	100	

The analyses of the perception and interpretation of utterance types have shown that the echo interrogative utterances had the highest correct percentage identification, (84.375 %), and identification rate (0.84375). They were followed by the imperative utterances which had

82.292% correct percentage identification and 0.82292 identification rate. Constituent interrogatives had 81.25% correct percentage identification and 0.8125 identification rate while the declarative utterances had 80.208 % correct percentage identification and 0.80208 identification rate. The polar interrogative utterances had the least correct percentage identification, 78.125%, and identification rate, 0.78125. The implication of this ranking is that echo interrogatives were the easiest to interpret while polar interrogatives were the most difficult to identify. The ease of recognition for the echo interrogatives was attributed to the 0% undecided rate of identification.

In terms of age, results have shown that children achieved a 70.9% correct interpretation of declarative paratones, 58.3% for the polar interrogatives, 75% for the constituent interrogatives, 70.8% for the echo interrogatives and 62.5% for the imperative utterances. On average, therefore, children had a 67.5% correct interpretation of utterance type. The youth, on the other hand had 70.8%, 70.8%, 62.5%, 66.7% and 79.2% correct percentage identification for the declarative, polar interrogative, constituent interrogative, echo interrogative and imperative utterances, respectively. This shows that the youth had an average 70% correct utterance type identification. The middle-aged participants had 83.4%, 87.5%, 100%, 95% and 100% correct interpretation for the declarative, polar interrogative, constituent interrogative, echo interrogative and imperative utterances, respectively. This shows that, on average, the middle-aged participants achieved a 93.18% correct interpretation of the different utterance types. In the declarative, polar interrogative, constituent interrogative, echo interrogative and imperative utterances, the advanced-aged participants had 91.7%, 95.8%, 87.5%, 100% and 87.5%, respectively. On average, the advanced-aged group had 92.5% correct percentage identification.

The above summary shows that the middle-aged and advanced-aged participants seemed to be more accurate (93.18 % and 92.5%, respectively) in identifying and classifying utterances based on the perceived intonation than the children (67.5%) and the youth (70%). This shows that length of exposure and perhaps language experience had an effect in the perception of the intonation of utterance type.

5.3 The Perception and Interpretation of Focus Intonation

In the previous sub-section, we have demonstrated that participants varied in identifying paratone types. Some paratones were identified more easily than others. In this sub-section, an analysis of the perception and interpretation of utterances in different focus structures is undertaken.

Table 5.11, gives a summary of the perception and interpretation of the NF structures by the 24 participants. The NF structures were extracted from the short dialogues labelled D1-D6 in Appendix 6.

Table 5.11: Perception and interpretation of the neutral focus utterances

Token	Response	Frequency	Percent	Valid Percent	Cumulative Percent
D1	Correct	17	70.8	70.8	70.8
	Wrong	4	16.7	16.7	87.5
	Undecided	3	12.5	12.5	100
	Total	24	100	100	
D2	Correct	19	79.2	79.2	79.2
	Wrong	3	12.5	12.5	91.7
	Undecided	2	8.3	8.3	100
	Total	24	100	100	
D3	Correct	17	70.8	70.8	70.8
	Wrong	5	20.8	20.8	91.7
	Undecided	2	8.3	8.3	100
	Total	24	100	100	
D4	Correct	13	54.2	54.2	54.2
	Wrong	10	41.7	41.7	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D5	Correct	17	70.8	70.8	70.8
	Wrong	6	25	25	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D6	Correct	18	75.0	75.0	75.0
	Wrong	4	16.7	16.7	91.7
	Undecided	2	8.3	8.3	100.0
	Total	24	100.0	100.0	

From the summary in Table 5.11, it was realized that the sentence focus structure had on average a 70.1% correct identification, 23.2% wrong identification and 7.6% of the participants were unable to classify this focus structure. From the frequency column, we note that there were 106 correct responses out of the expected 144 total correct responses. This means that the identification rate for the sentence focus structure was 0.701 (101/144). This rate was found to be lower than that of the argument focus structures. Results have also shown that participants achieved different levels of precision in the interpretation of the SF structures. A summary of these differences is presented in Table 5.12.

Table 5.12: Age and sex differences in the perception and interpretation of the sentence focus structures

Participant	Response	Frequency	Percent	Valid Percent	Cumul Percent
Children	Malecorrect	11	30.6	30.6	30.6
	Male wrong	7	19.4	19.4	50
	Female correct	9	25	25	75
	Female wrong	5	13.9	13.9	88.9
	Female undecided	4	11.1	11.1	100
	Total	36	100	100	
Youth	Male correct	7	19.4	19.4	19.4
	Male wrong	9	25	25	44.4
	Male undecided	2	5.6	5.6	50
	Female correct	17	47.2	47.2	97.2
	Female wrong	1	2.8	2.8	100
	Total	36	100	100	
Middle-aged	Male correct	17	47.2	47.2	47.2
	Male wrong	1	2.8	2.8	50
	Female correct	13	36.1	36.1	86.1
	Female undecided	5	13.9	13.9	100
	Total	36	100	100	
Advanced-aged	Male correct	14	38.9	38.9	38.9
	Male wrong	4	11.1	11.1	50
	Female correct	17	47.2	47.2	97.2
	Female wrong	1	2.8	2.8	100
	Total	36	100	100	

Table 5.12 shows that children achieved a 55.6% correct identification and 33.3% wrong identification. This shows that children's performance in correctly identifying the sentence focus structures was slightly above chance level. Male children had a better performance in the SF identification, (61.2%), than their female counterparts, (50%). This is so partly because 11.1% of the female children's performance indicated indecisiveness on the focus type. The level of precision for the youth group was better than that of the children. The youth's correct interpretation of the SF stood at 66.6% while the wrong ones stood at 27.8%. The female youth achieved a better correct percentage interpretation, 94.4%, than the male counterparts, 38.8%. This is so because unlike the children responses, 5.6% of the male youth's responses indicated indecisiveness. Again, similar to the observation made about the female children, 13.9% of the middle-aged female participants' responses indicated indecisiveness. As a result, middle-aged male participants realised a better performance, 94.4% than the female ones, 72%. The middle-aged participants, therefore, made 83.3% correct interpretation of this focus type. This shows that the group had a better identification percentage than the youth and children did.

As Table 5.12 shows, the advanced-aged participants had the best interpretation, 86.1%, of the NF structures of all the participants. Generally, the advanced-aged females paralleled the female youth and middle-aged males in making a better judgement, 94.4%, of the NF structures. On the other hand, the advanced-aged males had a 77.8% correct judgement. Overall, female participants proved better than their male counterparts did in interpreting this focus type for they had on average 77.7% correct interpretation against the 68.1% by the males. Table 5.13, summarises the interpretation of the argument focus utterances. These utterances were also extracted from the short dialogues marked D1-D6 in Appendix 6 with a cursory observation that male participants achieved higher identification rates in the argument focus intonation than the female ones.

Table 5.13: Perception and interpretation of the argument focus utterances

Token	Response	Frequency	Percent	Valid Percent	Cumululative Percent
D1	Correct	20	83.3	83.3	83.3
	Wrong	3	12.5	12.5	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D2	Correct	20	83.3	83.3	83.3
	Wrong	3	12.5	12.5	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D3	Correct	21	87.5	87.5	87.5
	Wrong	2	8.3	8.3	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D4	Correct	19	79.2	79.2	79.2
	Wrong	4	16.7	16.7	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D5	Correct	18	75	75	75
	Wrong	5	20.8	20.8	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D6	Correct	21	87.5	87.5	87.5
	Wrong	3	12.5	12.5	100
	Total	24	100.0	100.0	

Table 5.13 indicates that, on average, participants achieved an 82.6% correct identification and 13.9% wrong identification of the argument focus structure. There were also a 3.5% undecided responses in this focus structure. Given that 119 responses were correct, then the identification rate for this focus structure was 0.826. Though this IR is higher than that of the sentence focus condition, it is lower than that of the predicate focus intonation whose summary is contained in Table 5.14.

Similar to the observations made in the sentence focus structures, participants equally varied in the interpretation of the argument focus condition. Results contained in Table 5.14 display how participants of different age groups and sex performed in the interpretation of the argument focus structures.

Table 5.14: Age and sex differences in the perception and interpretation of the argument focus intonation

Participant	Response	Frequency	Percent	Valid Percent	Cumulative Percent
Children	Male correct	12	33.3	33.3	33.3
	Male wrong	4	11.1	11.1	44.4
	Male undecided	2	5.6	5.6	50
	Female correct	18	50	50	100
	Total	36	100	100	
Youth	Male correct	12	33.3	33.3	33.3
	Male wrong	3	8.3	8.3	41.7
	Male undecided	3	8.3	8.3	50
	Female correct	12	33.3	33.3	83.3
	Female wrong	6	16.7	16.7	100
	Total	36	100	100	
Middle-aged	Male correct	18	50	50	50
	Female correct	17	47.2	47.2	97.2
	Female wrong	1	2.8	2.8	100
	Total	36	100	100	
Advanced-aged	Male correct	15	41.7	41.7	41.7
	Male wrong	3	8.3	8.3	50
	Femal correct	15	41.7	41.7	91.7
	Female wrong	3	8.3	8.3	100
	Total	36	100	100	

Table 5.14 indicates that all female children and middle-aged male participants correctly identified the argument focus structures. Again, there were no sex distinctions in the advanced-aged group in the identification of the argument focus intonation for both had 83.4 % and 16.4 % correct and wrong responses respectively. It was also observed that the middle-aged

participants achieved the best performance, 97.2 %, in this focus intonation. In addition, contrary to the observations made in the sentence focus intonation, children were noted to be better, 83.3 %, in judging the argument focus intonation type than the youth, 66.6%. Overall, male participants achieved a higher identification rate in the argument focus intonation than the female ones.

The interpretation of the predicate focus intonation is contained in Table 5.15 and Table 5.16. Table 5.15 presents a summary of the frequency and percentage interpretation of the predicate focus utterances while Table 5.16 displays individual participants' identification rates for the argument focus structures. Utterances with predicate focus were extracted from the short dialogues (D1-D6) in Appendix 6.

Table 5.15: Perception and interpretation of the predicate focus utterances

Token	Response	Frequency	Percent	Valid Percent	Cumulative Percent
D1	Correct	18	75	75	75
	Wrong	5	20.8	20.8	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D2	Correct	21	87.5	87.5	87.5
	Wrong	2	8.3	8.3	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D3	Correct	22	91.7	91.7	91.7
	Wrong	2	8.3	8.3	100
	Total	24	100	100	
D4	Correct	20	83.3	83.3	83.3
	Wrong	4	16.7	16.7	100
	Total	24	100	100	
D5	Correct	22	91.7	91.7	91.7
	Wrong	2	8.3	8.3	100
	Total	24	100	100	
D6	Correct	23	95.8	95.8	95.8
	undecided	1	4.2	4.2	100
	Total	24	100	100	

Table 5.15 shows that the predicate focus obtained a collective 87% correct identification and 10.4 % wrong identification. Findings also show that 2.1% of the participants' were undecided on placing the argument focus structures. From the frequency column, we also realize that there were 126 correct responses for the predicate focus. This translates to an identification rate of 0.875.

Table 5.16: Age and sex differences in the perception and interpretation of the predicate focus intonation

Participant	Response	Frequency	Percent	Valid Percent	Cumul. Percent
Children	Male correct	11	30.6	30.6	30.6
	Male wrong	5	13.9	13.9	44.4
	Male undecided	2	5.6	5.6	50
	Female correct	18	50	50	100
	Total	36	100	100	
Youth	Male correct	16	44.4	44.4	44.4
	Male wrong	1	2.8	2.8	47.2
	Male undecided	1	2.8	2.8	50
	Female correct	16	44.4	44.4	94.4
	Female wrong	2	5.6	5.6	100
	Total	36	100	100	
Middle-aged	Male correct	17	47.2	47.2	47.2
	Female correct	19	52.8	52.8	100
	Total	36	100	100	
Advanced-aged	Male correct	11	30.6	30.6	30.6
	Male wrong	7	19.4	19.4	50
	Female correct	17	47.2	47.2	97.2
	Female wrong	1	2.8	2.8	100
	Total	36	100	100	

Table 5.16 shows that all the middle-aged participants correctly identified the predicate focus intonation. The youth whose level of precision was 88.8 % and the children who achieved 80.6% correct responses followed them. The least output, 77.8 %, was by the advanced-aged participants. The reason for this is not clear. The advanced-aged participants were expected to perform better in judging utterances in the language than the children, given their long interaction with the language. It seems their concentration in the study went down as the listening activity continued.

In terms of sex, all female children correctly identified the focus type while the male children had 61.2 % correct identification. There was no disparity between the middle-aged male and female participants in the identification of this focus structure. Both had 88.8% correct identification. Female advanced-age participants had a better identification rate, 94.4%, than the male counterparts, 61.2% in the same focus structure. Generally, female participants performed better, 95.8%, than the male ones, 77.8% in correctly identifying the predicate focus type. Table 5.17 presents results for the contrastive focus identification.

Table 5.17: Perception and interpretation of the contrastive focus utterances

Token	Response	Frequency	Percent	Valid Percent	Cumul. Percent
D1	Correct	13	54.2	54.2	54.2
	Wrong	9	37.5	37.5	91.7
	Undecided	2	8.3	8.3	100
	Total	24	100	100	
D2	Correct	14	58.3	58.3	58.3
	Wrong	9	37.5	37.5	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D3	Correct	19	79.2	79.2	79.2
	Wrong	4	16.7	16.7	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D4	Correct	17	70.8	70.8	70.8
	Wrong	6	25.0	25.0	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	
D5	Correct	17	70.8	70.8	70.8
	Wrong	7	29.2	29.2	100
	Total	24	100	100	
D6	Correct	17	70.8	70.8	70.8
	Wrong	6	25	25	95.8
	Undecided	1	4.2	4.2	100
	Total	24	100	100	

Details in Table 5.17 show that the contrastive focus structure had 67.35% correct identification, 28.5 wrong identification and 4.1% undecided. Its identification rate was 0.674 given that there were only 97 correct responses for it. This focus condition therefore had the least number of correct responses and the lowest identification rate in all the focus conditions investigated in this study. On the influence of age and sex in the interpretation of the contrastive focus intonation type, Table 5.17 indicates that the youth had the least correct interpretation of the contrastive focus structures, 63.9%, while the middle-aged participants had the highest percentage, 72.2%. It also appears as if all the female participants, except those in the advanced-aged, had a similar, 66.6 %, correct interpretation of the contrastive focus intonation. A marginal distinction between the male and female participants' correct interpretation was noted in this focus structure. Male participants had, on average, 66.7% correct interpretation while the female ones had 68%.

Table 5.18 Age and sex differences in the perception of the contrastive focus intonation

Participants	Response	Frequency	Percent	Valid Percent	Cumul. Percent
Children	Male correct	12	33.3	33.3	33.3
	Male wrong	5	13.9	13.9	47.2
	Male undecided	1	2.8	2.8	50
	Female correct	12	33.3	33.3	83.3
	Femalewrong	6	16.7	16.7	100
	Total	36	100	100	
Youth	Male correct	11	30.6	30.6	30.6
	Male wrong	6	16.7	16.7	47.2
	Male undecided	1	2.8	2.8	50
	Female correct	12	33.3	33.3	83.3
	Female wrong	6	16.7	16.7	100
	Total	36	100	100	
Middle-aged	Male correct	14	38.9	38.9	38.9
	Male wrong	4	11.1	11.1	50
	Female correct	12	33.3	33.3	83.3
	Female wrong	4	11.1	11.1	94.4
	Female undecided	2	5.6	5.6	100
	Total	36	100	100	
Advance-aged	Male correct	11	30.6	30.6	30.6
	Male wrong	6	16.7	16.7	47.2
	Male undecided	1	2.8	2.8	50
	Female correct	13	36.1	36.1	86.1
	Female wrong	4	11.1	11.1	97.2
	Female undecided	1	2.8	2.8	100
	Total	36	100	100	

The implication of the observations made in Section 5.3 is that the predicate focus seemed to be the easiest to interpret since it had the highest identification rate and correct percentage interpretation (0.875 and 87.5%, respectively) in all the focus structures. The argument focus intonation was second with an identification rate of 0.826388, translating to 82.639%. The third easiest focus intonation to interpret was the sentence focus, which had an IR of 0.701388, translating to 70.1388%. The contrastive focus intonation structure was the most difficult to interpret. This had the lowest identification rate and percentage correct identification (0.673611 and 67.3611%, respectively). In addition, the middle-aged participants achieved the highest identification rate of the focus type intonation (an average of 88.175%). The advanced-aged participants, on the other hand, had the second highest identification rate (78.5%) while the youth and children achieved the same identification rate (71.5%). This shows that by the age of nine years, an Ekegusii child has achieved near adult competence in identifying the focus intonation type.

Equally, female participants were better at interpreting focus structures than male ones in all the focus structures. This was so because most male participants, especially of the middle-aged and advanced-aged groups seemed to concentrate more on explaining the meanings of the utterances given, for example, /βàʧǐɾè kwòjìà ɛ́ŋɔˈɔˈmbɛ́/, which was interpreted in two different ways, namely, ‘They have come to take the cow’ and ‘They have gone to bring the cow’. Other male participants spent more time highlighting their personal achievements than concentrating in the research. When the researcher directed them back to the research, they made arbitrary selections. Though inconsistencies were reported in the age variable, it seems that the middle-aged participants had a better interpretation of the different focus conditions while the children had the hardest difficulties in interpreting the focus types.

5.4 Conclusion

This chapter has investigated the discrimination of sentence and focus types by participants of different ages and sex. Results have shown that the sentence-type intonation distinction seemed to be easier to interpret than the focus contrasts. On average, the sentence type contrasts had 81.25% discriminability measure while the focus type contrast had 76.91%. However, children and the youth seemed to interpret focus type intonation better (each had 71.5%) than utterance type (67.5% and 70%, respectively). On the other hand, the middle-aged and advanced-aged participants interpreted the utterance types better (93.18% and 92.5%, respectively) than the focus types (88.18% and 78.5%, respectively). This implies that the perception of linguistic categories marked by intonation features differs with some structures being easier to perceive than others are by the language users.

CHAPTER SIX
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

In this chapter, a summary of the major findings of the study is given, an overall conclusion is made and recommendations of the research gaps in Ekegusii intonation that future studies need to fill are presented.

6.2 Summary of Findings

The aim of this study was to analyse intonation-related features in Ekegusii. This was done in order to meet three objectives, namely to identify and describe the phonetic structure of intonation phrases in Ekegusii; show how intonation encodes focus in Ekegusii utterances and investigate the level of precision in the perception and interpretation of intonation contours by Ekegusii native speakers. To meet the above objectives, both production and perception tasks were assigned to 48 native speakers. Through the production tasks, audio-recordings of 3456 Ekegusii utterances were collected. These were analysed within the Autosegmental-Metrical and the Information Structure theories. The A-M Theory was used to reveal the phonetic features of different intonation phrases in terms of their autosegments and metrical structure. The autosegmental structure was analysed in terms of the interaction of intonation tones. The metrical structure, on the other hand, was revealed in terms of the degree of strength of the boundary between words in an intonation phrase. Using the Information Structure Theory, pitch contours extracted from each participant's speech were also analysed to show the information structuring strategies used in Ekegusii. Before addressing the research objectives, a brief description of the tonal structure of Ekegusii was carried out. Results from such a description have shown that Ekegusii has three level tones and one contour tone. The level tones are the low (L), high (H) and the downdrift high (ꜜH) while the contour tone is the falling (H-L) tone.

A description of the phonetic structure of intonation phrases in Ekegusii has shown that participants' pitch contours for all utterance types are characterised by downtrends like downdrift, declination and final lowering. In a sequence of HH tones, the second H tone is automatically lowered in a process called downdrift. Once an H tone is lowered, the following H tones display a general left-to-right progressive downward lowering in pitch. An extra final lowering in tones is then added at the end of an utterance such that most Ekegusii uterrances will always have a lowering intonation phrase boundary intoneme, marked as L%, L-L% or H-L%, irrespective of the individual tones that mark the words.

Although most Ekegusii utterances ended in a low final boundary intoneme, they were articulated at varied F0 ranges. Findings have indicated that polar interrogative paratones were articulated at the highest F0 (211 Hz) followed by the constituent interrogative paratones (202 Hz), imperative paratones (201 Hz), and the echo interrogative paratones (194 Hz). The declarative paratones were articulated at the least F0 (185 Hz). Intonation in Ekegusii differentiates declarative from polar interrogative paratones when the two have the same sound sequences. At the same time, constituent interrogative utterances are distinguished from their echo interrogative counterparts through variation in F0. Findings have shown that an upward pitch range-shift (H-raising) at the second to last syllable in a polar interrogative utterance and a high F0 (211 Hz) signals a polar interrogative intonation in Ekegusii while a downward pitch range-shift (downdrift) and a low F0 (185 Hz) is a characteristic of a declarative intonation phrase. Therefore, the assumption that most Ekegusii intonation phrases have a rising F0 is not true. It is only the polar interrogative utterances that were found to have a rising F0.

In terms of intonation structure, findings have equally revealed that individual participants had their own pitch registers, that is, the bottom and top domains at which their pitch ranges would reach. Results have indicated that both the age and sex of the participant determined their pitch register. The research has shown that Ekegusii children generally articulated utterances at a pitch span of between 227-249 Hz; the youth at between 176-198 Hz; the middle-aged at between 148-176 Hz and the advanced-aged between 187-228 Hz. On average, therefore children spoke at the highest pitch register of 242 Hz, the advanced-aged participants at the second highest pitch register of 205 Hz while the youth spoke at 185 Hz. The middle-aged participants achieved the least F0 register of about 163 Hz. This shows a drastic decrease in the fundamental frequency from the children to the youth and then to the middle-aged participants before an increase in the advanced-aged group for both male and female participants. Results have also revealed that female participants generally spoke at higher pitch registers than their male counterparts did in all the age groups. For instance, female children spoke at an F0 of 249 Hz while the male children spoke at 233 Hz. Female youth spoke at 223 Hz while their male conterparts spoke at 147 Hz. The middle-aged females spoke at 211 Hz while their male counterparts spoke at 119 Hz. The advanced-aged female participants, on the other hand, spoke at 231 Hz while the advanced-aged males spoke at an average F0 of 183 Hz. From the above values, the study established that Ekegusii female participants' F0 bottom line was about 184 Hz while their top line was about 244 Hz. On the other hand, the male participants' F0 bottom line was about 157 Hz and the top line about 179 Hz. Therefore, the average F0 register for the female participants was 218 Hz while that for the male participants was 168 Hz. Although the female participants' F0 ranges were not higher than what Brinton (2000) recorded as the bottom and top lines for female speakers (190-250 Hz), the male participants' bottom and top line F0s were higher than the limits set by the same author for males (100-150 Hz). This implies that Ekegusii male speakers have their vocal folds vibrating at higher F0s than what has been reported cross linguistically. This discovery about the F0 of male Ekegusii speakers makes the study unique and is an indication of how speakers utilize Gussenhoven's (2004) frequency and production codes in speaking differently.

On the interaction between intonation and the information structure unit of focus, the study has established that Ekegusii uses two main prosodic strategies to encode focus, namely, F0 variation and phrasing. With regard to the first strategy, results have revealed that differences in F0 distinguish the NF, AF, PF and CF structures. An utterance with neutral focus was pronounced at 195 Hz; one with argument focus at 199 Hz; that with the predicate focus at 198 Hz; while the one with contrastive focus was pronounced at 196 Hz. This means that the argument focus utterance was produced at the highest F0 while the sentence focus utterance was produced at the lowest F0. This shows that utterances with focus constituents, in Ekegusii, are produced at lower F0s than those with non-focus ones. Findings have also indicated statistically significant age and sex differences in the F0 scores in the different focus structures. Differences were also noted in the dispersion of F0 scores with the youth having their F0 scores spread most in all the age groups. The children, on the other hand, had their scores spread the least in all the age groups. In addition, apart from producing different focus structures at higher F0s, female participants had their F0 scores dispersed less than their male counterparts did.

On the phrasing strategies used to mark focus in Ekegusii, findings have shown that a focus constituent in Ekegusii has an effect on rephrasing. An intermediate intonation-phrase break either follows or preceds a focus construction. This implies that, in Ekegusii, focus induces two levels of intonation phrasing, namely, major and minor intonation phrase. Whereas the minor intonation break ends in an H- tone, the major intonation phrase ends in an L% or H-L% boundary tone. The minor intonation phrase was found to correspond to the focus constituent in the AF structures but with the non-focus constituents in the PF and CF structures. The sentence focus structure had only one major intonation phrase. The analyses have revealed that focus constituents in Ekegusii are signalled through either cleft or negative constructions. Cleft constructions are introduced by the morphemes, {nó} and {í}, 'it is' and were mainly restricted to the argument focus structures while negatives constructions were used in the contrastive focus structures. This shows that Ekegusii, unlike other languages that rely on only one strategy, uses mixed strategies in focus marking including prosodic, morphological and syntactic ones. Two prosodic strategies include F0 modulations and the insertion of boundary tones to the left or right of the focus constituent. Morphosyntactically, a focus constituent is embedded in the cleft and negative constructions which are signalled by specific morphemes.

Findings from the analyses of the perception and interpretation of intonation phrases in Ekegusii have indicated that participants differed in the identification accuracy of the different intonation structures presented to them. It has been established that the echo interrogatives received the highest accuracy rate of perception (0.84375, which is equivalent to 84.375%) while polar interrogatives had the least identification accuracy (0.78125 or 78.125%). The imperative paratones had the second highest identification rate of 0.82292, translating to 82.292% while the constituent interrogatives had an identification rate of 0.8125, an equivalent of 81.25%. Declarative paratones, on the other hand, had an identification rate of 0.80208 or 80.208%. In addition, the predicate focus condition had the highest identification accuracy (0.875, that is, 87.5%) while the contrastive focus condition had the lowest identification accuracy (0.67361, which is 67.361%). The argument focus had 0.826388 (82.6388%) and the sentence focus was 0.701388 (70.1388%) correctly identified.

The findings have also shown that the level of precision in identifying and interpreting the different types of utterances and focus structures was influenced by the age and sex of the participant. Therefore, the research assumption that native speakers of Ekegusii do not vary in their perception and interpretation of Ekegusii intonation phrases has been disapproved. Research findings have proved that the level of accuracy in the perception and interpretation of intonation in Ekegusii varies among participants. On average, the middle-aged participants were better in classifying the sentence types, with a precision level of 93.18%, followed by the advanced-aged group at 92.5%, the youth at 70% and the children at 67.5%. The middle-aged participants were again better than the other age groups in interpreting the focus types. Their percentage level of precision was 91.65% compared to the 70.9% for the advanced-aged, 63.9% for the children and 63.85% for the youth. Equally, female participants had a slightly higher average correct interpretation of sentence types (80.91%) than the male participants (80.41%). Similar sex trends were observed in the identification of the focus types where female participants were better than the male ones in all the focus structures. For instance, female participants had 77.75 % accuracy level against the 68.05% for males in the SF. In the AF structure, females had an 86.1% correct accuracy level while males had 79.15% accuracy level. The same was noted in the PF structure where the level of precision was 95.8% and 76.4% for the female and male participants, respectively. However, there was no sex variation in the interpretation of the contrastive focus structure. Both males and females had 68% correct interpretation. Generally, these observations show that female participants seemed to concentrate more in the study and were keener listeners than the male ones. Male participants took more time in describing the meanings expressed in the utterances given and revealing their personal achievements than just classifying them as instructed.

6.3 Conclusion

In conclusion, this study has established that intonation phrases in Ekegusii are characterised by features like downdrift, boundary intonemes and variation in fundamental frequency. Findings have shown that in a sequence of HH tones, the second H tone is lower in pitch than the first one. After this lowering, the following H tones are realised at a lower ceiling point in a process called declination. Ekegusii utterances have been found to end in L%, H-L% or L-L% boundary intonemes. The study has revealed that the nature of the boundary intoneme is not determined by the interaction of the level tones but is a property of the whole intonation phrase.

The study has also established that declarative, polar interrogative, constituent interrogatives, echo interrogatves and imperative utterances are realised at different F0s. Polar interrogative utterances were produced at the highest F0 (211 Hz) while the declarative ones were produced at the lowest F0 (185 Hz). The constituent interrogatives were articulated at 202 Hz, the echo interrogatives at 194 Hz and imperative utterances at 201 Hz. Apart from distinguishing utterance types, variation in F0 also distinguishes participants based on age and sex. Participants in the study articulated different utterances at varied mean fundamental frequency ranges. Findings have shown that children pronounced different utterances at a higher F0 (242

Hz) than the advanced-aged (205 Hz), the youth (185 Hz) and the middle-aged (163 Hz) participants. The study has also found out that the pitch span for Ekegusii female participants was between 184 and 244 Hz while that of males was between 157 and 179 Hz. This shows that female participants realised higher F0s than the male ones. The study concludes that the average F0 register for the female and male participants is set at 218 Hz and 168 Hz, respectively.

Results have revealed that Ekegusii, unlike other languages, uses mixed strategies to encode focus. Two main intonation-related strategies identified in this study are F0 modulations and rephrasing. Results have shown that a focus constituent was produced at a lower F0 than the non-focus one in the same proposition. This makes Ekegusii different from other languages like Japanese (Pierrehumbert and Beckman, 1988) where focused constituents receive increased tonal pitch. In terms of phrasing, in Ekegusii, an AF constituent is followed by an intermediate minor intonation phrase while in the PF and CF, the intermediate minor intonation phrase precedes the focus constituents. In both cases, the intermediate intonation phrase ends in a small rise, marked by an H- intoneme and an index value of 3. The H- tone was interpreted to mean that the speaker has more information to give before completing their utterance. Findings have indicated that the focus constituents are embedded either in a cleft or negative construction with the cleft constructions used in the argument focus conditions while negation was used more in the contrastive focus conditions.

Findings have also revealed that age and sex of the participant have a bearing on the level of precision in identifying and interpreting the different utterances types and focus structures. It has been established that middle-aged participants had the highest correct percentage and identification rate in all the sentence types and focus structures. The advanced-aged participants and the youth followed them. The children group had the least identification rate. Equally, female participants interpreted the utterance types and focus structures better than their male counterparts did. The differences noted in the interpretation of intonation phrases presented to the participants reflect differences in the perception of linguistic material.

Therefore, the study concludes that intonation in Ekegusii is meaningful and is determined by the F0 range of individual speakers; the syntactic and information structure and function of an utterance. Equally, Ekegusii native speakers can precisely identify the intonation structure of an utterance.

6.4 Recommendations

The description and analyses carried out in this study considered only the realization of intonation in simple sentences in Ekegusii. The researcher recommends a more comprehensive account of the intonation structure of other types of utterances in the language. For example, an investigation of the intonation structure of compound and complex utterances requires systematic research attention.

In addition, the emotive use of intonation to express the speaker's emotions of anger, fear, happiness, sadness, disgust or surprise requires a systematic investigation. At the same time, the use of intonation to express the speaker' attitude towards their interlocuters and the topic of their speech requires research attention. An investigation of, for example, the way intonation communicates feeling of irony, sarcasm, affection, doubt or disbelieve in speech will no doubt give valuable insight on the complexity of the interface between intonation and other aspects of communication.

Equally, investigations should be carried out to reveal the role of intonation in interaction. An understanding of how intonation, for example, signals turn taking roles in speech like holding a turn, ending a turn or continuation of a turn in Ekegusii needs to be investigated.

On the interaction between intonation and focus in Ekegusii, the analyses in this study only considered propositions with one focus constituent. It would also be important if future researchers investigated how multiple foci in one utterance are expressed and encoded intonationally. It would also be important for future research to give a detailed account of the various morphological strategies used by speakers of Ekegusii to express focus in addition to the syntactic means discussed in Mecha (2014) and the intonation strategies identified in this study.

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APPENDICES

Appendix 1: Coding of Participants

F1C- A 9-years old female child

F2C- An 11-years old female child

F3C- A 13-years old female child

M1C- An 11-years old male child

M2C- A 13-years old male child

M3C- An 11-years old male child

F1Y- An 18-years old female youth

F2Y- A 20-years old female youth

F3Y- A 21-years old female youth

M1Y- A 17-years old male youth

M2Y-An 18-years old male youth

M3Y- A 17-years old male youth

F1MA- A 48-years old middle-aged female

F2MA- A 49-years old middle-aged female

F3MA- A 44-years old middle-aged female

M1MA- A 44-years old middle-aged male

M2MA- A 46-years old middle-aged male

M3MA- A 49-years old middle-aged male

F1AA- A 61-years old advanced-aged female

F2AA- A 62-years old advanced-aged female

F3AA- A 70-years old advanced-aged female

M1AA- A 75-years old advanced-aged male

M2AA- A 64-years old advanced-aged male

M3AA- A 65-years old advanced-aged male

Appendix 2: Ekegusii Noun Classes with Illustrations

Class	Preprefix	prefix	Word	Gloss
1	o	mo	Ómòntò	Person
1a		mo	Mòntó	Person
2	a	βa	Áβààntò	People
3	o	mo	Ómòútò	blowing pipe
4	e	me	Émèútò	blowing pipes
5	e	ɾi	éɾíòté	Wound
6	a	ma	Ámàóté	Wounds
7	e	ke	Ékeombé	Group
8	e	β	Éβìóómbé	Groups
9	e	-	émìóɾó	Nose
9a	e	n	ééɳkòɾóómbá	Mosquito
10	-	ʧi	ʧímíòró	Noses
10a	-	ʧin	ʧííɳkòɾóómbà	Mosquitoes
11	o	ɾo	óɾòʧé	Pepple

12	a	ka	Ákááná	honey comb
14	o	βo	Óβòkánó	Herp
15	o	ko	Ókòβòkò	Hand
16	a	a	Áàsé	Place
21	-	ɲa	ɲánsánákò	grey cow

Appendix 3: Sentence List for the Production of Sentence Intonation

Instructions to Participants

The sheets presented contain a set of Ekegusii utterances. Say them three times as you possibly could do in spontaneous speech. Your speech will be recorded only for analyzing the intonation patterns of the utterances.

1.1 Declaratives

a. Nababwatania koba omosacha no'mokungu.
b. Tareteti kende pi.
c. Bachire kwoyia eng'ombe.
d. Omonto ogokora enyangi n'esese.

1.2. Polar Interrogatives

a. Nababwatania koba omosacha n'omokungu?

b. Tareteti kende pi?

c. Bachire kwoyia eng'ombe?

d. Omonto ogokora enyangi n'esese?

1.3. Constituent interrogatives

a. Ng'ai kwarenge?

b. Ndiriri kwamotebetie?

c. Ning'o kwanyora mogondo?

d. Ninki bakoreera?

e. Ninki gwateba?

1. 4. Echo interrogatives

a. Kwababwatani koba ki?

b. kwagenda arari?

c. kwaereria ng'o?

d. Ogantoma ririri?

1.5 Imperatives

a. Kora emeremo yao ogende

b. Gaki mbwatere ekemoni ekio.

c. Orende titoumerana agote.

d. Moe egetono kiaye bwango.

Appendix 4: Interview Schedule for the Production of Focus Intonation

The information in the sheets provided consists of short dialogues (D1-D4). Imagine you are speaker B and respond to speaker A's questions as naturally as possible. Your speech will be recorded and later only used for the analyses of focus marking in Ekegusii.

D1

A:	Ninki kwanyorerwa emeremo?	'Why did you get late to work?'
B:	Omotoka narinete nigo onyora omobasokano	'The vehicle I boarded got an accident.'
A:	Ninki kianyora omobasokano?	What got an accident?
B.	<u>N'omotoka narinete</u> onyora omobasokano.	It is the vehicle I boarded that got an accident.
A:	Omotoka kwarinete ninki okora?	What did the vehicle you boarded do?
B:	Omotoka narinete nigo <u>onyora omobasokano.</u>	The vehicle I boarded got an accident
A:	Ninki omotoka kwarinete onyora?	What did the vehicle you boarded got?
B:	Omotoka narinete nigo onyora <u>omobasokano</u>.	The vehicle I boarded got an accident.

A: Omotoka kwarinete noera amabuta? Did the vehicle you boarded run out of fuel?

B: T'oereti amabuta, nigo onyora omobasokano. It did not run out of fuel, it got an accident.

A: Omotoka kwarinete noera amabuta? Did the vehicle you boarded run out of fuel?

B: Nigo onyora omobasokano, toereti amabuta. It got an accident, it never ran out of fuel.

D2

A: Ninki abangina b'akoiririatera? 'Why are the women ululating?'

B: N'Moraa oiboira omwana omomura Moraa has delivered a baby boy.'

A: Ning'o oibora omwana omomura? Who has delivered a baby boy?

B: NMoraa oibora omwana omomura. It is Moraa who has delivered a baby boy.

A: Ninki Moraa okora? What has Moraa done?

B: Moraa nigo aibora omwana omomura. Moraa delivered a baby boy.

A: Moraa ninki oibora? What did Moraa deliver?

B: Moraa nigo aibora omwana omomura. Moraa delivered a baby boy.

A: Moraa naibora omwana omoiseke? Did Moraa deliver a baby girl?

B: Tari omwana omoiseke aibora, n’omwana omomura. It is not a baby girl she delivered, it is a baby boy.

A: Moraa naibora omwana omoiseke? Did Moraa deliver a baby girl?

B: N’omwana omomura, tari omwana omoiseke aibora. It is a baby boy, not a baby girl she delivered.

D3

A: Ninki mokumeretie iga? ‘Why are you so worried like this?’

B: N’Kerebi ongeeta omwana oye. ‘It is Kerebi who has strangled her child.’

A: Ning’o ongeeta omwana oye? Who has strangled her child?

B: Nkerebi ongeenta omwana oye. It is Kerebi who strangled her child.

A: Kerebe ninki okora? What did Kerebi do?

B: Kerebi nigo angeenta omwana oye. Kerebi strangled her child.

A: Kerebi ning’o angenta? Whom did Kerebi strangle?

B: Kerebi nigo angeenta omwana oye. Kerebi strangled her child.

A: Kerebi nasibia omwana oye? Did Kerebi wash her child?

B: Tamosibetie, nigo amongeenta. She did not wash the child, she strangled her/him.

A: Kerebi nasibia omwana oye? Did Kerebi wash her child?

B: <u>Nigo amongeenta</u>, tamosibetie omwana oye. She strangled her/him, she did not wash the child.

D4

A: Ninki mogosekera mono iga? Why are you laughing so heartily like this?

B: N'Omokungu omwaaka omosacha oroe. A woman has slapped a man.

A: Ning'o oaaka omosacha oroe? Who slapped the man?

B: <u>N'omokungu</u> oaaka omosacha oroe. It is the woman who slapped the man.

A: Omokung'u ninki okora? What did the woman do?

B: Omokungu nigo <u>amwaaka omosacha oroe</u>. The woman slapped the man

A: Ning'o omokungu aaka oroe? Whom did the woman slap?

B: Omokungu <u>n'omosacha</u> aaka oroe? The woman is the man she slapped.

A: Omokungu oyo naseria omosacha? Did this woman chase the man?

B: Taseretie omosacha, <u>nigo amwaaka oroe</u>. She did not chase the man, she slapped him.

A: Omokungu oyo naseria omosacha? Did this woman chase the man?

B: <u>Nigo amwaaka oroe</u>, tamoseretie omosacha. She slapped him, she did not chase the man.

D5

A: Ninki okwomanera? Why are you quarrelling?

B: N’Omoiseke orusirie oborito. ‘The girl has removed a pregnancy.’

A: Ningo orusia oborito? Who removed a pregnancy?

B: N’omoiseke oyo orusia oborito. It is this girl that removed a pregnancy.

A: Ninki omoiseke oyo okora? What did this girl do?

B: Omoiseke oyo nigo arusia oborito. This girl removed a pregnancy

A: Ninki omoiseke oyo arusia? What did this girl remove?

B: Omoiseke oyo nigo arusia oborito. This girl removed a pregnancy.

A: Omoiseke oyo nanyora omwana? Did this diliver a baby?

B: Tanyoreti omwana, nigo arusia oborito. She did not deliver a baby, she removed a pregnancy.

A: Omoiseke nanyora omwana? Did this diliver a baby?

B: Nigo arusia oborito, tanyoreti omwana. She removed a pregnancy, she did not deliver a baby.

D6

A: Ninki okorera? Why are you crying?

B: NKemunto ong’aaka etege. Kemunto beat me a kick.

A: Ningo ogwaaka etege? Who beat you a kick?

B: NKemunto ong’aaka etege. It is Kemunto who beat me a kick.

A:	Kemunto ninki akora?	What did Kemunto do?
B:	Kemunto nigo <u>ang'aaka etege</u>.	Kemunto beat me a kick
A:	Kemunto ninki agwaaka?	What did Kemunto beat you?
B:	Kemunto nigo ang'aaka <u>etege</u>.	Kemunto beat me a kick
A:	N'Ongau ogwaaka etege?	Is it Ongau that beat you?
B:	Tari Ongau ong'aaka etege, <u>NKemunto.</u>	It is not Ongau who beat me. It is Kemunto.
A:	N'Ong'au ogwaaka etege?	Is it Ongau that beat you?
B:	<u>Nkemunto</u> ong'aaka etege, tari Ong'ua.	It is Kemunto who beat me, not Ong'au.

Appendix 5: Utterances for the Analysis of the Perception and Interpretation of Sentence Intonation

Instructions

Listen to an audio recording of the utterances in the sheet provided and in the boxes after each, mark ‘S’, ‘I’ ‘O’, ‘R’ or ‘T’ to show whether it is said as a statement, interrogative, order, request or threat. If not sure/clear, mark UN.

a) Nababwatani koba omosacha n’omokung’u

b) Nababwatani koba omosacha n’omokung’u

c) Kwababwatani koba ki

d) Tareteti kende pi

e) Tareteti kende pi

f) Bachire kwoyia eng’ombe

g) Bachire kwoyia eng’ombe

h) Omonto ogokora enyang’i n’esese

i) Omonto ogokora enyang’i n’esese

j) Ng’ai kwarenge

k) Orende titoumerana agote

l) Ning’o kwanyora mogondo

m) Moe egetono kiaye bwang’o

n) Ninki bakoreera

o) kwaereria ng’o

p) Ninki gwateba

q) Kora emeremo yao ogende

r) kwagenda arari

s) Gaki, mbwatere ekemoni ekio

t) Ndiriri kwamotebetie

u) Ogantoma ririri

Appendix 6: Utterances for the Analysis of the Perception and Interpretation of Focus Intonation

Listen to an audio recording of the utterances in the sheet provided and in the boxes after each, underline the word, phrase or clause that is under focus. If you are not sure or undecided, mark UN in the boxes.

D1

Omotoka onyora omobasokano

N'omotoka onyora omobasokano.

Omotoka onyora omobasokano.

Omotoka onyora omobasokano.

T'oereti amabuta, onyora omobasokano.

D2

a. Moraa oiboira omwana omomura

b. NMoraa oibora omwana omomura.

c. Moraa nigo aibora omwana omomura.

d. Moraa nigo aibora omwana omomura.

e. Tari omwana omoiseke aibora, n’omwana omomura.

f. N’omwana omomura, tari omwana omoiseke aibora.

D3

a. Kerebi ongeeta omwana oye.

b. Nkerebi ongeenta omwana oye.

c. Kerebi angeenta omwana oye.

d. Kerebi angeenta omwana oye.

e. Tamosibetie, amongeenta.

f. Amongeenta, tamosibetie omwana oye.

D4

a. Omokungu omwaaka omosacha oroe.

b. N’omokungu oaaka omosacha oroe.

c. Omokungu nigo amwaaka omosacha oroe.

d. Omokungu n'omosacha aaka oroe

e. Taseretie omosacha, nigo amwaaka oroe.

f. Nigo amwaaka oroe, tamoseretie omosacha.

D5

a. Omoiseke oyo orusia oborito.

b. N'omoiseke oyo orusia oborito.

c. Omoiseke oyo aarusia oborito.

d. Omoiseke oyo aarusia oborito.

e. Tanyoreti omwana, aarusia oborito.

f. Aarusia oborito, tanyoreti omwana.

D6

a. Kemunto ong’aaka etege.

b. NKemunto ong’aaka etege.

c. Kemunto ang’aaka etege.

d. Kemunto ang’aaka etege.

e. Tari Ongau ong’aaka etege, NKemunto.

f. Nkemunto ong’aaka etege, tari Ong’ua.

Appendix 7: Tests of between subject effects for the Paratone Types

Table 6.1 Test of between subject effects for the Declarative Paratones

	Effect	Value	F	Sig.	PES
Intercept	Pillai's Trace	.989	302.77[b]	.000	.989
	Wilks' Lambda	.011	302.77[b]	.000	.989
	Hotelling's Trace	93.159	302.77[b]	.000	.989
	Roy's Largest Root	93.159	302.77[b]	.000	.989
Age	Pillai's Trace	1.151	2.36	.020	.384
	Wilks' Lambda	.170	2.761	.010	.446
	Hotelling's Trace	3.022	2.938	.006	.502
	Roy's Largest Root	2.172	8.147[c]	.001	.685
	Pillai's Trace	.664	6.413[b]	.004	.664
	Wilks' Lambda	.336	6.413[b]	.004	.664
	Hotelling's Trace	1.973	6.413[b]	.004	.664
	Roy's Largest Root	1.973	6.413[b]	.004	.664
Age * Sex	Pillai's Trace	.818	1.406	.199	.273
	Wilks' Lambda	.345	1.432	.198	.299
	Hotelling's Trace	1.451	1.411	.207	.326
	Roy's Largest Root	1.075	4.032[c]	.020	.518

Table 6.2 Test of between subject effects for the polar Paratones

	Effect	F	Sig.	PES
Intercpt	Pillai's Trace	366.807[b]	.000	.991
	Wilks' Lambda	366.807[b]	.000	.991
	Hotelling's Trace	366.807[b]	.000	.991
	Roy's Largest Root	366.807[b]	.000	.991
Age	Pillai's Trace	1.805	.076	.325
	Wilks' Lambda	2.217	.034	.395
	Hotelling's Trace	2.557	.015	.467
	Roy's Largest Root	8.413[c]	.001	.692
Sex	Pillai's Trace	8.696[b]	.001	.728
	Wilks' Lambda	8.696[b]	.001	.728
	Hotelling's Trace	8.696[b]	.001	.728
	Roy's Largest Root	8.696[b]	.001	.728
Age * Sex	Pillai's Trace	1.298	.253	.257
	Wilks' Lambda	1.336	.243	.285
	Hotelling's Trace	1.339	.241	.315
	Roy's Largest Root	4.066[c]	.020	.520

Table 6. 3 Test of between subject effects for the constituent interrogative paratones

Effect		Value	F	Sig.	PES
Intercept	Pillai's Trace	.991	344.474[b]	.000	.991
	Wilks' Lambda	.009	344.474[b]	.000	.991
	Hotelling's Trace	105.992	344.474[b]	.000	.991
	Roy's Largest Root	105.992	344.474[b]	.000	.991
Age	Pillai's Trace	.949	1.734	.091	.316
	Wilks' Lambda	.221	2.227	.033	.396
	Hotelling's Trace	2.807	2.729	.010	.483
	Roy's Largest Root	2.545	9.545[c]	.000	.718
Sex	Pillai's Trace	.760	10.286[b]	.001	.760
	Wilks' Lambda	.240	10.286[b]	.001	.760
	Hotelling's Trace	3.165	10.286[b]	.001	.760
	Roy's Largest Root	3.165	10.286[b]	.001	.760
Age * Sex	Pillai's Trace	.696	1.132	.360	.232
	Wilks' Lambda	.417	1.134	.366	.253
	Hotelling's Trace	1.135	1.104	.388	.275
	Roy's Largest Root	.824	3.089[c]	.048	.452

Table 6.4 Test of between subject effects for Echo Interrogatives

Effect		Value	F	Sig.	PES
Age	Pillai's Trace	1.314	2.921	.005	.438
	Wilks' Lambda	.117	3.615	.001	.511
	Hotelling's Trace	4.161	4.045	.001	.581
	Roy's Largest Root	3.228	12.104[c]	.000	.763
Sex	Pillai's Trace	.857	19.555[b]	.000	.857
	Wilks' Lambda	.143	19.555[b]	.000	.857
	Hotelling's Trace	6.017	19.555[b]	.000	.857
	Roy's Largest Root	6.017	19.555[b]	.000	.857
Age * Sex	Pillai's Trace	1.271	2.757	.007	.424
	Wilks' Lambda	.156	2.950	.006	.462
	Hotelling's Trace	3.019	2.936	.006	.502
	Roy's Largest Root	2.111	7.915[c]	.001	.679

Table 6.5 Test of between subject effects for imperative utterances

Effect		Value	F	Sig.	PES
Intercept	Pillai's Trace	.983	184.672[b]	.000	.983
	Wilks' Lambda	.017	184.672[b]	.000	.983
	Hotelling's Trace	56.822	184.672[b]	.000	.983
	Roy's Largest Root	56.822	184.672[b]	.000	.983
Age	Pillai's Trace	.951	1.740	.090	.317
	Wilks' Lambda	.278	1.798	.088	.347
	Hotelling's Trace	1.804	1.754	.097	.376
	Roy's Largest Root	1.185	4.443[c]	.014	.542
Sex	Pillai's Trace	.551	3.981[b]	.025	.551
	Wilks' Lambda	.449	3.981[b]	.025	.551
	Hotelling's Trace	1.225	3.981[b]	.025	.551
	Roy's Largest Root	1.225	3.981[b]	.025	.551
Age * Sex	Pillai's Trace	.632	1.001	.463	.211
	Wilks' Lambda	.454	1.006	.464	.232
	Hotelling's Trace	1.016	.988	.479	.253
	Roy's Largest Root	.773	2.901[c]	.058	.436

Appendix 8: Analysis of the Sentence Focus Condition

42a i. Context question: /níŋkì áβàŋìnà βákóìɾìɾìàtèɾàà/ 'Why are the women ululating?'

ii. Answer: [ímòɾáá óíβòɾá ômwáání ómòmùɾá] $_{NF}$. 'Moraa has given birth to a baby boy.'

Presupposition: --

Assertion: Something has happened

Focus: /ímòɾáá óíβòɾá ômwáání ómòmùɾá/.

Focus domain: Clause

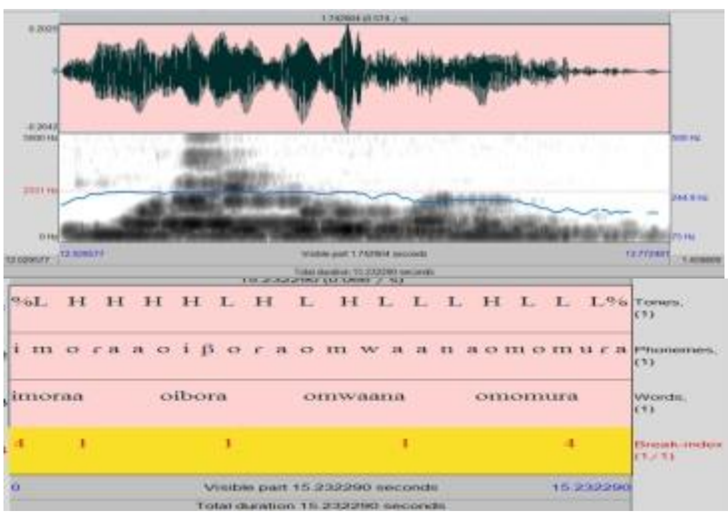

Figure 7.1 Pitch track for the NF paratone /ímòɾáá óíβòɾá ômwáání ómòmùɾá/ *produced by F2Y*

Table 7.1 Comparison of F0 means for the NF paratone / ímòɾáá óíβòɾá ômwáání ómòmùɾá/

Age	Sex	N	Mean	Std. Dev

Children	Female	3	248.900	22.16506
	Male	3	238.400	11.73584
	Total	6	243.650	16.87255
Middle Age	Female	3	189.400	23.05385
	Male	3	120.633	4.53909
	Total	6	155.017	40.49061
Advanced Age	Female	3	205.767	1.96554
	Male	3	159.133	36.98166
	Total	6	182.450	34.65549
Youth	Female	3	243.400	6.57951
	Male	3	144.900	10.35905
	Total	6	194.150	54.50610
Total	Female	12	221.867	29.63902
	Male	12	165.767	49.21445
	Total	24	193.817	48.98497

43a i. Context: /níŋkì mókúmérétí ìɣá/? Why are you so worried like this?

ii. Answer: [ŋkέɾέβí óŋὲὲntá ômwááná ójé] $_{NF}$ Kerebi has strangled a child.

Presupposition: --

Assertion: Something has happened

Focus: /ŋkέɾέβí óŋὲὲntá ômwááná ójé/.

Focus domain: Clause

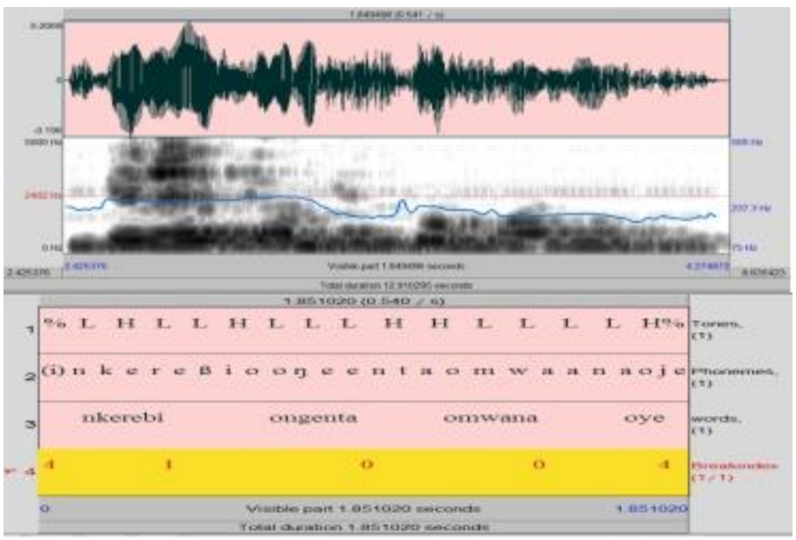

Figure 7.2 Pitch track for the NF paratone /ŋkέɾέβí óŋὲὲntá ômwááná ójé/ *produced by F2Y*

Table 7.2 Comparison of F0 means for the NF utterance /ŋkɛ́ɾɛ́βí óŋɛ̀ɛ̀ntá ômwááná ójé/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	236.6333	18.71158
	Male	3	231.2667	11.83906
	Total	6	233.9500	14.30926
Middle Age	Female	3	199.6333	20.35346
	Male	3	118.3667	3.08275
	Total	6	159.0000	46.37659
Advanced Age	Female	3	203.5333	25.82273
	Male	3	162.1000	29.61959
	Total	6	182.8167	33.65516
Youth	Female	3	232.4333	28.80995
	Male	3	156.5000	5.80259
	Total	6	194.4667	45.55474
Total	Female	12	218.0583	26.67789
	Male	12	167.0583	44.73180
	Total	24	192.5583	44.45079

44a i. Context: / níŋkì móɣósèkèɾà mònó ìɣà/? ‘Why are you laughing loudly like this?’

ii. Answer: [ómòkûŋú ómwááká ómòsâʧà óɾòé] $_{NF}$ ‘A woman slapped the man.

Presupposition: ---

Assertion: Something has happened

Focus: /ómòkûŋú ómwááká ómòsâʧà óɾòé/

Focus domain: Clause

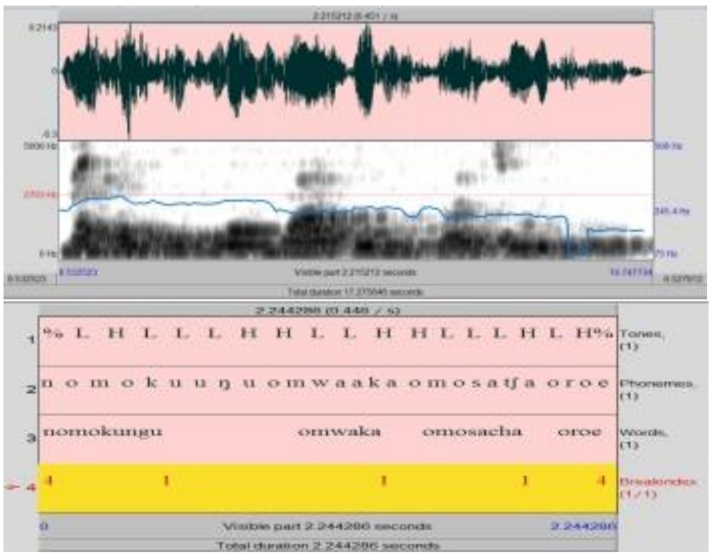

Figure 7.3 Pitch track for the NF paratone /ómòkûŋú ómwááká ómòsâʧà óɾòé/ *produced by F2Y*

Table 7.3 Comparison of F0 means for utterance / ómòkûŋú ómwááká ómòsâʧà óɾòé/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	248.3667	29.27394
	Male	3	240.7667	23.85484
	Total	6	244.5667	24.24324
Middle Age	Female	3	212.5667	14.18250
	Male	3	136.8333	9.21104
	Total	6	174.7000	42.83755
Advanced Age	Female	3	202.2000	6.81102
	Male	3	154.7000	17.15721
	Total	6	178.4500	28.51629
Youth	Female	3	245.6333	15.85129
	Male	3	150.9667	18.21547
	Total	6	198.3000	54.05331
Total	Female	12	227.1917	26.27195
	Male	12	170.8167	45.39229
	Total	24	199.0042	46.31005

45a i. Context: níŋkì ókwóómánèɾà ‘Why are you quarelling?’

ii. Answer: [nômóíséké óɾùsíà óβòɾìtò] $_{NF}$ ‘The girl has aborted.’

Presupposition: ---

Assertion: Something has happened.

Focus: nômóíséké óɾùsíà óβòɾítò.

Focus domain: Clause

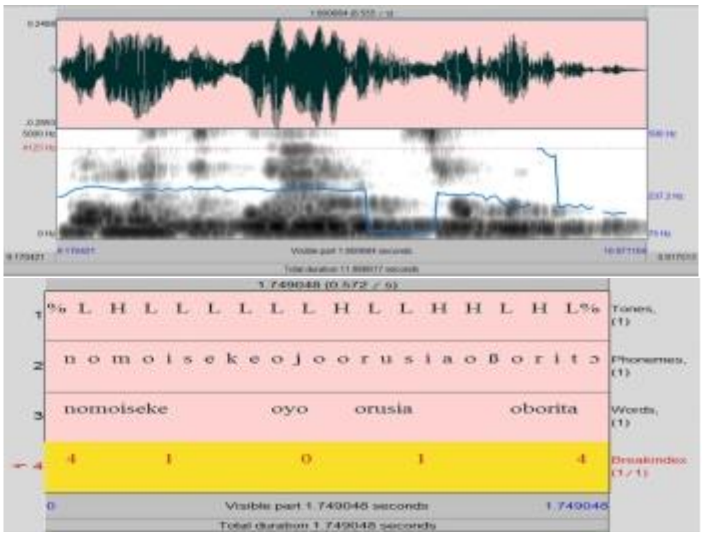

*Figure 7.4 Pitch track for the NF paratone /*nômóíséké óɾùsíà óβòìɾtò*/ produced by F2Y*

Table 7.4 Comparison of F0 means for utterance /nômóíséké órùsíà óβòìɾtò/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	245.3000	22.29776
	Male	3	237.3333	10.54577
	Total	6	241.3167	16.19882
Middle-Age	Female	3	203.9000	33.24470
	Male	3	143.5000	9.85343
	Total	6	173.7000	39.69091
Advanced Age	Female	3	202.4333	.49329
	Male	3	153.2000	18.18433
	Total	6	177.8167	29.31794
Youth	Female	3	250.4333	19.31692
	Male	3	157.7000	20.52486
	Total	6	204.0667	53.82942
Total	Female	12	225.5167	30.13394
	Male	12	172.9333	41.36963
	Total	24	199.2250	44.43097

46a i. Context: níŋkì ókóɾééɾà? ‘What makes you cry?’

ii. Answer: [ŋkémùùntó óŋâká έtέ̂gὲ]$_{NF}$ ‘Kemunto kicked me.’

Presupposition: ---

Assertion: Something has happened

Focus: /ŋkémùùntó óŋâká ɛ́tɛ̂gɛ̀/.

Focus domain: Clause

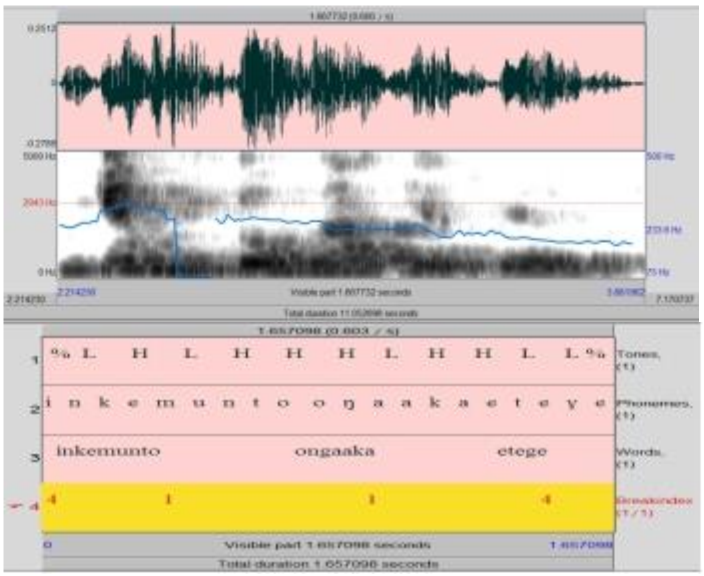

Figure 7.5 Pitch track for the NF paratone / ŋkémùùntó óŋâká ɛ́tɛ̂γɛ̀ */ produced by F2Y*

Table 7.5 Comparison of F0 means for the NF utterance /ŋkémùùntó óŋâká ɛ́tɛ̂ɣɛ̀/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	261.5333	35.85810
	Male	3	228.8000	12.54910
	Total	6	245.1667	29.97924
Middle Age	Female	3	204.7667	30.37521
	Male	3	126.4333	5.68712
	Total	6	165.6000	47.14692
Advanced Age	Female	3	213.1667	4.32474
	Male	3	154.9333	30.33436
	Total	6	184.0500	37.32140
Youth	Female	3	229.1000	19.54252
	Male	3	168.7333	13.77474
	Total	6	198.9167	36.35797
Total	Female	12	227.1417	31.42933
	Male	12	169.7250	41.94247
	Total	24	198.4333	46.62373

Table 7.6 Test of between subject effects for the NF condition

Effect		Value	F	Sig.	PES
Intercept	Pillai's Trace	1.000	11298.581[b]	.000	1.000
	Wilks' Lambda	.000	11298.581[b]	.000	1.000
	Hotelling's Trace	22597.162	11298.581[b]	.000	1.000
	Roy's Largest Root	22597.162	11298.581[b]	.000	1.000
Age	Pillai's Trace	1.936	1.517	.210	.645
	Wilks' Lambda	.000	6.916	.003	.922
	Hotelling's Trace	522.520	48.381	.000	.994
	Roy's Largest Root	520.301	433.584[c]	.000	.998
Sex	Pillai's Trace	.998	249.491[b]	.000	.998
	Wilks' Lambda	.002	249.491[b]	.000	.998
	Hotelling's Trace	498.982	249.491[b]	.000	.998
	Roy's Largest Root	498.982	249.491[b]	.000	.998
Age * Sex	Pillai's Trace	2.042	1.777	.133	.681
	Wilks' Lambda	.001	5.129	.008	.898
	Hotelling's Trace	205.295	19.009	.002	.986
	Roy's Largest Root	202.855	169.045[c]	.000	.995

Appendix 9: Analysis of the Argument Focus Condition

43b i. Context Question: / níŋò óŋὲὲntà ômwáánáòjè/?

ii. Answer: /[íŋkέɾέβí]$_{AF}$ óŋὲὲntá ômwáánáòjè/.

iii. Pragmatic presentation of (ii):

Presupposition: x / óŋὲὲntà ômwáánáòjè/

Assertion: ‘‘x= /íŋkέɾέβí/ ’’

Focus: /íŋkέɾέβí/

Focus domain: Determiner phrase

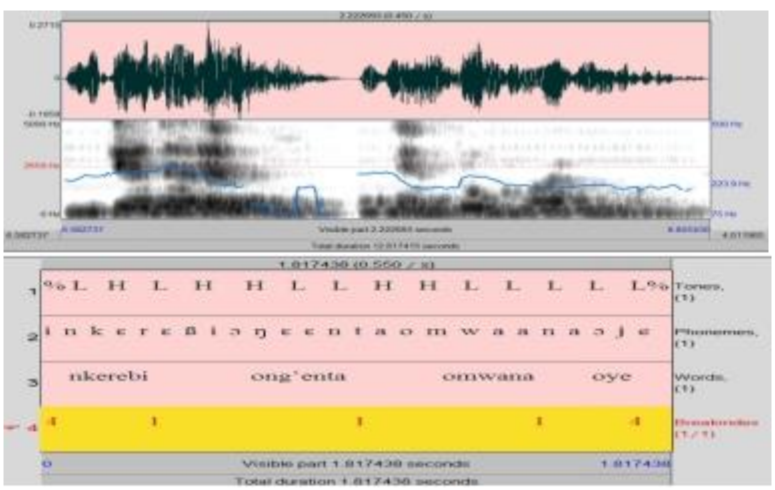

Figure 8.2a Pitch track for the AF utterance /íŋkέɾέβí óŋὲὲntá ômwáánáòjè/ *produced by F2Y*

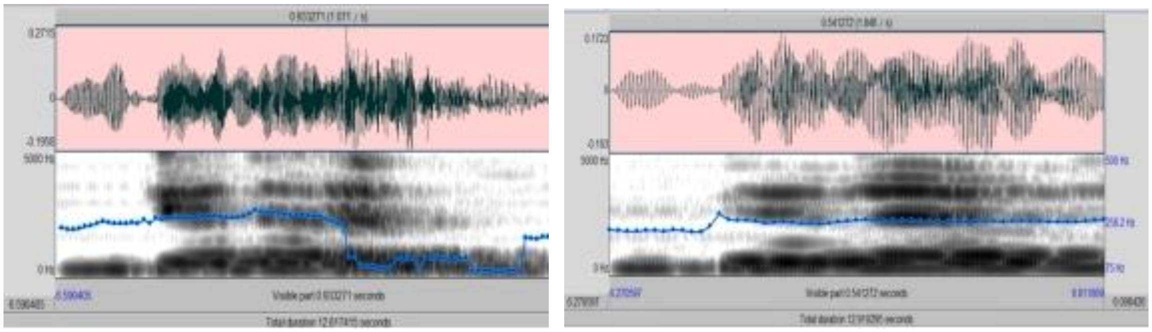

Figure 8.2b Pitch tracks for the AF and NF production of the phrase /íŋkέɾέβí/ by F2Y

Table 8.2 Comparison of F0 means for AF utterance /íŋkέɾέβí óŋὲὲntá ômwááná òjè/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	248.3667	23.39751
	Male	3	238.3000	12.27721
	Total	6	243.3333	17.59746
Middle Age	Female	3	197.9000	20.63419
	Male	3	122.0000	6.08933
	Total	6	159.9500	43.74223
Advanced Age	Female	3	203.1667	7.74231
	Male	3	165.6667	52.43113
	Total	6	184.4167	39.31236
Youth	Female	3	230.9667	7.20370
	Male	3	152.7667	8.96456
	Total	6	191.8667	43.44508
Total	Female	12	220.1000	25.69064
	Male	12	169.6833	50.35073
	Total	24	194.8917	46.81058

44b: i. Context: /níŋò óàkà ómòsâʧà óɾòè/?

ii. Answer: / [nômòkúŋgú] $_{AF}$ óáká ómòsâʧà óɾòé/.

iii. Pragmatic presentation of (ii):

Presupposition: x / óáká ómòsâʧà óɾòé/

Assertion: ‘‘x= /nômòkúŋgú/’’

Focus: ‘‘/nômòkúŋgú/’’

Focus domain: Determiner phrase

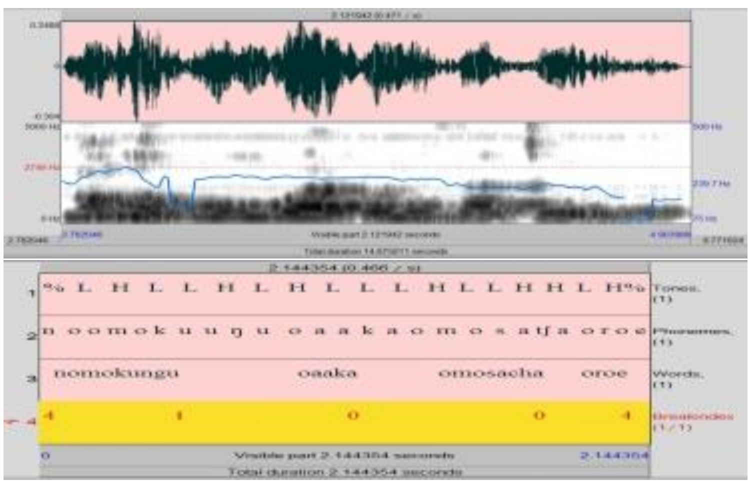

*Figure 8.3a Pitch track for the utterance /*nômòkúŋgú óáká ómòsâʧà óɾòé*/ as produced by F2Y*

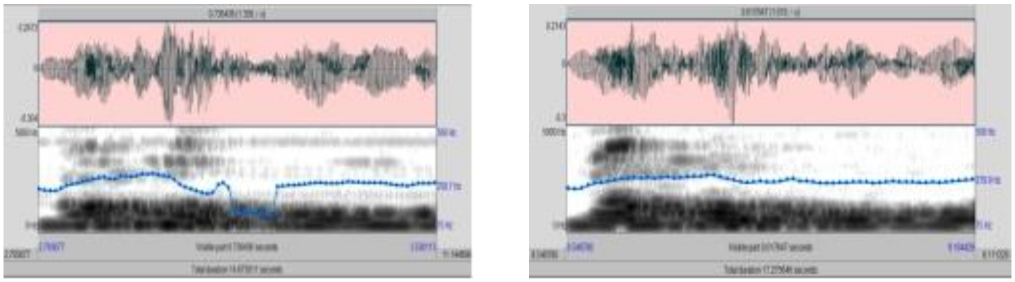

Figure 8.3b Pitch tracks for the AF and NF production of the phrase /nômòkúŋgú/ *by F2Y*

Table 8.3Comparison of F0 means for the AF utterance /nômòkúŋgú óáká ómòsâʧà óɾòé/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	268.5000	29.95396
	Male	3	248.2667	14.35142
	Total	6	258.3833	23.75074
Middle Age	female	3	211.7667	34.71114
	Male	3	134.5333	13.84425
	Total	6	173.1500	48.45727
Advanced Age	female	3	217.0333	13.44408
	Male	3	164.3667	26.79820
	Total	6	190.7000	34.52083
Youth	female	3	238.3333	8.53249
	Male	3	154.2000	14.81924
	Total	6	196.2667	47.33382
Total	female	12	233.9083	31.16649
	Male	12	175.3417	47.98025
	Total	24	204.6250	49.60204

45b: i. Context: /níŋò óɾùsìà óβòɾìtò/ 'Who terminated a pregnancy?'

ii. Answer: /[nômóíséké]$_{AF}$ óɾùsìà óβòɾìtò/. It is the girl who terminated a pregnancy

iii. Pragmatic presentation of (ii)

Presupposition: x óɾùsìà óβòɾìtò 'x terminated a pregnancy'

Assertion: ''x= nômóíséké '' 'x=It is the girl'

Focus: ''nômóíséké'' ' It is the girl'

Focus domain: Determiner phrase

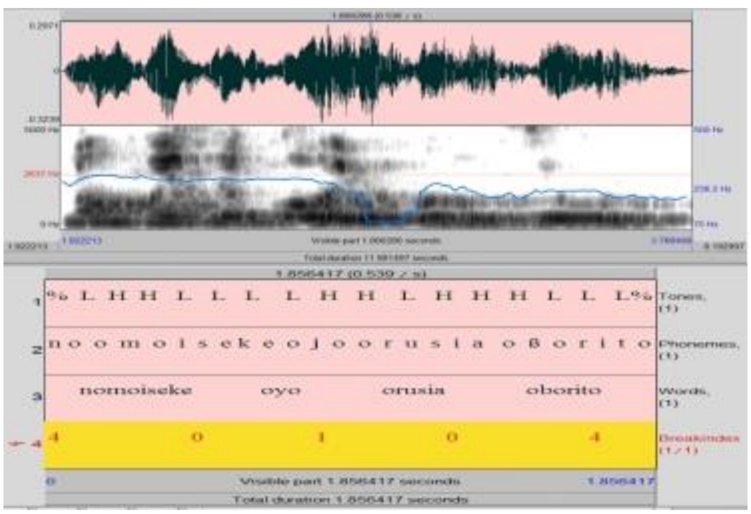

Figure 8.4a Pitch track for the AFutterance /nômóíséké óɾùsìà óβòɾìtò/

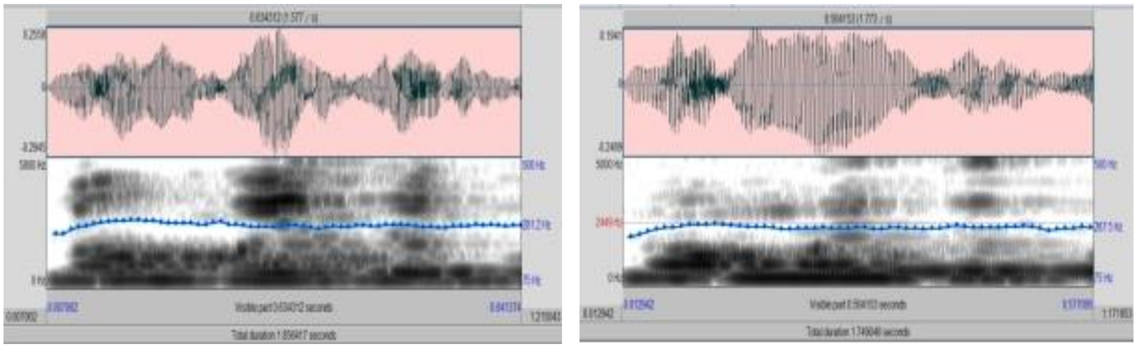

Figure 8.4b Pitch Track for the production of the AF and NF phrase /nômóíséké/ *by F2Y*

Table 8.4 Comparison of F0 means for the AF utterance /nômóíséké órùsìà óβòɾìtò/

Age	Sex	N	Mean	Std. Dev
Child	Female	3	258.7333	22.05682
	Male	3	241.9000	5.06853
	Total	6	250.3167	17.02603
Middle Age	Female	3	207.2667	22.71571
	Male	3	144.5333	18.57750
	Total	6	175.9000	39.05243
Advanced Age	Female	3	211.5000	9.10988
	Male	3	157.6333	19.03742
	Total	6	184.5667	32.38288
Youth	Female	3	229.2667	9.85207
	Male	3	166.6333	22.89199
	Total	6	197.9500	37.75345
Total	Female	12	226.6917	25.74238
	Male	12	177.6750	42.37815
	Total	24	202.1833	42.45722

46b: i. Context: /níŋò óŋwàáká ὲtɛ̂γè?

ii. Answer: /[íŋkémùùntó]$_{AF}$ óŋâká έtέ̂γὲ/.

iii. Pragmatic presentation of (ii)

Presupposition: x óŋâká έtέ̂γὲ

Assertion: ‘‘x= [íŋkémùùntó]’’

Focus: ‘‘[íŋkémùùntó]’’

Focus domain: Determiner phrase

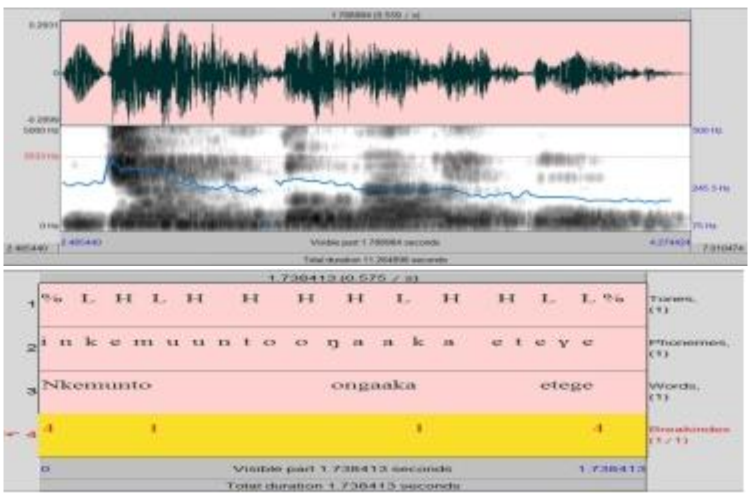

Figure 8.5a Pitch track for the AF utterance /íŋkémùùntó óŋâká έtέ̂γὲ/

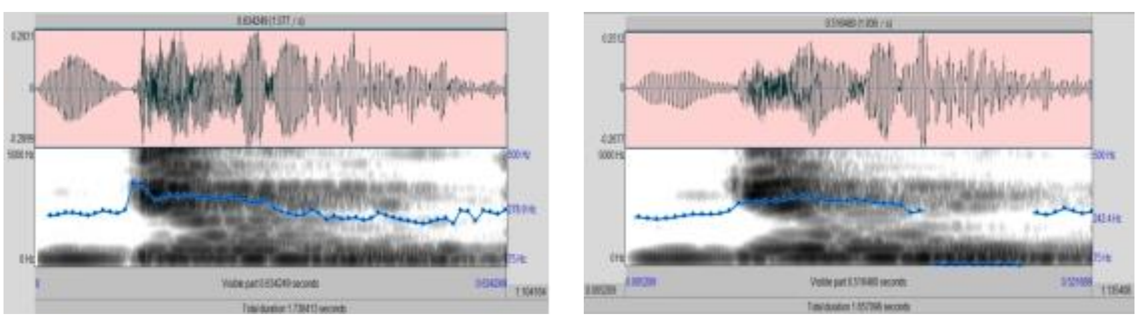

Figure 8.5b Pitch tracks for the AF and NF production of the phrase /íŋkémùùntó/ by F2Y

Table 8.5 Comparison of F0 means for utterance /íŋkémùùntó óŋâká έtɛ̂ɣὲ/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	268.6333	33.14006
	Male	3	234.3000	13.43763
	Total	6	251.4667	29.41372
Middle-aged	Female	3	212.8000	25.24302
	male	3	134.3333	3.16280
	Total	6	173.5667	45.89107
Advanced-age	Female	3	214.1000	28.92801
	male	3	179.0000	40.30000
	Total	6	196.5500	36.79634
Youth	Female	3	242.5667	9.11281
	male	3	164.8000	13.91151
	Total	6	203.6833	43.87397
Total	Female	12	234.5250	32.56086
	male	12	178.1083	42.39572
	Total	24	206.3167	46.87203

Table 8.6 Test of between subject effects for the AF condition

Effect		Value	F	Sig.	PES
Intercept	Pillai's Trace	.997	725.013[b]	.000	.997
	Wilks' Lambda	.003	725.013[b]	.000	.997
	Hotelling's Trace	395.461	725.013[b]	.000	.997
	Roy's Largest Root	395.461	725.013[b]	.000	.997
Age	Pillai's Trace	1.573	2.389	.011	.524
	Wilks' Lambda	.040	3.721	.001	.658
	Hotelling's Trace	10.390	5.580	.000	.776
	Roy's Largest Root	9.110	19.738[c]	.000	.901
Sex	Pillai's Trace	.893	15.330[b]	.000	.893
	Wilks' Lambda	.107	15.330[b]	.000	.893
	Hotelling's Trace	8.362	15.330[b]	.000	.893
	Roy's Largest Root	8.362	15.330[b]	.000	.893
Age * Sex	Pillai's Trace	1.125	1.299	.241	.375
	Wilks' Lambda	.128	1.872	.060	.496
	Hotelling's Trace	4.936	2.651	.009	.622
	Roy's Largest Root	4.559	9.879[c]	.000	.820

Appendix 10: Analysis of the Predicate Focus Condition

43c i. Prompt Question: /nínkì kɛ̀ɾɛβí ákôɾà/? ‘What did Kerebi do?

ii. Answer: /kɛ̀ɾɛβí [nîγó áŋɛ̂ɛntá ômwááná òjé]$_{PF}$. ‘Kerebi strangled her child.’

iii. Pragmatic presentation of (ii)

Presupposition: kɛ̀ɾɛβí nîγó ákôɾà x ‘Kerebi did x’

Assertion: ‘‘x= [áŋɛ̂ɛntá ômwááná òjé]’’ ‘x=strangled her child’

Focus: ‘‘/áŋɛ̂ɛntá ômwááná òjé/’’ ‘strangled her child’

Focus domain: Verb Phrase

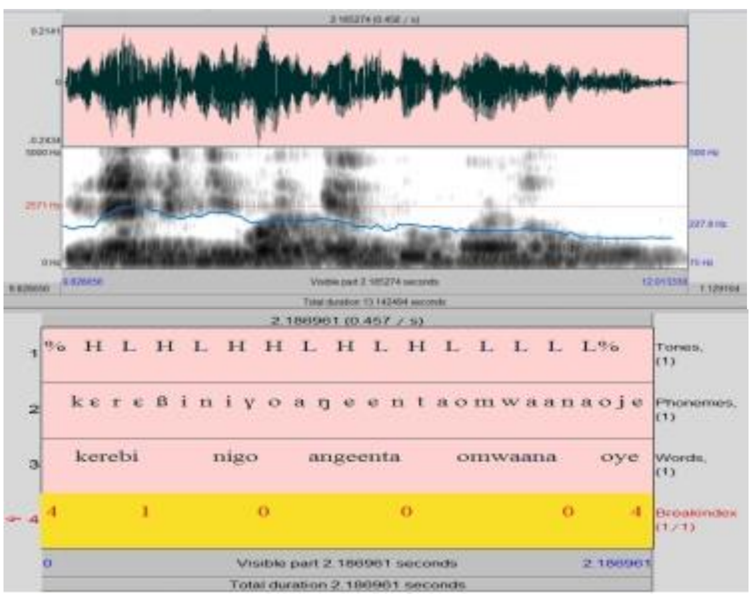

Figure 9.2a: Pitch track for the PF utterance / kɛ̀ɾɛβí nîγó áŋɛ̂ɛntá ômwááná òjé /

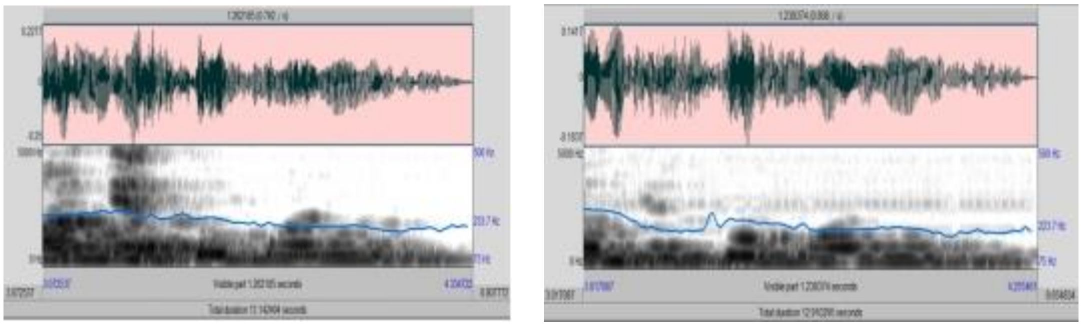

Figure 9.2b Pitch tracks for the PF and NF production of / áŋɛ̂ɛntá ômwááná òjé/ *by F2Y*

Table 9.2 Comparison of F0 means for PF utterance / kɛ̀ɾɛ́βí [nîɣó áŋɛ̂ɛntá ômwááná òjé/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	250.0667	17.36500
	Male	3	232.3000	11.59483
	Total	6	241.1833	16.40395
Youth	Female	3	230.7667	5.05206
	Male	3	139.1667	5.86202
	Total	6	184.9667	50.40955
Middle Age	Female	3	196.4333	8.20081
	Male	3	129.9667	12.01721
	Total	6	163.2000	37.55013
Advanced Age	Female	3	203.8667	22.50363
	Male	3	162.4000	42.17831
	Total	6	183.1333	37.81553
Total	Female	12	220.2833	25.77401
	Male	12	165.9583	46.18704
	Total	24	193.1208	45.91116

44c i. Context: /níŋkì ómòkûŋù àkòɾà/? ‘What did the woman do?

ii. Answer: /ómòkûŋgú nîγó [ámwâáká ómòsâʧà óɾòé] $_{PF}$/. ‘The woman slapped the man.’

iii. Pragmatic presentation of (ii)

Presupposition: / ómòkûŋù àkòɾà/ x ‘The woman did x

Assertion: ‘‘x= [ámwâáká ómòsâʧà óɾòé] ’’ ‘x=slapped the man.

Focus: ‘‘[ámwâáká ómòsâʧà óɾòé] ’’ ‘slapped the man’

Focus domain: verb phrase

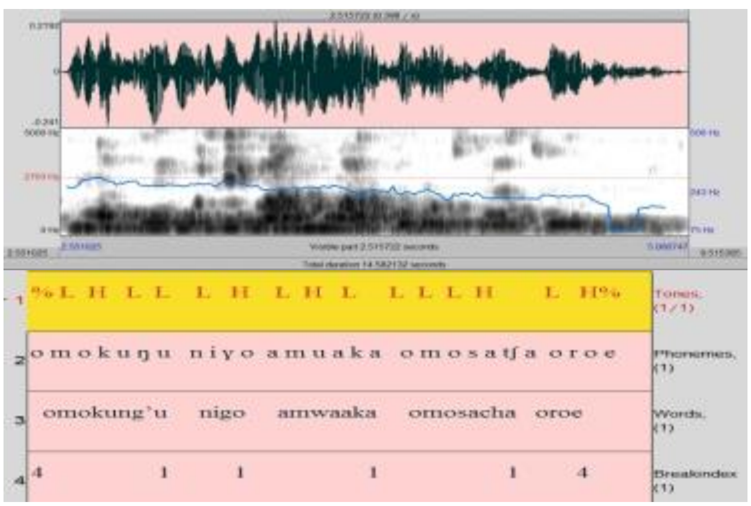

Figure 9.3a Pitch track for the PF / ómòkûŋgú nîγó [ámwâáká ómòsâʧà óɾòé]/

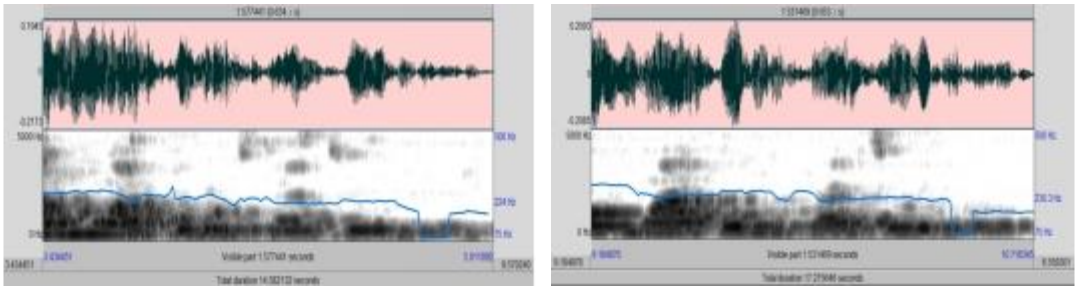

Figure 9.3b Pitch tracks for the PF and NF constituent /ámwââká ómòsâʧà óɾòé/

Table 9.3 Comparison of F0 means for the proposition / ómòkûŋgú nîɣó [ámwââká ómòsâʧà óɾòé/

Age	Sex	Mean	Std. Dev.	N
Child	Female	265.6000	17.12221	3
	Male	244.8000	14.99233	3
	Total	255.2000	18.35669	6
Youth	Female	242.5667	14.25494	3
	Male	141.9667	18.70223	3
	Total	192.2667	57.07275	6
Middle Age	Female	203.4333	29.39325	3
	Male	140.8000	10.77822	3
	Total	172.1167	39.60977	6
Advanced Age	Female	218.2667	32.26179	3
	Male	169.4667	23.18024	3
	Total	193.8667	36.68366	6
Total	Female	232.4667	32.38339	12
	Male	174.2583	46.65148	12
	Total	203.3625	49.25742	24

45c i. Context: /níŋkì ómòíséké òjò àkòɾà/? ‘What did this girl do?

ii. Answer: /ómòíséké òjò nîγó [áɾûsíá óβòɾìtò]$_{PF}$/. ‘The girl aborted.’

iii. Pragmatic presentation of (ii)

Presupposition: This girl is topic for comment x

Assertion: ‘‘x= [áɾûsíá óβòɾìtò]’’

Focus: ‘‘[áɾûsíá óβòɾìtò]’’

Focus domain: verb phrase

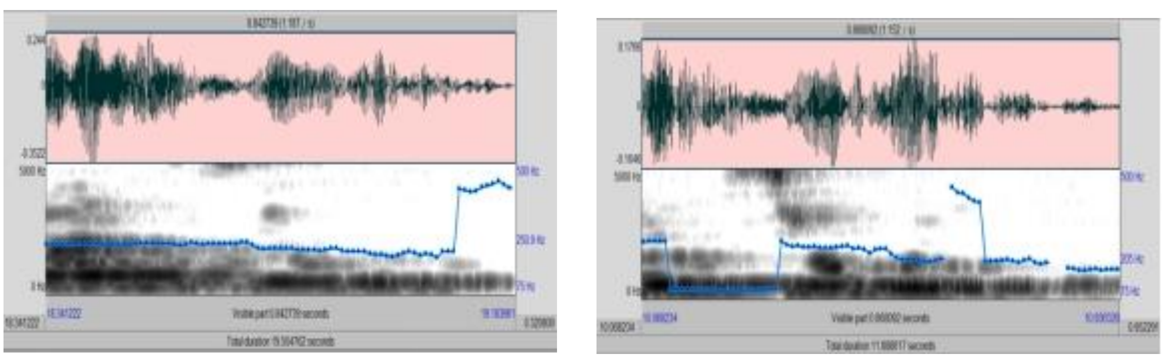

Figure 9.4 Pitch tracks for the PF and NF constituent /áɾûsíá óβòɾìtò/

Table 4.2.2e Comparison of F0 means for utterance / ómòíséké òjò nîγó áɾûsíá óβòɾìtò]PF/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	269.1333	31.64433
	Male	3	235.0333	4.28991
	Total	6	252.0833	27.50908
Youth	Female	3	242.5333	25.32594
	Male	3	143.1333	12.22552
	Total	6	192.8333	57.27525
Middle Age	Female	3	220.6333	28.53653
	Male	3	135.1667	13.25795
	Total	6	177.9000	50.86657
Advanced Age	Female	3	238.5000	8.52467
	Male	3	167.6333	26.58502
	Total	6	203.0667	42.64269
Total	Female	12	242.7000	28.07380
	Male	12	170.2417	43.28599
	Total	24	206.4708	51.40683

46c i. Context: /níŋkì kèmùùntò àkòɾà/? ‘What did Kemunto do?’

ii. Answer: /kèmùùntó nîγó [áŋâká έtέ̂γὲ]PF ‘Kemunto kicked me.’

iii. Pragmatic Presentation of (ii)

Presupposition: Kemunto is subject for comment x

Assertion: ‘‘x= /áŋâká έtε̂γὲ/ ’’ ‘kicked me

Focus: ‘‘/áŋâká έtε̂γὲ/ ’’ ‘kicked me’

Focus domain: Verb Phrase

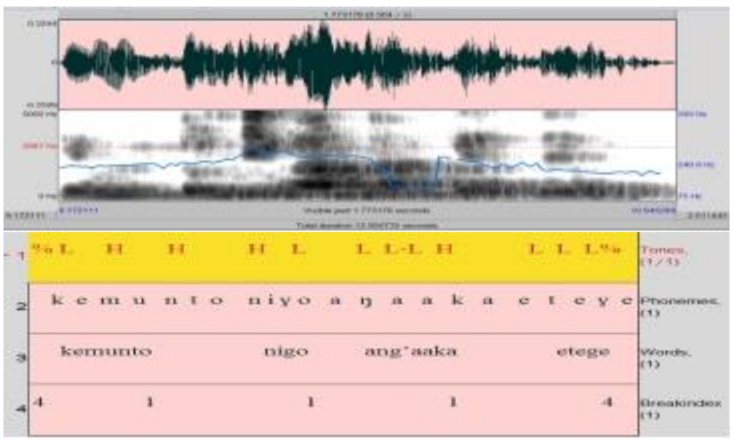

*Figure 9.5a Pitch track for the PF /*kèmùùntó nîγó áŋâká έtε̂γὲ*/*

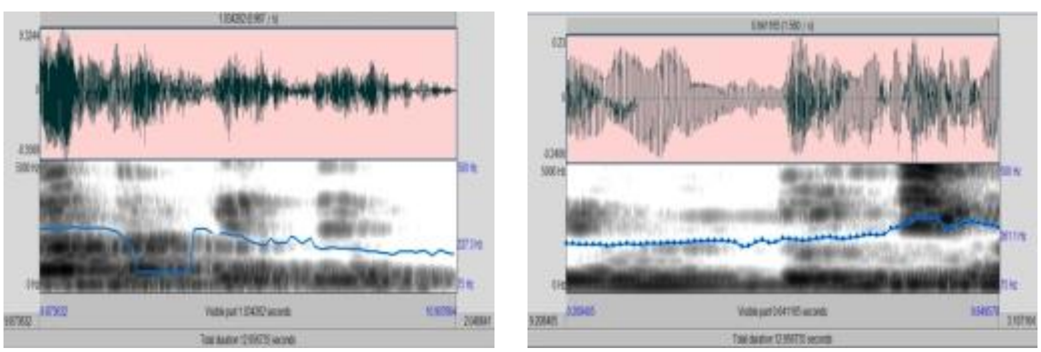

*Figure 9.5b Pitch tracks for the PF and NF pronunciation of /*áŋâká έtε̂γὲ*/ by F2Y*

Table 9.5 Comparison of F0 means for the PF utterance / kèmùùntó nîγó áŋâká έtε̂γὲ/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	265.7333	24.56122
	Male	3	233.7333	11.66033
	Total	6	249.7333	24.55375
Youth	Female	3	227.5333	14.90816
	Male	3	138.2000	22.29865
	Total	6	182.8667	51.78732
Middle Age	Female	3	216.2000	34.81939
	Male	3	130.9000	18.38831
	Total	6	173.5500	52.94370
Advanced Age	Female	3	201.4667	26.08167
	Male	3	175.7667	48.61947
	Total	6	188.6167	37.62698
Total	Female	12	227.7333	33.35387
	Male	12	169.6500	49.15154
	Total	24	198.6917	50.67112

Table 9.6Test of between subject effects for the F0 production in the PF condition

Effect		Value	F	Sig.	PES
Interpt		.998	1003.466[b]	.000	.998
	Pillai's Trace				
	Wilks' Lambda	.002	1003.466[b]	.000	.998
	Hotelling's Trace	547.345	1003.466[b]	.000	.998
	Roy's Largest Root	547.345	1003.466[b]	.000	.998
Age	Pillai's Trace	1.347	1.765	.068	.449
	Wilks' Lambda	.065	2.857	.005	.598
	Hotelling's Trace	8.551	4.592	.000	.740
	Roy's Largest Root	7.885	17.085[c]	.000	.887
Sex	Pillai's Trace	.942	29.530[b]	.000	.942
	Wilks' Lambda	.058	29.530[b]	.000	.942
	Hotelling's Trace	16.107	29.530[b]	.000	.942
	Roy's Largest Root	16.107	29.530[b]	.000	.942
Age *	Pillai's Trace	1.637	2.602	.006	.546
Sex	Wilks' Lambda	.046	3.476	.001	.643
	Hotelling's Trace	8.424	4.524	.000	.737
	Roy's Largest Root	7.043	15.261[c]	.000	.876

Appendix 11: Analysis of the Contrastive Focus Condition

43d i. Context question: /kὲɾɛβì násíβíá ômwááná òjé/?

ii. Answer: /kέɾɛβí tásîβètí ômwááná ójé nîγó [âmòŋɛ̂ɛntá]$_{CF}$/

iii. Pragmatic representation of (ii)

Pragmatic presupposition: [kὲɾɛβì násíβíá ômwááná òjé]

Pragmatic assertion: x= [âmòŋɛ̂ɛntá]

Focus: [âmòŋnɛ̂ɛtá]

Focus domain: Clause

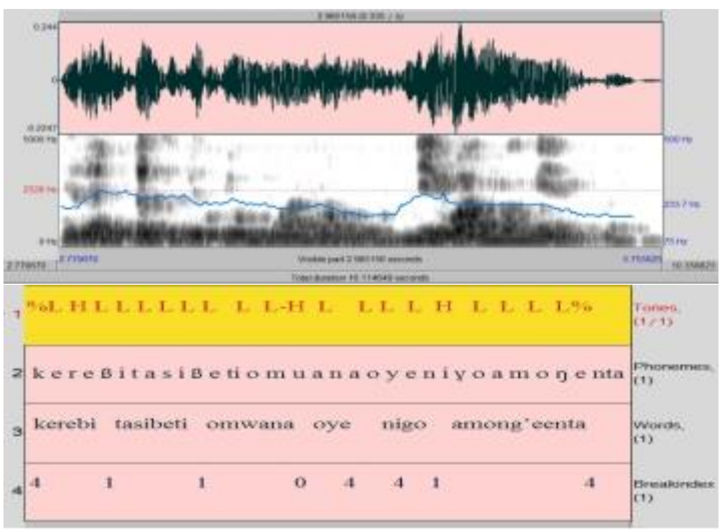

Figure 10.2 Pitch track for / kέɾɛβí tásîβètí ômwááná ójé nîγó âmòŋɛ̂ɛntá*/produced by F2Y*

Table 10.2 A summary of the mean F0 production for / kɛ́ɾɛ̂βí tásîβὲtí ômwááná ójé nîɣó [âmòŋɛ̂ɛntá/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	246.1333	35.53735
	Male	3	243.9667	10.95689
	Total	6	245.0500	23.54976
Youth	Female	3	227.1000	9.27146
	Male	3	127.0667	17.91936
	Total	6	177.0833	56.25678
Middle Age	Female	3	200.1667	11.58548
	Male	3	119.8333	9.26517
	Total	6	160.0000	44.98955
Avanced Age	Female	3	209.3000	11.29469
	Male	3	159.9333	40.93719
	Total	6	184.6167	38.11154
Total	Female	12	220.6750	25.11697
	Male	12	162.7000	55.23778
	Total	24	191.6875	51.35953

44d i. Context question: /ómòkúŋgú násɛ̂ríá ómòsâʧà/?

ii. Answer: /ómòkûŋgú tásɛ̂ɾὲtí ómòsâʧà nîɣó [àmwáàká óɾòé]$_{CF}$/ 'The wife did not chase the husband but slapped him.'

iii. Pragmatic representation of (ii)

Utterance: /ómòkûŋgú tásêɾètí ómòsâʧà nîγó [àmwáàká óɾòé]$_{CF}$/ 'The wife did not chase the husband but slapped him.'

Pragmatic presupposition: [ómòkúŋgú ásêɾíá ómòsâʧà] 'the wife chased the husband.'

Pragmatic assertion:	[àmwáàká óɾòé]	'she slapped him.'
Focus:	[àmwáàká óɾòé]	'she slapped him.'
Focus domain:	Clause	

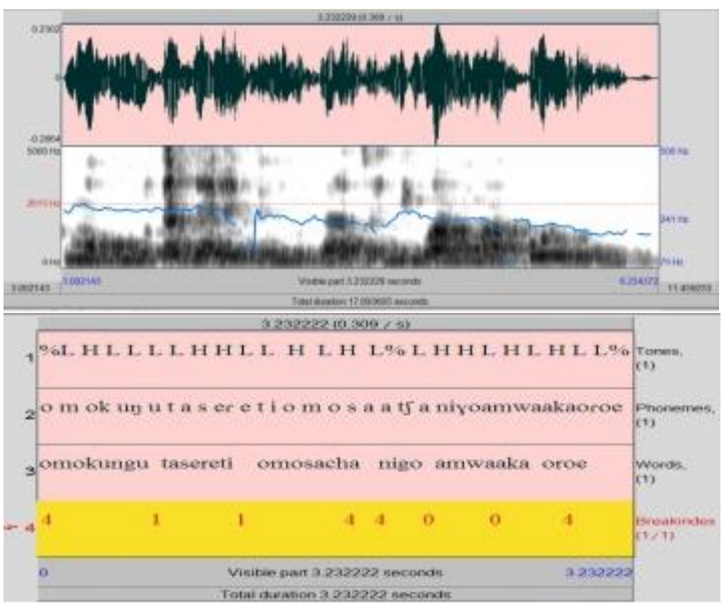

Figure 10.3: Pitch track for /ómòkûŋgú tásêɾètí ómòsâʧà nîγó àmwáàká óɾòé/ *produced by F2Y.*

Table 10.3 A summary of the mean F0 production for / ómòkûŋgú tásêɾètí ómòsâʧà nîγó àmwáàká óɾòé/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	255.4000	19.29845
	Male	3	231.2333	9.34095
	Total	6	243.3167	18.94945
Youth	Female	3	242.4333	34.37242
	Male	3	144.7333	18.21108
	Total	6	193.5833	58.89677
Middle Age	Female	3	208.9333	30.36550
	Male	3	137.4000	11.36486
	Total	6	173.1667	44.22211
Advanced Age	Female	3	209.8000	12.37457
	Male	3	159.9000	23.30579
	Total	6	184.8500	32.02373
Total	Female	12	229.1417	30.45729
	Male	12	168.3167	41.34832
	Total	24	198.7292	47.18544

45d i. Context question: /ómòísékóòjò náɲôɾômwáánà/? ‘Did the girl deliver?’

ii. Answer: /ómòíséké táɲôɾétí ômwááná [áɾûsíá óβòɾìtò]$_{CF}$/ ‘The girl did not deliver but aborted.’

iii. Pragmatic representation of (ii)

Proposition: /ómòíséké táɲôɾétí ômwáàná áɾûsíá óβòɾìtò/ 'The girl did not deliver but aborted.'

Pragmatic presupposition: [ómòísékó òjò áɲôɾômwáánà] 'this girl delivered.'

Pragmatic assertion: [áɾûsíá óβòɾìtò] 'she aborted'

Focus: [áɾûsíá óβòɾìtò]

Focus domain: clause

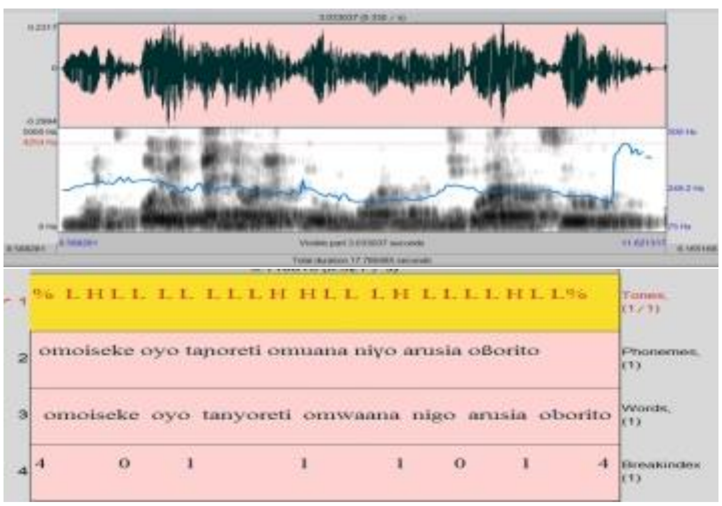

Figure 10.5 Pitch track for the utterance /ómòíséké táɲôɾétí ômwáàná áɾûsíá óβòɾìtò/

Table 10.6 A summary of the mean F0 production for the utterance /ómòíséké táɲôɾétí ômwááná áɾûsíá óβòɾìtò/

Age	Sex	N	Mean	Std. Dev
Children	Female	3	261.4667	35.51821
	Male	3	228.1667	14.21138
	Total	6	244.8167	30.29966
Youth	Female	3	244.5333	18.83861
	Male	3	141.6000	12.49360
	Total	6	193.0667	58.16334
Middle Age	Female	3	209.7000	27.16634
	Male	3	121.9000	7.99937
	Total	6	165.8000	51.31717
Advanced Age	Female	3	208.3333	12.02262
	Male	3	164.1667	41.68721
	Total	6	186.2500	36.58080
Total	Female	12	231.0083	31.95805
	Male	12	163.9583	46.21530
	Total	24	197.4833	51.79520

46d. i. Context question: /nôŋáù óɣwáàká ɛ́tɛ̂ɣɛ̀/? ‘Is it Ongau that kicked you?’

ii. Answer: /táɾí òŋáù óŋâkà ɛ́tɛ̂ɣɛ̀ [íŋkèmùùntò]$_{CF}$/ ‘It is not Ongau that kicked me but Kemunto.’

iii. Pragmatic representation of (ii)

Proposition: /táɾí òŋáù óŋâkà ɛ́tɛ̂ɣɛ̀ [íŋkèmùùntò]$_{CF}$ ‘It is not Ongau that kicked me but Kemunto.’

Pragmatic presupposition: /nôŋáù óɣwáàká ɛ́tɛ̂ɣɛ̀/

Pragmatic assertion: [íŋkèmùùntò]

Focus: /íŋkèmùùntò/

Focus domain: clause

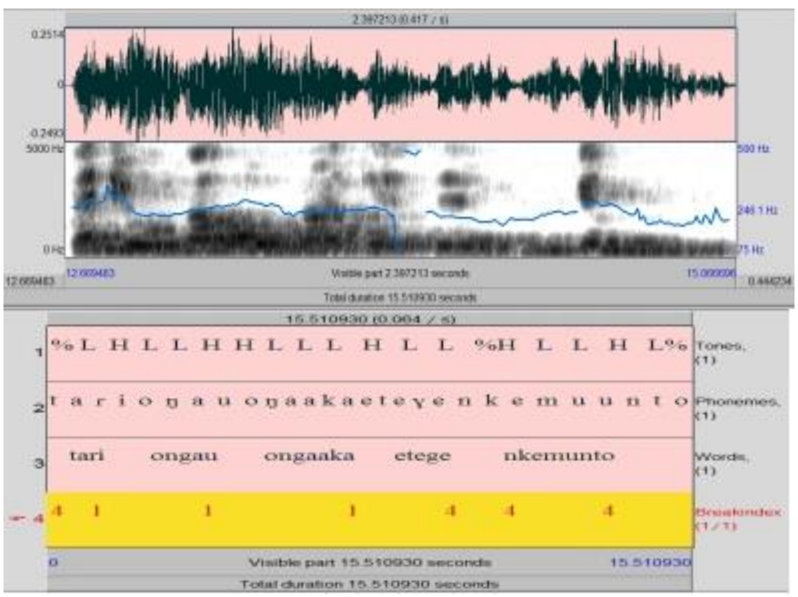

Figure 10.5 Pitch track for /táɾí òŋáù óŋâkà ɛ́tɛ̂ɣɛ̀ íŋkèmùùntò/ produced by F2Y

Table 10.5 A summary of the mean F0 production for the utterance /táɾí òŋáù óŋâkà έtεγ̂è íŋkèmùùntò/

Age	Sex	N	Mean	Std. Dev.
Children	Female	3	261.6333	24.61510
	Male	3	232.8000	5.70000
	Total	6	247.2167	22.46699
Youth	Female	3	232.7667	19.32830
	Male	3	138.0000	23.32638
	Total	6	185.3833	55.32899
Middle Age	Female	3	222.6333	25.32634
	Male	3	122.4000	13.86110
	Total	6	172.5167	57.85705
Advanced Age	Female	3	213.0333	19.43433
	Male	3	171.7000	51.94314
	Total	6	192.3667	41.74742
Total	Female	12	232.5167	26.92173
	Male	12	166.2250	50.87607
	Total	24	199.3708	52.25864

Table 10.6 Tests of between-subject effects in the CF condition.

Effect		Value	F	Sig.	PES
Intercept	Pillai's Trace	.997	581.362[b]	.000	.997
	Wilks' Lambda	.003	581.362[b]	.000	.997
	Hotelling's Trace	317.107	581.362[b]	.000	.997
	Roy's Largest Root	317.107	581.362[b]	.000	.997
Age	Pillai's Trace	1.522	2.231	.018	.507
	Wilks' Lambda	.041	3.688	.001	.656
	Hotelling's Trace	11.531	6.193	.000	.794
	Roy's Largest Root	10.582	22.927[c]	.000	.914
Sex	Pillai's Trace	.854	10.701[b]	.000	.854
	Wilks' Lambda	.146	10.701[b]	.000	.854
	Hotelling's Trace	5.837	10.701[b]	.000	.854
	Roy's Largest Root	5.837	10.701[b]	.000	.854
Age * Sex	Pillai's Trace	1.118	1.288	.248	.373
	Wilks' Lambda	.188	1.412	.193	.427
	Hotelling's Trace	2.829	1.519	.154	.485
	Roy's Largest Root	2.273	4.924[c]	.008	.694

Appendix 12: Test of between-subject effects for the perception and interpretation of sentence intonation

Effect		Value	F	Assumption df	Error df	Sig.
Intercept	Pillai's Trace	1.000	66978.000[b]	1.000	16.000	.000
	Wilks' Lambda	.000	66978.000[b]	1.000	16.000	.000
	Hotelling's Trace	4186.125	66978.000[b]	1.000	16.000	.000
	Roy's Largest Root	4186.125	66978.000[b]	1.000	16.000	.000
Age	Pillai's Trace	.998	2327.333[b]	3.000	16.000	.000
	Wilks' Lambda	.002	2327.333[b]	3.000	16.000	.000
	Hotelling's Trace	436.375	2327.333[b]	3.000	16.000	.000
	Roy's Largest Root	436.375	2327.333[b]	3.000	16.000	.000
Sex	Pillai's Trace	.529	18.000[b]	1.000	16.000	.001
	Wilks' Lambda	.471	18.000[b]	1.000	16.000	.001
	Hotelling's Trace	1.125	18.000[b]	1.000	16.000	.001
	Roy's Largest Root	1.125	18.000[b]	1.000	16.000	.001
Age * Sex	Pillai's Trace	.579	7.333[b]	3.000	16.000	.003
	Wilks' Lambda	.421	7.333[b]	3.000	16.000	.003
	Hotelling's Trace	1.375	7.333[b]	3.000	16.000	.003
	Roy's Largest Root	1.375	7.333[b]	3.000	16.000	.003