THE PHONOLOGY OF OLUTURA SYLLABLES

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A Thesis submitted to the Department of Linguistics and Languages in fulfilment of the requirements for the award of the degree of Doctor of Philosophy of the University of Nairobi.

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DECLARATION

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

9th December 2019

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This thesis has been written under our supervision and submitted for examination with our approval as the appointed University supervisors:

9th December 2019

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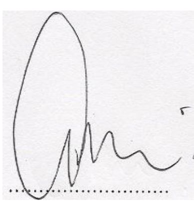

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DR AYUB MUKHWANA

DEDICATION

To the late Kayo

for teaching me patience and humility;

and to

my children; Laura, Ryan and Ron;

for

illuminating the grey road of my life;

my

beloved dad and mum,the late Saul Etakwa

and Miriam Anyona Etakwa for showing me

the path of life that I should walk.

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DEFINITION OF TERMS

CODA	The consonant elements that occur at the end of a syllable.
Constraint	A term used in Optimality Theory (OT) to refer to a structural requirement that may either be satisfied or violated by an output form.
Dialects	Language varieties that are mutually intelligible.
Dialect continuum	A situation in which not all the varieties of a language are mutually intelligible.
Faithfulness	OT constraints that preserve the properties of the inputs (underlying forms).
GEN	The procedure that is used in OT to generate the set of candidates for evaluation and selection.
Hiatus	A sequence of adjacent vowels which belong to different syllables without an intervening consonant and which creates a pause during articulation.
Language	Totality of the different varieties or dialects
Markedness	OT constraints that evaluate the outputs (surface forms).
Onset	The consonant elements that occur at the beginning of a syllable.
Optimal	An output that incurs the least violations of ranked constraints in OT.
Tableau	A table which is the conventional representation of constraint ranking in OT.
Tier	Levels that are used in autosegmental phonology to represent different phonological phenomena. In this thesis, they show the syllable, the consonant and vowel levels and the exact consonants and vowels that constitute the word being analyzed.

ABBREVIATIONS, ACRONYMS & SYMBOLS

CCV	Consonant consonant vowel sequence
CCVV	Consonant consonant vowel vowel sequence
CGV	Consonant glide vowel sequence
CV	Consonant vowel sequence
CSA	Consonant sequential alternation
CT	Correspondence theory
F	OT faithfulness constraints
GGV	Glide glide vowel sequence
GP	Generative phonology
HR	Hiatus resolution
IO	Input output mapping in OT
JS	Judeo Spanish
KNBS	Kenya National Bureau of Statistics
L1	A speaker`s first language
M	OT markedness constraints
MSA	Modern Standard Arabic
N	Nucleus
NC	Nasal consonant sequence

MOP	Maximum Onset Principle
Ø	Zero
O	Onset
OT	Optimality Theory
S_1	String 1 in OT correspondence sub-theory
S_2	String 2 in OT correspondence sub-theory
SA	Segment/sequential alternation
SCL	Syllable Contact Law
SSP	Sonority Sequencing Principle
PSSC	Positive Syllable Structure Condition
SR	Surface representation
UR	Underlying representation
V	Vowel only syllable
VV	Vowel vowel sequence
VSA	Vowel sequence alternation
V_1	The vowel in the first word at the morpho-phonemic boundary
V_2	The vowel in the second word at the morpho-phonemic boundary
γ	palatalized sound segment

☞	OT optimal candidate
*	OT constraint violation mark
*!	OT gross violation of a constraint
>>	OT constraint dominancy
.	Syllable boundary

OT SYMBOLS

$\text{COMP}_{\text{ONS(LAB)}}$	A complex onset with labialized segments.
DEP-IO(C)	No deletion from the output of a consonant that is represented in the input.
DEP-IO(σ)	A syllable that is not represented in the input should not be inserted the output.
*DIPH	Diphthongs are not allowed.
FAITH-V	Vowels in the input should be represented in the output.
$\text{IDENT-IO}_{\text{BIL}}$	Both the input and output should be identical it terms of bilabial segments.
*GG	Syllables should not have two glides in the onset.
*HIATUS	An OT constraint that forbids hiatus at the word boundary.
HETER(σ)	An OT constraint that disallows heterosyllabic sequences.

HNUC	A constraint that demands that the nucleus of a syllable should be a vowel.
IDENT-IO(F)	A constraint that demands identity between the input and output for a given feature.
IDENT-IO(μ)	A constraint that requires the mora places in the input and output should be identical.
IDENT-IO_{NAS}	A constraint that requires that the input and output should be identical it terms of nasal segments.
IDENT-IO_{VOI}	An OT constraint that demands that both the input and output should be identical it terms of voiced segments.
*DIPH	An OT constraint that prohibits diphthongs.
MAX-IO_{FUNC}	A constraint that forbids the deletion of a segment from a function word.
MAX-IO_{LEX}	A constraint that forbids the deletion of a segment from a lexical word.
MAX-IO(μ)	A constraint that forbids that deletion of a mora that is represented in the input from the output.
MAX-IO(σ)	A syllable that is represented in the input should not be deleted from the output.
*NC	A constraint that forbids the combination of nasal and obstruent sequences

*NÇ	A constraint that forbids the combination of nasal and voiceless obstruent sequences
*NC_{ALV}	A constraint that forbids the occurrence of nasal and alveolar consonant sequences
NUC/GLIDE	A constraint that forbids a glide from forming the nucleus of a syllable
$ONS_{(NAS)}$	A constraint that forbids the onset of a syllable from having a nasal sound.
*PEAK-C	A constraint that forbids consonant sounds from forming syllable peaks.
*SA	A constraint that forbids the alternation of sequences.
$SA_{INITIAL}$	A constraint that forbids the alternation of sequence in initial word position.
$SSP_{PLATEAU}$	A constraint that forbids the combination of sequences with the same manner of articulation.

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ABSTRACT

This thesis is about the sound segments, syllable structures and phonological processes of Olutura with the main aim of making a contribution towards making a valid conclusion as to which group of Luyia dialects Olutura belongs to. Olutura is one of the dialects of the Luyia continuum of dialects spoken in Western Kenya, E. Africa. The objective of the study was to find out how the phonological processes of Olutura constraint the formation of its syllable structures. The study first identifies the sound segments and how they function in this dialect before looking at the composition of the optimal syllable and the phonological processes that affect its construction. The study used Generative CV Phonology and OT sub-theories of the Correspondence and Syllable Theory in its investigation. The former is used to identify the syllable types by displaying the sound segments that constitute the different syllable types of Olutura. The OT notion of constraint ranking is used to establish why Olutura makes the choices that it does in its formation of syllables. A purposive sampling technique was used to identify native Olutura speakers and to categorize the data into the required categories for analysis. The results of this study show that Olutura has a 5V system. Olutura has 23 consonants that have a primary place of articulation and 20 with secondary articulation. This dialect has a total of seven syllable structures; V, CV, CVV, CCV, CGV, GGV and VV. The results also show that the phonological processes of coalescence, prothesis, epenthesis, and gliding complement each other in HR so as to arrive at the structural requirements of Olutura. With regard to coalescence, Olutura has two types of coalescence; one is identity coalescence which has two sub-types in which two different vowels merge into one intermediate vowel and the other subtype is whereby two vowels in the underlying representation (UR) are replaced by either of them in the surface representation (SR).The second type is identity coalescence in which the SR maintains the features of the vowel in the UR. In the phonological process of elision, the elision of both V_1 and V_2 occurs in Olutura and the vowel that elides can be from either the lexical or function word. Another observation is that labialization serves four functions in Olutura; it distinguishes meaning, it helps in the process of syllabification by determining the number of syllables in a word, it is used as a strategy for HR and it also serves the grammatical function of changing words from one class to another. The observation regarding the processes of SA and prenasalization is that in Olutura, SA occurs through the three processes of prothesis, epenthesis and voicing and prenalized segments are only formed by having a nasal followed by a voiced bilabial, alveolar or velar plosive, respectively. This study concludes that while Olutura uses the phonological processes of coalescence, elision, epenthesis, prothesis and glide formation are used to resolve hiatus in Olutura, the dialect does not completely disallow hiatus in its phonotactics.

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

This is a phonological study describing the syllable structures of Olutura and the phonological processes inherent in them. The study identifies the sound segments and syllable structures of Olutura and focuses on how Optimality Theory (OT) constraint interaction can be used to show the choices that Olutura makes with regard to the formation of its syllable structures. The phonological processes that are involved in HR in Olutura are identified and examined in order to establish how they constrain the constitution of the syllable structures of the dialect under study.

According to Appendix I, Olutura, which is yet to be classified as part of the Luyia continuum of dialects spoken North-east of Lake Victoria and part of Eastern Uganda, is found in Bumula, Bungoma County. Ealier studies on the Luyia language by Osogo (1966), Guthrie (1967), Itebete (1974) and also Angogo (1980) do not show Olutura as part of this continuum of dialects. Speakers of the different dialects of the Luyia language are collectively called Abaluyia and each of the dialects shown in Figure 1 should have the prefix 'Aba'before it in reference to the speakers. In view of this, the current study has used the pre-prefix 'O' before Lutura in agreement with the speakers of the dialect and the general Luyia phonology of using a vowel pre-prefix 'o', 'e' or 'a' before prefixes marking nouns.

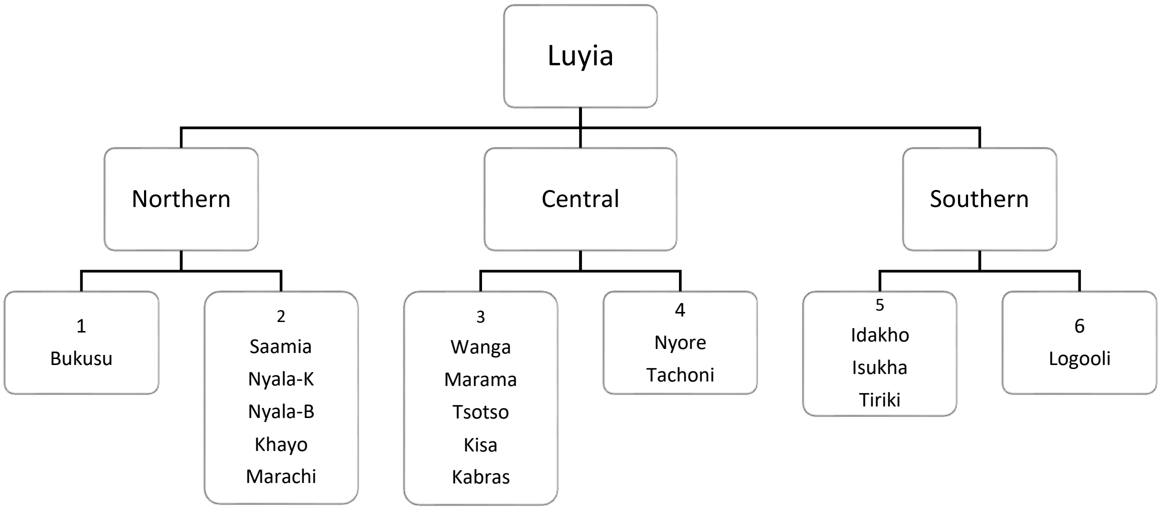


Figure 1: Luyia dialects Source: Angogo (1980:79)

Figure 1 shows the Luyia dialects as classified by Angogo (1980), who observes that the dialects range between17 to 25. Angogo only classifies the 17 shown in Figure 1 and says that the rest may, either be dialects that are yet to be determined or part of those already classified (see Appendix I).

The speakers of Olutura are referred to as Abatura and the dialect is spoken in Mungore sub-location of Bumula area, in Bungoma South, Bungoma County. The Abatura boarder the Bukusu to the north, the Bakhayo to the west and the Wanga to the south (Appendix I). According to the KNBS census carried out in 2009, the population of Abatura is 30, 388. Olutura is a variety of the Luyia continuum of dialects that is understudied. The dialect was first mentioned as one of the Luyia dialects after the study on Tura Verb Tonology by Marlo (2008) which delt with the tonal patterns marking tense-aspect-mood-polarity on different positions of the verb stem. Marlo's findings reveal that other aspects of the phonology of Olutura have not been studied.

This study is based on the syllable because it is essential in accounting for various phonological processes in a language. The phonological processes of deletion, epenthesis, nasalization, labialization and sequential alternation (SA) are discussed in this study on the premise of OT so as to determine their role in the formation of the optimal syllable in Olutura. The study used a descriptive research design in the analysis of the data that was collected.

In the investigation of its objectives, the current study used Optimality Theory (OT) by Prince and Smolensky (1993/2004) and Kager, (1999) as the main theory and this was complemented by Generative CV Phonology Theory as expounded by Clements and Keyser (1983). The researcher used a qualitative research design in the collection and analysis of data. Purposive sampling was used to get the required respondents and also to group the data into different categories for analysis.

The syllable is essential in accounting for various phonological processes in a language. According to Kenstowicz (1994) the syllable is the natural domain for the statement of many phonotactic constraints. General phonological theory shows that the syllable has two constituents; the ONSET which comes at the beginning and the RHYME, which follows the onset. However, Kenstowicz (1994) identifies smaller constituents of the syllable as the onset, the nucleus and the coda. The nucleus is the compulsory element in this phonological organization because every syllable must have it.

According to Hooper (1976), the CV is the optimal syllable because it is the syllable that is general in all languages and therefore, universal. The phonological syllable which is the interest of this study, is not coterminous with the phonetic syllable and requires a more precise definition in terms of boundaries and internal structure. Unlike the phonetic syllable, the phonological syllable is a structural unit that is formed from the combination of consonant and vowel elements (Lass, 1984).

These combinations differ from one language to another and that is why there is need to study the syllable structure of each language so as to make informed generalizations and conclusions.

Not all possible sound combinations in a language exist due to accidental gaps (Kenstowicz, 1994). Accidental gaps refer to combinations of sound segments that appear to be well formed in some languages but which do not actually exist in these languages. A description of the phonological syllable enables an analysis that goes beyond the phonetic sequencing that could easily leave some elements unrealized. The current study used this premise to uncover the individual graphemes and in turn the sound segments that form the syllables. This is what was used to establish an orthography and a phonemic inventory of Olutura.

Generally, syllables are either open or closed. This depends on whether the syllable ends in a vowel or a consonant sound. An open syllable ends with a vowel while a closed one ends with a consonant and is referred to as having a coda; for example [n] in the monosyllabic English word man. There are some languages that have complex onsets which consist of more than one consonant. A syllable that begins with a syllabic sonorant or a vowel is referred to as having a null onset or zero onset (Charette, 1991).

The determination of a number of phonological processes like nasalization, epenthesis and deletion can only be determined by boundaries of units larger than the segment (Bauer, 1988). According to Katamba (1989), there are phonological processes in every language that are motivated in order to preserve or create the preferred syllable types. The rules in such processes can only be understood by studying the syllable. An analysis of the syllable is also vital for not just the uncovering of the segments in a language but also their internal structure because segments are not uttered in isolation. The phonological processes of deletion, epenthesis, nasalization, labialization and segment alternation (SA) are discussed in this study with regard to the syllable.

1.2 Statement of the Problem

Each language needs to be studied individually in order to understand its phonotactics. This is according to Kenstowicz (1994) who argues that each language variety needs to be studied so as to make generalizations that can be validated. Figure 1, which does not show Olutura as one of the Luyia dialects, classifies the Luyia dialects into 6 groups. A study of its sound segments, syllable structures and phonological processes can contribute to making a valid conclusion as to which of these groups Olutura belongs. An examination of the sounds and syllables of Olutura in the current study lead to the establishment of a phonetic inventory and part of its orthography which are a vital reference point in phonetic and phonological studies in any language.

The syllable is very vital for, not just uncovering the sound segments in a language, but also their internal structure because segments are not uttered in isolation. This is in accordance with Katamba (1989) who notes that the syllable is very vital in the understanding of the phonological processes of any language. Bauer (1988) concurs with Katamba that quite a number of phonological processes are determined by boundaries of units larger than the segment. An analysis of the syllable structure of Olutura in terms of the onset, nucleus and coda as constituents of the syllable can only be possible by describing the distribution of the phonemes as the basic units of a word.

The construction of the syllable structures forces some change in two syllables in the morpho-phonological aspect of a language. The kind of change that is forced on the syllable as this linguistic contact happens in Olutura cannot be accounted for by studying the syllable alone, hence the examination of the phonological processes. The current study used Generative CV Phonology

Theory to examine the constitution of Olutura syllables and OT to show how particular phonological processes affect the various syllable types in Olutura.

1.3 Research Questions

The study seeks to answer the following questions:

(i) What are the sound segments of Olutura and how do they function in its phonology?

(ii) What are the syllable structures of Olutura and how are they affected by its phonotactics?

(iii) To what extent can OT constraint interaction account for the optimal syllable in the processes that are used in HR in Olutura?

(iv) To what extent can OT constraint interaction explain the phonological processes of prenasalization and labialization in Olutura?

(v) What is the role of the onset in the phonological process of segment alternation in Olutura syllables?

1.4 Objectives of the Study

The study was guided by the following objectives:

(i) Identify the sound segments of Olutura and show how they function in its phonology.

(ii) Explain the syllable structures of Olutura and how they are affected by its phonotactics.

(iii) To find out the extent to which OT constraint interaction can be used to account for the optimal syllable in the phonological processes that are used in HR in Olutura.

(iv) Determine if OT constraint interaction is capable of explaining the phonological processes of prenasalization and labialization in Olutura.

(v) Account for the role of the onset in the phonological process of segment alternation in Olutura syllables.

1.5 Justification of the Study

The choice of Olutura for the current study is informed by the observation by Angogo (1980) that there may be other Luyia dialects that are yet to be determined and classified and Karanja (2006) that there are many languages which are yet to be 'discovered' and classified. The phonological aspects of Olutura in this study pave way to an objective comparison of Olutura to other Luyia dialects to enable its classification among the Luyia continnum of dialects. The documentation of Olutura in useful to philologists and linguistic anthropologists in their undertakings of humanity.

The current study brought the phonetic inventory and orthography of Olutura to the fore as a prelude to dealing with the objectives of the current study. In view of the foregoing statement that Olutura is understudied, the phonological processes in this dialect have not been identified. In particular, the role of constraint interaction in the well-formed syllable on the premise of OT has not been done. This study was designed to account for the phonological processes inherent in various phonological constructions in this dialect and use OT to examine them. Phonological processes are vital when it comes to the establishment of a full orthography of any language and, in this case, it will lead to the development of a sketch grammar of Olutura.

The use of language particular ranking using universal constraints was done to enable the researcher to show what happens in the different aspects of linguistic contacts through constraint interaction. In this regard, the present study on Olutura makes a contribution to phonological theory by testing the notion of OT universal constraints using a language particular ranking system. This was done by showing that there are specific phonological processes at play in the contact of linguistic phenomena in the phonotactics of different languages. Through the examination of the phonological processes, this study also paves way for the establishment of a full orthography for Olutura because it shows how rules can be formulated across word boundaries, something that is essential to general linguistics.

Findings of this study are significant in the comparative dialectology of Luyia dialects, particularly so in the event of coming up with a standard form of Luyia that may be useful in the devolved county government system in Kenya. This is in accordance with the 2010 constitution of Kenya which encourages the growth of indigenous languages and indeed, Sessional Paper 14 of 2012 (GoK, State Department of Education) states that the language of the catchment area (mother tongue) shall be used in the education of primary school children from 0-8 years old in order to, not just preserve the Kenyan culture, but also ensure a smooth transition from home to school. This study can be of benefit to language planning in Kenya, particularly with regard to the standardization of Luyia dialects because those concerned need to be familiar with the differences that exist in this group of dialects. This is according to the view by Byron (1976) that standardization of related language varieties is important. The current study also makes a contribution to phonological theory by testing the notion of universal constraints using a language particular ranking system and by showing that there are specific phonological processes at play in the contact of linguistic phenomena in the phonotactics of different languages.

1.6 Scope and Limitations of the Study

This is a phonological study that deals with the aspects of segmental and supra-segmental phonology as indicated in its objectives. According to Hyman (1975), segmental phonology looks at the analysis of segments while supra-segmental phonology deals with units that go beyond the segment. In segmental analysis, the study was limited to identifying the vowel and consonant sounds of Olutura and discussed their functions besides accounting for the phonological processes while in supra-segmental phonology it dealt with the syllable structure. The phonological processes in this study are limited to coalescence, nasalization, epenthesis, deletion, prenasalization, labialization, SA and the zero onset syllable in nouns. These are the phonological processes that affect the constitution of the syllable in Olutura at individual word level or across word boundaries.

The current study also came up with an orthography that only shows the symbols for the sound segments of Olutura but excludes aspects of orthography like formulating rules for the joining or separation of words and punctuation. However, the phonological processes discussed in this study can be a basis of how rules for joining Olutura words can be formulated. According to Cahill & Rice (2014), an orthography describes or defines the set of symbols used in writing a language and the rules on how to use these symbols. The current study did not look at other aspects of orthography other than the symbols, and did not, therefore, give rules for the use of these symbols.

This study did not deal with other aspects of Olutura supra-segmental phonology such as tone. The study was also not concerned with the morpho-phonological aspects of Olutura as it did not look at the organization of the lexicon in this dialect. The morpho-phonological aspects of the dialect was only used in as much as they affect the phonological processes in syllable formation. The study did not compare Olutura to other dialects of the Luyia continuum of dialects and only refers to them in connection to their classification.

The limitation of this study was getting respondents who are monolingual speakers of Olutura to provide the required data. However this limitation was mitigated by ensuring that even though the respondents were bilingual or multilingual by virtue of the study area being sandwitched between other Luyia dialect speakers (see Appendix 1), they spoke Olutura as their L1. This was done by visiting their homes to establish the language that they use at home in order to make sure that indeed, the other languages were learnt outside their home environment.

1.7 Literature Review

This section discusses works that are related to the current study and the contribution that they make to it besides the gaps the present study was designed to fill. The researcher starts off by looking at literature on orthography before reviewing general literature on the syllable and phonological processes. The section ends with a discussion of literature on Luyia and other related languages with a focus on works on the specific phonological processes that also occur in Olutura.

1.7.1 Literature on Orthography Writing

An orthography is how a language is expressed in written form, with symbols, punctuation and spelling and it shows where to join or separate words (Cahill & Rice, 2014). An orthography describes or defines the set of symbols used in writing a language and the rules on how to use these symbols. Natural languages adapt the writing system from the spoken language. Philologists, linguists and educators have for a long time insisted that an ideal orthography has a one-to-one correspondence between grapheme and phoneme (Lüpke, 2010). An orthography in which the correspondences between the spelling and pronunciation are highly complex or inconsistent is a deep orthography. On the other hand, an orthography in which there is consistent correspondence between the spelling and pronunciation is called shallow or simply said to have regular spelling. This study was designed to establish the kind of orthography that Olutura has as a prelude to the examination of the phonology of its syllable structures.

Crystal (2003) notes that most alphabetic systems in use today do not meet the one on one criterion of the regular one grapheme for each phoneme to some extent. He argues that one of the reasons for this is because some languages use alphabets that were not originally designed for them. This is particularly made worse by the fact that languages vary in their grapheme/phoneme regularity. Lüpke (2010) concurs that languages with an orthography display some orthographic departures from a one-letter-one sound and one sound-one-letter model. An example can be found in the English orthography in which different forms of the letter 'k' represent different sounds. Another example is in the orthography of Bantu languages in which the symbol /β/ represents the graphemes 'v', 'b' or /f/ (Kuria, 2006, Etakwa, 2010). In the current study, we adopted the type of orthography which does not exactly have a one-on-one correspondence between the grapheme and the phoneme as seen in the example with /β/ in the preceding sentence. The other phonemes in which there is no one to one phoneme and grapheme correspondence in Olutura are /x/, /ɲ/, /ŋ/ and /j/. Examples of words are shown in Appendix IV. Although orthographies for different languages may resemble, each language needs to have an orthography based on the particular language.

According to Robinson and Gadelii (2003), apart from being a means of communication, a language is also a symbol of identity, and therefore, writing a language has a lot of cultural significance to the community. UNESCO (2003) underscores the use of a person's L1 as a human right and also recognizes the fact that there is a pedagogical advantage of starting school in a child's L1. Using languages in education requires a written form which is only possible when there is an orthography as the first step towards fostering the written use of the language. In this regard, developing an orthography for Olutura is something necessary as it paves way for a comprehensive study of the aspects of phonology that this study deals with.

1.7.2 Literature on the Syllable in Relation to Generative CV Phonology and OT

The syllable is very important in understanding phonological phenomena in any language and any phonological study cannot avoid it because it is the basic reference point in the description of phoneme distribution in a language. This is in line with Clements and Keyser (1983) who take note of the fact that the syllable is the phonological construct that leads to the appropriate formulation of phonological rules. Other scholars like Kahn (1976), Kenstowicz (1994), Blevins (1995) and Goldsmith (2011) all show that the syllable is an important unit of prosodic organization and it is central to the expression of phonotactic statements. Zsiga (2006) and Cohn (2006) also take note of the impotance of the syllable in the precise characterization of many prosodic systems in a language. The views by these scholars provided the current study with a basis for discussing the sound segments that occur in Olutura with regard to the constitution of its syllable structures. The argument by Goldsmith (1999) that in phonological analyses, the important question is always about the constitution of a well- formed word in that language also contributes to this study. The sounds in the inventory of that language are characterized and an inventory established. Goldsmith's argument is valid in the present study which seeks to establish a phonological inventory as part of the thesis in the discussion of the syllable structures and phonological processes of Olutura.

The other studies that also informed the examination of the syllable structures of Olutura in the current study included Katamba (1989) who posits that the syllable is the highest level of phonological analysis and the basis for defining the syllable structure of any language. Katamba makes several observations that are of interest to the current study. One is on the three patterns used to show that the syllable has the main function of providing an analysis of the internal structure of segments and indicates the number of rhythmic units in a given syllable. The three patterns show a one on one association of V or C with a segment, a simultaneous association of one segment to V or C slots as is the case with geminates or vowel lengthening and a simultaneous association of a single C slot with two segmental distinctive feature matrices. The third type was useful in the analysis of the syllable structure of Olutura which is composed of affricates in the onset.

The other relevant notion to the present study is that on prenasalized consonants, which, just like complex ones, also show sequential organization of features at subsegmental level. The current study used a similar analysis in dealing with the prenasalized sounds of Olutura. Another area that Katamba (1989) contributes to in this study is on the issue that in every language there are phonological processes that are motivated by the need to either preserve or create the preferred syllable. The foregoing statement sought to identify the phonological processes that affect the formation of the optimal syllable in Olutura.

Kenstowicz (1994) contends that there are two types of syllables in linguistic literature; the phonetic syllable and the phonological syllable. The phonetic syllable is a performance unit which brings out prosodic features like tone. The phonological syllable is a tructural unit which shows how sounds combine and is, therefore, capable of showing syllable boundaries.The interest of this study is the phonological syllable given its usefulness in the identification of the syllable types that occur in Olutura. This is also important because the phonological syllable is an abstract unit of prosodic organization through which the language expresses its phonology.

Another view that was useful in the discussion of the constitution of the syllables of Olutura arises from Ladefoged (2000) whose argument is that each language has its own way of clustering segments to form syllables. Ladefoged notes that the phonological rules of the language have to be applied in the appropriate order so as to put together sequences that will produce well-formed syllables and words in the language. In line with Ladefoged, Cardford (1988) also observes that languages differ in the kind of syllable structure they admit. The views by the two researchers were used in the current study to deal with the phonological processes to explain the changes that happen in the phonotactics of Olutura with respect to the formation of the optimal syllable in the dialect. Goldsmith (2011) contends that the syllable, and not the segment is the appropriate level of analysis for production and, probably, perception of an utterance. Goldsmith's view is of importance to this study as it focuses on the phoneme sequences that are allowed in a language. This view is adopted in this study to account for the sound sequences that are involved in the phonological processes envisaged in the objectives of the current study.

The basic unit of a word is what serves as a reference point for the description of phoneme distribution in a language. According to Clark *et al* (2007) and Gussenhoven &Jacobs (2011), the phonemic level of representation is formed from a finite number of phonemic units. The sequences of the segments of a given language can only be examined after determining the phonemic inventory of that language. The issue of a phonemic inventory or underlying forms is of interest to the present study because it is useful in discussing the functions of the sounds of Olutura.

As already pointed out, syllables are formed by sequences of vowel and consonant elements and this gives rise to different syllable types across languages. However, CV is the optimal syllable because it is found in all languages (Hooper, 1976). According to Clements and Keyser (1983), apart from the CV syllable structure, other syllable types may be formed by applying one or both of the following rules:

(i) Deleting syllable initial C to obtain V syllable.

(ii) Inserting syllable final C to get CVC syllable.

The current study, in its investigation of the syllable structures, is designed to determine which of the two rules Olutura applies in the formation of its syllables.

Sequential constrains play a vital role in the formation of syllables in a language. As far as the role and status of the syllable is concerned, sequential constraints is a term used to refer to the recurring pattern of segment possibilities over the course of an utterance. Goldsmith (2011) posits the view that the syllable, and not the segment is the appropriate level of analysis for production and, probably, perception of an utterance. This study adopted the approach by Goldsmith (2011) which focuses on the phoneme sequences that are allowed in a language to account for the phonological processes in the formation of Olutura syllables.

In its research, Generative linguistics involves the study of how to characterize the phonological differences between related languages or dialects. The basic unit of a word is what serves as a reference point for the description of phoneme distribution in a language. The core goal in the analysis of the phonology of a language is to determine the underlying segments of a language or its phonemic inventory (Pike, 1947; Roach, 2009; Nandelenga, 2013). The issue of underlying form was of interest to the present study because it was useful in establishing the phonological processes inherent in the well-formed syllable in Olutura.

Linguistic literature reveals that even closely related dialects have differences in their phonological inventories (Booij, 1999). According to Kiparsky (1982) and Berns (2002 *et al*), differences between two related dialects can sometimes be analyzed as differences in rule ordering. The two scholars argue that dialects may have the same underlying forms, but the phonetic realizations of the relevant words differ because certain phonological rules apply in different orders. This, therefore, leads to different phonetic outputs. The above arguments by Kiparsky (1982), Berns (2002 *et al*) and Booij (1999) were useful to this study not only in examining the phonological inventory of Olutura but also the constraints on syllable formation and, therefore, form a basis of linguistic generalizations on Luyia and Bantu dialects in general.

Every language has constraints on the syllable structure and only allows certain sound sequences. In the analysis of the phonology of any language, among other aspects, the way the sounds can be combined to form syllables and words in the language is looked at (Gussman, 2002). The conditions of well-formed phonological words in the language are then established in what is traditionally referred to as phonotactics (Goldsmith, 1999). According to Katamba (1989), not all sound combinations, even when they exist in a language are allowed. Katamba further posits that the syllable regulates how the lower level units, that is; the vowels and consonants in any language combine to form the optimal syllable. It is from this view that the present research sought to establish the sound segments that combine to form a well-formed syllable in Olutura.

The syllable controls the structure of the complex segments and provides an analysis of the internal structure of segments besides controlling their association on the CV tier. The syllable also controls phonological rules in a language by conditioning them according to the internal structure of a language. According to Hyman (1975), the position in which particular segments are placed in a word plays an important role in determining the phonological processes that can occur in a language.

The syllable plays the role of filtering sound sequences such that only those sequences that are permissible in a language can occur in syllable formation. Every language has phonotactics that determine well-formed and ill-formed syllables (Hyman, 1975). Languages have their own constraints on syllabification due to different syllable structures and segment clusters. The Onset First Principle by Clements & Keyser (1983) has been applied to determine the consonant clusters that are permissible in the phonotactics of Olutura. The preservation of the preferred syllable structures also depends on the syllable as it controls the phonological processes that occur in a given language. Hyman's observation was tested in the examination of the phonological processes using the OT notion of constraint interaction in Olutura.

GP fails to recognize the syllable as an integral part in phonological organization and analysis. It is this failure by GP that led to the development of models that could deal with the syllable. Multi-linear sequences of feature matrices were then developed by scholars like Goldsmith (1979) and Liberman & Prince (1977) to handle larger units like the syllable. Durand (1990) also argues for a non-linear model to deal with phonological units that are larger than the segment. CV Phonology is one of the non- linear models that was developed to fill the gap that was left by GP. It was developed by Clements & Keyser (1983) who argue that many phonological rules can only be appropriately formulated in terms of the syllable. Katamba (1989) as well underscores the importance of the syllable in the phonological organization of any language. Clements & Keyser (1983) developed a three tier model to deal with the syllable. Their model was an improvement from the theory by Kahn (1976) which had only two tiers; the syllable tier and the segmental tier. In Kahn's model the symbol 'S' was used to represent the syllable node. The hierarchical representation of the syllable by Kahn, though an improvement, had several deficiencies. It did not clearly specify the clusters that were possible in the initial or final positions, in that it did not show a distinction between the elements that should form syllable peaks and margins. The theory did not also specify the point at which syllable building rules first apply. In Kahn's representation, the two tiers were associated by association lines as shown in Figure 2.

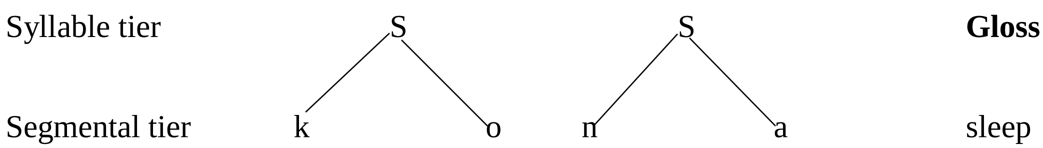


Figure 2: Kahn's two tier syllable representation.

In Kahn's model shown in Figure 2, S at the top represents the syllable node which is immediately linked to the lower level tier which has the sound segments that form a specific word.

Clements & Keyser (1983) enhanced the model by Kahn (1976) by, not only coming up with a third tier, but also showing an analysis of the internal structure by distinguishing the elements that form the peaks and the margins of the syllable. The notion of the CV tier was useful in showing the positions that the consonant and vowel sound segments occupy in the different syllable types of Olutura and was also instrumental in enabling the use of OT to account for the processes in syllable formation in this dialect.

A prelude to Optimality Theory (OT) is important at this early stage before its further deliberation in section 1.8. OT is suitable in accounting for the syllabic processes of Olutura because of its typological premise in which universal constraints are applied to a language particular ranking to account for differences in languages. The fact that OT allows for the violation of constraints is used in the current study to show the circumstances for this violation.

Using OT constraint ranking, Kager (1999) and Gordon (2007) argue that the syllable is very important in understanding phonological phenomena. OT as a theory has not been used a lot in studies on Bantu languages. Some of the few studies that have employed this theory with regard to African languages include Downing (2009) Nandelenga (2013) and Shume (2017). Downing (2009) uses ODT that is part of OT to account for the optimal candidate for tone assignment in Zulu, a Nguni Bantu language. Downing uses the interaction of OT constraints to show that the optimal candidate does not violate higher ranked constraints. The principle of constraint interaction was used in the current study to uncover the phonological processes that lead to the well-formed syllable in Olutura. Nandelenga (2013) uses OT sub-theories of Correspondence Theory (CT) and Generalized Alignment (GA) to explain the syllable structure of Lubukusu, a Luyia dialect, to discuss the syllable structure of the language and the phonological processes that are motivated by the syllable structure. The current study uses a similar approach to account for the well-formed syllable in Olutura and how it constraints segment placement. The application of OT to the phonological process of epenthesis by Shume (2017) is relevant to this study which also discusses epentesis as one of the processes that are used as HR strategies.

1.7.3 Core syllabification

In accordance to Generative CV Phonology, core syllabification refers to the idea that each language has its preferred syllable structure (Clements & Keyser, 1983). Many linguists have noted that there is a cross-linguistic preference for certain types of syllable structures and syllable sequences and that this is what leads to certain syllable types being less marked than others (Greenberg, 1978; Clements 1986; Harrington & Cox, 2009). How these tendencies happen and at what level, is a question that has found its answer in the concept of sonority. Sonority is an acoustic-perceptual term that is closely linked to the extent to which the vocal tract is constricted, depending on the ratio of energy in the low to the high part of the spectrum (Harrington & Cox, 2009). The issue of core syllabification is important in this study because of the discussion on the phonological processes which reveal why Olutura prefers certain sounds and rejects others in syllable formation.

As indicated at the beginning of this chapter, each language has constraints on the way sound segments combine to form syllables. According to Clements (1986), constraints on segment sequences in some languages on derived and non-derived stems give rise to "conspiracies" that cannot be accounted for using syllabification alone, hence the role played by sonority in syllabification.There is no agreement on what sonority actually is and this has given rise to different views by scholars and indeed a number of sonority scales. While Ohala, (1993) and Ohala & Kawasaki, (1997) argue that sonority hierarchy has empirical deficiencies, other scholars have tried to use it by applying different strategies. For example, according to Selkirk (1984) and Clements (1990), there is only one single sonority scale that is common to all languages. On the contrary, Steriade (1982) argues that sonority scales are language specific and that languages should have some freedom in assigning sonority values that are language specific to their segments. Casalli (1996) posits that sonority scales with fixed universal values apply to the major natural classes of sounds and sonority independent parameters like voicing and coronality can then be used to get distinctions that are language specific. The arguments by Steriade and Casalli were applied in this study on the discussion on SA.

Kenstowicz (1994) and Blevins (1995) both argue that the Sonority Sequencing Principle (SSP) is what governs the preferred order of segments within a syllable. The Maximum Onset Principle (MOP) which is based on phonotactic constraints should be applied in the syllabification of words in languages that tolerate long and arbitrary consonant sequences (Kenstowicz, 1994). This means that as many consonant clusters as possible can be syllabified with the following vowel, provided that the resultant syllable is the optimal one in a given language. SSP enables the segments to be ranked along a 'sonority scale' so that the segments which rank higher in sonority occur close to the centre of the syllable while those that are lower on the sonority scale are close to the syllable margin. Selkirk (1984) and Kenstowicz (1994) are of the view that in the core syllabification principle, syllables are characterized by a rise and fall reflected in the sonority scale values that characterize each of their segments. According to Parker (2002), many phonologists and phoneticians have always debated about sonority. However, the general agreement is that sonority increases towards the peak of the syllable. Many propose an SSP in which the sonority of a syllable final consonant must exceed that of a following syllable initial consonant in what came to be known as the Syllable Contact Law (SCL) (Hooper, 1976; Parker, 2002).

Stevens (1999) and Ohala (1992) argue that one of the reasons why languages prefer low sonority onsets is that the auditory system is sensitive to rapid spectral changes that may occur from segment to segment. A low sonority onset can be easily distinguished from the syllable nucleus and therefore preferred. Open syllables like those with /a/ have the highest sonority because of the large amount of acoustic energy that radiates from the open vocal tract during their production. This, in essence means that some segments that are adjacent should differ by a given number of steps on the sonority hierarchy. The direction to which a sound moves along the sonority scale is what determines whether it weakens or becomes stronger. Lass (1984) contends that weakening of sounds in some languages is what leads to deletion, a view whose relevance to Olutura was tested in the phonological processes of elision and SA to find out the sound segments that are deleted or alternate, respectively.

The Maximum Onset Principle which is part of the statement of the Core Syllabification Principle is what stipulates how sequences can be syllabified. Clements & Keyser, 1983) indicate that core syllabification rules are responsible for the syllabification of underlying representations which are reapplied to the output of each phonological and morphological representation. SSP holds at a deeper level of representation than surface representation and it is the principle that governs underlying representation in lexical phonology (Clements, 1986). In any language, underlying representations are fully syllabified in accordance with certain principles of core syllabification. Core syllabification principles are sensitive to sonority constraints and this is what makes some consonants remain unsyllabified and end up, either being re-syllabified later or deleted altogether. For instance, Olutura prohibits the occurrence of a nasal and a voiceless obstruent. Therefore, an input like /N+ fisa/, the prefix /N-/ is resyllabified as an onset in the preceding CV syllable in the phonological process of epenthesis. This resyllabification is what results in the right structure in the dialect, *nifisa* (if I hide) in which the vowel /i/ has been epentheted.

According to Morrelli (2003), SSP evaluates whether a cluster is well-formed in accordance to sonority requirements and may not distinguish between violations so as to show which sounds or sound combinations are marked and which ones are not. It is the interaction of both the faithfulness and markedness constraints in OT that can account for the surface phonotactic pattern that is right. This, in essence, is what results in the emergence of the core clusters in a given language. In this study the SSP principle and OT are adopted to account for the core syllables of Olutura. In particular, the SSP is used to show the consonants that Olutura allows in the internally complex onset.

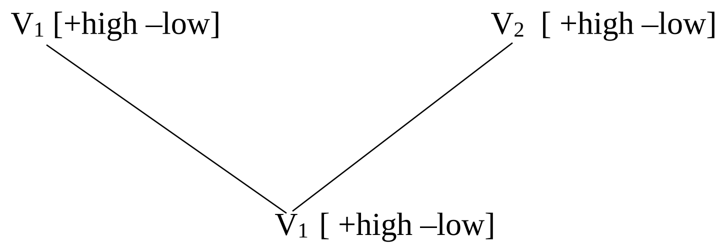
1.7.4 Review of Literature on Phonological processes that occur in Olutura and Related Languages

Kolaczyk (2013) posits the view that phonological processes are the natural way that simplify articulation and thus form the phonetic constraints that occur in languages. According to Casali (2011) phonological processes always affect the configuration of the syllable by changing the segment sequences as a way of resolving vowel hiatus. Casali (2011) further argues that in some languages, vowel hiatus is not allowed because the pause creates unnaturalness, and, as such, difficulties in articulation. This means that languages that do not allow hiatus always find a way of resolving it using different phonological process. The processes that affect the sequences in the configuration of the syllable are introduced in this section.

Coalescence is one of the processes that affect the configuration of the syllable; and it is a widespread phonological process in Bantu languages in which adjacent vowels cause each other to change and sometimes shorten (Harford, 1997). There are several types of coalescence; one of them is height coalescence which is used by some languages to mitigate against having sequences with adjacent dissimilar heterosyllabic vowels, an occurrence that is considered marked across languages (Casali, 1996, Wasike, 2004; Tanner, 2006; Bakovic, 2007). In view of this, many languages in the world avoid vowel hiatus by using different strategies. According to Mtenje (1980), any vowel that becomes juxtaposed to another vowel by either morphological and/or morphophonological processes or word derivation; or by the regular flow of speech results in a vowel sequence that is not allowed. As already mentioned in section 1.7.1, the open CV is the optimal syllable in Bantu languages and hiatus resolution (HR) is therefore used to maintain this canonical consonant-vowel structure. This configuration of HR that is meant to preserve the canonical CV syllable structure is a kind of ‘phonological conspiracy’ destined to arrive at the optimal syllable in a language (Kissberth, 1970; Mtenje, 1980). In many languages, vowel hiatus resolution by way of coalescence takes any of three forms. One form is where two vowels that are different merge into an intermediate quality vowel such that the 3rd vowel shares the characteristics of both the original vowels. The second form is the one in which identical short vowels merge into a long vowel; and the third form is the one in which the two vowels are replaced by a single instance of one of them, either short or long. In line with this, the current study sought to investigate the kind of coalescence that occurs in Olutura.

In Shona, a Bantu language mainly spoken in Zimbabwe, coalescence takes place across a syntactic boundary that occurs within a phonological word and is triggered by a particular vowel (Harford, 1997). This observation by Harford (1997) is tested using Olutura data in this study to find out at what linguistic contact that coalescence happens. In Chichewa, a Bantu language in Malawi, with a five vowel phoneme system like Olutura, there are no underlying long vowels. When long vowels occur in Chichewa, they are only manifested as resulting from phonological processes such as coalescence or elision (Sabao, 2013). Sabao (2013) argues that in Chichewa coalescence is onset driven because it seems primarily motivated so as to avoid the surface realization of heterosyllabic vowels in output forms. Chichewa has the type of coalescence that Bakovic (2007) refers to as ‘identity coalescence’ or ‘coalescence under identity’ because it is a coalescence of identical vowels. In this case there is no change in vowel quality as exemplified in 1.

1: Chichewa vowel identity coalescence



Adopted from Sabao (2013): 35

Identity coalescence is also exhibited in Olutura. When OT constraint interaction is used in the case of Olutura, it shows that vowel identity coalescence in Olutura is always in violation of the OT consttraint UNIFORMITY because this is the constraint that militates against the merging of two segments that are distinct in the input into a single segment in the output. PART FROM UNIFORMITY, the constraint HIATUS is used in this analysis to evaluate hiatus which Olutura does not allow in the current case. For that matter, this constraint constraint should not be dominated. The general constraint DEP-IO, as used in this analysis, should be ranked higher than IDENT(μ) and UNIFORMITY because this dialect prefers the maintenance of the mora places between the input and output and the merging of segments than insertion as a strategy for HR. The constraint IDENT(μ) stipulates that the mora places between the input and output should be maintained and so in OT constraint ranking, this constraint should be ranked low in Olutura which the winning candidate has to maintain the vowel places.

In Chichewa, similar low vowels [a + a] coalesce into an identical low but long vowel [a:] A similar occurrence is reported in Olutura as illustrated in Tableau 1 using the mid high vowels [o + o].

Tableau 1: Constraint interaction in Olutura identity coalescence

Input /βo-ola/	HIATUS	DEP-1O	MAX-IO	IDENT(μ)	UNIFORMITY
(a)/βo.o.la/	*!				
(b) ☞ /βo:la/					*
(c) /βo.la/			*	*	
(d) /βo.wo.la/		*!			

The interaction of the constraints in Tableau 1 shows that in Olutura, coalescence occurs with identical vowels which means that the resultant vowel maintains the feature qualities of both the initial vowels through the surface realization of the long vowel seen in the winning candidate (b). Therefore, the resultant long vowel ensures that the mora places in the input are preserved. This preservation ensures segment identity between the input and output as per the requirements of OT.

Sabao (2015) reports that in (isi)Ndebele, a southern Bantu language from South Africa, coalescence does not occur in the presence of the plural marker vowel /o/. Coalescence only takes place if the noun providing V_2 starts with the initial vowel /i/, /u/ and /a/; for example in 2.

2. (isi)Ndebele coalescence

la-**u**mu-nthu [lomunthu] ‘with/by a person

The (isi)Ndebele occurrence is unlike what is reported by Namulemu (2006), that in Lunyole, a Bantu language spoken in Uganda, vowel coalescence occurs in two instances. The first instance is when the [-round] vowel /a/ is joined to the [+round] vowel /o/ at morpheme boundary, V_1 assimilates to V_2 which is then lengthened as seen in 3.

3. Lunyole V_1 assimilation

/ga-/ + /one/ ‘four’ → [go:ne] all four

/dʒa/ + /-osi/ ‘all’ → [dʒo:si] all of them

The second instance is when the [-high] vowel /a/ comes first and the second is a [+high] vowel /i/, the two vowels coalesce. This results in a mid vowel which, just like in the first instance, is lengthened as in the example in 4.

4. Lunyole [-high]/ [-high] vowel coalescence

/βa-/ + /igula/ *open* → [βéigúlá] *they open*

The current study shows that Olutura has three types of coalescence.

Another phonological process that affects syllable formation in Bantu languages is glide formation. For example, in Chichewa, glide formation occurs across many morphophonological boundaries within the language (Mkochi, 2007). The two authors further indicate that in this language, a high vowel is changed into a glide when it is followed by another vowel, mostly a non-high vowel. According to Fortune (1985) and Sabao (2013), glide formation in Chichewa has a morphophonemic change which is necessitated by the need to preserve the feature [+round] of the input V_1. This process results in the lengthening of V_2 so as preserve the V-slots. Glide formation in Chichewa is motivated by the need to avoid onsetless and heterosyllabic vowels in its phonology. If V_1 has the features [+high], [+round] and/or [+back] and surfaces as the first one in the sequence, it automatically becomes a glide in Chichewa. The sequence which has these features in delinked with its associated mora and is in turn attached to V_2. However, V_1 still preserves its articulatory features by maintaining its attachment to the root node. This is shown in example 5.

5. m**u-a-** bwel- a [mwa:bwela] /u_1#a_2/→[w_1a_2] you have come

Another example of a Bantu language that uses glide formation as a strategy for HR is (isi)Ndebele in which the process is onset driven and does no result in compensatory lengthening. In Olutura, glide formation may or may not result in compensatory lengthening.According to Sabao (2015), in this language, the high vowel /u/ of the infinitive prefix /uku-/ *'to'* undergoes glide formation when it is juxtaposed with all other vowels apart from the mid back vowel /o/. The resultant glide maintains the feature identity of the initial vowel, that is, [+high], [+round] and [+back]. Olutura exhibits a similar case as that of (isi)Ndebele although there is no elision of the [+high] vowel /u/.

In Ki-Mavemba, if two vowels occur together, they both delete and if the first vowel is high it will change into a glide as long as the following vowel is not identical (Chaula, 1989). This is unlike (isi)Ndebele but similar to Lubukusu in which vowel lengthening is triggered. In the current study, data from Olutura has been used to show that three instances of glide formation are used to resolve hiatus in this dialect so as to attain the optimal syllable. The idea initially envisaged was to find out if Olutura also deletes the two vowels involved the way it happens in Ki-Mavemba. In Olutura, the [+high] vowel is realized as a glide while the [+low] vowel is retained in the output.

Syllable formation is also affected by the processes of epenthesis and prothesis. In respect to the phonological process of epenthesis, languages like Turkish, Klamath and Mohawk as reported by Michelson (1983) have phonological derivations that fail to be incorporated into the syllable structure earlier on and consequently trigger a variety of epenthesis rules. This attests to the general principle that certain rules apply so as to remove complex representations and replace them with simpler ones. Côté (2000) advances the view that the phonotactics of a language force it to find a way of repairing inputs that do not meet the phonotactic requirements of the language, and that vowel epenthesis is one of these ways. This sometimes causes underlying consonants to surface in phonotactically illegal contexts. Cote's view is that in this case undesired coda clusters are usually broken by vowel epenthesis. This is in agreement with Massamba (1996) who asserts that certain consonant clusters are not allowed in actual pronunciation in some languages and so epenthesis makes them perceptible. This is also the case for Olutura in which consonant and vowel epenthesis are used to repair inputs that do not conform to its optimal syllable.

In Sesotho, while /k/ is the epenthetic consonant which is used in domesticating loanwords in the language, the epenthesis of vowels at word initial position depends on the cluster of initial consonants (Rose & Demuth, 2005). While taking cognizant of the fact that the process has different roles in different languages, Olutura reports that the epenthesis of consonants and vowels has different grammatical functions in its phonology.

Elision, and in particular, vowel elision, is one of the processes that is used in many languages across the world to arrive at the optimal syllable. According to Mtenje (1992), phonological rules in most Bantu languages stipulate that a vowel deletes when followed by another vowel at the morphological boundary. Casali (1996) discusses the following four environments in which elision takes place:

1. At the boundary between two lexical words, V_1 is deleted;
2. At the boundary between a lexical word and a following function word, the deletion of V_1 is common;
3. At the boundary between a (minimally) CV prefix and a root, V_1 is generally elided; and
4. At the boundary between a root and a suffix, elision of either V_1 or V_2 is possible. In this type of elision, there is a tendency of V_1 elision if the suffix has a single vowel, and of V_2 when the suffix is minimally of VC form.

According to Casali (1996), vowel elision may target V_1 or V_2 and in some languages like Etsako, the process involves the deletion of V_1 in some contexts and V_2 in others. From the observation of 92 languages, Casali (1996) draws the conclusion that the elision of V_1 is more common than that of V_2. Only two languages from Casali's study have the elision of V_2 and also V_1 in some contexts. This observation by Casali guided the study on Olutura to find out in which of the two categories it falls; those that delete V_1 or both V_1 and $V_{2.}$

According to MacEachern (1995), there are several reasons that favour the deletion of V_I as opposed to V_2 in many languages including articulatory reasons, speech processing considerations and obedience to faithfulness constraints. MacEacher argues that word recognition is done at word initial position where the mental lexicons of speakers are indexed by the initial phonemes. This means that the important information will have been expressed/gained from the first syllable of the word that eventually releases the vowel in its last syllable to the deletion process. Cross-linguistically, initial syllables are resistant to phonological change and the structure of words in a language is bound to optimize such syllables for the efficiency of the processing system (Hawkins, 1988).

In a similar way, quite a number of researchers also argue for the preservation of V_2 because it is at word initial, which is a priviledged position. Beckman (1997) argues that word initial syllables are important cues for lexical access psychologically and are, therefore, protected in many languages. Certain prominent positions are meant to maintain contrast among particular kinds of features and/or segments (Steriade, 1982 & Casali, 1997). This means that certain segments and in particular vowel features are resistant to deletion in certain environments. The loss of word initial vowels is generally rare because there is a greater degree of both length and amplitude associated with the beginning of words in many languages (Casali, 1997). There is a lot of prominence that goes with initial position and thus the effort by languages to preserve features in such contexts where they are more salient (Jun, 1995, Steriade, 1994). Mtenje (1992) points out that V_1 elision in Chichewa occurs in three different environments. One instance is in the CV syllable structure where the vowel is deleted before a following prefix. The second one is the structure in which the vowel /a/ is considered as part of the lexical entry of the verb while the third one involves the passive and causative suffixes.

In languages in which ONSET is ranked low, this particular constraint may be tolerated in some environments. This will entail the occurrence of heterosyllabic vowels or adjacent non-identical vowels even if the second vowel belongs to an onsetless syllable. Etakwa (2010) discusses this kind of structure in Olunyala (K) in words like *'esianwa'* (offering) and *'omuolo'* (a sickle-like shaped farm implement). According to this study, Olunyala (K) is a sister language to Olutura. In languages in which ONSET is highly ranked, morphological or syntactic concatenations will always take place to eliminate heterosyllabic syllables whenever they occur. The elimination of heteroyllabic syllables in languages that do not allow them is done through constraint ranking of other relevant constraints.

Namulemu (2006) also discusses the process of vowel elision in Lunyole. In this language, when a high vowel that is [-round] is joined to a vowel initial morpheme, the final vowel which is V_1 of the preceding word is deleted as in 6.

6. Lunyole V_1 deletion

/si/ + /aloma/ → [saloma] he speaks not

As already mentioned, the elision of V_2 is not common but it does occur. Casali (1997) gives examples of languages like Yoruba in which elision of particular "weak" vowels in V_2 position occurs with particular combinations of lexical items. Casali reports that the elision of V_2 arises at the boundary between a lexical word and a following function word.

Chichewa is one of the languages which has both the elision of both V_1 and V_2. Mtenje (1992) reports that in this language, elision of V_2 only occurs with the demonstrative suffixes in the VCV syllable structure as in 7.

7. Chichewa V_2 elision

(i) /mwana – ujo/ → [mwanajo] (V2 'u' is deleted)

(ii) / ɲimbo –izi/ →[ɲimbozi] (V_2 'i' is deleted)

Olutura is also one of the languages that deletes both V_1 and V_2, but unlike Chichewa, it elides V_1 in the environment of demonstratives. This can be seen in the examples in 8.

8. Olutura V_2 elision

(i) /imoni+ejo/ → [e.mo.ni.jo] (V_2 is deleted) that eye

(ii) /ejo+isatsa/ → [e.jo.sa.tsa] (V_2 is deleted) that one is male

From these examples the mid low vowel /e/ is the one that is targeted for elision leaving the high and mid vowels intact.

Prenasalization is another process that plays a role in the configuration of the syllable in Bantu languages and which is discussed in this study. According to Hyman (2001) there are several views regarding the definition of prenasalized consonants (NC); whether they are units or clusters. The author further states that these views are caused by the large degree of phonetic variation in the realizations of this class of sounds. Prenasalization is phonologically a general term that is used to refer to several distinct processes which are similar in their phonetic realization. Young (2011) proposes the following four types of prenasalized consonants:

TYPE I: Phonetic prenasalized consonants, for example in Fijian in which the (^{N}C) contrast single segments and therefore have the same phonotactic distributions as single segments.

TYPE II: Derived prenasalized consonants which function as a unitary segment, for example in Kikuyu in which (NC) are derived through the application of phonological rules. In this process there is a fusion of nasal-plus-consonant clusters or [+nasal] spreading, behaving like single segments.

TYPE III: Derived prenasalized consonants which behave as a complex segment, for example in Japanese in which (^{N}C) contrast with ordinary clusters of homorganic nasal and a following obstruent (^{N}C) and therefore behave as complex segments.

TYPE IV: Phonetically enhanced prenasalized consonants like those found in Southern Barasano. In this language (^{N}C) are not phonological entities but phonetic realizations enhanced by articulatory adjustment.

According to Ferguson (1966), every language contrasts nasal and non-nasal consonants and has at least one Primary Nasal Consonant (PNC) in its inventory. The most characteristic allophones of PNC are the voiced nasal stops which are the most common prenasalized consonants. The voiced prenasalized consonants more often co-occur with nasals and voiced stops. Within any language system, the prerequisite for the recognition of phonological prenasalization is the existence of voiced oral stops or fricatives and nasal stops.

Young (2011) argues that in Bantu, prenasalized consonants are not defined as single phonological categories but are assumed to be derived from two underlying segments which behave like a single unit. These segments pattern differently in different languages. Young (2011) uses an example of Kilega of Congo to show that (^{N}C) are analyzed as unitary segments which occur word initially and intervocalically, for example in the Kilega word nkosanda [^{n}kosa^{n}da]- I taste. White (1949) also uses Lwena, a Bantu language to show that in Bantu, ^{N}C are homorganic and as such, pronounced as a single sound, making it a nasal compound which is a composite sound with a nasal conjoined to another consonant homorganic to it. This kind of analysis attests to type II indicated above and it is what is adapted in this study as discussed in chapter five.

Hayes& Stivers (1996) & Hyman (1992) both argue that prenasalized consonants do not occur at the level of underlying representation but are phonetic manifestations which are derived from underlying clusters and therefore trigger phonetic adjustments like vowel lengthening or nasal shortening. These writers argue that prenasalization may be the surface realization of an underlying feature specification [+voice]. Whatever the twist to the definition of prenasalized consonants, the issue of something underlying in the realization of NC consonants in not in dispute and this was a guiding principle in this study which sought to find out the consonants that are involved and how they behave as far as phonation is concerned and whether NC sequences were, as it is with Kilega, analyzed as unitary segments or not.

Languages deal with the cross-linguistically marked nasal consonant sequences in different ways. Herbert (1986) quotes Atkins (1954) who uses Hungu, a Bantu language in Angola, to show the connection between marked grammatical categories and prenasalization. In Hungu, alternation is used to show the first person singular in verbs and the plural of certain nouns. These alternations are caused by the prefix /N-/ in which, for example, /v/, /z/ and /j/ become *mv*, *nz* and *nj* while /b/,/d/ and /l/ become mb,nd and nd respectively. Herbert (1986) exemplifies this using the words in 9.

9. Hungu marked prenasalization

(i)	bind	shut	mbindindi	I shut
(ii)	vubuku	return	mvutukidi	I returned
(iii)	lamb	cook	ndambidi	I cooked

Herbert (1986:46)

In Hungu, the stems that do not behave the same as in the examples in 8 mark these forms using initial prenasalization and as such, nasal initial and vowel initial stems exhibit prenasalized voiced stops, for example in 10.

10. Hungu stem prenasalization

(i)	mon	see	mbwene	I saw
(ii)	u	hear	ŋguide	I hear

This study sought to find out whether the dialect exhibits a similar prenasalization occurrence in which initial stems in the first person become prenasalized.

Another example of the connection between prenasalization and marked grammatical categories is shown by Hyman (1972a) using data from FeˀFeˀ-Bamileke which has the two forms of verbs in 11.

11. FeˀFeˀ-Bamileke prenasalisation

(i) a zero form that is morphologically marked

(ii) a prenasalized form which is marked by the presence of a homorganic nasal prefix /N-/.

The prenasalized form shows non-completed and consecutive aspects while the zero form indicates the imperative and completive aspects. What is of interest to this study is that in the singular-plural distinction, some Bamilike nouns show prenasalized consonants in both singular and plural forms; for example in 12.

12. Bamilike singular and plural prenasalisation

	Singular	Plural	Class	
(i)	mbɔk	mbɔk	3/4	hole
(ii)	ŋgɛn	ŋgɛn	½	guest

In Bamilike, nouns that are marked by prenasalization in the singular are also marked by the same in the plural. According to Hyman (1972a), the prenasalization of initial consonants in fully Bantu languages occurs in noun classes in which it is used to mark both singular and plural. Hyman (1972a) further notes that the reconstructed form for the prenasalizing prefix is /ni-/ In some languages, the prefix */mu-/ which marks the singular of class ½ and ¾ has undergone vowel absorption in Bantu languages and the nasal stands directly before the stem initial consonant. In some languages the nasal assimilates in position to the following consonant while in others it is always syllabic, for example in Swahili in which it is always [m] irrespective of the following consonant. In other dialects the prefix is no longer [m] but the syllabic nasal /N-/ which is homorganic with the following consonant. Herbert (1986) gives examples of "mpunga" (rice plant) and "nlima" (mountain) from Chijomvu and Kingowe. According to Herbert (1986), Gitonga has no syllabic consonants and there is, therefore, simple prenasalization of stem initial consonants in which */mu-/ occurs in class 1 and 3 singular prefixes as in 13.

13. Gitonga prenasalization structure

(i) mu- before monosyllabic stems

(ii) mw- before vowel initial stems

(iii) Ø- before voiceless consonants and /r/

(iv) prenasalization of voiced consonants

According to the Gitonga prenasalization structure types in 13, in structure (iv), /b/ becomes [mb], /β/ becomes [mb] or [m] and /l/ becomes [nd] as the recognition of phonological prenasalization which includes a series of nasals and voiced oral stops/fricatives. Olutura data is used in the current study to test the structure that is found in its phonology with regard to prenasalization; that is, when the prefixes /mu-/, /M-/ or /N-/ are used.

Peng (2003) postulates that in Kikuyu, when the prefix of the placeless consonant /N-/ is attached to root initial voiceless plosives, they undergo voicing. The /N-/ then assimilates to the place of articulation of the root initial consonant and is fused with it in the output. This occurrence is similar to Olutura and is shown in the OT framework in Tableau 2 using the Olutura word *toola*.

Tableau 2: Olutura /N-/ place assimilation

	N-toola	*NC	ID(Voi)
	a.[^{n}toola]	*!	
☞	b.[^{n}doola]		*

Tableau 2 shows that the right output in Olutura is (b) in which the nasal /n/ has been perceptually assimilated. This shows that Olutura has a productive process in which there is mutation of the root-initial consonant which is triggered by the prefix /N-/ the way it happens in Kikuyu. (Peng, 2003). The winning of candidate (b) in Tableau 2 gave impetus to the current study which needed to use data from Olutura in OT constraint ranking because the dialect has the occurrence of words with voiceless alveolar like *toola* (pick). This is discussed in chapter 4.

Another phonological process that is relevant to the discussion of the syllable in this study is labialization. Kim (2010) indicates that labialization can vary even in languages that have it in their phonetic inventory and languages can develop typological commonalities and variation; for instance, Ladefoged (1968) gives an example of the Nigerian Koma and Kuteb as languages with labio-dentanilation. There can also be labio-palatalization as an allophonic variant of labialization in the environment of front vowels (Ladefoged & Maddieson, 1996). It is imperative to note that if labialization does not occur in a language, it can present challenges to 2nd language speakers of a language in which it occurs due to the inherent complexities in the interaction of labialization and vowel rounding. An examination of such complexities should be helpful when it comes to acquisition of languages that have labialization like Olutura.

Kim (2010) notes that the English language does not have a separate series of labialized consonants in its phonetic inventory. However, in this language, all consonants that are followed by the approximant /w/ become labialized. The labialized /w/ can be followed by a series of different vowel sounds although the labialized stop cannot co-occur with a wide range of vowels. For example, its co-occurrence with a [+high, -round] vowel segment would result in a combination like *[kw^w] which is not allowed in the language because both sounds will be phonetically affected (Kim, 2010). The question that is answered in the current study is, not just about the vowels that occur in the labialization process in Olutura but also the consonants that take on labialization in this dialect.

Labialization is common in dorsal (velar or uvular) consonants although labial and coronal consonants may also be phonetically labialized (Ladefoged & Maddieson (1996). In Kwakw'ala, a Wakashan language spoken in Vancouver Island, labialization occurs with velar and uvular consonants. In some languages, labialization is obligatory at syllable initial position in the absence of a preceding consonant. Bradley (2009) gives an example of Judeo-Spanish (JS) as one of such languages as shown in the examples in 14.

14. Labialization in JS

(i)	gweso (bone)
(ii)	pwéðe (can)
(iii)	bwenda (goodness)

(iv) fwente (fountain)

In JS [w] occurs after labials and dorsals while the non-etymological [w] occurs after labials and dorsals in the context of a preceding [u] as in tu-pwaore (your father) and uŋ ɡwato (a cat).

In JS, [w] does not appear after coronals and the emergence of coronal + /w/ will always be resolved using different mechanisms, for example the epenthesis of the medial vowel after a stop, an affricate or a trill as in /tuɣwèle/ (hurts) and /ruɣwelɣo/ (wheel). Before a lateral or fricative, prothesis is used as a mechanism, for example in the word /elɣwelɣo/ (later). Another way of resolving the emergence of coronal + /w/ in JS is through nasal place assimilation to a bilabial point of articulation as in *mwéve* (nine) and *mwévo* (new). The two examples show that in JS, prevocalic [w] is sensitive to the place of articulation of a preceding consonant. Bradley (2009) suggests that this is because in JS, /w/ forms a complex segment with a preceding consonant which then subjects it to a constraint against labialized coronals. Bradley notes that in JS, secondary labialization is avoided by coronals while dorsals are a favourable target of labialization. In a language called Trique (Oaxaca, Mexico), dorsals are labialized after the vowel /u/ while coronals are not (Hollenbach, 1977).

In some languages, labialization is used to show contrast. For instance, in the Chaha and Inor languages of Ethiopia, labialization is used to mark the masculine morpheme. In these languages the masculine morpheme is realized on the rightmost labial or dorsal consonant of the stem but it is never realized on coronals (Rose, 1994 as quoted by Bradley, 2014). In Twi, a Ghanaian language, the superscript of /w/ to another segment, for example, /k/ in the word /a/ka/ (has eaten) will result in the word [ak^{w}a] (a round-about way) which bears a different meaning (Laver, 1994). According to Ohala &Lorentz (1977, cross-linguistically, contrastive labialization occurs more often on velar, uvular and labial than on dental, alveolar and palatal consonants. In the current study, labialization is not just shown as having a distinctive function, but the specific word categories involved are revealed.

Labialization of consonants is also reported in Bangolan, a language in Cameroon which has twenty one labialized consonants. In Bangolan, most of the consonants in its inventory apart from the labio-velar double stops, the alveolar grooved affricates, the alveolar nasal and labialized consonants can occur before all vowels apart from /ɨ/. Another example of a Bantu language in which labialization occurs is Olunyala (K), which is a dialect of Luyia, just like Olutura (Etakwa, 2010). Etakwa (2010) reports that in Olunyala (K), there are 17 sound segments that result from labialization. As noted by Ohala &Lorentz (1977) and Hollenbach (1977), Etakwa also observes that in Olunyala (K), the labialized /w/ does not combine with all the phonemes in this language but does not explain why. Etakwa gives an example of /β/ which is very common in the language and yet does not combine with /w/ a combination that would not be wrong according to the phonotactics of the language. This is what Kenstowicz (1994) refers to as accidental gaps.

Etakwa reports that in Olunyala (K), labialization can be used to distinguish meaning in a language; for example in the words in 15.

15. Olunyala (K) distinctive labialization

aka (for these) (uncountable)	$\longrightarrow$ /k/ +/w/	ak^{w}a (s/he is falling)
esa (caterpillar)	$\longrightarrow$ /s/ +/w/	es^{w}a (termites)

The examples from Olunyala (K) and Twi show that labialization can result in the occurrence of different sounds. This is in agreement with Travel (1981) who argues that the process of labialization can cause the occurrence of independent phonemes. This is unlike Lunyole in which, according to Namulemu (2006), labialized /fw/ occurs in some environments as an allophone of /f/ and is, therefore, not a distinct phoneme in this language. The current study sought to find out if labialization could result in independent phonemes in the phonology of Olutura.

It has already been indicated in this section that quite a number of languages do not combine /w/ with all the sounds in their phonemic inventories. This means that labialization does not occur at all places of articulation in such languages. The current study looked at the issue of the consonant sounds that are involved in the process of labialization in Olutura in which it is observed that unlike some languages, all consonants in this dialect can be labialized. This means that in Olutura, labialization occurs at all places of articulation. In OT, the ranking of markedness constraints can be used to show the prohibition of secondary labialization in different places of articulation.

In Lunyole, when two vowels meet at a morpheme boundary and the first vowel is [+round], labialization is bound to occur. If V_1 is word initial, it becomes a labial [w] and if it is preceded by a consonant then the consonant is labialized (Namulemu, 2006). For example, if the second person singular prefix /o-/ is joined with the first person singular possessive root **/aŋge/,** the **/o/** becomes a labial /w/ as in 16.

16. Lunyole morpheme boundary labialization

/o/ + /aŋge/ → [waiŋge] mine

The results of the current study show that labialization in Olutura across the morpheme word boundary only involves the [+high] vowel /u/ unlike the Lunyole case shown in 16.

Sequential Alternation (SA) is another phonological process that affects the constitution of the syllable in some languages. According to Murray (2015), sequential change is about naturalness in language change. In Olutura, SA is one of the phonological processes that cause a change in the syllable. In languages that have dissimilation, this occurs when it is difficult to articulate or perceive two similar sounds in close proximity. For instance the word 'anma' in Late Latin was modified in Spanish to 'alma' to avoid the occurrence of consecutive nasal sounds. Kenstowicz and Kisserberth (1979) give examples from Lamba, a Bantu language from Zambia in which segment alternation occurs on the basic verb depending on the grammatical function of voice, state and application. Lamba, just like Olutura also shows segment epenthesis that is accompanied by alternation. Examples from Lamba are shown in 17.

17. Lamba sound alternation (adapted from Kenstowicz and Kisserberth 1979)

	Basic verb	Passive	Stative	Applicative	Gloss
(i)	seka	sek**w**a	se**ke**ka	sek**ela**	laughed
(ii)	kosa	kos**w**a	kos**eka**	kos**ela**	be strong
(iii)	poka	pok**w**a	po**ke**ka	pok**ela**	receive

The data in 17 shows the alternation of the segments /k/ and /l/ in the stative and applicative respectively. The epenthesis of /w/ to another phoneme has what is referred to in this section as a less natural sequence of CVCCV.

According to Murray (2015), in some languages, voiceless stops or fricatives weaken to voiced stops or fricatives while in others, weakening can result in the deletion of a consonant. Consonants also weaken in intervocalic environments. The scale for consonantal strength shown in Figure 3 has been used to account for some of the circumstances of SA in Olutura.

Stronger	↑	voiceless stops
		voiceless fricatives, voiced stops
		voiced fricatives
		nasals
		liquids
Weaker	↓	glides

Figure 3: Consonant strength scale

Murray (2015) argues that in a variety of languages, sound changes have the effect of reducing syllables that are less natural to the more natural CV type although some sounds change to less natural ones. This unusual occurrence happens in the process of syncope which reduces a CVCVCV syllable sequence to the less natural CVCCV syllable type. Olutura also reports this less natural syllable type as discussed in this study. The motivation for this shorter phonological form is also discussed in the same chapter to find out the sound sequences that are involved in Olutura SA.

1.7.5 Review of Literature on Luyia and Related Languages

There are other studies that have been carried out on languages that are related to the current one. Angogo (1980) deals with the attitudinal perception of speakers of the Luyia language with the actual linguistic situation in order to justify the dialectal divisions as perceived by, inter alia, the speakers themselves, linguists and anthropologists. Angogo indicates that there may be other Luyia dialects that are yet to be determined as Figure 1 only lists 17. The classification of these dialects by this researcher contributed to the motivation for the current study as it implies that more studies need to be carried out with regard to the Luyia continuum of dialects.

The issue of discrepancies in the phonetic symbols of some Bantu languages emerged in the current study and it was, therefore, imperative that studies related to the current one are discussed. One of the studies is by Kuria (2006) on the discrepancies between the graphemic and phonological structures of Gikuyu which shows that discrepancies exist in the symbols that are used in the phonetic inventories and orthographies of some Bantu languages. Kuria uses an example of the phonetic symbol [β] representing the orthographic symbols'v', 'f' and 'b' in Gikuyu to show that there are discrepancies between the phonetic inventory and the orthography in many Kenyan Bantu languages. Odden (2015) also notes that Bantu languages do not contrast /b/ and /β/. In this study, the phonetic symbol /β/ is used to transcribe the orthographic symbol /v/.

Namulemu (2006) in his phonology statement on Lunyole, a Luyia language in Uganda, does not use the conventional symbol /β/ that is used by other scholars on Bantu languages to refer to the orthographic symbols 'v' and 'b', something that adds to the foregoing argument on discrepancies in the symbols used. Namulemu uses the symbols 'bb' and 'b' to differentiate the plosive (hard) 'b' and the fricative (soft) 'b', respectively. Since the aim of this study sought to establish the sound segments of Olutura, the symbols used by Namulemu also guided this study regarding the phonetic inventory and development of an orthography for Olutura.

Etakwa (2010) discusses the syllable structures of Olunyala (K) and shows how the sound segments combine in their formation. In the discussion on the sound segments of Olunyala (K), Etakwa concurs with Kuria (2006) that the sounds ‘v’, ‘f’ and ‘b’ are also pronounced differently in Olunyala (K) just like in Gikuyu and recommends further research in order to have a standard symbol. Another observation that is made by Etakwa (2010) is on the issue of the two glides /w/ and /j/. Etakwa posits that in Olunyala (K), glides can only occur in the onset of a syllable and gives examples of words like ‘*njwa*’ (drink) and ‘*kwa*’ (fall) to show this point. The study by Etakwa (2010) contributes to the current study in the examination of the sound segments of Olutura and their functions, the results of which would be helpful to researchers in comparative dialectology of Luyia languages as envisaged in the justification of this study. The sound segments that Etakwa identifies were useful in making the conclusion that Olutura could be placed in group 2 of the Northern Luyia dialects as classified by Angogo (1980).

Nandelenga (2013) carried out a study on the syllable structure and how it constrains the phonological processes of Lubukusu on the premise of Optimality Theory (OT). The study uses OT constraints to explain the syllable structures of Lubukusu and how they motivate the various phonological processes in this dialect. Nandelenga concludes that the interaction of OT markedness and faithfulness constraints is enough to fully account for the syllable structures of Lubukusu and the phonological processes that these structures constrain. The issue of OT constraint ranking is what is of interest to this study which seeks to adopt a similar methodology to establish the particular phonological processes that are constrained by the syllable of Olutura. This study utilized OT constraints to a language particular ranking situation so as to contribute to phonological theory. The argument by Nandelenga that glides are pure consonants in Lubukusu was also tested in this study in line with the same view by Etakwa (2010).

The study by Wanjala (2014) which sought to find out the dominant dialect in the contact between Lubukusu and Lutachoni, two dialects of the Luyia continuum, notes that some Kenyan minor dialects are under threat of shift or death. Wanjala observes that some of these dialects are even considered to be dialects of other dominant languages when they are actually full languages. According to Wanjala, research on the dominance statuses of the different indigenous Kenyan languages and their influence upon the neighbouring languages is limited. The observation by Wanjala is in line with the current study on Olutura which is a dialect that had not been mentioned as a Luyia dialect until Marlo (2007), and which, as was noted during the face to face interviews, is considered as part of Lubukusu by the Babukusu who neighbour the Abatura. The recommendation by Wanjala that the study on Lutachoni contributes to the development of literacy materials, dictionaries, orthographies and grammars was also valid for this study.

Kebeya, Bwire & Erastus (2016) did an intra-dialectal analysis of Lukhayo which is one of the Luyia dialects in the neighbourhood of Olutura. The study seeks to demonstrate that linguistic variations can happen within a dialect. Kebeya *et al* (2016) observe systematic variations in two phonological variables in Lukhayo in the use of /ʧ/ and /ʃ/. In this study, the two linguistic variables of (CH) and (SH) are used to show the occurrence of intra-dialectal variations in Lukhayo. In the linguistic variable (CH), the Bakhayo in Matayos use [ʧ] while those in Nambale use [ts] while in the linguistic variable of [SH], the speakers in Matayos use [s] and the Nambale ones use [ʃ]. This occurrence leads to the conclusion by these researchers that Lukhayo has the two sub-dialects of Matayos and Nambale and that the two are influenced by the social factor of geographical region. This study is relevant to the current one in that the identification of the orthography and sound segments of Olutura in this study will be of use in similar studies with the objective of studying any intra-dialectal varieties in Olutura by virtue of its geographical region.

Marlo, (2008, 2014) are studies that deal with tone in Olutura and Bantu languages respectively. The study by Marlo (2008) on the verb tonology of Olutura likens its tone to Luyia dialects like

Lukhayo, Olunyala (B), Lusaamia and Lusonga, which, just like the former are equally understudied. The present study on Olutura gives an even stronger basis for its objective comparison to other Luyia dialects as it looks at the syllable which is a very important aspect in phonological studies. The orthography and phonetic inventory that this study proposes to bring to the fore would enable such a comparison. Tone, as one of the aspects of supra-segmental phonology was useful in discussing the function of the sounds of Olutura. Marlo (2014) observes that the factors that determine the choice of final vowel suffix are complex and include tense and aspect. Further, the current study underpins that final vowels may be triggered to change because of tense-aspect-polarity distinctions and clause type, and that this may cause tonal alternations. Although the current study is not on tone, the issue of sound alternations is important to it because of its investigation on the circumstances under which sounds alternate in Olutura. In line with Marlo (2014), the common vowel suffixes in Bantu are –a, -e and –i; this study investigated how the vowels function in the formation of the zero onset syllable in the process of SA and whether these vowels occur in other word positions other than word final position. This is because the changes in the sounds that constitute the syllable affect its structure.

Mwaliwa (2014) discusses the CCCV syllable structure of Kiswahili which comprises a nasal followed by a stop and a glide in words of Bantu origin. In the current research, the consonant clusters that form the onset in the syllables with the pre-nasalized sound, labialized /w/ and the marked glide /j/ was examined in Olutura to find out the position of glides and the constituents of the syllable in this dialect. Similarly, the data used by Savala (2005), in the study on the tonal patterns of Lwitakho shows that the argument that has always been advanced that Bantu languages have a simple syllable structure needs to be re-examined. Some of the phonological segments that Savala identifies in Lwitakho were beneficial to the current study in its establishment of an orthography and a phonetic inventory for Olutura. This will be an advantage when making a decision as to which Luyia group of dialects Olutura belongs.

In the comparison of the Chuka and Imenti dialects, Kanana (2011) concludes that although the two are phonologically closely related, they are not as similar in their consonant system and consonantal processes as they are in the vowels and vocalic processes. The discussion by Kanana (2011) on the inventory of the two dialects was useful to the current study in terms of adopting a similar methodology for the dialect under investigation by showing that even closely related dialects can differ in their phonotactics. This means that the current study on Olutura provides an objective basis for its comparison to other Luyia dialects.

1.8 Theoretical Framework

The study mainly used Optimality Theory (OT) which was complimented by Generative CV Phonology. This section explains how the two theories were used in the current study. Generative CV Phonology as propounded by Clements and Keyser (1983) and also advanced by Katamba (1989) and Kenstowicz (1994) has been used to analyze the syllables of Olutura in order to establish the sound segments that can form the peaks and the margins. OT, was first developed by Prince & Smolensky (1993; 2004) and also expounded by other scholars as was used to account for the phonological processes in the well-formed syllable in Olutura by using the OT notion of universal constraint ranking.

1.8.1 Generative CV Phonology

Generative CV Phonology has its origins from the Generative Grammar of Chomsky & Halle (1968) which became a motivation for quite a number of scholars who have based their studies on it and used it to come up with phonological models. For instance, Kahn (1976) developed a generative phonology model of the syllable which had only two tiers, namely: the syllable tier and the segmental tier. Clements and Keyser (1983) modified Kahn's model by adding a phonological representation; the CV tier, to make three tiers. The CV tier is meant to distinguish the functional positions of the elements within a syllable. It is, therefore, a non-linear model that was developed to fill the gap that was left by linear generative phonology developed by Kahn (1976). Clements and Keyser (1983) expounded a CV model according to which, a syllable (σ) consists of an onset (O) and a rhyme (R). The rhyme has a peak (P) and a coda (Co). Apart from the (P), the other categories may be empty (Lass 1984).

The theory, as expounded by Clements & Keyser (1983), is specifically designed to deal with the syllable and shows the number of syllables in a word. This model remains relevant today as shown by its continued application in studies since its inception; for example, Katamba (1989), Kenstowicz (1994), Kolaczyk (2012) and Mwaliwa (2014). The current study used the CV tier model advanced by Clements & Keyser (1983) and Katamba (1989) to show how the sound segments in Olutura combine to form syllables since not all phonemes can precede or follow all other phonemes in the language (Kenstowicz, 1994). Katamba (1989) elaborates on the simplicity and relevance of the model and Mwaliwa (2014) uses it in the analysis of the syllable structures of Standard Kiswahili loanwords from Modern Standard Arabic.

According to Katamba, (1989), in Generative CV Phonology, the syllable is what guides the formulation of many phonological rules, since, as a phonological unit, it plays a significant role in determining the organization of segments in a language. Jensen (2004) argues that the phonology of a language is about the patterns of distribution of its speech categories. Phonological analysis of processes is then used to determine what those patterns are, how to represent them and consequently explain why they are that way. Katamba, following Clements &Keyser (1983) posits that the theory is based on three tenets.

One of the tenets is based on the parameters that govern the various choices that are made with regard to the syllable in a language. This tenet operates on syllable transformations which show that there are phonological processes that occur in a language that affect the syllable structures of words. These processes are what determine the optimal syllable in the language. The principle of syllable transformations has been used to find out the syllable types that occur in Olutura and identifying the consonant combinations that are allowed in well-formed syllables in this dialect.

The other tenet is the one that specifies the syllabification rules in a given language. Clements & Keyser posit that each language has its core syllables and that all languages have the CV syllable. They argue that other syllable types vary between languages and are realized by applying language specific rules which either delete initial C or insert final C to get the V or CVC type, respectively. Syllabification rules operate on the principle of core syllabification which gives the procedure that should be used in marking syllable boundaries in words. The marking of boundaries is guided by the onset first principle that is used in this study to mark the boundaries at individual word level and across word boundaries in the discussion of the phonological processes of Olutura.

The third tenet is based on the task that specifies the expressions that are well formed in accordance to Generative CV Phonology Theory. The principle of well-formed expressions uses three tiers, namely; the syllable tier, the CV tier and the segmental tier to show the formation of the syllable. The segments that are denoted by V on the CV tier are syllable nucleus and must be vowels while those denoted by the C are the margins and are formed by consonant sounds. This is exemplified in Figure 4 using the Olutura word *"ima"* (stand), which, as seen in the figure, has two syllables.

					Gloss
Syllable tier	σ	σ			
CV tier	V	C	V		
Segmental tier	[i	m	a]		stand

Figure 4:*CV tier for Olutura*

Figure 4 shows that the three tiers are linked by association lines and that the segmental tier is dominated by the CV tier which is in turn dominated by the syllable tier. The study applies the principle of core syllable associations to link the elements on the CV tier to those on the segmental tier. The linking of these elements is done using a one to one syllable association line, whether they are single or internally complex. The notion of the CV tier is used in this study to establish the preferred sound segments for the various syllables and the word positions for Olutura syllables, and, therefore, provides the study with a mechanism to deal with the specific syllable structures in this dialect.

According to Generative CV Phonology, the syllable is what guides the formulation of many phonological rules, since, as a phonological unit, it plays a significant role in determining the organization of segments in a language (Katamba, 1989). Generative CV phonology operates on the principles of well-formed expressions, specification of the parameters that govern the varying choices of syllable types and the language specific rules that govern syllabification in languages. Clements and Keyser (1983) posit that all languages derive their syllable structure from any or more of the following four types; CV, CVV, CV CVC or CV V CVC VC. They advance the argument that CV is the optimal syllable because it belongs to the grammars of all languages and that any language that has VC must also have CV, V and CVC sequences. Clements and Keyser (1983) use CV elements that follow each other but according to Hawkins (1988) the model still recognizes the fact that some languages allow syllables other than the CV sequence, for example, CVC (Kenstowicz 1994).

The model by Clements and Keyser (1983) brings out the notion of constraints, referred to as positive and negative syllable structure conditions which apply on the segments that occur within a syllable. The constraints are applied to generate the set of well-formed core syllables for each language. Katamba (1989) shows three possible patterns of internal segment structure and that each depends on how segments are associated to the CV tier. One is that there can be a one-to-one association of V or C elements to a segment; secondly, is that there can be a simultaneous association of one segment to two C or V slots; and thirdly, is that there can be the simultaneous association of a single C slot to two segmental features. The study has used the CV tier model to show how the sound segments in Olutura combine to form syllables since not all phonemes can precede or follow all other phonemes in the language (Kenstowicz 1994). The model as propounded by Clements and Keyser (1983) provides the study with a mechanism to deal with the specific syllable structures in this dialect. This study used Generative CV Phonology to investigate the consonant combinations that are allowed in well-formed syllables in Olutura.

The CV tier is what also displays syllable weight by showing the branching nucleus and as such the heavy or light syllable as illustrated in the Olutura word *naava* in Figure 5.

/naaβa/ (to fish)

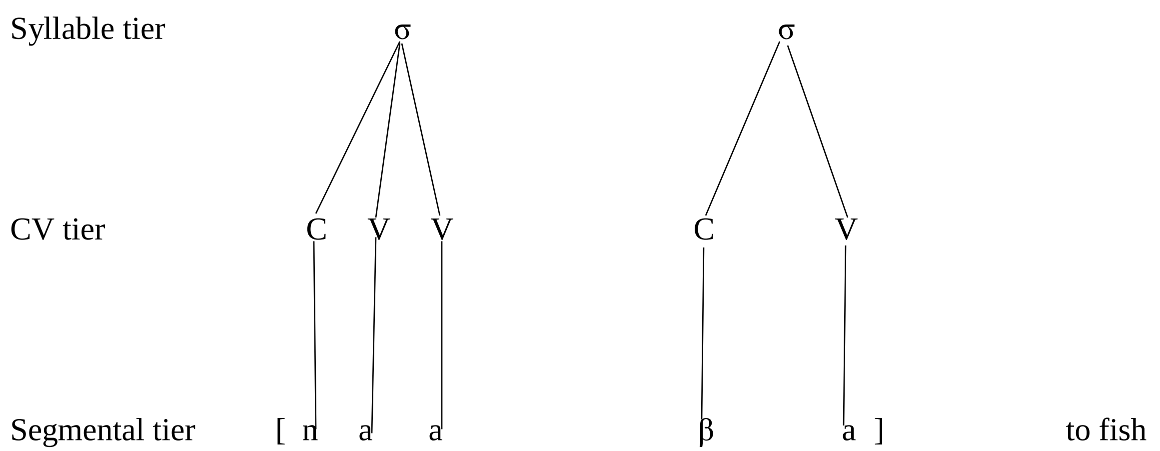


Figure 5: CV tier for Olutura heavy *syllable*

Figure 5 shows that the the Nucleus (N) has two similar vowels and this is what makes the first syllable of the word *naava* to have a CVV type of syllable. This is in line with Clements and Keyser posit that long vowels and consonants can be represented as one feature matrix associated with two adjacent CV positions. This means that when the quantity in the syllable changes, the CV slots can be deleted or added as the case may be.

The three principles of Generative CV phonology were found quite suitable in the analysis of Olutura data as they were helpful in making conclusions on its syllable types and sound segments that constitute them. However, the theory was less useful in the current study when it came to showing why Olutura chooses given sound segments instead of others in the formation of its syllables; a phonological phenomenon that is shown using the phonological processes of a language. This study found OT more useful in this regard. In the current study, Generative CV phonology was useful in showing how the sound segments are combined in syllable formation in Olutura while OT was useful in answering the question of why Olutura chooses certain sound sequences in place of others in the formation of the various syllable structures.

1.8.2 Optimality Theory (OT)

Optimality Theory (OT) is a typological theory on human language capacity (Prince & Smolensky 1993). OT has been in development since it was introduced by Prince & Smolensky (1993). The theory underwent further development by McCarthy & Prince (1995, 1999) before its publication in 2004. Since then, the theory has developed a lot of interest and has been applied, not just in phonology which was its initial concern, but other areas of linguistics as well. OT has a number of related theories and sub theories or models in its implementation. The OT related theories are; the Syllable Theory (the CV Theory of the Syllable), the Moraic Theory and the Feature Geometry Theory while the sub-theories are the Correspondence theory, Positional Faithfulness Theory and Sympathy Theory (McCarthy & Prince (1995, 1999). However, this study used the concepts of OT that apply to phonology, hence the adoption of Correspondence Theory (CT) and Syllable Theory. These two theories are manifested in the works of Prince & Smolensky (1993,2004), McCarthy & Prince (1995), Archangelli &Langendoen, (1996), Kager, (1999) and McCarthy, (2002), McCarthy, Mkochi,(2004, 2007), Bradley, (2009), Sabao, (2013), Kawahara (2014) and Shume, (2017).

Generally, OT is a model that shows how grammars are structured and is based on parallel evaluation of possible output forms which result from a ranked system of constraints that are violable. OT operates on the basic notion that every grammar has a system of conflicting forces which are embodied by constraints. Each constraint makes a requirement about the aspect of output that it requires. The theory starts by looking at the fact that every phonological structure has an underlying structure with an input and a surface form. OT operates on the principle of conflicting constraints. Typically, constraints conflict, such that to satisfy one means violating another. Naturally, no form can satisfy all constraints. Therefore, there must be a mechanism for selecting forms that incur lesser constraint violation than those that incur more serious violations. The mechanism involves hierarchical ranking of constraints; the higher ranked constraints have priority over the lower ranked ones. Constraints are structural requirements that may either be satisfied of violated by an output form. A form satisfies a constraint if it fully meets the structural requirement of a given language while that which does not meet the requirement is said to violate it.

OT has two constraints; faithfulness and markedness. Faithfulness constraints evaluate the relationship between the input and output by demanding that there is an exact replication of the input along some structural dimension (Prince & Smolensky, 1993, Gnanadesikan, 1995). This means that there should be some similarity between the output and its input. Faithful constraints are the ones that protect the lexical items of a language against the 'eroding' powers of markedness constraints. Faithfulness constraints serve two major communicative functions; one is to preserve lexical constraints to allow a language to have distinct lexical items to express different meanings. The second function is to enhance the one to one relationship of meaning and form by restricting the shape variability of lexical items (Prince & Smolensky 1993). Under faithfulness constraints, the followings terms are used; MAX, which forbids all deletion and demands that the input should be maximally represented in the output and DEP, a constraint that forbids insertion. Faithfulness constraints require that the observed surface form (output) matches the underlying lexical form (input) in some particular way. This means that there should be identity between the input and output forms, hence the constraints attributed to IDENT.

In order to assess faithfulness in a language, OT basically uses the two mechanisms of GEN and EVAL in an input-output relationship (Archangeli & Langedoen, (1996, 1997). GEN is the procedure that is used to generate the set of candidates for evaluation and selection. It is the component that defines the set of outputs that each input may be connected with. It enumerates the range of the pairs of inputs and outputs from which the ‘best’ candidate must be selected by the specific grammar. Any grammar must define, explicitly, what the possible outputs for each input are. GEN explains the correspondence relation the input has to each of the outputs. In this process, GEN produces alternatives which are referred to as a candidate set. This is shown in Tableau 3 using the input /- ma/ from which the Olutura word *luma* (bite) is formed.

Tableau 3: Olutura OT candidate set

/-ma/	*CODA	*HIATUS	ONSET	DEP-IO
a. ☞[lu.ma]				*
b. lum.a	*!	*!		
c. l.ma	*!			*
d. lum	*!			
e. uma			*	*

In line with Archangeli & Langedoen (1996, 1997), Tableau 4 also shows that in OT the constraints and input forms are represented in the top row while the competing output candidates are in the first left column of the tableau. The underlying form, which is the input is enclosed in two slashes, /-ma/ while the surface form or output is enclosed in square brackets, [lu.ma].

EVAL is the procedure that is used to select the optimal candidate from the set of candidates that the language puts forth.In Tableau 3, EVAL assesses 5 candidates from which candidate (a) emerges as the optimal candidate by virtue of, not only making the least violations but also violating a lowly ranked constraint, DEP-IO.

The other component that is very central in OT hypothesis is that of CON which demands that all constraints should be ranked so as to arrive at the grammar of a language. CON enumerates all the components on the basis of universal grammar. It shows the substantive constraints in the grammar of a language by providing a set of constraints that often conflict. The concept of ranking is introduced in Tableau 4 using the Olutura word *ngwa* (I fall) and discussed in the phonological processes in this study.

Tableau 4: Olutura OT dominance hierachy

/ŋgu +a/	M: *DIPH	F:IDENT
a. [ŋgua]	*!	
b. ☞[ŋgwa]		*

In Tableau 4, the candidate (b) is prioritized above candidate (a) which makes one fatal violation while (b) violates a low ranked constraint. This is therefore written as (b) >> (a) and it is said that (b) is ranked above (a) or dominates (a) as shown by the star which represents a violation. The use of dominance hierarchy enables an entire set of possible outputs to be evaluated. This is the best way of explaining the processes that are inherent in syllable formation and is used in explaining the phonological processes in the current study. In Tableau 4, *DIPH is ranked above IDENT, so option (b) is deemed better than (a) in this set of constraints. In Olutura, candidate (a) satisfies IDENT but violates *DIPH because two vowels that are not similar occur in the same syllable.is deleted from the input. Candidate (b) emerges as the 'best' candidate because it violates the low ranked constraint, IDENT.

In OT, the ranking of faithfulness and markednes constraints draws from the ranking schema of positional neutralization used in studies of languages in which root initial syllables cause certain phonological processes. This ranking was observed in earlier studies by Kiparsky, 1981, 1988), Steriade (1982) and Goldsmith (1989). Constraints act as criteria for making a decision when it comes to selecting an output from among the various possible ways in which an underlying form can be realized. The OT hypothesis is that no constraint is capable of meeting all requirements and therefore, there is no perfect constraint (Kager, 1999, McCarthy, 2002, Potts & Pullum, 2002). As a result, the satisfaction of all constraints is not essential to the optimal output and the optimality statement. Therefore, the important question to answer is not about the perfect output but rather, the best output. Getting the best output should be made by using the OT hypothesis of prioritizing the constraints with respect to each other using a specific language; in this case, Olutura as shown in Tableau 4 using the OT notion of dominance hierarchy. There is a correspondence relationship between the input and each of the outputs which is explained by GEN.

The use of a single hierarchy to rank the constraints ensures that all the dimensions of Markedness and Faithfulness are evaluated on the same grammatical footing. This means that the demands of each constraint is weighed on the same scale but recognizing the fact that there can be considerable formal disparities due to varying linguistic structures. An example of this variation is seen in the choice of constraint (b) in Tableau 4 which satisfies a lowly ranked constraint.

The Faithfulness set of constraints work hand in hand with the second OT set of constraints; that of Markedness. Faithfulness constraints prevent every input from being realized as some unmarked form while Markedness constraints motivate changes from the underlying form. OT markedness constraints require that output forms meet some criterion of structural well formedness. This happens through the imposition of requirements on the structural wellformedness of the output. The requirement may take prohibitions of marked phonological structure, for example segment types; that vowels must not be nasal or about prosodic structure that syllables must not have codas. According to Middieson (1984), segmental markedness constraints may be validated by inspecting the relative markedness of segments in inventories on cross-linguistic basis. Natural languages may either allow codas in their inventory or not. Onsets seem to be allowed by all languages and that is why Prince and Smolensky (1993, 2004) refer to the CV syllable as the universally unmarked one. They use the XYZ pattern to come up with the notation $\sum^{\mathrm{XYZ}}$ to denote languages with syllables that fit in the XYZ pattern which can be used to show whether onsets and codas are obligatory or forbidden. This is shown in Table 1.

Table 1: CV syllable structure typology

		ONSETS	
		Required	Not required
CODAS	forbidden	$\sum^{CV}$	$\sum^{(C)V}$
	allowed	$\sum^{CV(C)}$	$\sum^{(C)V(C)}$

Source: Prince & Smolennsky (2002, p.94)

From Table 1, $\sum^{CV}$ means that only CV syllables are allowed while $\sum^{CV(C)}$ means that the language allows codas. According to Kager (1999), if a language has syllables that lack onsets, then it also has syllables that have an onset. Therefore, universally, according to the notion of onset, languages fall into two categories. Those that allow syllables without onsets and those that do not allow. According to Blevins (1995), there is no language that forbids onsets and some languages actually provide one through phonological processes like epenthesis. The markedness constraint of ONSET demands an obligatory onset as a well formedness requirement in languages where the onset constraint is undominated.

As indicated at the beginning of this section, this study used the two subtheories of OT; CT and the CV theory of the syllable. The Correspondence Theory (CT) model proposed by McCarthy and Prince (1995) and Kager, (1999) as applied by these researchers and in the recent past by Kahawara (2014), provided the constraints that were used in the data of Olutura in order to answer the objectives of this study regarding the optimal syllable. In the CT model, correspondence is the input and output relation between the elements of S_1 and S_2 and correspondence is evaluated by constraints which are violable. This means that optimal candidates may have relationships with elements with feature changes and as such, may not be perfect. Feature changes can be manifested differently in languages but occur in phonological processes such as deletion and epenthesis which, in this case, form part of the argument of the current study. The two processes were examined using Olutura data to find out the sound segments that are affected so as to get the optimal syllable in this dialect.

The CV theory of the syllable by Prince & Smolensky (1993, 2004) posits that CV is the unmarked syllable type because it is universally optimal as it does not violate any of the universal constraints of the theory. According to the CV syllable structure typology by Prince & Smolensky, the presence of an onset is the unmarked type and a well-formedness requirement which the markedness constraint of ONSET demands. This means that if ONSET is not dominated in a language, then onsets are a must. This sub-theory was used to provide constraints that were of use in the issue of ranking the constraints in Olutura in order to get the best candidates in its phonotactics.

This study also applied the concept by Kager (1999) who provides a typology that languages can use in the interaction between syllabic well formedness and faithfulness constraints so as to get the optimal grammar for each language. This concept shows that processes like deletion and epenthesis, which are dealt with in this study, are driven by the onset. The issue of codas as shown by Kager (1999) is that languages which have closed syllables, also have open syllables. Since languages either allow or disallow codas, some languages use different processes to avoid them; for example consonant deletion or vowel epenthesis. Languages that have no codas (*CODA) usually have open syllables. In such languages, *CODA is not dominated and, therefore is unmarked. Kahn (1976) & Selkirk (1984) posit that these are the markedness constraints according to which intervocalic consonants are syllabified according to the Maximal Onset Principle (MOP) which demands that they be syllabified as onsets. In this case, the ranking of constraints does not matter so long as a single intervocalic consonant will always be syllabified as an onset. An example is shown in Table 2 using the Olutura word *fisia* (hide).

Table 2: Constraint ranking for Olutura

Input	Output	Remarks
a. /fisja/	[fi.sja]	optimal
b. /fisja/	[fii.sja]	*non-optimal

Table 2 shows that Olutura accepts the syllabification in (a) as the right one as opposed to (b). In (b), there is epenthesis of an extra vowel that is not provided by the input to the first syllable which makes the the first syllable of the output to have CVV instead of CV as the input. This shows a violation of a faithfulness constraint against segment insertion in outputs that do not correspond to the input and it goes against MOP. According to Blevins (1995 and Goldsmith (2011), languages avoid complex margins through either epenthesis or deletion.

According to Prince & Smolensky (1993), in OT, the syllable is a phonological prosodic structure which comes from the interaction of constraints. It has the capacity to analyze constraint interaction with regard to syllable composition in terms of onset, nucleus and coda. It enabled the use of universal constraints on a language specific typology to account for the processes that are inherent in the well-formed syllable in the current study. This is exemplified in Tableau 5 using the Olutura word *tsia* (go).

Tableau 3: Constraint interaction in Olutura

/tsia/	MAX-1O	DEP-1O	*COMPLEX	PEAK-1O
a) ☞[tsja]			*	
b) [tsa]	* !		*	
c) [tsija]		* !	*	
d) [ts]	*!		*	* !

Tableau 3 shows that Olutura allows complex onsets because (a) is the optimal candidate as it violates only one constraint- *COMPLEX. The violation has no serious consequences because it is low ranked. In Olutura, the markedness constraint *COMPLEX must be lowly ranked because in must be violated as the dialect allows complex onsets.

As explained and exemplified in this sub-section, the study utilized the OT sub-theories of CT and the Syllable Theory because they were found suitable in accounting for the phonological processes of Olutura. This is due to the typological premise of OT in which universal constraints are applied to a language particular ranking to account for differences in languages. The fact that OT allows for the violation of constraints was used in the current study to show the circumstances for this violation in Olutura and how this results in the various phonological processes that in turn impact on the constitution of the optimal syllable in this dialect.

The use of an eclectic approach of the two theories was found necessary in the current study in order to adequately address its objectives. OT was not found suitable in the identification of the constituents of the Olutura syllable because it does not show the specific sounds that constitute it although it is capable of showing why one sound is chosen instead of another. In this regard, the Generative phonology tier model was found suitable and was used in the analysis of the constituents of the syllable. The identification of the constituents of the syllable types on the premise of Generative CV Phonology is what paved way for the use of OT in discussing the phonological processes to account for the choices that Olutura makes in the formation of its syllable. This was carried out through the use of the OT universal constraints which were applied to a language particular ranking situation, in this case, Olutura.

The analysis of data confirmed what had been envisioned in the proposal that it is only the interaction of OT constraints that could reveal this because Generative CV Phonology was only useful in the identification of the sound segments and syllable structures but could not show the alternative choices in syllable formation and why Olutura rejects these choices. Unlike Gereretive CV Phonology, OT does not emphasize on a sequence of ordered rules but rather, on the interaction of violable universal constraints which determine the wellformedness of output forms (Steriade, 1994; Smolensky & Tesar, 2003). The OT principle of allowing the violation of constraints was used to explain why the phonotactics of Olutura rejects certain syllable formations in favour of others. The ranking of constraints was used in the generation of, not only all possible, but also the phonological patterns of the dialect under investigation. Consequently, OT was found suitable because of its capability to evaluate the output vis a vis the input forms in the phonological processes that are at play in the formation of the optimal syllable in Olutura. In OT constraint ranking, it should be noted that any broken line in the tableau shows that the contraints concerned are not in strict ranking with respect to each other while two stars shows a candidate that incurs two violations of the same constraint.

1.9 Methodology

This section focuses on the methodology that was used in the current study. The section is divided into six subsections and discusses the research design, the study location, sampling techniques and sample size, research instruments, data collection before ending with data analysis procedures.

1.9.1 Research Design

A descriptive research design was used with the main objective of describing the sound segments and syllable structures of Olutura and the phonological processes inherent in their formation. The study used Generative CV Phonology Theory as expounded by Clements & Keyser (1983) and Optimality Theory (OT) by Prince and Smolensky (1993), McCarthy and Prince (1995) and Kager, (1999) in its analysis of data. Generative CV Phonology Theory was useful in identifying the sound segments and the syllable structures while OT was used to describe the phonological processes observed in the linguistic contacts and consequently the constraints on the well- formed syllable in the dialect under study.

The descriptive design was suitable for this study because it enabled the researcher to collect information about people's attitudes, opinions, habits or any of the variety of social issues from which the researcher was be able to get a variety of words that brought forth the required data. This is in line with Orodho (2009). This design enabled the researcher to group the data into categories, not only according to the word classes and syllable types, but also to describe and explain the linguistic phenomena that was observed.

1.9.2 The Study Location

The research location is in Mungore location, Bumula, Bungoma County in Western Kenya. This is the area where the Abatura who speak the subject dialect predominantly live. Mungore area borders the Bukusu to the north, the Bakhayo and Marachi to the west and the Wanga to the south. Many speakers of Olutura also speak other Luyia dialects by virtue of its location (Appendix I).

1.9.3 Sampling Technique

Purposive sampling technique was used to pick the respondents from Mungore in Bumula where Olutura is spoken. The sampling technique ensured that only Olutura native speakers were selected for this study. In other words, this was done by ensuring that the respondents speak/spoke Olutura from childhood to date and that both their parents spoke/speak the same dialect.

The purposive sampling technique was also used to get the required number of words which were categorized into nouns, verbs, adjectives and demonstratives and was also useful in picking out the sound segments and syllable structure types. This sampling technique ensured that the data were classified into words with a gloss consisting of nouns, verbs, adjectives and demonstratives for purposes of having a systematic analysis.

1.9.4 Study Population

The data required in this study was collected from a total of five respondents aged between 40 and 60 years with adequate mastery of Olutura. The number of respondents was informed by the argument that linguistic studies do not require many informants and large samples (Biber, 1993; Dickinson, 2013). The respondents were speakers of Olutura who have lived in Mungore for a long time and who exhibited sufficient competence in the subject dialect and who were also able to identify words that are not from Olutura. This was helpful as it assisted the researcher to deal with the issue of code switching that would, otherwise, interfere with the originality of the dialect under investigation. This is in line with Chomsky (1986) who asserts that linguistic data should be generated from native speakers of the language.

1.9.5 Sample Size

The study used a total of 120 basic words in the data analysis. According to Milroy (1987), large samples are not necessary in linguistic studies and fewer words would still have been sufficient. Biber (1993) concurs with Milroy by asserting that in linguistics, a sample of 200 words, for instance, is likely to have the same number of nouns and large samples are not necessary. Other studies in linguistics and in particular phonological studies have also been able to adequately address the objectives of their studies by using small samples; for example, Mwangi (2001) uses 72 words, Kuria (2006) uses 64 words while Orago (2015) uses 55 words. The 120 words were, in this case, a representative sample of the sound segments and syllables found in Olutura and thus helped the researcher to answer the research questions.

1.9.6 Research Instruments

To get the required data, the study utilized one interview schedule which had two parts as data collection instruments Appendix III). The first part of the interview schedule by the research assistants covered the following areas: age, gender, stay longevity in the respective area, number of Luyia dialects they speak, and any other language they speak apart from Luyia. This part of the interview schedule was aimed at selecting respondents from the sample frame of Olutura speakers (Appendix III). The second part of the interview schedule consisted of items which tackled the respondent’s schooling, the occupation and how one spent his/her leisure time. This interview schedule was meant to get the required data to address the study objectives.

1.9.7 Data Collection Procedure

Approval was obtained from the University of Nairobi to proceed for data collection, a research permit was obtained from the National Commission of Science, Technology and Innovation (NACOSTI)(Appendix VI) to collect data. The interviews were conducted in the month of August

2017 by the researcher. Data was obtained from the respondents through oral interviews and was recorded using a sound recording machine. The interview method gave the researcher the advantage of observing day to day interaction between respondents. This enabled the researcher to stimulate the respondents' insight and, consequently got more information which ensured a representative sample for analysis (Best and Kahn, 1989; Crowley, 2007). To ensure that data belonged to the dialect under investigation, the researcher used the research assistants and the reseacher's linguistic knowledge and native speaker intuition to verify the same (Chomsky, 1986; Kenstowicz, 1994; Mwangi, 2001; Berg, 2009). This view is also supported by Crowley (2007) who observes that linguistic data collected from native speakers is sufficient if it is verified by other native speakers. The research assistants and the researcher`s native speaker intuition was useful in verifying any disparities that came up in the data.

1.9.8 Data Analysis

The data that had been recorded from the interview guide was analyzed using Generative CV Phonology Theory and OT. The data was transcribed and lists prepared. Purposive sampling was then used to group the data into the required word categories of nouns, verbs, adjectives and demonistratives as single lexical items. Using purposive sampling, a total of 120 words were picked and put into four categories as per the four categories of required words. Each of the lists was given a column for the gloss as per Milroy (1987). The sound segments were picked and an orthography given based on the IPA chart before describing them and discussing their functions. After this, syllable boundaries were drawn for each of the words before identifying the syllable structure types. The researcher was guided by Generative CV phonology to examine the composition of the syllable types in terms of the onset and nucleus.

The next step in the analysis of data was to use the OT notion of constraint interaction to find out what happens in the linguistic contacts of Olutura phonology. The observation of what happens in the linguistic contacts at the morpho-phonemic level is what revealed the phonological processes involved in the formation of Olutura syllables. Using OT, the words were analyzed at boundary level to establish how the configuration of the Olutura syllables are affected. This was followed by an analysis of the nouns to show the processes involved in the choice of the noun class prefix which is manifested as a zero onset syllable in Olutura. Lastly, the phonological process of SA that occurs in Olutura verbs was examined and the sound segments that alternate identified and discussed.

CHAPTER 2

THE SOUND SEGMENTS AND SYLLABLE STRUCTURES OF OLUTURA

2.1 Introduction

This chapter has two sections in which the sound segments and syllable structures that occur in Olutura are identified and discussed. The first section identifies and examines the vowel and consonant sound segments of Olutura in order to establish how each one of them functions in the overall phonology of Olutura. Examples of Olutura words in which these sounds occur are presented and tables used to show the sounds that occur from both primary and secondary articulation. The second section identifies the syllable structures of Olutura and examines their constitution on the premise of CV Phonology and OT. Syllable structure trees are used in order to show the particular sound segments that form each of the syllable types. The syllable structure trees are also used to show the sounds that are capable of forming the onset and nucleus elements of the syllables of Olutura.

2.2 The Sound Segments of Olutura

The phonemic inventory of Olutura is discussed in this section. This is to answer one of the research questions that Olutura as a dialect is understudied and lacks a phonemic inventory. An identification of the sound segments of Olutura is what enables an objective discussion of the phonological processes in the subsequent chapters and also making conclusions about it as part of the Luyia continuum of dialects.

2.2.1 The Vowel Segments of Olutura

This study adopts the definition of vowels pertaining to Ladefoged, (2000) who defines a vowel as a sound that is produced without an obstruction in the oral cavity. Phonologically, a vowel is the nucleus of the syllable or that part of the syllable that cannot be left out (Vikner, 1986). Vowels are described using three parameters. One parameter is height of the tongue, in which case it can be high or low. The second one is the position of the tongue and this shows the point at which a particular vowel sound is articulated. The sound can be articulated at the front, middle or back of the tongue. The third parameter in the description of vowel sounds is the shape of the lips. This means that a vowel can be produced when either the lips are rounded, unrounded or neutral. Vowels are produced with open approximation and are, therefore, sonorous (Hyman, 1975; Ladefoged, 2000). All languages distinguish between close and open vowels and also between front and back vowels. According to Odden (2005), some languages distinguish full vowels, e.g. [ē] and [i,e].

Olutura, like many Bantu languages has a 5V system consisting of the vowels shown in Table 4.

Table 4: Olutura vowel system

	Front	Central	Back
Close	/i/		/u/
Mid	/e/		/o/
Open		/a/	

Olutura has only five short vowels which have their long counterparts as shown in Table 5 and in the examples in 18.

Table 5: Olutura vowels

	Front	Central	Back
Close	/i/ /i:/		/u/ /u:/
Mid	/ e/ /e:/		/o/ /o:/
Open		/ a/ /a:/	

18. Olutura short and long vowels

		UR	SR	Gloss
		UR	**SR**	**Gloss**
(i)	/i/	/ima/	[i**m**a]	stand
	/i:/	/iima/	[iima]	hunt
(ii)	/e/	/enda/	[e^{n}da]	belly
	/e:/	/eenda/	[e:^{n}da]	I am worried
(iii)	/a/	/ana/	[ana]	give
	/a:/	/aana/	[a:na]	he is lighting (e.g. a fire)
(iv)	/o/	/βola/	[βola]	rot
	/o:/	/βoola/	[βo:la]	say
(v)	/u/	/una/	[una]	prick

/u:/	uuna	[u:na]	leave/go early

The results show that Olutura falls into the category of Bantu languages with a 5V system. The vowel grouping of Bantu languages falls into two; those with five vowels, (a, ɛ, i, ɔ, u) and those which have seven vowels, (a, ɛ, ɔ, e, o, i, u) in their phonemic inventories (Guthrie, 1967). In particular, quite a number of Luyia dialects have been reported to have a 5V system. For instance, Olunyala (B) and Lubukusu (Onyango, 2006, Mutonyi, 2000; Nandelenga, 2013).

The data analysis also showed that Olutura uses vowel length to distinguish meaning in words. This means that words in Olutura, when a word with a short vowel gets an extra mora through the addition of another similar vowel in a word, it acquires a new meaning. Four out of the five short Olutura vowels had words which distinguish meaning using vowel length. Examples are shown in 19.

19. Olutura meaning distinguishing vowels

	Vowel	**UR**	**Gloss**
(i)	/a/	/sala/	vomit
(ii)	/a:/	/a:na/	he is giving
(iii)	/i/	/lira/	cry
(iv)	/i:/	/li:ra/	eat for/name
(v)	/o/	/βola/	rot away
(vi)	/o:/	/βo:la/	say
(vii)	/u/	/xula/	grow up
(viii)	/u:/	/xu:la/	uproot

(ix)	/u/	/βula/	subdue
(x)	/u:/	/βu:la/	reveal

Languages that have five vowels tend to have a three vowel height system (Katamba, 1989; Mutonyi, 2000). Olutura also has five vowels (5V) and a three vowel height system like most proto Bantu languages (Hyman, 2003; Thornnell & Madsen, 2012).

Olutura has two high vowels / i, u/, two mid vowels /e, o/ and one low vowel /a/. Front vowels like /i/ are those which are produced with the front or blade of the tongue raised towards the hard palate. It is made with spread lips as in the word **/iɲiŋga/** (day). In Olutura, the vowel /i/ occurs in word initial position in common nouns, adjectives and demonstratives as shown in 20.

20. Olutura /i/ at word initial position

	UR	**SR**	**Gloss**
(i)	/irja/	[irja]	that one
(ii)	/iŋgololofu/	[iŋgololofu]	a straight one
(iii)	/iɲimbikiti/	[iɲimbikiti]	a short one
(iv)	/ixoŋgo/	[ixoŋgo]	a big one
(v)	/iɲumu/	[iɲumu]	a dry one
(vi)	/indambi/	[indambi]	a long one
(vii)	/iŋguvo/	[iŋguβo]	cloth

/i/ is a prefix in common nouns, particularly names of animals. This is exemplified in the words in 21.

21. Olutura /i/ in nouns

	UR	SR	Gloss
(i)	/imbwa/	[imbwa]	a dog
(ii)	/iŋombe/	[iŋombe]	a cow
(iii)	/iŋgwe/	[iŋgwe]	a leopard
(iv)	/ipunda/	[ipunda]	a donkey
(v)	/inzu/	[inzu]	a house

/i/ also forms the prefix that is used in borrowed words that have been adapted to conform to the phonotactics of Olutura. One of the reasons for borrowing words from other languages is the need that arises when the borrowing language lacks an equivalent word (Antila, 1972; Lyle, 1998). The words in 22 have been borrowed from English and Kiswahili and adapted in Olutura.

22 Olutura /i/ in borrowed words

	UR	SR	Gloss
(i)	/iʧtoi/	[itoʧi]	a torch
(ii)	/iraβa/	[iraβa]	a rubber
(iii)	/itaa/	[ita:]	a lamp

(iv)	/iteepu/	[ite:pu]	a tape

/i/ is used to contrast meaning, for example in the words [iria] and [jiria]. The first word with a null onset means *that one* but when the semi vowel /j/ is added to make the syllable CV, the meaning changes to *it is eating* (a –human entity is eating). The vowel /i/ does not occur word medially and word finally in Olutura in the zero onset syllable structure. It only occurs in these word positions if it follows a consonant. The optimal position for /i/ is word initial position.

The long counterpart of /i/, that is /i:/ was attested in Olutura words like those in 23.

23. Olutura vowel /i:/ occurrence

	UR	**SR**	**Gloss**
(i)	/miima/	[mi:ma]	manners
(ii)	/fwiisia/	[fwi:sja]	lose someone (in death)
(iii)	/siina/	[esi:na]	court hearing
(iv)	/jiima/	[ji:ma]	hunt
(v)	/jiija/	[ji:ja]	walk aimlessly

It was noted that the short /i/ and long /i:/ are used to show a difference in meaning; for example in the words **/ji:ja/** and **/jiija/** which mean *walk aimlessly* and *something is getting cooked*, respectively.

/e/ is a front vowel which is produced with the tongue hump in medial position. It is made with neutral lips as in the words in 24.

24. Vowel /e/ in word initial position

	UR	SR	Gloss
(i)	/ŋgula/	[*e*ŋgula]	I am buying
(ii)	/eema/	[*e*ema]	I am panting
(iii)	/numa/	[*e*numa]	I am biting
(iv)	/mbaara/	[*e*mba:ra]	I am thinking
(v)	/mbe:ja/	[*e*mbe:ja]	I am lying
(vi)	/mbulira/	[*e*mbulira]	I am listening

It was observed that the 'e' prefix seems to be disappearing from Olutura verbs indicating the 1st person singular. This is due to the fact that it is a redundant feature since its absence does not alter the meaning of the verb in question.

/a/ - This is a central low vowel that is made with neutral lips as in the word **/alja/** (he is eating). This is the vowel that is used as a pre-prefix in the third person singular pronoun and forms the zero onset V syllable structure discussed in section 2.2; for example in the word **a**lia. In Olutura, it is also the vowel to which some prepositional morphemes are added to indicate place. For instance in **/ano/** (here), and /**ao**/ (there). The examples in 25 show that in Olutura, /a-/ is prefixed to a basic verb to indicate, not just the first person grammatical category, but also the continuous tense.

25. Word initial vowel /a/ function

	UR	SR	Gloss
(i)	/alima/	[alima]	he is digging
(ii)	/aluma/	[aluma]	he is biting
(iii)	/akona/	[akona]	he is sleeping
(iv)	/ateexa/	[ate:xa]	he is cooking
(v)	/aɲwa /	[aɲwa]	he is drinking

The vowel /a/ is the prefix morpheme that forms the 3rd person singular category. Unlike the 'e' prefix in 24, in 25 'a' is not redundant because it is needed in Olutura phonotactics to bring out meaning. /o/ - this is a mid vowel that is made with rounded lips, for example, in the word /**omwitsa/** (a friend).

/o/ is produced by retracting the tongue to the back from its neutral position and it is therefore a back vowel. This vowel occurs at word initial position mostly in common nouns like those in 26.

26. Vowel /o/ at word initial position

	UR	SR	Gloss
(i)	/**o**mwana/	[omwana]	a child
(ii)	/**o**mwitsa/	[omwitsa]	a friend
(iii)	/**o**mwoni/	[omwoni]	a sinner

(i)	/**o**mwami/	[omwami]	a leader
(ii)	/**o**mukongo/	[omukoŋgo]	the back
(iii)	/**o**mulosi/	[omulosi]	a witch

It was observed that Olutura speakers always leave out the prefix 'o' in quick speech but they are aware that it is part of the phonological make-up of such words. Just like the prefix 'e', 'o' is a redundant feature in common nouns and that is why speakers of Olutura leave it out in most cases. While the distribution of the vowel /o/ is relatively free in Olutura words, its prevalence in particular word groups, word positions and even formation of the nucleus with only some consonants was noted. The data analyzed shows that /o/ only occurs before the nasal consonant /m/, the lateral /l/, the stop /k/ and the prenasalized sounds in nouns. The vowel /o/ forms the null onset syllable which forms the prefix in demonstratives and which also indicates the 2nd person in Olutura verbs as shown in 27 (i)-(ii) and (iii)- (iv), respectively.

27. Zero onset vowel /o/

	UR	**SR**	**Gloss**
(i)	/ojo/	/[ojo]	that one
(ii)	/olja/	[olja]	the one who is further
(iii)	/okona/	[okona]	you are sleeping
(iv)	/oluma/	[oluma]	you are biting

In this case, 'o' cannot be omitted because it carries meaning. In terms of vowel harmony, /o/ can occur before the CV syllable that has any of the rest of the vowels in the phonology of Olutura.

This means there are no restrictions on the vowel features that can occur with /o/ in the following CV syllable, the nucleus may be [round], [back], [low] or [high].

/u/- This is also a back vowel like /o/ since it is made with the tongue at the back. It is a high vowel that is produced with closely rounded lips as in the second onsetless syllable in the word /**owuulu**/ (a bad smell). The data analyzed did not show any words with /u/ in the word initial position. The distribution of /u/ in Olutura is not as free as is the case with the rest of the vowels in Olutura. It mostly occurs as the nucleus in syllables with onsets but not as an onsetless syllable as is common with the rest of the vowels in Olutura. This means that /u/ does not occur as a pre-prefix in the 1st and 2nd person singular marker; for example in /**eŋgona**/ (I am sleeping) and /**akoneere**/ (he has slept). The process that is involved is discussed in Chapter 4.

Olutura also has the long vowels /i:/, /e:/, /a:/, /o:/ and /u:/. In Generative CV phonology, the nucleus of a syllable is what distinguishes between the heavy and light syllable as is shown in Section 2.2.

/i:/ - This is produced in the same way as /i/. However, it only differs with /i/ in that the tongue is much higher during production than /i/ and occurs in words such as in the second syllable of the word /**emi:ma**/ (manners).

e:/ is similar to /e/ in all parameters but the only difference is that it is made with the lips more spread than /e/. It is found in such words as /**le:ra**/ (bring) and /**te:ma**/ (try).

/a:/ is a central vowel just like its shorter counterpart /a/. In Olutura, it occurs in words like *kaangulula* which means untie.

/o:/- This is the long counterpart of the short Olutura vowel /o/ and is found in words like *botookhana* (go round).

/u:/ is similar to /u/ in all other parameters apart from the height of the tongue which is higher than /u/ during production. An example of this vowel is in the word *wuula* (husk grains).

The five vowels give Olutura a three vowel height system (Katamba, 1989). This is similar to other Luyia dialects like, Bukusu, Logooli, Olunyala (B), Olunyala (K) and Wanga (Mutonyi, 2000, Ingonga, 1991, Onyango, 1997, Sumba, 1992). The distribution of the vowels of Olutura according to the three word positions is shown in Table 6. The distribution of vowels in different languages depends on the category of lexical items. According to Schane (1971, 1973), the relative distribution of consonants and vowels in a syllable or word is governed by the phonotactic rules of the language. In Olutura the distribution of the low vowel /a/ and the mid vowels /e/ and /o/ is fairly predictable while for the high vowels /i/ and /u/ is not. The distribution of /o/ and /a/ is free since they can occur in all word positions unlike /e/ which is restricted to word initial and medial positions. The distribution of Olutura vowels as single onsetless syllables in different word positions is shown in Table 6.

Table 6: Olutura vowel distribution

	initial	mid	final
i	√		
u		√	
e	√	√	
o	√	√	√
a	√	√	√

Table 6 shows that in Olutura, the vowels /i/, /u/ and /e/ do not occur as onsetless syllables in final word position. The distribution of the long vowels (not indicated in Table 6) in Olutura is only limited to word medial and initial positions in Olutura.

In Generative CV Phonology all vowels are classified as syllabic by virtue of their privileged position to occupy the syllable peak. They are the most sonorous phonemes to which languages must build their syllables because the peak is the compulsory part of any syllable (Selkirk, 1982; Kenstowicz, 1994). As mentioned in section 1.7.5, sonority, which is important in syllabification depends on vowel sounds and the sonority of all consonants is measured in relation to vowel sounds (Raphael, Borden &Harris, 2007). However, in the current study, sonority is not only limited to consonant sounds; this means that vowels, too, can be put on a sonority scale. In Olutura, the fact that it is not easy to predict the distribution of the [+high] vowels seems to suggest that the sonority of vowels in Olutura can be put on some vowel sonority scale to evaluate which vowels are ‘more sonorous.’ Table 6 can be used to equate the frequency of the vowels to their sonority such that in Olutura, the [+high] vowels are less sonorous than the mid and low ones.

2.2.2 The Consonant Segments of Olutura

Consonant sounds are made with some kind of constriction in the vocal tract and are quieter than vowels (Hayes, 2009). The consonants that have primary articulation in Olutura are shown in Table 7. They incude the dark /l/ discussed in this study as a distinct phoneme. These consonants are said to have primary articulation because they are produced with the greatest obstruction in place and manner of articulation.

Table 7: Olutura consonants with primary articulation

	Bilabial	Labio-dental	Alveolar	Palatal	Velar
Voiceless stop	p		t		k
Voiceless fricatives		f	s		x
Voiced fricatives	β				
Voiceless affricate			ts	ʧ	
Nasal	m		n	ɲ	ŋ
trill			r		
Lateral			l	ɭ	
Approximant	w			j	
Prenasalized stops	mb		nd	ɲɟ	ŋg
Prenasalized fricatives			nz		

Apart from the sounds shown in Table 7, Olutura also has consonant sounds that occur as a result of secondary articulation as shown in Table 8. The phonotactics of Olutura allow quite a number of consonants to take on secondary articulation. These sounds surface from the phonological processes of labialization and palatalization. According to Maledo (2011), secondary articulation is the superimposition of lesser stricture upon a primary articulation. It happens when two or three simpler consonants are combined to make one articulation.

Table 8: Olutura Consonants with secondary articulation

	Bilabial	Labio-dental	Alveolar	Palatal	Velar
Plosive	pw		tw		kw
Affricate			tsw		
Fricative	βw	fw	sw		xw
Nasal	mw		nw	ɲw	ŋgw
Trill			rw		
lateral			lw	lj	
Approximant				jw sj	
Prenasals	mbw		ndw		ŋgw

In phonology, the three parameters of place of articulation, manner of articulation and phonation are used to describe consonant sounds. These parameters are used here to describe Olutura consonant sounds in subsections 2.2.2.1 to 2.2.2.6.

2.2.2.1 Olutura Stops

Olutura has three stops, namely /p/, /t/, and /k/ all of which are voiceless. The three have their labialized counterparts /pw/, /tw/ and /kw/. Stops are sounds that are produced when there is, first a complete closure of the articulators and then a sudden burst of the air that was built up behind the closure (Roach, 2009). In Generative CV Phonology, stops are referred to as nonsyllabic because they do not form the nucleus of the syllable.

Olutura has only non-emphatic stops as discussed in the next paragraph. The IPA chart by Al-Ani (1970) categorizes consonants into two; those that are emphatic and those that are not. Emphatic stops are symbolized as [ˤ] superscripted on the emphasized sound. The emphatic consonants are those that are pharingealized and are produced in secondary articulation when the tongue retracts to the back wall of the pharynx. A segment that is not pharyngeal can be pharyngealized and therefore become empathic (Abercrombie, 1967).

One of the plosives found in Olutura is /p/. In place and manner of articulation, this is a bilabial plosive while in terms of phonation it is voiceless. In Olutura, the voiceless bilabial plosive /p/ is found in words such as **/paara/** (think). This is one of the consonant sounds that are used very predominantly in Olutura. This confirms the observation by Hyman (1975) that not all sound segments in the phonemic inventory of a language are used equally, some are used more than others. The speech sounds that are more common than others in a language are unmarked while those that are rare are marked. The voiced bilabial plosive /b/ was not attested in the data and does not occur in the phonemic inventory of this dialect. The speakers of Olutura have a problem in pronouncing it whenever they encounter it from other languages and always interchange it with the bilabial fricative /β/ or the labio-dental fricative /v/ in written medium and with the voiceless /p/ in speech.

The other plosive that occurs in Olutura is /t/ which is a voiceless alveolar plosive that is very common in Olutura speech sounds. It occurs in words such as **/tiira/** (catch). The voiced alveolar plosive counterpart /d/ was not attested in the data collected. The sound /d/ only occurs together with the alveolar nasal /n/. This is discussed further in chapter 4. Another plosive in the inventory of Olutura is /k/. This was attested in words like **/kaluxa/** (come back). It is a voiceless velar stop with a lot of frequency in Olutura speech sounds, particularly verbs. Just like with the sounds /p/ and /t/ which do not have the voiced counterparts, /k/ does not also have the voiced /g/ which only occurs together with /n/ in the onset of words such as **/iŋɡuβo/** (dress). The velar plosive /k/ does not therefore form a sequence with the nasal /n/ in Olutura onsets.

2.2.2.2 Olutura Liquids

Olutura has three liquid sounds; two lateral, /l/ and /ɭ/ and the trill /r/. According to Roach (2002), liquids are a type of approximants which differ from glides in that they can be maintained as steady sounds. These are sounds that are produced when the tongue approaches a point of articulation in the mouth but does not come close enough to cause turbulence by constricting the air flow. The tongue sends the air in the mouth into different directions before it goes out through the mouth. In Olutura, the sound /l/ is a lateral liquid which is produced when the air escapes along the sides of the tongue and is articulated with the tip of the tongue behind the alveolar ridge. It occurs in Olutura words like **/luma/** (bite) and **/moola/** (crawl). The sound /ɭ/ is a retroflex palatal lateral approximant which is articulated with the tip of the tongue retracted from the alveolar ridge and touching the hard palate. This sound is found in words like /**mu*l*embe/** (peace) and *leera* (bring). The lateral /l/ has its counterpart sound /li/ [lj] which is as a result of secondary articulation. It occurs in words like /**l**ia/ (eat) and /***l*jaŋge/** (mine) phonetically transcribed as [lja] and [ljaŋge], respectively. The production of /l/ differs from that of /l/ because in /l/, the air on the side of the tongue escapes only once as opposed to /l/ in which the escaping air takes a while. The data analyzed shows that in Olutura, /l/ only occurs in the CVV syllable structure and it is marked due to its sparse occurrence in this dialect. The other liquid that occurs in Olutura is the non-lateral liquid alveolar trill /r/. It is produced in the same way as the lateral liquid but the only difference is that the flow of air is over the tongue near the roof of the mouth before escaping through the lips. The sound occurs in such words as /rusja/ (remove) **/randula/** (tear) and /**ruma/** (send).

2.2.2.3 Olutura Fricatives

In Generative CV Phonology, fricatives are nonsyllabic consonants because they can only form the onset or coda in a syllable. In Olutura and Bantu languages in general, they can only form onsets because Bantu languages do not have a coda. The production of fricatives involves an incomplete closure of the articulators involved. Olutura has four fricatives, namely; one voiceless labio-dental fricative, /f/ , for example in the word /**funuula**/ (uncover), the postalveolar fricative /ʃ/ as in the word /**jateʃja/** (he is married), one velar fricative /x/ as in /**xina/** (dance) and a voiced bilabial fricative /β/with a very high occurrence in this dialect. It is found in words such as β*usiru* [βusiru] (foolishness) and *i*ŋg*uvo* [iŋguβo] (dress). In Olutura, v is the sound that is phonetically realized in words such as /**βangi/** (many); this means that such words should bear the orthographic symbol v and not ‘b’. Indeed, Olutura speakers tend to interchange b and v in their writing. The sound b, in most Luyia dialects, particularly those that do not have single voiced consonants, only forms a cluster with nasals. In the Lulogooli dialect of Luyia, the word /**βiabati/** has the onset of the first syllable as v while the second syllable has the sound /b/. An orthographic representation of both consonants as /β/ would, in my view, cause a mispronunciation of the word. This is because b and v are different in terms of manner of articulation. This attests to the discrepancy in the representation and use of the symbols ‘b’, ‘v’and ‘f’ as [β] (Kuria, 2006; Etakwa, 2010; Odden, 2015).

2.2.2.4 Olutura Affricates

An affricate sound is a combination of a plosive and a fricative. The production begins like a plosive with a complete closure but instead of the plosion, it gets into the slow release of a fricative (Vikner, 1986). Olutura has one voiceless alveolar affricate /ts/ as in the onset of the second syllable of the word ***itsa*** (come). In Olutura, the /ts/ is articulated with the tip or blade of the tongue slightly behind the alveolar ridge. It is, therefore, referred to as a retracted articulation. Olutura does not have the voiced alveolar affricate /dz/ that occurs in, for example a Luyia dialect like Logooli and the Bantu languages spoken at the coast of Kenya. The affricate /ts/ can occur in any word position as seen from 28.

28. Olutura /ts/ occurence

(i)	[tsja]	go
(ii)	[tsino]	these ones
(iii)	[βitsere]	rags
(iv)	[amatsi]	water
(v)	[tsiosi]	all of them

Olutura also has the voiceless palatal affricate /ʧ/. This is found in Olutura words such as **/omukaʧi/** (sugarcane). This sound segment is not very common in this dialect as it is in other

Luyia dielects like Olunyala (K) and Olunyala (B) (Ochwaya, 1992; Onyango, 2006; Etakwa, 2010). Speakers of Olutura usually confuse the palatal plosive /ʧ/, which is voiceless, and the voiced palatal plosive /ʤ/. The voiced palatal affricate /ʤ/ does not occur in the inventory of Olutura, hence the confusion and complementary use of the two by Olutura speakers, particularly in spoken English.

2.2.2.5 Olutura Nasals and Prenasalised Sounds

Olutura has four nasal sounds, namely the bilabial nasal /m/, the alveolar nasal /n/, the velar nasal /ŋ/ and the palatal nasal /ɲ/. Nasal sounds are produced when the velum is lowered so that most of the air passes through the nose. According to Ladefoged (2000), nasals are produced when the air is concurrently released through the nose and oral cavities. Olutura has five prenasalized sounds. Prenasalization occurs at the same place of articulation as the consonant that follows. These are; the voiced bilabial prenasalized stop /mb/as in **/mbuka/** (I wonder), the voiced alveolar prenasalized stop /nd/ as in **/mundu/** (a person), the alveolar prenasal /nz/ as in **/inzala/** (hunger), the velar prenasal /ŋɡ/ as in **/ŋgula/** (I buy) and the voiced palatal prenasal /ɲɟ/. The voiced palatal prenasal / ɲɟ / as in **/iɲɟuku/** (groundnuts) occurs in borrowed words in Olutura. The velar nasal /ŋ/ also has the complex onset ŋgw that occurs as a result of labialization as in the swear word /ŋɡwee/. It is interesting that Olutura prenasalizes the voiced plosives /b/ and /d/ which do not singly occur in the phonemic inventory of the language and rarely prenasalize the voiceless plosives which are quite predominant. There is a possibility of the prenasalization of voiceless plosives in Olutura as it is with some Bantu languages such as Bangolan, a Cameroonian language which prenasalises /t/ and /k/ (Njeck, 2003). Such an occurrence, would, however be marked in Olutura. As seen from the literature review, prenasalization of voiced sounds is also reported in Bantu languages like Kikuyu, Ngindo, Yao, Ndali and Kamba (Long, 2003; Odden, 2015).

2.2.2.6 Olutura approximants (Glides)

Olutura has two approximants /w/, /j/ which are also referd to as glides. Glides, shown in Table 8 as approximants, are sounds that are produced when the tongue approaches a point of articulation in the oral cavity but not close enough to cause an obstruction. The air glides over the tongue and gets out through the mouth. The sound /w/ is a bilabial approximant whose production involves the body of the tongue being rolled towards the velum. In Olutura, the sound /w/ behaves like a pure consonant because it does not form the nucleus of a syllable. The sound /j/ is a palatal glide which is produced by raising the main body of the tongue towards the hard palate. This, just like /w/, also behaves like a pure consonant in Olutura just like /w/ and can only forn the onset in Olutura syllables.

2.3 The Syllable Structures of Olutura

Olutura has an open syllable structure because the language does not allow codas. This means that all the syllable types identified in this study and discussed in the subsequent sections are open. Olutura has seven syllable types; V, VV, CV, CVV, CCV, CGV and GGV. It is noted that the last two are, however discussed under the CCV syllable structure because the data collected did not have enough words to include sections for each of them.

2.3.1 The V Syllable Structure

Olutura has the V syllable structure as illustrated in Figure 6. In this dialect, the V syllable structure can occur in all the three word positions, that is, initial, medial and final. This syllable structure is referred to as the zero onset syllable (Ø) because it only has the nucleus. It is composed of only one vowel segment and is analyzed in Generative CV Phonology without a branching tree. Apart from (N), which is also called the PEAK, all the other categories may be empty (Lass, 1984). This analysis can be seen in the first syllable of the word /**i ŋgo**/ in Figure 6. Figure 6 is also used to show that in CV phonology, the V syllable structure does not branch fro the CV tier level. The Olutura word /ingo/ in Figure 6 is used to explain this point.

Syllable tier		σ		σ			**Gloss**
CV tier		V	C		V		
Segmental tier	[	i	ŋ	g	o	]	home

Figure 6: Zero onset syllable tree

It should be noted here that certain vowel sequences; in this case the diphthongs and long vowels, should not be confused with the V syllable structure, particularly when the structure occurs word medially in between CV syllables in Olutura words. Linguistic literature has a lot of information about diphthongs. According to Durand (1990), both the diphthong and the long vowels have VV sequences but the difference is that the former changes the quality of the vowel elements while the later remains the same for the whole duration. In this study we also take note of the occurrence of the VV sequences although from a different prespective. In this study, the VV sequences that we are discussing fall into different but subsequent syllables. Olutura has many V syllables in the word initial position in monosyllabic, disyllabic and polysyllabic words as shown in 29.

29. Word initial V syllable structure

	UR	**Gloss**
(i)	/a.u.ndi/	may be /another place
(ii)	/a.o/	there
(iii)	/a.si.ri.o/	he is still there
(iv)	/e.no/	this side

(v) /a.βe.i.nzu/ those of the same house

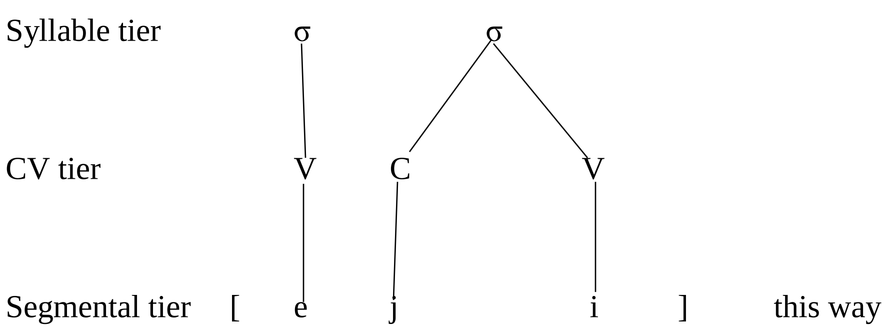
(vi) /o.mu.o.lo/ implement for harvesting/cutting

(vii) /a.e.nda/ he is worrying

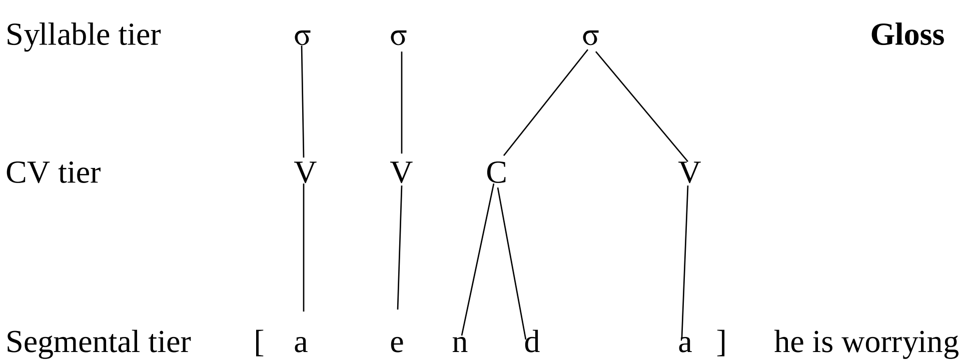
(viii) /o.u.si.li.xa. ŋga/ one who treats

The CV phonology syllable tier model is used in Figures 7 (a) and (b) to show how syllabification takes place in the V syllable structure in Olutura. This is meant to remove any confusion that might arise with diphthongs and the long vowels, particularly when the V syllable occurs in subsequent syllables, especially in word medial position.

(a) Single word initial V syllable **Gloss**



(b): Subsequent V syllables



Figures 7: Olutura V syllable structure in different word positions

Figure 7(b) shows a syllable tree with V syllables that follow each other but are heterosyllabic. The first two syllables in the word /**aenda/** in 7(b) are short because each is composed of only a vowel. The first zero onset syllable is at word initial position while the second one is at word medial position. This example shows that in Olutura, zero onset syllables can be adjacent to each other in a word.

In OT constraint ranking in Olutura, the markedness constraints demand that onsets must be dominated by faithfulness constraints in the case of the sparse occurrence of the V syllable structure in positions that are not word initial. The constraints that are relevant in the analysis of the marked V syllable structure in Olutura are as follows:

ONSET is a markedness constraint used to assess the presence or absence of an onset. This constraint is important in this analysis because of dealing with the V syllable type which is onsetless. ONSET should be ranked low here because it is the constraint that must constantly be violated in the formation of the V syllable structure which occurs in the phonology of Olutura.

*CODA is a markedness constraint that is needed in this analysis because Olutura, like other Luyia dialects does not allow codas. In this case, *CODA should be ranked high and as such, not dominated. The constraint DEP-1O(C) which is a faithfulness constraint is used in this constraint hierarchy to show why consonants are not inserted as a repair mechanism in the word initial position to attain the optimal CV syllable. MAX-1O is a faithfulness constraint that forbids deletion. This constraint is necessary in the current analysis because the phonotactics of Olutura demand that the output should have a vowel prefix and, therefore, this specific vowel is priviledged and should not be deleded at all. It should be ranked high because deletion is not an option in this case. The constraint DEP-IO which forbids insertion should be ranked lower that MAX-IO because in Olutura insertion would be a better option that deletion although in the current analysis, Olutura does dot need it. The constraint IDENT-IO is ranked low but it still does not help in the selection of the winning candidate which maintaints its identity to the input. This means that another constraint in needed to help ingetting that right candidate, hence the use of the constraint ONSET. The conatraint ONSET should be dominated by all the constraints in this set because I is destined for violation by the winning candidate. The Olutura word **/eno/** (this way) is used in Tableau 6 to show constraint interaction in the formation of the V syllable structure in Olutura. Tableau 6 shows that the markedness constraint *CODA dominates the faithfulness constraints MAX-IO, DEP-IO(C) and IDENT-IO in the constraint hierarchy *CODA >>MAX-IO >> DEP-IO >> IDENT-IO >>ONSET

Tableau 6: Olutura V syllable formation

/e+no/	*CODA	MAX-IO	DEP-IO	IDENT-IO	ONSET
a. ☞ [e.no]					*
b. [en.o]	*!			*	*
c. [no]		*!		*	
d. [ne.no]			*!	*	

An analysis of the constraints in Tableau 6 shows that candidate (b) makes one serious violation of *CODA and does not stand a chance of winning. It also violates IDENT-IO because it differs from the input although this is not a serious violation because that is what Olutura actually wants. Its violation of *CODA is such that the input [e.no] has only one consonant which can only be syllabified as an onset in the second syllable because syllabifying it with the first zero onset syllable creates a coda as seen in (b) which is a serious violation in Olutura. This, therefore leaves the first syllable in (a) to be headed by a vowel and to remain onsetless, a syllable sequence that is in accordance with Generative CV phonology because the nucleus is the indispensable element in any syllable. Candidate (c) incurs a serious violation of the constraint MAX-IO because it elides the vowel that Olutura targets to maintain which also puts it at variance with the input by violating IDENT-IO. This violation results in a word that does not occur in Olutura. Candidate (d) incurs a serious violation of the constraint DEP-IO by inserting a consonant to the first onsetless syllable which makes it also violate IDENT-IO and loses out any chancer of winning. The fact that candidate (a) emerges as the optimal one shows that Olutura tolerates onsetless syllables and that is why this dialect does not make any effort to change the V syllable structure in the initial word position to the canonical Generative Phonology CV syllable structure. Candidate (a) violates the lowest ranked constraint in this set by failing to have a syllable with an onset. This shows that in Olutura, there are incitances when there is no need to vary the output from the input. The fact that all the candidates, apart from the winning candidate violate IDENT-IO shows that Olutura does not make any effort to change the formation of the V syllable structure in the word initial position. The winning of candidate (a) is already pre-determined by the components of the input which has a vowel prefix that is actually the zero that forms the V syllable structure of Outura.

The V syllable structure either occurs at word initial position or word medially. It can also occur at word final position although this is very rare and mostly happens in demonstratives. The V syllable structure is followed by, or it may follow a CV syllable structure. CV is the optimal syllable in Olutura and the V syllable structure is therefore supposed to be marked. However, the argument in this study is that the frequent occurrence of the V structure, particularly at word initial position shows that the markedness only applies to its occurrence in other word positions, particularly the word final position. Indeed the frequency of the V structure and its importance was attested in our discussion on vowels in Section 2.1.

The data analyzed showes that the V syllable structure is used in the formation of the prefix on Olutura basic verbs; for example in the words /**i.tsa**/ (come),/**i.mba**/ (sing), and /**i.ŋgi.ra**/ (go/come in). The V syllable structure is also the 'stem' to which adverbs and verbs are added to indicate position and the 3rd person respectively; for instance, /**a.no**/ (here), /**e.no**/ (this way), and /**a.lja** (there)/. The V syllable structure in Olutura is illustrated in Table 9.

Table 9: Olutura V syllable structure occurence

Input	Output	Gloss
(a) /i + no/	[i.no]	this one
(b) /e + jo/	[e.jo]	that one
(c) /i + wa/	[i.wa]	it`s getting finished
(d) /i + mbi/	[i.mbi]	a bad one
(e) /u + no/	[u.no]	this person
(f) /o + rje/	[o.rje]	how are you?
(g) /i + ŋgo/	[i .ŋgo]	at home
(h) /e + siaŋgafu/	[e.si.a.ŋga.fu]	a mature one (object)
(i) /o + muofu/	[o.mu.o.fu]	a blind person
(j) /e + sian^{w}a/	[e.si.a.n^{w}a]	an offering

The words in Table 9 (a) to (g) show the occurrence of the V syllable structure at word initial position in disyllabic words. This structure also occurs word medially in polysyllabic words as seen in the same table from (h) to (j). In this dialect, the occurrence of the V syllable structure word medially is not as predictable as it is in the word initial position. This calls for us to come up with a language specific rule to capture the phonotactics of Olutura. A rule to this effecte is attempted in 30. Two instances of the occurrence of the V syllable structure at word medial position were noted. This happens; one, when a low central vowel follows a high front vowel, and, two, when a mid, round back vowel follows a high back round vowel. This shows that the V structure only occurs word medially when the vowel forming it is lower than the vowel in the preceding CV syllable structure. The horizontal position of the tongue does not matter. In Generative CV Phonology, a rule to this effect can be stated as shown in 30.

30. Word medial V structure

$$[(c)\ V_1\ \text{+high}] \rightarrow [V_2 = V\sigma]$$

The rule says that when V_1, which in the preceding CV syllable is [+high], it leads to the following V_2 emerging as a heterosyllabic V syllable. The occurrence of the V syllable structure in word medial position in Olutura is shown using CV Phonology in Figure 8.

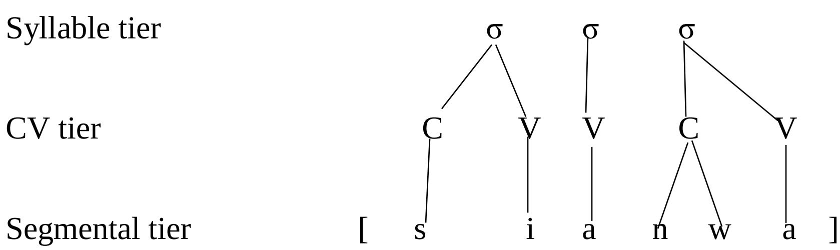


Figure 8: Olutura V syllable structure word medially

Figure 8 shows that the two V slots on the CV tier in word medial position belong to different syllable, hence a zero onset syllable falling in the middle of two CV syllables.

The circumstances that cause the V syllable structure to occur on the second syllable in Olutura are also explained using OT constraint ranking in Tableau 7. The constraint *HIATUS should be ranked low because it should be violated by the winning candidate as this is one of the few cases when Olutura allows hiatus to occur. ONSET should also be ranked low because the onsetless syllables should be left intact in the output. The constraints are ranked as *DIPH, *PEAK-C >> $COMP_{ONS(LAB}$ >>*HIATUS,ONSET.

Tableau 7: Olutura V syllable syllabification

/omu+ofu/	*DIPH	*PEAK-C	$COMP_{ONS(LAB)}$	*HIATUS	ONSET
a. ☞[o.mu.o.fu]				*	**
b. [om.ou.fu]	*!	*!			**
c.[o.mw.o.fu]		*!	*		*
d.[o.mwo.f]		*!	*		

Candidate (b) incurs three violations, two of which are serious as far as the syllable structure of Olutura is concerned. It violates the constraints *PEAK-C which disallows consonants to form the nucleus of a syllable and *DIPH which prohibits diphthongs in Olutura. Its two violations of ONSET is not serious because Olutura allows null onsets. Candidate (c) also violates the two constraints of *PEAK-C. $COMP_{ONS(LAB}$ and ONSET although its violation of the latter two is not serious because they are lowly ranked. Its violation of *PEAK-C is what is serious because the glide /w/ does not form the nucleus in Olutura. Candidate (d) incurs three violations, one serious and two which are not serious. The violation of PEAK-C is serious because Olutura, like other Luyia languages does not allow consonants to form peaks in its syllable structure. The violation of $COMP_{ONS(LAB}$ by candidate (d) is not serious because Olutura uses labialization as a strategy for HR although it is not required in this particular environment. Tableau 7 shows that candidate (a) is the optimal one in Olutura because it makes two violations of *HIATUS and ONSET, both of which are not a serious violation becauses the language accepts hiatus in this case and also null onsets in its phonology.

Tableau 7 was used to focus on the occurrence of the V syllable structure at word medial position in Olutura phonology. Tableau 8 is now used to explain the occurrence of the V structure at word initial position. In this case, the constraint *DIPH is not necessary because sequences of heterosyllables are not common at word initial position in Olutura. In Olutura, zero onsets are allowed at word initial position when the markedness constraint of ONSET is dominated by the faithfulness constraints MAX-IO and DEP-IO. The constraint ranking that is suitable for Olutura in this case is *CODA>> MAX-1O, DEP-1O >> ONSET. This is shown using the word **/e.jo/** (that one) in Tableau 8.

Tableau 8: Olutura constaint ranking- initial V syllable structure

/e +yo/	*CODA	MAX-IO	DEP-IO	ONSET
a. ☞ [e.jo]				*
b. [ej.o]	*!			*
c. [jo]		*!		
d. [je.jo]			*!	
e. [jej.o]	*!			*

In the analysis of Tableau 8, candidate (b) violates *CODA which constitutes a serious violation and also violates ONSET. Candidate (c) violates the faithfulness constraint MAX-IO by deleting the vowel prefix that constitutes the V syllable structure at word initial position. Indeed, this is what makes the violation a serious one in Olutura uses the phonological process of prothesis to have such a structure for semantic reasons. Candidate (d) incurs a serious violation of DEP-IO by inserting a consonant before the vowel that should form the V syllable structure. Candidate (e) makes two violations of *CODA and ONSET one of which is gross and so does not stand a chance of winning. The optimal candidate, (a) only incurs one violation of the markedness constraint ONSET. This is a necessary violation because it results in the V sequence that is acceptable in Olutura.

Another observation regarding the V syllable structure is about the occurrence of the vowels that occur in this structure. It was observed that the vowels that occur in the V structure depends on the grammatical function of the word in which this structure occurs; whether it is a noun, verb or demonstrative. In demonstratives, the occurrence further depends on the type. For demonstratives showing objects, only a high front vowel may occur in the prefix that manifests itself as the V syllable structure word initially and the vowel that occurs in the following CV of V syllable structure can only be [+high] or [-low]. This is shown in 30.

30. Vowels in the V structure of demonstrative categories

	UR	**Gloss**
(i)	/irja/	that one (further)
(ii)	/eji/	this one (not so far)
(iii)	/alja/	there (further)

(iv) /ano/ here

(v) /ao/ there (not so far)

(vi) /uno/ this one

(vii) oju/ this one (a little further)

In demonstratives showing place, only the low central vowel /a/ occurs in the V syllable structure and it can only be followed by the mid vowel /o/ in the V syllable structure (see (v)). In demonstratives, the onsetless V syllable structure with /a/ can also be followed by /a/ or /o/ as the nucleus in the CV syllable structure. The examples in 30 (iii), (iv) and (v) show this distribution. The examples in 30 (vi) and (vii) show that in demonstratives referring to people, only the mid back vowel /o/ occurs in the V structure and can be followed by the mid vowel /o/ or the high, back vowel /u/ as the nucleus forming elements in the CV syllable structure. The notion of positional faithfulness can be used to explain why certain vowels are favoured in the V syllable structure in Olutura. According to Steriade (1994), one of the factors that determine the occurrence of phonemes in given positions is the issue of lexical access and language processing. Steriade posits that word initial material plays a key role in speech production. In Olutura demonstratives, all the vowels may occur in the null onset V structure at word initial position.

In Olutura verbs, the distribution of vowels in the V syllable structure depends on person. When the high front vowel /i/ occurs in the V structure in word initial position, it is used neutrally; that is, it can be used for any of the three persons (1^{st}, 2^{nd} and 3^{rd} persons). However, the occurrence of /e/, /o/ or / a/ in a similar position shows the 1^{st}, 2^{nd} or 3^{rd} persons respectively. The occurrence of the vowels in the CV syllable that come after the V structure may consist of any of the five vowels in the inventory of Olutura. In nouns, the V syllable structure can occur in any of the three word positions.

2.3.2 The VV (V:) Syllable Structure

Olutura has the VV syllable structure which is distinguished in this study from the V syllable structure discussed in the previous section. The VV syllable structure was not initially envisaged in our proposal. However, it was observed during the analysis of data. The VV syllable is made up of two similar vowels, hence tauto-syllabic. This syllable is zero onset as exemplified in 31 and it was only attested at word initial position in Olutura.

31. VV syllable structure

(i)	/a:na/	[a:.na]	s/he is giving
(ii)	/a:nda/	[a:.nda]	s/he is getting stuck
(iii)	/a:mbia/	[a:.mbja]	s/he is lighting, e.g. fire
(iv)	/e:nda/	[e:nda]	I am worrying
(v)	/i:ŋge/	[i:.ŋge]	press out as at birth
(vi)	/i:ne/	[i:.ne]	go down to avoid
(vii)	/o:ŋga/	[o:.ŋga]	fail to leave home
(viii)	/u:ma/	[u:.ma]	make noise like a vehicle

A CV phonology analysis shows the structure in Figure 9 in which the syllable has a branching nucleus similar to the one in the CVV syllable structure but the only difference is that the structure in Figure 9 is onsetless.

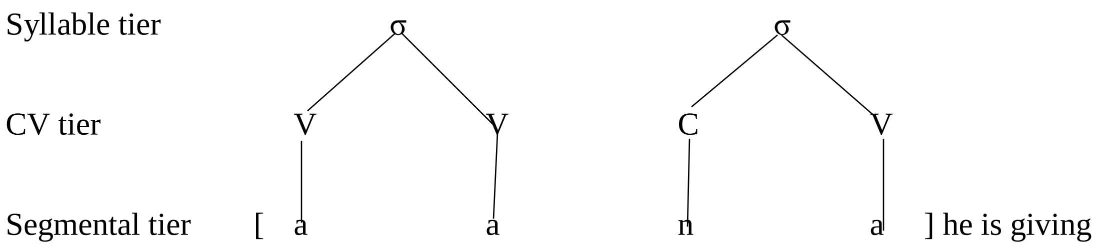


Figure 9: Olutura VV syllable tree

To argue for the VV syllable structure clearly, we compare it with the CVV syllable structure in which two syllables follow each other but are syllabified in different syllables in word medial position and the syllable structure in words which have two zero onset syllables, and, therefore, heterosyllabic VV.The Generative CV Phonology tier model is used by juxtaposing figures 10 (a), (b) and (c). The three diagrammes show the syllabification of Olutura words to demonstrate the difference between the V and VV syllable structures.

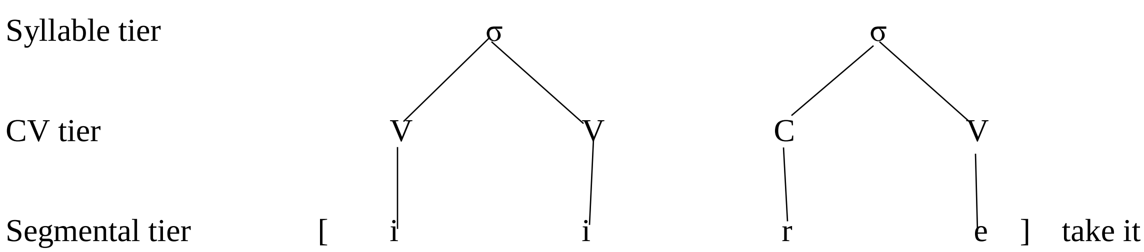


Figure 10 (a): Olutura word initial VV syllable (tautosyllabic)

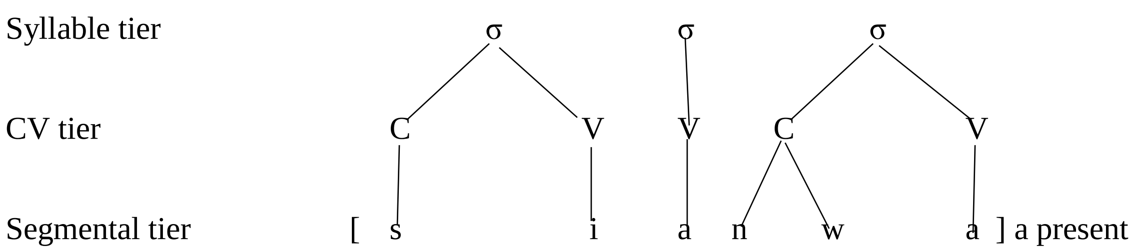


Figure 10(b): Olutura word medial V syllable (heterosyllabic)

Syllable tier		σ	σ			
CV tier		V	V			
Segmental tier	[	a	o	]		there

Figure 10 (c): Olutura word initial V syllable (heterosyllabic)

In Figure 10 (a), the VV occurs in the same syllable and the syllable concerned is a heavy one by virtue of having a long vowel. This syllable occurs in word initial position and it has a branching nucleus. Figure 10 (b) shows the V syllable which occurs in word medial position and is bound on either side by CV syllables. This means that the two vowels in the middle of the Olutura word *esianwa* are syllabified in different syllables as [e.si.a.n^{w}a]; hence heterosyllabic. This means that Olutura allows hiatus in certain contexts (Casali, 2011). In Figure 10 (c), the word that is analyzed has two syllables both of which do not have onsets and are syllabified as [a.o], that is; V.V. This is different from the syllabification in 10(a) which results in [ii.re] with two vowel elements in the same syllable, that is; VV.CV which makes the initial syllable tautosyllabic.

The examples in 34 and the foregoing discussion on the long vowel attests to the observation that Olutura has the heavy syllable composed of VV. This observation is similar to that made by Etakwa (2010) who reports the occurrence of the VV syllable in Olunyala (K), a Luyia dialect just like Olutura. Oduor (2002) in a discussion of syllable weight, also reports the occurrence of the VV syllable structure in Dholuo, a non Bantu language.

The process that results in the occurrence of the zero onset syllable structure can be explained using the OT notion of constraint interaction. OT deals with the underlying forms of the language to get the licit forms. If the underlying input form does not have a consonant in the onset, it follows that the output will emerge without an onset. Faithfulness constraints require that the output preserve the properties of their basic forms such that there should be some kind of similarity between the output and its input. Olutura data has been used to show that there are many words with onsetless sllables in the dialect.

OT is used to show how constraints interact in order to arrive at the right VV (V:) syllable structure in the initial word position. The constraints that are relevant in the analysis of formation of the VV syllable structure in Olutura are ONSET which is meant to show the presence or absence of the onset. ONSET should be ranked low to enable the winning candidate to violate it. The constraint *CODA is also needed in this analysis to show that having a CODA in Olutura amounts to a serious violation and that codas cannot be used as a repair mechanism in any phonological process in Olutura. The constraint *V: is relevant in this analysis to deal with the emergence of the long vowel. This constraint should be ranked low because the targeted structure should have a long vowel although the winning candidate does not need to violate it because it is lready represented in the input. In order to get the optimal candidate that satisfies the phonotactics of Olutura, *CODA must necessarily dominate the markedness constraint ONSET against zero onset syllables and *V: against long vowels. This can be interpreted to mean that, not only are null onsets allowed in the phonology of Olutura, but also long vowels, hence the VV syllable structure. The constraints involved are ranked as follows: *CODA >> V: ,ONSET. Tableau 9 is used here to show the choices that are made to arrive at the VV syllable structure in Olutura.

Tableau 9: Olutura constraint interaction in the VV syllable structure

/a+a^{n}da/	*CODA	*V:	ONSET
a.[a.nda]		*	*
b. ☞[a:.nda]			*
c. [a:n.da]	*!		*
d. [and.a]	*!	*	

The analysis of the constraints involved in Tableau 9 shows that candidate (a) violates the constraint *V: and ONSET by having an output that does not only have a long vowel but that also has no onset. Candidate (c) incurs a serious violation of *CODA and, cannot therefore, be an optimal and also violates the lowly ranked ONSET. Candidate (d) violates *CODA by having a structure that is not allowed in Olutura by virtue of the first syllable ending in a coda so it cannot win. The same candidate also fails to win because of not having a ling syllable in the output. Candidate (a), which is the optimal candidate as it makes only one violation of the constraint ONSET which is dominated and, therefore, becomes the winner. As regards the vowel distribution in the VV syllable structure, all the 5 prime vowels of Olutura occur in this syllable structure.

2.3.3 The CV Syllable Structure

The CV syllable structure is composed of one consonant and one vowel sound and is, therefore referred to as the onset syllable (Katamba, 1993). As mentioned in Section 1.7.4, the CV structure is the optimal syllable structure in the Luyia continuum of dialects and other Bantu dialects. This, therefore, is presumably the case for Olutura. The occurrence of the CV syllable structure is very high in Olutura since the onset can be formed by any of the consonants that occur in the phonemic inventory of this language. This is shown using the data in 32

32: CV syllable structure

			Input	**output**	**Gloss**
(a)	Plosives	/k/	/kula/	[ku.la]	buy
			/kira/	[ki.ra]	cause to
		/p/	/paŋga/	[pa.ŋga]	arrange
		/t/	/toola/	[to:.la]	pick
(b)	Fricatives	/f/	/funa/	[fu.na]	break/harvest
			/fiiɲa/	[fi:.ɲa]	press
		/s/	/simja/	[si.mja]	put off a fire
			/soma/	[so.ma]	read
		/x/	/xesja/	[xesja]	greet
			/xula/	[xu.la]	grow
(c)	Nasals	/m/	/mira/	[mi.ra]	swallow
			/mala/	[ma.la]	finish
		/n/	/nuuna/	[nu:na]	suckle

			/nina/	[ni.na]	climb
		/ŋ/	/iŋeeni /	[iŋe:ni]	fish
			/iŋuunda/	[iŋu:nda]	rubbish
(d)	Liquids	/l/	/luma/	[lu.ma]	bite
			/loora/	[lo:ra]	dream
		/r/	/lee**ra/**	[le:ra]	bring
			/**r**uma/	[ru.ma]	send
(e)	Glides	/w/	/wuula/	[wu:.la]	husk grains
			/wiina/	[wi:.na]	who is it?
/f/	prenasals	/mb/	/mbira/	[mbi.ra]	I am taking/passing
			/fwi**mb**a**/**	[fwi.mba]	I am swelling/covering
		/mbw/	/mbwao/	[mbwa.o]	I am going home/leaving
		/nd/	/ndala/	[nda.la]	one
			/ndola	[ndo.la]	I am seeing
		/ndw/	/ndwaala/	[ndwa:la]	I am sick/getting sick
			/indwasi/	[i.ndwa.si	alergy
		/ŋgw/	/ŋg**w**a/	[ŋgwa/	I am falling/ failing

The CV syllable structure of Olutura is represented in Figure 11 using the CV phonology as expounded by Clements &Keyser (1983).

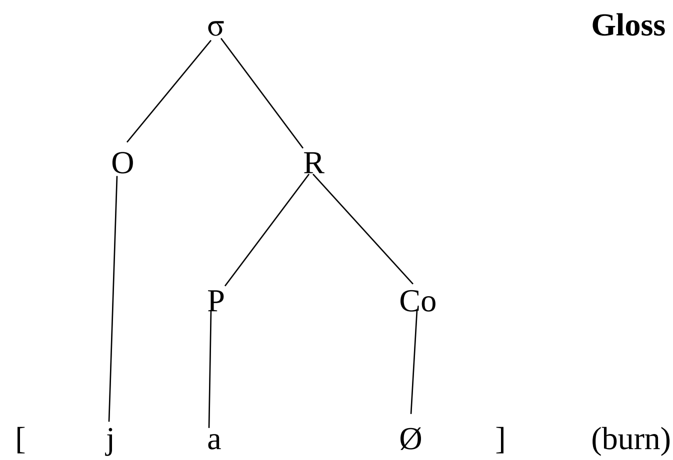


*Figure 11: Olutura *CODA CV syllable*

Figure 11 shows that just like the V syllable structure, the CV syllable structure in Olutura also has an empty coda while Figure 12 shows how the three tiers are represented in syllable formation in Olutura.

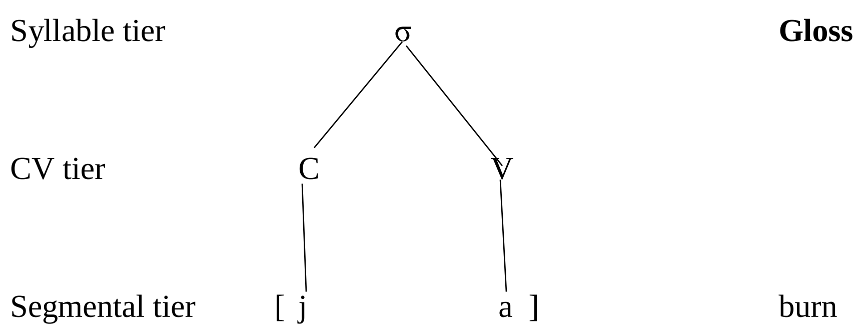


Figure 12: Olutura CV tier model

The notion of the CV tier model is important in this study because it shows the specific C and V elements that the CV syllable structure accepts in Olutura. Following McCarthy &Prince (1993 a), we use the tier model to specify the exact segments that occupy the skeletal slots. This ensures that the segments correspond according to the tiers and the conjugations for each template are captured.

Olutura has C elements that have clusters are captured using the CV tier models in the figures in 13. This means that in Olutura, the onset in the CV syllable structure is formed by either one grapheme or several graphemes.

The onset in the Olutura CV structure can have any of the phonemes in 33.

33. Olutura CV syllable structures

(i)	one grapheme-	/p/	/paara/	[pa:ra]	think
(ii)	prenasalized stop	/nd/	/mundu/	[mundu]	a person
(iii)	affricate onset	/ts/	/itsa/	[itsa]	come
(iv)	labialized onset	/fw/	/fwana/	[f^{w}ana]	looks like/resemble
			/fwala/	[f^{w}ala]	dress up
(v)	prenasalized and labialized	/mbw/	/imbwa/	[imb^{w}a]	dog

Figures 13(a) and (b) show a CV tier model with a complex onset using the Olutura words /**imbwa/** and /**tsja**/, respectively.

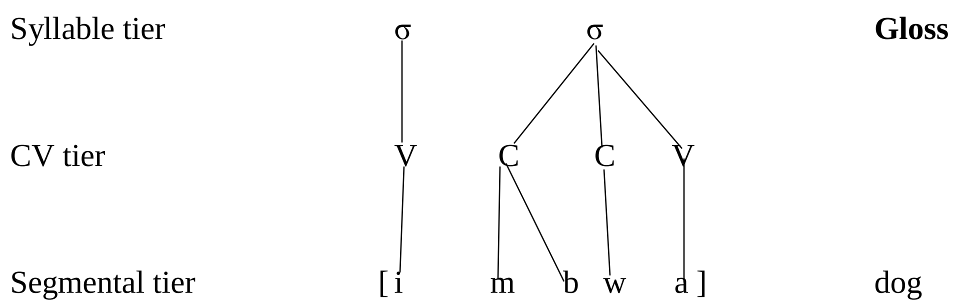


Figure 13 (a): Olutura internally complex onset with /mbw/

Syllable tier σ Gloss

tier C C V

Segmental tier [t s j a] go

Figure 13(b): Olutura internally complex onset with /tsj/

It was observed that although all the vowel sounds occur in the nucleus position in the CV syllable structure, this occurrence is very minimal when the onset is composed of the prenasalized and labialized sounds. Although the vowel /i/ can also form the nucleus in the prenasalized and labialized CV syllable structures, many words were not attested to this effect from the data that was collected and analyzed. The prenasalized CV syllable structure is exemplified in 34.

34. Olutura vowels in prenasalized CV syllable

(i)	/imbwa/	[i^{m}b^{w}a]	dog
(ii)	/mbweo/	[mb^{w}eo]	I can leave?
(iii)	/mbwao/	[mb^{w}ao]	I am going home/ I am leaving
(iv)	/mbwama/	[^{m}b^{w}ama]	I am lying low/ I am sticking

The examples in 34 show that in Olutura, the onset can be formed by three consonants that occur independently in the phonemic inventory of the language. We, however, discuss the fact that not all vowels occur in this syllable structure. This can be explained using the concept of vowel harmony. Vowel harmony is the restriction of vowel occurrence that requires vowels in neighbouring syllables to agree in certain features. For instance in Bantu languages, generally non-low vowels in neighbouring syllables are required to agree in the feature [high]. As per Clements (1985,1986), the features that distinguish vowels such as [high], [low], [back], [round] or [ATR] are used to describe vowel harmony.

2.3.4 The CVV (CV:) Syllable Structure

The Olutura data analyzed shows that the dialect has the CVV (CV:) syllable structure which is composed of one consonant and two similar vowel elements. The idea that the vowels concerned must be similar is vital in this particular structure because a dissimilarity would lead to either diphthongs or vowels being syllabified in different syllables as discussed in Section 2.3.2. The long vowel is transcribed in this study as CV:.

The representation of the CV: syllable structure in Olutura is shown using Generative Phonology in Figure 14 using the Olutura word *paara.*

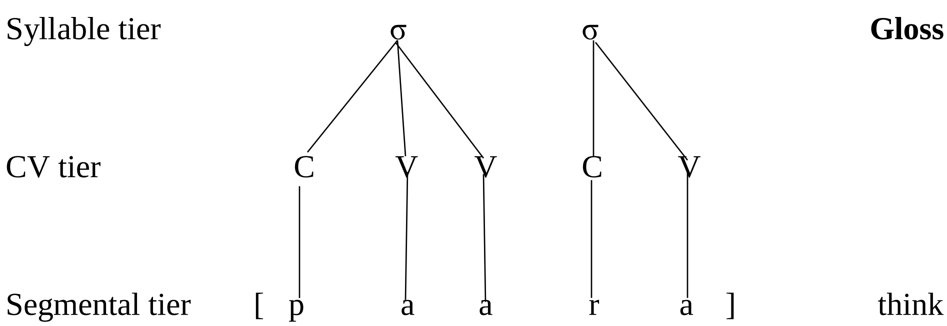


Figure 14: Olutura CV: syllable

The representation in Figure 14 shows that the first syllable of the word [pa:ra] has a branching nucleus by virtue of having two VV slots on the CV tier. In Generative CV Phonology, length, which is constituted by the timing units of the C or V elements in a syllable, is what determines syllable weight. This means that in Olutura, the CV: is a heavy syllable by virtue of having a nucleus with two timing slots. This is unlike the CV syllable which has only one V slot. In Olutura, the CV: syllable structure can occur in the word initial position in basic verbs and adjectives and in word medial position in common nouns as seen in 35.

35. Olutura CV: syllable in basic verbs

	UR	SR	Gloss
(i)	/βoola/	[βo:la]	say
(ii)	/jiima/	[ji:ma]	hunt
(iii)	/jaala/	[ja:la]	make/spread a bed/ put on trial
(iv)	/fuuβa/	[fu:βa]	throw
(v)	/xesja/	[xe:sja]	greet
(vi)	/xuula/	[xu:la]	uproot
(vii)	/siteere/	[site:re]	day time
(viii)	/emiima/	[e.mi:.ma]	manners
(ix)	/aambi/	[a:.mbi]	near
(x)	/wuula/	[wu:la]	husk grains

In most cases the CV: occurs at word initial position in verbs but automatically moves to the second syllable when the verb gets a prefix as in 36.

36. Occurrence of CV: in the second syllable

	UR	SR	Gloss
(i)	/aβoola/	[a.βo:.la]	he is saying

(ii)	/ajiima/	[a.ji:.ma]	he is hunting
(iii)	/oxuula/	[o.xu:.la]	you are uprooting

Some exceptions are noted with certain verbs retaining the CV syllable word initially like the verb [*ja:la*] in 35 (iii). Interestingly [*ja:.la*] only changes the consonant in the onset to indicate the aspect of person unlike the rest of the verbs which get a new V syllable before them. More interesting is the observation that the new sound segments that show the different persons are all different. The occurrence in which there is SA is shown in 37.

37: Different onset phonemes showing person

/- ala/

(i)	[na:la]	I am spreading (1st person)
(ii)	[wa:.la]	you are spreading (2nd person)
(iii)	[ja:.la]	he is spreading (3rd person)

In the CV: structure, a difference is noted in the word *yaala* which can either mean to spread a bed or to put someone on trial. The occurrence in 37 (i) applies to the Olutura word that means to spread a bed because to prosecute behaves like the rest of the basic verbs in 35. The motivation for this difference was not established in the current study as it was not within its scope.

The length of the vowel in the CV: syllable is used to distinguish meaning in Olutura. This is captured using the moraic principle whereby the long syllable is bimoraic whereas the short one has only one mora. An OT language particular ranking using Olutura is used to show how the CV: syllable emerges to contrast meaning. The constraint that can be used to bring out this contrast and ensure that meaning is maintained is CONTRAST. This constraint ensures that short vowels are not lengthened and long ones are not shortened. CV: is used to distinguish meaning as in 38.

38. Olutura meaning distinguishing CV:

	CV word	Gloss	CVV word	Gloss
(i)	[amaβere]	soghum	[amaβe:re]	milk
(ii)	[xula]	grow	[xu:la]	uproot
(iii)	[xaja]	refuse	[xa:ya]	cut grass for roofing
(iv)	[kula]	buy	[ku:la]	fix roofing poles
(v)	[lasja]	burn food	[la:sja]	spoil ones reputation
(vi)	[lera]	hold a child	[le:ra]	bring
(vii)	[mala]	finish	[ma:la]	smoothen the floor with cowdung
(viii)	[nula]	shine/sweeten	[nu:la]	snatch
(ix)	[ndola]	I am seeing	[^{n}do:la]	I am picking

The Olutura input /nu+la/ has been used in Tableau 10 to illustrate how vowel length distinguishes meaning in Olutura. The constraints involved in the analysis are *CODA, ONSET, *IDENT and *V: which is a faithfulness constraint that bans the occurrence of long vowels. Contrary to the general input that stipulates that both the input and output segments should be identical, we come up with a new constraint, *IDENT-IO which stipulates that there should be no idenditry between the input and output. The new constraint should be ranked high so as to motivate the violation of the rest of the constraints in this set of dominance hierarchy. This is because Olutura does not tolerate an output that is similar to the input in the current analysis.

The constraint *CODA is needed in this analysis because Olutura does not allow codas and so this constraint is ranked highly. ONSET is relevant in this analysis to evaluate the syllables without onsets which do occur in Olutura phonology. This constraint should be ranked below *CODA and *IDENT-IO. The need for contrast demands an extra mora hence the emergence of an extra vowel.

This is what calls for the use of the constraints *V: which should be ranked lower than the markedness constraints *CODA and ONSET. This constraint should also be dominated by *IDENT-IO which causes its violation. The adopted ranking is as follows;

*CODA >> *IDENT-IO >> ONSET >> *V:.

Tableau 10: Olutura meaning distinguishing vowel length

/nu+la/	*CODA	*IDENT-IO	ONSET	*V:
a. ☞ [nu:.la]				*
b.[nul.a]	*!		*	
c.[nu.la]		*!		*
d.[ul.a]	*!		* *	
e.[ula]			*	*

From Tableau 10, Candidate (b) incurs a serious violation of *CODA because Olutura like any other Bantu language forbids codas. It also violates ONSET by having an onsetless syllable, although this is not a serious violation in Olutura phonology. From the foregoing discussion on contrast in meaning brought about by the long and short vowels, candidate (c) incurs a serious violation because it neutralizes the meaning that the long vowel is meant to convey in Olutura. This happens when it violates the highly ranked *IDENT-IO which makes it similar to the input, an occurrence that Olutura does not allow in under the circumcitances. Candidate (c) also violates the lowly ranked *V: which also contributes to its lose. It should be noted here that while candidate (c) seems right in accordance with syllable formation of Olutura, it cannot be optimal in this case because it denotes a syllable structure that already exists in the phonology of Olutura for which the heavy syllable exists to give semantic significance. Candidate (d) is prohibited in Olutura phonotactics because it violates two contraints, *CODA and ONSET. While its violation of *CODA is serious because Olutura does not allow codas, the violation of ONSET, for which it undergoes two violation marks, is not serious because onsetless syllables are allowed in Olutura phonology. Candidate (e) makes two violations of ONSET and *V: which are not serious but it cannot win because elision is not an option in the current analysis.The winning candidate is (a) because it only makes one violation of the constraint *V: by inserting an extra vowel which makes it to have a long vowel, hence the VV syllable structure. This is a necessary violation because the phonotactics of Olutura demand the extra vowel to bring out contrast and have a different lexical item in its phonology.

2.3.5 The CCV Syllable Structure

It has already been stated in 2.3 that the CCV syllable structure in Olutura has three types, namely CCV, CGV and GGV. Olutura has a syllable structure that is composed of a consonant that is not an approximant, an approximant and a vowel. This sequence results in the occurrence of what is, in our view, a complex syllable discussed in this section. Other scholars discussing Luyia dialects also report the existence of this kind of syllable structure and refer to it as CGV or CSV (Wasike, 2004; Savala, 2005). As mentioned in section 1.7.4, some scholars discuss the syllable structure with an onset that has a consonant that is followed by a semi vowel (glide) as CV syllable structure. In this study, it should be noted that /w/ and /j/ occur as separate phonemes and can only form onsets in the phonology of Olutura, and, therefore, form a cluster of consonants with whatever other consonants they combine; hence the analysis of this structure as a CCV type. The consonants with which they form a cluster also occur as separate sound segments in the phonology of this language, hence a cluster of the CCV structure when they combine. In the discussion on the CV syllable structure in section 2.3.3, the CV is the optimal syllable in Olutura as was attested from the data that was analyzed. The occurrence of the CGV type of CCV syllable structure is marked because not all consonants in the phonology of Olutura can combine to form a cluster in this syllable type. Due to perceptual and articulatory reasons, there are constraints on the sound segments that can combine to form syllables (Blevins, 1995; Goldsmith, 2011). This is the reason why many languages, and in particular Bantu languages, use various phonological processes like those discussed in chapter 3 to achieve syllable structures that are simple because the dialect does not allow complex ones.

Of the two glides, /w/ combines with all the consonants and consonant clusters in Olutura. Its combination with the velar nasal /ŋ/ and the alveolar affricate /ts/ is, however, very rare and therefore marked. One word has been used to represent each consonant to show the composition of CG type of CV syllable onset in 39. These examples are meant to show how Olutura forms consonant sounds from secondary articulation and, therefore, expanding its phonetic inventory beyond the consonants that arise from primary articulation.

39. Consonant combination in the CG syllable structure.

(i)	/p/	[sipwoni]	sweet potato field
(ii)	/k/	[ikwa]	it is falling
(iii)	/fw/	[fwa:la]	dress up
(iv)	/sw/	[tsiswa]	termites
(v)	/tw/	[itwasi]	female cow
(vi)	/x/	[tsixwi]	firewood
(vii)	/m/	[me:no]	in the river
(viii)	/nw/	[munwa]	mouth
(ix)	/ɲw/	[simiɲwi]	a chick

(x)	/rw/	[sirwi]	an ear
(xi)	/lw/	[lwaɲi]	outside
(xii)	/jw/	[ijajwa]	an axe
(xiii)	/mbw/	[imbwa]	a dog
(xiv)	/ndw/	[indwasi]	allergy
(xv)	/ ɲɟ/	[esiʧi ɲɟwini]	wagtail
(xvi)	/ŋg/	[iŋgwe]	a leopard

All the vowels in Olutura, apart from /u/, can form the nucleus in the formation of the syllable structure with the glide /w/. The CCV syllable structure is also formed using the glide /j/ in Olutura. Examples of words with the palatal glide /j/ are shown in 40 while those with the bilabial glide /w/ are shown in 41.

40. Olutura CCV syllable structure with /j/

(i)	/sje/	[esjeyo]	a broom
(ii)	/tjo/	[esitjo:li]	sheep pen
(ii)	/tsj/	[esitsjamolu]	praying mantis
(iv)	/sja/	[sjamuxi:re]	it is morning
(v)	/sja/	[sja]	grind

41. Olutura CCV syllable structure with /w/

(i)	/ndw/	/ndwa.la/	I am sick
(ii)	/ndw/	[indwasi]	allergy

(iii)	/ŋgw/	[ŋgwa]	I am falling
(iv)	/mbw/	[imbwa]	dog
(vi)	/sw/	[luswa]	something that is forbdden

There is a possibility of the consonant /t/ combining with the glide /w/ in the CCV syllable structure although the data did not have words with this sequence. The consonant /s/ can form a cluster with the glides /w/ and /j/ as in 40 (iv) and 41 (vi). It should be noted that the occurrence of /j/ in the CCV syllable structure is not as frequent as it is with the glide /w/. This is due to the perception between /j/ and the vowel /i/ in the nucleus of the syllable. Olutura, like most Bantu languages uses the vowel /i/ instead of the glide /j/ which may be perceived from the concept of gliding.

The argument for this as separate segments of the onset in the CCV structure is based on the observation that the sound segments that do not form clusters in Olutura do not occur as separate phonemes in the phonetic inventory of Olutura. For instance the sounds /mb/, /ŋg/ and /nd/ are combinations of a sound that occurs in the inventory of Olutura (the first member), and one that does not (the second member). The second member is a voiced sound which does not occur in Olutura. The prenasalised sounds form one sound segment in Olutura and enter into the onset of the CCV syllable structure as one entity which is then followed by the glide as seen in words such as /**indwasi/** (allergy).

The other type of CCV syllable structure in Olutura can also be composed of two glides in the onset which are followed by a vowel. This brings up the GGV sequence discussed in this study as a CCV syllable structure. Examples of Olutura words with the GGV sequence are shown in 42.

42. Olutura GGV type of CCV syllable structure

(i)	/βajwa/	being played, e.g. a ball (passive)
(ii)	/tsifujwe/	being washed, e.g. clothes
(iii)	/ja:jwa/	it is being grazed
(iv)	/kajojwa/	they are being scooped
(v)	/tsjejwa/	they are being swept
(vi)	/siejwe/	Kakamega town

In Olutura, the GGV type of the CCV syllable structure is mostly used to show the passive voice. The data analyzed revealed that this syllable structure mainly occurs in verbal constructions. Only one example was attested for nouns in this study and this means that the GGV sequence also occurs in nouns, however minimal.

The discussion on the existence of the CCV syllable structure is in agreement with other scholars on Bantu languages who view it as such instead of simplifying the segment sequences to the canonical and easier to perceive CV syllable structure. Savala (2005) and Etakwa (2017) also report of the occurrence of the kind of CCV syllable discussed in this section in Lwitakho and Olunyala (K), respectively. The two are also Luyia dialects just like Olutura. The syllabification of these combinations as CV would mean that either the glide or fricative would be part of the onset or the nucleus. By virtue of their capability to form onsets in Olutura, glides are consonants and cannot, therefore, form the nucleus as shown using Generative CV phonology in Figures 15. Figure 15(a) shows the CCV structure type with a pure consonant and a glide in the onset, Figure 15 (b) shows the CCV syllable structure with a consonant and a glide while 15(c) shows that the second syllable of the word *sieywe* has two glides in the onset and a vowel; hence the GGV sequence.

(a)

Syllable tier σ σ

CV tier C G V C V

Segmental tier [**f** **w** **a** l a] dress up

Figure 15(a): Olutura CGV syllable structure with /w/

Syllable tier σ σ

CV tier C G V C V

Segmental tier [**s** **j** **e** j o] broom

Figure 15(b): Olutura CGV syllable structure with /j/

Syllable tier σ σ

CV tier C V V G G V

Segmental tier [s i e **j** **w** **e**] Kakamega town

Figure 15(c): Olutura GGV syllable structure

Figures 15 (a), (b) and (c) show the various types of the occurrence of the CCV syllable structure (in bold) in Olutura. This is not the same as the CV structure which has the prenasalized sound shown in Figure 16. The examples in Figures 15 show that the consonant elements in the onset do not branch from the CV tier level. This is one of the points that this study is using to explain the foregoing argument that they are distinct elements unlike the C elements in Figure 16 which are combined and, therefore behave as one C element. Another argument for the CCV structure is that, one of the consonants that constitute it does not occur in the phonemic inventory of Olutura as a single, distinct phoneme. Secondly, the other consonant in the structure occurs as a phoneme and forms a syllable onset in this dialect. Thirdly, the second consonant in the pair cannot form the nucleus because consonants do not occur in nucleus position in Olutura.

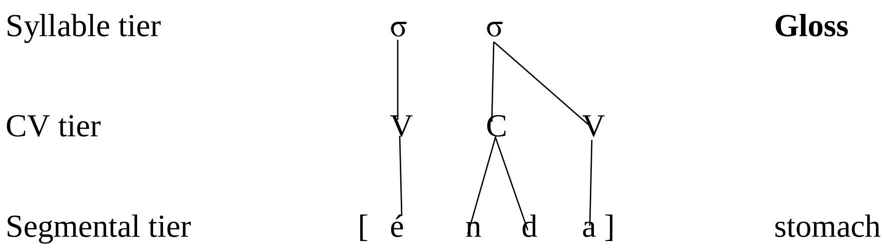


Figure 16: Olutura CV syllable with a prenasalized sound.

We have already mentioned that Olutura has a simple syllable structure and that the CV is the optimal syllable. The CCV is, therefore, a marked syllable structure in this dialect and the motivation for its occurrence needs to be established. The SSP discussed in the literature review can be used to explain the consonants that combine in the CCV structure in Olutura because it can help to predict the possible clusters and syllabification in a given language. In Olutura, glides can easily combine with any other consonant but the other consonants cannot combine with each other in the onset position. A combination of /t/ and /s/ is allowed because both consonants have the same place of articulation of alveolar and /t/ is lower on the sonority scale than /s/ and that is why the latter is nearer the nucleus in the onset. For a speaker of Olutura, it is easier to articulate /t/ as a pre-onset in the combination with /s/ without the intervention of a vowel as it would be with /s/ forming the pre-onset.

2.4 Conclusion

Olutura has five primary vowels which give it a 5V system like most Bantu languages and 5 long vowels, making a total of 10 vowel sounds. The total number of consonant sounds with primary articulation that occur in Olutura 23 while those with secondary articulation are 20. Out of the five primary vowels, only the vowel /i/ was found to have more functions than the rest while the vowel /u/ has very few functions. The vowel /i/ is used to contrast meaning and to customize borrowed words while the vowel /u/ is used in very few verbs, nouns and demonistratives

Olutura has a total of seven syllable structures. Five of the syllable structures have already been identified by scholars of Bantu languages including Kiswahili; these are: V, CV, CVV, CCV and CGV. The sixth syllable structure, VV which represents a long vowel was found to occur in the initial word position. Long vowels have two vowel positions in the same syllable. The seventh syllable structure is that of GGV which has two glides in the onset and a vowel. The VV and GGV syllable types had not been projected in the proposal but were observed during the analysis of data in the current study. The use of CV Phonology was instrumental not only in establishing the syllable structures of Olutura, but also in discussing their composition in the sound system of Olutura.The use of OT constraint ranking also had the capacity of showing that in Olutura, not every sound can combine with every other sound in its sound system.

CHAPTER 3

PHONOLOGICAL PROCESSES AS HIATUS RESOLUTION (HR) STRATEGIES IN OLUTURA SYLLABLE FORMATION

3.1 Introduction

Phonological processes refer to the natural way in which the apparatus of speech production simplify sound sequences that are otherwise difficult to articulate (Donegan & Stampe, 1979:127) Phonological processes, therefore, create natural responses of the human vocal and perceptual systems to the difficulties encountered in the production and perception of speech. Hiatus is the pause that is created during the articulation of adjacent vowel sound sequences that belong to different syllables (Senturia, 1998). According to Casali (2011: 1434-1460), some languages freely permit hiatus, others do not permit it at all while others place strict limits on the contexts in which heterosyllabic vowel sequences can occur. Casali further argues that cross-linguistically, phonological processes always cause a change in the configuration of the syllable by changing the segment sequences as a way of resolving hiatus. As mentioned in 1.7.4, the phonotactics of different languages constrain them to deal with such articulatory difficulties using different phonological processes (Donegan & Stampe, 1979). In this chapter, the second objective of the current study is achieved by discussing the processes of coalescence, glide formation, epenthesis, prothesis and elision as they are used as HR strategies in Olutura. The issue of whether Olutura completely disallows hiatus or not is also discussed.

3.2 Olutura Coalescence

Coalescence is a type of assimilation in which two adjacent sound segments affect one another (Massamba, 1996). This means that in coalescence, there is a merger of features from two or more segments into a single segment. Coalescence is one of the phonological proceses that is used as a strategy for HR in Olutura. It is, indeed, a very common strategy used in hiatus resolution in many Bantu languages (Cassali, 1996 and Wasike, 2004). In HR, coalescence occurs across a syntactic boundary that takes place within a phonological word. This process occurs in vowels that are adjacent to each other because the morphemes they belong to occur at the end and beginning of adjacent words. In this section, the cases that trigger coalescence in Olutura are discussed. Two types of coalescence occur in Olutura. The first one is vowel height coalescence which has two instances, these are; low to high and low to mid vowel height coalescence The second type is and identity or morphophonemic word boundary coalescence.

3.2.1 Vowel Height Coalescence

In Olutura, vowel height coalescence takes place when V_1 is a low vowel and V_2 is a high vowel, and both of them coalesce into a mid vowel as illustrated in 43.

43. Olutura low and high vowel coalescence

	Input	**UR**	**SR**	**Gloss**
(i)	/ a+ i /	/βa+itsa/	[βe:tsa]	they come
(ii)	/ a + i /	/ βa + ira/	[βe:ra]	they kill
(iii)	/ a + i /	/βa + isia /	[βe:sia]	they bring down
(iv)	/ a + i /	/βa + imba/	[βe:mba]	they sing

From the data in 45, the two vowels /a/ and /i/ not only fuse into the mid vowel /e/, but also acquire a new feature of length. They, therefore, lose their original features of [+ high] and [-high] and the emerging vowel acquire the features [-high] and [-low]. The new feature of length, however preserves the moras from the input seen in both V_1 and V_2. The resultant long vowel seen in all the examples in 43 is an indicator of how Olutura is able to avoid the occurrence of diphthongs, a combination of vowels that is not allowed in this particular dialect.

Vowel height coalescence in Olutura can also occur between [+low] t and [-mid], in particular mid vowels as shown in 44.

44: Olutura low and mid vowel coalescence

	Input	**UR**	**SR**	**Gloss**
(i)	/a +e /	/am**a** + **e**no/	[ame:no]	teeth
(ii)	/ a + e/	/am**a**+ **e**na/	[ame:na]	holes
(iii)	/ a + e/	/am**a** + **e**so/	[me:so]	awake
(iv)	/ a + e/	/ m**e** +**e**ra/	[me:ra]	names

This type of coalescence is similar to that identified by Mtenje (1992) and introduced in 1.7.7.1. In this type of coalescence, two vowels in the UR are replaced by a single instance of one of them in the SR. In the examples in 44, the two vowels in the input, /a/ and /e/ are replaced by one of them, that is, the mid vowel /e/ in the SR. Just like the case in Shona (Beckman, 1997, Kadenge & Simango, 2014), the SR in Olutura also has a long vowel. The occurrence of long vowels is in line with the phonotactics of Olutura which has long vowels in its vowel inventory.Olutura vowel height coalescence is shown in Figure 17.

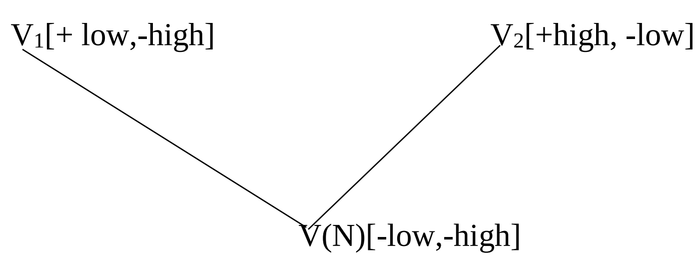


Figure 17: Olutura vowel height coalescence

Figure 17 shows that the vowel in the output is a mid one, [-low,-high] and this is indicated by (V(N) which means that the resultant vowel is none of the two that occur in the input.

OT constraint interaction is used in Tableau 11 to show how coalescence happens in the phonology of Olutura. The constraints involved in the analysis of Tableau 11 are discussed immediately below. The constraint *HIATUS is a markedness constraint which refers to hiatus. It is relevant in this case to militate against the occurrence of hiatus which Olutura always strives to avoid in most cases by using various strategies. This constraint should not be dominated because it plays a pivotal role regarding the changes that take place to the constraints that it dominates.

*DIPH is another markedness constraint which stands for diphthong. It plays a similar role to that of *HIATUS to check the sequence of two dissimilar syllabic peaks which Olutura demands that they are coalesced.

UNIFORMITY-IO is a faithfulness constraint which demands that there should be no merging of two distinct constraints in the input into one in the outpt. The constraint is important in the analysis because coalescence in Olutura involves the fusion of two distinct vowels. UNIFORMITY-IO is ranked low in this set of constraints because in this case in Olutura, coalescence is a better option than having hiatus. In particular, UNIFORMITY-IO should be dominated by IDENT(μ) to rule out the possibility of having an output that does not take cognizant of the mora places in the input and therefore fails to conform to the phonotactics of Olutura.

IDENT(μ)- This is a faithfulness constraint that is useful in checking whether every mora in the input has a correspondent in the output. The ranking that is adopted is as follows: *HIATUS, *DIPH >> IDENT(μ) >> UNIFORMITY-IO

Tableau 11: Constraint interaction in Olutura coalescence

/βa+ imba/	*HIATUS	*DIPH	IDENT(μ)	UNIFORMITY-IO
a. [βa.i.mba]	*!			
b. ☞ [βe:.mba]				*
c. [βai.mba]		*!		
d. [βe.mba]			*	*

From the analysis in Tableau 11, candidate (a) violates the constraint *HIATUS which is a serious violation because Olutura rarely allow hiatus and that is why the dialect uses coalescence as one of the strategies to avoid it. Candidate (c) violates *DIPH which is also a serious violation because diphthongs do not occur in the phonemic inventory of Olutura. Candidate (d) violates the constraint IDENT(μ) because the output has a short vowel as opposed to the input and has, therefore, lost one mora. It alsomakes a second violation of UNIFORMITY –IO and cannot win. Candidate (b) emerges as the optimal candidate for two reasons. One is that it only violates UNIFORMITY-IO which is a lowly ranked constraint and therefore, inconsequential because any candidate that competes favourably in the current analysis must violate it. The second reason is that candidate (b) mantains the mora places of the input in spite of it losing the original vowels, the moraic places are maintained through the resultant long vowel.

3.2.2 Identity Coalescence

This type of coalescence occurs at the boundary between morphemes and is what Bakovic (2007) refers to as 'identity coalescence'. In this type of coalescence, identical vowels coalesce in a way that there is no change in the vowel quality in the output. This type of coalescence is illustrated using the Olutura words in 45.

45: Olutura Identity Coalescence

(i)	/i + i /	/ ni + itsa/	[ni:tsa]	I am coming
(ii)	/ i + i /	/ ni + iba/	[ni:βa]	I am stealing
(iii)	/ u + u/	/ βu + uxa/	[bu:xa]	wake up
(iv)	/o +o/	/βo +olola/	[βo:lola]	untie
(v)	/ a + a/	/βa + akula/	[βa:kula]	remove from the stem (e.g. maize/bananas)

This shows a coalescence occurrence in which all the features of the input are retained in the output as shown in Figure 18.

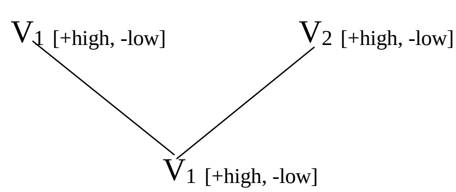


Figure 18: Olutura Identity coalescence

The coalescence of the two identical vowels is what helps Olutura to avoid the surface realization of heterosyllabic vowels in the output in some environments. Heterosyllabic sequences occur in Olutura but identity coalescence certainly helps to avoid the occurrence of otherwise illicit diphthongs. This is what results in the occurrence of the CVV syllable structure discussed in Chapter 2. In theis case, coalescence is driven by the lexical word at the morphophonemic boundary. In actual articulation, it is actually V_2, which occurs at the beginning of the lexical word that is retained.

The interaction of constraints in OT has been used to bring out the occurrence of Olutura identity coalescence in Tableau 12. Apart from *HIATUS, the other constraints that are relevant in the analysis of Tableau 12 are IDENT(μ) is used to check whether every mora in the input has a correspondent in the output while DEP-IO is used to check whether there is epenthesis of any segments in the output that do not occur in the input. The constraint *V: is relevant in this analysis because the vowel segments concerned lead to a long vowel and this is the constraint that is against coalescence of identical vowels, hence it must be violated by the winning candidate. For this case, the other constraint that is relevant is IDENT-IO(F) so as to evaluate whether the input and output bear identical specifications for the feature [+high, -low]. This is the feature that motivates the occurrence of the identity of coalescence. The constraint *HIATUS should not be dominated because it is the cause of the violations that the other constraints incur.

Tableau 12: Constraint interaction in Olutura identity coalescence

input /ni+itsa/	*HIATUS	DEP-IO(C)	IDENT-IO(μ)	IDENT-IO(F)	*V:
a. ni.i.tsa	*!				
b. ☞ **ni:.tsa**					*
c. ni.tsa			*	*	
d. ni.ni.tsa		*		*	

From Tableau 12, the input [ni +itsa] has four candidates and is evaluated using five constraints. The constraints *V: and IDENT-IO(F) are dominated because the change that they undergo is determined by the constraints that dominate them. Candidate (a) violates the constraint *HIATUS which is undominated in the operational set of constraints at hand. This is, therefore, a serious violation because Olutura, in this case, does not tolerate hiatus and that is why (a) cannot be optimal. Candidate (c) makes two violations of the constraints, IDENT-IO(μ) and IDENT-IO(F). Both violations are not serious although the candidate does not emerge as the optimal one. In the later violation, candidate (c) does not have the initial vowel which marks the feature [+high] from the lexical morpheme in the input and this is what causes it to lose out. It's violation of IDENT-IO(μ) makes candidate (c) to lose out on account of the moras which, compared to the input, are less in the output.

Candidate (d) violates the constraints DEP-IO(C) and IDENT-IO(F) by inserting a consonant segment to have a CV instead of V syllable and by having an output that does not correspond to the features of the input, respectively. While the said violations are not serious, they yield an output that is not semantically permissible in Olutura. The winning candidate, (b), is optimal as it incurs only one violation of the constraint *V: which prohibits the occurrence of long vowels which is important for evaluating the occurrence of long vowels that emerge in the input. Although the feature of the short vowel that occurs in the input is lost, the resultant output, which has a long vowel, maintains the mora places in the input and conforms to Olutura syllable formation. The ranking of the constraints results in the occurrence of the long CV: syllable which is brought forth by the coalescence of the two identical [+high] vowels which were initially in the input. The long vowel ensures maintenance of the feature qualities that are in both vowels in the input. This means that there is segment identity between the input and output in terms of the feature [+high]. Therefore, in Olutura, coalescence as a strategy for hiatus resolution occurs with identical vowels as observed in Tableau 12. This is seen in the merging of two identical vowels in the input.

3.3. Olutura Glide Formation

The definition of glide formation as a process in which the first of the two adjacent vowels surfaces as a semi-vowel by Casali (1997) and Hamman (2003) is adopted in this study. Both authors content that glide formation is one of the phonological processes that are used in many languages as a strategy for HR in a bid to achieve the optimal syllable in a language.

At the end of chapter 2, the need to establish the motivation for the occurrence of the marked CGV sequence in the CCV syllable structure in Olutura was mentioned. The phonological process of glide formation discussed in this chapter as a strategy for HR is a motivation for the CGV sequence. Glide formation is a process that is used to resolve hiatus in Olutura. In this dialect, glide formation results from the two glides /w/ and /j/ across the morphophonemic word boundary. V_1 refers to the vowel that occurs at the end of the first word in the pair of words involved while V_2 occurs at the beginning of the second word in the said pair.In OT analysis, a new constraint $*COMP_{ONS(LAB)}$ has been introduced to evaluate the occurrence of labialization. The constraint means that thre should be no complex onsets with a labialized sound.

In Olutura, glide formation resulting from the bilabial approximant /w/ occurs in three instances. This process is shown in 46 using examples of the vowels involved. One occurrence is when a [+high] vowel is followed by another [+high] vowel. In this case, V_1 changes into a glide while V_2 is retained and forms the nucleus of the resultant CV syllable (examples 46 (i) - (iii)). The second occurrence is when a [+high] vowel is followed by a [+low] vowel as seen in examples 46 (iv) - (vii). Just as in the first instance, V_1 becomes a glide while V_2 is retained. The third occurrence involves a [+high] vowel as the V_1 and a mid vowel as the V_2. This is shown in examples 46 (viii) and (ix). In this case, the mid vowel, which is the V_2 is retained while V_1 becomes a glide.

46. [+high] vowel gliding in Olutura

	Input	UR	SR	Gloss
(i)	[u + i]	/ mu + ifi/	[mwifi]	a thief
(ii)	[u + i]	/ βu + itsa /	[βwitsa]	friendship
(iii)	[u + i]	/ lu + ika/	[lwi:ka]	a horn
(iv)	[u + a]	/mu + ami /	[mwami]	a leader
(v)	[u + a]	/ xu + aka/	[xwaka]	to weed
(vi)	[u + a]	/ lu + ana/	[lwa:na]	struggle
(vii)	[u + a]	/ lu + ana/	[lwana]	childshness
(viii)	[u + o]	/ omu +ojo/	[omwojo]	a heart
(ix)	[u + e]	/ xu + eɲa/	[exwe:ɲa]	I want you

The above examples show that in Olutura, glide formation may or may not result in compensatory lengthening. In examples 46 (i),(ii), (iv), (v), (vii) and (viii) there is no compensatory lengthening because the [+high] vowel that moves to the onset is not compensated in the output. In these examples, the [+high] vowel /u/ is replaced by the glide /w/, an occurrence in which one mora place is actually lost since the input had one mora place in the prefix and stem respectively. However, in examples 46 (iii), (vi) and (ix), compensatory lengthening takes place because V_1, which is a [+high] vowel /u/ is syllabified as part of the onset and loses its weight but this is compensated in the extra vowel that brings forth a long vowel.The vowel slots are, therefore, preserved. Moras play an autosegmental role and that is why they are not usually deleted (Hayes, 1989; Goldsmith, 1999). This is because moras are tone bearing and deleting them would alter the desired word semantically. Although V_I is replaced by the non moraic [w], its mora is compensated in the lengthening of V_2 which becomes a long vowel, /i:/ as shown in the 'Moraic tier' in Figure 19. As discussed in chapter 2, glides are non moraic in Olutura because of their capability to form onsets in this dialect and that is why /w/ is syllabified in the onset. Compensatory lengthening is shown in Figure 19.

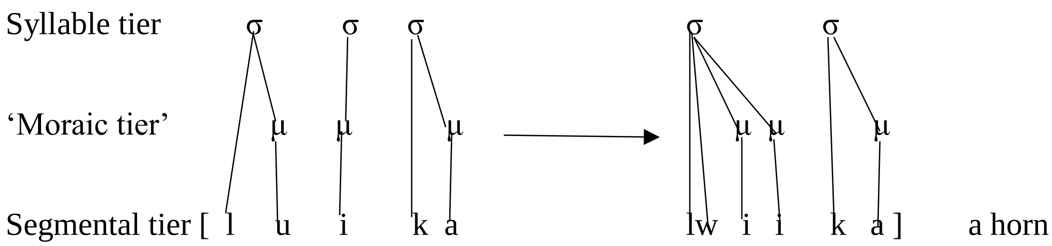


Figure 19: Olutura compensatory lengthening glide formation

In Figure 19, the mora that is lost when the [+high] vowel /u/ becomes a glide is recovered in the output compensatory lengthening which is realized through an extra [+high] vowel /i/. This is in turn realized as a CCVV in the output from a CV.V which means that the middle zero onset syllable moves to the nucleus of the preceding CCVV syllable.

Olutura compensatory lengthening glide formation is expounded using OT constraint interaction in Tableau 13. *HIATUS is ranked high here because Olutura is supposed to use the phonological process of liabialization to resolve it as it is prohihited in this context. *DIPH is necessary because the nature of the input can easily result in an output that has a diphthong, an occurrence that is not allowed. The constraint MAX-IO(μ) is necessary in this analysis so as to evaluate the occurrence of moras which should be maintained in both the input and output. This is the constraint that should evaluate if there is compensatory lengthening in the output. The other constraint that is important in this analysis is *COMP$_{ONS(LAB)}$ which is used to evaluate the occurrence of labialization that should be there in the output. This particular constraint should be ranked lowst because the winning candidate should violate it. The ranking that is used in this analysis is as follows: *HIATUS,*DIPH >> MAX-IO(μ) >> COMP$_{ONS(LAB)}$.

Tableau 13: Olutura compensatory glide formation

/lu.$_{1+}$a.$_{2}$+ na/	*HIATUS	*DIPH	MAX-IO(μ)	V:	*COMP$_{ONS(LAB)}$
a.[lua.na]		*!			
b. ☞ [lwa:na]				*	*
c.[lu.na]			*!		
D. lu.ana	*!				

Candidate (a) undergoes a serious violation of *DIPH and as such, loses all the chances of winning for the foregoing reasons introduced in 3.1. Similarly, candidate (d) also undergoes a serious violation of *HIATUS and loses out and chance of competing further. Candidate (c) fails to resolve hiatus hy violating MAX-IO(μ) because it has an output that is less with one mora compared with the input. This happens due to the loss of one of the moras that was initially in the input but fails to emerge in the output. This is caused by the deletion of the [-high] vowel /a/ which is not compensated in the output. The violation of MAX-IO(μ) is serious because the loss of one mora results in a word that does not occur in Olutura. This means that the extra more in the input carries meaning and so it should not be lost. This occurent in Olutura is in line with the observation by Goldsmith (1979) that moras are protected from elision. The optimal candidate from this set of candidates is (b) which makes two violations; that of *COMP$_{ONS(LAB)}$ and V:. However, the constraint that it violates are lowly ranked and (b) must necessarily violate them. As already pointed out at the beginning of this section, labialization which happens through the realization of the [+high] vowel /u/ as a glide is what Olutura must use to resolve the hiatus that is seen in the input. In this analysis, although the [+high] vowel /u/ loses its mora by moving to the onset as a glide, compensatory lengthening is achieved through the violation of tha constraint V: by realizing a long vowel.

Some languages like ciNsenga and chiShona treat the occurrence of the vowel /u/ forming a glide as labialization because they do not allow complex onsets. In this study, we are not treating glide formation using /w/ as such because, one, Olutura allows complex onsets as attested in chapters 1, and, 2, glides are allowed to occur in the onset alone in Olutura, their capability of labialization not withstanding.

In Olutura, when the [+high] vowel /u/ occurs before the vowel /o/, it does not always result into the glide /w/. In such cases, the vowel /u/ does not elide but is instead syllabified as the nucleus of the CV syllable. This leaves the /o/ intact as an onsetless syllable in word medial position as shown in the exampes in 47.

47. Olutura non-glide forming /u/

(a)	**UR**	**SR**	**Gloss**
(i)	/o.xu+oma/	[o.xu.o.ma]	to smoothen a floor using cow dung
(ii)	/o.xu +ana/	[o.xu.ana]	to give
(iii)	/o.mu + oni/	[o.mu.o.ni]	one who sees

(b)

(i)	/o.xu + o.ma/	[o.xwo.ma]	to dry up
(ii)	/o.xu + a.na/	[o.xwa.na]	mow (like a cow)
(iii)	/o.mu +o.ni/	[o.mwo.ni]	a sinner

This occurrence is used in Olutura as a meaning distinguishing strategy because the words in 47 (a) change the meaning when the /u/ changes into a glide in 47 (b).

Olutura also has the occurrence in which the [+high] front vowel /i/ becomes a glide. In this dialect, glide formation involving the palatal glide /j/ takes place when the [+high] vowel /i/ comes before any [+high] or [-high] vowel as exemplified in 48. The [+high] vowel which is V_1 changes to the glide /j/ while V_2 is retained in the surface output. If V_1 is the [+high] /i/, it is realized as a palatal glide /j/ in the output. This occurrence in Olutura is in accordance with Rosenthall (1994), who argues that the glides /w/ and /j/ are underlying representations of the high vowels.

In Olutura, glide formation is also used to resolve hiatus when the prevocalic high vowel /i/ changes into the palatal glide /j/. This occurs when the [+high] vowel /i/ comes before another [+high] vowel or a [-high] vowel as shown in 48.

48. Olutura prevocalic glide formation.

	Input	**UR**	**SR**	**Gloss**
(i)	/i + a/	/esi + alo/	[es**j**alo]	world
(ii)	/i + a/	/esi + amberi/	[es**j**amberi]	first fruits
(i)	/ i+a/	/ emi + alo/	[em**j**alo]	rivers
(iii)	/ i +u/	/esi + uja/	[es**j**uja]	good taste
(ii)	/i+u/	/esi + uma/	[es**j**uma]	a bead
(iv)	/ i +e/	/esi +eja/	[es**j**ejo]	a broom

Glide formation in Olutura involving the palatal glide /j/ is not as common as the one involving the bilabial approximant /w/. However, in the case of /j/, glide formation occurs when the [+high] vowel /i/ in the input is phonetically realized as a palatal glide in the output form. This occurrence will always happen whenever the glide /j/ comes before a high, mid or low vowel. In Olutura, the two glides, /w/ and /j/ which are pure consonants exchange places with the [+high] vowels /u/ and /i/, respectively. Glide formation in Olutura can be accounted for using the notion of place of articulation. Both glides are homorganic and /j/ shares the phonetic feature of [+high] with the vowel /i/. The glide /w/ shares the phonetic features of [+labial] and [+round] with the vowel /u/. In the case of a pre-fix and a noun or verbal stem, it was observed that in Olutura, glide formation always leads to the segment change of V_1 and not $V_{2.}$ The reason for this lies in the notion of positional faithfulness which protects V_2 as it is at the previledged word initial position. Segments in this position always resist any form of phonological change.

3.4 Olutura Epenthesis

In general terms, epenthesis is the insertion of a segment in a position other than word initial position (Massamba, 1996). Cross-linguistically, the motivation for epenthesis is to repair inputs that do not meet the phonotactic or metrical requirements of a language. The reasons for these requirements depend on specific languages but they revolve around the ease of consonant perception, giving words the required number of syllables and avoiding complicated segmental sequences (Itô, 1989, Massamba, 1996). Epenthesis is one of the phonological processes that are used in Olutura as strategies for HR. This process involves consonants and vowels alike and indeed whole syllables as discussed in the subsequent sections.

3.4.1 Syllable Epenthesis

As shown in Chapter 2, CV is the optimal syllable in Olutura. This statement implies its pivotal role in the phonology of this dialect. The epenthesis of the CV syllable at either word medial or word final position was observed in Olutura lexical items. The particular CV syllables and consonants involved in this case depend on the context. This is shown in the examples in 49.

3.4.2 CV Syllable Epenthesis

Epenthesis in Olutura is determined by the morphological classes of number, possessive, noun class and case. This means that the constituents of the epenthetic CV syllable is determined by the grammatical category. In Olutura, different CV syllables are used to realize the singular form as shown in 49.

49. Olutura grammatical epenthesis

	Input	**Output**	**Gloss**
(i) /la/	/e.+la/	[likondi e**la**la]	one sheep
(ii) /la/	/e+la/	[litumwa e**la**la]	one cob of maize
(iii) /la/	/a+teʃja/	[a**la**teʃja]	he will marry (near future)
(iv) /li/	/o+βajo/	[o**li**βajo]	you will be there

In the examples in 49, the epenthesis is formed by a CV syllable that has the consonant /l/ in the onset while the vowel elements that form the nucleus of the syllable are /a/ and /i/. CV epenthesis in Olutura can also be used to indicate the grammatical category of person. The epenthesis of the CV syllable to show person in Olutura is illustrated in 50.

50. Olutura CV epenthesis

	Input	UR	SR	Gloss
(i)	[xu]	/xu + saβa/	[xu**xu**saβa]	to ask from you
(ii)	[mu]	/xu + saβa/	[xu**mu**saβa]	to ask from (2nd person)
(iii)	[βa]	/xu +saβa/	[xu**βa**saβa]	to ask from (many people)
(iv)	[na]	/xu +ʧama/	[xuʧama**na**]	to love each other
(v)	[na]	/xu +βeja/	[xuβeja**na**]	to cheat each other

In 50, the epenthesis of the CV syllable happens between the prefix /xu/ which is an indicator meaning ‘to’ and the verbal stem. It brings out the meaning of ‘making or causing someone to do something’ and thus creates the grammatical aspect of person. We observe here that the prefix /xu/ and the verbal stems in 50(i) to (iii) are similar and it is only the epenthesis of the CV syllable that changes the meaning. The epenthesis of the suffix /na/ which occurs word finally in the output is mophorphonemic and it brings out the meaning of ‘each other’ from the input /xuβeja +na / to [xu.βe.ja.-na].

The epenthesis that results in SA and the change of phonological features was also observed in Olutura. In the current discourse, the study answers the question of what determines the syllable that is used in epenthesis in Olutura; whether it is the morphological class or not. OT constraint interaction is used in Tableau 15 to answer this question. The constraints involved are; *HIATUS- which is meant to evaluate the occurrence of hiatus, DEP-IO(V), to check against the insertion of vowels and MAX-IO(σ) which stipulates that output segments must have input correspondents in terms of the syllable. The constraints that are used in this analysis are ranked as follows:*HIATUS>> DEP-IO >> MAX-IO(σ).

Tableau 15:Olutura CV epenthesis

/xu$_1$ +saβa/	*HIATUS	DEP-IO(V)	MAX-IO(σ)
a./xu.asaβa/	*!	*	
b. ☞ [xu.mu.sa.βa]			*
c.[xu.$_{1}$-βa]	*!		*
d.[xu.sa	*!		*

Candidate (a) is a viable candidate in Olutura phonology but incurs a serious violation of the constraint *HIATUS by having an output that can only be valid through the insertion of a whole syllable. It also violates DEP-IO(V) by inserting a vowel which is not in the input. Candidates (c) and (d) both violate a highly ranked constraint; *HIATUS, and cannot, therefore, win. The two also violate MAX-IO(σ) by having outputs that do not have the same number of syllables as the input. The optimal candidate, (b) violates only one lowly ranked constraint, that is, MAX-IO(σ) because the output has an extra syllable that is not represented in the input. However, this is a necessary violation in Olutura because it is what the language uses to avoid hiatus to achieve the grammatical category of person.

3.4.3 Consonant Epenthesis

The epenthesis of a consonant element to a zero onset vowel is another HR strategy in Olutura. The consonants /β/ and /j/ are added to the zero onset syllable in word medial position to create a CV syllable as a way of repairing inputs that do not meet the phonotactic requirements of Olutura. The examples in 51 are used to illustrate the epenthesis of either /β/ or /j/ in Olutura.

51. Consonant epenthesis in Olutura

	Input	**UR**	**SR**	**Gloss**
(i)	[si]	/si + ola/	[si.βo.lu]	a rotten thing
(ii)	[βa]	/βa + ira/	[βa.ji.ra]	they are taking
(iii)	[i]	/i+ira/	[i.ji.ra]	it is taking (e.g. an animal)
(iv)	[βa]	/βa + iŋga/	[βa.ji:.ŋga]	they are forcing
(v)	[βa]	/βa + ala/	[βa.ja:.la]	they are prosecuting them
(vi)	[βa]	/βa + ina/	[βa.ji.na]	tempting him to fight

Tableau 16 shows how this happens in Olutura. The constraints concerned are DEP-IO(C), *DIPH and *HIATUS. The last two are necessary in this analysis because they induce the violation of DEP-IO(C) to enable the emergence of the optimal candidate. They are ranked as follows:*DIPH,*HIATUS >>DEP-IO(C).

Tableau 16: Constraint interaction in Olutura consonant epenthesis

/ si + ola/	*DIPH	*HIATUS	DEP-IO(C)
a.[si.o.la]		*!	
b. ☞ [si.βo.la]			*
c.[sio.la]	*!		

The epenthesis of the consonants /β/ and /j/ in Olutura is a necessary violation of the constraint DEP-IO(C) and this is why it must be dominated by the constraints *DIPH and * HIATUS.

In Tableau 16, candidate (a) makes a serious violation of *HIATUS by having two dissimilar vowels adjacent to each other which results in a wrong construction in this particular case. Candidate (c) makes a serious violation of *DIPH because diphthongs do not occur in the phonology of Olutura. The optimal candidate is (b) makes the necessary violation of the lowly ranked DEP-IO(C) because the dialect allows epenthesis to repair hiatus.

In Olutura, what determines the consonant that is inserted in the epenthesis process is the word class as well as the morpho- phonemic context. Example 51 (i) refers to [-animate] whereas the rest of the examples in the same series refer to [+animate] entities. However, if [+animate] entities would perform the action of taking, they would also take on the epenthetic /ji/. An example is seen in 51(iii). This is also a case of irregular occurrences whose motivation was not established in the current study because it was not within its scope.

3.4.4 Vowel Epenthesis

Vowel epenthesis is the insertion of a vowel in any word position other than word initially. Just like syllable and consonant epenthesis, vowel epenthesis is one of the phonological processes that is used to repair inputs that do not meet the phonotactics of Olutura. The epenthesis of vowels at the end of a verb causes a change in the meaning of the word as shown in 52. It should be noted that the epentheted vowel is realized as the glide /j/ because it is analyzed as part of the onset in CV Phonology because Olutura does not allow the occurrence of two disimillar vowels in the same syllable in the current case.

52. Olutura vowel epenthesis

	UR	**Gloss**	**SR**	**Gloss**
(i)	/ke.nda/	(walk)	[xu.ke.nd**j**a]	to help one to walk

(ii)	/ke.nda/	(walk)	[βa.ke.nd**j**a]	help them walk
(iii)	/hona/	(heal)	[hon**j**a]	cause to heal
(iv)	/iŋgira/	(enter)	[i.ŋgi.s**j**a]	cause something to enter
(v)	/kona/	(sleep)	[ko.n**j**a]	put to sleep
(vi)	/kula/	(buy)	[ku.s**j**a]	sell

In 52, a vowel that was not initially in the input is added to the verbs immediately after the last CV syllable. This means that the CV syllable takes on a new vowel element and changes the syllable from CV in the input to CGV in the output. However, it must be noted here that since the vowel involved is the [+high] vowels /i/, it is phonetically realized as the glide /j/ in the phonological processes of glide formation. Thus, vowel epenthesis of the [+high] vowel /i/ in Olutura leads to glide formation in this dialect. This is analyzed using OT constraint interaction in Tableau 18.

The constraints that are relevant in the case of Tableau 18 are; *DIPH, *HIATUS, DEP-IO(C), DEP-IO. In this analysis, the constraint that prohibits insertion of vowels DEP-IO (V) must be dominated by the markedness constraints *DIPH and *HIATUS. This constraint should be violated by the winning candidate and it should be dominated by the general anti-insertion constraint DEP-IO. The ranking that is proposed for the ranking of the constraints involved is as *DIPH, *HIATUS >> DEP-IO >> DEP-IO(V).

Tableau 17: Olutura vowel epenthesis

/ko +na/	*DIPH	*HIATUS	DEP-IO	DEP-IO(V)
(a) /ko.$_1$nia/	*!	*!		*
(b) ☞ /ko.nja.$_1$/				*
(c) /ko.ni.$_1$ja/		*!	*	
(d) /ko.ni.$_{11}$a/		*!		

From the analysis of Tableau 17, candidate (a) incurs two serious violations of *DIPH and *HIATUS. As already established in this study, Olutura does not allow diphthongs while HR is the motivation for the current analysis and so candidate (a) does not stand a chance of winning because of violating *DIPH by having two dissimilar vowels in the same syllable. Actually candidate (a) seems right even after violating DEP-(V) but its surface realization which syllabifies the epenthetic /i/ as a glide in the onset is what rules it out. Candidate (c) violates the general anti-insertion constraint *DEP-IO through the epenthesis of two segments that do not occur in the input. Candidate (c) also incurs a serious violation of *HIATUs by juxtaposing the vowel at the end of the second syllable to the glide at the start of the next syllable. The glide, in this case behaves like the vowel /i/ and so the two can not follow each other witout causing hiatus. Candidate (d) incurs a fatal violation of *HIATUS. This happens when the vowel /a/ is articulated as a separate zero onset syllable from the rest of the word. The winning candidate (b), violates the constraint DEP-IO(V) when the [+ high] vowel /i/ is inserted between the nasal /n/ and the [-high] vowel /a/. As opposed to both candidates (c) and (d), the syllabification and articulation of the [+high] vowel /i/

as part of the second CGV syllable is what is used to resolve the hiatus. In Olutura, vowel epenthesis as a strategy for HR only involves the [+high] vowel /i/ which is inserted before the low vowel /a/ which is relegated from the second position in the CV syllable to the third position in the resultant CGV syllable. The vowel epenthesis only involves Olutura verbs and it changes the syllable structure from CV to CGV.

3.5 Olutura Prothesis

Hyman (1975) defines prothesis as the addition of a sound to the start of a word or the prepending of phonemes at the beginning of a word without changing its morphological structure. The addition of a vowel or a consonant sound at the beginning of a word does not change its meaning, in most cases and so the basic meaning remains the same (Schane, 1973). Massamba (1996) posits that prothesis happens in order to either avoid segmental sequences that are complicated or consonant clusters that are not allowed word initially in a given language.The current study discusses this process with regard to single segments and also syllables using data from Olutura to test the perception that prothesis is meant to ease pronunciation. Massamba cites examples of Spanish data given by Hyman (1975) in which the vowel /e/ is inserted word initially so as to avoid initial consonant clusters like *sp* and *st* which are not allowed in Spanish. Akidah (2012) explains that some instances of prothesis are as a result of borrowing which forces a loan word to conform to the preferred syllable structure of the receiving language. The views by Massamba and Akidah are also tested in the current study and used to make conclusions on the cause(s) of prothesis in Olutura. Unlike Olutura, prothesis does not occur as a result of borrowing but in the grammatical category of person and it involves syllables or single sound segments as discussed in the following sub-sections. In Olutura, prosthesis is not just meant to ease pronunciation or avoid unwanted consonant clusters but, most importantly, it plays a grammatical function as it resolves hiatus at the morpho-phonemic word boundary.

3.5.1 Syllable Prothesis

In the noun class system, Olutura reports a 3rd class system which is a prefix that marks different aspects of the noun. These aspects indicate, for instance whether the object is [+ animate] or [-animate], plant or animal. Various CV syllables are prefixed to the stem to indicate these aspects as shown in the examples in 53. The prothesis of the CV syllable removes the unnatural pause that would otherwise occur.

53.CV noun class prothesis in Olutura

	Input	**CV syllable**	**Output**	**Gloss**
(i)	/sikombe +lala/	[si]	[sikombe **si**lala]	one cup
(ii)	/musala+lala/	[mu]	[musala **mu**lala]	one tree
(iii)	/mundu+lala/	[mu]	[mundu **mu**lala]	one person
(iv)	/imbwa+lala/	[nda]	[imbwa **nda**la]	one dog

It is interesting that aspects of the same occurrence in which the noun indicates singularity through the underlying Olutura input morpheme [**lala]** are realized through the prothesis of different CV syllables, particularly when the zero onset pre-prefix indicator is used, for instance, in the CV syllable /nda/ in [i.mbwa nda.la]. Indeed the input is the same for 53 (i) to (iv) but (i) and (iv) realize different outputs in the prothetic CV syllable. The different outputs are because of the emergence of different consonant elements in the onset. In fact the prefix for the different aspect of the noun [i.mbwa] is not a CV syllable but an onsetless V syllable. This shows that in Olutura the prefix indicating these different aspects of the noun is irregular.

When it comes to the morphological class of number, Olutura realizes only two instances of the CV syllable prothesis. The two are shown in 54.

54. CV syllables indicating number in Olutura

	Input	CV syllable	Output	Gloss
(i)	/sjaki +lala	/si/	[si.la.la.]	one
(ii)	/βi.ko.mbe+βiri/	/βi/	[**βi**.βi.ri]	two
(iii)	/βjaa.na+ne/	/βi/	[**βi**.ne]	four
(iv)	/βi.a.nwa+iŋgi/	/βi/	[**βi**.ŋgi]	many

The morphological class of possession is also realized through the multiple phonological processes of prothesis, epenthesis and glide formation, all at a go. This is shown using the Olutura examples in 55.

55. Multiple processes of possession in Olutura HR

Input	CV syllable	Output	Gliding	Gloss
(i) /ŋge/	/si/	[si+a+ŋge]	[s**j**aŋge]	mine (e,g, granary, match box.etc.)
(ii) /fwe/	/si/	[si+e+fwe]	[s**j**ef**w**e]	it is ours
(iii) /ŋge/	/ki/	[ki+a+ŋge]	[k**j**aŋge]	mine (e.g. ropes, loafs of bread, etc.)
(iv) /fwe/	/ki/	[ki+e+fwe]	[k**j**ef**w**e]	ours (many, e.g ropes)
(v) /ŋge/	/ku/	[ku+a+aŋge]	[k**w**aŋge]	mine (e.g. a rope, a loaf of bread, etc.
(vi) /ŋge/	/lu/	[lu+a+^{ŋ}ge]	[l**w**aŋge]	mine (e.g. a song
(vii) /ŋge/	/βi/	[βi+a+ŋge]	[β**j**aŋge]	mine (many) e.g. shoes
(viii) /fwe/	/βi/	[βi+e+fwe]	[β**j**ef**w**e]	ours (many) e.g. presents

From the output realizations in 55, /si/, /ki/ and /βi/ have been prefixed to the stem /nge/ in the phonological process of prothesis. These are then followed by the zero onset syllable /a/ or /e/ in the phonological process of epenthesis and lastly there is the glide formation of the two [+high] vowels /i/ and /a/ in the output. The glide formation happens when the [+high] vowel /i/ and /u/ are realized as glides in the first syllable of the output. The inputs that have /ku/ or /lu/ prefixed to the stem /ŋge/ undergo prothesis which is followed by the epenthesis of the zero onset syllable that leads to glide formation oi the output. The prothesis process in which a CV syllable is prefixed is vital here because anything contrary would not yield the correct word.

An OT analysis is done using the constraints in Tableau 19 to illustrate that the right candidate undergoes several processes to emerge the winner. The constraints that are used here are: MAX-1O IO(σ) to deal with syllables in the out that have no correspondents in the input. This is the constraint that should be violated by the winning candidate and should be dominated. The constraint *HIATUS is required in all cases of HR because it is what motivates the violation that the rest of the constraints in this analysis make in order that the right candidate is arrived at. *DIPH is also necessary for the sake of evaluating the vowels in the prefix and the stem that might create hiatus in the output. The vowels in these grammatical categories should not emerge as diphthongs, hence the *DIPH, which must be highly ranked to rule them out. DEP-IO is needed in this analysis to deal with the epenthesis that happens at the morpho-phonemic word boundary while NUC/GLIDE is meant to deal woth the process of glide formation that accompanies the process of prosthesis as a strategy for HR. The constraint ranking that stands in this case is; *HIATUS, *DIPH>> DEP-IO >> *COMP$_{\mathrm{ONS(LAB).}}$

Tableau 19: Olutura multiple processes constraint interaction

/ŋge/	*HIATUS	*DIPH	DEP-IO	*COMP$_{ONS(LAB)}$
a.[lu.a. ŋge]	*!		*	
b. ☞ [lwa. ŋge]			*	*
c.[lua. ŋge]		*!	*	

The analysis in Tableau 19 is such that candidate (a) makes a serious violation of *HIATUS and does not therefore stand a chance of winning. Candidate (a) also violates the general anti-insertion constraint DEP-IO by having the insertion of, not just a syllable, but also a vowel, both which are not represented in the input. Candidate (c) undergoes three violations and just like (a), makes one serious violation of *DIPH which makes it to lose out to candidate (b). The optimal candidate, (b) incurs two violation of DEP-IO and *COMP$_{ONS(LAB)}$ by having an output that has the insertion and also an onset that is internaly complex because is has the labialized /w/. The two violations are, however, not serious and so it wins. Candidate (b) actually goes through the three phonological processes of prothesis, epenthesis and gliding discussed in the preceding paragraph. Prothesis happens when a CV syllable is added in word initial position while epenthesis occurs with the insertion of the vowel prefix /a/ in the **SR** in 55. This is then followed by glide formation when the underlying [+high] vowel /u/ is realized as the glide /w/ and is syllabified as part of the onset in the first syllable of winning candidate [**lwaŋge**] from /luaŋge/.

3.5.2. Prothesis involving Phonemes

Vowel prothesis is the occurrence in which a vowel is inserted word initially so as to avoid initial consonant clusters that are not allowed in a language (Hyman (1975). However, it should be noted that this definition is not in quite appropriate to the kind of prosthesis that occurs in Olutura. In which prothesis used in the grammatical category of person. The vowel prothesis occurrence in Olutura happens when a vowel is put at the word initial position before the basic word. . In Olutura the prothetic vowel (in bold) occurs as the V2 at the morpho-phonemic word boundary and it is what gives meaning to the pair of words involved. This is shown in the examples in 56.

56. Vowel prothesis in Olutura

	UR	SR	Gloss
(i)	/ojo +ka:la/	[ojo **a**ka:la]	he is in his own world/ in a trance
(ii)	/esje +kula/	[esje **e**ŋgula]	I am buying
(iii)	/ewe +kenda/	[ewe **o**kenda]	you are walking
(v)	/ojo +xina/	[ojo **a**xina]	he is dancing
(vi)	/ewe +kona/	[ewe **o**kona]	you are sleeping

Vowel prothesis in Olutura is what manifests itself as the V syllable structure that was discussed in chapter 2. In this case, the V occurs in the phonological process of prothesis at word initial position. And is what gives meaning to the pair of words involved. This is the verbal prefix that changes the basic verb in the grammatical category of person. Prothesis involving consonants is shown in the examples in 57.

57. Consonant prothesis in Olutura

	Singular	Gloss	Plural	Gloss
(i)	/alja/	he is eating	/**β**a.lja/	they are eating
(ii)	/aɲwa/	he is drinking	/**β**a. ɲwa/	they are drinking

(iii)	/ola/	that one	/**β**a.la/	those ones
(iv)	/aβe:ja/	cheat	/**β**a.βe:ja/	they are cheating
(v)	/aβaja/	he s playing	/**β**aβaja/	they are playing

In the examples in 57, consonant prothesis changes the verb from singular to plural form. In Olutura, any vowel may occur in the singular form, but in the plural, the consonant that is used in the prothetic form is always the labio-dental fricative /β/. An OT analysis of consonant prothesis is done using the Outura input */-ola/* in Tableau 19. In this dialect, different consonants can be prefixed to this input to get words with different meanings. Since prothesis is about insertion, the constraint against insertion of consonants DEP-IO(C) must be dominated by the markedness constraints although ideally it should be dominated by the faithfulness constraint against insertion of whole syllables MAX-IO(σ). MAX-IO(σ) is important in the current analysis to take care of occurrence of candidates with insertions of more than one segment. This gives rise to the ranking *HIATUS, *DIPH >> MAX-IO(σ) >> DEP-IO(C).

Tableau 19: constraint interaction in Olutura consonant prothesis

/ola/	*HIATUS	*DIPH	MAX-IO(σ)	DEP-IO(C)
a. ☞[βo.la]				*
b.[βi.o.la]	*!		*	
c. /[βio.la]		*!	*	

In the interaction of the constraints in Tableau 20, candidate (b) incurs one serious violation of *HIATUS by having two dissimilar vowels adjacent to each other but in different syllables and this is what makes it to lose out. Candidate (b) also violates MAX-IO(σ) by inserting a syllable that is not in the input. Candidate (c) also makes one serious violation of *DIPH by having two dissimilar vowels in the same syllable which Olutura does not allow in its phonology besides violating DEP-IO by having two segments that are not represented in the input. The winning candidate (a) makes one violation which is not serious because the constraint is lowly ranked. It violates DEP-IO(C) by the prothesis of a consonant that does not occur in the input. This is a necessary violation as it results in the required word.

3.6 Olutura Elision

Giegerich (1992) defines elision as the deletion of one or more sounds, such as a vowel, a consonant or a whole syllable in a word or a phrase. As discussed in the literature review in chapter 1, instances of vowel elision have been reported in some Bantu languages. Some of the Bantu languages that use elision as a repair strategy in their phonotactics delete either V_1 or V_2 in all hiatus resolution cases while others delete V_1 or V_2 in different circumstances. The fact that many scholars argue for the deletion of V_1 was also mentioned. The four environments in which elision takes place as an HR strategy in Olutura were also discussed in chapter 1, section 1.7.4. Olutura is one of the languages in which there is the elision of both V_1 and V_2. The environments in which the vowels are elided in Olutura is discussed in the subsequent sections. In this section, the numerals 1 and 2 are subscripted to the outputs in the analyses to indicate the vowels at the end and beginning of the lexical or function word, as the case may be. This is what clearly shows the vowel that is not elided in the surface form.

3.6.1 V_1 Elision

In Olutura, the elision of V_1 has two instances; one is that V_1 is elided when a function word precedes a lexical word while the second instance occurs when the function word comes after the lexical word. The two occurrences are shown in the examples in 58 (a) and (b) respectively.

58. Olutura V_1 elision

(a)

	UR	**SR**	**Gross**
(i)	/ojo$_1$+e$_2$tsa/	[oje$_2$:tsa]	That one is coming
(ii)	/ejo1+e$_2$ndaji/	[eje$_2$:ndaji]	That one is good
(iii)	/ejo$_1$+a$_2$ŋge/	[eja$_2$:ŋge]	That one is mine

(b)

(i)	/embwa$_1$+$_2$eji/	[embwe$_2$:ji]	that dog
(ii)	/omwana$_1$+o$_2$jo/	[omwano$_2$:jo]	that child
(iii)	/omulaji$_1$+ o$_1$kwo/	[omulajo$_{2:}$kwo]	the nice one
(iv)	/murambi$_1$ +o$_2$kwo/	[murambo$_{2:}$kwo]	that long one

The elision of V_1 in Olutura is only similar to the observation by Casali (2011) in one instance in which the elision of V_1 occurs when the function word precedes the lexical word. The words in the examples in 58 (a) are either a basic verb, an adjective or a pronoun and a demonstrative. In the examples in (a), V_1 which is the vowel attached to the 2nd syllable in the function word is deleted, leaving V_2 which is the vowel in the zero onset and first syllable of the verb, adjective or pronoun. In the examples in 58 (a), the mid low vowel /o/ deletes leaving the mid low front vowel /e/ and the low vowel /a/. This shows that in Olutura the elision of V_1 can be of a mid vowel so that what is seen in this case is a back to front kind of deletion owing to the fact that the back vowel /o/, which is on the right elides and leaves the front one, /e/ which is on the front of the conventional vowel trapezium. Unlike a language like Lubukusu as reported by Nandelenga (2013), in Olutura, high vowels also participate in the process of elision (see 58 (b) (iii) and (iv).

Deletion of V_1 also occurs when the function word comes after the lexical word as shown in 58 (b). In examples (i) and (ii), the words /embweji/ and /omwanojo/ which are common nouns, the [+low] vowel /a/ is deleted and leaves the [-low] vowels /e/ and /o/. In example (iii), the word in which V_1 occurs is an adjective just like in example (ii) in 58(a). However, the adjectives in the two examples occur after and before the demonstratives, respectively. Thus, when the adjective comes before the demonstrative, the V_1 that deletes is in the lexical word; but if it comes after the functional word the V_1 that deletes is in the functional word. Therefore, V_1, which happens to be at the final word position, is targeted for deletion, irrespective of whether the vowel occurs in the lexical or functional word. V_2, which is at word initial position is preserved. At this point, this study is in agreement with the observation by Beckman (1997) that the word initial position is a prominent position which has the burden of language storage, retrieval and processing and, therefore, many languages tend to protect it.

In 58 (b) the deletion occurs between the noun, that is, the lexical word, and the demonstrative, that is, the function word. In this case, the V_1 that is the nucleus of the noun, is what gets elided. The output shows that V_1 deletes in quick speech when two words from different word classes end up as one in the phonotactics of Olutura. In the examples in 58 (b), V_1 is the low vowel /a/ in the second CV syllable of the noun while V_2 is either the mid back vowel /o/ or the mid front vowel

/e/. There is the elision of the [+low] vowel /a/ while the mid vowels are left intact in the output. Examples 58 (b)(iii) and (iv) show that elision also targets the [+high] vowel /i/ which leaves the [-high] vowel [o]. It was observed that the elision process in Olutura that targets V_1 always ends up with the preservation of the [-high] vowels /o/ or /e/. An algorithm to this effect can be stated as in 59.

59. Olutura elision rule

elision of [+high,+low] vowels $\rightarrow$[mid] vowels

The best way to show the vowel that gets elided is using constraint interaction in OT. Following leads by Casali (1997) and Wasike (2004) we have used the constraints *HIATUS, *DIPH because they are important in analyses where elision is targeted as a process that leads to the desired syllable structure. Therefore, in the analysis in Tableau 21, the constraints HIATUS and *DIPH must be un-dominated because Olutura does not allow hiatus in this case and diphthongs are ruled out in phonology. The ranking that is adopted in this set of constraints is as follows: *HIATUS,*DIPH >>MAX_{FUNC} >>$MAX_{LEX..}$ *HIATUS, in this case, is the constraint that triggers the elision of V_1 and must not be dominated.

Tableau 21: Olutura V_1 elision

Input /omwana$_1$+o$_2$jo/	*HIATUS	*DIPH	MAX-IO$_{FUNC}$	MAX-IO$_{LEX}$
a.[o.mwa.na.$_1$.o$_2$jo]	*!			
b. ☞ [o.mwa.no$_2$.jo]				*
c.[o.mwa.na$_1$.jo]			*!	
d.[o.mwa.na$_1$o$_2$.jo		*!		

Candidate (a) violates *HIATUS by having the very structure that Olutura is trying to do away with because it fails to elide either V_1 or V_2. This is a serious violation and so it fails to win. Candidate (c) incurs violates MAX-IO $_{FUNC}$ by deleting V_2 which is the verb from the function word. This is what makes this violation gross because it is the verb that Olutura needs in this case to resolve hiatus and that is why (c) loses.Candidate (d) also incurs a gross violation of the constraint *DIPH because it has an output that syllabifies V_1 and V_2 in the same syllable, a structure that does not occur in Olutura and so it loses to (a). Candidate (a) violates MAX-IO$_{FUNC}$ by its elision of V_1 from the lexical word. This is what Olutura needs as an HR strategy to have the right syllable structure.

3.6.2 V_2 Elision

Vowel elision in most Bantu languages targets V_1. Olutura is one of varieties of the Luyia continuum in which the process of elision also targets V_2 at the morpheme boundary. This, just like with the deletion of V_1, the deletion of V_2 also involves a lexical and a functional word at the word morpheme boundary. The environment in which V_2 is elided is the same as the elision of V_1; V_2 elision occurs at the boundary between a lexical and a functional word and it does not matter which of the words comes first; the elision will take place on the first vowel of the second word. This is exemplified in 60.

60: V_2 elision

(a) Olutura function word V_2 elision

	UR	**SR**	**Gloss**
(i)	/e.mo.n.i$_1$+e.$_2$jo/	[e.mo.ni.$_1$jo]	that eye
(ii)	/mu.ndu.$_1$+o.$_2$jo/	[mu.ndu.$_1$jo]	that person
(iii)	/mu.fu.mu.$_1$+o.$_2$no/	[mu.fu.mu.$_1$no]	this prophet
(iv)	/i. ŋgu.βo$_1$ +i.$_2$ɲu.mu/	[i. ŋgu.βo1ɲu.mu]	a dry cloth
(v)	/i.mbwa$_1$+i.$_2$nda.ji/	[i.mbwa$_1$.nda.ji]	a good dog

(b) Olutura lexical word V_2 elision

	Input	**Output**	**Gloss**
(i)	/xu$_1$+e$_2$sii.ro/	[xu.$_1$si:.ro]	at the market
(ii)	/xu$_1$+i.$_2$mo.ni/	[xu.$_1$mo.ni]	on the eye
(iii)	/o.li$_1$+i.$_2$ŋgo/	[o.li.$_1$ŋgo]	are you at home?
(iv)	/o.li.$_1$+o.$_2$mu.la.mu/	[o.li.$_1$mu.la.mu]	are you fine?

(v) /o.ju$_1$+o.$_2$mwi.fi/ [o.ju$_1$mwi.fi] this one is a thief

The examples in 60 show the deletion of V_2 from either the lexical or the function word. In the examples in 60(a), the vowel that is elided is V_2 which is from the function word that is a demonstrative, while in the examples in 60(b), the vowel that elides is V_2 which is from the lexical word which is a noun.

The elision of V_2 is analyzed using the OT approach is shown in Tableau 22. The same constraints as those used in the elision of V_1 are used. The OT constraints used in the discussion of the process of elision are in line with Casali (2011), McCarthy (2002) and Sabao (2013). In Tableau 22, the constraint MAX_{FUNC} must dominate MAX_{LEX} because in Olutura, and in the current case, it is better to delete the vowel from the lexical word than the function word. The constraint MAX_{LEX} is relevant in the analysis to trigger the constraint conflict that must be there between competing constraints because the morpheme from which the vowel deletes can either be a lexical or functional. The ranking of the constraints is: *HIATUS, *DIPH >> MAX_{FUNC} >> MAX_{LEX}.

Tableau 22: Olutura V_2 elision

/xu$_1$+i.$_2$mo.ni/	*HIATUS	*DIPH	MAX-IO$_{FUNC}$	MAX-IO$_{LEX}$
a.[xu$_1$.i$_2$mo.ni]	*!			
b. ☞ [xu.$_1$mo.ni]				*
c.[xu$_1$i.$_2$mo.ni]		*!		
d.[xi.$_2$mo.ni]			*!	

From the analysis in Tableau 22, candidate (a) make a serious violation of *HIATUS beacause of its failute to elide either V_1 or V_2. Candidate (c) makes a serious violation of *DIPH by having two vowels that are not similar in the same syllable and that is why it can not emerge as a winner. Candidate (d) also fails to resolve hiatus when it elides V_1 which is the vowel that Olutura needs to retain so as to do away with hiatus in the current analysis. This now leaves candidate candidate (b) to emerge as the winner through its violation of the lowest ranked constraint in the hierarchy, MAX$_{LEX}$. Its violation of MAX$_{LEX}$ is necessary because this is what results in the elision of V_2 as opposed to that of V_1 by the optimal candidate in Tableau 22.

According to McCarthy (2002), the deletion of segments from lexical morphemes is not favoured in many languages and it only happens when other phonological processes like gliding fail. The case for Olutura is such that even if gliding is possible in the examples (i) and (ii) in 62(b), the elision of V_2 would still take place. That is why the analysis in Tableau 22 is similar to that of

Tableau 21 and the only difference is the change of places between the lexical and function word. It was observed that the mora place of the vowel that elides is lost because there is no compensatory lengthening in the output. This is unlike the process of coalescence discussed in Section 3.2 in which the vowel in the input lengthens.

3.7 Conclusion

From the results, Olutura has two types of coalescence, the first one is identity coalescence which has two sub-types in which two different vowels merge into one intermediate vowel and two vowels in the input are replaced by either of them in the output. In this case a [+low] vowel and [+high] vowel merge into a mid vowel in the output and a [+ low] vowel and a mid vowel merge into a mid one. The second type is identity coalescence in which the SR maintains the features of the vowel in the UR . From these findings, it can be concluded that coalescence in Olutura is onset driven and occurs at the word boundary. The results of the study were able to confirm part of the observation by Harford (1997) that in coalescence, vowels change and sometimes shorten. Apart from this, it can also be concluded that coalescence in Olutura results in the formation of long vowels in the output. As far as the process of glide formation is concerned two observations were made; the first one is that glide formation in Olutura may or may not result in compensatory lengthening, and, the second one is that the dialect allows complex onsets involving /w/.

The findings of the study further show that the process of epenthesis in Olutura involves entire syllables, vowels or consonants. The epenthesis of CV syllables is morphologically motivated and is determined by the grammatical category of case, noun class, number and possession. It was also established that the epenthesis of CV to a zero onset syllable is used as a strategy for HR while vowel epenthesis is used to repair inputs that fail to conform to the phonotactics of Olutura. The results also show that the epenthesis of vowels also causes meaning change in Olutura.

In the process of prothesis, the findings show that in Olutura, there is the insertion of syllables at word initial position. Contrary to the view by Massamba (1996), prothesis in Olutura is not used to avoid unwanted consonant clusters as is the case with Spanish although it creates an extra onsetless syllable in both cases. In Olutura, prothesis involving vowels changes the basic verb in the grammatical category of person while that of consonants changes the verb from singular to plural.

The conclusion in this chapter regarding the phonological process of elision is that the elision of both V_1 and V_2 occurs in Olutura and the vowel that elides can be from either the lexical or function word. Unlike the observation by Casali (1997) that V_1 elides when the function word precedes the lexical word, in Olutura V_1 also elides when the lexical word comes before the function word. The results confirm that OT constraint ranking has the capability of using language specific data to show how phonological processes in a language constrain syllable formation. The processes of coalescence, prothesis, epenthesis, elision and glide formation complement each other in HR so as to arrive at the structural requirements of Olutura. The general conclusion in this chapter is that Olutura allows hiatus for semantic reasons although this is a marked occurrence and that is why the dialect uses the phonological processes discussed here to avoid it. This is as per Casali (2011) who posits that some languages that allow hiatus place strict limits on the contexts in which it may occur.

CHAPTER 4

THE PRE-NASALIZED SYLLABLE ONSET

4.1 Introduction

This chapter deals with the fourth objective of this study by discussing constraint interaction in the formation of the pre-nasalized syllable onset. The occurrence of the NC in Olutura is first discussed to establish the segments that constitute its onset in Olutura. This is then followed by an examination of the sound sequences that are prohibited in the NC onset and the phonological processes involved in the formation of this onset in Olutura. The prenasalized syllable onset is composed of a nasal segment and another consonant that is not a nasal; hence (NC). In section 1.7.4 the different definitions pertaining to NC sound sequences were alluded to. In particular, Young (2011) identifies four types of prenasalized consonants from which this study adopts the type II NC type. The type II type considers NC segments as derivations that function as a unitary segment. This means that in Olutura, NC segments are derived through the application of phonological rules which fuse a nasal and another consonant to have an output that behaves like a single segment. The process that takes place in the fusion of NC segments is that of assimilation because the following consonant assimilates to the nasal, hence the prenasal sound. A new constraint, *SA has been introduced in the current study to deal with the phonological process of SA. In this case, the constraint SA is important in the evaluation of the nasal and liquid sequences in which a sound alternation from a liquid to a different consonant was observed in Olutura.

Prenasalization is a surface realization of an underlying feature specification [+voice] (Hayes, 1989, Hyman, 2001). N-is an underlying prefix that Olutura uses to indicate the first person singular. The observation by Padgett (1995) and Hayes &Stivers (2000) that cross linguistically, nasals are always elided when they occur as prefixes before voiceless fricatives is tested using Olutura data in this chapter. The data in 61 has been used to exemplify the process of prenasalization in Olutura.

61. Olutura prenasalization

	UR	SR	Gloss
(i)	/N-kula/	[ŋgu.la]	I am buying
(ii)	/N-lira/	[ndi.ra]	I am crying
(iii)	/N-βaja/	[mbaja]	I am playing
(iv)	/N-ti:ra/	[ndi:ra]	I am holding
(v)	/N-te:xa/	[nde:xa]	I am cooking

The Olutura data in 61 is in line with the argument introduced in chapter 1, section 1.7.4 by Tak (2011) that prenasalized consonants should be analyzed as single phonological units that are assumed to be derived from two underlying segments.

4.2 Prohibition of a Nasal and Fricative Onset

The occurrence in which a nasal is followed by a fricative, whether voiced or voiceless is not permitted in Olutura. In the case of a nasal and fricative sequence, the nasal cannot combine with the voiced fricative /β/ as is the case with the nasal and voiced plosive. It ahould be noted here that the underlying sound for /β/ in Olutura is actually /v/ and not /b/. Olutura has three fricatives, namely /s/, /f/ and /x/. In the phonotactics of Olutura, the two strategies of elision and epenthesis are employed to avoid the marked sequence of a nasal and a fricative. In Olutura /N-/ is a prefix that can be attached to different root words with any consonant it its phonology. However, when /N-/ is likely to occur together with consonants that would result in combinations that are marked, then the phonotactics of Olutura have to repair such combinations using either elision or epenthesis. The examples in 62 show the occurrence of the two phonological processes of elision and epenthesis which are used to repair combinations that are not valid.

62. NC sequence formation in Olutura

(a) Elision in NC sequences in Olutura

	UR	**SR**	**Gloss**
(i)	/N+sala/	[sa.la]	vomit
(ii)	/N+xira/	[xi.ra]	defeat
(iii)	/N+fisa/	[fi.sa]	hide
(iv)	/N+xina/	[xi.na]	dance
(v)	/N+funa/	[fu.na]	harvest

(b) Epenthesis in NC sequences in Olutura

(i)	/N+sa.la/	[ni.sa.la]	if I vomit
(ii)	/N+xi.ra/	[ni.xi.ra]	if I defeat
(iii)	N+fi.sa/	[ni.fisa]	if I hide
(iv)	/N+xi.na/	[mu.xi.na]	you are dancing (plural)
(v)	/N+fu.na/	[mu.fu.na]	you are harvesting (plural)

In 62(a), the process of elision is used to ensure that a nasal sound segment is not immediately followed by a fricative sound segment and it is therefore, not syllabified as part of the onset in the initial word position because it would result in sequences such as **'nsala'** which are prohibited in Olutura. Olutura, therefore, avoids such sequences by using the phonological process of elision in which the prefix N- is elided to leave the words in the output in 62(a). The process of elision them works together with that of epenthesis to have the words in the output in 62(b). In this case the vovel /i/ is epentheted so as to have the first person category. An OT analysis of the elision process and the relevant constraints is illustrated in Tableau 23.

The constraints that are relevant in this case are, *NC, which prohibits the combination of nasals and voiceless consonants in a syllable. HNUC is necessary for the evaluation of the candidates that should occupy the nucleus of a syllable. PEAK-C is useful to ensure that any onset that forms a syllable must have a vowel which is the nucleus forming element that is compulsory in a syllable. The constraint is meant to check against the deletion of segments from the input. The constraints are ranked as follows:*NC >>HNUC, PEAK-C >> MAX-IO.

Tableau 23: Olutura N + Fricative Prohibition through elision

/N+funa/	*NC	HNUC	PEAK-C	MAX-IO
a./nfu.na/	* !			
b. ☞/fu.na/				*
c./nf.na/		*!		
d./n.fu.na/			*!	

The analysis in Tableau 23 shows that candidate (a) makes a serious violation by combining a nasal with a fricative and so it loses. Candidate (c) loses because of having consonant in nucleaus position and as such, with the wrong sonority.Candidate d violates PEAK-C by having a syllable without a nucleaus which is a serious violation.The winning candidate, (b) incurs only one violation of the lowly ranked MAX-IO. This is through the elision of the nasal consonant prefix. The fact that MAX-IO is ranked as the lowest means that in Olutura, it is better to delete the nasal that to syllabify it with a voiceless fricative.

It is noted that some Bantu languages like IsiXhosa allow a nasal to be followed by a voiceless fricative, for example in /imfazwe/ (rain) (Oosthuysen (2016). In the case of Olutura, the interaction of constraints in Tableau 23 show that the dialect prefers the elision of the nasal prefix /N-/ instead of having a fricative come after it. This is in line with Ohala, (1995) and McCarthy (2002, 2004) who argue for the deletion of the nasal using articulatory phonetics. This means that the fricative needs more air to articulate it and this forces most of the air to pass through the oral cavity than nasal cavity. This is what leads to the deletion of the nasal rather than the fricative sound.

The data in 64(b) shows how prohibition of nasal and voiceless sequences takes place through the phonological process of epenthesis. This happens when a vowel is inserted between the nasal prefix /N-/ or /M-/and the first CV syllable of the root word. This creates another CV syllable instead of having a complex syllable with a CC onset and in turn makes the output longer by getting an extra mora. The process of epenthesis involving the nasal prefix causes the root to change to either the 1st person grammatical category or the plural in Olutura. If the word in the **SR** is in the 1st person, then the vowel that is inserted in the output should be the [+high] front vowel /i/ as in example (i) in 64(b); but if the **SR** is in the plural, then the vowel that is inserted is the [+high] back vowel /u/. This occurrence leads to our conclusion that the epenthesis process in this case only involves high vowels.

The process of epenthesis to remove NC cominations in Olutura is exemplified using the input /N-fisa/ in Tableau 24. Only three constraints are needed in this analysis. The constraint *NC is used to evaluate the occurrence of nasal and voiceless obstruent sequences which are not allowed in Olutura phonology. In this case, *NC must dominate all the other constraints in this set because it is the one that is responsible for their violation. The constraint MAX-IO is used in this evaluation to deal with deletion of segments which is likely to occur and so it should be ranked higher than DEP-IO(V) because deletion is not an option in the current case. As discussed in 3.6, deletion is one of the strategies that Olutura uses to get words with different meanings. MAX-IO should be ranked higher than DEP-IO(V) which is targeted for violation by the winning candidate. DEP-IO(V) is important in this analysis so as to evaluate the insertion of vowel segments. This constraint must be ranked low because vowel insertion is needed in the epenthesis processes that is targeted to remove unwanted combinations in this case.

Tableau 24: Olutura N + Voiceless Prohibition through epenthesis

Input /N-fi.sa/	*NÇ	MAX-IO	DEP-IO(V)
a. ☜ /fisa/		*	
b. ☞/nifisa/			*
c./nfi.sa/	*!		

The nasal prefix /N-/ is treated as a segment that is added in the phonological process of prothesis and is therefore syllabified in the onset. The analysis of Tableau 24 shows that candidate (a) violates MAX-IO by removing the prefix /N-/, an output which, as seen in Tableau 23, is also optimal because Olutura also uses elision to get the right syllable structure. However, it is not the targeted word in the current analysis because much as it looks valid, it already exists in the phonology of Olutura whose phonotactics now need a different word through epenthesis. The mark that shows the selection of a wrong candidate is, therefore, used to show that although (a) is well constructed in Olutura phonology, it is not the optimal candidate in the current case. The optimal candidate, (b) has to violate DEP-IO(V) in order to win. This is not a serious violation because, as seen in 3.4.1.3, vowel epenthesis is one of the common strategies that are used to resolve nonconforming sound sequences in Olutura.

4.3 Prohibition of a Nasal and Liquid Onset Cluster

The liquids /r/ and /l/ are very common in the phonology of Olutura. However, unlike English in which the two can either be syllabic or nonsyllabic, /r/ and /l/ are only capable of forming the onset in Olutura. This is the reason why this dialect does not allow the two to form a sequence with either of the nasal sounds that occur in the language as illustrated in the last column of 63 which also shows the occurrence of the liquids in Olutura.

63. Olutura nasal liquid prohibition

	UR	Gloss	SR	Gloss	prohibited sequence
(i)	/rula/	come out	[ndu.la]	I come out	[* nru.la]
(ii)	/rusia/	remove	[ndu.sja]	I remove	[*nru.sia]
(iii)	/loka/	bewitch	[ndo.ka]	I bewitch	[*nlo.ka]
(iv)	/laama/	pray	[na:.ma]	I pray	[*nla.ma]
(V)	/ruma/	send	[ru.ma]	I send	[*mru.ma]

Olutura uses the two strategies of prothesis and SA to deal with the occurrence of an onset sequence in which a nasal is immediately followed by a liquid. The strategy that is used between the two depends on the grammatical category of person or the context in which one is speaking. The basic verbs in 64 are used to show how the two strategies of SA and prothesis are used to deal with the occurrence of sequences like */nr/ */mr/ which the dialect under study does not allow.

64: Olutura SA and prothesis

	UR	SR	Gloss	SR	Gloss
(i)	/rusia/	[ndu.sja]	I remove	[ni.ru.sja]	if I remove
(ii)	/ruma/	[ruma]	I send)	[mu.ru.ma]	you send (2^{nd} person)
(iii)	/lira/	[ndira]	Iam crying	[ni.ndi.ra]	if I cry

In example 64 (i), it is noted that SA takes place in reference to the first person which generally means 'remove' while prothesis of a syllable is used to impose the condition seen in the prefix '**ni**' (if). In example 64 (ii), the prothetic syllable /mu-/ is used to bring out the plural (2^{nd} person).

Constraint interaction in OT is used in Tableau 25 to show how the undesired consonant segment sequence of a nasal and a liquid is avoided in the onset in Olutura. *NC which is the general constraint that prohibits the occurrence of nasals and obstruents in the onset together, is relevant in this analysis due to the evaluation of the nasal liquid sequence as per Pater (2001). It helps in the evaluation of harmony so as to arrive at the right candidate because in Olutura, the sequence of a nasal and any obstruent sound segment is marked. *NC should be ranked high because it is one of the constraints that prompt the violation of other lower ranked constraints. The constraint $SSP_{PLATEAU}$ is necessary here because it evaluates the emergence of sequences that have the same manner of articulation which should not form a cluster in Olutura onsets. The combination of a nasal and a liquid, which is the subject in the current discussion, forms a sonority plateau and so the constraint $SSP_{PLATEAU}$ prevents this occurrence. The constraint $SSP_{PLATEAU}$ should be ranked higher than *SA because it causes the violation of the latter and the faithfulness constraints by demanding that there should be harmony in the consonants that occur in the onset. The two faithfulness constraints IDENT-IO and IDENT-IO$_{NAS}$ are the ones that demand that there must be a different sound segment in the output and as such, must be ranked above the markedness constraint *SA. The constraint *SA is ranked low because sequential alternation is allowed in Olutura. The general faithful constraint IDENT-IO alone is not enough to yield the desired results and this calls for the inclusion of another faithful constraint IDENT-IO$_{NAS.}$ This constraint is the one that causes the occurrence of a cluster in the prenasalized onset. This constraint is useful in the evaluation of the emergence of the prenasal sound segment which the phonotactics of Olutura allow as is seen in the emergence of the optimal candidate. The constraints that are involved in this analysis are, therefore, ranked as follows: *NC, SSP$_{PLATEAU}$ >> *SA >> IDENT-IO$_{NASAl.}$

Tableau 25: Olutura N + Liquid Probibition

/lira/	*NC	SSP$_{PLATEAU}$	*SA	IDENT-IO$_{NAS}$
a.[nli.ra]		*!		*
b. ☞ [ndi.ra]			*	*
c.[nti.ra]	*!		*	*

The analysis in Tableau 25 shows that candidate (a) incurs two violations of SSP$_{PLATEAU}$ and IDENT-IO$_{NAS.}$ Candidate (a)'s violation of SSP$_{PLATEAU}$ is fatal because it leads to a sequence in the output that is completely ruled out in Olutura. Its violation of IDENT-IO$_{NAS}$ is not serious because the constraint is lowly ranked and the violation does not have serious consequences. Candidate (a) does not win because of its gross violaton of SSP$_{PLATEAU.}$ Candidate (c) makes three violations, one of which is a serious one. The candidate violates the general faithfulness constrain

*SA by having an output that deviates from the one in the input through its replacement of the liquid /l/ with the alveolar voiceless /t/. Candidate (c) also violates the constraint IDENT-IO_{NASAL} by the prothesis of the nasal /n/ which is not represented in the input. These two violations are not serious and the violation of the markedness constraint *NC is what makes candidate (c) to lose out because the constraint is highly ranked. The winning candidate, (b) also makes two violations of *SA and IDENT-IO_{NAS}. However, these violations are lowly ranked and that is what enables it to emerge as a winner. The shading of the cells with the violated constraints in Tableau 26 is used to indicate that their violation is inconsequential. This means that the winning candidate must necessarily violate the two because the phonology of Olutura allows the sound sequences involved in order to have the optimal syllable in the current analysis. That is the reason why candidate (b) emerges as the optimal candidate.

4.4 Prohibition of a Nasal and Bilabial Voiceless Plosive Onset

In Olutura, the onset sequence in which a nasal is followed by a bilabial voiceless plosive is not allowed. It was established in chapter 2 that Olutura does not have the voiced bilabial plosive /b/ in its inventory as a single segment. Its voiceless counterpart does occur although it does not combine with the nasal pre-fix /N-/ and such a sequence is marked in this dialect. The voiced bilabial plosive is the one that combines with the nasal prefix /N-/ to form the prenasalized sound /mb/ which is very common in this dialect. The fusion of the bilabial nasal /m/ and the bilabial plosive in Olutura results in the single segment shown in Figure 20.

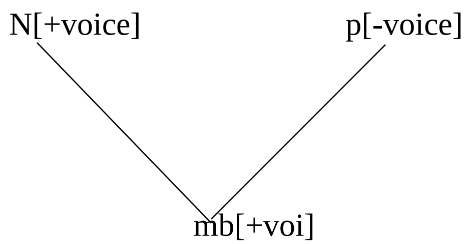


Figure 20: Olutura NC fusion

Figure 20 shows that the voiceless consonant assimilates to the voiced nasal. This is what results in the markedness, and hence prohibition of the occurrence of a nasal and a voiceless consonant, (*NC in Olutura).

We have used OT constraint interaction in Tableau 26 to show how Olutura allows /mb/ but not */mp/. The constraint *NC is relevant for the same reasons given in section 4.2. IDENT-IO$_{\mathrm{NAS}}$ is important in the analysis because it must be ranked below *NC in order to give an edge to the winning candidate. The constraints IDENT-IO$_{\mathrm{BIL}}$ and *NC$_{\mathrm{ALV}}$ have been introduced in the current analysis to deal with the segment alternation between the input and output. This is because no suitable constraints were found in already existing literature to deal with the assimilation of bilabials and alveolars to nasals. IDENT-IO$_{\mathrm{BIL}}$ means that both the input and output should be identical in terms a bilabial segments while NC$_{\mathrm{ALV}}$ means that the combination of a nasal and an alveolar consonant is not allowed. The fact that /n/ changes to /m/ in the output means that in Olutura, faithfulness to bilabial nasal is ranked below faithfulness to alveolar nasal. This is the reason why the constraints IDENT-IO$_{\mathrm{BIL}}$ and *NC$_{\mathrm{ALV}}$ are necessary in this analysis. This yields the ranking *NÇ, PEAK-C, *NC$_{\mathrm{ALV}}$ >> *NC, IDENT-IO$_{\mathrm{BIL,}}$ IDENT-IO$_{\mathrm{NAS}}$.

Tableau 26: Olutura /*mp/ Prohibition

/N-pa:ra/	*NÇ	PEAK-C	*NC$_{ALV}$	*NC	IDENT-IO$_{BIL}$	IDENT-IO$_{NAS}$
a. [npa.ra]	*!					
b. ☞ [mba:.ra]				*	*	*
c.[m.pa.ra]	*!	*!			*	
d.[nba.ra]			*!	*		
e. [mpa.ra]	*!			*!	*	

The analysis of Tableau 26 shows that four out of the five candidates incur serious violations and are, therefore, eliminated right away. Candidate (a) violates *NÇ by having a sequence of a nasal followed by a voiceless bilabial stop. More serious is the candidate's violation of IDENT-IO (bilabial) which results in a sequence that does not occur in Olutura. Candidate (c) incurs two serious violations of *NÇ and PEAK-C. The violation of PEAK-C by candidate (c) causes hiatus which Olutura resolves using the phonological process of epenthesis discussed in Section 3.3.3. The violation of *NC$_{ALV}$ results in a sequence that is prohibited in this dialect and for which the constraints ranked below it are there to help avoid. Candidate (d) makes two violations, one of which is inconsequential but the other is a serious one; that is, the violation of *NC$_{ALV}$ because it results in a prohibited sequence in Olutura which does not allow the alveolar nasal to combine with any bilabial stop. Candidate (e) violates *NÇ, IDENT-IO$_{BIL}$and IDENT-IO$_{VOI}$. In fact candidate (e) is a likely competitor with the winning candidate and only loses out because of incurring a serious violation of IDENT-IO_{VOI}. Candidate (b) makes the most violations, but since none of them is serious, it emerges as the winner. Its violation of the constraint IDENT-IO_{BIL} and *NC is important because this is what gives it an edge over its close competitor (e).

While prohibiting the [+nasal] and voiceless plosive sequence, Olutura allows the voiced plosive /b/ to form an onset with only the bilabial nasal /m/ and not the alveolar nasal /n/. It was further observed that although the underlying pre-nasal is /N-/ as seen in the input, the output will still be /mb/ and not /nb/. However, if the nasal prefix is an underlying /m/ as it is the case with the output in the plural, then uniformity with the input in terms of voice is maintained but with an intervening vowel as per the phonotactics of this dialect. Both consonants /b/ and /m/ are voiced and this means that they are articulatorily easier to combine than /*mp/. This is similar to what is shown in Tableau 24 by the winning candidate using the occurrence of /f/. Using constraint interaction, we exemplify how the nasal /m/ still occurs in the same environment with the bilabial voiceless plosive /p/ albeit with the intervention of a vowel. In Tableau 27, the input */paa.ra/* (think), is realized as [**mupa:ra***]* and not */**mubaara/**. The output is realized with [+voice] as /mb/ in the singular but [-voice] as /mupara/ in the plural. OT constraint interaction is used in Tableau 27 so exemplify how the sequences alternate in order to avoid the combination of a nasal and a voiceless bilabial stop /p/ in Olutura phonology.

In the analysis in Tableau 27, and contrary to Tableau 26, the constraint *NC must be ranked high because it is the cause of all the violations that the other constraints incur. The constraint IDENT-IO_{VOI} is needed in the current analysis to deal with the emergence of sequences with voiced bilabials in the onset. This constraint should be ranked high because it is the cause of the violations the constraints below it. The constraint DEP-IO(σ) is meant to deal with the occurrence of syllables that are not represented in the input. The constraint *SA which prohibits the alternation of sequences between the input and output is important for the evaluation of sounds that are different in the output. This constraint should be ranked lower than IDENT-IO$_{VOI}$ because SA is very important in the current situation. This is because Olutura equally needs an alternation of sequences and the insertion of a whole syllable in order to get the output. Both IDENT-IO$_{VOI}$ and *SA are important because the alternation of segments alone is not enough, but the fact that the segment in the input must be voicelss. The constraints in this hierarchy set are ranked as *NC, *IDENT-IO$_{VOI}$ >> *SA, DEP-IO(σ).

Tableau 27: Constraints interaction in Olutura bilabial SA

/mba:ra/	*NÇ	IDENT-IO$_{VOI}$	*SA	DEP-IO(σ)
a.[mu.ba:.ra]		*!	*	*
b. ☞ [mu.pa:.ra]			*	*
c. [mba:.ra]	*!			

Candidate (a) violates DEP-IO(σ) by inserting a syllable which is not represented in the input and *SA by having a different sound from that in the input. It also incurs a serious violation of IDENT IO$_{VOI}$ and does not stand a chance of winning. Its violation of the constraint is gross because the discussion in chapter 2 shows that Olutura does not have the voiced bilabial stop /b/ and cannot, therefore, constitute an onset in this dialect. Candidate (c) incurs a serious violation of *NC by preserving the input which Olutura wants to do away with in this case and so fails to win. The optimal candidate, (a) makes two violations of DEP-IO(σ) and *SA. The two violations are not serious because insertion of whole syllables and alternation of sequences are some of the commonest strategies that Olutura uses in its phonology.

4.5 Prohibition of a Nasal and Alveolar Voiceless Sequences

Olutura has the voiceless consonants /t/ and /s/ in its phonemic inventory although our data analysis shows that neither of them combines with any of the nasal sounds. It has already been mentioned in Section 4.1 that Olutura allows a nasal sound to be followed by a voiced bilabial stop. This happens in the process of prenasalization mentioned at the beginning of this chapter. The fact that the sound /t/ occurs in the phonemic inventory of Olutura coupled with the prenasalization that results in sequences such as /^{n}d/ may lead to the assumption that a sequence like /nt/ exists. Indeed the occurrence of /nt/in Bantu languages has continued to decline due to language change. We have explained in section 4.1 that in Olutura, the voiceless sound that occurs in the input is always realized as a voiced prenasalized sound in the output in the 1st person singular as seen in the examples in 65.

65. Olutura nasal+ voiceless sequence prohibition

	UR	**Gloss**	**SR**	**Gloss**
(i)	/to:la/	pick	[ndo:.la]	I pick
(ii)	/ti:ra/	catch/hold	[ndi:.ra]	I catch/hold
(iii)	/te:ma/	try	[nde:.ma]	I try
(iv)	/to.ŋa/	remain	[ndo:ŋa]	I remain

The best way to explain why /nt/ is a marked sequence in Olutura is to use OT constraint interaction. Tableau 28 shows how the language does away with the marked /nt/ and instead chooses /nd/. Apparently, the /nd/ sequence occurs in the first person singular but, as seen from the examples in 65, the sound segment reverts back to the one in the input in the 2^{nd} and 3^{rd} persons. In Tableau 28, the process involved in the prohibition of /nt/ is prothesis and voicing of the alveolar plosive /t/.

The constraint *NC is important because it is the one that triggers the violation of the lower ranked constraints and it must, therefore, not be dominated. PEAK-C is relevant because of the nasal prefix /N-/ which emerges as an underlying feature without a nucleus but ends up attaching itself to the consonant in the verb base and is syllabified as the initial component in the CV syllable structure. Just like *NC, PEAK-C is also ranked high because it is the constraint that triggers the violation of the constraints IDENT-IO_{VOI}, IDENT-IO_{NAS} and DEP-IO. The constraint DEP-IO is necessary because of the insertion of the underlying nasal prefix in the input which is what triggers the emergence on the different as well as voiced sound in the input. $IDENT_{VOI}$ and $IDENT_{NASAL}$ are relevant due to the emergence of the voiced prenasalization sequence that Olutura allows while prohibiting its voiceless counterpart. The constraint IDENT-IO_{NAS} is necessary because it is the one that triggers the violation of IDENT-IO_{VOI} and *SA. The constraint *SA has been used here to specifically deal with the occurrence in Olutura in which the sound segment that is realized in the output is different from the one in the input. The argument is that the constraints IDENT-IO_{VOI} and IDENT-IO_{NASAL} are not enough in bringing out this specific fact. The constraints involved are ranked as follows:*NC >> *PEAK-C >> DEP-IO, IDENT-$IO_{VOI,}$ IDENT-IO_{NAS} >> *SA.

Tableau 28: Olutura double processes in /*nt/ prohibition

/te:ma/	*NÇ	PEAK-C	DEP-IO	IDENT-IO$_{VOI}$	IDENT-IO$_{NAS}$	*SA
a.[nte:.ma]	*!		*			
b. ☞ [nde:.ma]			*	*	*	*
c. [n.te:ma]		*!				

The interaction and analysis of the constraints involved is such that candidate (a) incurs a serious violation of *NÇ besides violating DEP-IO by inserting the nasal /n/ which does not occur in the input. Candidate (b) violates DEP-IO when the nasal segment /n/ which derives from the nasal prefix /N-/ that does not occur in the output is realized in the input. Candidate (b) also violates IDENT-IO$_{NASAL}$ by acquiring the nasal feature from the nasal prefix /N-/ which makes it to undergo voicing. The fact that (b) emerges as the optimal candidate means that in Olutura, voicing, nasalization and *SA must take place in order to avoid the emergence of the marked /nt/ sequence. This is further illustrated in Tableau 29. Other than the emergence of the voiced prenasalization that prohibits the occurrence of the /nt/ sequence, the other phonological processes that are involved are shown using constraints in Tableau 29 ranked as *NC, *NÇ >> *SA, DEP-IO(V).

Tableau 29: Olutura [+voice] prohibition in the 3rd persons

/N-te:ma/	*NC	*NÇ	*SA	DEP-IO(V)
a.[a.nte:.ma]		*!		*
b. ☞ [a.te:.ma]				*
c.[a.nde:.ma]	*!		*	*
d.[nte:.ma]		*!		

In the analysis in 29, candidate (a) violates *NC which is a highly ranked constraint and also violates the dominated constraint DEP-IO(V) through the insertion of a vowel in word initial position. Therefore, candidate (a) cannot win because of the fatal violation of *NC. Candidate (c) violates DEP-IO(V) by inserting a vowel at word initial position in the output. This is not a serious violation because the dialect allows it as seen from the winning candidate. However, the violation of *NC is a serious one because what is being tested in this case is the recurrence of the feature [+voice] in the two persons other than the 1st person which Olutura only achieves by avoiding NC sequences. Indeed, the occurrence of the voiced prenasalized onset after an onsetless syllable is illegal in Olutura phonology. Candidate (c) also violates the constraint *SA by interchanging the voiceless alveolar /t/ with the voiced alveolar plosive /d/.

Candidate (d) incurs a serious violation of *NÇ which makes it to lose. Candidate (b) is the optimal candidate by virtue of the OT idea that although it has two violations, none of them is a serious one. Notable is the fact that the winning candidate does not violate the constraint *SA because in Olutura there should be no SA in the 3rd person singular as opposed to the case discussed in Tableau 28 in which the optimal candidate must violate this particular constraint. The constraint DEP-IO (V) must be violated by the winning candidate because the insertion of a vowel in the word initial position is what constitures the output that this dialect needs in the current analysis.

In the current study, the sonority sequencing principle explains why Olutura prefers the sequence in which a nasal is followed by the voiced alveolar stop /d/ or voiced bilabial plosive /b/instead of their voiceless counterparts. Voiced stops, and by implication the voiced prenasalized sounds, are weaker in consonality than the voiceless ones and therefore easier to articulate because they do not need hardening. This means that the sonority sequencing principle is also applicable in the phonology of Olutura.

In Tableau 29, the input is taken from the optimal candidate in Tableau 28(a). This is meant to show the extent to which Olutura goes in its prohibition of the nasal and alveolar voiceless plosive sequence. Even after the input /**te:ma**/ becomes prenasalized in the 1st person singular, the phonological processes of elision and prothesis must come in to ensure that the illegal sequence of /nt/ does not occur. In Tableau 29, the optimal candidate must violate IDENT-IO$_{NAS}$ and DEP-IO(V). Candidate (b) also violates MAX-IO by deleting the nasal phoneme /n/ from the onset of the input.

The data in 66 shows that Olutura allows a nasal and voiced alveolar fricative /nz/ but not a nasal and voiceless alveolar fricate /ns/. We take note here that other Luyia dialects which have voiced sound segments, for example Luloogoli also have the nasal and voiced fricative sequence (Sumba, 1992). It is interesting that Luyia dialects that are closer to Olutura like Olunyala (B) and (K) do not have /nz/ in their phonemic inventories (Onyango, 2006 & Etakwa, 2010).

66. Olutura alveolar fricative sequence

	Valid	**Invalid**	**Gloss**
(i)	/inzu/	*/insu//	a house
(ii)	/inzuxa/	*/insuxa/	a snake
(iii)	/inzaxaɲu/	*/insaxaɲu/	a red one
(iv)	/inzala/	*/insala/	hunger
(v)	/iɲaɲanza/	*/iɲaɲansa/	centipede

The OT notion of constraint interaction has been used in Tableau 30 to demonstrate how Olutura allows the voiced nasal alveolar sequence/nz/ to occur while disallowing its voiceless counterpart /ns/. This is the same way that this dialect probibits /mp/ and /nt/ sequences.

Tableau 30: Olutura voiced alveolar prenasal occurence

/i +nzu/	*NÇ	IDENT-IO$_{VOI}$
a. [i.nsu]	*!	*
b. ☞ [i.nzu]		

The input in Tableau 29 has the vowel /i/ which enters the input as a separate onsetless syllable from the stem because it is the vowel prefix that is used in Olutura at word initial position to indicate singularity in [-human] entities.

In this analysis, only the two constraints *NÇ and IDENT-IO_{VOI}. As previously discussed, the markedness constraint *NÇ is used here to penalize the voiceless fricative /s/ and thus rule out the occurrence of the prohibited sequences shown in 66. The violation of *NÇ by candidate (a) is what results in the emergence of the voiced /nz/ which Olutura allows. The constraint IDENT-IO_{VOI} is relevant to help in the evaluation of the optimal candidate which must be [+voice].

Indeed Tableau 29 shows that the input of a nasal followed by a voiced fricative, that is, /nz/ emerges intact because it does not incur any violation. This is according Pater (1999, 2001) who states that the markedness constraint *NÇ should penalize inputs that have a nasal followed by a voiceless obstruent. This is not surprising because a number of voiced sounds occur in the phonetic inventory of Olutura through prenasalization, and are, therefore, internally complex by virtue of having more than one element in the syllable onset.

There are two ways that can be used to explain why Olutura allows the nasal + voiced fricative sequence. One is that the voiced fricative share the feature [+voice] with the nasal that comes before it and it therefore assimilates easily than the [-voice] alveolar fricative /s/. The other way is that there seems to be a lenition process taking place. Lenition causes weakening and eventual elision of sounds (Lass, 1984). What is happening in the case of Olutura can be explained using the idea of the consonantal strength scale shown in Figure 3, according to which, voiced fricatives are weaker than voiceless ones and are, therefore, more susceptible to lenition. In the case of Olutura this means that the opposite of hardening is taking place such that the articulatory apparatus are moving towards the elision of the consonant that comes after the nasal but fall short of deleting it so that it just weakens into a voiced /z/ alveolar nasal hence the prenasalized /^{n}z/.

4.6 Conclusion

From the findings in this chapter, it was established that in the phonology of Olutura, prenalized segments are only formed by having a nasal followed by a voiced bilabial, alveolar or velar plosive sound. This is what rules out the occurrence of a sequence like */nv/, such that, whereas /*nt/ can be realized as the voiced /nd/, the input in Tableau 23 cannot be realized as */nv/ because the phonotactics of Olutura disallows such sound sequences. In view of this, it can be concluded that prenasalization in Olututa is only limited to /nd/, /ŋg/, /nz/ and /mb/. Another observation is that in Olutura, the occurrence in which a voiceless consonant comes after a nasal can only occur with the intervention of a vowel in the process of epenthesis which makes the output to have the optimal CV syllable, the commonest in Olutura phonology. This chapter further conludes that the sound segments that are prenasalized in Olutura, do not occur in its phonemic inventory; the consonants that combine with nasals in Olutura can only be [+voice] which are marked in this dialect. The phonological processes of prothesis and SA were seen to play a pivotal role in the realization of the prenasalized syllable onset. Another conclusion in this chapter is that the nasal prefix N- does not syllabify to become homorganic with the consonant that comes after it as it is the case in languages like Chichewa and Kingowa (Sabao, 2013). Olutura uses the phonological processes of elision or epenthesis to ensure that the /N-/ prefix corforms to the optimal syllable in this language. Constraint interaction in OT was found suitable in achieving part of the third objective of this study on how constraint interaction can be used to explain the process of prenasalization. The general conclusion that this study makes is in line with the observation by Odden (2015) that in Bantu languages, nasal plus consonants are frequently subjected to various modifications which play a role in the syllable structures of these languages.

CHAPTER 5

LABIALIZATION IN OLUTURA

5.1 Introduction

This chapter deals with part of the fourth objective of this study by looking at labialization as one of the phonological processes of Olutura and how OT constraints interact in its syllable formation. Maddieson (1984) and Ladefoged & Maddieson (1996) posit that labialization is used with regard to consonants to refer to the lip rounding gesture that is added to a segment with the accompanying elevation of the back of the tongue. Ladefoged &Johnson (2015) posit that labialization is one of the four types of secondary articulation that the phenomenon of phonetic co-articulation causes and it happens when a primary articulation is accompanied by the lips brought forward and protruding. This shows that secondary articulation is an articulation with a lesser degree of stricture which accompanies a primary articulation of a higher degree. Labialization, just like palatalization, is one of the phonological processesthat results in glide formation (see 3.3)

As mentioned in chapter 1, labialization is a phonological process in which the vowel /u/ is realized as the glide /w/ in the phonotactics of Olutura. In this chapter, the syllable onset with the glide /w/ is first discussed to reveal the consonant sounds that pattern with it. The processes involved in the occurrence of the identified consonants are then discussed to find out if labialization has a functional role in Olutura. Two new constraints, HETER(σ) and $\text{COMP}_{\text{ONS(LAB)}}$ are introduced in this chapter to deal with occurences that are specific to Olutura and for which suitable constraints were not found. The constraint *HETER(σ) bans the occurrence of heterosyllabic sequences. The constraint $\text{COMP}_{\text{ONS(LAB)}}$ is meant to draw a line between the glide /w/ and the constraint *ONS/GLIDE which is general to the two glides /w/ and /j/. The constraint $\text{COMP}_{\text{ONS(LAB}}$) only caters for the glide /w/ in the phonological process of labialization in which the glide /j/ is not involved.

5.2 Consonant Distribution in Olutura Labialization

Consonant distribution is used in this study to refer to the way the consonant sounds of Olutura pattern with each other to form the onset in the phonological process of labialization in this dialect. All consonants in Olutura, apart from the glottal stop /h/ combine with /w/ in the labialization process. Apparently, even when /h/ seems to combine with /w/ in words like /**obulahwi**/ (fame/praise), it is difficult to perceive the /h/. It is no wonder then that such sequences as /hw/ do not quite occur in this dialect and are therefore marked. This can be attributed to the different places of articulation of /h/ and /w/ in which the former is a glottal fricative while the latter is a bilabial approximant, and, therefore, harder to combine with the latter during articulation. In Olutura, the place of articulation for the sounds that combine with the bilabial approximant /w/ are above the larynx and these are practically all the sounds in the dialect. This is unlike some languages in which only certain types of sounds can be labialized. For example in Judeo Spanish (JS), coronal sounds are not favoured by labialization (Bradely, 2014). It has already been mentioned in the first chapter of this study that labialization is a secondary type of articulation and this assertion in itself points to the fact that there must be certain sounds that are involved in the primary articulation that come before it. In chapter two, the idea that all the single sounds and most complex onsets in the phonemic inventory of Olutura can occur with the glide /w/ in the process of labialization was discussed. However, the data analysis shows that Olutura, just like Mainstream Spanish (MS) (Bradley,2009), has preference for onsets that have lesser sonority and that is why the occurrence of the sequence /pw/ is not common, and is, therefore, marked. Olutura labialization is illustrated in 67.

67. Olutura consonant labialization

(i)	/t/	/i.mbu**t**^{w}e/	mixture of flour and water for fermenting
(ii)	/k/	/**k**^{w}**a**/	fall
(iii)	/p/	/ li.**p**^{w}**o**.ni/	a potato
(iv)	/f/	/**f**^{w}**a**.la/	dress up
(v)	/s/	/**swa**.la/	mix soil with water
(vi)	/x/	/**x**^{w}**e**.sia/	pull
(vii)	/v/or /β/	/**β**^{w}**e**.ja/	state of being a bride
(viii)	/ts/	/**ts**^{w}**i**:sia/	tighten, e.g, a rope
(ix)	/m/	/o**m**^{w}a.lo/	a river
(x)	/n/	/o.mu.**n**^{w}**a**/	mouth
(xi)	/ɳ/	/ ɲ^{w}**a**/	drink (V)
(xii)	/r/	/**r**^{w}**a** ɲi/	outside
(xiii)	/l/	/a.ma.**l**^{w}**a**/	liquor/beer
(xiv)	/j/	/i.fu.**j**^{w}**a**/	being washed
(xv)	/mb/	/i.**mb**^{w}**a**/	a dog
(xvi)	/nd/	/i.**nd**^{w}**a**.si/	allergy

The data analysis revealed that the complex onset in Olutura also takes the glide /w/ in the process of labialization. The only complex onsets for which words were not attested in the said process are /ŋɟ/ and /ʧ/ and /nz/. In Olutura nouns, when the noun class prefix that ends with the high vowel /u/ is joined to a basic word, the /u/ is deleted and is replaced by the glide /w/. This is the labiolization process that is shown by the examples in 68.

68. Olutura high vowel labialization

	UR	SR	Gloss
(i)	/omu +ana/	[o.m^{w}a:.na]	a child
(ii)	/omu+ami/	[o.m^{w}a:.mi]	a leader/husband
(iii)	/omu+eja/	[o.m^{w}e:.ja]	a bride
(iv)	/omu+ifi/	[o.m^{w}i:.fi]	a thief
(v)	/omu + oni/	[o.m^{w}o:.ni]	a sinner
(vi)	/omu + ini/	[o.m^{w}i.ni]	a hoe stick

In Olutura, the back high vowel /u/ changes into the bilabial /w/. It does not matter whether the vowel in the basic word is [+low] or [+high]; the only exception is the vowel /u/ itself, something that can be attributed to articulatory and perceptual phonetics. This case is similar to that of Lunyole discussed in Chapter 1 in which a noun class prefix that has the final vowel /u/ joined to a word initial root, the vowel /u/ is lost and emerges in the bilabial approximant /w/ in the output in the process of labialization (Namulemu, 2006).

According to Kim (2010), labialization in English and Korean also applies to various places of articulation the same way it happens in Olutura. We have used one example of each place of articulation in 69 to show that in Olutura labialization happens at all places of articulation apart from glottal region.

69. Olutura labialization occurence

	Place of articulation	Olutura word	Gloss
(i)	velar	[**k^w**aŋge]	it is mine

(ii)	bilabial	[li**p**ʷoni]	a potato
(iii)	alveolar	[**l**ʷaŋgu]	quickly
(iv)	labio-dental	[**f**ʷana]	look like
(v)	alveolar	[omu**n**ʷa]	mouth

The labialization that occurs in Olutura is not the type that brings about complementary distribution the way it happens with some sound segments in a language like Lunyole (Namulemu, 2006). In Lunyole, the labialized /fw/ is in complementary distribution with the plain /f/ which is not the case in Olutura.

5.3. [+high] Vowel Failure to Labialize

We have already observed in 3.3 that the process of glide formation which is indeed realized through the phonological process of labialization in Olutura, is used as an HR strategy in the dialect. However, there are circumstances in the phonotactics of Olutura in which the process of labialization is not necessary as a strategy for hiatus resolution, an occurrence that leads to heterosyllabic sequences. This is in line with Vratsano & Kadenge (2017) who observe that some languages tolerate hiatus in certain contexts and not others. In Olutura, hiatus is tolerated in order to have words with different meanings in the inventory of this dialect. The occurrence of vowel heterosyllabic sequences is what brings about zero onset syllable at word medial position in the phonotactics of Olutura as shown in the examples in 70.

70. Vowel heterosyllabic sequences

(i)	[mu.o.lo]	traditional instrument for cutting grass
(ii)	[mu.e.ji]	a promiscuous person
(iii)	[mu.i.ni]	an inciter
(iv)	[mu.a.ni]	a generous person

The occurrence of heterosyllabic vowels in the phonotactics of Olutura is explained using constraint interaction in Tableau 30. Tableau 30 is used in this case to demonstrate the observation in this study that in Olutura, there are cases when the [+high] back vowel /u/ fails to labialize in spite of the sound segments around it being similar to the cases when labialization does happen. This is what results in the emergence of zero onset syllables at word medial position in Olutura as seen in the words in 70. This is a case of Olutura accepting the occurrence of hiatus for lexical reasons. The constraints that are relevant here are, *DIPH, which should not be dominated because Olutura avoids diphthongs and HNUC which should dominate the other two constraints in this analysis because Olutura only allows vowels to form the nucleus of a syllable. The other constraints in the analysis are $\text{COMP}_{\text{ONS(LAB)}}$ to deal with the[+high] vowel which can be realized as a labialized glide and *HETER(σ) to evaluate the occurrence of heterosyllables in word medial position. This constraint should be ranked low because it is destined for violation by the winning candidate. These constraints yield the ranking *DIPH >> HNUC >> $\text{COMP}_{\text{ONS(LAB),}}$ *HETER(σ).

Tableau 30: Olutura heterosyllabic occurence

Input /omu +ofu/	*DIPH	HNUC	COMP$_{ONS(LAB)}$	*HETER(σ)
a.[o.mw.fu]		* !	*	
b. ☞[o.mu.o.fu]				*
c.[o.muo.fu]	*!			

From the analysis in Tableau 30, candidate (a) incurs a serious violation of HNUC and also violate COMP$_{ONS(LAB).}$ Although the latter violation is not serious, candidate (a) loses because of the serious violation. Candidate (c) incurs a serious violation of *DIPH by having tautosyllabic occurence in which two dissimilar vowels are syllabified in one syllable. The winning candidate, makes one violation of the lowly ranked constrant *HETER(σ) because it has a heterosyllabic sequence in word medial position. This violation is necessary for Olutura to get the required output.

Another analysis which enables the use of an input that is already labialized is needed in order to show that in Olutura, even if labialization is allowed, there are circumstances in which it has to be done away with. This is seen in Tableau 31 in which only three constraints, *CODA, COMP$_{ONS(LAB)}$ and *HETER(σ) are relevant. All the constraints, apart from *CODA, are used in the same manner as in Tableau 30. *CODA must be ranked high because Olutura prohibits codas. The ranking of the constraints used in this analysis is, *CODA >> COMP$_{ONS(LAB)}$ >> *HETER(σ).

Tableau 31: Olutura labialization avoidance

/o.mwe.ji/	*CODA	$COMP_{ONS(LAB)}$	*HETER(σ)
a.[o.mwe.ji]		*!	*
b. ☞ [o.mu.e.ji]		*	
c.[om.e.ji]	*!		

In Tableau 31, candidate (c) cannot win because it incurs a serious violation of *CODA by having an output that is prohibited in the phonotactics of Olutura according to which all syllables must be open. Candidate (a) violates $COMP_{ONS(LAB}$ which is ranked higher than *HETER(σ) because Olutura does not require labialization as a strategy for HR in this case. In accordance with OT, candidate (b), which makes the least violations emerges as the optimal candidate because it violates the lowly ranked *HETER(σ). The analysis in Tableau 31, and the rejection of candidate (a) shows how Olutura can reject stuctures that are well formed in certain cirmcitances when there is need to have a different word from the one being rejected. The heterosyllabic structure of Oluturra is analyzed using the CV phonology tier model in Figure 21.

V CV V CV

/o.mu.e.ji/ [o.mu.e.ji]

Syllable tier	σ	σ		σ	σ		
CV tier	V	C	V	V	C	V	
Segmental tier	[o	m	u	e	j	i	]

Figure 21: Olutura heterosyllabic CV tier

The examples in 81 and the CV tier model in Figure 21 mean that the vowels in the middle of the word /o.mu.e.ji/ that appear to be tauto-syllabic are syllabified in two different syllables; the vowel /u/ forms the nucleus of the CV syllable while /e/ is syllabified as a zero onset syllable in word medial position.

5.4 Functions of Labialization in Olutura

The functions of labialization in some languages were discussed in chapter 1. This section discusses the role of labialization in the dialect under study. Labialization is meaning distinguishing in Olutura, an occurrence that is also reported by Ohala & Lorentz (1977). Distinctive labialization in Olutura was observed in the three word classes of verbs, nouns and adjectives. A discussion of how labialization distinguishes meaning, that is, distinctive labialization, in Olutura verbs is done before discussing the same in nouns and adjectives.

5.4.1 Distinctive Labialization in Olutura Verbs

In Olutura, distinctive labialization is used as a word formation process. In the current study, distinctive labialization is used to refer to the occurrence in which the insertion of the bilabial approximant /w/ to another consonant in a syllable changes the meaning of a particular word. This shows that the process of labialization is used as a word formation process in Olutura. This is in recognition of the observation by Laver (1994), that in some languages like Twi, a Ghanian language, the superscript of /w/ to another segment; for example /k/results in a word with a different meaning (see 1.7.4). Olutura, like Twi, reports a similar occurrence in its phonology in which the addition of /w/ reports a new phoneme. In this study, we are using the definition by Massamba (1996), that a phoneme is distinctive by the fact that it distinguishes meaning in the language system. In Olutura, labialization is used in verbal processes to form new words because when /w/ is added to a pure consonant or the glide /j/, this results in a complex onset which brings out a different word. What this means is that, it is only the addition of /w/ that brings about the change of meaning because all other sound segments in the word remain the same. This is exemplified in 71.

71. Distinctive Labialization in Olutura Verbs

	A		**B**	
(i)	/sa:.la/	pray	[s^{w}a:.la]	mix soil and water for walling a house
(ii)	/fi.sja/	hide	[f^{w}i.sja	loose someone (in death)
(iii)	/la.:sja/	spoil ones name	[l^{w}a.sja]	mind a sick person
(iv)	/xe.sja/	greet	[x^{w}e.sja]	pull
(v)	/uu.na/	leave early	[u:.n^{w}a]	be visited early

In the examples in 71, we note that the words in column A have exactly the same form as those in column B and it is only the insertion of the bilabial approximant /w/ in the phonological process of labialization that brings out the difference; and as such, the meaning. The examples in 71 (i) to (iv) show that labialization is used to form new words in Olutura while those in (v) to (vii) show that labialization can be used to change the active voice to the passive voice. This is similar to the case of Twi mentioned at the beginning of this section because a phoneme that distinguishes meaning in both Olutura and Twi is realized.

Another function of labialization in Olutura is to bring out the general meaning as opposed to the meaning that refers to something in particular. In the examples in 72 the verbs in column A refer to a particular action while those in column B refer to general action

72. Distinctive labialization -particular vis a vis general meaning

	A		**B**	
(i)	[o.xu+jo:mja]	to dry something	[o.xwo:mja]	to dry
(ii)	[o.xu+je:.ja	to sweep it	[o.xwe:.ja]	to sweep
(iii)	[o.xu+ji:.βa/	to steal it	[o.xwi.βa]	to steal
(iv)	[o.xu+jisja]	to bring it down	[o.xwi.sja]	to bring down

The observation that can be made from 72 is the occurrence in which the high back vowel /u/, which occurs at the end of the verbal prefix in the words in **A** becomes a bilabial approximant /w/ in the words in **B**. It was observed that in Olutura, when labialization happens for the sake of distinguishing meaning in terms of particular vis a vis general meaning, the process of labialization goes hand in hand with that of elision. Elision occurs when the CV syllable with the palatal approximant /j/ which occurs in the input is deleted from the output, which changes the configuration of the output, hence the general meaning. In 72, the distinction of meaning is realized in the extension of meaning arising from the same verbal stem. The examples in 72 show that the words in **B** are shorter than those in **A** because two mora places are replaced by one mora place. This contrast means that in Olutura, the high vowel /u/ does not always undergo the labialization process whenever it occurs before another vowel or when it is followed by the palatal glide /j/. The lack of labialization in this case is distinguished with labialization such as the one in 72 **B** to bring out different meanings. Contrastive or distinctive labialization cross-linguistically occurs on velar, uvular and labial consonants than dental alveolar or palatal consonants (Ohala & Lorentz, 1977). The examples in 71 and 72 show that this is not the same case with Olutura in which contrastive labialization also occurs with labio-dentals as seen in the Olutura word **/fwi.sja/** in example 71 (ii).

The process of labialization in Olutura verbs also plays a role in reducing the number of syllables in a given word. Labialization leads to a reduction in the number of syllables in the output. In 73, the inputs in **A** have more syllables as compared to those in the output in **B**. This is because the word that has the approxiant /w/ has a reduced number of syllables, that is, three. What causes this reduction in the number of syllables is the fact that the onsetless syllable in the input is realized as the nucleus of syllable which has /w/ in the output. The data analyzed shows that in Olutura verbs, whenever there is the elision of a whole syllable, the word in the output means something general. The syllable in the input is lost when the glide /j/ is deleted and the high back vowel /u/ is replaced by the glide /w/ in the phonological process of labialization. The words in the input have four syllables while those in the output have three syllables. This shows that labialization is one of the phonological processes that Olutura uses to get different categories from the same stem or words with different meanings.

73. Olutura syllable reduction labialization

	A	Gloss	B	Gloss
(i)	/o.xu +ji.ma/	to hunt	[o.xwi.ma]	to stand
(ii)	/o.xu.o.ma/	to smear	[o.x^{w}o:.ma]	to dry
(iii)	/o.xu +je:.ja/	to sweep it	[o.x^{w}e:.ja]	to sweep
(iv)	/o.xu.je.ɲa/	to want it	[o.x^{w}e.ɲa]	to want it
(v)	[o.xu.i:βa]	to steal it	[o.xwi:βa]	to steal

Labialization changes the syllable to which the /w/ is added from a simple syllable to an internally complex one by virtue of having two segments that are otherwise distinct in the phonemic inventory of Olutura. The occurrence in Olutura in which the vowel /u/ is realized as the glide /w/ is similar to what Hall (2006) refers to as an 'intrusive vowel'. Hall observes that intrusive vowels do not form syllable nuclei at any level of representation. In Olutura, the intrusive /u/ is syllabified as part of the onset and not the nucleus, and, therefore, causing the occurrence of an internally complex syllable onset, that is, CG. The syllable type of the words in 73 **B** falls under what we have discussed here as the CGV syllable type.

To illustrate the process of labialization, which also causes a reduction of the syllables in the words involved in Olutura, we use OT constraints in Tableau 32. The constraint *DIPH, in this analysis, is meant to trigger the violation of the other constraints so as to have the optimal candidate and should be undominated, while IDENT(μ) is meant to ensure that the mora places in the input are not lost in the output. The other constrainst in this analysis are MAX-IO(σ) and

*COMP$_{ONSET(LAB)}$ which are meant to mitigate against thh deletion of syllables and to deal with the labialization that must take place, respectively. The constraint *COMP$_{ONS(LAB)}$ should be ranked lowest because labialization is what is targeted as a solution in the current analysis. The constraints in this analysis yield the ranking *DIPH >> IDENT-IO(μ), MAX-IO(σ) >> *COMP$_{ONS(LAB).}$

Tableau 32: Olutura syllable reduction through labialization

Input /o.xu+je:.ja/	*DIPH	IDENT-IO(μ)	MAX-IO(σ)	*COMP$_{ONS(LAB)}$
a. [o.xue.ja]	*!	*	*	
b. ☞ [o.xwe:.ja]			*	*

Candidate (a) makes three violations, one of which is serious and, therefore, loses to candidate (a). It violates IDENT-IO(μ) by losing a mora from the input and MAX-IO(σ) by losing a whole syllable. The loss of a syllable is not serious because the winning candidate also violate the same constraint. This means that Olutura requires that to happen in order to get the optimal output. The winning candidate (b), incurs two violations which are not serious and that is why it emerges as the winner. Candidate (b) violates MAX-IO(σ) by deleting a syllable that is represented in the input and *COMP$_{ONSET(LAB}$ by realizing the [+high] /u/ as a labialized glide /w. However, the violation of the two constraints is what is targeted in Olutura in this analysis. It should be noted that the violation of MAX-IO(σ) by the winning candidate is what results in an output with fewer syllables. In Tableau 32, the elision of the glide /j/ is not enough to get the required output as it would still result in a sequence of adjacent dissimilar peaks. Such a sequence would form a diphthong which is not allowed in the phonology of Olutura. It is then necessary to delete a whole syllable and for the [+high] back vowel /u/ to move from the nucleus to the onset. We note that Olutura allows a glide to form a complex onset with consonants in its phonology in what was identified as the CGV syllable structure.

5.4.2 Semantic Distinctive Labialization in Olutura

Just like our discussion on verbs in 5.3.1, distinctive labialization in Olutura is used to bring out distinct phonemes and, therefore, distinguishes meaning in word classes. This means that in Olutura, as labialization distinguishes meaning, it changes a word from one class to another as seen in examples in 74. In this case, the phonological process of labialization is used in Olutura to create new words in the dialect; and in some cases, the labialized words can fall in different word classes as shown in 74. Labialization is used in Olutura to form words that fall in a different word class, and therefore, with a different meaning. This is illustrated in the Olutura words 74 in which the only difference between the words in A and B is labialization of the [+high] vowel /u/ to the glide /w/ in B.

74. Olutura noun labialization

	A		**B**	
	Non-labialized	**Gloss**	**Labiazed**	**Gloss**
(i)	[o.mu.e.ji]	a promiscuous person	[o.m^{w}e.ji]	a sweeper
(ii)	[o.mu.a.ni]	a generous person	[o.m^{w}a.ni]	one who moos like a cow
(iii)	[o.mu.i.ni]	an inciter	[o.m^{w}i.ni]	a hoe stick
(iv)	[o.mu.e.ndi]	one who worries	[om^{w}endi]	one who fetches

(v)	[o.mu.i.ri]	one who takes away	[o.m^{w}i.ri]	a killer

The nouns in 76 have the [+high] back vowel /u/ falls in the CV syllable which comes before an onsetless syllable. The vowel /u/ in the adjectives is the one that is realized as the glide /w/ in the words in column B in the phonological process of labialization which changes them into common nouns with different meanings and in a different word class in Olutura.

5.4.3. Labialization as a heterosyllabic prevention Strategy

Another function of labialization in Olutura is to prevent the occurrence of heterosyllabic sequences in environments in which they are not required. In this study, heterosyllabic sequences are those in which two vowels that fall in different syllables occur together. The examples in 75 show that if labialization does not take place in the case of the words shown, heterosyllabic sequences would occur in the wrong environment.

75. Olutura heterosyllabic prevention labialization

(i)	/omu + oyo/	*[o.mu.o.jo]	[om^{w}o.jo]
(ii)	/omu+ ana/	*[o.mu.a.na]	[o.m^{w}a.na]
(iii)	/omu + ami	*[o.mu.a.mi]	[o.m^{w}a.mi]
(iv)	/omu + alo/	*[o.mu.a.lo]	[o.m^{w}a.lo]

In Olutura, the onsetless syllables in word medial position appear to be tautosyllabic in ordinary orthography but they are actually permitted in syllable sequences in some environments as reported in 2.1. This happens when the process of labialization is not necessary and onsetless syllables must be left intact, whether it is at word initial, medial or word final positions. We have used the Olutura word *lwasia* (to mind a sick person) in Tableau 33 to show how labialization is used in Olutura as an HR strategy in the environment where lack of it can result in a word with a different meaning.

This means that Olutura uses labialization as a method of forming words in the language and that is why this study treats labialized phonemes as distinct from their un-labialized counterparts.

The constraints that are relevant in this case are HIATUS, *DIPH, NUC/GLIDE and *COMP$_{ONS(LAB)}$. A new constraint, *COMP$_{ONS(LAB)}$, as in all other cases of labialization, is used to deal with the internally complex onset that has the labialized element /-^{w}/. The introduction of this constraint is necessary because the constraint *ONS/GLIDE is general to both glides and is, therefore, not suitable in dealing with the specific case of labialization. *COMP$_{ONS(LAB)}$ should be dominated because Olutura demands that labialization occurs as an HR strategy. The constraints *DIPH and *HIATUS must not be dominated because they are the ones that are responsible for what happens to the rest of the contraints. The constraint NUC/GLIDE is necessary due to the evaluation of the glide /w/ that should not be syllabified as part of the nucleus in Olutura which disallows that. This yields the following ranking of all the constraints involved: *DIPH, *HIATUS >> NUC/GLIDE >> *COMP$_{ONSET(LAB).}$

Tableau 33: Olutura HR labialization

/lu+asia/	*HIATUS	*DIPH	NUC/GLIDE	COMP$_{ONS(LAB)}$
a.[lu$_1$.a$_2$.sia]	*!			
b. ☞ [l^{w}a.sia]				*
c.[l^w.a.sia]			*!	*
d.[lua.sia]		*!		

The analysis of the constraints Candidate in Tableau 33 is such that candidate (a) incurs a serious violation of *HIATUS by having an onsetless syllable at word medial position which Olutura does not allow in such an environment. Candidate (c) makes a serious violation of NUC/GLIDE by syllabifying the glide /w/ as part of the nucleus, a sequence that is prohibited in Olutura since the dialect does not allow glides to form the nucleus of a syllable. Candidate (c) also violates $\text{COMP}_{\text{ONS(LAB)}}$ although the constraint is lowly ranked and so the violation is inconsequential. Candidate (d) also incurs a serious violation of *DIPH by having a syllable that has a dipththong. Diphthongs do not exist in the vowel inventory of Olutura and therefore, (d) cannot win. The winning candidate, (b) makes only one violation of $\text{COMP}_{\text{ONS(LAB)}}$. However, as observed in Section 5.2, this is a necessary violation because, as discussed in Section 3.3, /u/, is in many cases realized as a labial /w/ in the environment of vowels that are lower than it on the vowel trapezium in Olutura.

In Olutura, /w/ can be syllabified as part of a complex onset and that is why (b) emerges as the optimal candidate in Tableau 33. The case of Olutura is similar to that in JS in which /w/ forms a complex onset with a preceding consonant and it is subject to a constraint against labialized coronals (Bradley, 2009). The syllabification of /w/ in the onset as opposed to the nucleus shows that Olutura does not accept nucleus with lesser sonority and uses labialization to, not just remove the unwanted vowel but also avoid the emergence of heterosyllabic vowels in certain environments as well as to avoid hiatus.

As already observed in 5.4.3, labialization is one of the phonological processes that is used to prevent the occurrence of heterosyllabic syllables in environments where they are not allowed, and as such, used as an HR strategy. In the examples in 78, column A show Olutura words in which there is hiatus and consequently, are hard to articulate. However, when labialization takes place in the words in 81 B, the articulation becomes easier. However, there are environments in which Olutura speakers must content with such difficult articulations (see 76).

76. Olutura hetero vis a vis tauto-syllabification exemplification

	Input	**A**	**B**
(i)	/omu + ana/	*/o.mu.a.na/	[o.m^{w}a.na]
(ii)	/omu+ ami/	*/o.mu.a.mi/	[o.m^{w}a.mi]
(iii)	/omu + ifi/	*/o.mu.i.fi/	[o.m^{w}i.fi]
(iv)	/omu + a^{ŋ}gu/	*/o.mu.a. ^{ŋ}gu/	[o.m^{w}a.ngu]
(v)	/omu + iri/	*/o.mu.i.ri]	[o.m^{w}i.ri]

5.5 Conclusion

In Olutura, labialization serves three functions. The first one is that it is meaning distinguishing as it results in segments other than those that occur before labialization.Therefore, labialization is a strategy that Olutura uses to come up with words with different meanings and word classes in the language. The second one is that labialization helps in the process of syllabification because it determines the number of syllables in a word. The third and last one is that labialization is used as a strategy for HR whenever heterosyllabic sequences are not required. In Olutura, the high vowel /u/ does not always undergo labialization whenever it occurs before another vowel or when it is followed by the palatal glide /j/. The phonological process of labialization in Olutura happens when the [+high] vowel /u/ is realized as /w/ before all the vowels in this dialect other other than /u/ which remains the same when followed by another /u/ across a word boundary; an occurrence that is marked in Olutura.

CHAPTER 6

SEQUENTIAL ALTERNATION (SA) IN OLUTURA

6.1 Introduction

This chapter addresses itself to the fifth objective of the current study. The processes that cause sound sequences to alternate in the constitution of the syllable in the 1st, 2nd and 3rd person categories and the role of the zero onset syllable in the processes involved in Olutura are discussed. This chapter focuses on an analysis of the zero onset syllable in Olutura to identify the vowel sounds that alternate. The chapter also discusses the consonant segments with regard to SA to establish the processes involved. The grammatical categories that contribute to SA and the role of SA in the phonology of Olutura are also dicussed. The OT notion of constraint interaction is used to show how and why Olutura replaces one segment with another in the process of SA. As mentioned in Chapter 5, a new constraint called *SA that is specifically meant to deal with the occurrence in which a sound other than the one in the input emerges in the output has been introduced. This is occasioned by the observation that the faithfulness constraints IDENT-IO$_{NAS}$ and IDENT-IO$_{VOI}$ alone cannot bring forth the desired output that the phonotactics of Olutura demand concerning SA. This is because the two constraints help to yield a nasal and a voiced sound but fall short of showing that the segment that the dialect requires must be different from the one in the input. The constraint UNIFORMITY is also inadequate in dealing with SA because it only deals with the occurrence of two segments that are distinct in the input being merged as a single segment in the output and not the alternation of segments. Two other constraints have also been introduced in the current analysis; IDENT$_{OBS}$ to deal with this specific case of SA that demands an obstruent onset as opposed to the sonorous one in the input and $IDENT_{SON}$(place) which is needed to evaluate the winning candidate.

6.2 The Occurrence of SA in Olutura

Campbell (2013) defines SA as the phenomenon in which a phoneme exhibits variation in its phonological realization. Sequential or segment alternation occurs when a different sound is realized in the output from the one in the input. The author argues that alternation may be conditioned by the phonological, morphological or syntactic environment. An example of phonological alternation is found in the English realization of the plural marker. In this language, if the preceding sound is a sibilant, that is, /s/, /z/, /ʃ/, /ʧ/ or /ʤ/, then the plural marker takes [iz]. Historically, most sound changes involve sequence of segments and are as a result of articulatory simplification that is seen in everyday speech (Murray, 2015). This implies that the motivation for SA is generally articulatory and is determined by the morpho-phonological and syntactic environment. The motivation for SA in Olutura is discussed in this section and the subsequent sections.

In the discussion on epenthesis in Chapter 3, it was mentioned that Olutura has the occurrence in which the sound sequence in the basic word changes to a different one in different realizations. This is dealt with in this section because the alternation of segments that takes place only affects the category of person and also involves other phonological processes like voice and prothesis. We have also mentioned in 1.7.5, that SA is one of the natural phonological processes that causes a change in the configuration of the syllable in Olutura. This process involves both vowel and consonant sound segments. In this chapter, the process of SA is discussed with regard to verbs as well as nouns and it also seeks to establish if all the consonant and vowel sounds in the phonology of Olutura are capable of SA.

6.2.1 Vowel Sequential Alternation (VSA)

In this study, Vowel Sequential Alternation (VSA) refers to the realization of different vowels in the various realizations of the grammatical category of person in Olutura verbs. One word has been used for each consonant sounds sampled in 77 to illustrate how VSA in the grammatical category of person in Olutura. The sounds are shown in bold at the beginning of the words used in this analysis. This is also meant to to establish if VSA is determined by the consonants in the basic verb.

77. Olutura Vowel Sequential Alternation (VSA)

	Basic verb	**Gloss**	**1st person**	**2nd person**	**3rd person**
(i)	/funa/	harvest/break	[**e**funa]	[**o**funa]	[**a**funa]
(ii)	/kona/	sleep	[**e**ᵑgona]	[**o**kona]	[**a**kona]
(iii)	/luma/	bite	[**e**numa]	[**o**luma]	[**a**luma]
(iv)	/moola/	crawl	[**e**mo:la]	[**o**mo:la]	[**a**mo:la
(v)	/nula/	shine	[**e**nula]	[**o**nula]	[**a**nula]
(vi)	/saaβa/	wash hands	[**e**sa:βa]	[**o**sa:βa]	[**a**sa:βa]
(vii)	/tiira/	catching	[**e**ndi:ra]]	[**o**ti:ra]	[**a**ti:ra]
(viii)	/paara/	think	[**e**mba:ra]	[**o**pa:ra]	[**a**pa:ra]
(ix)	/βaya/	play	[**e**mbaja]	[**o**βaja]	[**a**βaja]
(xi)	/xesia/	greet	[**e**xesia]	[**o**xesia]	[**a**xesia]

(xii)	/ruuma/	jump	[**e**ru:ma]	[**o**ru:ma]	[**a**ru:ma]
(xiii)	/jira/	take	[**e**mbira]	[**o**jira]	[**a**jira]

In the examples in 77, the vowel prefixes alternate as the verb changes from /e/ in the 1st person, to /o/ in the 2nd person and finally to /a/ in the 3rd person singular. The examples in 77 show that in Olutura, the alternation of the vowels in the grammatical category of person is predictable for the verbs that take on vowels in word initial positon in the three persons. The word initial vowels seen in the different manifestations of person are what was discussed in chapter two as the zero onset V syllable structure. However, the data analysis shows that not all verbs in Olutura behave like those in 77. There are some verbs in the phonology of this dialect which do not take zero onset syllables as prefixes in the category of person. This means that in Olutura, the occurence of the zero onset verbal prefix that signifies the category of person is determined by the consonant in the verb stem.

6.2.2 Consonant Sequential Alternation (CSA)

Following the definition by Campbell (2013) at the beginning of this section, Consonant Sequential Alternation (CSA) in this study refers to the occurrence in which the consonant sound in the output differs from that in the input. The examples in 78 have been used to demonstrate CSA in Olutura.

78. Olutura CSA

Basic verb	Gloss	1st person	2nd person	3rd person
(i) /**k**enda/	walk	[*e***ŋg**enda]	[okenda]	[akenda]
(ii) /tiira/	catch	[*e*ndi:ra]	[oti:ra]	[ati:ra]

(iii) /lira/	cry	[*e*ndira]	[olira]	[alira]
(iv) /βaja/	play	[*e*mbaja]	[oβaja]	[aβaja]
(v) /pi:ma/	measure	[*e*mbi:ma]	[opi:ma]	[api:ma]
(vi) /luma/	bite	[*e*numa]	[oluma	[aluma]

The examples in 78 show that in Olutura, CSA happens as the basic verb changes to the 1st person singular and that this is a process of consonant mutation caused by the prefix /e/ which is an underlying 1st person prefix but which speakers of Olutura omit in quick speech.That is why we have shown it in italics in the examples for the 1st person category (see 2.2.1). The cases in which the consonants change result in a sequence of tauto-syllabic consonant clusters which form the onset of the second syllable that comes after the zero onset syllable. This means that the second CV syllable has two root nodes in the onset as was discussed in 4.4. This is by virtue of having a pre-nasalized consonant and one that is not prenasalized in the onset.

From the examples in 78, two instances of CSA can be observed. The first instance of CSA that was observed in Olutura is where there is a change of segment in the 1st person category only. This means that the consonants in the 2nd and 3rd person categories retain the segment in the verb base. This was observed in words that have the consonants /p/, /β/, /l/, /t/, /k/, /r/ and /w/ which change to a voiced pre-nasalized sounds. The consonants /p/, /β/ and /w/ share the place of articulation as bilabials while /l/ and /t/ also share the place of articulation as alveolars. Olutura CSA in which there is a change from a voiceless sound in the input to a voiced sound in the 1st person singular is discussed using OT constraint interaction in Tableau 34. The following constraints apply in this case. *NÇ which prohibits the occurrence of a nasal followed by a voiceless obstruent should be ranked high so that it is not violated by the winning candidate. The constraint *SA is important due to the segment alternation that occurs between the voiceless alveolar /t/ and the voiced alveolar /d/. It is ranked at the same level as the faithfulness constraints because Olutura requires that the output should have a different segment from that in the input. The faithfulness constraint DEP(V) which demands that every vowel in the output must have a correspondent in the input is used in the current analysis to deal with the emergence of any vowel in the output. This constraint is dominated by the rest of the constraints in this analysis because having a vowel prefix is optional in certain circumcitances in Olutura (see 2.2.1). The violation of *NC is caused by the constraint *SA which should, consequently, be ranked higher than it. These constraints yield the following ranking that results in the emergence of the optimal candidate in Tableau 35: *NC >> *SA >> *NC >>DEP-IO(V).

Tableau 34: Olutura voiced sound CSA

/N-tima/	*NÇ	*SA	*NC	DEP-IO(V)
a. ☞[e.ndi.ma]		*	*	*
b.[nti.ma]	*!			

In this analysis, GEN produces only two competing candidates in Tableau 34 which are evaluated using the constraints discussed in the preceding paragraph. The evaluation from Tableau 34 is such that the winning candidate, (a) violates three constraints; *NC,*SA and DEP-IO(V). Candidate (a) is phonologically correct because the verbal prefix /e/ is an underlying form that speakers are aware that it indicates 1st person singular. Candidate (b) makes one serious violation of *NÇ. Although the output is similar to the input, (b) cannot win because of the phonotactics of Olutura with regard to the argument in this chapter which demand SA. The violation of the constraint DEP(V) by candidate (a) has no serious consequence as it would still win without it because it has already been indicated that the vowel prefix /e/ is optional, ans as indicated by the shadind of the cells, this constraint does not play an important role in the decision of the winner.The fact that (a) wins shows that in Olutura, the process of SA must be in constant violation of the constraint *SA because it is the one that determines the alternation of the segments concerned

The second instance of CSA in Olutura is where the palatal approximant /j/ changes to /n/ in the 1st person singular, /w/ in the 2nd person and reverts back to /j/ in the 3rd person. This is demonstrated in 79.

79. Olutura CSA involving /j/or /i/

	Input	**1st person**	**2nd person**	**3rd person**	**Plural**	**Gloss**
(i)	/ja:la/	[na:la]	[wa:la]	[ja:la]	[βa:la]	spread
(ii)	/jenda/	[nenda]	[wenda]	[jenda]	[βe:nda]	stand
(iii)	/joŋga/	[noŋga]	[woŋga]	[joŋga]	[βo:ŋga]	string (verb)
(iv)	/jaa/	[na:ka]	[wa:ka]	[ja:ka]	[βa:ka]	weeding
(v)	/iŋgira/	[niŋgira]	[wi ŋgira]	[je ŋgira]	[βeŋgira]	come/go in
(vi)	/imba/	[ni:mba]	[wi:mba]	[je:mba]	[βe:mba]	sing

From the examples in 79, it is easy to predict that /j/ or /i/ will alternate with /n/ in the 1st person, /w/ in the 2nd person, /j/ in the 3rd person and /β/ in the plural. This kind of CSA can be explained using the concept of hardening in which consonants that are lower on the consonant strength scale change to those that are higher in the 1st person singular and in the plural. In this study, a consonant strength scale specific to Olutura SSP is proposed in Figure 22 as per Selkirk (1982, 1984) who argues that languages can have a language particular sonority hierarchy scale which is based on the inherent sonority that each segment has.

Stronger	Voiceless plosives	[p, t ,ʧ, k]
	Voiceless fricatives	[f, s, x, ts]
	Voiced fricative	[β]
	Prenasals	[mb, nd, ŋɟ,ŋg, nz]
	Nasals	[m, n, ɲ, ŋ]
	Liquids	[l, r]
	Labials	[-^{w}]
Weaker	Glides	[w, j]

Figure 22: Olutura Consonant Strength Scale

This shows that in Olutura, CSA from the input to the four categories of 1^{st}, 2^{nd}, 3^{rd} and the plural goes up on the Olutura consonant scale and then down and lastly up again as shown in Figure 23.

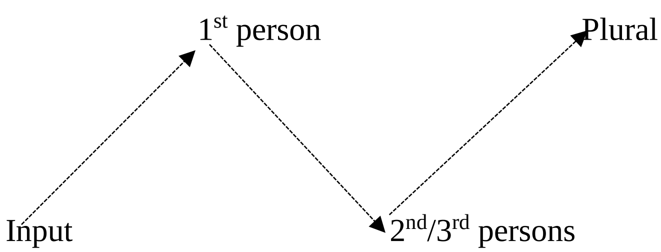


Figure 23: Olutura CSA involving /j/ or /i/

On the sonority scale of Olutura in Figure 22, the change moves from softening in the input to hardening, backc to softening and then hardening again. The approximant /j/ and /w/ are lower on the sonority scale than the nasal /n/ and the bilabial fricative /β/.

The 3rd instance of CSA in Olutura is the occurrence in which some segments change to completely different ones in, either the first or last syllables of the verbs concerned. This occurrence is illustrated in the words in 80 in which the sounds that altenate are presented in bold.

80. Olutura Unpredictable CSA

	Input	**Gloss**	**Output**	**Gloss**
(i)	/iŋgi**r**a/	come in	[i. ŋgi.**sj**a]	cause to enter
(ii)	/kalu**x**a/	come back	[kalu**sj**a]	bring back
(iii)	/**l**aŋga/	you call	[**n**aŋga]	I call
(iv)	/**r**e:ra/	you bring	[**nd**e:ra]	I bring
(v)	/**k**ula/	buy	[**ŋg**ula]	I buy

In the examples in 80, the liquid /r/ and the velar fricative /x/ in 80 (i) and (ii) are both replaced by the palatalized /sj/ in the last syllables. The case of /r/ is a typical case of hardening discussed earlier in this section because in accordance to SSP, the liquid /r/ is lower than /sj/ on the sonority scale. The change of /x/ to /sj/ is at the same level on the scale because both of them have the same consonality. In example 80 (iii), the CSA occurs between the liquid /l/ and the nasal /n/ both of which occur in the first syllable of the verbs concerned. The CSA in Olutura which involves the alternation of /l/ and /nd/ or /n/ is like that reported by Herbert (1986) in Gitonga in which the former changes to /n/ in the 1st person singular. The alternation of /l/to /n/ can also be explained using the concept of hardening because /l/ has lower consonality than /n/.

Following McCarthy (2002) and Bradley (2009) who use the constraint $\text{IDENT}_{\text{OBS}}$(place), the constraint $\text{IDENT}_{\text{ONS(NAS)}}$ is introduced in the current analysis. $\text{IDENT}_{\text{ONS(NAS)}}$ demands that both the input and output should be identical by having a nasal onset. IDENT-IO should be ranked high because Olutura does not require an output that is similar to the input. It is the constraint that is responsible for the violations that the rest of the constraints in this set incur because of the demand for lack of identity in the output. It should be noted here that in such cases, a faithful constraint can be ranked high in Olutura when its phonotactics demand so. A constraint that prohibits the combination of a nasal and a consonant that is an alveolar is required in the current analysis to deal with this specific case, hence the use of $\text{*NC}_{\text{ALV.}}$ The constraint *NC cannot serve this purpose because it is general to all nasal and obstruent combinations. *NC_{ALV} should be ranked high because Olutura does not require such a combination in the current case. The other constraint that is required in this analysis is $\text{*SA}_{\text{INITIAL}}$ in order to deal with the occurrence of SA that must take place in the word initial position. The constraint $\text{IDENT-IO}_{\text{ONS(NAS)}}$ is used in this analysis because the SA that occurs in the output is that of a nasal sound. This constraint should be ranked lowest because it I a target of violation by the winning candidate. The constraints in Tableau 35 are ranked as IDENT-IO >> *NC_{ALV} >> $\text{*SA}_{\text{INITIAL,}}$ $\text{IDENT-IO}_{\text{ONS(NAS).}}$

Tableau 35: Constraint interaction in Olutura SA due to hardening

/laŋga/	IDENT-IO	*NC_{ALV}	*$SA_{INITIAL}$	IDENT-$IO_{ONS(NAS)}$
a.[laŋga]	*!			
b. ☞ [naŋga]			*	*
c.[ndaŋga]		*!	*	

Candidate (a) makes a serious violation of IDENT-IO by having an output that is similar to the input. This occurrence is what Olutura is trying to do away with in the current analysis because a change of segment must be realized by the optimal candidate. Candidate (c) makes a serious violation of *NC_{ALV} by having a nasal and an alveolar obstruent which Olutura is trying to avoid in this particular environment and so it does not stand a chance of winning. Candidate (c) also makes a second violation of *$SA_{INITIAL}$ which is, however, not serious because Olutura allows SA in the word initial position. The winning candidate in this analysis, (b), makes two violations that are not serious.The violations of *$SA_{INITIAL}$ and $IDENT_{ONS(NAS)}$ are both necessary because SA is allowed in Olutura and in this particular case, the dialect demands a nasal in the onset.

In the analysis of data, it was observed that there is an instance in which some consonant sound segments fail to alternate. This occurrence means that such consonants are not capable of taking part in the CSA process in Olutura. This is illustrated in 81.

81. Olutura CSA Non-conforming sequences

	Input	Gloss	1st Person	2nd Person	3rd Person
(i)	/fu:βa/	throw	[efu:βa]	[ofu:βa]	[afu:βa]
(ii)	/mala/	finish	[emala]	[omala]	[amala]
(iii)	/nuna/	suck	[enuna]	[onuna]	[anuna]
(iv)	/sala/	vomit	[esala]	[osala]	[asala]
(v)	/xomba/	lick	[exomba]	[oxomba]	[axomba]
(vi)	/ruma/	send	[eruma]	[oruma]	[aruma]

The data in 81 shows that the consonant segments /f/, /m/, /n/, /s/, /x/ and /r/ in the first syllable of the verb base do not realize a different consonant in the 1st, 2nd and 3rd persons. We have already indicated that CSA in Olutura is used to indicate person and, therefore serves a semantic function in the language. This means that when CSA fails to occur, the meaning that is lost by this failure can only be created through the phonological process of prothesis. Prothesis, as discussed in Section 3.5 enables the addition of the vowel sound segments [e], [o] and [a] that show the 1st, 2nd and 3rd persons, respectively. It was observed that all the six consonant sounds are nasals, fricatives or the liquid /r/. The motivation for the lack of CSA in these consonant segments can be explained in terms of ease of articulation and perception. The segments /m/ and /n/ are nasal and cannot therefore acquire more nasalization unless they become geminates and not prenasalized segments. Such an occurrence would not be in line with Olutura phonology regarding the 1st person. A mutation of the segment /s/ would, also, not result in a viable segment sequence, for example; /soma/ would be *[nzoma]. The mutation of /f/ and /x/ would result in sequences that are not allowed in the dialect. In other words, the prenasalization of the two would result in *[nvu] and *[nx], respectively, combinations that were ruled out in Section 4.2. Therefore, /f/ and /x/ cannot be prenasalized in line with the phonological process regarding the 1st person singular in Olutura.

Using the Olutura word /**futsa**/, OT constraint interaction is used in Tableau 36 to demonstrate how Olutura CSA does not allow the mutation of the fricative and nasal consonants. Only three constraints*NC, *NÇ and *SA have been used. In this analysis, the markedness constraint *NC is needed because of the cases of SA involving the first person singular which Olutura usually realizes using a nasal and an obstruent in the onset. In the lack of SA, a change of the consonant segment to a prenasalized one in the output is not realized. The constraint *SA is important in the analysis of all cases of segment alternation because it is responsible for the change that takes place to the rest of the constraints. It is therefore, needed to evaluate the lack of SA in the current analysis that is seen in the emergence of the same segment in the input and output in the 1st person singular. This means that in Olutura, there are circumstances in which SA is expected but it fails to take place. The constraint *SA must also not be dominated because in this analysis, Olutura prohibits SA and so this particular constraint is the cause of the violations that any other candidate incurs. The constraint *NÇ is required in the current analysis in order to assess the likely emergence of candidates that may syllabify the underlying prefix /N-/ for Olutura verbs in the onset. The constraints concerned yield the ranking *SA >> *NC >> *NÇ.

Tableau 36: Olutura CSA Nonconforming Consonant sequences

Input /fu.tsa/	*SA	*NC	*NÇ
a.[ndu.tsa]	*!	*	
b. ☞ [fu.tsa]			
c.[nfu.tsa]			*!

From the analysis in Tableau 36, candidate (a) violates the two constraints *SA and *NC. The violation of *SA is a serious one because Olutura prohibits SA involving the sound segment concerned. Its violation of *NC is not serious because Olutura allows a nasal and the voiced alveolar together as a prenasalized onset in its phonology. Candidate (c) makes one serious violation of *NÇ because it has a combination that is prohibited in Olutura, and so it cannot win. This leaves candidate (b) to emerge as the winner, without any violation at all. The fact that (a) does not incur any violation ensures that the input is left intact due to the failure to take part in SA. The explanation regarding this lack of SA involving the six consonants discussed in this paragraph is also valid for a similar occurrence in the failure of the consonant to change in the 2^{nd} and 3^{rd} persons. It should be noted from the analysis in 36 that in cases where consonants do not change, constraint interaction cannot help in getting the right candidate.

6.2.3 The Role of Sonority in CSA

In the literature review in Section 1.7.6, we alluded to the observation by Lass (1984) and Murray (2015) that in some languages segment alternation is such that voiceless stops or fricatives, which are higher on the consonant sonority strength scale weaken to their voiced counterparts. The consonant strength scale shown in Figure 22 has been used to partly account for the occurrence of CSA in Olutura. The data discussed in 6.2.2 shows a similar observation in Olutura. The occurrence of the consonants that change to, either a nasal or a prenasalized segment in the first person category can be accounted for by using the Olutura consonantal scale in Figure 22 introduced in Section 6.2.2. The examples in 82 show the Olutura consonant sounds that are higher on the sonority scale weaken to those that are lower.

82. Olutura higher to lower sonority

	Input	UR	Gloss	Output	SR	Gloss
(i)	[k]	/**k**ona/	sleep	[ŋg]	[**ŋg**o.na]	I am sleeping
(ii)	[p]	/**p**i:ma/	measure	[mb]	[**mb**i:.ma]	Iam measuring
(iii)	[t]	/**t**o:la/	pick	[nd]	[**nd**o:.la]	I am picking
(iv)	[β]	/**β**aja/	play	[mb]	[**mb**a.ja]	I am playing

In Olutura, the consonants /p/, /t/, /k/, and /β/ are higher on the sonority scale or have stronger consonality and therefore weaken to /mb/ is lower on the sonority scale. The assumption in this case is that the prenasalized sounds are lower on the consonant scale and have a weaker consonality. However, the argument by Lass (1984) and Murray (2015) does not completely apply to Olutura in which there are sounds that are lower on the Olutura consonant strength scale that alternate to those that are higher.This is illustrated in 83.

83. Olutura lower to higher sonority

	Input	UR	Gloss	Output	SR	Gloss
(i)	[l]	/**l**uma/	bite	[n]	[**n**u.ma]	I am biting
(ii)	[l]	/**lj**a/	eat	[nd]	[**nd**ja]	I am eating
(iii)	[w]	/**w**ola/	say	[mb]	[**mb**o:.la]	I am saying
(iv)	[j]	/**j**a:la/	spread	[n]	[**n**a:la]	I am spreading(e.g. a bed)

The examples in 82 and 83 have been used to show the different segment alternations that occur in the 1st person in Olutura. What can be observed from this is that in Olutura, the sound alternation has no specific direction. This is because some sounds alternate to those with a stronger consonality while others alternate to those with a weaker consonality.The observation from the data used shows that the alveolar lateral /l/ does not occur after the mid front vowel /e/. As far as /w/ is concerned, the change cannot only be explained using the Olutura consonant strength scale, but also the fact that it shares the same place of articulation with /^{m}b/ to which is alternates as bilabials.

The phonological process of SA in Olutura also involves the occurrence of post-nasal voicing. Olutura uses the strategy of postnasal voicing and nasal deletion to deal with marked nasal voiceless consonant sequences. The only difference is that in addition to postnasal voicing, Olutura does not delete the nasal sound segment that is formed in the phonological process of prothesis as is the case with Kikuyu (Peng, 2003). Therefore, in essence, Olutura uses the prothesis of /N-/ and then post-nasal voicing. Olutura also has a productive process in which mutation takes place in the 1st person singular. A mutation of the initial consonant occurs when the nasal prefix /n/ is attached to the verbal root to mark the first person singular. This process of productive mutation that begins with prothesis and then voicing is shown in Tableau 37. Only three constraints are used in this analysis; the markedness constraint *NC and the faithfulness constraints DEP-IO and IDENT-IO_{VOI}. The constraint *NC is what is responsible for the change, specifically the SA in the winning candidate and also the insertion of the nasal consonant in the onset. The ranking of constraints that pertains in Tableau 37 is *NC >> DEP-IO, IDENT-IO_{VOI}.

Tableau 37: Productive mutation in Olutura

Input /toola/	*NC	DEP-IO	IDENT-IO_{VOI}
a.[nto:la]	*!	*	
b. ☞ [ndo:.la]		*	*

From the analysis in Tableau 37, candidate (a) undergoes a serious violation and cannot emerge as the optimal candidate. Its violation of DEP-IO through the insertion of consonant in the word initial is not serious because the winning candidate also incurs a violation of the same. Candidate (b) must necessarily violate IDENT-IO_{VOI} and DEP-IO to emerge as the winner. The violation of IDENT-IO_{VOI} happens when the voiced alveolar plosive /d/, which does not occur in Olutura displaces the voiceless alveolar plosive /t/ in the output. The violations of the constraints IDENT-IO_{VOI} and DEP-IO are not serious because the phonotactics of Olutura allow it.

In our discussion in Chapter 5 we reported the occurrence in which the palatal approximant /j/ is replaced by the bilabial approximant /w/ in the phonological process of labialization. This kind of SA is equated to what happens in some languages in which the loss of the bilabial glide /w/ would mean losing important information. Jaeger and Van Valin (1982) as quoted by Clements (1986) cite the example of Yateē Zapotec in which /w/ carries essential morphological information that would be lost if it were deleted. In the case of Olutura the /w/ that takes the place of /j/ is what has semantic value and not /j/ and that is why it emerges in the output and displaces the palatal glide. In this chapter, the OT constraint interaction in Tableau 38 has been used to show how this happens. The relevant constraints in this analysis are; *DIPH, FAITH-V, GG and *COMP$_{\text{ONSET(LAB)}}$ The constraint *GG is new and is needed in this analysis to evaluate sequences that have two glides in the onset, a possibility that is caused by the glide /j/ which is not just part of the input, but falls next to the /u that is destined to labialize. This is also important because in 2.3.5, we made the observation that two glides can form an onset in Olutura. FAITH-V is relevant in order to evaluate the vowels that appear in both the input and output items as one of them must be labialized. As it was established in Section 5.2, in Olutura, a vowel that is [-high] should be juxtaposed to the [+high] vowel /u/ in order for labialization to happen. The newly introduced constraint COMP$_{\text{ONSET(LAB)}}$ is used here because it is particularly concerned with the occurrence of labialization. This constrain is destined for satisfaction by the winning candidate so it should be ranked low.The constraints involved are ranked as *DIPH >> FAITH-V >>*GG >> COMP$_{\text{ONSET(LAB).}}$

Tableau 38: Glide SA in Olutura

Input /oxu+jeja/	*DIPH	FAITH-V	*GG	$COMP_{ONSET(LAB)}$
a.[o.xue.ja]	***!**			
b. ☞ [o.x^{w}e.ja]		*		*
c. [o.j^{w}e.ja]		*	*	*

The constraint analysis in Tableau 38 is such that candidate (a) incurs a serious violation of *DIPH by having two vowels that are not similar in the same syllable.Olutura does not allow diphthongs in its syllable formation. Candidate (c) cannot emerge as a winner because of making the most violations. It violates FAITH-V by oremoving the [+high] vowel /u which is earmarked for the liabilization that is vital in this particular analysis. It also violates *GG and $COMP_{ONSET(LAB)}$ which are, however, lowly ranked as such, inconsequential. The winning candidate (b) violates two constraints, the first one is that of FAITH-V which happens when the output fails to emerge with the [+high] vowel that occurs in the input something that also contributes to a shorter output. The second one is the violation of the general constraint $COMP_{ONSET(LAB)}$ which occurs when the [+high] /u/ is realized as a glide in the output. This is what must happen for labialization to happen and that is why this particular constraint was ranked low. It is observed here that the glide /j/ must be done away with and its place taken over by /w/ which does not occur in the input but emerges in the output through the process of labialization. The reason why the bilabial glide /w/ displaces the palatal /j/ is due to the [+high] vowel /u/ which occurs in the last syllable of the prefix and therefore, comes before the palatal glide /j/ on the sonority scale. As already established in chapter 3, the [+ high) back vowel /u / can only be realized as /w/ in Olutura and not as /j/. The other reason for this displacement is that the glide /w/ is more sonorous than /j/ and therefore, more qualified to occur nearer the nucleus that /j/. In Olutura, /j/ is articulated with more constriction that /w/ and is, therefore, higher than /w/ on a sonority scale of Olutura.

The analysis of the data shows that in Olutura SA in the plural forms in the grammatical category of person is predictable. The prefix that comes before the main verb in the three persons takes a CV prefix as opposed to the onsetless V syllable prefix discussed in 6.2.1 in Olutura plural consonantal SA is demonstrated in the examples in 84.

84. Olutura plural SA

	1st person	Gloss	2nd person	Gloss	3rd person	Gloss
(i)	[xupana]	we are fighting	[mupana]	you are fighting	[βapana]	they are fighting
(ii)	[xulja]	we are eating	[mulia]	you are eating	[βalja]	the are eating
(iii)	[xuamba]	we are massaging	[muamba]	you are massaging	[βaamba]	they are massaging
(iv)	xutsja]	we are going	[mutsja]	they are goung	[βatsja]	they are going

It was observed that the prefix in the examples in 86 is always a CV syllable, which is /xu-/ in the 1st person plural, /mu-/ in the 2nd person plural, and /βa-/ in the 3rd person plural.

6.2.4 Olutura SA in Nouns

As already stated in 6.2.2, SA in nouns refers to the occurrence in which the segment in the input changes to a different one in the output. This occurrence was observed in Olutura in the word class of nouns in which the realization of the plural form of the noun is realized through a different segment from the one in the singular form. The nouns in 85 have been used to demonstrate this occurrence in Olutura. The prefix /e/ is indicated in italics in the column for plural because it is a redundant feature in Olutura.

85. Olutura Plural Noun SA

	Singular	Gloss	Plural	Gloss
(i)	/sisa:la/	a chair	[*e*βisa:la]	chairs
(ii)	/sianwa/	a gift	[*e*βianwa]	gifts
(iii)	/sipini/	a pin	[*e*βipini]	pins
(iv)	/sikombe/	a cup	[*e*βikombe]	cups
(v)	/sikapo/	a basket	[*e*βikapo]	baskets

The examples in 87 show that the singular forming consonant /s/ in the first syllable of the words in the singular form is realized as the labio-dental fricative /β/ in the plural. The SA between the alveolar fricative /s/ to the labio-dental fricative /β/ is used to mark the plural for all the consonants that take part in SA to mark the plural, whether voiced or voiceless. The consonant /s/ also has stronger consonality and weakens to /β/ which is lower on the consonant strength scale of Olutura.

The SA that involves plural nouns is discussed on the premise of OT in Tableau 39. Drawing from the data in 85, the constraint $\text{IDENT}_{\text{VOI}}$ is essential in this analysis to deal the change from a voiceless sound to a voiced one in the output. It must be undominated because in this case Olutura does not allow an output segment to be identical to the one in the input in terms of voice.

The constraint $SA_{INITIAL}$ is introduced here to deal with the specific case of SA in the initial word position. This constraint, which prohibits SA in initial word position replaces the general constraint *SA in thisparticular analysis. It is important so as to evaluate the alternation of the segments from /s/ to /β/ at the beginning of the words used in this analysis. $*SA_{INITIAL}$ should be ranked lower that $IDENT_{VOI}$ because Olutura is demanding an alternation of segments. The two constraints involved are ranked as $IDENT\text{-}IO_{VOI} >> *SA_{INITIAL}$.

Tableau 39: Olutura plural noun SA

/sisa:la/	IDENT-IO $_{VOI}$	$*SA_{INITIAL}$
a. [sisa:la]	*!	
b. ☞ [βisa:la]		*

The analysis in Tableau 39 shows that candidate (a) makes a gross violation of the constraint $IDENT\text{-}IO_{VOI}$ and cannot, therefore win. This is because the phonotactics of Olutura demand a voiced sound in the output in order to realize the plural and yet candidate (a) retains the voiceless sound which must be discarded. The winning candidate, (b), makes one violations of the low ranked $*SA_{INITIAL}$ by realizing a different segment from the one in the input at word initial position. This showls that Olutura allows SA in word initial position.

Apart from the SA involving primary consonants, it was noted from the analysis of data that some common nouns and adjectives with the labialized sound /m^w/ in Olutura also realize /β/ in plural nouns. The nouns in 86 are used here to illustrate this type of SA.

86. Olutura Labialized SA

	Input	Gloss	Output	Gloss
(i)	/omʷami/	a leader	[aβa:mi/	leaders
(ii)	/omʷana/	a child	[aβana]	children
(iii)	/omʷifi/	a thief	[aβefi]	thieves
(iv)	/omʷeji/	a sweeper	[aβeji]	sweepers
(v)	/omʷaŋgu/	a light person	[aβaŋgu]	light people
(vi)	/omʷoni/	a sinner	[aβoni]	sinners

The words in 86 (i) to (iv) are common nouns while those in 86 (v) to (vi) are adjectives. Both categories realize the labio-dental fricative /β/ in the plural. This occurrence, just like that in the examples in 83, also shows that in Olutura, a sound with weaker consonality can alternate with a sound which has stronger consonality.

6.3 The Role of the Zero Onset Syllable in SA

As discussed in 6.2.2, SA involves vowel sound segments in Olutura. The data analysis shows that in this dialect there is a change of the vowel constituting the zero onset syllable that signals the change in the grammatical category of person as one moves from the 1st to the 3rd person. In Olutura SA, the zero onset syllable plays a semantic role. In the examples in 87 (a), it is noticed that the change from the basic verb to all the three persons takes place whenever a different vowel is used. The 1st person uses the vowel /e/, the second person uses the vowel /o/ while the 3rd person uses the vowel /a/. The sound alternation occurs in the 1st person singular after the zero onset syllable that has the vowel /e/. The consonant segment that alternates with the one in the CV syllable of the basic word after the vowel prefix is either a nasal or a prenasalised sound in the 1st person. Vowel SA in the grammatical category of person is shown in 87.

87. Olutura Vowel Sequential Alternation (VSA)

(a) VSA (person)

	1st person		**2nd person**		**3rd person**	
(i)	[eŋga:sia]	I am making	[oka:sia]	you're making	[aka:sia]	He's making
(ii)	[enuma]	I am biting	[oluma]	you're biting	[aluma]	He's biting
(iii)	[eŋgona]	I am sleeping	[okona]	you're sleeping	[akona]	He's sleeping
(iv)	[emba:ra]	I am thinking	[opa:ra]	you're thinking	[apa:ra]	He's thinking
(v)	[endi:ra]	I am holding	[oti:ra]	you're holding	[ati:ra]	He's holding

(b) Irregular Olutura VSA occurences

	1st person	**2nd person**	**3rd person**
(i)	/eŋgona	[*oŋgona]	[*aŋgona]
(ii)	/endima/	[*ondima]	[*andima]
(iii)	/eŋgenda/	[*oŋgenda]	[*aŋgenda]

In Olutura, the vowel in the zero onset syllable determines the consonant segments that alternate in input and output configurations. The vowel prefixes indicating person does not just occur before any consonant. The vowel /a/ which is an indicator for the 3rd person does not come before the prenasalized sounds while the mid vowel /e/ which is the vowel prefix for the 1st person singular does not occur before the consonants that are not prenasalized. Similarly, the mid back vowel /o/ which is a vowel prefix for the 2nd person singular cannot come before the prenasalized consonant segments. The asterisks in 87(b) show that the constructions using the consonants that come after the zero onset syllable do not occur in Olutura. This shows that the zero onset syllable determines the consonant segments that can occur in the onset of the second CV syllable. This phonological occurrence in Olutura is what leads to SA in this dialect. Similarly, as illustrated in 87(b), the zero onset syllables that signal the 2nd and 3rd persons cannot take on the prenasalized sound in the second CV syllable as this would result in constructions that the dialect does not allow. Tableau 40 has been used to show how constraints are always in conflict with each other regarding the input-output relationship.

IDENT$_{(VOI)}$ is used in tha same way as it was used in Tableau 39 because Olura demands a different segment in terms of voice. The constraint shold not be dominated because it is the cause of the violations incurred by the lower ranked constraints. The constraint *NC, which should be ranked at the same level with *SA, should be ranked lower than *NÇ because in Olutura, it is better to have a nasal with an obstruent than with a voiceless obstruent. The ranking IDENT-IO$_{VOI}$ >> *NÇ >> *SA,*NC Iis applied in the current analysis.

Tableau 40: Olutura 1st person CSA

Input /kona/	IDENT-IO$_{(VOI)}$	*NÇ	*SA	*NC
a.[ko.na]	*!			
b. ☞ [ŋgo.na]			*	*
c.[ŋko.na]		*!		

Tableau 40 shows how constraints interact in OT to arrive at the right construction in the 1st person singular in Olutura.

Candidate (a) makes one srious violation of IDENT-IO$_{(VOI)}$ by having an output that is identical to the input. This inwhat Olutura is trying to avoid in the current case and that is why (a) gets the mark for gross violation. Similarly, candidate (c) also incurs one serious violation of *NÇ because, as discussed in Chapter 4, it has an output that is prohibited in Olutura.The disqualification of these two candidates, therefore, leave candidate (b) to be th winner because it violates two lowly ranked constraints.

6.4 Segment Combination in the Zero Onset Syllable and SA

It is observed in 83 that the alternation in which the approximant /j/ changes to the nasal /n/ in the 1st person singular is the only one that is incapable of having a zero onset syllable in Olutura. The approximant /j/ is lower than /n/ in the Olutura consonant strength scale and this means that there is hardening of segments in the 1st person singular but a reversal to the weaker segment of the basic verb happens in the 2^{nd} and 3^{rd} persons plural. The 2^{nd} and 3^{rd} persons plural revert to the bilabial and palatal approximants /w/ and /j/, respectively.

88. Olutura /j/ alternation

(a) /j/ → /n/

	stative	**Gloss**	**1^{st} person**	**Gloss**
(i)	/ja:la/	spread	/na:la/	I spread
(ii)	/ja:ka/	weed	/na:ka/	I weed
iii)	/jema/	stand	/ne:ma/	I stand
(iv)	/jo:la/	reach	/no:la/	I reach

(b) /j/ → /w/

	stative	**gloss**	**2^{nd} person**	**gloss**
(i)	/jo:sja/	clean	/wo:sja/	you clean
(ii)	/je:ma/	stand	/we:.ma/	you stand
(iii)	/jaŋgala/	mature	/waŋga.la/	you mature

(c) /j/ → /β/

	stative	**gloss**	**3^{rd} person(plural)**	**gloss**
(i)	/ja:la/	spread	/βa:la/	they spread
(ii)	/ja.ŋga.la/	mature	/βa. ŋga.la/	they are mature

(iii)	/je:ma/	stand	/βe:ma/	they stand up

The analyses in 88 show that for the Olutura basic verbs as those used in 88 (a), (b) and (c), when the verb starts with the glide/j/, it alternates with the alveolar nasal in the 1st person singular, the glide /w/ in the 2nd persons plural and the bilabial fricative /β/ in the 3rd persons plural plural respectively. The case in which voiceless stops weaken to voiced prenasalised sounds is very frequent in Olutura. The voiceless stops /t/, /p/ and /k/ which occur in the basic verbs change to voiced prenasalised sounds /nd/, /mb/ and /ŋg/ respectively in the 1st person singular.

In the zero onset syllable which constitutes the verbal prefix for the grammatical category of person, the vowels involved do not just attach themselves to any consonant in the second CV syllable. The mid vowel /e/ which is the prefix for the 1st person singular is the only one that is attached to the CV syllable with the prenasalised sound as seen in 89.

89. /e/ $\longrightarrow$ / e+prenasal/

(i)	/e+mb/	[embo:la]	I am saying
(ii)	/e+nd/	[endira]	I am crying
(iii)	/e+ŋg/	[eŋgana]	I am telling stories

As far as the vowel verbal affixes are concerned, the prefix of any other vowel in the 1st person singular category would result in constructions that do not occur in this dialect. This means that in Olutura, the prefix for each of the three persons do not occur haphazardly with all the consonant sounds.

In Olutura, SA changes verbs into various states. This is exemplified in 90.

90. Olutura morphological SA

Basic verb	Gloss	Passive	Gloss	Stative	Gloss	Applicative	Gloss
(i) /kula/	buy	/kul^{w}a/	be bought	/kulira/	buy for	/kulir^{w}a/	be bought for
(ii) /rula/	go out	/rusiβ^{w}a/	be taken out	/rusja/	take out	/rusirja/	take out for
(iii) /kiŋga/	carry	/kiŋgwa/	be carried	/kiŋgira/	carry for	/ki^{ŋ}gj^{ɣ}a/	make one to carry
(iv) /βeːja/	cheat	/βeːjwa/	be cheated	/βeːjera/	framing one	/βejerja/	help to cheat

The case of Olutura is similar to that reported in Lamba, a Bantu language in Zambia in which the consonant in the basic verb changes to different ones in the passive, stative and applicative forms (Kenstowicz & Kisserberth 1979).

It is noted that in examples 90 (i) and (ii), the segment in the basic verb alternates from /l/ to the labialized /l^{w}/ in the passive and /r/ alternates to the labialized /r^{w}/ in the applicative. In example (ii), the alveolar lateral /l/ changes to the alveolar fricative /s/ in the passive, stative and applicative forms. The idea that the liquid /l/ hardens to the fricative /s/ in the prosses of SA in Olutura has already been discussed in 6.2.2. In example 90 (iii), the voiced pre-nasal /ŋg/ is realized as the labialized /ŋg^{w}a/ in the passive and palatalized / ŋgj^{ɣ}/ in the applicative. This shows that in Olutura, both labialization and palatalization are used to change the basic verb into different verbal categories. In example (iv), the palatal approximant /j/ changes to the labialized /j^{w}a/ in the passive form. This, just like what happens in example 90 (iii) also shows that palatalization is used in Olutura to change the verb base into the passive and applicative forms. This type of SA in Olutura is similar to the morphologically driven type that is meant to get sequences that conform to the phonotactics of a given language as posited by Lombardi (2001). The OT constraints in Tableau 25 in chapter 4 can also be used to explain this occurrence.

6.5 Conclusion

The findings show that in Olutura SA occurs in verbs, nouns and adjectives and it affects both vowel and consonant sounds. The SA regarding vowels is such that the consonant segments that alternate in the input and output configurations are determined by the vowel prefix that indicates the grammatical category of person. The conclusion that is made from this observation is that in Olutura, SA has a functional role because the vowel alternation is what shows the grammatical category of person while the alternation of consonants brings out the different states of the verb. Thus, the kind of SA reported in Olutura is unlike the one in Korean in which it is a matter of preference as exemplified by Young (2012). In the SA involving consonants, it was observed that some Olutura consonants retain the consonant in the basic verb in the category of person and only use the zero onset verbal prefix SA in the process of prothesis to indicate the change of meaning. The consonants involved in this occurrence are either nasals or fricatives. In this dialect, some consonants have SA in the 1st person singular only while others have it in the 2nd and 3rd persons plural. In VSA, all consonant sound segments in Olutura can have the relevant verbal prefixes of /e/, /o/ and /a/ before them as verbal prefixes in the formation of the V syllable structure.

SA in Olutura has no specific direction on the Olutura consonantal strength scale because some consonant sound segments alternate due to hardening while others alternate due to weakening. This is unlike the observations by both Lass (1984) and Murray (2015) that in some languages segment alternation is such that voiceless stops or fricatives, which are higher on the consonant sonority strength scale weaken to their voiced counterparts. Another conclusion in this chapter is that the SA that occurs through the phonological processes of labialization and palatalization is used in Olutura to change some verb stems into the passive, stative and applicative forms. The general conclusion that is made from the discussion in this chapter is similar to the observation by Hayes (2004) that most SA is conspiratorial and driven directly by the need for morphologically derived sequences so as to conform to the phonotactics of the language. As observed in this chapter, the grammatical function that SA serves in Olutura affects the configuration of the optimal syllable in this dialect.

CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The present study focused on the identification of the sound segments and syllable structures of Olutura as well as the phonological processes that are involved in the formation of Olutura syllables. In particular, the study set out to answer four research questions, namely; the sound segments and syllable structures of Olutura, the phonological processes involved in HR in Olutura, how constraint interaction results in the formation of the prenasalized syllable and labialization, and the role of the onset in the process of SA in Olutura. The data analysis, based on the research questions, provides a summary of the findings of this study which is followed by the conclusion and then the rcommendations.

7.2 Summary of the findings

The first objective of this study focused on the sound segments of Olutura and how they function in its phonology. The study findings show that Olutura has five phonemic vowels and a three vowel height system. The five primary vowels have their long counterparts which makes a total of ten vowels in phonetic realization. Only one vowel, /i/, was found to have more functions than the rest while the vowel /u/ is used very minimally. This observation is in tandem with most Bantu languages which have five vowels. Olutura has 20 consonants that have a primary place of articulation (Table 7) and 20 which have a secondary articulation (Table 8). It was observed that Olutura does not have many words with /ʃ/ and /^{n}ts^{w}/ which have primary and secondary articulation, respectively.

The second objective of the study was to find out the syllable structures of Olutura and how they are affected by its phonotactics. The results established that Olutura has seven syllable structures all of which are open because the dialect does not allow codas. The first one is the V syllable structure which is only made of one vowel and occurs in all word positions although its prevalent position is the word initial and medial positions. The V syllable structure is marked at both word initial and word final positions because not many words were attested in the said position in Olutura. In verbs, the distribution of the vowels in the V syllable structure of Olutura is determined by the grammatical category of person.The findings show that the [+high] back vowel /u/ does not occur at word initial position in the V structure in Olutura verbs. In nouns, the V structure can occur in any word position.The second syllable type is CV syllable structure which is the optimal one. The findings show that the CV syllable structure in Olutura can be formed by any of the consonants in its phonemic inventory. It was observed that not all vowels form the nucleus in the prenasalized and labialized CV onset. The third syllable type is CVV which is composed of one consonant and a long vowel. The CVV syllable structure occurs at word initial position in basic verbs but moves to the second position when the verb gets a prefix in most verbs. An important observation from the study findings is that the bimoraic nature of the CVV syllable structure gives it the role of distinguishing meaning in Olutura. The fourth syllable structure of Olutura is VV which is composed of only a long vowel and therefore, an onsetless syllable. This syllable only occurs at word initial position in Olutura demonstratives and verbs and can be formed using any of the vowels in the inventory of Olutura. The fifth syllable structure is the CCV which has two consonants in the onset and a vowel. The sixth syllable type is GV which has a glide and a vowel, the seventh one is GGV which has two glides in the onset and a vowel. It is formed through the combination of a consonant and a glide or two glides in the onset. The two glides are the only ones in the phonemic inventory of Olutura that result in having a complex onset when they combine with other consonants. In the CGV structure, the glide must always form the second member of the onset when it occurs with a consonant that is not a glide. In the GGV structure, the palatal glide/j/ is the one that must occur before the bilabial glide /w/. In the formation of the CGV structure, the glide /w/ combines with all other consonants apart from two and it also accepts all vowels in the nucleus apart from /u/. The patterning of the glide /j/ is quite restricted in the CGV structure.

The third objective of this study was to account for the phonological processes that are used to resolve hiatus in Olutura so as to have the optimal syllable. The findings established that the structural requirements in the phonology of Olutura demand that the five processes of coalescence, glide formation, prothesis, epenthesis and elision are used to resolve hiatus. The five processes were found to complement each other such that one or other is used and sometimes more than one of them are used at a go. The grammatical category of pessesion is realized through the phonological processes of prothesis, epenthesis and glide formation, all at once. The study found out that Olutura has two types of coalescence, namely vowel height coalescence in which a low and high vowel coalesce into the mid vowel /e/ at the mopho-phonemic word boundary and “identity” coalescence in which two similar vowels coalesce such that there is no change in vowel quality in the output. This results in compensatory lengthening which occurs through the long vowel in the output. Vowel coalescence in Olutura helps to avoid the occurrence of heterosyllabic sequences in environments where it is not allowed. The use of glide formation as a strategy for HR in Olutura occurs at the morpho-phonemic word boundary and involves the two glides /w/ and /j/. Glide formation in Olutura targets the [+high] vowels, /u/ and /i/ which are realized as glides in the surface realization.

The study also established that epenthesis as an HR strategy in Olutura involves whole syllables or single segments. It was observed that when consonant epenthesis occurs in word initial position, it results in the occurrence of a CV syllable from a V syllable. This is one of the ways that the dialect uses to repair inputs that do not conform to its phonotactics. Consonant epenthesis in Olutura only involves the palatal glide /j/ and the bilabial fricative /β/. Olutura also exhibits vowel epenthesis which is used to distinguish meaning. This type of epenthesis occurs at the end of verbal stems in which the epenthetic vowel is inserted before the vowel that is initially in the input. However, it was noted that since the vowels involved are the [+high] vowels /i/ and /u/, they are phonetically realized as glides in the phonological process of glide formation.

In Olutura, the phonological process of prothesis occurs in nouns and verbs and it involves both consonants and vowels. In nouns there is a 3rd class system prefix that marks different aspects of the noun, whether animate or inanimate. In Olutura nouns, prothesis is what causes the noun to indicate the singular or plural aspect. Prothesis is the phonological process that Olutura uses to indicate the grammatical category of person. In Olutura, the process may involve entire syllables or single sound segments. Prothesis in Olutura neither occurs because of the need to institutionalize borrowed words nor deal with pronunciation issues but rather, it is used to distinguish meaning. Elision is another phonological process that Olutura uses as a strategy for HR. The current study found that Olutura elides both V_1 and V_2. V_1 is elided when the function word precedes the lexical word or when the lexical word precedes the function word. This means that in Olutura when V_1 is targeted for elision, V_2 will always be spared irrespective of whether it is part of the lexical or function word. In this dialect, the elision of V_1 involves all vowels such that vowel height is not what determines the vowel that gets elided. A low V_1 elides leaving V_2 which is a mid vowel, a high V_1 elides leaving V_2 which is a mid vowel or a mid V_1 elides leaving a mid V_2. Similarly, the elision of V_2 targets any vowel irrespective of height or whether the vowel is part of the lexical or functional word.

The fourth objective of this study had the two issues of dealing with how constraint interaction results in the formation of the prenasalized syllable in the phonological process of labialization and prenasalization. Regarding the prenasalised syllable onset, the study found that in the phonology of Olutura, prenasalized segments are only formed by having a nasal followed by a voiced bilabial, alveolar or velar plosives. It was also established that Olutura does not combine nasals and voiceless sounds but instead combines them with voiced sounds which do not singly occur in the phonemic inventory of the dialect. In regard to this fourth objective, the findings of the study imply that Olutura has type II prenasalization in which there is a fusion of a nasal and a consonant which form a cluster that behaves like a single consonant. The findings also imply that the dialect prenasalizes the voiced sounds /b/, /d/ and /g/ which do not occur in its phonemic inventory. As far as the objective on prenasalization is concerned, it was also established that Olutura is one of the Luyia dialects, and by extension, of the Bantu language family which do not have syllabic consonants and so the nasal prefix N- is syllabified as /mu-/ in class 1 and 2 singular prefixes (Peng, 2003). The dialect uses the phonological processes of elision and epenthesis to avoid the sequence in which a nasal sound segment occurs together with a fricative in the onset. The discussion in Chapter 3 shows that Olutura does not allow a nasal sound to combine with a liquid in the onset. This prohibited sequence is avoided through the phonological processes of prothesis and SA. Either of the processes that the dialect uses in this case depends on the grammatical category of person and the context.

In the phonological process of labialization, it was established that all consonants in the phonemic inventory of Olutura, including the complex onsets, combine with the glide /w/ to form an onset that has more than one or two consonants.The study also found that labialization in Olutura happens with verbs as well as nouns. When the [+high] vowel /u/ happens to be the last vowel in the noun class prefix, it is realized /w/ in the phonological process of labialization. The same thing also happens when /u/ occurs as the last vowel in the verbal prefix. It was noted from the findings of the study that in some cases, when the basic word starts with the glide /j/ and the prefix ends in the [+high] vowel /u/, /j/ is elided and leaves /u/ which is then labialized. A summary of the study findings shows that labialization has four main functions in Olutura. One is that it serves a contrastive role in verbs and nouns. In verbs, labialization distinguishes the general vis a vis the specific function of the verb in question. It was also noted that in verbs and nouns, when the [+high] vowel /u/ in Olutura is not labialized, it results in the occurrence of a zero onset syllable coming after it. The occurrence of such a syllable at word medial position is what brings about distinctive labialization by bringing about a word with a different meaning. Secondly, the study also established that labialization can change a word from an adjective to a noun and, thirdly, that it plays a role in syllabification by determining, not just the number of syllables in some verbs and nouns, but also, the composition of these syllables in terms of the vowel and consonant elements. A syllable that has the labialized /u/ is usually shorter than the one which fails to have it labialized. The fourth function of labialization was established in the present study is that it is one of the phonological processes that Olutura uses to resolve hiatus when need arises.

The fifth objective of this study was to account for the role of the onset in SA in Olutura syllables. It was established that SA in Olutura occurs through the three processes of prothesis, epenthesis and voicing and that this process happens in verbs and demonstratives in their different states and at the morphophonemic word doundary. It was also established by the study that the CSA that takes place in verbs has no specific direction on the consonant strength scale because a consonant that is lower on the scale can alternate with one that is higher or vice versa. It was also found out that consonantal SA in Olutura is not as predictable as it is with vowels. It is only in the grammatical category of person that one can predict the consonants that will emerge in the output but not with the rest of the alternations that happens with verbs. When consonantal SA occurs in the environment of a zero onset syllable, the consonant segments that alternate in the input and output are determined by the vowel prefix that determines the grammatical category of person and only a limited number of consonants are involved. In Olutura, SA has a functional role because the vowel alternation is what shows the grammatical category of person while the alternation of consonants brings out the different states of the verb.

7.3 Conclusions

From the study findings, it is concluded that Olutura has 23 consonants with primary and 20 with secondary articulations. The study further concludes that Olutura has five phonemic vowels and a three vowel height system just like most Bantu languages. With regard to the findings on the syllable structures of Olutura, this study concludes that the dialect has seven syllable structures all of which are open. Another conclusion in the current study is on the phonological processes that are involved in the formation of Olutura syllables. The study concludes that the phonological processes of coalescence, elision, epenthesis, prosthesis, glide formation, prenasalization, labialization and SA all affect the structure of the optimal syllable in Olutura. The ranking of constraints in OT can determine the optimal syllable by showing why the dialect makes the choices that it does in the formation of its syllables. In the process of coalescence, the OT constraints of *HIATUS, *DIPH, IDENT(μ),UNIFORMITY, *V:, DEP-IO(C) and IDENT-IO(F) were able to interact to arrive at the desired syllable of Olutura. In the process of elision, the interaction of the markedness constraints of *HIATUS and DIPH with the faithfulness constraints of MAX-IO_{FUNC}

and MAX-IO$_{LEX}$ had the ability to show the optimal syllable. The constraints *HIATUS, *V, and *ONS/GLIDE were able to interact with the faithfulness constraints of MAX-IO(μ) and COMP$_{ONSET(LAB)}$ in the phonological process of glide formation to get the optimal syllable structure of Olutura. Another conclusion by the current study is that epentheis and prothesis also have a role to play in the formation of the syllable structures of Olutura. The OT constraints of *DIPH, *HIATUS, DEP-IO, DEP-IO$_{VOI}$, DEP-IO(C), COMP$_{ONS(LAB)}$ and MAX-IO(σ) have the ability to show how hiatus is resolved in Olutura using the phonological processes of epenthesis and prothesis.

The conclusion that the current study makes on the role of OT constraints in Olutura prenasalization and labialization is that the OT notion of constraint interaction is adequate in showing how Olutura does not allow the nasal consonants to occur with all the other consonant sounds in its inventory. It is, therefore, concluded that in the process of prenasalization, the constraints *NC, *NÇ, HNUC, PEAK-C, DEP-IO, DEP-IO$_{VOI}$,SSP$_{PLATEAU,}$ *SA$_{,}$ IDENT-IO$_{NAS,}$ NC$_{ALV}$IDENT-IO$_{BIL,}$ DIP-IO(σ) and IDENT$_{VOI}$ are sufficient in bringing forth the right candidate in Olutura syllable formation with regard to NC sequences. In addition, this study concludes that prenasalization is one of the process that Olutura uses to realize most of its voiced sounds. As far as the phonological process of labialization is concerned, this study concludes that the process of labialization in Olutura involves the [+high] vowel /u/ in certain cases, changing to the bilabial approximant /w/ before all the vowels other than /u/. The study further concludes that OT constraint ineraction is capable of showing why Olutura labializes all the vowels other than /u/. The OT constraints *DIPH, HNUC, COMP$_{ONS(LAB),}$ HETER(σ), *CODA, IDENT-IO(μ)MAX-IO(σ) and NUC/GLIDE have the ability to show how labialization happens in Olutura.

As far as the role of the onset in the phonological process of SA in Olutura syllables is concerned, the conclusion that this study makes is that the onset has no role in determining the vowels that constitute the zero onset syllable. Instead, it is the vowel that constitutes the zero onset syllable that actually plays a role in determining the consonants that occur in the onset of the CV syllable after the initial V syllable. The study further concludes that the constitution of the zero onset syllable in Olutura depends on the grammatical category of person; that is, whether it is 1^{st}, 2^{nd} or 3^{rd} person singular. The OT constraints of *DIPH,*NC, IDENT-IO, $\text{IDENT}_{\text{(VOI),}}$ FAITH-V, $\text{SA}_{\text{INITIAL,}}$ *GG, $\text{COMP}_{\text{ONS(LAB),}}$ $\text{ONS}_{\text{(NAS)}}$ and *SA are adequate in examining the phonotactics of Olutura with regard to the zero onset syllable and SA. The general conclusion regarding the phonological processes that this study dealt with is that while the processes of coalescence, elision, epenthesis, and prothesis and glide formation are used to resolve hiatus in Olutura, the dialect does not completely disallow hiatus in its phonotactics. In Olutura, the processes of SA and prenasalization only affect the configuration of the syllable in this dialect but are not used in HR. The process of labialization is not always used to resolve hiatus because there are cases when Olutura allows sequences that look like hiatus to occur for semantic reasons. This study also makes the conclusion that sometimes several processes, in this case, the processes of prosthesis, epenthesis and labialization work together in HR so as to get the optimal syllable in Olutura.

7.4 Recommendations

There were certain phenomena that the current study could not deal with because they were outside its scope. Apart from the study on verb tonology and the current study which has now identified the sound segments, syllable structures and the phonological processes in their formation, other areas of this dialect have not been studied. In view of this, other studies, not just on phonology, but the morphology and syntax of Olutura are recommended so as to come up with a sketch grammar of Olutura.

This study recommends that its findings be used to compare Olutura to other Luyia dialects to enable its classification among the Luyia continuum of dialects. In particular, it should be compared to those in group 2 of the northern Luyia dialects of Lusaamia, Olunyala(K), Olunyala (B), Lukhayo and Lumarachi (see appendix 1). This is due to the observation made during our data collection that Lukhayo, which has been grouped with the rest of these dialects is closely related to it and the main difference between the two is in terms of phonation, which means that Lukhayo seems to have some voiced sounds that generally do not occur in the phonemic inventory of Olutura. In view of this, a lexico-phonological comparison of Olutura and the dialects in group 2 is recommended.

We also recommend that stakeholders, including the Ministry of Education through KICD to utilize the findings of the study in the event of standardization of Luyia dialects when developing materials for learners in grades 1-3 in Kenya.This is in line with the GoK Sessional Paper 14 of 2012 that the language of the catchment area be used for learners from the age of 0-8 years in order to have a smooth transition from home to school.

During the collection of data, we observed that beside Olutura, nearly all its speakers use other dialects from the neighbouring areas. This could be a pointer to the fact that the dialect can easily disappear. In view of this, we recommend a study to find out the reasons why speakers of Olutura speak the neighbouring dialects while their neighbours are not keen to speak Olutura. This will help in knowing whether the speakers of Olutura are on the verge of language shift and the reasons for this.

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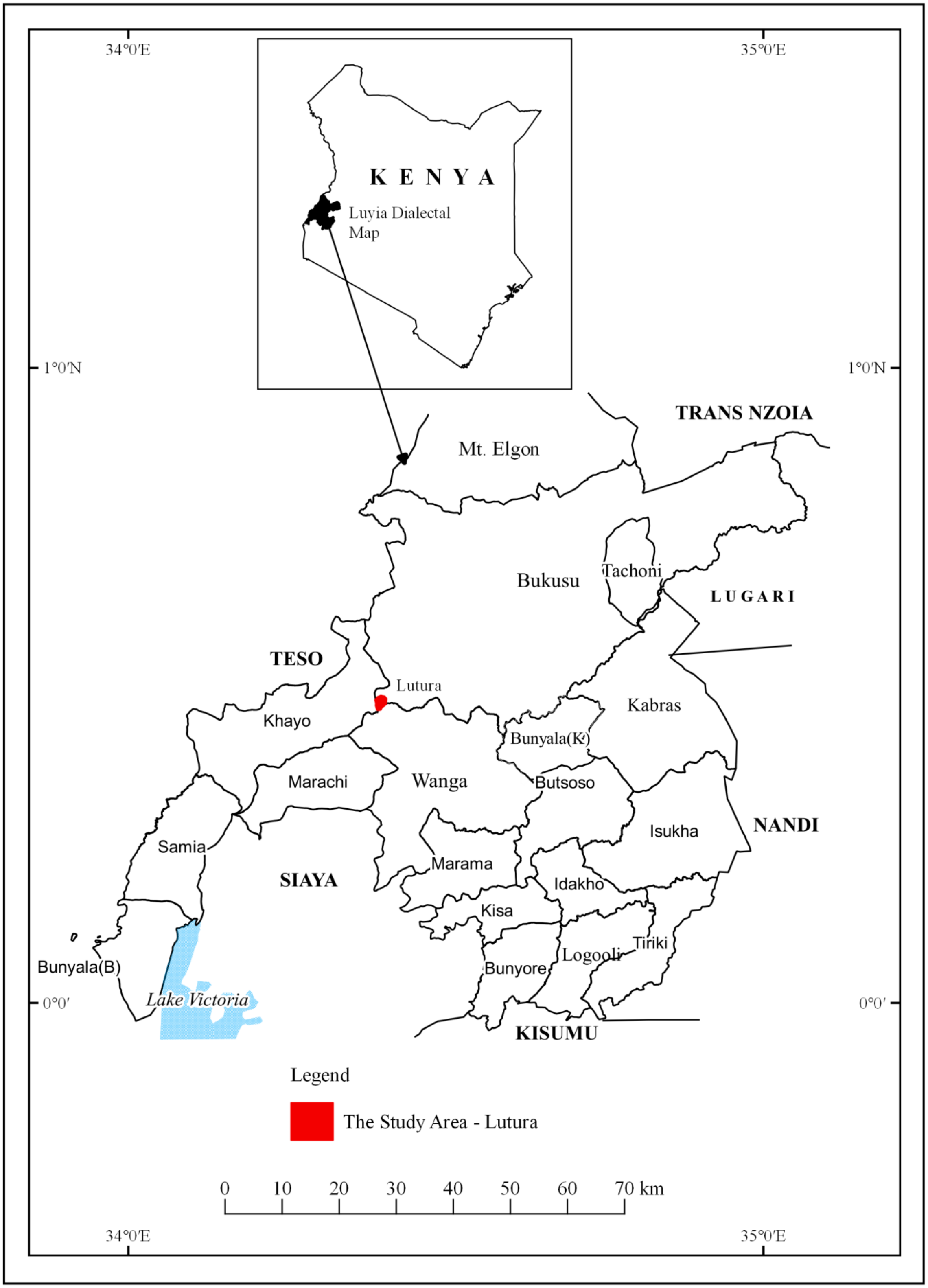
Appendix I: Study area- Luyia dialectal map



Source: Modified Kenya Administrative Boundaries (2009) & Kanyoro (1983).

Appendix II: Olutura Orthography

Grapheme	Phonetic symbol	Olutura word	Gloss
a	/a/	**a**no	here
e	/e/	**e**no	this way
i	/i/	**i**nda	louse
o	/o/	**o**yo	that one
u	/u/	l**u**sala	a stick
ch	/ʧ/	omuka**chi**	sugarcane
f	/f/	**f**uya	give a gift
k	/k/	**k**ula	buy
kh	/x/	**kh**esia	greet
l	/l/	**l**ola	see
ɭ	/ɭ/	mu**l**embe	peace
m	/m/	**m**oola	crawl
n	/n/	**n**iina	climb
ng	/ŋg /	**ng**ona	I am sleeping
nj	/ɲɟ/	tsi**nj**uku	groundnuts
ng’	/ŋ/	i**ng’**ombe	a cow

ny	/ɲ/	i**ny**anga	a day
p	/p/	**p**aara	think
r	/r/	**r**usia	remove
s	/s/	**s**indu	something
sh	/ʃ/	te**sh**ia	get married
t	/t/	**t**oola	pick
ts	/ts/	i**ts**a	come
v	/β/	ingu**v**o	a dress
w	/w/	ta**w**e	no
y	/j/	**y**ira	take
nz	/nz/	i**nz**ala	hunger

Appendix III: Interview Schedule for Respondents

This is a research that is meant for academic purpose. The main aim of the research is to investigate the phonology of Olutura syllables. You are kindly requested to respond to the following questions as honestly as possible.

Section A: Demographic Information (*Was used by the research assistants)*

1. Your Gender   Male ( )   Female ( )

2. Your Age:

( ) 25 years and below

( ) 26 – 30 years

( ) 31 – 35 years

( ) 36 – 40 years

( ) 41- 45 years

( ) 46 – 50 years

( ) 51 years and above

3. Your education level:

( ) Degree and above

( ) Diploma

( ) Certificate

( ) A’ level

( ) O’ level

( ) Un-schooled

Any other specify______________________________

4. How long have you lived in Bumula?

( ) Less than 5 years

( ) 6 – 10 years

( ) 11– 15 years

( ) 16 years and above

Section B: Thematic questions ***(Was used by the researcher)***

6. How do you greet people of different age sets in your language?

____

____

____

____

7. Briefly tell us about your lineage?

____

____

____

____

8. Tell us about your family?

____

____

____

____

9. What do you do for a living?

10. How do you pass your free time?

Thank you for your time. God bless you!

Appendix IV: Sample data collected from the interviews

bula	defeat
wuula	reveal/ husk grains
esianwa	a gift/a present
omulongi	a creator
omutekhi	a cook/wife
muani	muani/ he that gives
khula	grow/mature
amabatswa	thighs
khuula	uproot
mala	finish
maala	smear using mud/cow dung
ruma	send
ruuma	skip/ jump up
ndola	I see
ndoola	I pick
laama	pray/ curse
laasia	spoil ones character

lichio	broken pot
lunji	straight
injinia	generousity/extravagance?
muchesi	a clever person/ oversear
lichoki	board that joins two bulls to plough
ìnjìra	come in
ínjíra	a path
shifwabi	untideness
erwanyi	outside
liani	vegetables
eliuba	sun
nywa	drink
lwangu	quickly
tieri	true
aulire	let him listen
omwana	a child
boolola	untie

handu	a place
chenga	dribble
teshia	marry
holera	keep quiet
onia	heal
engwa	I am falling
ŋgwee	(a swear word)
mwini	a hoe stick
chira	cause to
fuua	wash clothes
itsa	come
amatsyeri	the truth
syamukhire	it is morning
tsia lwanyi	go out
randula	tear
lingera	look
khutendeya	loosen
khukhovola	peel as in the case of sugarcane but not potatoes
lora	dream
siange	it is mine

imbwa	a dog
indwasi	allergy
sio	completely
yirukha	run
futsa	spit
fisia	hide
omwana	a child
inzukha	a snake
imbutwe	a mixture of water a flour for fermenting

Appendix V: Analyzed data for Phonemic and phonetic inventories

Olutura Vowels

/a/	/ali/	[ali]	he is
/e/	/ejo/	[ejo]	that one/there
/i/	/iŋguβo/	[iŋguβo]	cloth
/o/	/ojo/	[ojo]	that one
/u/	/maundu/	[maundu]	mischief

Olutura Consonants

/p/	/mupani/	[mupani]	a fighter
/pw/	/sipwoni/	[sipwoni]	a sweet potato field
/k/	/kololosia/	[kololosja]	straighten
/kw/	/kwa/	[kwa]	fall
/nz/	/inzala/	[inzala]	hunger
/ts/	/itsa/	[itsa]	come
/β/	/visia/	[βisja]	make someone pass
/f/	/fundulula/	[fundulula]	untie
/t/	/toola/	[to:la]	pick
/x/	/xesia/	[xesja]	greet
/m/	/ruuma/	[ru:ma]	jump
/n/	/niina/	[ni:na]	climb

/nw/	/munwa/	[omunwa]	mouth
/ɲ/	/lwaɲi/	[lwaɲi]	outside
/ŋ/	/iŋunda/	[iŋunda]	dirt
/l/	/lora/	[lora]	dream
/r/	/rera/	[rera]	bring
/ɭ/	/mulembe/	[mulembe]	peace
/j/	/jija/	[jija]	wander around
/w/	/wangu/	[waŋgu]	quickly
/^{m}b/	/mbaara/	[mba:ra]	I think
/nd/	/sindu/	[sindu]	something
/ɲɟ/	/ tsiɲɟuku/	[tsiɲɟuku]	groundnuts
/ŋg/	/iɲiŋga/	[iɲiŋga]	a day
/βw/	/βwitsa/	[βwitsa]	friendship
/xw/	/tsixwi/	[tsixwi]	firewood
mw	/mwifi/	[mwifi]	a thief
ɲw	/ɲwa/	[ɲwa]	drink
rw	/rera /	rera]	bring
lw	/amalwa/	[amalwa]	alcohol
ɭj	/ ɭjae/	[ɭjaŋge]	it is mine (e.g a thought)
sj	/sjange/	[sjaŋge]	it is mine (e.g. a book)
mbw	/imbwa/	[imbwa]	a dog

ndw	/indwasi/	[indwasi]	allergy
ŋgw	/ŋgwa/	[ŋgwa]	I am falling
ŋgw	/ ŋgwe/	[ŋgw]	a swear word
/ʧ/	/omukaʧi/	[omukaʧi]	sugarcane

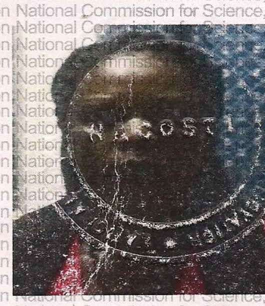
Appendix VI:Research permit

THIS IS TO CERTIFY THAT:
MS. EVERLYN ETAKWA SIMIYU
of UNIVERSITY OF NAIROBI, 724-300
Nairobi,has been permitted to conduct
research in *Bungoma County*

on the topic: *THE PHONOLOGY OF OLUTURA SYLLABLES*

for the period ending:
14th September,2017

Permit No : NACOSTI/P/16/73182/13642
Date Of Issue : 15th September,2016
Fee Recieved :ksh 2000



....
Applicant's Signature

....
Director General
National Commission for Science, Technology & Innovation