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ASPECTS OF GURENƐ PHONOLOGY

BY

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DECLARATION

I do declare that with the exception of references to works, which have been duly acknowledged, this thesis is the result of my own research and that it has not been presented in either whole or part for another degree elsewhere.

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DEDICATION

I dedicate this thesis to Jesus, the author and finisher of my faith, my mentor Professor Ephraim Nsoh Avea, my son, Emmanuel Yinebotima Adongo and to all scholars and students of Gurene.

ACKNOWLEDGEMENT

I am thankful to God for seeing me through the whole period of my Ph.D programme. I am also indebted to many people who have contributed to the successful completion of this work. I would like to thank my supervisors Dr. Akanlig-Pare, Dr. Seth Ofori, and Dr Fusheini Hudu for all the many valuable comments, ideas, criticisms and discussions that helped in shaping this work. Special thanks to Professor Ephraim Nsoh Avea for his mentorship and his foresight in my academic career. I am grateful to Dr. Samuel Awinkine Atintono for the academic advice and all the encouragement during my difficult moments of writing this thesis. Despite your busy schedules, you made time to read my proposal and draft chapters. As the HoD at the time, you facilitated my study leave. You again gave me opportunities to undertake fieldwork to enhance my research skills through the research grants that you won for language mapping. God bless you.

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ABSTRACT

The thesis provides a detailed description of aspects of the phonology of Gurene, a Gur language under the language family of Niger-Congo and a dialect of Farefari spoken in the Upper East Region of Ghana. The aspects of Gurene phonology discussed in this thesis are the phonemic system, the syllable, tone, harmony and other phonotactic processes. The analyses were pursued within linear and non-linear phonology frameworks. Within the Linear Phonology approach, the Distinctive Features Theory was used to describe the sound system of Gurene. While within the Non-Linear Phonology framework, the Moraic Theory was used to account for the syllable structure and the Autosegmental phonology was employed to analyse tonal and segmental processes at the different points of the Gurene syllable and word. The findings show that Gurene has twenty-five consonants consisting of twenty-one simple consonants, four complex consonants, which include a pre-nasal labial velar sound. Gurene also has sixteen distinct vowels and one derived vowel, which is the schwa. These vowels comprise nine oral vowels and seven nasal vowels. All the nine oral vowels can be nasalized. Isolated vowel syllables have also been observed in Gurene. The CV and CVC are the basic or core syllable types, while the mora is the tone-bearing unit in Gurene. It has also been established that Gurene has three light and three heavy syllable types. It is observed that harmony is widespread in Gurene. Thus, the types of harmony that occur in Gurene include vowel harmony, vowel-consonant harmony, and nasal harmony. It has also been established that there are three level tones (low, mid and high) and two contour tones (falling and rising) in Gurene. The verb has a default low tone while the tone of the noun varies depending on the context in which it occurs (a simple word, compound or phrase). Tonal processes in Gurene include downdrift, downstep, tone shift, tone preservation and tone spreading or assimilation. Data for this research come from two sources: primary data and secondary data. The primary data consist of recordings of utterances of native speakers of the language. The secondary source of data includes the Gurene-

English dictionary and other Gurene literature. In addition, the researcher's intuition as a native speaker of the language and insights from key native speaker linguists of the language has been very useful.

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CHAPTER ONE

1.0 Introduction

The thesis describes aspects of Gurene phonology. It has been attested that to accurately describe the phonology of a language, it is important to know what the segmental structure, the syllable structure and other phonological processes in that language are; how they are organised and how they behave within and across words. Therefore, the aspects of Gurene phonology that the thesis addresses include the segmental structure, the syllable structure, tone, and assimilatory processes. First, the thesis describes the segmental structure of Gurene using the distinctive features theory to account for the sounds. All distinct speech sounds were identified and put into minimal pairs to establish phonemic contrast. This is based on the assumption that the first step in the phonological analysis of a language is to identify all of its basic speech sounds and the minimal units that serve to distinguish words from each other (Hayes 2009). The second aspect of Gurene phonology that the thesis explores is the syllable structure. This includes types of syllable structure and syllable structure processes using the syllable as a unit of organisation and the mora theory as a theory of interpretation.

The third phenomenon the thesis examines is tone and tonal processes which are contrastive. Previous studies indicate that Gurene has two types of tones; low and high as well as downstep and downdrift, which are closely related because both refer to the process of High tones lowering (Dakubu 1996). The argument is that downdrift occurs when the level of the High tones that follow low(s) is slightly lower than the level of the High tones before the same Lows. Therefore, in a sentence like à *wá dī ságébbó* ‘he will eat TZ (a local dish)’, *ságébbó* is said at a slightly lower pitch level than *wá*, because of the low tone of *dī* between them. While downstep occurs when Low tone level after a High tone is slightly lower than those before it. Thus, *dī* in the above

example is slightly lower in pitch than *à* because of the intervening High tone of *wá* (Dakubu 1996).

Another interesting phenomenon that is worthy of discussion is harmony in Gurene. The thesis discusses five types of harmony: vowel harmony, vowel-consonant harmony, rounding harmony, nasal harmony and nasal place assimilation. Harmony in Gurene, especially vowel harmony plays important role in the grammar as vowels in words are generally governed by ATR harmony rule. For instance, only vowels of the same quality or feature can co-occur in words, and vowels in suffixes obey the harmony rule by agreeing in feature with vowels in the stems to which they are affixed. This rule applies particularly to vowels of plural morphemes which usually assume either the feature [+ATR] or the feature [-ATR] according to the features of the vowels that are in the stem to which they are to be affixed. To this end, a good understanding of these rules is central to the formation of words, the use of suffixes and in making correct and meaningful sentences. Similarly, the study of other phonological processes that occur in Gurene will contribute to the understanding of the phonology of Gurene. Therefore, the thesis begins with an overview of the structure of Farefari phonology, with focus on the description of the phonemes, syllable structure, tone and tonal processes and assimilatory processes. The analyses are cast within linear and non-linear approaches of generative phonology.

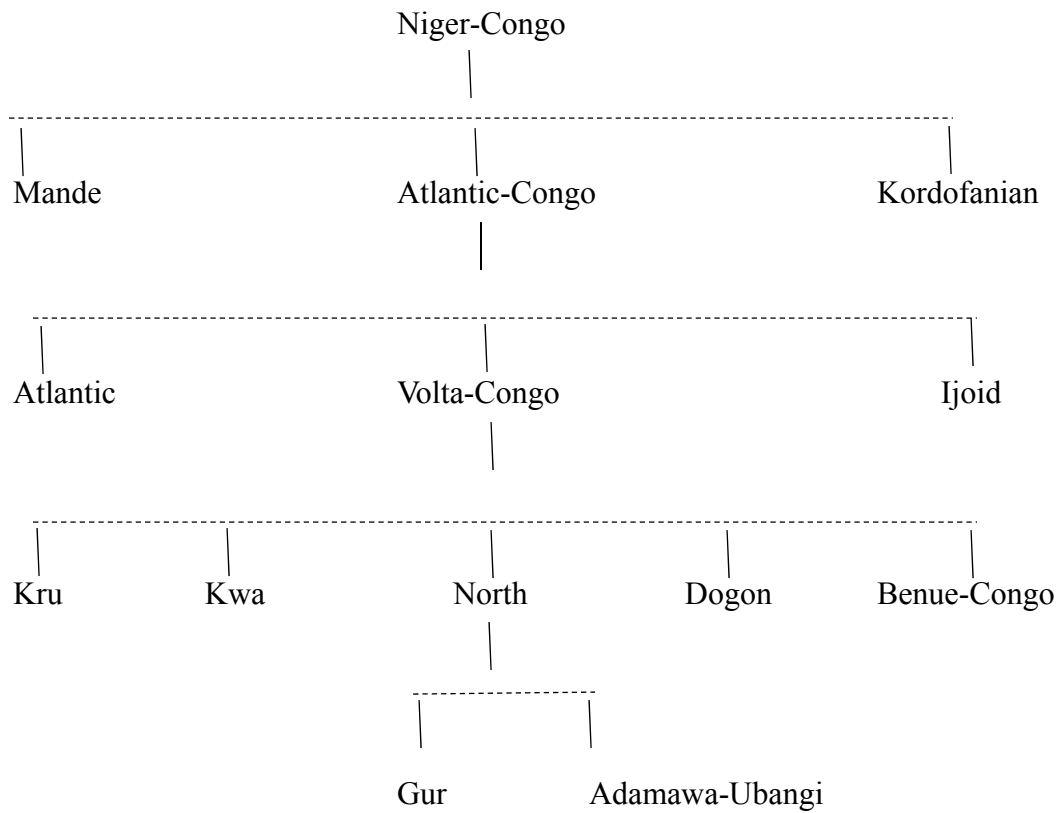
1.1 Background of study

Gurene is one of the five major dialects of Farefari, spoken in the Upper East Region of Ghana. The name Farefari which was derived from *fara fara* meaning ‘well done’, is a common greeting used to express gratitude and believed to have originated from early European visitors who identified the speakers by this daily greetings. Then later, natives who travelled down to the

southern part of Ghana in search of greener pastures during the colonial era used the name as their surname and were referred to by it. Hence, Farefari is used to refer to the language and the speakers (cf. Nsoh 2011), and it is anglicised as Frafra (Raymond 2006; Nsoh 2002, 1997; Dakubu 1996; Naden and Schaefer 1973) cited in Nsoh (2011).

There has been controversy regarding the use of the name of the language by various scholars. For instance, while Nsoh (2011; 1997), Naden and Schaefer (1973) refer to the language as Farafare, Dakubu (1996), Atintono (2002, 2004, 2011 & 2013) and Adongo (2008, 2013) use Gurenɛ. Rattray (1932) and Cardinal (1920) used Nankani whereas Apeligiba (2015) uses Nankare as the dialect for speakers of the Kasena Nankana West district and the Kasena Nankana Municipality. However, this study uses Gurenɛ to refer to the dialect spoken within Bolgatanga and its environs and maintains Farefari as the language in line with (Naden & Schaefer (1973; Nsoh 1997 & 2011), which consists of five major dialects - Gurenɛ, Boone, Talen, Nabt, and Nakane (Atintono 2013, 2004; Nsoh 2011, 1997; Adongo 2008; Dakubu 1996; Naden and Schaefer 1973). The reason for this choice is to distinguish the language from the dialects for the purpose of this study. Among these five dialects, Gurenɛ is considered the standard dialect because it is the most widely spoken and previous linguistic research tended to focus on it. The 2010 Population and Housing census figure for speakers of Farefari was 441,059.

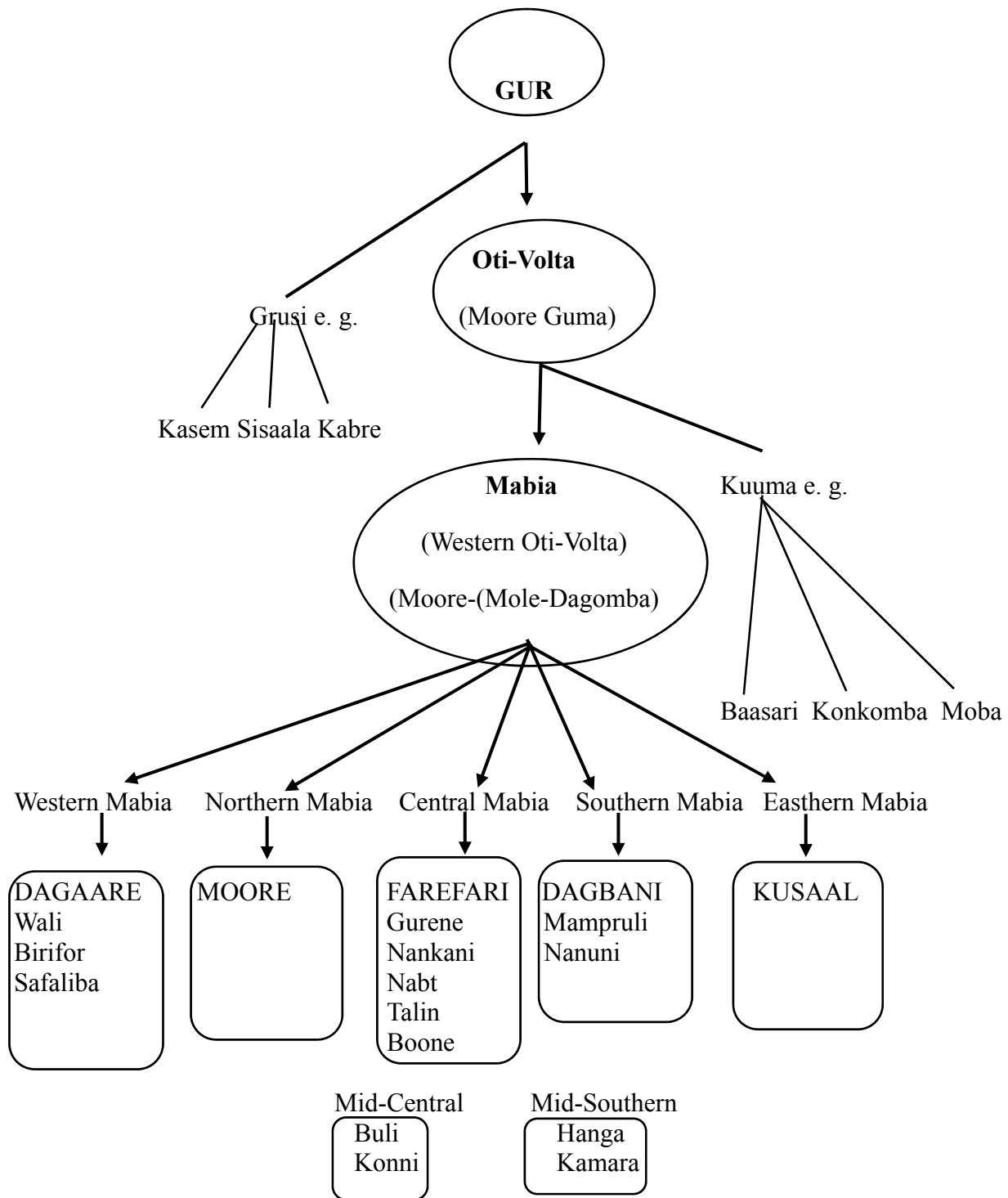
With the genetic classification, Farefari is a Gur language classified under Niger-Congo language family. The language is spoken in the North Eastern part of Ghana and stretches into Burkina Faso where it is called Nikãre (Nsoh 2011). The Farefari speaking area is boarded by other Gur languages such as Kusaal (in the East), Moore (in the North), Mampruli (in the South), and Kasem and Buli (in the West). Figures 1 and 2 are the genetic classifications of the Niger Congo language family and the Gur language family respectively.



(<http://www.ethnologue.com>).

Figure 1: Genetic classification of Gur Languages under Niger-Congo language family

Farefari is closely related to Kusaal, Mampruli, Moore, Dagbani and Dagaare. Figure 2 presents Bodomo's 1994 classification of Gur languages as follows;



(Bodomo, 1994; Bodomo & Abubakari, 2017 adopted and modified)

Figure 2: Genetic classification of Gur languages

1.2 Morphophonemic processes in Gurene

According to Atintono (2004), Gurene is an agglutinating language with incorporation and polysynthetic features because it makes use of compounding, reduplication, and affixation processes in the derivations of new forms. Morphophonemic processes may occur between nominal/verbal/adjectival stems and their suffixes (Nsoh, 2011). These processes usually take place between the final consonant of the stem and the initial consonant of the suffix. However, Nsoh (2011) explains that the standard analysis adopted by linguists for the Gur languages is the one-to-one morpheme analysis. For instance, in the analysis of nouns, the singular and plural nouns are treated as distinct unrelated processes.

1.2.1 Morphophonemic analysis of nouns

	SG	PL			
(1)	a.	/ner + á/	/nerε + bv/	[nerəbá]	‘persons’
	a.	/sáán + á/	/sáán + bv/	[sáámá]	‘strangers’
	c.	sáán + a (Singular)		underlying form	
		sáán + bv		consonant nasalisation	
		sáán + mv		Place of articulation assimilation	
		[sáámmá] (Plural)		surface form	
		“strangers”			

(Nsoh, 2011 adopted and modified)

In the above examples, the singular noun requires that the morpheme /-a/ should be added to the stem while the plural noun requires the addition of /-bv/ (V represents a final vowel in the nominal suffixes).

The addition of /-bv/ as in (1c) triggers further morphophonemic processes such as nasal place assimilation and consonant nasalisation. In these processes, (1) the consonant of the plural morpheme changes from an oral consonant to a nasal consonant (/b → m/ (2) the final consonant of the stem /n/ assimilates to the place of articulation of the initial consonant of the suffix (/n/ → /m/) and this results in the surface form [sáámmá] “strangers”. Even though, the standard approach assumes independent derivation of singular and plural forms as shown in the derivation of bárəgá “blade” where the plural does not include part of the singular suffix bárə+gá → bárə-sɪ “blades”, there are instances in Gurene where singular stems take the singular form as input to the plural derivation process. Example is the derivation of the plural of kóká “chair”, which includes part of the singular affix (/kóká/ → [kugə-sɪ]). The [-gə -] in kugəsɪ can be analysed as a weak form of [-kv] (Nsoh, 2011).

1.2.2 Formation of Adjectives

Nsoh (2011) has classified the Gurene adjectives into two types. The two types of adjectives are (1) those that are derived from verbs (2) the non-derived ones. The derived ones are realised by lexical rules through a process of affixation of the adjective marker to a verbal stem as shown in (rule 1). Therefore, Gurene does not have monosyllabic adjectives (Nsoh 2010; 2011).

Adjective formation rule:

Rule 1. V stem + adj. marker → adjective

Usually the aspectual status of the verb stem determines the form of adjective that is derived. For instance, perfective verb stems derive class type and concord type I adjectives while imperfective stems derive concord type II adjectives. The following are illustrations of adjectives derived by the lexical rule (1).

(2) **Non-derived adjectives**

	Perf. stem	affix	adj derivate	Type	gloss
a.	wɔyɛ	-ko	wókó	class type	“tall, long”
b.	ɲmɛlɔɛ	-ɲa	ɲmɛ́lɔɲá	conc type I	“crooked”

(3) **Imperfect stem**

a.	diti	-mo	dítəmò	conc type II	“edible(of sagebɔ)”
b.	luti	-re	lutere	conc type II	“falling (of cars)”

(Adopted from Nsoh, 2011).

In the perfective form (2a & b), the suffix of the stem is deleted and the adjectival suffix is added with a phonological process of vowel change. i.e., the stem vowel /ɔ/ in the input verb becomes /o/ in the adjectival derivate. However, in (3a & b), the adjectival marker is added to the whole imperfective stem.

Nsoh (2010: 123-4) cited in Nsoh (2011) argues that there are many non-derived adjectives in the Farefari (Gurenɛ) as shown in the following examples:

(4) **Non-derived adjectives**

naana	“cheap”
pésɔɲá	“shallow”
dárɔbɛ́	“stout”

nyáámá	“coarse”
bààlà	“smooth”
béélǝgá	“unmixed” (Nsoh, 2011)

1.2.3 Formation of compounds in Gureɛ

In Farefari, compounds are formed on freebase with either the first element or the second element modifying the other element in the compound. In terms of syntactic categories, possible type of compounds that may occur in Gureɛ include (i) Noun + Noun compounds (ii) Noun + Verb compounds, (iii) Noun + Adjective compounds (iv) Verb + Adjective compounds. With the exception of N-V compounds, which combination involves a noun stem + a verb + a nominalising morpheme, all the other types have a similar structure of two constituents combination. In the process of compounding, the suffix morpheme of the first constituent deletes while the second constituent is added to derive the compound. In addition, phonological processes like vowel reduction and segment insertion are observed. Examples of the types of compounds are as follow;

1.2.3.1 Noun + Verb compounds

(5)	a.	daa-m	+	kɔgɛ	+	-ra	→	[dakɔgɛra]
		pito	+	brew	+	NOM		‘one who brews pito’
	b.	gulu-go	+	ɲmɛ	+	-ra	→	[gulɔɲmɛʔɛra]
		drum	+	beat	+	NOM		‘the person who drums’

1.2.3.2 Noun + noun compounds

- (6) a. kuu-rɛ + yire kuyire ‘funeral + house - funeral house’
 b. na-ba + bia nabia ‘chief + child - prince’

1.2.3.3 Verb + Adjective compounds

- (7) a. paʔa-lɛ + too paʔalɛtoo
 ‘to show + bitterness destined to suffer in life’
 b. paʔa-lɛ + suŋa paʔalɛsuŋa
 ‘to show + beautiful destined to succeed in life’

1.2.3.4 Noun + adjective compounds

In the case of compounding involving adjectives, the type that occurs in Gureɛ is mostly the noun + adjective (N + A) compound. Noun + adjectives compounds are usually composed of a noun, which constitute the stem plus an adjective, which constitutes the second part of the compound. In the process of N A compounding, the suffix vowel of the first element which is the final sound of the stem is either deleted as shown in (8a & b) or reduced to a weak vowel /e/ (8c & d) while the adjective is added to the noun stem. However, in the case of example (8e), we have all three segments deleted (the second syllable and the final vowel of the first syllable) and the adjective added to it.

(8) **Noun + Adjective compounds**

a.	zu-o	+	beʔo	→	zube'o
	'head	+	bad	→	'bad luck'
b.	dɔɔ	+	gbi'a	→	dɔgbi'a
	'wood	+	short	→	'stump'
c.	pɔk-a	+	mɔlega	→	pɔgɛmɔlega
	'woman	+	red	→	'fair lady'
d.	ner-a	+	girega	→	nerɛgirega
	'human	+	short	→	'short person'
e.	puu-rɛ	+	peelum	→	pupeelum
	'stomach	+	happy	→	'happiness'

Generally, the formation of compounds in Gurene involves the combination of two lexical categories (N-N, N-A, N-V, V-A) and such combination triggers deletion of suffixal morphemes of usually the first stem of the compounds. Some of the compounds undergo phonological processes like vowel insertion at word boundaries and vowel reduction of some stems of the first constituents.

1.3 Statement of the Problems

Previous studies such as Dakubu (1996), Atintono (2011) and Azagsiba (1977) have described the phonology of the Gurene; the phonemes, syllable structure, tone and vowel harmony.

However, these were only brief descriptions. Hence, to the best of my knowledge, no detailed description of the phonology of Gurene with any theoretical grounding has been published. For instance, Schaefer (1975:27-28) describes the Zuarungu dialect as having eight oral vowels as follows, [i, ɪ, e, ε, a, u, o, ɔ]. However, Dakubu (1996: 29-31) states that the Gurene language has nine vowels namely [i ɪ e ε u ɔ o ʊ a] which have been grouped into short oral and nasal vowels and long oral and nasal vowels. Seven of these vowels [i, ɪ, ε, u, ɔ, ʊ, a] have nasal counterparts, except [e] and [o], which do not have their nasal counterparts because there are no words in which they occur (Dakubu 1996; Schaefer 1975). The claim that the Gurene language has nine vowels with seven having nasal counterparts is supported by other researchers like Nsoh (1997; 2011), Atintono (2011; 2013) and Adongo (2008). Other areas that have not been adequately described in previous studies are presented in (1.2.1 – 1.2.7).

1.3.1 Consonant phonemes

The consonants of Gurene have been classified based on their distribution in the word. According to Atintono (2011), all the consonants in Gurene can occur only in word initial and medial positions, while /m/ can occur in all the three positions; word initial, medial and final positions. Atintono (2011) gives the phonemic inventory of Gurene consonants as follows,

Table 1: Consonant phonemes and allophones of Gurenɛ

	Bilabial	labiodental	alveolar	palatal	velar	glotal
Plosive	p b		t d		k g	ʔ
Nasal	m		n	ɲ		
Trill			[r]			
Fricative		f v	s z		[χ]	[h]
Approximant					w	
Lateral			l			

(Atintono 2011)

1.3.2 Vowel phonemes

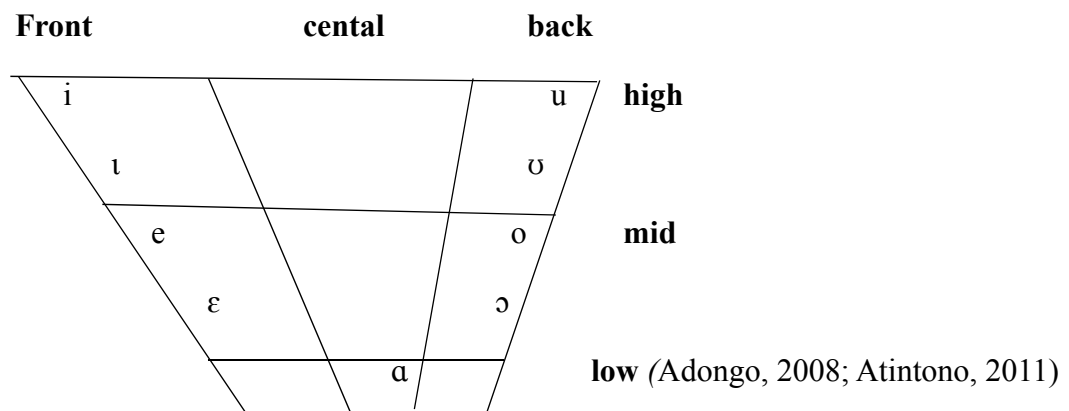


Figure 3: Vowels of Gurenɛ

It is realised that the phonemic inventory lacks phonetic description of both consonants and vowels, based on the places and manners of articulation as well as theoretical representation of the Gurenɛ sounds.

1.3.3 Vowel length in Gurene

(9) Illustration of vowel length in Gurene

i.	[vi] ‘shame’	[vi:se] ‘return’	
ii.	[ni] ‘always’	[ni:rɛ] ‘become bright’	
iii.	[pe] ‘wash	[pe:re] ‘the act of washing’	
iv.	[tɛ] ‘sieve/strain’	[tɛ:ŋa] ‘beard’	
v.	[ba] ‘they’	[ba:] ‘dog’	
vi.	[du] ‘be close’	[du:te] ‘caterpillar’	
vii.	[kɔ] ‘kill’	[kɔ:rɛ] ‘funeral’	
viii.	[po] ‘also’	[po:re] ‘back’	
ix.	[sɔ] ‘bath’	[sɔ:] ‘broom’	(Atintono 2011, adopted and modified)

1.3.4 Nasal vowels

(10) Gurene words containing nasal vowels

i	tĩ	‘to vomit’	tĩĩro	‘vomit’
ɪ	gĩ	‘hold’	gĩĩru	‘walk in anger’
ẽ	kẽ	‘enter’	kẽẽ	‘dry up’
ũ	gũ	‘weighty’	gũũre	‘ants’
õ	tõ	‘tear’	tõõra	‘cont. tearing’
õ	kõ	‘serve local dish’	kõõse	‘scrape’
ã	bã	‘ride’	bããre	‘granary (Atintono 2011, adopted and modified)

1.3.5 The syllable structure

Previous studies indicate that, the basic syllable structure in Gurene is open syllable (Dakubu 1996; Nsoh, 1997; Atintono 2011), with few cases of closed syllables. It has also been argued

that the Gurene syllable types are the V, CV, CVC and usually oral stops occupy the syllable margins whereas vowels and syllabic nasals occupy the nucleus position. Atintono (2011) explains further that all oral stops can occupy the onset position but only nasal stops can occupy the coda position.

Below is an example of a CVC syllable in Gurene:

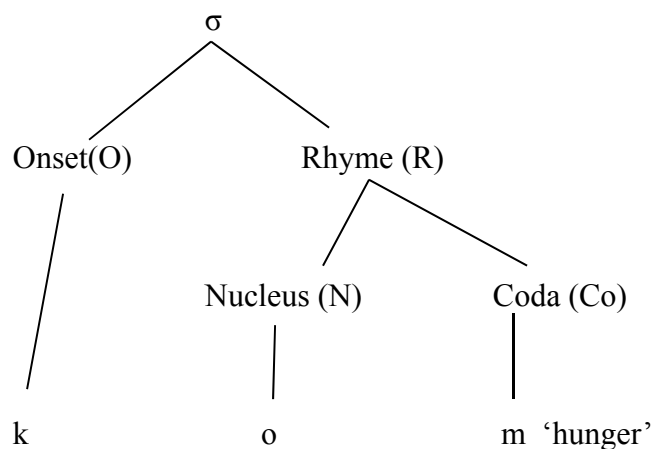


Figure 4: Illustration of Gurene syllable structure

Although, the dominant syllable is the open CV syllable, there are few cases of closed CVC syllables, with the nasals [m, n, ŋ] as well as the glottal stop [ʔ] occupying the coda position.

- | | | |
|------|---|---|
| (11) | a. Nasals
(i) kum 'death'
(ii) zom 'climb'
(iii) kom 'hunger'
(iv) kan 'won't' | b. glottal stop
(i) paʔ 'clap'
(ii) kɔʔ 'break'
(iii) daʔ 'buy' |
|------|---|---|

There are cases where syllables are either made up of only the nucleus such as the third person pronoun *a* ‘s/he, or the syllabic nasals with the structure N (Dakubu 1996; Nsoh, 1997; Atintono 2011);

(12) a. n kɔma ‘my children’

C + CVCV

b. m bia ‘my child’

C + CVV

Although, the Gurene syllables have been classified into the three syllable types, this aspect of the Gurene phonology lacks theoretical representations. In addition, the syllable structure processes have not been described in the previous studies.

1.3.6 Vowel harmony in Gurene

Again previous studies show that vowel harmony occurs in Gurene. For instance, it has been argued that in Farefari only vowels of the same qualities or features can co-occur. Hence, vowels of plural morphemes usually assume either the feature [+ATR] or the feature [-ATR] according to the features of the set of vowels that are in the stem to which they are to be affixed (see Azagsiba, 1977; Dakubu, 1996; Nsoh, 1997; Adongo, 2008; Atintono, 2011). Usually the vowels of the stem are of the same set and all vowels in affixes (suffixes) harmonise with the vowels of the stem. Examples as follows;

(13) i.		+ATR [-si]				-ATR [-sɪ]			
pesəgo	+	si	→	piisi	boa	+	sɪ	→	bʊʊsɪ
sheep	+	pl		sheep	goat	+	pl		goats
niɪŋa	+	si	→	niisi	sʊʔa	+	sɪ	→	sʊʔʊsɪ
bird	+	pl		birds	knife	+	pl		knives
zuʔa	+	si	→	zuʔusi	loŋa	+	sɪ	→	loʊsɪ
fly	+	pl		flies	drum	+	pl		drums
buləga	+	si	→	buləsi	bɔka	+	sɪ	→	bɔgəsɪ
well	+	pl		wells	stream	+	pl		streams
duŋa	+	si	→	dusi	seka	+	sɪ	→	sɛgəsɪ
animal	+	pl		animals	narrow way	+	pl		narrow ways
ii. +ATR [-rɔ]						-ATR [-rɔ]			
toʔo	+	ro	→	toʔoro	dɔɔ	+	rɔ	→	dɔɔrɔ
baobab fruit	+	pl		baobab fruits	wood	+	pl		woods
muʔo	+	ro	→	muʔuro	sɔɔ	+	rɔ	→	sɔɔrɔ
a fruit	+	pl		type of fruits	broom	+	pl		brooms
yoko	+	ro	→	yogəro	yɔɔ	+	rɔ	→	yɔɔrɔ
hole	+	pl		holes	grave	+	pl		graves

iii. +ATR [-to]				-ATR [-tɔ]				
fuo	+	to	→	futo	gɔrəgɔ	+ tɔ	→	gɔtɔ
dress	+	pl		dresss	bed	+ pl		beds
deo	+	to	→	deto	bɪrəgɔ	+ tɔ	→	bɪtɔ
room	+	pl		rooms	vegetable	+ pl		vegetables
zonko	+	to	→	zonto	dɔrəgɔ	+ tɔ	→	dɔtɔ
hair +		pl		hairs	ladder	+ pl		ladders
zuo	+	to	→	zuto	va'am	+ tɔ	→	vɔtɔ
head	+	pl		heads	farm	+ pl		farms

(Azagsiba 1977, adopted and modified)

According to Azagsiba (1977), the kind of harmony that exists in Farefari is the symmetric vowel harmony system where the vowels of the stem can determine the series of vowels in the whole word. In this system, the harmonizing series are said to be of equal power since each can cause vowels of the other series to change quality. This type of harmony system as is shown in the examples above indicates progressive assimilation. Again, it has been observed that previous studies only concentrated on the description of vowel harmony whereas there are various types of harmony such as nasal harmony (vowel nasalisation, consonant nasalisation, nasal place assimilation), rounding and backness harmony, etc that have not been described.

1.3.7 Tone in Gurene

Tone is another aspect of Gurene phonology that has been described by previous works. For instance, Dakubu (1996) and Atintono (2011) found that Gurene has two basic tones that contrast H and L as shown in example (14). Even though Dakubu and Atintono provided data to support their claim on the nature of tone in Gurene, their explanations did not cover contour tones, some tonal processes and lacked theoretical analyses.

(14)

- | | | |
|------|------------------------|---------------------|
| i. | (a) zòm ‘climb’ | (b) zóm ‘flour’ |
| ii. | (a) sirà ‘truth’ | (b) sírá ‘husband’ |
| iii. | (a) bàṅà ‘lizard’ | (b) báṅá ‘ring’ |
| iv. | (a) kùregò ‘mallet’ | (b) kúregó ‘metal’ |
| v. | (a) kànià ‘oily’ | (b) káníá ‘lantern’ |
| vi. | (a) sàné ‘melon fruit’ | (b) sáné ‘debt’ |

(Atintono 2011, adopted and modified)

From the above illustrations, it is clear that there are inadequacies in the descriptions of Gurene phonology by the previous studies. This study, therefore, fills the gaps and provides detail description of the phonology of Gurene using relevant theories.

1.4 Research Questions

1. What is the nature of phonemes in Gurene?
2. What is the nature of the syllable and syllable structure processes that occur in Gurene?
3. What kind of harmony occurs in Gurene?

4. What is the nature of tone in Gurene? What processes are these tones involved in Gurene constructions?

1.5 Objectives of the study

1.5.1 Major objective(s) of the study

The General objectives of this study are to Provide;

1. General explanations of the aspects of Gurene phonology.
2. Some theoretical analyses and interpretations of the aspects of Gurene phonology.

1.5.2 Specific objectives of the study

The specific objectives of this study are to provide detail accounts of;

1. The phonemes of Gurene
2. The syllable and syllable structure processes in Gurene
3. The types of harmony in Gurene
4. Tone and tonal processes in Gurene

1.6 Significance of the Study

The study is significant in a number of ways. First, it is the first detailed study of the phonology of Gurene with theoretical analysis. Second, it contributes to the understanding of the Gurene phonology by addressing the inadequacies and theoretical issues regarding the description of Gurene phonemic inventory. Third, it contributes to the understanding of other aspects of the grammar of Gurene like the syntax and morphology as they interact and relates with phonology.

1.7 Methodology

1.7.1 Introduction

This section describes the processes that I used to collect the data from the field for the analysis, the consultants who contributed data for the analysis and how the data is analysed. In describing the major phonetic structures of a language which include where the consonants are produced, what kinds of articulations are involved, how the vowels differ in quality and in length, how the pitch varies in different phrases, and other straightforward phonetic properties, the first thing to know is how the sounds are organized. However, the phonology needs to be clear before one can make a meaningful description of the phonetics, just as without a description of the sounds, you cannot get very far with the phonology. Hence, the two types of investigation should be considered (Ladefoged 2003). According to (Ladefoged 2003), a good starting point for the description of segments is a list that illustrates each consonant before two vowels that are very distinct from one another like, *i* and *a*, if they occur in the language, and if the language allows syllable-final consonants, then they should also be illustrated after two different vowels. The illustration of consonant allophones is also necessary, and to describe vowels, a list of all the vowels in a similar context should be made just as the list made for consonants. This will as well illustrate vowel allophones, contrasts between oral and nasal vowels, and vowel length. Similarly, there must be material that illustrates the suprasegmental aspect of the language like variation in stress, tone and intonation. For instance, in the illustration of tone, a word list should include words that contrast tone with each on at least two different vowels whereas for intonation patterns. It is worth recording sentences that illustrate commands, statements and different types of questions, and other syntactic devices that are conveyed by intonation changes, as well as

differences in focus (Ladefoged, 2003:2). Therefore, the data for this study illustrate the segmental and suprasegmental contrasts in Gurene.

1.7.2 Research design/Fieldwork

The study uses qualitative research design, an approach that focuses on understanding phenomena from a closer perspective and describing them in a deep comprehensive manner. This approach is considered because the data are usually collected in the form of ‘words’ rather than ‘numbers’ and it allows one to identify, explore and describe the dynamics in the area of research and it is suitable for gaining an in-depth understanding of underlying processes. Also, this method generates rich, detailed and valid data that contribute to the in-depth understanding of the phenomena. In addition, since qualitative research takes place in the socio-cultural context of participants of the study, it involves an interaction between the researcher and the participants. This enables researchers understand people and the socio-cultural context within which they live (Verma and Malick 1992 cited in Kusi 2012).

1.7.3 Consultants

I consulted twelve native speakers, who were made up of six females and six males with their ages ranging between twenty and sixty. The reason was to maintain gender balance and to check variations in the pronunciations of old and young speakers of the language.

Speakers were selected based on the fact that they have spent most part of their lives in the language area and use Gurene in their daily life. These speakers were all literates in Gurene. Seven of them were teachers, two farmers, two traders and one dropout. However, all these speakers were Gurene lectors in their respective churches, with two being choristers and one a

catechism teacher. The speakers were given a list of minimal pairs and phrases to read and their utterances were recorded.

1.7.4 Area of Study

Speakers who participated in the study come from six towns. These towns include, Zowɔrɛŋɔ (which is to the East of Bolgatanga), Tundoomɔlegɔ (to the South), Namoo (to the North), Suregɔ (West), while Zɔkɔ and Sumbrongo are (to the North-West of Bolgatanga).

Table 2: Participants' information

town/village	Age as in 2016	Sex	Occupation
Suregɔ	30	M	Teacher, lector
	40	F	Trader, lector
Zowɔrɛŋɔ	57	M	Farmer, lector, chorister
	40	F	Teacher, lector, weaver
Somboreŋɔ	34	M	Teacher, lector
	26	F	Teacher, lector
Zɔkɔ	60	M	Retired teacher, lector
	40	F	Teacher, lector
Tundoomɔlegɔ	43	M	Lector, catechism teacher (former assembly man)
	33	F	Trader, lector
Namoo	32	M	Teacher, lector
	21	F	Lector and chorister

1.7.5 Sources of data

Data for the research comes from two sources. Primary data and secondary data. The primary data were recordings of utterances of speakers who read a word-list of minimal pairs and phrases while the secondary source of data were collected from the Gurenɛ-English dictionary and other written sources. In addition, the researcher's intuitive knowledge of the language as a native speaker was useful.

1.8 Organization of the work

The work is organized into seven chapters. Chapter 1 provides an overview of the structure of Gurene phonology, background of the study, statement of the problem, research questions, objectives, significance of the study and the methodology. Chapter 2 reviews literature on works that are closely related and relevant to the current study, and the theoretical framework. Chapter 3 presents the phonemes and allophones of Gurene. In addition, distinctive features have been used to specify the distribution of the vowels and consonants. Chapter 4 is devoted to the description of the Gurene syllable structure using the Mora Theory. Chapter 5 is dedicated to the description of the various types of harmony in Gurene using Feature Geometry and Autosegmental Phonology. Tone and tonal processes are discussed in chapter 6 while summary, conclusions and proposed future research are presented in chapter 7.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.0 Introduction

The literature review focuses on three relevant areas to the study, particularly those that concern phonetics and phonology. First, the review is on phonological studies of the Gur languages spoken in Ghana. They include works in Dagbani (Hudu 2010; Hyman & Olawsky 2000), Buli (Akanlig-Pare 1994; 2005; Akanlig-Pare & Kenstowicz 2003; Schwarz 2003; 2007; Kenstowicz 2005; Dagaare (Anttila and Bodomo 1996, 2007a & b), Safaliba (Schaefer & Schaefer 2003) and Kɔnni (Cahill 2004; Akinlabi & Liberman 2001). The second part of the literature review is on the various dialects of the Farefari language, while the final part discusses some theoretical issues which include discussions on phonological features by scholars like Hyman (1975), Ewen and Van Der Hulst (2001) and Gussenhoven and Jacobs' (2013).

2.1 Review of related studies

Hudu (2010) gave a formal account of Dabgani Tongue-root Harmony using ultrasound. He performed five experiments. The first experiment tested the hypothesis that vowels in the two classes have different tongue-root positions using the following stimuli.

(15) **Stimuli for advanced and retracted vowels**

[+ATR] vowels	[-ATR] vowels
---------------	---------------

a. tí ‘vomit’	tí má ‘for me
---------------	---------------

b. tú ‘insult’	tóm ‘work’
----------------	------------

c. tó ‘bitter’	tóm ‘bitterness’
----------------	------------------

d. té ‘filter’	dém ‘play’
----------------	------------

The first recording took place in Mississauga with five participants. The [-ATR] vowels [ɔ, ɔ̄, ε] were put in words like *tól-í* ‘hot-sg.’, *tó-í* ‘mortar-sg.’, and *téí* ‘to flood’ while the [+ATR] vowels tested were those that surface in non-harmonic contexts. In this experiment, the mid-point frame for each vowel token was extracted from the video as a still image while all measurements were done using ImageJ (Rasband 1997), a software that measures images in pixels. The figures were then converted from pixels to millimetres at a ratio of 1 pixel = 0.265 millimetres. The midpoint of the transducer arc was used as the base point for measuring various positions in the midsagittal arc, in order to obtain values for the various test conditions for each vowel. This was determined using the x and y co-ordinates in ImageJ with a straight measurement line, which was drawn to the tongue-root position at a specified angle for each vowel pair. For tongue-root measures, the lowest angle at which the tongue-root was visible for all tokens of a vowel pair was used with an assumed consistent angle across each [ATR] pair for each participant. The same procedure was followed in obtaining measures of the tongue body height. General, the results of experiment 1 revealed that:

1. Outside of harmonic contexts, the tongue-root position varies systematically across Dagbani vowels for all participants and that
2. Class I ([+ATR]) vowels reveal a significantly more anterior tongue-root position than Class II ([-ATR]) vowels.
3. By contrast, results for the two participants for whom tongue-body figures were available showed that the tongue-body position of [+ATR] vowels is not consistently higher than that of [-ATR] vowels.

Experiment 2 tested the harmonic [ATR] hypothesis to check whether Class I vowels, which emerge in [+ATR] domains differ from [-ATR] by the position of the tongue-root, as found for Class I vowels that emerge in non-harmonic contexts. Class II vowels and Class I vowels that occur in harmonic contexts were compared. Also, measures of the low vowel pair, whose Class I variant only occurs in harmonic contexts were included in this experiment. The stimuli for Experiment 2 are as follows with the target vowels in bold face.

(16) **Stimuli for Advanced vowels in harmonic domains**

	UR ([-ATR])	Surface [+ATR] harmony
a.	/i/ /bíh-í/	[bíh-í] ‘child-pl.’
c.	/ɛ/ /dédé/	[dédé] ‘exact’
d.	/ɔ/ /tí-bô/	[tí-bû] ‘giv-ing’
e.	/ɔ/ /dór-ó/	[dór-ó] ‘disease’
f.	/a/ /gár-ó/	[gár-ó] ‘bed’ (IZD only)

g. /a/ /tádáb-ô/ [tédáb-ô] ‘writing ink’ (other participants)

For experiment 2, the following results were observed;

1. Within harmonic contexts, the tongue-root position varied systematically across Dagbani vowels for all participants.
2. Harmonic Class I vowels exhibited a significantly more anterior tongue-root position than Class II vowels.
3. A comparison of each vowel pair indicated that with the exception of the u/ɔ pair for three participants, each [+ATR] vowel had a significantly more anterior tongue-root position than its [-ATR] variant.

In experiment 3, the tongue-root positions of harmonic and non-harmonic [+ATR] vowels were compared to determine the extent to which the assimilatory pattern can be argued to be phonological. The same methods, procedure and stimuli (data) used for Experiment 1 were used for experiment 3. Experiment 3 results indicated that there were some differences in tongue root position between harmonic and non-harmonic [+ATR] vowels. However, the differences did not systematically show which of the two vowel sets have a more advanced tongue-root position than the other across all participants.

Experiment 4 tested distance effects. This experiment examined whether the assimilation observed in harmonic contexts is phonological and whether harmony takes place when the target vowel is more than one syllable away from the trigger. The Stimuli for distance test is as follows:

(17)	UR	Plural suffix	singular suffix
		(No [+ATR] trigger)	([+ATR] harmony)
	tadab/	[tâdâb-tî]	[tâ dâb- ô] V2 V1 [+ATR] trigger

Experiment 4 results were on only four participants. Out of the four participants, only one participant's result indicated a significant difference between the two vowels while the three participants' showed no significant difference in the tongue-root position of the two target vowels.

Experiment 5, which is the final experiment, was on articulatory correlates of dominant tongue-root feature. This experiment tested the hypothesis that the active [+ATR] feature is directly correlated with a tongue-root position anterior to the neutral rest position. The same methods and procedures for experiments 1-4, were also used in this experiment. However, in addition to measures of the tongue-root and tongue-body positions for Class I and Class II vowels, measures were also taken of the default position of the tongue-root. Values for ISP were compared to each of the positions for [-ATR] and [+ATR] and analysed statistically. Experiment five results show that for all the speakers, Class I vowels had a significantly and systematically anterior tongue-root position compared to the ISP. Class II vowels for four of the participants were also significantly anterior to the ISP. Therefore, the general results showed that the dominant [+ATR] feature in Dagbani corresponds to a distinct anterior position of the tongue-root compared to the neutral position. [+ATR] harmony takes place regardless of the relative distance of the trigger

from the target, and that [+ATR] harmony affects vowels of all height specifications, including the low vowel.

Although, Hudu (2010) used ultrasound to investigate the tongue-root harmony while the current study is purely descriptive, the findings of Hudu (2010) are central to the current study, especially the chapter on harmony. For instance, the finding on the difference between vowels that occur in [+ATR] domains and those that occur in the domain of [-ATR] were significant.

Akanlig-Pare (1994) examined some major aspects of Buli phonology. He provided an inventory of Buli consonant and vowel segments and described them using the non-hierarchical binary distinctive features of Chomsky and Halle (1968). His findings showed that only five consonants /b, m, n, k, ŋ/ in Buli may occur in syllable coda while all 23 occur in the onset position and that Buli has no consonant clusters within the syllable. He also discussed the core syllable structure of Buli based on the distribution of Buli sounds and some syllable structure processes. It was observed that though the basic underlying syllable type for Buli is CV(C), in syllable structure processes, gliding ensures that no syllable in the surface phonetic output contains vowel sequences. Also, vowel insertion breaks up consonant clusters within the syllable that results in CV syllable types, while glottal stop insertion is motivated by the need to change a V or VC syllable structure to the basic CV and CVC types respectively.

Some assimilatory processes such as nasalization and syllable final nasal consonant truncation and some major tonal and intonational processes that characterize Buli phonology were also discussed. It was revealed that Buli has two lexical tones- High and Low tones and the domain of tone operation is the syllable. Akanlig-Pare (1994) claims that tone perturbation in Buli involves

basically, Low tone spreading which involves the lowering of the pitches of H tones. However, Akanlig-Pare (2005) which describes tone and its interface with the morpho-syntax of Buli using autosegmental phonology and lexical phonology, argues for a three-tone system which is more reflective of the tonal structure of Buli - High, Mid and Low contrary to the earlier claim that Buli had only High and Low tones. He gave an inventory of the basic tone realizations on monosyllabic, disyllabic and trisyllabic forms as follows.

(18) **Buli tone inventory**

High	Mid	Low
túá ‘older sister:	lām ‘meat’	bàŋ ‘lizard’
núm ‘eye’	tēŋ ‘town’	bìik ‘language/speech
bíik ‘child’	bāŋ ‘bangle’	nààb ‘chief’
yérí ‘house’	būlī ‘seep’	wùsùm ‘horse’
núró ‘man (generic)	māsā ‘be sweet’	

(Akanlig-Pare, 2005)

Akanlig-Pare also illustrated the lexical contrastive function of these tones in Buli using minimal tone pairs and triplets in the following examples:

(19) **Buli tonal contrasts**

a. **Monosyllabic stem**

high	mid	low
síúk ‘path’	sīūk ‘navel’	sìúk ‘fish’
bíík ‘child’	—————	bìik ‘language/speech’
ká ‘focus particle’	kā ‘swear’	kà ‘pronoun (it)’
kók ‘mahogany’	kōk ‘father’	kòk ‘ghost’
—————	bāŋ ‘bangle’	bàŋ ‘lizard’

b. **Disyllabic stem**

túrí ‘bean’	tūrī ‘ear’	tùrì ‘abruptly’
yérí ‘house’	—————	yèrì ‘confused’
chélim ‘journey’	—————	chèlim ‘eyebrow make-up’
pósók ‘sheep (sing.)’	—————	pòsòk ‘building (type)’
—————	lālīk ‘bull’	làlīk ‘clay (red)’

(Akanlig-Pare, 2005)

He asserts that the mid tone which was not established in the previous study, is as active as the High and Low tones and that apart from its lexical function, the mid tone also carries the heaviest functional load in the morpho-syntax of the verb in Buli. Hence, it is the tone of the finite verb and the default tone. Akanlig-Pare (2005) argues further that, the Low tone is the most active as it is the one that spreads. i. e., the Mid and the High do not spread.

Again, some of the claims in Akanlig-Pare (1994 & 2005) will be relevant to this research.

Some of the claims made in Akanlig-Pare (1994) would inform findings on the segmental structure and the syllable structure analyses in the current study. Aspects of Akanlig-Pare (1994) analyses and findings would be applied to the discussions on the sounds and syllable structure of Gurenɛ. In addition, Akanlig-Pare (2005), which describes tone in Buli is also

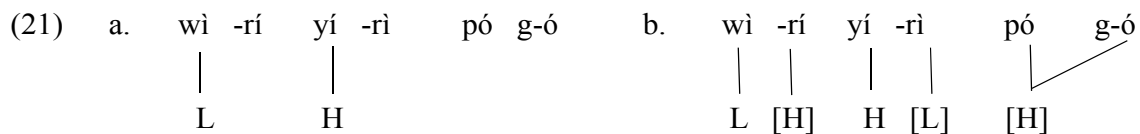
critical to my chapter on tone, especially on the inventory of the basic tone realizations. The theories used in both Akanlig-Pare (1994), which is distinctive features theory and Akanlig-Pare (2005), which is autosegmental phonology will be adopted in the current study for the analyses of the sounds and tone respectively in the Gurenɛ.

Other works directly related and relevant to the current study also border on tone and tonal processes. For instance, the work of Anttila and Bodomo (1996) discussed stress and tone in Dagaare, a two-tone language with lexical contrast between H and L tones, and mostly restricted to the penultimate syllable in nominal system and the remaining tones being predictable.

(20)	(a)	H-L	(b)	L-H	(c)	H-H	(d)	L-L
		yí-rì		wì-rí		póg-ó		-
		house-SG		horse-SG		woman-SG		-

Anttila and Bodomo (1996) demonstrated in their analysis that the root morphemes *yí-* and *wì-* as in *yí-rì* 'house' and *wì-rí* 'horse' are H and L respectively while the singular suffix *-ri* shows tonal polarity. However, *póg-ó* 'woman' with a H-H shows that tonal polarity falls short of predicting all suffixal tones as one H tone spreads over both the root and the suffix, and that L-L nouns are systematically absent in Dagaare. In Dagaare, three binary choices of H vs. L, lexical vs. derived, stressed vs. unstressed can be made on each syllable, with possible combinations such as a lexical H assigned to a stressed syllable and a derived L to an unstressed syllable while derived H and lexical L may occur on either. They argue that most of the simple nominals in Dagaare fall into three tonal classes: LH, HL and HH with the syllable as the TBU.

Anttila and Bodomo (1996) also look at tone polarity in their analysis of polarity in nouns in which *wìrì* 'horse', *yíri* 'house' and *pógó* 'woman' are given underlying representation (21a) and surface representation in (21b) as follows.



It was realized that in both representation, the root tone is lexical and does not spread, consequently forcing tone insertion on the toneless suffix (21b). This newly inserted derived tone (in square brackets) now assumes a value opposite to the root-final tone by the Obligatory Contour Principle (OCP) which prohibits two adjacent identical tones (*HH, *LL) (see also, Anttila & Bodomo 2007).

Anttila and Bodomo claim the implication of their analysis is that there is no synchronic reason to presume that the suffix tone started underlyingly as some specified tone. In class C (*pógó*), both the root and the suffix are lexically toneless which induces the insertion of a derived H tone that spreads on both syllables. They argue further that given the fact that Low is the default tone the above process seems unusual. But the reason given for this process is that the H tone is induced by the presence of word stress which overrides the general preference for L tones. Hence, while an initial L tone polarizes in Dagaare, initial H tones come in two forms: one polarizes and the other spreads. While non-emphatic pronouns are toneless and get a default L in non-polarity contexts that suggest that polarity tones are derived and not lexical.

Anttila and Bodomo also discussed downstep and downdrift in various contexts in Dagaare. They explain that in many tone languages, a Low tone lowers the overall pitch range. For instance, in the sequence $H_1 L H_2$, H_2 has a lower pitch than H_1 . Therefore, if the L tone is explicitly present on the surface, downstep is realized and if "hidden", downdrift. Anttila and Bodomo's discussion of downstep and downdrift was in the environments of (1) across root+suffix juncture (2) across N+A

juncture (3) across N+N juncture (associative constructions). With downstep, they proposed the tonal melody as HLH for class D (which is of the form H-¹H). It was observed that class D patterns with class B in N+A construction, where the root H is not suppressed and if a H-toned adjective follows, an intervening L tone is realised either as a downstep (H-¹H) or an actual contour (HL-H). The intervening L tone is considered an automatic consequence of the OCP where two adjacent H tones trigger L-interpolation.

The following phenomena were also observed; in Dagaare lexical tones trigger downstep while derived tones do not in associative construction (N+N), where there are abutting H tones across word boundary and a parallel between tonal polarity and downstep. Also, in Dagaare, when two lexical H tones collide due to morphological concatenation, the result is an internal downstep of the class D nouns. Anttila and Bodomo (1996) concluded that Gur languages like Dagaare, Dagbane and Moore exhibit the absence of L-toned in nominals longer than one syllable and for that matter, nouns with tones like *sàrà, *sàkàrà etc. are missing in these languages. There is thus no way to derive a noun like *sàrá. Therefore, aspects of Anttila and Bodomo's (1996) findings on tone and tonal processes would be relevant and inform the analysis in the current study.

Another work that was discussed is Akinlabi and Liberman's (2001) 'Tonal Complexes: the prosodic organisation of tone'. In this article, Akinlabi and Liberman (2001) discuss the application of some tonal complexes to the tonal phenomena in Yoruba, Kɔnni, Dagaare, Lokaa and Tem, all Niger-Congo languages. They explain tonal complexes as structured combinations of tonal features, analogous to the structured combinations of non-tonal features in segments, moras, syllables and feet. They say these tonal complexes can be considered as "bound states" of (two or more) different tones, such as [HL] or [LH], which have a role in organizing tonal features similar to those of moras and syllables in organizing

segmental features. Constraints on such tonal structures may motivate deletion, epenthesis, spreading or re-ordering of tonal features, just as constraints on syllable or foot structure may motivate such processes in cases of segmental phonology.

In their discussion, Akinlabi and Liberman (2001) state that Yoruba has three phonemically distinctive tones-H(igh), M(id), and L(ow) with H occurring in word-initial position only in marked consonant-initial words, which reveal an implicit initial vowel when preceded by another word in genitive construction. They say most words in Yoruba start with a vowel, which is usually L or M but not H and that apart from this minor tonotactic restriction, tones occur freely in lexical representations, without apparent restrictions on word melodies. They also indicated that spreading or relinking of Yoruba tones is to fill available positions in adjacent tonal complexes but not to satisfy the needs of adjacent tonally unspecified vowels (or moras/ syllables). Akinlabi and Liberman further claim that Yoruba exhibit dissimilation of H and L levels in bound sequences and the limitation of “catethesis” or “downdrift” to bound sequences of HL or LH which are similar to what happens in Japanese. Akinlabi and Liberman’s (2001) discussion of tonal phenomena in Yoruba would be relevant to the analysis on syllable structure processes like tone spreading.

In a comparison between Kɔ̀nni and Dagaare, Akinlabi and Liberman (2001), explain that properties of Dagaare are close to those of Kɔ̀nni in that in both languages, there are no LL nouns but there must be a H in a word. However, these two languages differ in the following contexts:

(1) Unlike Kɔ̀nni, the number suffixes in Dagaare do not have a Low tone (2) while the number H-tone suffix polarizes in Dagaare, in Kɔ̀nni, it does not. (3) In trisyllabic nouns of the form HØ + H, that is, in a disyllabic noun plus a number suffix the H tone suffix does not polarize in Dagaare. Akinlabi and Liberman assume that the Dagaare facts can be handled by

assumptions close to those proposed for Kɔnni. In other words, Dagaare has the same requirement of a tonal complex within a minimal N⁰ as Kɔnni, and Dagaare has the same tonal complexes as Kɔnni. Tone polarization takes place in the number suffix in Dagaare because the language prefers tone change to tone merger. That is, as long as the requirements of having a tonal complex and satisfying the OCP are met, Dagaare chooses feature change over feature merger in the number suffixes. Even though, the current study examines tone and tonal processes, tone polarity would not be discussed in the present study.

Cahill (2004) discusses tone polarity in Kɔnni nouns using Optimality Theory (OT) by McCarthy and Prince (1995). In his analysis, the constraints for Kɔnni were split between High and Low tones due to their different behaviors: High tones spread, but Low tones do not. Low tones can remain floating, but High tones cannot. Tonal behavior of the class 1 plural suffix in Kɔnni in terms of a constraint POLAR, specific to that morpheme was analysed.

It was observed that suffixes on most nouns in Kɔnni are High-toned, and the behavior of the plurals of Noun Class 1 is not consistent with the idea that they are synchronically High-toned. In addition, the High-toned suffix /-ń/ produces a different tonal result from the plural suffix, and so Cahill concluded that an analysis of Moore, which involved underlying High tones for all suffixes and the general OCP (High) schema, was not applicable in Kɔnni. This is because, in Moore, most noun suffixes are apparently polar, hence, both the "polar" nouns and those that do not exhibit polarity could be analyzed with the same rules, to give a unified account of all Moore nouns. However, in Kɔnni, most nouns do not have apparent polarity but only the one suffix that exhibits such. Therefore, Cahill proposes a constraint expressing this surface polarity as follows:

Rule 2. POLAR: in a Noun Class 1 plural, the last tone of the plural is opposite in value to

the immediately preceding tone.

In the analysis, the segmental portion of the NC 1 plural –a/-e is analysed as toneless while the stem as in [tàná] 'stones', has a Low tone, with [tàná] 'stones' and [tànǎí] 'the stone' both having High-toned suffixes as a high tone is inserted on the NC 1 plural suffix.

Table 3: Rankings of POLAR and DEP (H)

UR	L- Ø tan-a	POLAR	DEP(H)	DEP(L)
☞	L H tana		*	
b.	L \	*!		
c.	L L tana	*!		*

(Cahill, 2004)

Using constraints POLAR, DEP (H) and DEP (L) with POLAR ranked higher over DEP (H) and DEP (L), the winning candidate (a) had a High tone inserted on the suffix to avoid violating POLAR. Thus, where the noun has a HH stem tone, a polar low tone is inserted on the suffix.

Table 4: Ranking of MAX (H) and POLAR over *CONTOUR

UR	H H- Ø dzag -a	MAX (H)	POLAR	*CONTOUR	DEP (L)
☞ L	H H dzaga			*	*
b.	H H dzaga		*!		
c.	H L dzaga	*!			*

d.	$\begin{array}{c} \text{H L} \\ \text{N} \\ \text{dzaga} \end{array}$	*!	*	*
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(Cahill, 2004)

with MAX(H) and POLAR ranked over *CONTOUR above, the analysis shows that candidate (a) satisfies POLAR by inserting a Low tone, without deleting an underlying High, which would violate MAX(H). Candidate (b) retains its input tones, but does not satisfy POLAR and therefore is ruled out. Candidate (c) satisfies POLAR, but incurs a fatal violation of MAX (H) by deleting the second underlying High tone. Candidate (d) is phonetically identical to (a) but has achieved that at the cost of deleting the input High, which is an untenable representation.

A well-formedness constraint was also used to show that a surface HLH tone is not licensed but when morphemes that would have produced such a sequence are concatenated, the result is H'HH. With analysis on the relation of POLAR to the floating Low tone, it was realised that because the constraint refers to "the last tone of the plural, the floating tone can be considered as part of that morpheme rather than to the definite suffix due to dependency involved. So that, when the plural suffix is present, the Low tone is inserted where there was no definite suffix and without the presence of the plural morpheme, the Low tone does not occur.

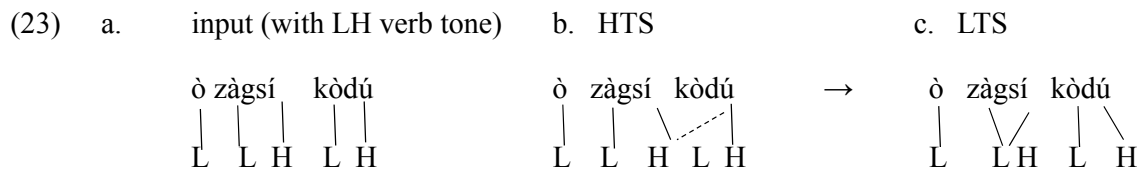
Using the form [tánáhá] 'the stones', Cahill (2004) illustrates spreading, another source of polar tone in Kɔ̀nni. The analysis shows that High tones do spread, which is a violation of *H-SPREAD. Also, High tones can be inserted on nouns, which is also a violation of DEP (H), but satisfies a higher-ranked H-PRES, that requires a High tone in a word. Cahill concluded that in Kɔ̀nni High tone insertion is limited to only words that have no underlying High while High-spreading is more common but there has not been a clear empirical evidence to decide this ranking; therefore it remains indeterminate. Therefore, the OT

H L H

H L H

Hyman and Olawsky (2000) show in their analysis that the subject pronoun *ò* is L tone, while the verb *zàgsì* receives a LH melody as realized on *zagsi* plus *ya* (the perfective marker), when there is no intervening element between them (a). However, when the same verb appears after the H-toned subject pronoun *ń*, the H spreads onto the two syllables of *zagsi*. Hence creating a H plus HL falling sequence. Hyman and Olawsky also demonstrated that Low Tone Spread (LTS) occurs in Dagbani and Buli. They argue that in Dagbani, when the sequence is not utterance-final, a L tone spreads onto a following stressless H tone-bearing unit and delinks it as illustrated as follows in their analysis of /ò zàgsí kòdú/ ‘he has refused a banana’;

LTS: /ò zàgsí kòdú/ ‘he has refused a banana’



Hyman and Olawsky (2000) explain that the verb in (a) has a LH tone which is assigned by the Main Clause Affirmative non-future perfective and HTS applies in (b) which is then followed by LTS as in (c). However, *kò!dú* ‘banana’ which is the noun object has a floating L tone lodged between linked Hs, which causes a downstepped H tone and when downstepped H tone occurs directly before a pause, the H-!H is simplified to H-L, hence *kò!dú* becomes *kódù* as in ‘ò zàgsì kódù’. Again, the discussion by Hyman and Olawsky (2000) on tone spread and the behavior of tone based on the context in which it occurs in Dagbani, would be relevant in the analysis of tone assimilation in Gurene.

2.2 Literature on the Farefari Language

Most of the studies in Farefari tend to focus on Gurene, while the other dialects have received little attention. Among the previous linguistic studies on the phonetics and phonology of Farefari, apart from Adongo (2008) who has described vowels of the five major dialects (Gurene, Nankane, Boone, Talen and Nabt), most of the studies seem to concentrate on only Gurene as already stated above. For example, works by Dakubu (1996), Atintono (2004, 2011, 2013); Adongo (2008) present the nine vowels of Gurene as [i, ɪ, e, ε, u, ɔ, o, ʊ, a]. These vowels are grouped into short oral vowels versus short nasal vowels, and long oral vowels versus long nasal vowels. Seven of the oral vowels have nasal counterparts except [e] and [o]. In terms of vowel harmony, Gurene vowels have been put into two sets commonly known as Advanced Tongue Root [+ATR] and Non-Advanced Tongue Root [-ATR]. The [+ATR] vowels include, [i, e, u, o] while the [-ATR] vowels are [ɪ, ε, ʊ, ɔ, a] (Atintono 2004, 2011, 2013; Dakubu 1996; Adongo 2008; Azagsiba 1977).

In Adongo's (2008) 'Spectrographic analysis of Gurene short oral vowels', an acoustic description of short oral vowels of five dialects of the Gurene (Farefari) language namely Gurene, Boone, Nankani, Nabt and Talen were given. Adongo compares vowels of the five dialects, produced by male and female speakers as well as young and old adult speakers. She also performed ANOVA test on the data and compared the results for levels of significance. To check similarities and differences in vowel quality, paired-sampled Test was performed on seven pairs of vowels for all the dialects. The data were recordings of utterances of sixty speakers and the adaptive dispersion theory was used to account for the vowels of the specific dialects and the language as a whole. Adongo's findings show that, vowels of four dialects (*Gurene, Boone, Nankani* and *Nabt*) seem to occupy eight areas in the vowel space because [ɔ] and [o] were close to each other in the vowel chart. However, Tongo speakers' vowels and the vowels of the Gurene (Farefari) language in general occupy nine areas with [ʊ] and [o]

close to each other. She explains that the front vowels follow a similar pattern in all the dialects while the back vowels show some inconsistencies.

Adongo also claims there is no significant difference in how young adult speakers and old adult speakers produce their vowels; however, the results show that the vowels of the female speakers occupy a wider area and are lower, while the vowels of the male speakers occupy a smaller and higher area in the vowel chart. Adongo concluded that though, the vowels of Bolga and the overall vowel space of Gurene (Farefari) seem to be governed by the principle of adaptive dispersion, not all the vowels are governed by this theory. Despite the fact that Adongo's study seems to be the only work so far that has attempted describing vowels of all the major dialects of Farefari, it still falls short in that the analyses were limited to only short oral vowels.

Dakubu's (2006) paper on 'the prosodic features of the Gurene verb' was also reviewed. This article examines two prosodic features (accent, tone), and the glottal stop, which affect the Gurene verb. With minimal pairs of the patterns H/L, H/HL, L/HL and LH, Dakubu demonstrates that tone is contrastive in Gurene, both lexically and grammatically. However, she claims that there are no minimal pairs of LH pattern in the language. On Gurene word accent, Dakubu indicates that the first syllable of any lexical stem (noun, verb, adjective or adverb) without a prefix can carry accent and with the glottal stop. Dakubu says syllables that begin with glottal stops also carry accent and this is because any accented syllable that has no C onset begins with a glottal stop. Therefore, the occurrence of an initial glottal stop is a function of accent.

On verbal tone in Gurene simple phrase, Dakubu claims the verb itself carries no lexically contrastive tone but that it copies the tone of its subject that occurs before it without any intervening particles as in the following examples.

- (24) a. à tò pɔ́ka ‘he insulted the woman’
 b. bòdáa lá tó pɔ́ka ‘the man insulted the woman’

She also asserts that the tone of the verb subsequently affects the tone of the following syllable, which is usually opposite, or a downstepped high. Therefore, subject tones spread to the verb, with tone of the syllable following the verb polarized in declarative expressions. Dakubu (2006) states that, the polarization rule in Gurene also applies to the last syllable of polysyllabic verbs, if the verbs appear utterance finally even though tone change is not strictly tied to a specific syllable. She also examined tone patterns associated with five particles that precede declarative verbs in order of *daa* ‘past tense’, *na-ŋ* ‘prospective’, *ka* ‘negative marker’ *wa* ‘ingressive’ and *le* iterative’. It was realised that, these particles behave like the verbs in that they get a low tone after a low toned subject and a high tone after a high-toned subject, and with some exceptions where they are followed by a polar tone.

Ninkare also known as Nankani is one of the major dialects of Farefari that has also received some attention. Example is Apeligiba’s (2015) work on aspects of the phonology of the Ninkare dialect of Farefari. In this study, Apeligiba described the sounds of Ninkare. His findings revealed that Ninkare has nine short vowels [i, ɪ, e, ɛ, a, ɔ, o, ʊ, u], which can all be lengthened and like Gurene, all these vowels except [e] and [o] have nasal counterparts. Again, Apeligiba claims Ninkare has twenty-six consonants [b, d, f, g, h, k, l, m, n, ŋ, p, r, s, t, v, w, y, z, gb, kp, ny(n) ŋm/ŋw, ʔ, ʎ, dʒ and ʃ], with the syllable types of the structure V and CV which are mostly open syllables similar to the Gurene syllable.

Other works on Gurene include brief descriptions of the syllable structure of Gurene (Dakubu 1996, Atintono 2011 and Nsoh 1994); some description of the tone of Gurene (Dakubu 1996; 2006; 2007) and Atintono (2004, 2011, & 2013). Some work has also been done on the grammar of Gurene (Dakubu 1996; Dakubu 2000, 2006, 2007; Nsoh 1997, 2002, 2010 & 2011; Atintono 2011, 2013) and the bilingual Gurene-English dictionary and the English-

Gurene Glossary (Dakubu et al. 2007). There is also a brief description of the phonology and clause of the Zuworene, another dialect of Farefari (Schaefer, Robert 1974/75; Schaefer, Nancy 1975) cited in Atintono (2013). The current study will benefit enormously from all the previous studies on the language, particularly those on the phonetics and phonology as they are directly related to the current study and references will be made to them as and when the need arises.

2.3 Overview of phonological theories

This section provides an overview of the theories to be used in the analysis of the data. In this section, I give an overview of distinctive features theory by Hyman (1975), Ewen & Van Der Hulst (2001) and Gussenhoven & Jacobs (2013). I also discuss feature geometry (Clements and Hume 1996; Clements 1985; Sagey 1986; Ewen & Van der Hulst (2001), the mora theory (Hyman 1984, 1985; Hayes 1989) and autosegmental phonology (Goldsmith 1976).

2.3.1 Distinctive features

Kaan and Yoo (2014) state that distinctive features theory provides a means of examining the similarities and differences in segments. Hawkins (1984) also holds that distinctive features theory determines phonetic features that are significant in a language and those that are not significant towards the realization of a theory of phonology and functions in stating phonological regularities in terms of rules. Agbedo (2000) cited in Kaan and Yoo (2014) expounds that "... this method is partly phonological as it considers the functional properties of phonemes, and partly phonetic because it considers the articulatory and acoustic differences between phonemes in the inventory". While Akmajian et al (2003) think that distinctive features are exactly those that permit an insightful description of segments and allow the exact nature of assimilation process between two adjacent phonological segments to be clearly expressed, Hawkins (1984), says distinctive features serve to distinguish

phonemes. Kaan and Yoo (2014), in support of Hawkins, argue further that distinctive features are significant phonetic properties of human language that play a crucial role in the statement of phonological rules by distinguishing phonemes from one another, and conclude that distinctive feature theory is a mechanism that is derived from the properties of the phonological rules of the world's languages.

2.3.1.1 Ewen and Van Der Hulst's discussion on distinctive features

In Ewen and Van Der Hulst's (2001) summary of the various approaches to phonological features claim that though Chomsky and Halle's (1968) SPE model is the most widely known system, the first comprehensive formulation was by Jakobson et al. (1951). They say these two models differ in that whereas Chomsky and Halle's (1968) SPE features are based entirely on articulatory parameters, those of Jakobson et al. were defined purely in terms of acoustic properties. Also, while the Jakobsonian features were used for both description and characterisation of vowels and consonants, the SPE system was used largely to separate sets of features.

Major Class Features

Ewen and Van Der Hulst (2001) describe features as the phonetic properties responsible for the phonological behaviour of segments. Thus, phonological segments are made up of properties (phonological features) which are used to characterise segments and make distinction between them. Hyman (1975) explains further that the study of phonetic properties of segments is the subject of the various branches of phonetics and that, as phonologists, our interest in phonetic features centres around the question of how articulatory and acoustic properties of sounds are put to work in various languages - how they function to convey meaning. Major class features are therefore, used to characterise and make a distinction between major classes of segments in terms of place and manner of articulation. Example is the feature [sonorant] which is used to characterise vowels, nasals and liquids as a

natural class or major class of sonorants because they share the feature value [+sonorant] while stops, fricatives, and affricates form a natural class of obstruents and assigned the value [-sonorant] (Ewen & Van Der Hulst 2001:10-11).

Also, the features [continuant] and [voice] are used to further make a distinction between the various major classes (vowels, liquids, nasals and obstruents). Thus, in the obstruent category, which is [-sonorant], fricatives are [+continuant], while stops are [-continuant]. Whereas, within the [+sonorant, +consonantal] category, nasals are [-continuant], while liquids are [+continuant]. Then, the feature [+voice] characterises sounds produced with vibration of the vocal cords while [-voice] sounds are those with no such vibration (Ewen & Van der Hulst 2001). Here, what Ewen and Van der Hulst have done is assume a grouping of the features [consonantal] with [sonorant], which together define ‘major classes’ while [voice] with [continuant] characterise ‘manner of articulation’. They say the interaction of the two features [consonantal] and [sonorant] which divide up the ‘major’ classes’ of segments is relevant to a number of phonological phenomena. Example is how combinations of the two features can define classes that occur frequently in phonological processes. In addition is how these features, typically determine the ordering of elements within a syllable, such that a vowel ([+sonorant, +continuant]) forms the peak of the syllable, and an obstruent, which is [-sonorant, +continuant] fills the margin, while any liquid or nasal [+sonorant, +consonantal] occurs intermediate. The claim is that the features [sonorant] and [consonantal] determine a sonority hierarchy (or sonority scale), which is reflected in the behaviour of segments in the syllable; the higher the sonority of a segment, the closer it is to the peak of the syllable. For instance, [+continuant] are considered higher on the sonority hierarchy than [-continuant] and [+voice] segments are higher than [-voice].

Also, in examples that involve processes such as historical ‘weakening’ or lenition of stops to sonorants in intervocalic position, undergo a gradual assimilation of features of the stop to

surrounding vowels. However, nasals which do not participate in intervocalic lenition processes with respect to sonority within the class of sonorant consonants, can be established on the bases of their behaviour on syllable structure such that liquids ([+continuant]) are closer to the syllabic element than nasals ([-continuant]). With examples from English, Ewen and Van der Hulst (2001:14) explain that in syllables as in *kiln* and *barn*, the *-r* and *-l* are in postvocalic as opposed to their occurrence in **/kinl/* and **/banr/* which are ungrammatical. Ewen and Van der Hulst observe that the four features [sonorant], [consonantal], [continuant] and [voice] together form a group with respect to which phonological regularities can be uncovered as only they distinguish the classes involved in sonority-based phenomena.

Based on Ewen and Van der Hulst's (2001) grouping of features, [consonantal] with [sonorant], which together define 'major classes' and [voice] with [continuant], the 'manner of articulation' will be used to characterise and make distinction between the major classes of consonant segments in Gureɛ. Since various combinations of features can define major classes of segments and determine the ordering of elements within a syllables.

Vowel Features

In making a distinction between the major classes of segments, Ewen and Van Der Hulst (2001) make a distinction between vowel features and consonants features. For the classification of vowels, four features [high], [low], [back] and [round] can be used to distinguish vowels of a language. These features are defined in terms of the position of the highest point of the tongue and the presence or absence of lip-rounding when producing the vowel. The definition of the first three features [high], [low] and [back] is in reference to the neutral position of the tongue (roughly the position for [ɛ]). Therefore, [+high] sounds have their closest constriction higher than the neutral position, whereas [-high] do not, and similarly for [+low] vs [-low] and [+back] vs [-back] (Ewen & Van Der Hulst 2001:3).

According to Ewen and Van Der Hulst, a system of this sort treats the vowel features as interpretations of two axes as follows;

- (25) [+high]
 [-back] [+back]
 [+low]

These features they said, are given because languages typically make a three-way opposition on the vertical axis, but only a two-way opposition on the horizontal axis. Thus, there is no feature [±front] beside [±back], but there is a feature [±low] alongside [±high]. Hence, the only way of charactering a three-way opposition on their high-low axis within a binary feature framework is to postulate two features as follows;

- (26) [-back][+back]
 [-back][+round]
 [-round] [+round]
 [+high, -low]
 [-high, -low]

However, the definition of these features exclude the firth possible combination of two features which is [-high, -low] (mid). Therefore, to characterise vowel space which requires other features, various proposals have been made to distinguish the various pairs of [-high, -low] vowels on *vowel height dimension and related issues*. These proposals have been divided into three major groups.

- i. Those that distinguish the members of each pair by means of a binary feature [tense]
- ii. Those that try to reflect the difference in height ‘directly’
- iii. Those that introduce the feature [Advanced Tongue Root] to distinguish the members of the various pairs.

In the first proposal, which is found in SPE, it is argued that the difference is one of tense vs lax. i.e. each pair of tense vowels is produced with greater deviation from the neutral or rest position of the tongue than its lax counterpart, and are longer in duration. Example of such distinctions are /i:/ vs /ɪ/ as in *meal* and *mill* in English. According to Ewen and van der Hulst (2001), this approach is applicable to the [-high, -low] vowels in which the opposition between the members of each pair is not just one of tongue-height (quality), but also of length (quantity). Thus, the type of phonological opposition between the two [-high, -low] vowels [e] and [ɛ] is different from that holding between the high vowel [i] and the higher of the two mid vowels [e], or between the lower of the two mid vowels [ɛ] and the low vowel [a]. Other examples in which vowels are distinguished only by vowel height come from some dialects of Scots English as in (27) below.

- (27)
- | | |
|-------------|-------|
| <i>beat</i> | [bit] |
| <i>bit</i> | [bt] |
| <i>bait</i> | [bet] |
| <i>bet</i> | [bɛt] |
| <i>bat</i> | [bat] |

However, this approach has received criticism from those who believe that there are vowel systems in which it is reasonable to speak of at least four distinct vowel heights. Also, Ewen and Van der Hulst (2001) disagree with Chomsky and Halle’s notion of tense vs lax in which phonological distinction of vowels (as in the examples above) are made *only* by vowel height (quality), without a distinction in length (quantity). Hence, existence of systems like the

above has resulted in the proposal of features like the multivalued feature ‘high’, which reflects the height dimension more directly by phonologists such as Wang (1968). In this system, Wang (1968) for instance, replaces the feature [low] with [mid] to allow the expression of four heights, rather than the three of SPE as follows;

- (28) +high +high -high -high
 -mid +mid +mid -mid
 /i/ /e/ /ɛ/ /æ/

Even though this formulation allows the expression of four heights, there is also a problem associated with the expression of vowel height using binary features to express a single phonetic dimension. That is, a sequence like, /i/-/e/-/ɛ/-/æ/ is seen as a set of points on a single scale. This led to phonologists like Ladefoged (1975) and Willianson (1977), to abandon binary features for **multivalued scalar features** in the description of vowel height as follows;

- (29) /i/ [4 high]
 /e/ [3 high]
 /ɛ/ [2high]
 /æ/ [1 high]

The third proposal is the feature [Advanced Tongue Root], in which, the difference between a pair of vowels such as [e] and [ɛ] typically involves the position of the tongue root. So that in the production of [e] the tongue root is forward while for [ɛ] it is further retracted. The similar relationship holds between [i] and [ɪ]. Thus, the difference between the two vowels does not

relate exclusively to the relative height of the body of the tongue, but involves additional phonetic parameters like [ATR]. To Ewen and Van Der Hulst (2001), the choice among these alternatives – tense/lax, height and ATR approaches depends on which one of them can more successfully predict what actually happens in phonological systems and processes than the others. That is, if we find processes that show that the relationship between [i] and [e] is phonologically the same as that between [e] and [ɛ], this would provide evidence in favour of multivalued feature high. Ewen and Van Der Hulst (2001:18) believe that all the three approaches are required in phonological theory- vowel systems may be organised along any of the three lines suggested by the approaches discussed, so that the nature of the phonetic parameters, which play a role in a particular sound system is reflected in the phonology of the language in question. Based on Ewen and Van der Hulst suggestion, two of the approaches will be applied in the description of Gurene vowels. The distinction between pairs of vowels such as [i] and [ɪ], [e] and [ɛ] and [u] and [ʊ] will be made using the height and ATR approaches. Thus, all the four vowel features [high], [low], [back] and [round] plus the feature [ATR] will be used to describe the vowels of Gurene.

Consonantal features

In describing consonants within an SPE-type system, the two features [anterior] and [coronal] distinguish the major places of articulation. In ‘place of articulation theory’, it was realised that the tongue-body and tongue root consonants which are [-anterior, -coronal] can be distinguished from each other by the use of the vowel features [high], [low] and [back] in addition to the features [anterior] and [coronal]. However, the representation of place of articulation led to other proposals. Example is the SPE’s proposal of ‘place of articulation theory’, in which the feature [anterior] is defined in terms of the passive articulator. This

place of articulation theory is contrasted with ‘articulator theory’, where ‘the active articulator that makes the constricting gesture instead of place of articulation’ distinguishes segments. Thus, in ‘articulator theory’, the major places of articulation (labial, alveolar, post-alveolar, palatal, velar, uvular & pharyngeal) are distinguished by the features [labial], [coronal], [dorsal] and [radical] (McCarthy, 1988) cited in Ewen and Van Der Hulst (2001). Ewen and Van Der Hulst (2001) support McCarthy’s distinction between articulator theory and place of articulation theory by arguing that indeed [labial] consonants are produced with the lips, [coronal] consonants with the blade and front of the tongue, [dorsal] consonants with the tongue body (dorsum) and [radical] consonants with the root of the tongue. According to Ewen and Van Der Hulst (2001), one advantage the ‘articulator theory has over SPE and ‘place of articulation theory’ is that in ‘articulator theory’, the feature [anterior] is no longer used to identify any of the major places of articulation. This is because in SPE treatment of segments, the class of labials and alveolars is predicted to form a natural class, characterised as [+anterior]. However, this is not a recurrent class in the phonologies of languages as there are no phonological processes that affect the set of coronal and non-coronal anteriors such as /p, t̪, t/ (Yip, 1989 cited in Ewen & Van der Hulst, 2001). Therefore, to avoid this anomaly the feature [anterior] is no longer used to characterise a major place of articulation though it is still required to subcategorise the class of coronals. Hence, the feature [labial] is used to characterise the class of labial consonants instead of [+anterior], [-coronal], as in the SPE classification.

While in SPE and place of articulation theory, the feature [coronal] is used to characterise only alveolars and postalveolars, in ‘articulator theory’, [coronal] segments have been extended to include palatals. This extension of [coronal] segments to include palatals brought about the debate as to whether palatals should be characterised as [coronal], [dorsal] or both. Thus, It has been observed that Chomsky and Halle characterise them as [-coronal]. This is in

accordance with their definition of [+coronal] as involving the raising of the tongue. Also, from Hall's (1997) observation, 'the vast majority of phonologists have concluded that palatal sounds are [+coronal] because they pattern in many languages with the alveolars'. This led to Halle and Stevens' (1979) reclassification of [+coronal] as involving 'the raising of the frontal (tip, blade and or central) part of the tongue so as to make contact with the palate'. Hence, Ewen and Van der Hulst support the view that palatals are certainly [+coronal], and think articulatory theory is a positive one for the classification of the major places of articulation. As already stated, the feature [anterior] is still required in 'articulator theory' for subcategorization of coronal sounds. Even though it is retained in this theory, it is restricted to only [coronal] segments. Thus, [coronal] segments may be [+anterior] or [-anterior], but segments which are not [coronal] simply have no specification for the feature [anterior]. In the articulator theory, dental and retroflex consonants are also characterised as [+coronal] and though the definition is retained, it only applies to consonants produced with the tongue-blade as active articulator. Still on coronal segments, Ewen and Van der Hulst have also adopted two other features [strident] and [distributed] which Chomsky and Halle (1968) originally proposed, for further distinctions of these segments. This is because they serve to subcategorise consonants in the coronal region but not because they are defined in terms of place. Thus [strident] is used to distinguish the class of fricatives based on relative amount of 'high frequency noise' involved – [s z ʃ ʒ] are [+strident] and [j ð θ] are [-strident], while the feature [distributed] is used to classify tongue-blade (laminal) sounds as [+distributed] while tongue-tip (apical) sounds are [-distributed]. This feature is again used to distinguish non-retroflex as [+distributed] from retroflex, which is [-distributed].

2.3.1.2 Hyman's summary of distinctive features

Even though, Ewen and Van Der Hulst (2001) claim that the first comprehensive formulation of distinctive features was by Jacobson et al. (1951), Hyman (1975) summary of the various

approaches of distinctive features theory indicates Trubetzkoy's (1939) Theory of Distinctive Opposition as the first to have attempted a comprehensive taxonomy of the phonetic properties of distinctive contrasts employed by languages. Hyman's (1975) asserts that Trubetzkoy was interested in the contrasts between segments as well as the nature of contrasts within a given phonological system. Thus in his 'Principles of phonology', he classifies distinctive oppositions on three bases as;

- (30) (i) the relationship to the entire system of oppositions,
- (ii) the relationship between opposition members and
- (iii) the extent of their distinctive force.

The first classification of Trubetzkoy's (1939) distinctive opposition, which is based on the relation between members of the opposition, makes a distinction between bilateral and multilateral, and between proportional and isolated oppositions. In the second classification, which is based on the relation between members of the opposition, a distinction is made between privative, gradual and equipollent. In the final classification in which the distinction is made according to the extent of distinctiveness of an opposition, he makes a distinction between constant and neutralisable oppositions. Expounding on the distinction between constant and neutralisable oppositions, Hyman says that in standard German, although *rat* 'advice' and *rad* 'wheel' are written differently, both are pronounced [ra:t] while in their plural forms; *rate* [rɛ:tə] 'advices' and *rader* [rɛ:dər] 'wheels', there is a contrast between /t/ and /d/ in intervocalic position. This is due to the presence of the plural suffixes -ə and -ər, which has put them in non-final position. Therefore, the opposition between /t/ and /d/ is realised phonetically only in certain positions: when the two members are realised as only [t] phonetically, the opposition is said to be neutralised or cancelled. Nevertheless, when the two

segments of an opposition can occur in all positions, the opposition is said to be constant and not neutralised.

The second approach Hyman (1975) discussed is Jakobson's Theory of Distinctive Features, which was intended to predict only those oppositions that could be found in languages. Here, Jakobson made two assumptions. First, that the presence of certain phonetic oppositions brings about the presence of others. Second, that all features are binary, including features which are logically gradual oppositions. This led to the introduction of 'binary and non-binary features (Jakobson, Fant and Halle 1952: Jakobson and Halle 1956 cited in Hyman 1975). Jakobson et al (1952) made two innovations in their theory-(1) incorporating acoustic phonetics into phonology and (2) converting all phonological features into binary ones, so that a feature can have only two values, one of which is designated [+F] and the other [-F]. Jakobson also re-interpreted Trubetzkoy's gradual oppositions, which seem to defy binary interpretation because vowels such as [i, e, ε, æ] differ in degree of vowel height and require a scale, like from [1 vowel height] for /æ/ to [4 vowel height] for /i/. The four-vowel height of Trubetzkoy has been reinterpreted in terms of two binary features-*Diffuse* and *Compact*. These binary features were proposed only to capture the phonological oppositions found in languages, but not necessarily the different phonetic realisations of these oppositions. Hence, they do not account for every phonetic detail of the phonological segment. Jakobson et al. (1952), first proposed the major class features; consonantal and vocalic for the classification of the major classes of sounds and which can be defined in terms of either their acoustic or articulatory terms. These two binary features define four major classes of sounds as follows:

(31)	True Consonants	Vowels	Liquid	Glide
	+cons	-cons	+cons	-cons
	-voc	+voc	+voc	-voc

/p/

/a/

/l/

/y/

The specifications above indicate that true consonants do not have anything in common with vowels because they do not share any feature specification except that they are segments.

However, vowels and liquids share the feature specification [+voc] while vowels and glides share the feature specification [-con]. Hence, binary features provide a way of revealing ‘natural classes’ of segments (Hyman 1975:34).

For the classification of vowels, the features [Diffuse, Compact, Grave, and Flat] are used in addition to [-cons, +voc]. The features [tense/lax] were also introduced to differentiate between vowels such as /ɛ/ and /e/. Another set of features [Voice, Continuant, Strident and Nasal] were used by Jakobson and Halle (1956) such that Vowels are universally specified [+continuant] and [-strident]. This is because all vowels are produced with a continuous airflow, but no vowel is characterised by the kind of high-intensity noise characterised by [+strident]. However, the contrasts between [+continuant] and [-continuant] and [+strident] and [-strident] are limited to consonants.

For the characterization of consonants, the Jakobsonian framework defines consonants as segments which are not specified [-cons, +voc]. In other words any segment which is either [+cons] or [-voc] qualifies as a consonant. Hyman (1975) explains that one of the advantages of Jakobson’s feature system is that it makes it possible to characterise both consonants and vowels in terms of the same features. For example, though vowels are described as being either front, central or back, and consonants as labials, dentals etc, these different placements of the two articulators are required to make vowels and consonants that are related by means of the features Diffuse and Grave. Thus, the same distinctive features for vowels are used to capture the contrasts in consonants. In the description of consonants, the Jakobsonian theory makes a distinction between primary and secondary articulation using different sets of

features. For instance, for primary articulations, the feature [strident] is used to distinguish between the various phonetic places of articulations. Thus, they make a distinction between interdental and dental/alveolar consonants, labial fricatives and the labiodental fricatives, alveopalatals and palatal fricatives, as well as affricates and stops. By their use of this feature [strident], the six places of articulations - bilabial, labiodental, interdental, dental/alveolar, alveopalatal and palatal, have been grouped into three; labials, dentals and palatals, where as uvulars and velars are also classified as velars. Again [strident] is used to distinguish the uvular fricative [X] as [+strident] from the velar fricative [x] as [-strident]. Therefore, each of these places of articulation (four general oppositions) stands for two more precise phonetic places of articulation (Hyman 1975:41) as follows;

(32)	LABIAL		DENTAL
	Bilabial Labiodental		Interdental Dental/Alveolar
	PALATAL		VELAR
	Alveopalatal Palatal		Velar Uvular

These four places of articulation are distinguished by means of the two distinctive features [Grave] and [Diffuse];

(33)		LABIAL	DENTAL	PALATAL	VELAR
	Grave	+	-	-	+
	Diffuse	+	+	-	-

On the other hand, the features Flat, Sharp, and Checked were proposed to characterise consonants with secondary articulations such as labialisation, palatalization, etc. summarised as follows;

- (34) [+flat] : labialised, velarized, pharyngealised and retroflex consonants
- [+sharp] : palatalised consonants
- [+checked] : glottalised consonants
- [+tense] : aspirated and geminate/long consonants

Thirteen features were proposed in the Jakobsonian system to account for all possible phonological contrasts of languages except tone and stress, as follows:

- | | | | |
|------|-------------|------------|---------|
| (35) | Vocalic | Voiced | Checked |
| | Consonantal | Nasal | Grave |
| | Compact | Continuant | Flat |
| | Diffuse | Strident | Sharp |
| | Tense | | |

The third theory of distinctive features discussed by Hyman (1975) is the distinctive features of Chomsky and Halle (1968), which were designed to first capture the phonological contrasts of languages like Jakobson's features and second, to describe the phonetic content of segments derived by phonological rules, as well as underlying segments. In their treatment of major class features, Chomsky and Halle (1968) pointed out the problems with the Jakobsonian features of consonantal and vocalic, which define the four major classes of segments; true consonants, vowels, liquids, and glides. They argue that, there are some similarities between the four major classes because true consonants and liquids could be classified as [+cons], true consonants and glides as [-voc], vowels and liquids as [+voc], and

vowels and glides as [-cons]. Therefore, these feature specifications are a prediction that true consonants and liquids are subject to certain phonological rules that vowels and glides are not subject to. Chomsky and Halle (1968) explain that, though the binary features consonantal and vocalic provide means of capturing relations between segment classes in groups of two, there is no straightforward way to group three classes together as opposed to four. Therefore, the most natural grouping of these four major classes may be between true consonants, liquids and glides on one hand and vowels on the other hand. Chomsky and Halle (1968) claim that phonological properties should usually be stated in terms of vowels and non-vowels when the general word structure of a language is CVCV, such that C stands for either true consonants, liquids or glides since what is common with them is usually not syllabic like Vowels. Therefore, based on their idea that segments be grouped into vowels and non-vowels, Chomsky and Halle (1968) proposed the feature syllabic to replace vocalic. So that [+syllabic] segments include those that constitute a syllabic peak (vowels, syllabic liquids and syllabic nasals), while all remaining segment are [-syllabic] (Hyman 1975: 43) According to Hyman (1975), Chomsky and Halle (1968) also proposed the feature [sonorant] to characterise vowels, liquids, glides and nasals as [+sonorant], whereas, non-nasal true consonants or obstruents (stops, affricates and fricatives), are [-sonorant]. Thus, having abandoned the feature vocalic, the two new features syllabic and sonorant, along with the Jakobsonian features consonantal and nasal, were used to define the major classes of segments.

In the description of primary placement features for vowels and consonants, Chomsky and Halle (1968) retained the features Consonantal, Tense, Voice, Continuant, Nasal and Strident from the earlier feature system but replaced all other ones with new features. For instance, they used the features high, back and Low to describe both vowels and consonants. i.e., palatal and velar consonants, along with high vowels are [+high], while labial and dental

consonants, along with non-high vowels are [-high] contrary to the Jakobsonian system in which labials and dental consonants, along with high vowels, are [+diff], and palatal and velar consonants, along with non-high vowels, are [-diff]:

(36)	JAKOBSON ET AL		CHOMSKY AND HALLE
	[+diffuse]	[-diffuse]	[+high] [-high]
	labials	palatals	palatals labials
	dentals	velars	velars dentals
	high	nonhigh	high non-high

Also, the feature Back is used to characterise the velar (ised), uvular, pharyngeal(ised) consonants as well as back vowels. For example, [+back] features are characterised by the retraction of the body of the tongue. Thus, back vowels and consonants produced in the velar region, (with the exception of where they are velarized or pharyngealised), and glottal and glottalised consonants are all [+back]. However, the features High, low and back fail to show the difference between primary place of articulation (palatal, velar, pharyngeal and glottal) and secondary place of articulation (palatalised, velarized, pharyngealised and glottalised). Chomsky and Halle, therefore, proposed anterior and coronal features to distinguish between primary and secondary articulations, such that, in primary articulation, labials and dental consonants are [+ant], while all other consonants are [-ant], dentals, alveolars and alveopalatals are [+cor], while all other consonants are [-cor]. On secondary articulation, Chomsky and Halle (1968) use the feature Round to specify rounded vowels and labialised consonants with Pharyngealised consonants considered as [+back, +low]. The feature Advanced Tongue Root (ATR) was also introduced to divide vowels into two sets, one specified as [+ATR] and the other [-ATR] whereas Delayed Release, which characterises only contrasts in sounds produced with complete closure in the vocal tract, was used to distinguish

between affricates and stops. The feature [+labial] is used to define labial and labialised consonants as well as rounded vowels, and for the labiovelar consonants / $\widehat{k}p$, $\widehat{g}b$, $\widehat{\eta}m$ /, Chomsky and Halle (1968) proposed that they should be considered as velarized labials rather than labialised velars with their feature specifications as follows (22a), not as in (22b):

- (37)
- | | | | |
|----|--------|----|-------|
| a. | +ant | b. | -ant |
| | -cor | | -cor |
| | +back | | +back |
| | +high | | +high |
| | +round | | |

2.3.1.3 Gussenhoven and Jacobs discussion on distinctive features

In a recent treatment of distinctive features, Gussenhoven and Jacobs' (2013) use both binary and univalent features. Thus, the set of binary features is used to specify the major classes, the state of the glottis and the manner of articulation of consonants while the univalent features are used to specify the place of articulation of consonants and the tongue position of vowels. They state that, the main motivation for the introduction and definition of features is to enable us characterize and describe natural segment classes in languages. Hence, a distinctive feature system should have the following characteristics:

- (38)
- i. be able to characterise natural segment classes.
 - ii. be able to describe all segmental contrasts in the world's languages.
 - iii. be definable in phonetic terms.

Gussenhoven and Jacobs (2013) state that, since the first proposal of binary features (Jakobson et al., 1952), distinctive features have standardly been assumed binary until

recently when univalent features (unary, single-valued or privative) have been proposed (e.g. Ewen 1995). These recently proposed features refer to only the class of segments that has the feature and not to the collection of segments that does not possess it. Example is, the feature [labial] which allows reference to the group of labial segments, but not possible to express any generalization involving all non-labial segments. When a univalent feature like [labial] is assumed, the claim is that no language ever refers to the class of non-labial segments. However, multivalued features are no longer used (Gussenhoven & Jacobs, 2013:74).

Based on Halle and Clements (1983), and Sagey's (1986) feature systems, Gussenhoven and Jacobs (2013) revised the distinctive features by putting them into four groups. These features are (1) Major-class features, which classify segments into segment types such as 'vowel' and 'obstruent' (2) Laryngeal features, which specify the glottal properties of the segment (3) Manner features, which specify the type of constriction, or more generally the manner of articulation and (4) Place features, which encode the place of articulation. While major-class features, laryngeal features and manner features are binary, place features are univalent. Gussenhoven and Jacobs (2013) use three major-class features as [±consonantal], [±sonorant] and [±approximant]; three laryngeal features, [±voice], [±spread glottis] and [±constricted glottis]; four manner features, [±continuant], [±nasal], [±strident] and [±lateral] and four place features, as [labial] ([±round]), [coronal] ([±anterior], [±distributed] & [±strident]), [dorsal] ([±high], [±low], [±back], [±tense], [±ATR]) and [radical]. The place features (univalent features); [labial], [coronal], [dorsal] and [radical] which specify the major areas of articulation to indicate that a segment either has the feature or it does not, are each further specified for other features. For instance, [labial] segments are further specified for [±round], such that [+round] segments involve lip rounding, like [p^w, t^w, o, u, ɔ] while [-round] segments do not. [Coronal] segments are articulated with a raised crown of the tongue, i.e. a raised tip and/or blade, ranging from a dental [θ] to a prepalatal [j]. Examples of [coronal]

segments are [t, z, l, θ, j, ʃ, ɲ, r]. These may also be further specified for the features [±anterior] and [±distributed], and in the case of coronal fricatives and affricates, for [±strident]. [Dorsal] sounds are articulated with bunched dorsum: [k, g, γ, ŋ] (velars), as well as [ç, ƙ] (fronted velars) and uvulars (e.g. [χ, q]). In addition, all vowels are [dorsal]. Just like [labial] and [coronal], [dorsal] segments can also further be specified for the tongue body features [±high], [±low], [±back], [±tense] and [±Advanced Tongue Root] for the description of vowels of West African languages. While [radical] ([pharyngeal]) sounds are articulated with the root of the tongue. (Gussenhoven and Jacobs 2013: 84).

2.4 Theoretical Framework

2.4.1 Introduction

The study uses both linear and non-linear approaches of generative phonology. In the linear phonology, the nature of sounds are described using distinctive features. The processes involved are also explained using linear rules while in the non-linear approach, feature geometry and autosegmental phonology are used. As already stated, in the linear phonology, distinctive features theory (Trubetzkoy 1939; Jakobson et al 1952; Jakobson & Halle 1956; Chomsky and Halle 1968; Gussenhoven & Jacobs 2013), feature geometry (Clements 1985, Sagey 1986; McCarthy 1988; Clements and Hume 1995), moraic theory (Hayes 1989) and autosegmental phonology (Goldsmith 1976), are used to analyse the data.

It has been argued that acoustic phonetics, which was developed in the 1940s, provided the foundation for the theory of distinctive features of Jakobson and Halle (Jakobson et al. 1951), which in turn formed the basis of generative phonology in the 1950s and 1960s and was revised by Chomsky and Halle (1968). Generative phonology (GP), which was adopted within the framework of generative grammar was proposed in the late 1950s by Chomsky et al. (1956) and Halle (1959) and was more concerned with rule systems than with features in

the 1970s. Generative phonology developed into a standard form in Chomsky and Halle's *The Sound Pattern of English (SPE)* (1968). In the 1970s, most of the work derived from SPE tried to address the problems posed by generative phonology while the 1980s saw the development of non-linear phonology, with optimality theory evolving in the 1990s. (The Routledge linguistic encyclopedia 2010).

Chomsky and Halle's study of the *Sound Pattern of English (SPE)* (1968) is the first systematic account of generative phonology in which a key feature was to take seriously the notation in terms of which sounds are represented and rules are formulated. Example is the SPE's analysis of the English Vowel Shift and Velar Softening processes and alternations among [aj] ≈ [i] (*divine, divin-ity*), [ij] ≈ [e] (*serene, seren-ity*), and [ej] ≈ [æ] (*profane, profanity*). Since the short vowels of *rigid, perpetu-al*, and *final* (cf. *rigid-ity, perpetu-ity, final-ity*) are stable, the long vowel must underlie the [aj] ≈ [i], [ij] ≈ [e], [ej] ≈ [æ] alternations. However, the underlying quality of the vowel is reflected in the short variant. Hence, SPE posits underlying /i:/, /e:/, and /æ:/ and two ordered rules. The first shortens the vowel before certain suffixes. Any remaining long vowels are diphthongized and they rotate their nuclei by two rules. It also interchanges high and mid /i/ and /e/ by changing [αhigh] to [-αhigh]. The second interchanges mid (derived from high by the first change) and low vowels by changing [αlow] to [-αlow]. Thus, in the derivation of *divine* the high vowel switches places with the mid vowel of *serene* and then with the low vowel of *profane* as follows.

(39) /devi:n/ /sere:n/ /profæ:n/ Phonological Representation

ij	ej	æj	diphthongization
ej	ij	-----	[αhigh] -> [-αhigh]
æj	-----	ej	[αlow] -> [-αlow]

This vowel interchange defined a new category of sound change in English. The analysis of the Vowel Shift also allowed one to make sense of consonantal changes. For example, /k/ is replaced by /s/ before suffixes beginning with /i/: *critic*, *critic-ism*; *medic*, *medic-ine* and the trigger in *critic-ise* is a back vowel [aj] at the phonetic surface. However, if velar softening applies before Vowel Shift (to /kritik-i:z/) then the latter is not exceptional at all. The strength of SPE's theoretical and descriptive development was its analytic insights, which rest on a formally explicit methodology in which systematic alternations are derived from a common underlying form by an ordered set of rules. Chomsky and Halle (1968) successfully applied this generative method to languages like Russian, Japanese, French, and Spanish.

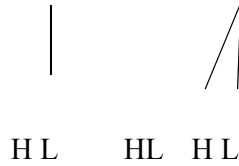
However, SPE had some weaknesses. An example is the excessive abstractness of many analyses adhering to the generative method, raising the question of how a learner could arrive at such rules and representations in the absence of knowledge of their historical antecedents. Kiparsky (1968, 1971) was of the view that abstract representations are motivated by alternations and that grammars change to states in which the underlying representations can be induced by rules that state generalizations over the surface phonetic representation. In addition, with its emphasis on formal connections among rules, the SPE model was unable to express the functional unity among diverse processes and in general, it was unclear how to formalize the notion of rules applying or blocking to satisfy a constraint (Kisseberth, 1970). Kisseberth (1970) reveals how various rules in the phonology of Yawelmani conspire to ensure that the output does not contain three successive consonants. The language lacks roots of this structure; and when stems and suffixes are combined to create CC+C or C+CC sequences, various rules come into play that either delete one of the consonants or insert a vowel. Moreover, another rule elides a vowel in the context VC__CV; it can be understood as a more general V -> Ø process that is blocked just in case its output would violate *CCC. Finally, with its emphasis on rules of sound change, the SPE model has little to say about phonotactics--static constraints on word shape that are unsuited to rules of sound change and

seem best treated as conditions on representation that outputs must respect. Therefore, in the 1980s more unified approaches were developed to address the SPE generative phonology's weaknesses such as the inadequacy of a linear representation of suprasegmental features like stress, tone, length, etc. Example was the problem of how to represent and manipulate all sounds by the rules of grammar. This gave rise to the adoption of non-linear approaches by autosegmental phonology and metrical phonology and optimality theory (The Routledge linguistic encyclopedia 2010). Autosegmental phonology (Goldsmith 1976) began as a theory of tone in which Goldsmith proposed tonal features which can be represented on a separate level (tier) that are associated with but autonomous from the segmental tier (The Routledge linguistic encyclopaedias 2010). In the SPE framework, the purely segmental representations, which do not even recognise the syllable as a unit, imply that tones are specified as features of vowels. This becomes difficult, as in some approaches, contour tones, i.e. rising and falling are regarded as sequences of pitch levels, since two successive features must be assigned to the same vowel. Furthermore, in many tone languages, particularly those of Africa, the number of tones is not always the same as the number of vowels, since more than one tone may occur on a given syllable, and tones may 'spread' to adjacent syllables, The Routledge linguistic encyclopedia (2010). These problems are addressed in the autosegmental framework where tones are not regarded as features of vowels but as separate, autonomous units that have a separate level, or tier of representation, which are related to segments by rules of association. According to Kenstowicz (2006), in this theory, there are conditions governing a well-formed association of tones and vowels such as one-to-one mapping and from left-to-right without unassociated tones or vowels deriving the surface patterns by simple rules operating in local environments as in example (40a) below. Instead, tone stability occurs; since tones are autonomous, vowels can be deleted while the tone persists on its own tier and maps to an adjacent syllable to ensure maximal association as in example (40b):

(40) a. kenya → kenya



mbu → mbu → mbu



b. wu + ari → w + ari → wari



Other phenomena such as stress, the syllable, vowel harmony (Clements, 1976) and nasalisation (Hyman 1982) cited in (The Routledge Linguistic Encyclopedia, 2010), which could not be represented in SPE were addressed in autosegmental phonology in order that phonological processes could be expressed in autosegmental terms (Clements & Keyser, 1983).

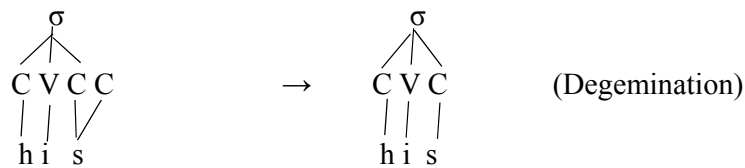
Clements & Keyser are of the view that long consonants and vowels can be represented as one feature matrix associated with two adjacent CV positions such that changes in quantity involve the addition or deletion of CV slots. Using Turkish data, these authors illustrate how the disparate changes of consonant degemination, vowel epenthesis and vowel shortening may be formalized into CVC syllables as follows;

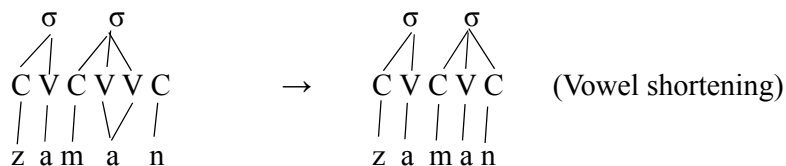
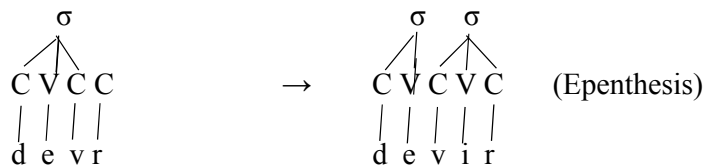
(41) **accusative** **nominative** **ablative**

hiss-i his his-ten ‘feeling’

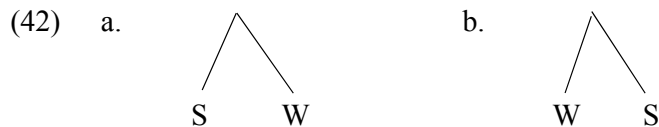
devri-i devir devir-den ‘transfer’

zaman-ı zaman zaman-dan ‘time’





Metrical phonology began as an interpretation of the stress rules of the SPE framework, in which it was shown that various stress levels could be derived from a hierarchically ordered arrangement of strong and weak nodes. However, this theory of stress was later extended to other phenomena that exhibit metrical features (Lieberman 1975; Lieberman & Prince 1977; Halle & Vergnaud 1978; Selkirk 1980; Hayes 1981; The Routledge Linguistic Encyclopedia 2010). According to Van der Hulst & Smith (1982), Fudge (1969) argued that there are two types of hierarchical organization imposed on each linguistic expression and both take segments as their starting point. The first type is the morpho-syntactic in which segments are organised into morphemes, morphemes into words, words into phrases etc. The second type is the phonological hierarchy where segments are grouped together into syllables, syllables into feet and feet into (phonological) words. Van der Hulst & Smith explain that metrical phonology in a developed stage is a theory about the nature of phonological hierarchy, its internal organization, its role in the application of phonological rules, and its relation to the morpho-syntactic hierarchy. For instance, within metrical theory, stress pattern of a word (or larger units) is represented in terms of a binary branching constituent structure where sister nodes are labelled ‘S’, which means ‘stronger than’ or ‘dominant’ and ‘W’ to mean ‘weaker than’ or ‘dependent’ as illustrated below:



In this theory, the labels ‘S’ and ‘W’ are not to be interpreted as phonological features with a fixed phonetic interpretation. These labels only show that the node S is in some way dominated with respect to the sister node W and that the ‘stronger-than’ relation is binary, asymmetrical and irreflexive. Therefore, binary trees that are labelled S/W have one and only one terminal element that is exclusively dominated by S nodes. It is this property that makes these labels so suitable to express characteristics of sound flow that are traditionally called culminative, of which stress is one such phenomenon (Van der Hulst & Smith 1982)

Other theories that also developed within the generative framework include, (1) Lexical Phonology by Mohanan 1(986). This approach develops the cyclical principles of SPE in ways that integrate phonological and morphological processes, (2) the theory of prosodic phonology (Nespor & Vogel 1986), which handles prosodic structures comprising hierarchies of prosodic units and (3) moraic phonology (Hayes 1989), which incorporates the quantitative unit of the mora in order to account for length and syllable weight.

The Routledge Linguistic Encyclopedia (2010) states that, the most recent and vibrant development in phonological theory since non-linear phonology is Optimality Theory (OT), which was proposed in the early 1990s. Although some features such as the distinction between underlying and surface representations of GP have been maintained in OT, many of the apparatus of the SPE model have been abandoned, with phonological rules replaced by constraints.

According to Kenstowicz (2006), more languages were analyzed from the autosegmental and metrical perspectives and recurrent cross-linguistic patterns were discovered. However, there was tension between descriptive coverage and theoretical economy where some linguists defended the latter at the cost of more elaborate representations and derivations (e. g., Kaye's 1990 Government Phonology), while others looked to connectionist inspired modeling of "soft" universals (e.g., Goldsmith's 1993 Harmonic Phonology), and competing principles that evaluate representations (e.g., Burzio's 1994 analysis of English metrical structure).

Therefore, to address these concerns as well as the unresolved problems from the 1970's, Prince & Smolensky (2008) introduced Optimality Theory (OT), which was a new model of phonological derivation, in which rules are abandoned and the explanatory burden is placed entirely on constraints of Universal Grammar. Kenstowicz explains further that, in OT, possible descriptive coverage is ensured by the idea that constraints conflict and can be resolved by a strict ranking. The OT model consists of two basic functions: GEN, which generates a large pool of candidate outputs for any given input, which are then EVALuated by a fixed UG set of conflicting constraints (CON). CON examines the pool of candidates and eliminates all except the correct output. Here, grammars differ in the ranking of the constraints. Kenstowicz (2006) illustrates the OT model with crosslinguistic treatment of word-final rising sonority clusters such as in the stem of *theatr-ic*. English *thea*[t' r] inserts a schwa, Canadian French *théâ*[t] deletes the liquid, while European French *théâ*[tr] remains faithful to the input. The relevant constraints appear in rule (3) and their evaluation of these candidates appears in Table (5).

Rule 3. Max-C: don't delete a consonant.

 Dep-V: don't insert a vowel.

Sonority Sequencing: a sonority peak is a syllable peak.

Table 5: Rankings of Max-C, Dep-V and Sonority Seq

thea/tr/	Max-C	Dep-V	Son Seq
thea[tər]		*	
thea[t]	*		
thea[tr]			*

According to Kenstowicz (2006), the grammar of English imposes the ranking Son Seq, Max-C >> Dep-V so that the faithful candidate *thea*[tr] and the truncating *thea*[t] are penalized in comparison to the winning candidate with epenthesis *thea*[t'ɹ] as summarized in tableau (6).

Table 6: Rankings of Max-C, Sonority Seq and over Dep-V

thea/tr/	Max-C	Son Seq	Dev-V
> thea[tər]			*
thea[t]	*!		
thea[tr]		*!	

Kenstowicz (2006).

2.4.2 Feature geometry

On the issue of how features are organized in phonological representation, Clements and Hume (1996) pointed out the weaknesses of linear theories of representation, which led to the

development of alternative, nonlinear frameworks such as feature geometry (Clements and Hume 1996; Clements 1985; Sagey 1986). According to them, in this approach, features that regularly function together as a unit in phonological rules are grouped into constituents and segments are represented in terms of hierarchically organized node configurations whose terminal nodes are feature values, and whose intermediate nodes represent constituents. They explain that, this model groups features in the manner of a Calder mobile, instead of placing features in matrices as shown below:

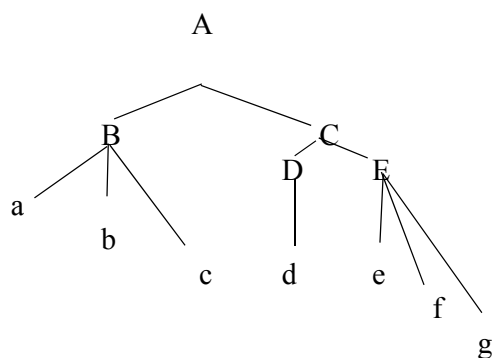


Figure 5: Feature tree of Clements and Hume 1996; Clements 1985; Sagey 1986

Clements and Hume (1996) suggest that terminal elements or feature values, which are unordered and placed on separate tiers should be placed on separate lines as in Figure 5. They argue that this organization makes it possible to express feature overlap, as in standard autosegmental phonology. In Clements and Hume's (1996) feature tree all branches emanate from a root node, (A), which corresponds to the speech sound itself while Lower-level class nodes (B, C, D, E) designate functional feature groupings.

In feature geometry, association lines have a double function. They serve first to encode patterns of temporal alignment and coordination among elements in phonological representations. They also group elements into constituents, which function as single units in phonological rules. As shown in the diagram above (Fig 5), the immediate constituents of such a grouping are sister nodes and both are daughters, or dependents, of a higher

constituent node. e.g., if D is generally a daughter of C, the presence of D in a representation will necessarily entail the presence of C. also, D and E are sisters, and daughters/dependents of C.

Based on Clements and Humes (1996) discussion from previous proposals, they concluded with a summarized feature tree, which to them showed better-established class nodes and their form of organization in consonants and vocoids as follows;

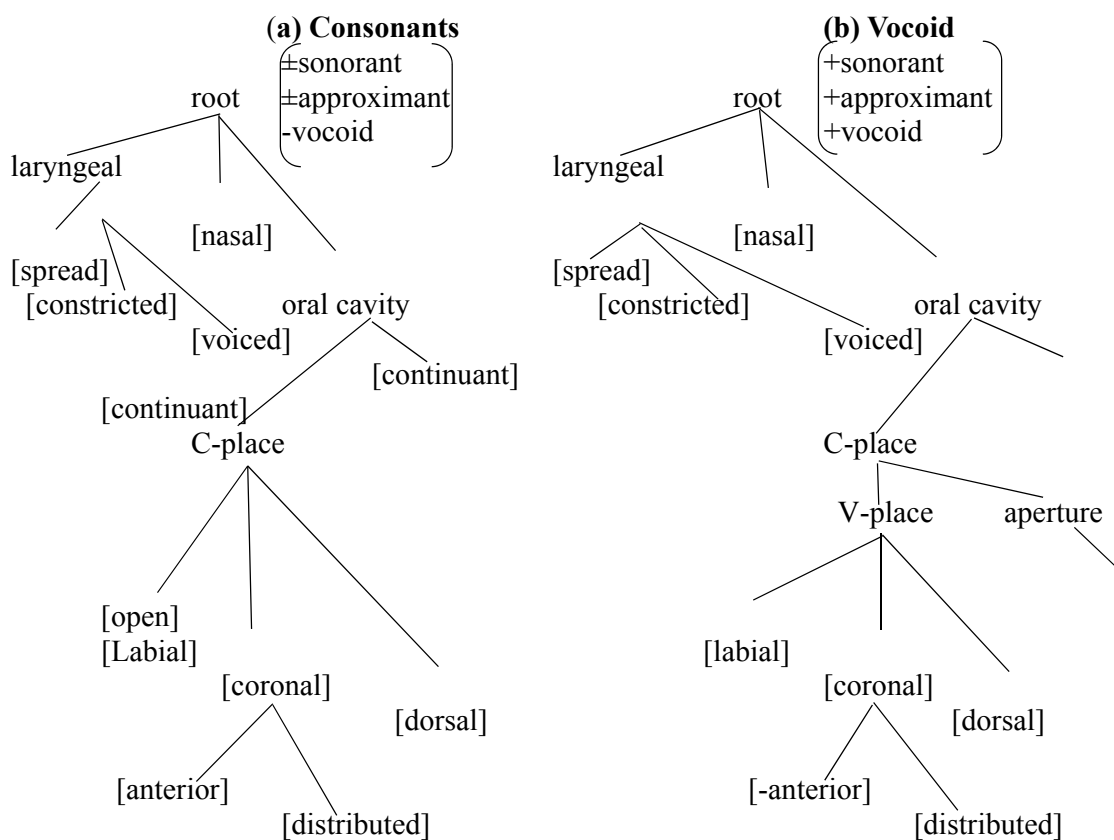


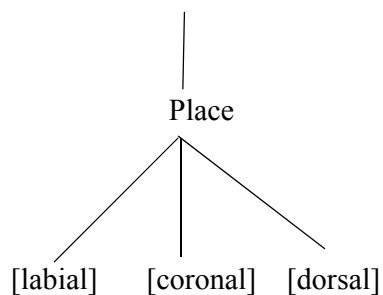
Figure 6: Feature tree of consonants and vocoids (Clements & Hume 1996)

Clements and Humes (1996) are of the view that with this tree, any particular segment can be represented with an appropriate selection of these features in its fully specified form. Therefore, any speech sound can be represented in this general form. Also, based on the universality principle, which states that the manner in which feature values are assigned to

tiers and grouped into larger constituents does not vary from language to language, Clements and Humes (1996) suggest that this mode of organization holds for all segment types in all languages. However, Clements and Humes proposal differs from the earliest ones in that they have not included a supralaryngeal node.

In this approach, nodes have been used as labels for individual and group features. Thus, Ewen and Van der Hulst (2001) use class nodes as labels for groups of features and content nodes as labels for individual features. Content nodes have been described as single-valued features, which express privative opposition – they are either present or absent. Here, each of the nodes that characterises the features is dominated by articulatory or place node which like other class nodes, is a single-valued ‘feature’. Therefore in example (43) below, each of the nodes characterizing the features [labial], [coronal], [dorsal] (the primary articulators) is dominated by the articulatory or place node (Ewen & Van der Hulst (2001) as follows:

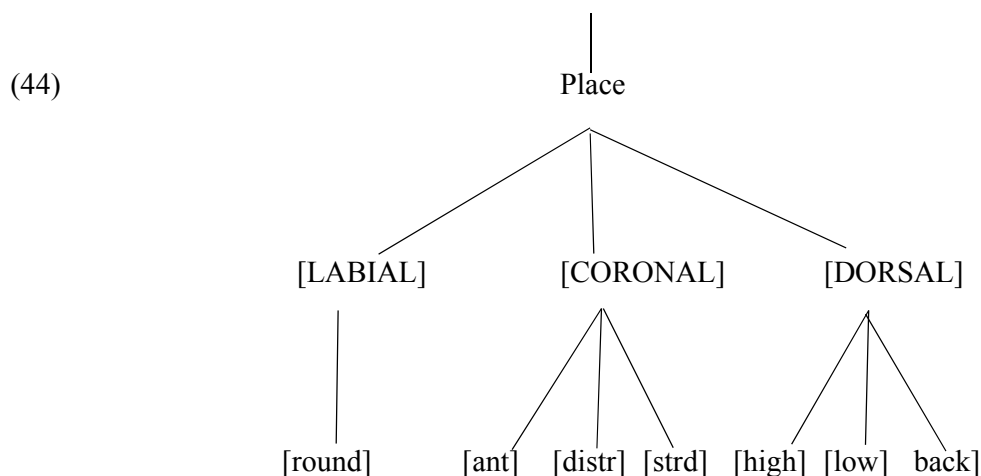
(43)



This is a demonstration that a consonant is either [labial], [coronal] or [dorsal] and that these consonants do not usually have more than one place of articulation. Therefore, the relationship between these three primary nodes is one of mutual exclusivity and each of the features is single-valued while the class node which is Place is multivalued with three possible values [labial], [coronal] and [dorsal]. Because the three values are mutually exclusive, they are in a disjunctive relationship: only one value of Place can be chosen. These content nodes ([labial], [coronal] and [dorsal]) may also dominate other nodes in feature geometry (Ewen & Van der Hulst, 2001). Here, the notion is that certain features are only

relevant if other features are present. For instance, a feature such as [anterior], is only relevant to segments which are [coronal] because, if a consonant is not [coronal], then the question of whether it is [+anterior] or [-anterior] simply does not arise.

Again, if a consonant is not [dorsal], its value for [high], [low] and [back] are irrelevant (if the body of the tongue is not involved in the production of a consonant, then its position does not need to be stated). Similarly, [strident] and [distributed] are restricted to [coronal] consonants, and [round] restricted to labials. This notion of certain features only being relevant due to the presence of other features can be represented in feature geometry as follows:



Example (44) above shows that [round] is said to be a dependent on [LABIAL], while [anterior], [distributed] and [strident], are dependents of [CORONAL].

From the discussion, it has been observed that in feature geometry, the relationships between features is that between the class node (Place) and its dependents which are intermediate nodes ([LABIAL], [CORONAL] and [DORSAL]), and that between the intermediate nodes and their dependents, terminal features which are both (content nodes). Also, the presence of a lower node is dependent on the presence of a higher node which dominates it and while the

class nodes are multivalued, content nodes are single-valued or privative and the terminal features are binary that carry either a '+' or '-' value.

2.4.3 The mora theory

Mora theory was proposed for the characterisation of syllable weight in which syllables are divided into 'weight units' or moras such that light syllables contain only one mora while heavy syllables contain at least two moras (Hyman 1984, 1985; Hayes 1989). In this theory, a language may classify CVC syllables as light while syllables with geminate codas (CVC) are classified as heavy. The main generalisation of mora theory is that:

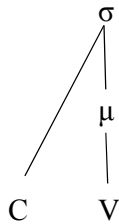
(45) a. Heavy syllables consist of two morae b. Light syllables consist of one mora.

In mora theory of the syllable structure, there is usually a split after the vowel unlike the onset-rhyme theory where the split is before the vowel of the syllable. Ewen and Van der Hulst (2001) explain that though, within the onset-rhyme theory, the syllable is made up of an onset and a rhyme, and the rhyme, of a nucleus and a coda, this division of the syllable into immediate constituents is a weakness in the onset-rhyme approach to syllable structure. This is especially when it comes to the distinction between heavy and light syllables, which involves either the branching of nucleus or branching of the rhyme, rather than being given some uniform interpretation. Hence, the proposal of mora theory for the characterisation of syllable weight. In this theory, syllables are not divided into immediate constituents called onset and rhyme, but into 'weight units' or moras. Here, light syllables contain only one mora (monomoraic) while heavy syllables contain at least two (bimoraic). Thus in mora theory, each mora dominates one segment which contributes to the weight of a syllable. For example, in the treatment of CVC syllables as heavy in a rhyme-weight language, distinct moras are assigned to the vowel and the final consonant while onset consonant will not be assigned a mora because initial consonants do not contribute to the weight of a syllable.

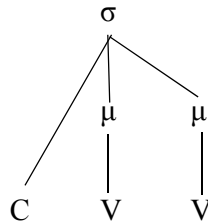
Following Hayes (1989), Ewen and Van der Hulst (2001) present the difference between light and heavy syllables in rhyme-weight languages in mora theory, with the assumption that initial consonants are extramoraic as follows:

(46) **Rhyme-weight languages**

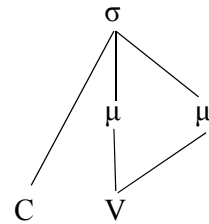
a. light



b. heavy



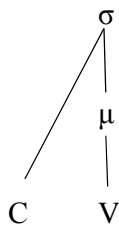
c. heavy



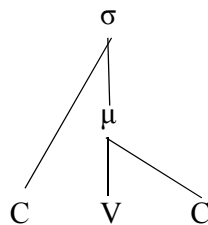
With the above representation, Ewen and Van der Hulst assume that long vowels have a single V specification associated with two moras, as shown in the CVV syllable (46c) while diphthongs have two Vs, each associated with a mora. However, in a nucleus-weight language, where CVC syllables are light (monomoraic), the final consonant does not associate with a separate mora as shown in (47):

(47) **Nucleus-weight languages**

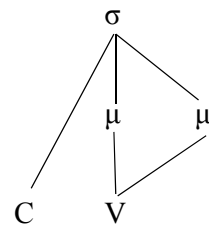
a. light



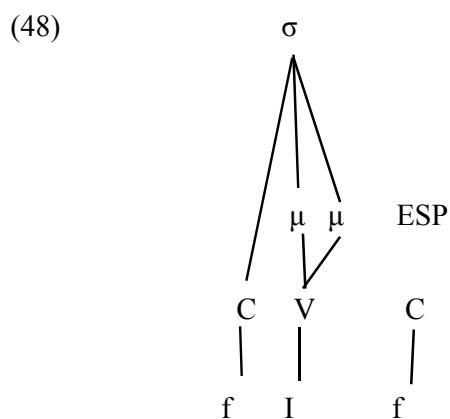
b. light



c. heavy



In addition, overlong syllables can be represented as trimoraic with the assumption that the second consonant is extrasyllabic. This phenomenon can be given a natural representation using compensatory lengthening in mora theory, which involves the deletion of a consonant between a vowel and another consonant. However, Ewen and Van der Hulst (2001) point out that compensatory lengthening is more difficult to express in onset-rhyme theory than in mora theory. Example (48) is when a postvocalic nasal is deleted before a fricative as in the form: **fimf* ‘five’, which changed to **fif* in the Proto-Germanic language. Here, the process involves delinking of the nasal and the C node from the mora node, with reattachment of the mora node to the V node as follows (Ewen and Van der Hulst, 2001:153);

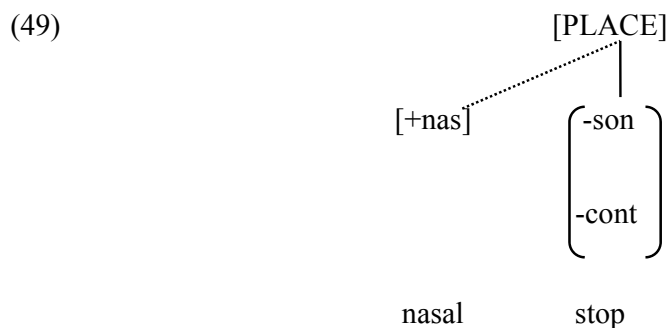


In mora theory, more general problems like the representation of segmental length in both consonants and vowels (germinates) can be accounted for by incorporating skeletal positions in syllabic representation.

2.4.4 Autosegmental phonology

Using non-linear autosegmental approach by (Goldsmith 1976, 1990; Clements 1977), assimilatory processes such as nasal assimilation and Vowel harmony can be accounted for. For instance, in homorganic nasal assimilation, where the nasal precedes a consonant, a process of spreading is required for it to be specified for place of articulation from the consonant, i.e. it does not have an independent set of features characterizing place, it ‘shares’

its place features with the following consonant. Thus, using these conventions of non-linear autosegmental approach, a possible formulation by Ewen Van der Hulst (2001) is represented as follows:



In this formulation, the two consonants share a single specification for place of articulation with the direction of the assimilation in dashed line (left) to show the features of the place gesture that are associated with the stop spreads from the top to the nasal. The place feature is an example of one set of features that operates *independently* from the other features. With respect to the place features in (49), there is only one specification – a single autosegment, while for all other features, there are two specifications, thus two segments. Hence, autosegmental phonology is concerned with the characterisation of cases where two segments share the same specification for a feature or group of features (Ewen & Van der Hulst, 2001: 30-31).

Also, in vowel harmony, a phonological process which involves two vowels showing agreement in the values for a particular feature, can be represented within a model using feature spreading. For instance, using the feature [ATR] within the domain of a word in a

language, all vowels in a word must have the same value for a particular feature [\pm ATR]. These vowel harmony phenomena have provided a fertile source of exemplification for the proponents of autosegmental phonology (Ewen & Van der Hulst 2001: 46). Therefore, assimilatory processes such as nasal assimilation, place assimilation, voicing and vowel harmony will be analysed using autosegmental phonology.

2.5 Summary

This chapter reviewed relevant literature on three areas. The first being literature reviewed on studies that have been conducted on the phonology of Gur languages of Ghana. The second part of the literature reviewed was on some dialects of the Farefari language, while the third part reviewed literature on some theoretical issues and some discussions on phonological features.

One study that is closely related and relevant to the current study is Hudu's (2010) ultrasound investigation of Dagbani Tongue-root Harmony, which revealed that the dominant [+ATR] feature in Dagbani corresponds to a distinct anterior position of the tongue-root when compared to a neutral position. Hudu also found out that [+ATR] harmony takes place regardless of the relative distance of the trigger from the target, and that [+ATR] harmony affects vowels of all height specifications, including the low vowel.

Akanlig-Pare's (1994 & 2005) are also very relevant to the current study. Akanlig-Pare (1994) looked at some major aspects of Buli phonology and among the results was, only five consonants /b, m, n, k, ŋ/ in Buli may occur in syllable coda while all 23 occur in the onset position and that Buli has no consonant clusters within the syllable. While Akanlig-Pare (2005), which examined tone and its interface with the morpho-syntax of Buli using autosegmental phonology and lexical phonology, claims Buli has three-tones - High, Mid and Low.

The discussions on overview of some theories and theoretical framework revealed that phonological features are either binary in nature with two values represented as plus or minus ([±]) or unary, where they are simply present or absent without a [±] value. These features are normally grouped based on the natural classes of the segments, which they describe and each feature usually has an articulatory characteristic and an acoustic correlate. Therefore, feature geometry (section 2.4.2), the mora theory (section 2.4.3), autosegmental phonology and distinctive features such as the major class features, laryngeal features, manner features and place features will be relevant to the present study. In addition to the above mentioned theories, the literature that have been reviewed in sections 2.1 and 2.2 on Gur phonology and the Farefari language will be relevant to the description and classification of segmental and suprasegmental phonemes, as well as phonological processes in Gurene.

CHAPTER THREE

THE SOUNDS OF GUREŃ

3.0 Introduction

This chapter gives a phonetic description and classification of the GureŃ sounds using distinctive features like the major class features, laryngeal features, manner features and place features. The chapter also discusses the distribution of GureŃ sounds in relation to the syllable, vowel sequencing and diphthongs.

3.1 Consonants of GureŃ

All the consonants in GureŃ can occupy the onset position while only the nasal consonants [m], [n] and [ŋ] and the glottal stop occupy the coda position. This is a confirmation of previous findings (e.g. Dakubu 1996; Atintono 2011).

GureŃ has twenty-two consonant phonemes, which comprise eighteen simple consonants - /b, d, f, g, k, l, m, n, p, t, v, y, z, ʔ, w, s, ŋ, / and four complex consonants, /kp, gb, ŋm/ and a prenasalised labial velar sound, /nw/, and three consonant allophone [y], [h], and [r]. The places and manners of articulation of GureŃ consonant phonemes are discussed in the next section.

3.1.1 Phonetic description of GureŃ consonants

GureŃ has nine plosives of which five are voiceless while four are voiced. Apart from the glottal stop /ʔ/, all four of the voiceless plosives /p, t, k, kp/ have their voiced counterpart /b, d, g, gb/ respectively. All these plosives can occur in onset position as C in CV syllable structure. The following are examples illustrating the plosives of GureŃ.

3.1.1.1 Gurene plosives

(50) Voiceless	voiced
/p/ [pɛ̀] ‘to swear’	/b/ [bì] ‘to be cooked’
/t/ [tɛ̀] ‘to sieve’	/d/ [dì] ‘to eat’
/k/ [kɛ̀] ‘to cut’	/g/ [gà] ‘to dig’
/kp/ [kpà] ‘to hit a peg into the ground’	/gb/ [gbì] ‘to break down a wall’
/ʔ/ [ʔɛ̀] ‘to search’	

3.1.1.2 Nasals

There are six nasal consonants in Gurene, all of which can occur in onset position as C in CV syllable structure. Gurene nasals include a bilabial /m/, alveolar /n/, palatal /ɲ/, velar /ŋ/ and two labiovelars /nw/ and /ɲm/. The following examples of minimal pairs show Gurene nasal consonants.

(51) /m/ [mɛ̀] ‘to build’
 [nɛ̀] ‘to step on something’

/n/ [ní] ‘to rain’
 [mí] ‘to know’

/ŋ/ [pɛ̀ŋó] ‘straw fan’
 [pɛ̀nó] ‘straw fans’

/ɲ/ [ɲɔ̀] ‘to burn’
 [bɔ̀] ‘to give’

/nw/	[nwáni]	‘what’
	[nàni]	‘better than’
/ɲm/	[ɲmè]	‘to beat’
	[tè]	‘to sieve’

However, in Gurene, the bilabial nasal /m/ can also be used as a first person pronoun with its alveolar and velar nasal variants /n/ and /ɲ/ depending on the environment in which it occurs. They can form a C syllable structure as illustrated in the examples below;

(52)	/m/	m-má	‘my mother’
	/n/	n-sóh	‘my father’
	/ɲ/	ɲ-kðmá	‘my children’

3.1.1.3 Fricatives

Gurene has six fricatives, three are voiceless and three voiced. The voiceless fricatives are /f, s, h/, whereas the voiced fricatives are /v, z, ʝ/. The following are minimal pairs to show phonemic structure of the fricatives;

(53)	/f/	[fɔ]	‘you’	/v/	[vi]	‘shame’
		[yò]	‘to close a door’		[yi]	‘to call a person’
	/s/	[sígè]	‘get down’	/z/	[zð]	‘friend’
		[lígè]	‘to faint’		[fð]	‘to be blind’
	/ʝ/	[liyóm]	‘tickle’			
		[liróm]	‘be messy’			
	/h/	[há]	‘there’			
		[sá]	‘there’			

3.1.1.4 Approximant

The examples in (54), (55) and (56) show that Gurene has two glides /j, w/ and two Liquids, which are made of a lateral /l/ and a trill /r/ respectively. The glides and liquids form the class of approximant. Therefore, we have the lateral approximants /l/ and the central approximants (semivowels) /j, w/, and a trill /r/. All the glides and liquids can occur in onset position (C).

Glide

- (54) /j/ [jɔ] ‘to pay’
[kɔ] ‘to break’

/w/ [wa] ‘will’
[da] ‘to buy’

Lateral

- (55) /l/ [lu] ‘fall’
[gu] ‘to block’

Trill

- (56) /r/ [fɔrɛ] ‘to wear’
[fɔkɛ] ‘to remove’

3.1.1.5 Pre-nasalised labial velar

We have observed that the Gurene has a prenasalised labial-velar consonant /nw/, which is an approximant. i.e., in Gurene, the labial-velar approximant can be prenasalised. This prenasalised labial-velar approximant occurs syllable initial position only. Even though, the prenasalised consonant does not end with a plosive, its articulation begins with a nasal and changes in constriction halfway through. Therefore, I classify this sound as a prenasalised

approximant and not a stop based on the fact that it begins with a nasal and ends in approximant.

However, its occurrence is limited as words in which it occurs are few in the language. The following are minimal pairs showing the occurrence of this consonant.

- (57) /nw/ [nwana] ‘reason for an action’
 [kpana] ‘chief linguist’
 [nwani] ‘what’
 [ɲani] ‘be better than’
 [nwaŋa] ‘deaf’
 [zaŋa] ‘empty’
 [nwɔnɛ] ‘resemblance’
 [mɔnɛ] ‘type of snake’

3.1.1.6 Double articulation and Affricates in Gurenɛ

Double articulated sounds in Gurenɛ include the labial-velar plosives [kp] and [gb], the labial-velar nasal [ɲm], the labial-velar approximant [w] and the prenasalised labial-velar [nw] as shown in the examples below;

- (58) /kp/ [kpa] ‘to hit a peg into the ground’
 [ta] ‘to join’
 /gb/ [gba] ‘to close buttons’
 [da] ‘to buy’
 /ɲm/ [ɲma] ‘to cut’
 [kpa] ‘to hit a peg into the ground’
 /w/ [wa] ‘to dance’
 [pa] ‘to slap’

/nw/ [nwana] 'reason for an action'

[kpana] 'chief linguist'

Although, **Affricates** are not found in Gurene words, Nankani has the voiceless palato-alveolar affricate [tʃ] and its voiced counterpart [dʒ] as shown in the following examples;

59. /tʃ/ [tʃɔ] 'father'

/dʒ/ [dʒɔ] 'friend'

3.1.1.7 Word-level distribution

Again, in Gurene there are instances where sounds occur in context to the exclusion of other sounds. That is, they occur in context in which the other sounds never occur. For instance, in Gurene words, the sounds [w, ɲ, ŋm, kp, nw] all occur in word initial only, while [ŋ, ɣ, r] occur in word medial only. Examples are in table (7) as follows:

Table 7: Distribution of Gurenɛ consonants at Word-level

Consonant	Word-initial	Word-medial	Word- final
/b/	[ba] ‘they’	[bobɛgɛ] ‘tie firmly’	
/d/	[di] ‘eat’	[bɔdɑ:] ‘man’	
/f/	[fɔ] ‘you’	[safɔlɔfɔ] ‘lungs’	
/g/	[gu] ‘block sth’	[kugərə] ‘stone’	
/k/	[ki] ‘millet’	[kinkirəgɔ] ‘dwarf’	
/l/	[la] ‘laugh’	[laləgɑ] ‘bridge’	
/m/	[ma] ‘mother’	[pɔmpɪ] ‘borehole’	[kaam] ‘oil’
/n/	[ni] ‘rain’	[dindɪŋɔ] ‘millipede’	
/p/	[pɔ] ‘swear’	[pɔmpɪɑ] ‘one cedi’	
/s/	[sɔ] ‘father’	[sɔsəgɑ] ‘chat’	
/t/	[tɪ] ‘that’	[yɛntɑɑ] ‘rival’	
/v/	[vi] ‘shame’		
/j/	[jɛ] ‘wear’	[jɪjɪɑ] ‘spinster’	
/z/	[zɔ] ‘run’	[zunzɛrɛ] ‘caterpillar’	
/ɲ/	[ɲɔ] ‘burn’	[jɪɲɔm] ‘complain’	
/gb/	[gbi] ‘break a wall’		
/ɲm/	[ɲmɛ] ‘beat’		
/ʔ/	[ʔɛ] ‘to search’	[veʔɛ] ‘to pull’	[zeʔ] ‘standing’
/nw/	[nwani] ‘how much’		
/r/		[lorəgɛ] ‘untie’	
/ɲ/		[ɲmaɲgɑ] ‘monkey’	
/ɣ/		[dɛɣɔrɔ] ‘dirt’	
/h/	[hɑɛ] ‘yellow’	[jɛhɛ] ‘go out’	
/w/	[wa] ‘to dance’		
/kp/	[kpa] ‘to peg on ground’		

Table (7) shows that [v, w, ɲ, ŋm, kp, gb, nw] do not occur in any other position but only word initial and can be said to be in non-contrastive distribution with the sounds [ɲ, ɣ, r] which never occur in word initial and final positions but in word medial only and in intervocalic position. However, only the glottal stop [ʔ] and the bilabial nasal [m] can occur in all three contexts (word initial, medial and final positions). Hence, [w, ɲ, ŋm, kp, gb, nw] and [r, ɲ, ɣ, v] can be said to be defectively distributed in Gurene since they occur in only one context – word initial position and word medial position respectively. This is based on the Post-Bloomfieldian statement of **defective distribution** that, ‘in the contexts where a given phoneme does not occur, the phoneme is defectively distributed’ (Bloomfield, 1887-1949 cited in The Routledge Linguistics Encyclopedia, 2009). Therefore, apart from [r, ɲ, ɣ], all other consonants can occur word-initial in Gurene. Table (8) shows Gurene consonant phonemes with their place of articulation on the horizontal axis and manner of articulation on the vertical axis.

Table 8: Gurene consonants phonemes

		Bilabial	Labio Dental	Den tal	Alveolar	Palate Alveolar	Palatal	Velar	Labia- velar	Glottal
Stops	voice- less	/p/ pa 'slap'			/t/ ta 'join'			/k/ ka 'Negat ive'	/kp/ kpa 'to nail'	/ʔ/
	voiced	/b/ ba 'they'			/d/ da 'buy'			/g/ ga 'dig'	/gb/ gba 'to button'	
Affric	Voice- less					/tʃ/ tʃɔ 'father' (Nankani)				
	voiced					/dʒ/ dʒɔ 'friend' (Nankani)				
Frica	Voice- less		/f/ fara 'greeting'		/s/ sa					/h/ halt 'even'
	voiced		/v/ va 'hit'		/z/ za 'scoop'					[ʏ] pɔya 'wife'
Nasal		/m/ ma 'mother'			/n/ na 'here'		/ɲ/ nyɛ 'to see'	/ŋ/ lɲa 'lid'	/ŋm/ ŋma 'cut'	
Appr	lateral				/l/ la 'laugh'					
	central				/r/ bure 'break'		/j/ ja 'you- PL'		/w/ wa 'dance'	
Pre- nasal								/nw/ nwaŋa 'deaf'		

3.1.1.8 Syllable closure and consonant clustering

In Gurene, when two or more consonants occur together – whether in onset or coda position, the clusters will be considered defectively distributed. Even though Gurene does not permit syllable closure and consonant clusters, these phenomena may result from phonological processes such as vowel weakening and deletion. For instance, the examples in (60) show

that in the underlying form all vowels in each syllable/word have equal strength and so every vowel is written as articulated in slow speech.

	Underlying form	gloss
(60)	a. /pɔ́sɪgá/	‘the act of starting’
	b. /tubɪgá/	‘dragon fly’
	c. /yɔ́lɪgɔ́/	‘hundred Ghana cedis’
	d. /tarɪmá/	‘weak person’
	e. /pugɪmá/	‘careless’
	f. /fɛrɪmá/	‘messy’
	g. /limɪsɪgɔ́/	‘the act of spying’
	i. /walɪsɪgɔ́/	‘the act of trying’
	j. /pɪgɪsɪgɔ́/	‘to pick every leave from its plant’

However, in fast speech, the middle vowels usually become weak or unstressed and the result is a schwa as in example (61):

Vowel weakening		
(61)	a. [pɔ́səgá]	‘the act of starting’
	b. [tubəgá]	‘type of insect’
	c. [yɔ́ləgɔ́]	‘hundred Ghana cedis’
	d. [tarəmə]	‘weak person’
	e. [pugəmə]	‘careless’
	f. [fɛrəmə]	‘messy’
	g. [liməsəgɔ́]	‘the act of spying’
	h. [waləsəgɔ́]	‘the act of trying’
	i. [pɪgəsəgɔ́]	‘pick every leave from its plant’

The examples in (62) are three syllable words. The vowel of the middle syllable, which is the weak vowel (schwa) deletes. This causes the consonants of the middle syllables, which was in the onset of the second syllable to shift into the coda position of the first or preceding syllable as follows:

		Deletion/output form	gloss
(62)	a.	[pɔs.ga]	‘the act of starting’
	b.	[tub.ga]	‘type of insect’
	c.	[yɔl.gɔ]	‘hundred Ghana cedis’
	d.	[tar.ma]	‘weakling’
	e.	[pug.ma]	‘useless’
	f.	[fɛr.ma]	‘messy’

In (63), just like (62) the vowel of the middle syllable deletes and the consonant shifts into the coda position of the first syllable. The only difference between examples of (62) and (63) is that words in (63) are derivatives of four syllable words, which result in coda clusters while (62), has simple codas. The following are examples showing coda clusters in Gurene:

(63)	a.	[lims.go]	‘the act of spying’
	b.	[wals.gɔ]	‘the act of trying’
	c.	[pɪgs.gɔ]	‘pick every leave from its plant’
	d.	[lɔgs.gɔ]	‘to make one angry’
	e.	[sɛ̃gs.gɔ]	‘the act of undressing’
	f.	[dems.go]	‘the act of straightening’

3.1.1.9 Allophones and free variation in Gurenɛ

Unlike phonemes, the occurrence of allophones is always predictable. This is because in a particular context it is only one realization of the phoneme that is expected. Example is the realisation of the English aspirated plosive /p^h/ when it occurs in the initial position of stressed syllable as in the word *pill* and the unaspirated plosive /p/ when it occurs in a non-initial position of the syllable as well as in an unstressed syllable as in *spill*.

In Gurenɛ the voiced velar stop /g/ can be realized as a velar fricative [ɣ] when it occurs in intervocalic environment of [-ATR] vowels. In other words, when /g/ occurs in the environment of [-ATR] vowels, its form changes from a velar voiced stop to the velar voiced fricative [ɣ]. This synchronic weakening process affects the non-initial, intervocalic obstruent /g/. A rule for this process can be formulated as follows:

Rule 3. /g/ → [ɣ]/ V[-ATR] ——— [-ATR]

(64) buɣɛ → [buɣɛ] ‘to beat a person’

 pɔɣa → [pɔɣa] ‘wife’

 baɣa → [baɣa] ‘idols’

 baɣɛ → [baɣɛ] ‘to adorn’

 dɛɣɛɾɔ → [dɛɣɛɾɔ] ‘dirt’

 taɣɛɾa [taɣɛɾa] ‘sandals’

 lɔɣɛɾɔ [lɔɣɛɾɔ] ‘luggage’

However, when it occurs with [+ATR] vowels, its form does not change. Therefore, [ɣ] is an allophone of /g/. The following examples illustrate the occurrence of the velar stop in the environment of [+ATR] vowels.

- (65) lige [lige] ‘to fill up’
 dige [dige] ‘to drive away’
 sige [sige] ‘to descend’
 fulege [fuləge] ‘to take a piece’
 pilege [piləge] ‘to uncover’
 lobege [lobəge] ‘to throw’
 lebege [lebəge] ‘to turn’

Some consonants also occur in free variation in Gureɲ. Examples are the pairs of consonants [d & r], [s & h] and [f & h]. These pairs of consonants may occur in free variation because when one consonant in a pair substitutes for the other in the same context in a word, it only alters the pronunciation of the words but it does not bring about a change in meaning as demonstrated in the following examples:

- (66) /d/ → [bɔda:] ← ‘man’
 /r/ → [bɔra:]
- (67) /s/ → [pesəgo] ← ‘sheep’
 /h/ → [pehego]
- (68) /f/ → [yefo] ← ‘horse’
 /h/ → [yeho]

However, the alternation of these pairs of sounds [d & r], [s & h] and [f & h] as free variants may be viewed as the result of a weakening rule such that for instance, it is only in intervocalic position and in some words that /d/ changes to [r] (/d/ → [r]). It is not every /r/ that is considered as basic and the same applies to the derivations of /s/ → [h] and /f/ → [h]. Hence, the occurrence of [r] and [h] in non-initial position are derived sounds and for that matter allophones.

The rule to express the above process is shown in the below;

Rule 4: /f, s/ → [h]/ V _____ V

As stated above, when /f/ and /s/ occur intervocallically, they are realised as [h]. I therefore suggest that there are three allophones in Gurenɛ. These are [r], [h] and [ɣ].

Table 9: Summary of Gurenɛ consonant phonemes

	bilabial	labiodental	alveolar	palatal	velar	Labia- velar	glottal
Plosive	p b		t d		k g	kp gb	ʔ
Nasal		m		n	ɲ	ɲm	
Fricative		f v	s z	[ɣ]			[h]
Approximant				j		w	
Lateral			l				
Trill			[r]				
Prenasalised						nw	

3.2. Gurenɛ Vowels

3.2.1 Short vowels

Gurenɛ has nine short oral vowels and each of these vowels has a long counterpart. Therefore, vowel length can be said to be phonemic or contrastive in Gurenɛ. The examples below are minimal pairs showing short vowels vs. long vowels;

(69) Short oral vowels	Long oral vowels
/i/ [ni] 'rain'	/i:/ [ni:] 'cows'
/ʌ/ [tʌ] 'that'	/ʌ:/ [tʌ:] 'support with sticks'
/e/ [pe] 'wash'	/e:/ [pe:] 'wash'
/ɛ/ [kɛ] 'to cut'	/ɛ:/ [kɛ:] 'to charge a fee'
/a/ [ba] 'they'	/a:/ [ba:] 'dog'
/u/ [du] 'be close'	/u:/ [du:] 'rub'
/ɔ/ [bɔ] 'wonder about'	/ɔ:/ [bɔ:] 'dull'
/o/ [yo] 'emphasis'	/o:/ [yo:] 'ok'
/ɔ/ [sɔ] 'bath'	/ɔ:/ [sɔ:] 'broom'

3.2.2 Oral vowels vs. nasal vowels

There are seven nasal vowels in Gurene and nasality is phonemic. This confirms previous findings (Dakubu 1996; Schaefer 1975; Nsoh 1997 & 2011; Atintono 2011 & 2013; Ababila 2006 and Adongo 2008). This is shown in the examples below;

(70) Oral vowel	nasal vowels
/i/ [ti] 'that'	/ĩ/ [tĩ] 'to vomit'
/ʌ/ [gʌ] 'hold with teeth'	/ĩ/ [gĩ] 'hold something with hands'
/ɛ/ [kɛ] 'cut'	/ɛ̃/ [kɛ̃] 'enter'
/u/ [gu] 'block s'thing'	/ũ/ [gũ] 'weighty'
/ɔ/ [to] 'carry'	/õ/ [tõ] 'tear'

/ɔ/ [kɔ] ‘break’

/ɔ̃/ [kɔ̃] ‘serve TZ’

/a/ [ba] ‘they’

/ã/ [bã] ‘ride’

However, all the nine oral vowels including /o/ can be nasalized when they occur in the environment of nasal consonants. Therefore, I argue that Gureɛ has seven nasal vowels as in example (70) above, but nine nasalized vowels as in (71):

(71) **Gureɛ nasalised vowels**

/i/	[sĩm]	‘bees’
/ʌ/	[tĩnsɔŋã]	‘heaven’
/e/	[bẽnto]	‘bean leaves’
/ɛ/	[lẽm]	‘be close’
/u/	[mũm]	‘close’
/ʊ/	[tõntonã]	‘worker’
/o/	[zõnko]	‘hair’
/ɔ/	[yõm]	‘to complain’
/a/	[nãŋã]	‘scorpion’

In the examples above, we observe vowel nasalization. The data in (71) show that vowel nasalisation can be progressive or regressive. This is conditioned by the syllable structure such that in closed syllables where the coda is the nasal consonant, spreading of the nasal feature is regressive. However, in open syllables, spreading of the nasal feature is rightward or progressive. For example, in [kũm] ‘death’ and [zõnko] ‘hair’, the vowel gets its nasal feature from the coda while in [nãŋã] ‘scorpion’, and [nẽŋã] ‘face’ the onset spreads its nasal feature on the vowel.

3.2.3 Nasal vowels and length

Just as all nine short oral vowels have their long counterparts, all the short nasal vowels have their long counterparts too as follows;

(72)	Short nasal vowels		Long nasal vowels	
	/ĩ/	tĩ ‘to vomit’	/ĩ:/	tĩ:ro ‘vomit’
	/ĩ/	gĩ ‘hold something’	/ĩ:/	gĩ:m ‘mix’
	/ē/	kē ‘enter’	/ē:/	kē: ‘dry up’
	/ũ/	gũ ‘weighty’	/ũ:/	gũ:re ‘ants’
	/õ/	tõ ‘tear’	/õ:/	tõ:ra ‘cont. tearing’
	/õ/	kõ ‘serve TZ’	/õ:/	kõ:sɛ ‘scrape’
	/ã/	bã ‘ride’	/ã:/	bã:rɛ ‘granary’

3.2.4 The schwa

The schwa is a derived allophone in Gurenɛ. Any vowel that occurs in word-medial position, is realised as a schwa and so, it does not contrast with other vowels. The following are examples that show the occurrence of schwa in Gurenɛ;

(73)	/i/	/limisigo/	[liməsəgo]	‘the act of spying’
	/ɪ/	/walɪstɔ/	[waləsəɔ]	‘struggle’
	/e/	/selege/	[seləge]	‘cut/slice’
	/ɛ/	/yagɛbɛ/	[yagəbɛ]	‘mould with clay’
	/a/	/laharɛ/	[lahərə]	‘Sunday’
	/u/	/kurugo/	[kurəgo]	‘iron/metal’
	/o/	/yɔlɔɔ/	[yɔləɔ]	‘hundred’
	/o/	/akologo/	[akoləgo]	‘a name’
	/ɔ/	/pɔɔlɔm/	[pɔyəlɔm]	‘to sustain injury’

3.2.5 Vowel harmony

Vowel harmony is a type of assimilation in which all vowels usually in the domain of the word, agree in a particular feature. Vowel harmony systems include backness, rounding, vowel height, and advanced or retracted tongue root harmony (Gussenhoven and Jacobs, 2005). The type of vowel harmony that operates in Gurene is Advanced/Retracted Tongue Root [\pm ATR] harmony (see section 5.1 for detailed discussion). [\pm ATR] has been observed to be contrastive in Gurene vowels. Thus, [+ATR] vowels contrast with [-ATR] vowels as shown in example (74).

(74)	[+ATR]		[-ATR]			
	/i/	[pire]	‘to wear’	/ɪ/	[pɪɛ]	‘be full’
	/e/	[weke]	‘to hatch’	/ɛ/	[wekɛ]	‘break into two’
	/u/	[bure]	‘break into pieces’	/ʊ/	[buɾɛ]	‘sow’
	/o/	[loko]	‘quiver’	/ɔ/	[bɔkɔ]	‘shoulder’
	/a/	[laka]	‘palate’			

3.2.6 Vowel sequences

Vowel sequences in Gurene can be classified under CVV in which we have sequences of two vowels occurring in a word. Vowel sequences of the CVV structure include /eo/, /uo/, /ia/, /ia/, /ɛa/, /ɔa/, /ua/, /ʊɔ/, /ɪɔ/, /ɔa/. In example (75), the vowel sequences are of two types - /eo/ and /uo/. While in (75a), we observe a gliding from the front mid to the back mid region of the tongue, in (75b), the gliding starts with a high back vowel to a mid back vowel.

3.2.6.1 CVV sequence

(75)		Singular		plural	
	(a)	/eo/	[de-o]	[de-to]	‘room’

	[zangbe-o]	[zangbe-to]	‘Huasa person’	
	[paye-o]	[paye-to]	‘nonresident’	
(b)	/uo/	[fu-o]	[fu-to]	‘dress’
		[zu-o]	[zu-to]	‘head’
		[topu-o]	[topuu-ro]	‘fruits of the baobab tree’
		[tintu-o]	tintuu-ro	‘shrubby’
		[kusoləpu-o]	[kusoləpuu-ro]	‘type of lizard’

These sounds are considered as vowel sequences and not diphthong because they can be modified. For instance, all the words in (75) are in their singular forms. These forms consist of the root and the singular marker (the final vowel), which must delete when the root takes a plural marker.

Another set of vowel sequences are /ia/ and /ɪa/ as shown in examples in (76). These sequences of vowels begin with a [+front, +high] vowel and end with a [+back, +low] vowel. The difference between these two is, while the vowels in (76a) consist of initial vowel of [+ATR] and a [-ATR] vowel, which is transparent and co-occurs with vowels of [+ATR], the sequence in (76b) are [-ATR].

(76)	a.	/ia/	pia	‘ten’
			bia	‘child’
			tia	‘tree’
			ania	‘a personal name’
			dɔvia	‘leaves of dawadawa tree’
	b.	/ɪa/	via	‘name of a town’
			yia	‘first’
			sia	‘waist’

- lia 'axe'
 c. /ɛa/ goyɛa 'hunter'

However, in (76c), the sequence of vowels involves gliding from [+front, +mid] to [+back, +low]. The last set of CVV vowel sequences are those, which all have the quality [+back] as shown in (77). While the sequence of vowels in (77a) involve gliding from high to low, (b) glides from high to mid and (c) from mid to low.

- (77) a. /ua/ mōã 'native of Moshi'
 nambuã 'moom'
 gũa 'type of tree'
 bunvuã 'a living thing'
 fũa 'blind person'
 dajũa 'son'
 võõ 'living'
- b. /uɔ/ mōõ 'grass'
- c. /ɔa/ sɔa 'bathing'
- d. /ɔ/ dindĩ 'millipede'

In (77d) however, we have a sequence of front high vowel and a back mid vowel.

3.2.6.2 CV:V sequence

There is also another form of CVV vowel sequence in Gureɛ that consists of a long followed by another vowel of a different quality, which gives us the structure CV:V. The only difference between examples (76 & 77) and (78) is that the words in example (78) contain long vowels even though long vowels do not form a sequence as shown in the following examples;

- (78) /i:e/ [ni:e] 'be angry'

/u:ɛ/ [yu:ɛ] ‘to delay’

/o:ɛ/ [yo:ɛ] ‘pour out’

/ɪ:a/ [yɪ:a] ‘first’

/i:a/ [mi:a] ‘a type of straw’

/o:ɛ/ [to:ɛ] ‘to finish up weeding’

/a:ɛ/ [na:ɛ] ‘to complete sthing’

3.2.6.3 Sound weakening

Sound weakening refers to the phonological changes that lead to deletion of a segment. According to Trask (2000), phonological weakening, which is synonymous to lenition is any phonological change in which a segment becomes less consonant-like than previously. In Gurene, phonological weakening is a process that leads to the deletion of some segments in words. This process results in yet another vowel sequence of of the type VV in syllables like CVV.

In example (79), the words have a sequence of two vowels with a structure of CVV, which have evolved over the years from two syllable words of the structure CV:CV. This phenomenon has occurred over a period. As such, younger generation speakers seem not to use the CV:CV forms. With older generation, it is in few cases that they use these forms for emphasis. The underlying forms are said to have gone through a process of vowel reduction and consonant deletion. In the first syllable, which has a long vowel, the second vowel deletes, thereby reducing the long vowel into a short one. Also, the onset of the second syllable deletes while the final vowel remains. Hence, the bisyllabic word has been reduced to a monosyllabic word and the initial consonant serves as the onset to the vowel of the first syllable and that of the second syllable. The derived forms then end up with a structure similar to diphthongs, and which actually sound like diphthongs but these are not. What is observed in this data is gliding of the long vowels as indicated by Jenner (1995), who says,

‘... one may predict that in diphthong-rich languages most long vowels will ultimately tend to glide while languages with a low incidence of diphthongs will ultimately be entirely free from diphthongs’. The following are examples:

(79)	Underlying form	derived form
	/ue/ /tuuge/	→ [tue] ‘miss a way’
	/vuuge/	→ [vue] ‘pull’
	/duuge/	→ [due] ‘rub’
	/puuge/	→ [pue] ‘put down- horizontally’
	/oe/ /sooge/	→ [soe] ‘take over’
	/booge/	→ [boe] ‘dissolve’
	/wooge/	→ [woe] ‘wrap a cloth round the waist’
	/fooge/	→ [foe] ‘remove’
	/looge/	→ [loe] ‘pick from the lot’
	/iε/ /nugε/	→ [niε] ‘brightern’
	/tugε/	→ [tiε] ‘support s’thing to stand upright’
	/sugε/	→ [siε] ‘remove skin of s’thing’
	/ɔε/ /yɔɔgε/	→ [yɔε] ‘hold loosely with a twine’
	/zɔɔgε/	→ [zɔε] ‘
	/yʊʊgε/	→ [yʊε] ‘pour out liquid from a bottle’

The occurrence of /g/ after a long vowel suggests that /g/ is a suffixal consonant. Hence, what is observed in the above data is a process of suffixal consonant deletion, which results in the sequence of vowels. The examples in (79) shows that the voiced, velar, stop deletes in the

intervocalic position for the sequence of vowels to be derived. Hence, a rule for suffixal consonant deletion is as follows:

Suffixal consonant deletion:

Rule 5: /g/ → Ø/ V — V

3.2.6.4 Ideophones

The last type of vowel sequences in Gurene are found in ideophones. Some ideophones in Gurene have sequences of vowels that are diphthong-like as shown in the following examples;

- (80) /oi/ [woi] [loi] [toi]
/ɔɔ/ [fɔɔ]
/ai/ [lai] [kai] [wai] [fai] [tai]
/ɔi/ [mɔi] [sɔi] [tɔi] [pɔi] [bɔi] [vɔi]

3.2.7 Diphthongs

Though diphthongs are a relatively rare phenomenon in human language (Jenner 1995), they have been attested in languages such as British English, American English, Scottish English etc. Studies in some Gur languages of Ghana show that Dagbani does not have diphthongs. For instance, M-minibo (2014) indicates that Dagbani has ‘*CV + diphthong type*’ of syllable which are found in only verbs as in (81) and not nouns as shown in (82), or the other word classes. He also indicates that words of the ‘*CV + Diphthong Type*’ have the same meaning, as words of CVV type and for that matter, those of verbs are allophones as shown in (81):

(81) **VERBS**

- daa = daai [da:i] ‘to push’
 - vaa = vaai [va:i] ‘to gather and collect from the floor’
 - duu = duui [du:i] ‘to light fire’
- ʃee [ʃe:] = ʃeei [ʃe:i] ‘to get down from a height’ (M-minibo 2014)

(82) **NOUNS**

- noo [no:] ‘hen’ *nooi
- ʃee [ʃe:] ‘a waste’ *ʃeei [ʃe:i] (M-minibo 2014)

His argument against diphthongs in Dagbani is because when these ‘diphthong like’ sounds occur before a pronoun or a focus marker, they change to long vowels and when they occur before nouns in an NP or AdjP, the second vowel is deleted as in the examples below;

- (83) a. bua [bua] ‘a goat’ buu la ‘the goat’ *bua la
- b. tia [tia] ‘a tree’ tii la ‘the tree’ *tia la
- c. tua [tua] ‘a baobab tree’ tuu maa *tua maa
- d. bua [bua] ‘goat’ bu zee *buu zee

(M-minibo, 2014)

However, diphthongs are observed in Dagaare (Rhodes, 2010.) Rhodes indicates that in Dagaare, the high portion of the diphthong agrees with surrounding vowels for [ATR] as in the examples below;

- (84) a. nimie ‘eyes’

b. pɛlɔŋ 'whiteness'

Cahill (1993) also demonstrated that apparent vowel sequences in Kɔnni are diphthongs, which are derived from long mid vowels as shown in the following examples;

- (85)
- a. $ee \rightarrow [ie]$ bítíeéŋ 'beard'
 - b. $εε \rightarrow [ɪa, εa, ɪε]$ chéàŋ 'waist'
 - c. $oo \rightarrow [uo]$ jùóŋ 'room'
 - d. $ɔɔ \rightarrow [oɑ, oɑ]$ dòáŋ 'bush-pig'

(Cahill, 1993)

As to what constitutes a diphthong, various definitions have been given. From the phonetics perspective, a diphthong is a linear unit typically anchored in a short stretch of speech by a set of phonetic feature-values, which are relatively unchanging. The segment is a construct of phonetic theory, which relies here on a related concept of three different phases of articulation of any segment, (Laver, 1994) cited in (Jenner, 1995). These three phases are subsequently defined as the medial phase, where the maximum degree of vocal tract constriction is achieved, and this is preceded by an onset phase and followed by an offset phase. This latter shows the movement of the organs towards the medial phase of the next segment. Hence, this constitutes an overlapping phase with the onset phase of that next segment (Laver, 1994 cited in Jenner, 1995). According to Jenner, elsewhere, Laver applied this 3-phase analysis to monophthongs and diphthongs, and suggests that monophthongs show "a relatively unchanging quality through the medial phase", whereas diphthongs are characterized by a "unidirectional change" in this phase of articulation (Laver 1994 cited in Jenner 1995).

Jenner (1995) gives a phonological definition of a diphthong as "a double articulation vowel which belongs to a single phonological syllable". Giegerich (1992) also defines diphthongs based on phonemic contrast. This definition is based on his observation on the phonemes of British English that all phonemes may be grouped in contrasting pairs except the three true diphthongs /aʊ/, /aʊ/ and /ɔʊ/. He identifies the pairs as /i:/ - /ɪ/, /u:/ - /ʊ/, /e:/ - /ɛ/, /ɑ:/ - /ɒ/ (/æ/), /o:/ - /ʌ/, /ɔ:/ - /ɒ/ and argues that this may apply in American English with a similar process found in Scottish where the inventory is reduced by a symmetrical absence of a long-short opposition as in /u:/ - /ʊ/, /ɑ:/ - /ɒ/ just like in the American /ɔ:/ - /ɒ/. Although studies show that diphthongs are a relatively rare phenomenon in human language (see Jenner 1995), they have been attested in some Gur languages like Dagaare and Konni.

3.2.7.1 Evidence in favour of Gurene Diphthongs

Going by the phonetic definition of diphthongs by Laver (1994), the articulation of Gurene monophthongs does not show any change both in short and long vowels. Neither does the articulation of the long vowels show gliding (cf. 3.2.1). Rather, it is vowel sequences that show gliding as shown in words with the structure CV:V; [yɪ:ja], [yʊ:wɛ], [ni:je], and CVV; [pija], [vi:ja], [li:ja], [si:ja]. However, the articulation of the sequences of vowels, which I argue to be diphthongs in Gurene first of all involves a systematic movement from one vowel quality to another as presented below;

- (86)
- | | | | | |
|------|------|---------|----------------|-----------------|
| i. | /oi/ | [boi] | ‘present’ | |
| ii. | /aʊ/ | [faʊ] | ‘unperturbed’ | [waʊ] ‘nothing’ |
| iii. | /ui/ | [mui] | ‘rice’ | |
| iv. | /ĩɔ/ | [sĩɔ] | ‘rainy season’ | |
| v. | /ɔʊ/ | [yopɔʊ] | ‘seven’ | [sɔʊ] ‘to own’ |

vi. /ɔa/ [ɲɔa] ‘nose’

vii. /ɛa/ [zɛa] ‘millet’ [kɛa] ‘malt used in brewing pito’

viii. /ua/ [pɔɛn] ‘inside’

Second, these vowels are not contrastive with vowel sequences. Thus, substituting them with the vowel sequences results in incorrect words. In addition, the articulation of these sequences of vowels does not show vowel lengthening or gliding. Instead, they show a "unidirectional change" (Laver, 1994). Also, the phonological definition applies in the data above. This is because these sequences of vowels can be said to possess the characteristics of double articulation and belong to a single syllable (Jenner, 1995). Thus, using the phoneme inventory to test for diphthongs in Gurene, we state that there is opposition between short and long vowels (cf. 3.2.1), which may be grouped into contrasting pairs with the exception of the various sequences of vowels. In other words, diphthongs do not form a pair with other vowels. Therefore, we claim that Gurene has true or default diphthongs, which can be distinguished from monophthongs and other sequences of vowels, as well as with those that tend to glide.

Other arguments in support of the existence of true diphthongs in Gurene include the fact that when one of the sequences of the vowels in each word is deleted, it renders the whole word meaningless and also because these forms cannot be broken into smaller morphemes and do not take any other morpheme such as the plural marker. With the eight types of diphthong as shown in (86), we have demonstrated that Gurene does not only have true or default diphthongs but is a diphthong-rich language.

3.2.8 Vowel distribution – syllable level

In Gurene, all the nine vowels can occur in open syllables and in closed syllables even though these are rare. Also, there are eight diphthongs in Gurene, which occur mostly in open

syllables. Like all other languages, all the vowels of Gureɛ occupy the nucleus position in CV and CVC syllable types and three of the vowels /a/, /ĩ/, /e or ɛ/ can occur as isolated vowel syllables V. The examples that follow show the occurrence of Gureɛ vowels in open syllables and closed syllables:

(87) Open syllables	closed syllables
/i/ [di] ‘eat’	[gĩm] ‘to tie s’thing’
/ʊ/ [gi] ‘holg with teeth’	[gĩ:m] ‘mix’
/e/ [gee] ‘and’	[dẽ:m] ‘room’
/ɛ/ [kɛ] ‘enter’	[kẽmstɪ] ‘roofing sheet’
/a/ [da] ‘buy’	[dãm] ‘stir’
/u/ [gu] ‘block’	[kũŋkura] ‘blows’
/o/ [to] ‘carry’	[tõntona] ‘worker’
/o/ [yoko] ‘hole’	[zõm] ‘flour’
/ɔ/ [yɔ] ‘pay’	[dõm] ‘grow lean’
/oi/ [boi] ‘present’	
/aɪ/ [faɪ] ‘unperturbed’	
/ui/ [mui] ‘rice’	
/ĩɔ/ [sĩɔ] ‘rainy season’	
/ɔʊ/ [sɔʊ] ‘to own’	
/ɔa/ [ɲɔa] ‘nose’	
/ɛa/ [zɛa] ‘millet’	
/ua/ [pʊɛn] ‘inside’	

3.2.9 Isolated vowel syllables

In Gurenɛ, the third person singular subject pronoun /a/ and the third person singular object pronoun [i] (represented orthographically as /e/) can occur as isolated vowel syllables. Another vowel that may occur as isolated vowel syllable is /e/ and its allophonic variant /ɛ/ ‘search’. These two occur in free variation. /a/ also functions as a personalising prefix. Like Buli, when /a/ is prefixed to a noun, verb or an adjective, that word turns into a personal name (cf. Akanlig-Pare, 1994:38). In other words, when a name of any kind or phrase is prefixed with /a/ it changes to a personal name as illustrated in (88) as follows,

- (88)
- | | | | | | | | |
|------|--------|---|---------|---|---------------|---|---------------|
| i. | a | + | di | → | adii | | |
| | prefix | | eat | | personal name | | |
| ii. | a | + | tia | → | atia | | |
| | prefix | | tree | | personal name | | |
| iii. | a | + | vea | → | avea | | |
| | prefix | | a town | | personal name | | |
| iv. | a | + | babila | → | ababila | | |
| | prefix | | puppy | → | personal name | | |
| v. | a | + | tintono | → | atintono | | |
| | prefix | | ground | | personal name | | |
| vi. | a | + | nyɛ | + | ele | → | anyɛele |
| | prefix | | see | | marry | | personal name |

Table 10: Gureɛ Vowel phonemes

	Front	Central	Back
High	i		u ui
	ɪ ɪɔ		ʊ ʊɛ
Mid	e		o oi
	ɛ ɛa		ɔ ɔɪ ɔa
Low		a aɪ	

3.3 Distinctive feature analysis of Gureɛ sounds

This section discusses Gureɛ sounds using distinctive features (see section 2.3.1). Major class features, laryngeal features, manner features and place features are relevant to the description and classification of the consonants and vowels of Gureɛ. It is a well-known fact that segments are composed of phonological features, which are grouped based on the natural classes of the segments they describe. Each feature usually has an articulatory characteristic and its acoustic correlate. While some distinctive features are binary, which means each feature has two values represented as plus or minus, others are univalent (unary, single-valued or privative). These features are ever present and so do not need to have the plus or minus values (Kenstowicz, 1994:19; Jakobson et al., 1951; Chomsky and Halle, 1968; Ewen & Van der Hulst, 2001). With univalent features, reference can be made to the class of segments that has the feature, and not to the group of segments that does not have it. Example is the feature [LABIAL] that allows us to make reference to the group of labial segments but not non-labial segments (Gussenhoven & Jacobs 2005).

3.3.1 Major-class features

Major class features are used to classify large natural classes of segments such as sonorants, obstruents, approximants and consonants. Together with manner features, major class features also define other natural classes of segments like stops and fricatives (Hall 2007). In addition, major class features define the opposition between these segment types. Example is the

opposition between vowels, glides, liquids, nasals and obstruents (Gussenhoven & Jacobs 2011:11; Kenstowicz 1976:242).

3.3.1.1 [±syllabic]

[±syllabic] feature defines sounds that form the nucleus of the syllable. Therefore, Gurene vowels and syllabic nasals are [+syllabic] since they form the nucleus of the syllable in the language while obstruents are [-syllabic].

3.3.1.2 [±consonantal]

“[+cons] segments have a constriction somewhere along the centre

line in the vocal tract which is at least as narrow as that required

for a fricative; [-cons] segments lack such a constriction” (Jakobson et

al. 1952; Chomsky and Halle 1968; Gussenhoven & Jacobs 2011:75).

The feature [+consonantal] groups together liquids, nasals, and obstruents in contrast with vowels and glides (Kenstowicz 1976:243). Therefore, in Gurene [+cons] sounds include plosives, affricates, fricatives, nasals, and liquids /l, r/, while [-cons] are vowels and glides since their stricture is in the larynx instead of the vocal tract.

3.3.1.3 [±sonorant]

[±sonorant] feature is used to distinguish obstruents as [-son]) from sonorant consonants and vowels which are [+son]. [+son] segments are produced with a constriction in the vocal tract which allows free flow of air, while in the production of [-son] segments, the stricture involved disrupts airflow such that voicing is inhibited (Gussenhoven & Jacobs 2011:75; Kenstowicz 1994:36). Hence, all Gurene vowels, glides, liquids and nasals are [+son] segments whereas [-son] segments consist of plosives, fricatives, affricates and laryngeal segments (glottal segments /h, ʔ/; the vocal tract does not include the larynx).

3.3.1.4 [±approximant]

[+approx] segments have a constriction in the vocal tract, which allows a free flow of air. This is because they do not make a sufficiently narrow stricture and where they do, it is not held enough to inhibit spontaneous voicing, but it is not so for [-approx] segments (Clements 1989; Gussenhoven & Jacobs 2011:77; Kenstowicz 1994). Gussenhoven & Jacobs classify vowels and non-nasal sonorants, like [l, ɾ, ʌ] as [+approx] segments. In Gurene [+approx.] segments are /l, r, j, w/ while all other segments are [-approx].

3.3.2 Laryngeal features

We use laryngeal features to specify the glottal properties or the glottal states of segments. Like the major class features, there are three laryngeal features [±voice], [±spread glottis] and [±constricted glottis].

3.3.2.1 [±voice]

[+voice] sounds are produced when the vocal folds are close enough together to allow vibration, while the vibration of the vocal cords does not occur in the articulation of [-voice] sounds. All vowels in Gurene and sonorant consonants and voiced obstruents are [+voice] while voiceless obstruents are [-voice] sounds.

3.3.2.2 [±spread glottis]

According to Halle and Stevens (1971) cited in Hall (2007) “spread sounds are produced by a displacement of the arytenoid cartilages that create a wide glottal opening, while nonspread sounds are produced without this gesture.” In other words, [+spread] segments have a vocal cord configuration that produces audible friction in the glottis, while [-spread] segments lack such a configuration (Gussenhoven & Jacobs 2011:78). Example of [+spread] sounds include both aspirated and breathy voiced segments. Therefore, in Gurene, the voiceless glottal fricative [h] is considered a [+spread] segment whereas all other segments are [-spread].

3.3.2.3 [±constricted glottis]

In the articulation of [+constr] sounds, the vocal cords are usually tense and drawn together while articulation of [-constr] segments does not involve this process. Example of [+constr] sound in Gurene is the voiceless glottal stop [ʔ] while all other sounds are [-constr].

3.3.3 Manner features

Manner features are used to define the type of constriction, or manner of articulation of segments. The manner features used to describe Gurene consonants include, [±continuant], [±nasal], [±strident] and [±lateral].

3.3.3.1 [±continuant]

“[+cont] segments lack a central occlusion in the vocal tract, while [-cont] segments are produced with such an occlusion” (Gussenhoven & Jacobs 2011:79). Thus, in Gurene vowels, glides and fricatives are [+cont] while plosives, nasal consonants, and lateral are [-cont].

3.3.3.2 [±nasal]

[+nasal] segments are articulated with the velum or soft palate lowered to allow air escape through the nose. Examples of [+nas] sounds in Gurene include the nasal consonants /m, n, ŋ, ŋm, nw/, and seven nasal vowels /ĩ, ɪ̃, ẽ, ã, õ, õ̃, ù/. All other segments are [-nasal] because their articulation involves a velic closure or the raising of the velum to shut off the nasal cavity while allowing the air escape through the oral cavity and out of the mouth.

3.3.3.3 [±strident]

According to Gussenhoven & Jacobs, this feature refers to a type of friction relevant for obstruents only, such that [+strident] segments cause a noisier kind of friction than [-strident]

segments. Therefore, the Gurene labiodental fricatives /f, v/ and alveolar fricatives /s, z/ are all [+strident], while all other consonants are [-strident].

3.3.3.4 [±lateral]

[+lat] segments have a central tongue contact in the oral cavity with one or both sides of the tongue being held away from the roof of the mouth, allowing the air to escape in that area. (Gussenhoven & Jacobs 2011:80). Gurene has /l/ as [+lat] sound while all other sounds are [-lat].

3.3.4 Place features

While major class features, laryngeal features and manner features are binary in nature and used to specify the major classes, the state of the glottis and the manner of articulation of consonants respectively, place features are used to define the major areas of articulation in the vocal tract - the place of articulation for consonants and the tongue position for vowels. These features are univalent or unary and include [LABIAL], [CORONAL], [DORSAL] and [RADICAL]. However, binary place features have been proposed to subcategorise segments within a major articulator area. For instance, [LABIAL] sounds are further specified for the feature [±round] while [CORONAL] segments are further specified for [±anterior], [±distributed] and [±strident] for coronal fricatives and affricates (Gussenhoven & Jacobs 2011:82-83).

3.3.4.1 [LABIAL]

The feature [labial] is used to characterise the class of labial segments. i.e., sounds that have the lips involved in their articulation. Gurene labial consonants include the bilabials /p, b, m/ and the labiodentals /f, v/ and the labial velars [gb, kp, w, mw, ŋm].

[±round]: The feature [±round] is used to specify segments that are articulated with the help of the lips, i.e. Segments that are [labial] may be specified for [±round]. Hence, segments whose articulation does not involve the lips are neither [+round] nor [-round]. This is because they do not have specification for that feature (Gussenhoven & Jacobs 2011). The feature [±round] is also used to distinguish between plain and labialized labials. For instance, the plain labials /p b/ are [-round] while their labialized counterparts /p^w, b^w/ are [+round] (Hall 2007). In Gurene [+round] segments, which involve lip rounding include the back rounded vowels /u, ʊ o, ɔ/, the labial velar sound /w/ and the prenasal labial velar consonant /nw/. While all other vowels and consonants are [-round] since their articulation does not require lip rounding.

3.3.4.2 CORONAL

[CORONAL] sounds are those articulated with the front part of the tongue, which include articulations involving the tip, the blade, and the forward part of the body of the tongue that typically forms a constriction under the hard palate (Clements and Hume 1995 cited in Hall 2007). The places of articulation considered as coronal are dental, alveolar, retroflex, palatoalveolar and palatal. Therefore, the feature coronal classifies natural classes of sounds such as /t, d, n, l, r, y, ð, s, z, ʃ, ʒ, ʒ, dʒ/ (Hall 2007). [CORONAL] segments are further specified for the features [±anterior] and [±distributed] as follows.

[±anterior]: all labial consonants /p, b, m, f, v/ plus the alveolar consonants /t, s, n, s, z, r, l/ are considered as [+ant] segments in Gurene due to the fact that the crown of the tongue articulates with the alveolar ridge or somewhere further forward. However in the production of [-ant] segments, the crown articulates with a point behind the alveolar ridge. These include prepalatal or postalveolar and retroflex consonants like [ʃ, ʒ, c, j]. Gurene does not have [-ant] sounds.

[±distributed]: [±distributed] feature distinguishes laminal (tongue-blade articulated), dental and non-retroflex segments as [+distr] from apical (tongue-tip) and retroflex segments as [-distr] (cf. Ewen & Van der Hulst 2001:24; Gussenhoven & Jacobs 2011:83). Gurene does not have sounds that specify for [+distr] feature. However, [-distr] sounds in Gurene include /t, d, n, s, z/.

[±strident]: “the feature [±strident], distinguishes the class of sibilant fricatives ([+strident]) from non-sibilant fricatives ([-strident]) based on the relative amount of ‘high-frequency noise’ involved” (Van der Hulst & Ewen 2001:24). Thus, sibilant fricatives are produced with a very narrow vocal tract and usually with a grooved tongue that result in a relatively high-frequency noise. In contrast are non-sibilant fricatives, which are produced with a lower-pitched/frequency noise. Since, the feature [strident] is not defined in terms of place here but only used to subcategorise coronal fricatives, the Gurene coronal sibilants /s, z/ and the labiodentals /f, v/ are classified as [+strident] sounds.

3.3.4.3 DORSAL

[DORSAL] sounds are articulated with a bunched dorsum or tongue body. Features that relate to the tongue dorsum are used to distinguish vowels (i.e. front vs. back, and high vs. mid vs. low), and for the velar vs. uvular contrast among consonants (Hall 2007). Examples of [DORSAL] sounds include all vowels, velars and uvulars. [DORSAL] segments are further specified for a set of features that specify just where the bunch of the tongue body is located, these are called TONGUE BODY FEATURES and they include [±high], [±low], [±back], [±tense], and [±ATR] (Gussenhoven & Jacobs 2011).

[±high]: sounds considered [+high] in Gurene are /i, ɪ, u, ʊ/ and /k, g, ŋ/ based on Gussenhoven & Jacobs’ definition that these sounds are produced with the dorsum raised to a

position close to the roof of the mouth, while the production of [-high] sounds does not involve a raised dorsum. [-high] sounds in Gurene include the vowels /e, ε, a, ɔ, o/.

[±low]: Gurene [+low] segments include [ε, a, ɔ], because they are articulated with a bunched dorsum low in the mouth whereas [-low] segments include all high vowels and the mid vowels /e, ε, o, ɔ/

[±back]: Gussenhoven & Jacobs (2011), describe [+back] segments as those whose articulation involves the bunch of the tongue positioned in the centre or further back, whereas in the articulation of [-back] segments the bunch is in the front. Based on this definition, [+back] segments in Gurene consist of the vowels /u, ʊ, o, ɔ/ and velar consonants /k, g, ŋ/ while all other segments are [-back]

[± Advanced Tongue Root (ATR)]: the feature [±Advanced Tongue Root (ATR)] is used to divide vowels into two harmony sets, one specified for [+ATR] and the other [-ATR]. While in the articulation of [+ATR] vowels the tongue root is advanced, in [-ATR] vowels the tongue root is retracted. [+ATR] sounds in Gurene include /i, e, o, u/ whereas [-ATR] sounds are /ɪ, ε, a, ɔ, ʊ/.

Table 11 gives feature specifications of 25 Gurene consonants. Binary features are specified as + or - and the presence of a unary feature is indicated by √. While table 12 presents the feature matrix for Gurene vowels as follows;

Table11: Feature matrix for Gurene consonants

	p	b	t	d	k	g	kp	gb	ʔ	m	n	ɲ	ŋm	nw	f	v	s	z	h	ɣ	j	l	r	w	
cons	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	-	
son	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+	+
approx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+
cont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-	+	+
nasal	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-
lateral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-
voice	-	+	-	+	-	+	-	+	+	+	+	+	+	+	+	-	+	-	+	-	+	+	+	+	+
spread	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
LAB	√	√					√	√		√			√		√	√								√	
COR			√								√						√				√	√	√		
distr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-
ant	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	+	-
strid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-
DOR					√	√	√	√					√							√				√	
high	-	-	-	-	+	+	+	+	-	-	-	+	+	-	-	-	-	-	-	+	+	-	-	+	
back	-	-	-	-	+	+	-	-	-	-	-	-	+	-	-	-	-	-	+	+	-	+	-	+	

Table12: Feature matrix for Gurene vowels

	i	ĩ	i:	ɪ	ĩ	ɪ:	e	e:	ɛ	ẽ	ɛ:	a	ã	a:	ɔ	õ	ɔ:	o	o:	ɔ	õ	ɔ:	u	ũ	u:
son	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
cons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
syll	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
long	-	-	+	-	-	+	-	+	-	-	+	-	-	+	-	-	+	-	+	-	-	+	-	-	+
high	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+
back	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
low	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
voice	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ATR	+	+	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	+	+	+
round	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+
back	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
cont	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
nasal	-	+	-	-	+	-	-	-	-	+	-	-	+	-	-	+	-	-	-	-	+	-	-	+	-

3.5 Conclusion

Chapter 3 describes the sounds of Gurene. It was observed that Gurene has twenty-two consonant, which comprise eighteen simple consonants, four complex consonants and three allophones. However, there are sixteen vowels, which consist of nine oral and seven nasal vowels. All the nine oral vowels can be nasalised. Hence, nasality and length are phonemic. Any consonant in Gurene can fill the onset position and any simple vowel, diphthongs and syllabic nasals occupy the nucleus position, while only the bilabial nasal /m/, alveolar /n/,

velar nasal /ŋ/ and the glottal stop /ʔ/ fill the Coda position. There is also a schwa, which is a derived allophone of any vowel that occurs in word medial position (weak vowel). I have argued that Gureɛ has true or default diphthongs as well as vowel sequences, which can be classified under CVV, CV:V syllable structure types. Distinctive features such as the major class features, laryngeal features, manner features and place features, which are relevant to Gureɛ sounds, were used to describe and classify the consonants and vowels of Gureɛ.

CHAPTER FOUR

THE SYLLABLE

4.0 Introduction

This chapter discusses Gurene syllable structure. First, we present an overview and classification of Gurene syllables. Second, we describe the syllable types using moraic representation based on their weight. In addition, we give a moraic representation of Geminate and diphthongs in Gurene. This chapter also gives an autosegmental account of syllable structure processes in Gurene.

4.1 An Overview

In generative phonology, the syllable has been referred to as a prosodic unit and its importance for linguistics theory has increased since the 1970s (Venneman 1974; Hopper 1976; Kahn 1976 cited in Fery, 2003). Blevins (1996) states that the syllable can be viewed as the structural units which show melodic organization to such strings based on the inherent sonority of phonological segments, where the sonority of a sound is roughly defined as its loudness relative to other sounds produced with the same input energy. This melodic organization of phonological strings into syllables results in a characteristic sonority profile where segments are organized into rising and falling sonority sequences, with each sonority peak defining a unique syllable. Blevins (1996) identified four syllable types in prosodic morphology as maximal syllable, light (monomoraic) syllable; heavy (bimoraic) syllable; and core (CV) syllable. Hence, the syllable generally refers to a phonological unit, which organizes segmental melodies into sequences according to their sonority values. The structural element can be stressed or unstressed.

Kager (1999) summarises the functions of the syllable as a major ingredient of phonological generalisations, and in defining phonotactic patterns (well-formed sequences of segments). It governs patterns of epenthesis and deletion, supplies a level of prosodic organization between segments and higher prosodic units. The syllable is also used in the demarcation of morpheme edges as well as in defining the position and shape of affixes. At the segmental level, examples are processes like glottalisation and aspiration of voiceless stops in coda or onset of syllables respectively in English, where connection of the syllables with segments is obvious. However, at higher prosodic levels, the shapes of the syllable in most languages determine the syllables that are most likely to be stressed. In other words, heavy syllables tend to be stressed, while light syllables are not.

Blevins (1996) has presented four arguments in support of the syllable as a phonological constituent. First, drawing examples on pharyngealisation from Arabic and Berber dialects, she argues that the syllable is a phonological constituent because phonological processes and/or constraints take the syllable as their domain of application and that such rules and constraints are sensitive to a domain that is larger than the segment, smaller than the word, and contains exactly one sonority peak. Phonological properties that take the syllable as their domain include stress and tone both at the phonetic level where they are typically realized on multi-segmental strings (Firth, 1948; Pike, 1962; Beckman, 1986) and at the phonological level, where in many languages placement of predictable stress or tone requires “skipping” C_0 VC_0 sequences. The second argument for the syllable as phonological constituent is the existence of phonological rules that apply at syllable edges, such that in all languages, word or utterance edges correspond to syllable edges or refer to the syllable. An example is aspiration, which is often associated with syllable boundaries as in English, where syllable-initial obstruents are aspirated (Kahn, 1976; Sommer, 1981 cited in Blevins, 1996). Thirdly, Blevins points out that, syllables can function as targets of language games or as prosodic

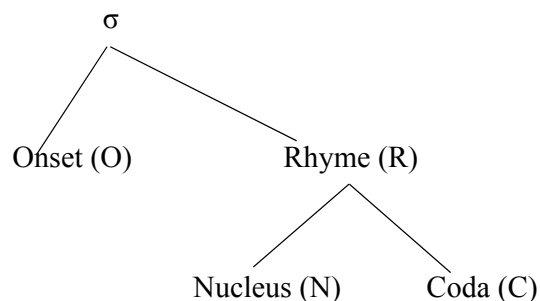
targets in morphological processes. For instance, many language games that have been described with reference to the syllable include White's (1955) where /-ti/ is suffixed to each syllable of the word and Laycock's (1972) survey of language games which notes at least twenty cases where the syllable is the target of affixation, truncation, substitution, or movement. Blevins explains further that syllables are also the prosodic targets of morphological processes like reduplication, which involves affixation of a bare prosodic template to a base, where those of the base determine the segmental properties of the template. The final argument Blevins made in support of the syllable, as a phonological constituent is native speakers intuition. She explains that in many languages, native speakers have clear intuitions as to how many syllables are in a word or utterance and where syllable breaks occur and that if phonology is in part the study of the mental representations of sound structure, then such intuitions support the view of the syllable as a plausible phonological constituent.

From the above discussion, it is realized that the syllable plays an important role in phonological analysis. This is because it is the domain for the application of phonological processes. Also, word or utterance edges correspond to syllable edges or make reference to the syllable in all languages. In addition, the syllable functions as a target of language games and morphological processes and in defining positions and shapes of affixes among others.

Clements & Kayser, (1983) state that segments are not immediately associated to their syllables, but are dominated by structural positions, known as skeletal slots that encode segment duration. Consonants and vowels that are associated to single slots are short, while long vowels and geminate consonants are represented as being doubly linked to two slots. They assume that the syllable margin which is onset or coda can be represented by a C while the syllable peak represented by a V and that the CV slots are dominated by the syllable

nodes, where each syllable is represented as σ . The following is an example of a CVC syllable with a hierarchical branching:

(89) Basic syllable structure (McCarthy, 1979; Kiparsky, 1979; Halle & Vergnaud, 1980)



4.1.1 Syllabification: the Maximum Onset Principle (MOP)

The Maximum Onset Principle, which correctly predicts syllabification in languages and is responsible for maximizing the onset, assumes that syllable affiliation to C slots is largely predictable and the presence of intervocalic consonant in the onset of the second syllable rather than the codas of the first is universal. In other words, consonants prefer to form an onset rather than a coda, if they can legitimately do so. Also, it is only the association of the V slot with a vowel that is lexically given, but the association of the C slots with the syllable nodes can be derived by rule (Hayes 2009; Gussenhovens and Jacobs 2005). The MOP is stated as follows:

Rule 6. **MAXIMUM ONSET PRINCIPLE (MOP):** First, make the onset as long as it legitimately can be, then form coda.

This principle requires that a string such as [tata] be syllabified as [ta.ta] and not *[tat.a] and if the language allows clusters such as [st] at onsets, then a string like [asta] should be [a.sta],

instead of *[as.ta] or [ast.a]. Even though this is a universal principle, languages differ in the kinds of syllables they allow. For instance Dutch and English allow [st] in the onset, but Spanish does not and so is Gurene. For instance, since Gurene does not allow consonant clusters, a word like *daka* ‘a box’ would be syllabified as [da.ka] instead of *[dak.a].

4.1.2 Sonority

According to Blevins (1996), some observations by some researchers (e.g., Jespersen, 1904; Sievers, 1881) on peaks of sonority led to the Sonority Sequencing Generalization (SSG). The Sonority Sequencing Generalization states, ‘Between any member of a syllable and the syllable peak, a sonority rise or plateau must occur’. Blevins argues that such observations also led many researchers to adopt the SSG as a determinant of syllable markedness.

4.1.3 Sonority Profile

Segmental composition of the onset and coda are similar cross linguistically such that in a CC onset position, the type of consonant that is most likely to fill the second position will be a glide like [j] or [w] while the first position will be occupied by consonants like [p], [t] or [k]. These tendencies are described in terms of a number of syllable “laws” (Venneman, 1972 cited in Gussenhoven & Jacobs, 2005). According to Gussenhoven and Jacobs (2005), the SONORITY PROFILE captures much of the regularity, as in (6).

Rule 7. SONORITY PROFILE: the sonority of a syllable increases from the beginning of the syllable onwards, and decreases from the beginning of the peak onwards.

Therefore, sonority is related to the overall acoustic energy of segments, which are usually distinguished along the following dimension in order of increasing sonority.

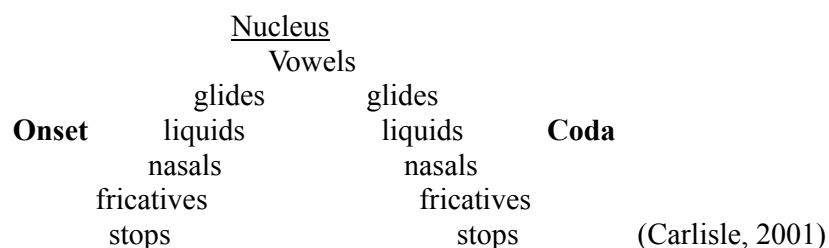
Rule 8. SONORITY SCALE: Obstruents- Nasal- Liquids – Glides – vowels.

The sonority scale shows that it is not common to have any onset reversing the direction of increasing sonority like [mk-] or [wl-], instead of [pn-] or [ml-], and any rhyme increasing the sonority from left to right like [-lj]. In other words, in the onset, large sonority differences are preferred over small ones while in the rhyme, small sonority differences are preferred over large ones (Clements, 1990).

4.1.4 Sonority Sequencing

Cross-linguistically, segments that make up syllables are patterned based on sonority such that the preferred syllable type in all languages is one in which the nucleus is the most sonorous constituent, usually a vowel. The process of Sonority Sequencing Principle requires that the segments that compose onsets and codas rise in sonority from the most peripheral member (Clements, 1990) cited in (Carlisle 2001). Thus, members of onsets and codas must obey the Sonority Sequencing Principle by being composed of segments that are less sonorous than the nucleus. Onsets differ from codas in their preference of segments. Universally, segments that compose onsets have the tendency to be weak in sonority while the segments that form codas are high in sonority. Hence, onsets prefer obstruents to sonorants while the reverse is true for codas (Carlisle, 2001).

(90) **Sonority scale;**



With complex onsets and codas, universally preferred complex onsets begin with segments that are lower on the sonority scale and followed by those that are higher. Thus, a complex onset that obeys SSP will consist of a stop followed by a liquid or a fricative followed by a

glide. While complex coda will have a segment that is high on the sonority scale first and followed by one that is lower on the scale. Thus a complex coda that obeys SSP may begin with a nasal followed by a stop or a liquid followed by a fricative (Carlisle, 2001).

Carlisle argues that though Sonority Sequencing Principle expresses a very strong universal tendency, complex margins may violate it in two manners. First, two segments in a margin may have the same sonority (sonority plateaus) as in the English word *sphere* (Clements, 1990). The second argument Carlisle made is that, the more peripheral segment in the onset or coda may have higher sonority than a segment closer to the nucleus (Sonority reversals) as in the examples *spin* and *hops*. Carlisle considers sonority reversals as more serious departures from the Sonority Sequencing Principle than sonority plateaus and are consequently less frequent and more marked (Carlisle, 2001).

4.2 The Gurene syllable

This section describes Gurene syllables based on the universal syllable structure, which comprises sequence of sounds that contains one peak of prominence. The syllable is usually divided into onset and rhyme, with the rhyme further divided into nucleus and coda. The basic syllable structure in Gurene is generally open. There are also closed syllables, but they are few. Therefore, an epenthesis schwa [ə] is sometimes required to break consonant clusters (see 4.4.2).

Any consonant in Gurene can fill the onset position (Dakubu 1996; Atintono 2011), and any simple vowel, diphthongs and syllabic nasals occupy the nucleus position while the coda position may be filled by only the nasals /m, n, ŋ/ and the glottal stop /ʔ/. However, in the case where codas evolve because of phonological processes like vowel weakening and deletion, the segments /s, b, l, r, g/ can form codas as well. Examples of such codas with possible clusters may be in the sequences /ms/ as in [limsgo], /ls/ as in [walsgə] and /gs/ as in

[pɪgsgɔ]. Clearly, these sequences are Sonority reversals, which are violations of the Sonority Sequencing Principle. This is because in Gurene, this type of clustering occurs only in coda position and not onset. Hence, Gurene does not have onset clusters.

4.2.1 Gurene syllable types

Gurene has four types of syllables, which can be modified. These syllables are the V, C, CV, CVC types.

4.2.1.1 V-syllables

There are three types of V-syllables in Gurene. These include the V, V: and the syllabic Nasals. The V and V: only types of syllables are isolated vowel syllables, which are composed of either short vowels only or a sequence of two vowels (92). Examples of isolated vowel syllables are the third person singular subject pronoun *a* and its object counterpart *ĩ*, *e* and its allophonic variant *ɛ* ‘search’, and *ẽɛ* ‘yes’. These syllable types represent only the nucleus without onset and coda. The following are examples of Gurene isolated vowel syllables.

(91) Isolated vowel syllables

- i. *a* ‘he/she’
- ii. *ĩ* ‘him/her’
- iii. *e/ɛ* ‘search’
- iv. *ẽɛ* ‘yes’

Apart from the V and V: types of syllable, the third type of syllable that lack onset and coda in Gurene is the syllabic nasals. These syllabic nasals include the first person subject pronoun

n ‘I’ as well as the first person possessive pronoun *m* ‘my’ and its variants *n* and *ŋ*. All these three syllable types, which are the V, V: and the syllable nasals have the same structure (i.e., they occupy the nucleus) but are only realized differently. Syllabic nasals are illustrated in the following examples.

(92) **Syllabic nasals**

- (i) *n* [n wan di] ‘I will eat’
- (ii) *m* [m ma] ‘my mother’
- (iii) *n* [n sɔ] ‘my father’
- (iv) *ŋ* [ŋ kɔma] ‘my children’

In (92ii), /m/ is a contraction of **ma** ‘my’ which is realized as [m] in the environment of a bilabial consonant, [n] in the environment of an alveolar consonant and [ŋ] in the environment of a velar consonant as in the above examples.

4.2.1.2 CV/ CV: syllables

Gurene also has a CV and CV: syllable structures, which have an Onset but lack a Coda. The CV type of syllable is generally referred to as the core or the basic syllable type because it consists of an onset and a nucleus, which is obligatory and it is the syllable people first acquire in infancy when they start to speak. Examples (93) are words showing CV syllables while (94) are examples of CV:

- | | |
|---|---|
| <p>(93) a. [di] ‘to eat’</p> <p>b. [la] ‘to laugh’</p> <p>c. [kɔ] ‘to weed’</p> | <p>(94) a. [ba:] ‘dog’</p> <p>b. [sɔ:] ‘broom’</p> <p>c. [dɔ:] ‘wood’</p> |
|---|---|

d. [ta] 'to join'

d. [la:] 'bowl'

While examples (93) are verbs, examples (94) are nouns in their singular forms.

4.2.1.3 CVC/ CV:C syllable

Other types of syllable in Gureɛ include the CVC and CV:C syllable type, which is the closed syllable. These syllable structures have all the parts of a syllable; the Onset, the Nucleus and the Coda. Examples (95) & (96) illustrate both CVC and CV:C respectively;

(95) a. [dom] 'to bite'

(96) a. [ka:m] 'oil'

b. [kom] 'hunger'

b. [da:m] 'pito/alcoholic beverage'

c. [zom] 'flour'

c. [za:m] 'yesterday'

d. [dam] 'to stir'

d. [yɔ:m] 'to sing'

In addition to the types of syllables discussed above, the Nabt and Talen dialects have VC and CVCC syllable types as in (97 & 98).

4.2.1.4 VC

(97) [ɔn] 'who'

4.2.1.5 CVCC

(98) [tobt] 'ear'

Of all the syllable types, the CV is the basic syllable structure type and though there are the VC and CVCC types, these are found in only Talen and Nabt dialects. Apart from [r, ŋ, ʎ], all other consonants can fill the onset position. On the other hand, it is only the nasal consonants [m], [n] and [ŋ] and the glottal stop that can fill the coda position. The examples below are words with coda consonants,

- (99) a. kom 'hunger'
b. tintine 'elephantiasis'
c. koŋko 'empty tin'
d. daʔ 'to buy'

4.3 Moraic representation of Gurene syllables

This section gives a moraic account of Gurene syllable structures. Mora theory (Hyman 1984, 1985; Hayes 1989) was proposed for the characterisation of syllable weight in which syllables are divided into 'weight units' or moras such that light syllables contain only one mora while heavy syllables contain at least two moras. It was the study of languages in which two adjacent segments in a syllable rhyme may carry different pitches or in which the position of stress, accent, or tone depends on an opposition between light (CV) and heavy (CV: or CVC) syllables that led to the development of the moraic theory (Gussenhovens & Jacobs 2005; Broselow 1996).

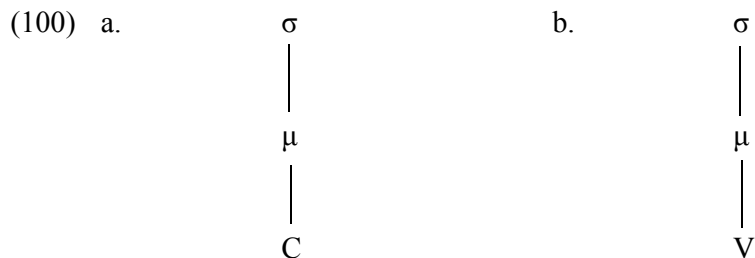
With the notion of phonological weight of a language, Rob & van der Hulst (2013) made a distinction between some types of weight which include (1) intrinsic weight (due to properties of the syllable), (2) rhythmic weight (due to rhythmic footing), which was assumed for **count systems** and (3) diacritic weight (due to lexical marking of 'accents'), which equals lexical marking. Focusing on the intrinsic weight, Rob and Van der Hulst, indicate that, even though, the intrinsic properties that determine weight may differ from one language to the other, vowel length and syllable closure (quantitative weight) are important determinants. They say though in principle these two factors are independent, they

both (long vowels and closing consonants) cause syllables to be heavy for primary and/or secondary stress in a language. The third factor is vowel length and syllable closure, for languages that count codas for weight as well as long vowels while open, short-voweled syllables are light. Therefore, a weight-sensitive language could be identified based on vowel length, syllable closure and vowel length and syllable closure. Based on the criteria for weight sensitive languages, Gureɛ is considered as a weight sensitive language as it has all the intrinsic properties that determine the weight of a language's syllables. For instance, these monosyllabic words are classified as heavy syllables - *baa* 'dog', *kom* 'hunger', *kaam* 'oil' while *ba* 'they' is light syllable.

The next section gives moraic representations of the various syllable types of Gureɛ as discussed above. This is based on the principle of the moraic theory, which requires the use of the moras as a unit involved in the determination of syllable weight, such that light syllables count as monomoraic, and heavy syllables as bimoraic. Since onsets do not contribute to syllable weight, every onset in the syllable structures are not given separate moras but are attached to the syllable nodes directly.

4.3.1 Moraic representation of Gureɛ light syllables

In Gureɛ four syllable types may be represented as light syllables in moraic representation. These syllables include only the syllabic nasal – C type, the isolated vowel syllable – V type, the CV and the CVC types since they have one mora each. The following are moraic representations of Gureɛ light syllables with one mora (μ) each.



n 'I'

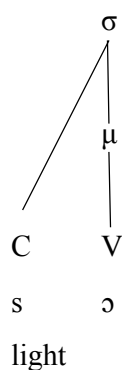
a 's/he'

light

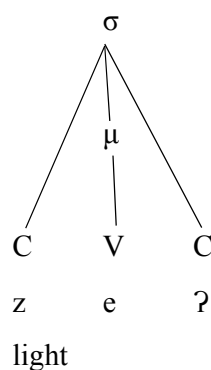
light

In examples (100), because both the syllabic nasal and the vowel occupy the nucleus position and carry moras, each of the segments in (100a & b) has one mora dominating it at the intermediary level, which is dominated by the syllable.

(c)



(d)



Again, the representations in (100c & d) have one mora each, as they are light/ monomoraic.

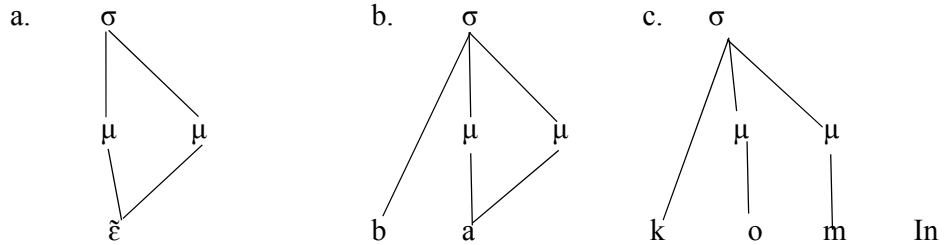
In (100c), we have one mora dominating the vowel and the onset C attached directly to the syllable node, whereas in (100d), only the nucleus (V) has a mora. Both the onset and the coda are not associated with moras but attached directly to the syllable node because the onsets do not contribute to the weight of the syllable and the coda is weightless in this case.

4.3.2 Representation of Gurene heavy syllables

There are three syllable types in Gurene that may be considered heavy in moraic representation. These are the V:, CV: and CVC, where coda C is a sonorant consonant. Based on the argument that the choice of consonants as mora-bearing is constrained by sonority, which states that consonants that may bear a mora are more sonorous than those which cannot (Hayes, 1989 cited in Broselow, 1996), all the Gurene syllables presented below count as

heavy. This stems from the fact that they all have two rhyme units or moras each with syllabic nasals also having moras due to their sonorous nature.

- (101) a. $\bar{\epsilon}$: ‘yes’ b. ba: ‘dog’ c. kom ‘hunger’

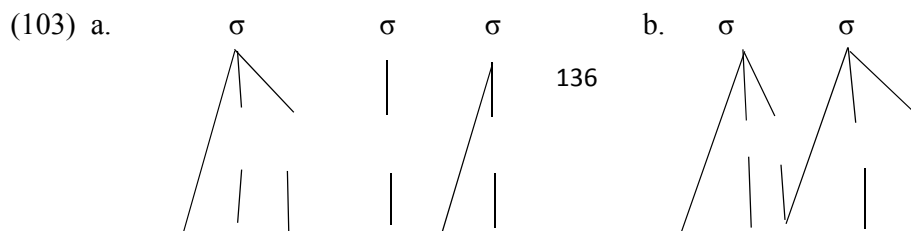


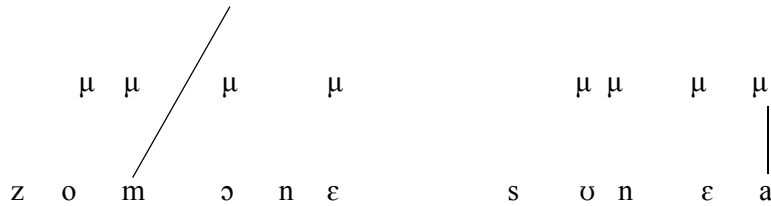
In examples (101a) and (101b), we have one segment each associated with two moras while in (101c), we have two segments, and each associated with a separate mora. The difference between these syllables is, while (a) has only one segment and is without an onset and a coda, (b) has an onset and (c) has an onset and a coda, which is associated with a mora because it is sonorous.

4.3.3 Moraic representation of Gurene geminates

A geminate is a cluster of two identical consonants of which the first occupies a syllable coda while the second is rearticulated as the onset of a following syllable (Abu-Abbas & Abdel-Ghafer 2011). Abu-Abbas & Abdel-Ghafer argue that within Moraic Theory, a geminate is seen as a consonant encoding inherent weight rather than length. In Gurene, geminates occur intervocalically as shown in the examples as follows,

- (102) a. /zom/ + /mone/ → [zommone] ‘flour’
 b. /som/ + /nea/ → [sonnea] ‘beauty’
 c. kum + maaləŋə → kummaaləŋə ‘embalment’





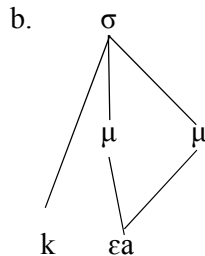
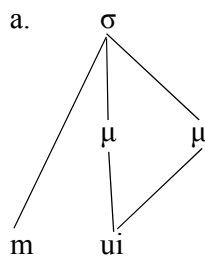
With moraic representation of Gurene geminates as in the structures above, the geminates are dominated by one mora unlike the long vowels, which are represented by two morae. However, the consonant melody that is linked to the second mora is "flopped" onto the following vowel-initial syllable to create an onset which is a preferred syllable structure (Noske, 1992).

4.3.4 Moraic representation of Gurene diphthongs

In the representation of diphthongs, just like long vowels, each syllabic unit is associated with a mora as follows,

(104) /mui/ 'rice'

/kea/ 'malt for brewing pito'



Because onset consonants do not contribute to the weight of a syllable, in the representations, each onset is attached directly to a syllable node (Hayes, 1989 in Gussenhoven & Jacobs, 2011), whereas each diphthong is dominated by two moras.

4.4. Syllable structure processes in Gureɛ

Phonological processes often apply to eliminate ill-formed sound combinations through phonotactics. Therefore, syllable structure processes affect the distribution of segments in words and in most cases, the effect of these processes is to achieve a preferred and or simplified syllable structure. Syllable structure processes include deletion, insertion/epenthesis, metathesis, apocope, syncope etc. For instance, evidence for a preference for simpler onsets and codas exists from both historical linguistics and from phonological processes from many languages. This reduces complex codas and onsets by vowel epenthesis or deletion. Hence, very few examples exist in the world's languages of processes that produce complex onsets or codas (Blevins, 1995). In Gureɛ, syllable structure processes are observed in compounds and loan words. These and other processes are discussed in the next section.

4.4.1 Syllable structure processes in Gureɛ compounding

Compounding is the process of forming words by combining two or more lexemes (Bauer, 2003; Lieber, 2009; Dolphyne, 2006; Katamba, 1993; Appah, 2013). In Gureɛ, compounding involves a series of processes. These include syllable deletion, syllable reduction and vowel shortening, which are discussed in the following sections.

4.4.1.1 Syllable deletion

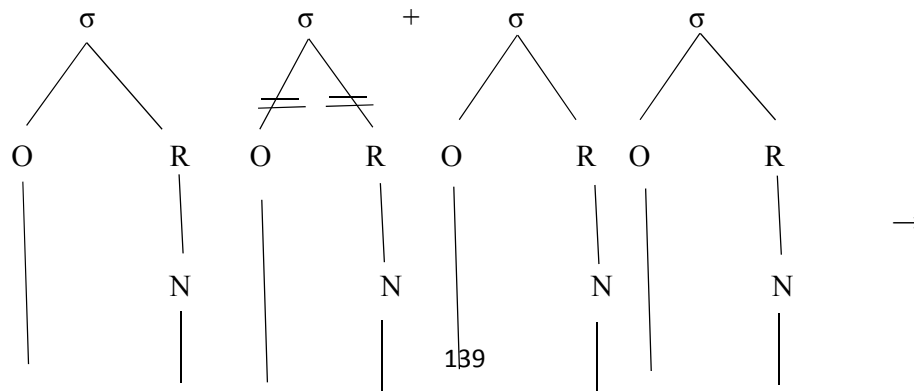
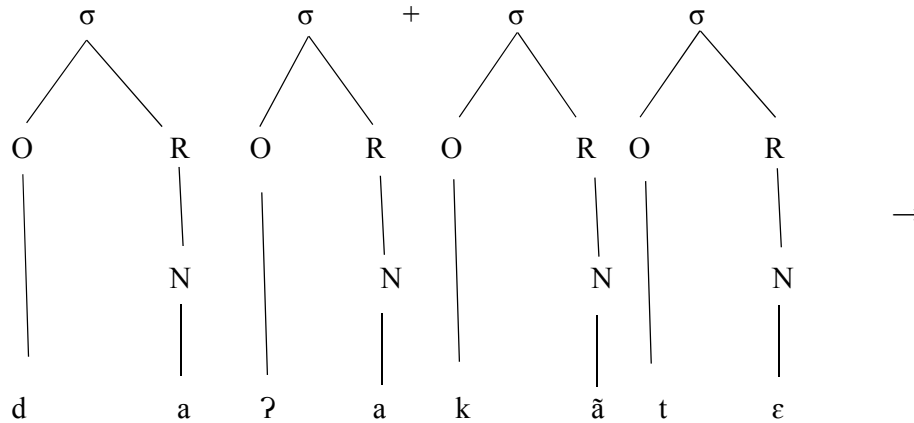
In order to achieve well formedness, some of the compounds undergo both morphological and phonological processes. In the data presented in (105), the first constituent of the compound is a noun while the second constituent is an adjective. Thus, the compounds are noun + adjective combination. The formation of these compounds involves the deletion of the nominal suffix, which is the final syllable of the first constituent. This allows the nominal

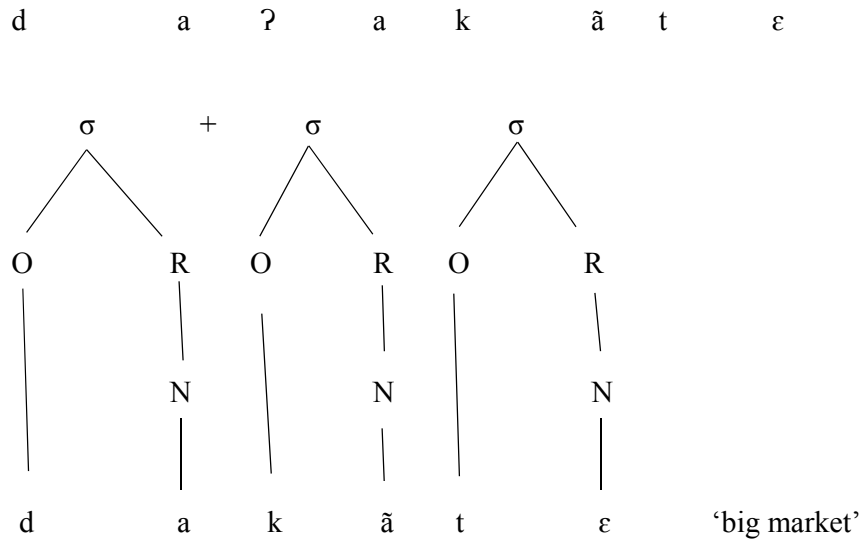
stem (the initial syllable) to combine with the second constituent, which is an adjective to form the derived compound as shown in the following examples;

(105) Underlying compound	Nominal suffix deletion	derived compound
a. #ko+ ʔom #miʔisum# #water+sg #sour#	#ko+---#miʔisum#	/komiʔisum/ 'sour water'
b. #da+ ʔa # kãtɛ# #market+sg #big#	#da+--#kãtɛ#	/dakãtɛ/ 'big market'
c. #tu+ ʔa # kãtɛ# #baobao+sg #big#	#tu+--#kãtɛ#	/tokãtɛ/ 'big baobao tree'
d. #su+ ʔa # kɔbɔgɔ# #knife+sg #big#	#su+--#kɔbɔgɔ#	/sokɔbɔgɔ/ 'cutlass'

(106) /daʔ-a + kãtɛ → daʔa + kãtɛ/ → [da+kãtɛ]

CVCV + CVCV → CV+CVCV





However, when the first constituent of the compound (noun) has more than two syllables, the second syllable is an extended stem or syllable of the noun and though this syllable does not delete, it becomes a weak syllable due to its occurrence at word boundary. Hence, the vowel of the second syllable changes to a weak vowel - /e/ → /ə/. Another process that these compounds undergo is morphological. The final syllable, which is the suffix morpheme (the singular suffix) of the nominal stem, deletes while the stem and its extended syllable combine with the adjectives to form the derived compounds as shown in the following examples;

(107)	Underlying compound	Nominal suffix deletion	derived compound
a.	#ku+ge+re #katε# #stone+sg #big#	#ku+gə+-- #katε#	/kugəkate/ ‘a big stone’
b.	#zɔ+le+gɔ #bugere# #mad+sg #luke warm#	#zɔ+lə+-- #bugere#	/zɔləbugere/ ‘mentally unstable’
c.	#sa+ge+bo #bɔ̃tε# #TZ (food)+sg #morsel#	#sa+gə+-- #bɔ̃tε#	/sagəbɔ̃tε/ ‘morsel of TZ (a delicacy)’

d.	#kunko+re #maʔasum#	#kunko+-- #maʔasum#	/kunkomaʔasum/ #neck+sg #shade#	‘mouthwatering’
e.	#ze+lɛ+ŋa #pɔlaka#	#ze+lɔ+-- #pɔlaka#	/zɛlɔmpɔlaka/ #tongue+sg #palate#	‘hard palate’
f.	#ze+lɔ+ŋa #piia#	#zɛlɔ+-- #pĩia#	/zɛlempĩia/ #tongue+sg #vein#	‘vein of the tongue’

In (107 e & f), weakening of the second syllable or vowel is observed in addition to nasal place assimilation. The final consonant of the noun /ŋ/ assimilates to the place of articulation of the following obstruent /p/.

Also, in examples (108), apart from the deletion of the nominal suffix (singular suffix) that is observed through out the data in this section, the second syllable of the stem also deletes as shown below;

(108)	Underlying compound	Nominal suffix omission	derived compound
a.	#pe+se+go #daa# #sheep+sg#male#	#pe+sɔ+-- #daa#	/pedaa/ ‘ram’
b.	#pe+se+go #nya’ɔŋa# #sheep+sg#female#	#pe+se+-- #nya’ɔŋa#	/penyaʔɔŋa/ ‘ewe’

From the above data it is realised that apart from syllable deletion, compound formation also goes through nominal suffix deletion and syllable or vowel weakening.

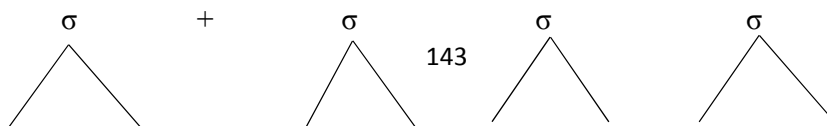
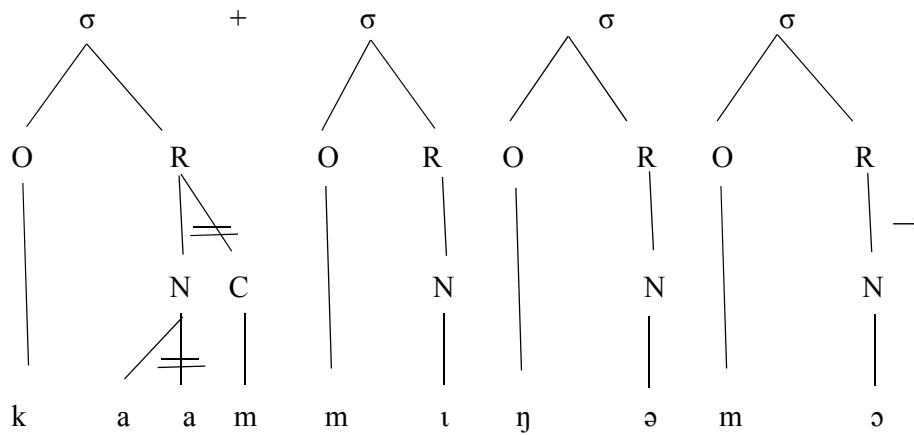
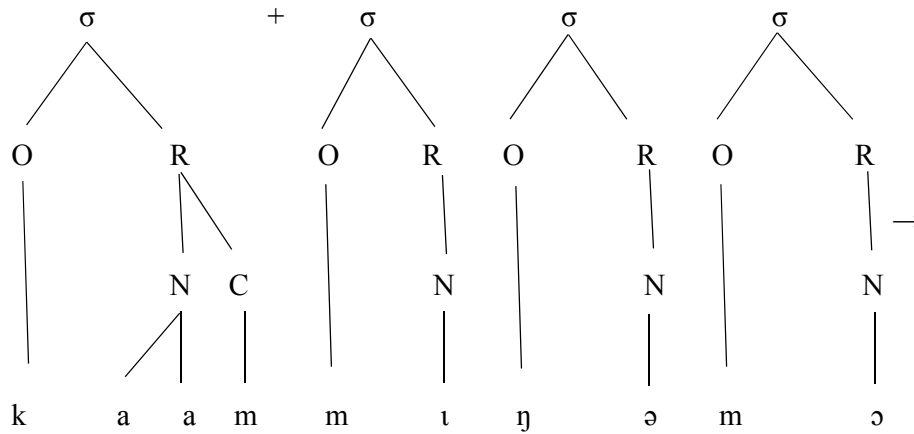
4.4.1.2 Syllable reduction

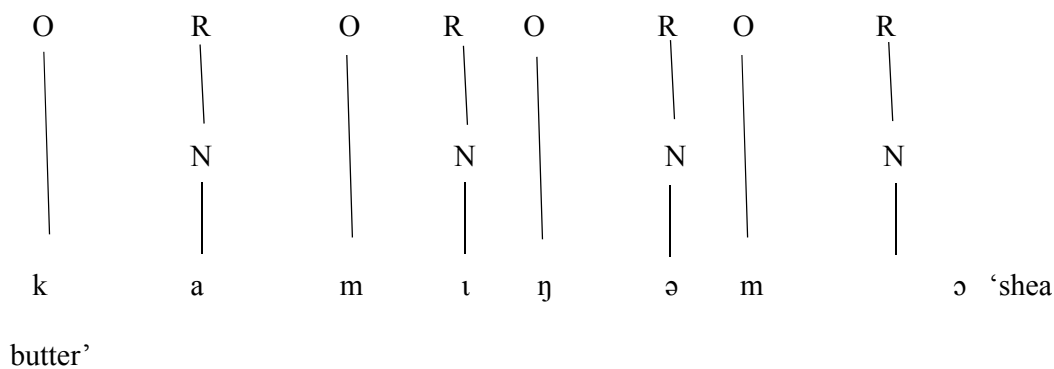
The second syllable structure process to look at in Gurene compounds is syllable reduction. In Gurene, syllable reduction occurs in monosyllabic words, which are composed of onset, long vowels and a coda or only onset plus long vowels. In this process, part of the

monosyllabic word usually the final vowel only or the final vowel and the coda are deleted. Therefore, it is argued that syllable reduction in Gurene occurs in monomorphemic words in the domain of CV:C and CV:. The data in (109) show that when the first constituent is monosyllabic and composed of a long vowel and a coda, the long vowel is reduced to a short vowel. The whole syllable is reduced from CV:C to CV. The reduced syllable, which is the stem, is then brought together with the second constituent (the adjective) to form the compound. Examples (109a-c) illustrate this process as follows,

(109)	Underlying compound	Nominal suffix omission	derived compound
a.	#ka+ am #miŋemɔ# #oil+sg#true#	#ka+-- #miŋəmɔ#	/kamiŋəmɔ/ 'shea butter'
b.	#ka+ am #mɔlegɔ# #oil+sg#red#	#ka+-- #mɔləgɔ#	/kamɔləgɔ/ 'palm oil'
c.	#da+ am #buge# #alcohol+sg#be drunk#	#da+-- #buge#	/dābugərə/ 'drunkard'

(110). /kaam + mɪjəməɔ → kaam + mɪjəməɔ/ → [ka+mɪjəməɔ]



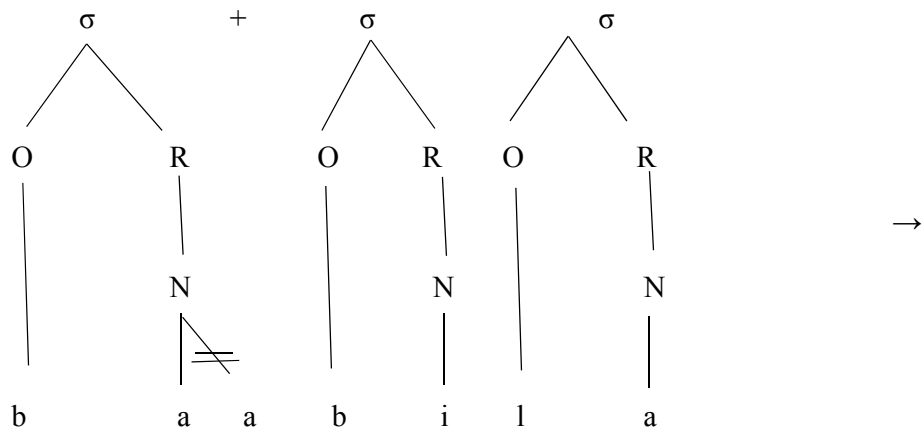
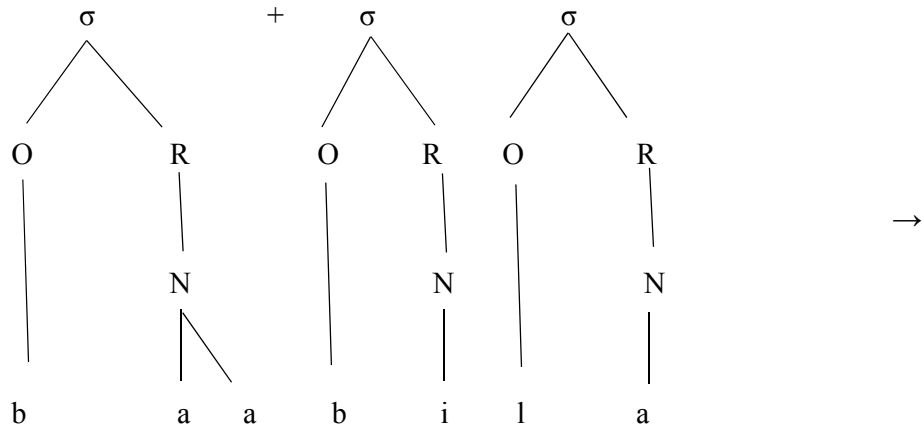


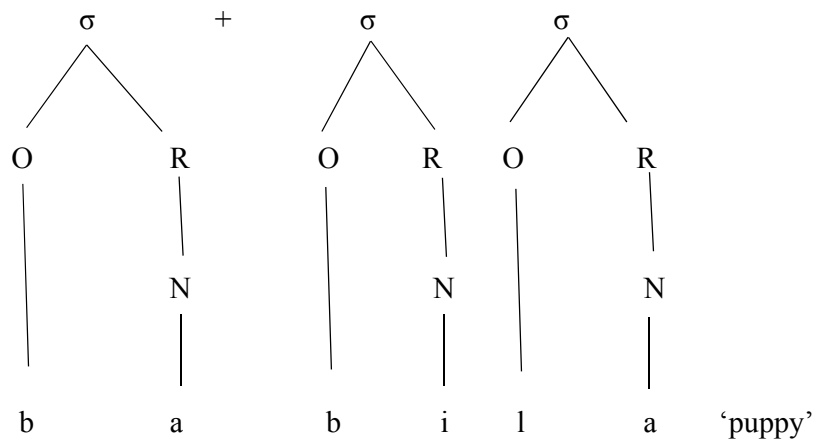
In the case of CV:, the final vowel deletes, which results in the reduction of the the long vowel from CV: → CV in order to achieve well-formedness in the formation of the compound as shown in the examples below,

(111).	Underlying compound	Nominal suffix omission	derived compound
a.	#dɔ+(g)ɔ #kɛʔɛŋa# #wood+sg #dry#	#dɔ+- #kɛʔɛŋa#	/dɔkɛʔɛŋa/ ‘dried wood’
b.	#ba+(g)a #bila# #dog+sg #little#	#ba+- #bila#	/babila/ ‘puupy’
c.	#la+(g)a #pɛɛlega# #bowl+sg #white#	#la+- #pɛɛlega#	/lapɛɛləga/ ‘white bowl’
d.	#sa+(g)a #kātɛ# #rain+sg #big#	#sa+- #kātɛ#	/sakātɛ/ ‘heavy rain’
e.	#yɔ(g)ɔ #kɛka# #grave+sg#big#	#yɔ+- #kɛka#	/yɔkɛka/ ‘big grave’
f.	#sɔ+(g)ɔ #kɛka# #broom+sg#old#	#sɔ+- #kɛka#	/sɔkɛka/ ‘old broom’
g.	#sɔ̃+a #kɛka# #witch+sg#old#	#sɔ̃+- #kɛka#	/sɔ̃kɛka/ ‘old witch’

- h. #bɔ+a #nyaʔaŋa# #bɔ+- #nyaʔaŋa# /bɔnyaʔaŋa/
 #goat+sg#female# 'female goat'

(112) /baa + bila → baa + bila/ → [ba+bila]





The data show that just like all other Gur languages, compounding in Gurene undergoes both morphological and phonological processes. Also, only the first constituent of the compound undergoes these processes. Some of the phonological processes include, syllable deletion, syllable reduction and syllable or vowel weakening while the only morphological process observed is nominal suffix deletion.

4.4.2 Syllable structure processes in Gurene loan words

The way speakers of Gurene syllabify loan words provides a window into how the syllable structure of the language is. Gurene borrows from other languages such as English, Akan and Hausa, and the borrowed words usually undergo some form of modification in order to generate well-formedness in the output forms. Three types of syllable structure processes occur in Gurene loanwords. These include vowel epenthesis, deletion and consonant alternation. The following sections discuss the syllable structure processes that occur in loanwords from English to Gurene.

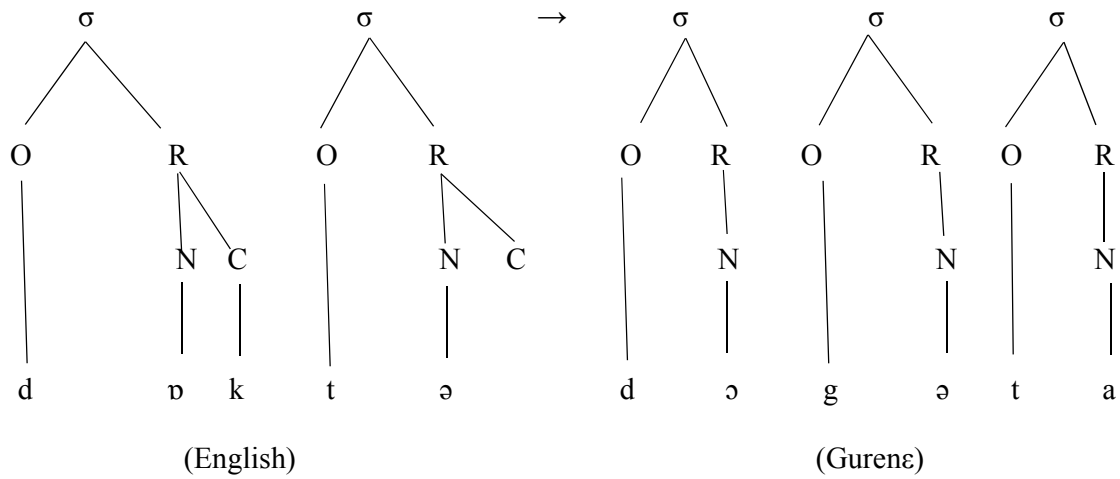
4.4.2.1 Vowel epenthesis

Vowel epenthesis is a common process that is observed in loanword adaptation. This process is usually applied to satisfy constraints on phonotactics and syllable structure in the target or borrowing language. For instance, where a borrowed word does not conform to the syllable structure requirements of the language, vowel epenthesis is applied to create well-formed

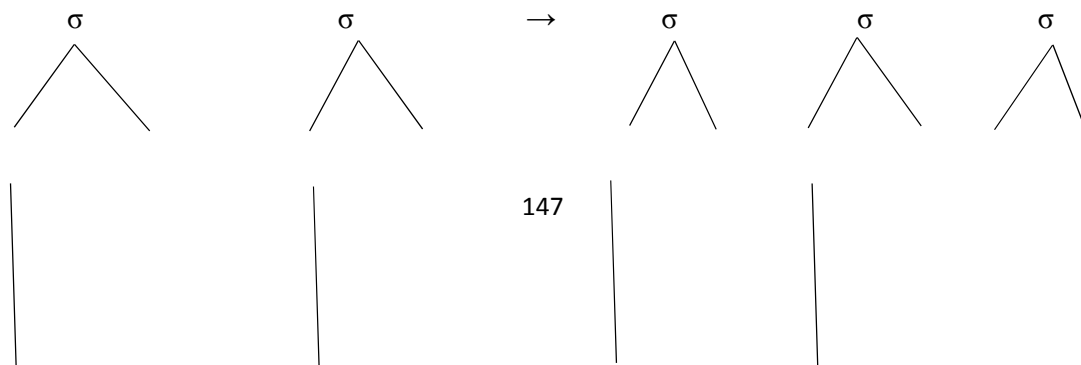
output. Therefore, languages with a strict CV syllable structure often epenthesize vowels in certain positions to break up consonant clusters or resyllabify coda consonants (Uffmann 2001).

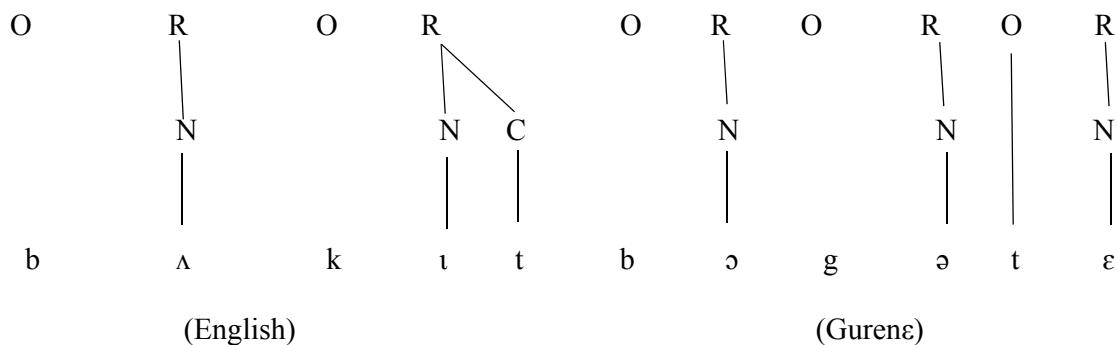
Epenthesis occurs in Gurene loan words in order to break up consonant clusters and to create open syllables by resyllabifying the coda consonant of borrowed words into Gurene. This process is illustrated in the following examples,

(113) /doctor/ → [dɒktə] → [dɔgətə]



(114) /bucket/ → [bʌkɪt] → [bɔgətɛ]





4.4.2.2 Voicing assimilation

	English				Gurene
(115) a.	/doctor/	→	[dɒktə]	→	[dɔgəta]
b.	/truck/	→	[trʌk]	→	[torogo]
c.	/bucket/	→	[bʌkɪt]	→	[bɔgətɛ]

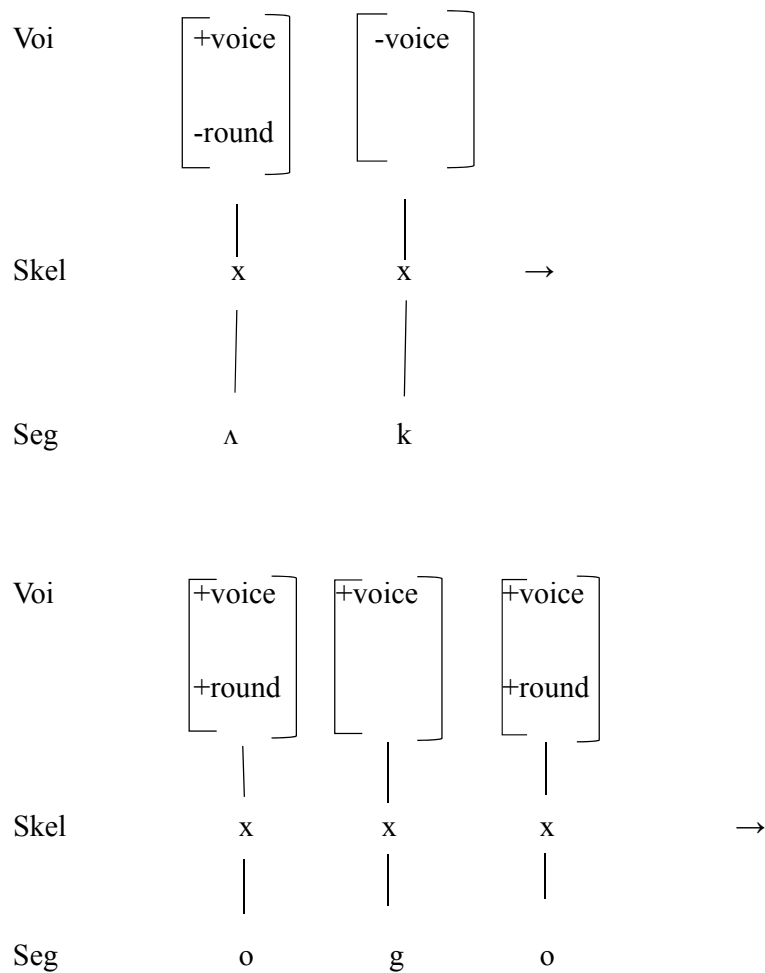
Another phonological process that has been observed in Gurene loanwords is voicing assimilation. In the examples above, it is realised that the voiceless velar consonant, which filled the coda position in the first syllable of the English words (115a & b) and onset in (c), becomes voiced when borrowed into Gurene. In other words, ([k]), which is a voiceless velar changes to a voiced velar consonant /g/. This is because the English words that are borrowed into Gurene have undergone vowel insertion to generate the preferred CV syllables in the borrowed words. This is represented in a rule as follows:

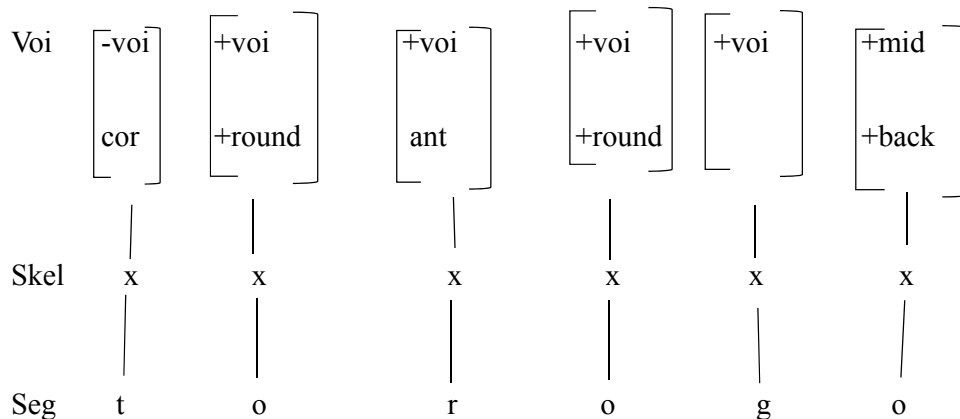
Rule 9: k → g / [+vowel] — [+vowel]

This obvious reason for the change of the velar segment from voiceless to voiced is because in the borrowed words the velar consonant occurs between vowels, which are [+voice].

Therefore, it assimilates to the voice feature of the vowels. The following is a non-linear representation of the *truck*, borrowed from English into Gurene as *torogo*.

(116) /truck/ → [trʌk] → [torogo]





In example (116), ([trʌk] → [torogo]), we observe vowel epenthesis, vowel alternation and voicing assimilation. /o/ is inserted in the first syllable and the final syllable to create CV syllables, while the back unrounded vowel /ʌ/ changes to a back rounded vowel /o/ in the second syllable and the voiceless velar stop changes to a voiced velar stop in the final syllable onset (/k/ → /g/). Here, the coda consonant becomes an onset to the final syllable.

(117) /table/ → [teɪbəl] → [teebule]

However, in (117), we observe a diphthong [eɪ] as in [teɪbəl] changed to a long vowel [ee], which results in the Gurene version - [teebule]. The second phonological process that is observed in example (117) is the alternation of a schwa [ə] to a high back vowel /u/ in the second syllable and insertion of the final vowel. Thus, the coda of the final syllable is now assigned the function of an onset. Therefore, segment alternation, vowel epenthesis and voicing assimilation apply in Gurene loanwords to break consonant clusters and to simplify syllables.

Other phonological processes that are observed are those that result from dialectal variations (Gurene vs Talen/Nabt dialects). Even though most of the words are common among these dialects, there are instances when speakers have to alter some of the words in order to satisfy

the grammar/phonology. Phonological processes that result from dialectal variations include apocope, final consonant devoicing, paragoge, schwa epenthesis and consonant alteration.

4.4.3 Apocope

Apocope is the loss or omission of one or more segments from the end of a word (Trask, 1996). Even though final syllable vowel deletion does not occur in Gurene, Nabt and Talen have this phenomenon. For instance, in some instances Gurene words said in Nabt or Talen requires that final syllable vowel deletes (118a & b), and in other instances, both medial and final syllable vowels delete (118c & d). This is because consonant clusters and closed syllables are allowed and are common in these dialects as shown in the examples below.

- (118)
- | | | | | |
|----|--------|---|-------|----------------|
| a. | pehəgo | → | pehək | ‘sheep’ |
| b. | pəsəga | → | pəsək | ‘beginning’ |
| c. | Nabətə | → | nabt | ‘Nabt dialect’ |
| d. | tübərə | → | tübt | ‘ear’ |

We also observe that final vowel deletes and the final consonant changes from a voiced velar to a voiceless velar consonant as in (118a & b).

4.4.4 Paragoge

Paragoge, which is the opposite of apocope also occurs when some words are taken from Nabt/Talen to Gurene. Paragoge is a process where one or more segments are added to the end of a word (Trask, 1996). Paragoge happens when a vowel is added to the end of words from Nabt/Talen to Gurene. Here, the monosyllabic words are made bisyllabic due to the addition of final vowel as in the examples below,

	Talen/Nabt	Gurene	
(119) a.	uk	uka	‘hencoop’
b.	ɔn	ani	‘who’
c.	dok	dokə	‘pot’
d.	yir	yire	‘house’

The data in (120) also show schwa epenthesis as well as consonant alternation as the coda consonants in Nabt and Talen words are either changed or replaced by a different consonant (120a - c) when said by Gurene speakers in addition to the final vowel epenthesis. This is shown in the following examples,

	Talen/Nabt	Gurene	
(120) a.	talen	taləŋa	‘a speaker of Talen dialect’
b.	nabt	nabəra	‘a speaker of Nabt dialect’
c.	tɔbt	tɔbərə	‘ear’
d.	sayb	sayəbɔ	‘type of food’

4.4.5 Consonant alternation

Another instance where consonant alternation occurs in Gurene is in the formation of some plurals. In this case, the voiceless velar stop changes to a voiced velar fricative when a third syllable which is the plural morpheme is added to the stem. The following examples show this phenomenon;

(121)	singular	plural	
a.	pək.ɔ	→ pəyərə	‘shells’

- b. pək.a → pɔɣə.st ‘women’
- c. dək.ɔ → dɔɣə.rɔ ‘pots’
- d. lək.ɔ → lɔɣə.rɔ ‘belongings’
- e. dak.a → dayə.st ‘boxes’
- f. bək.a → bɔɣə.st ‘streams’
- g. kək.a → kɔɣə.st ‘chairs’
- h. pak.a → payə.st ‘hut’

Some phonological processes are also observed across the dialects. For instance, words that are considered to be underlying in Gurenɛ, have to undergo some processes in order to derive wellformed words in Talen/Nabt as shown in the following examples;

	Gurenɛ		Talen/Nabt
(122) a.	/adəkɔ/	→	[dɔk]
b.	/akolego/	→	[kolək]
c.	/atia/	→	[tia]

In (122), all the examples undergo a morphological process, where the nominal morpheme, which is the prefix /a/ is deleted. In addition, phonological processes such as vowel change, vowel weakening and deletion are observed. In (122a & b), the words go through a process of final vowel deletion word medial vowel change. For instance, while in (122a) /ɔ]/ changes to [o] as in /adəkɔ/→ [dɔk], in (122b), /e/ changes to a weak vowel [ə] as in /akolego/ → [kolək].

4.5 Summary

The chapter began with a discussion of syllable structure and the mora theory. A description of Gurene syllable structure types were given as V, C, CV, CVC. I also observed VC and CVCC syllable types in Talen and Nabt, which are sister dialects of Gurene. Irrespective of the dialect, the CV is the basic syllable structure type. It was realised that all consonants can fill the onset position while only the nasal consonants [m], [n] and [ŋ] and the glottal stop fill the coda position. Based on syllable weight, mora theory was used to characterize Gurene syllables into light and heavy syllables. Geminate and diphthongs were also given moraic representations. Syllable structure processes in Gurene have also been discussed and given autosegmental analysis. These include whole syllable deletion, syllable reduction, vowel shortening, consonant alternation, vowel epenthesis, apocope and paragoge.

CHAPTER FIVE

HARMONY IN GUREŃ

5.0 Introduction

This chapter discusses various assimilatory processes in GureŃ. Some of the assimilatory processes that are found in GureŃ include vowel harmony, nasal harmony and nasal place assimilation. Feature geometry representations have been given to illustrate some of these phenomena. I have demonstrated that processes that are governed by vowel harmony in GureŃ include plural suffixes, loan words adaptation and compounding. I have also discussed nasal harmony in GureŃ based on the triggers and directionality, and supported it with autosegmental representations.

5.1 Vowel harmony

Harmony is a widespread phenomenon of which all phonological segments of a particular type within a particular domain (the morpheme, the stem, the word, etc.) are required to agree with respect to some phonological property (Hansson 2001). Hansson posits that within morphemes, harmony manifests itself as a static co-occurrence restriction that prohibits disharmonic combinations but allows harmonic ones. Hansson explains further that however, when harmony reaches beyond the confines of individual morphemes, it can be directly observed ‘in action’, as it results in *assimilation*: A potentially disharmonic combination is made harmonic by forcing one segment to agree with another in the phonological feature in question.

Generally, harmony processes regulate the distribution of a given feature or feature complex in specific but not necessarily contiguous phonemes of a word. For example, in Finnish words

the back-front contrast in rounding, and in low vowels agree with that of the stem, whereas in Navaho words the contrast of anterior- non-anterior in coronal affricates and continuants is determined by the last coronal affricate or continuant in the word (Halle & Vergnaud). Various types of harmony in Gurene are discussed in the next section. Among the types of harmony are vowel harmony, consonant harmony, vowel-consonant harmony, nasal harmony, nasal place harmony etc. The domain of harmony in Gurene is the phonological word, which consists of the root and suffix.

5.1.1 Gurene vowel harmony

Vowel harmony is a phonological process in which the vowels in a given domain share or harmonise for a particular feature. Vowel harmony differs from other processes affecting adjacent vowels such as umlaut in that, typically, all the vowels of the language participate in the harmonic constraint within the domain of usually the word. Features such as vowel height, backness, rounding, nasality, and pharyngeal opening or [ATR], which are used to distinguish vowels, are said to be part of a harmonic system (Kenstowicz 1994).

The analysis of vowel harmony has been a major focus of generative research because it exhibits many of the ‘action-at-a-distance’ properties displayed by tone. On the nonlinear representation of vowel harmony, autosegmental approach captures the basic insight of the root-marker theory, which says the harmonic feature is a property of the entire root morpheme rather than any one of its individual vowels. Since autosegmental representations permit a one-to-many relation between features and positions in the string, harmonic contrast may be represented in phonological terms with each root lexically selecting a [+ATR] or a [-ATR] specification. The harmonic feature is represented on an autosegmental tier separate from the other features and the universal association convention (UAC) associates the

autosegment to the leftmost or rightmost relevant segment which is usually a vowel (Kenstowicz 1994).

Therefore, vowel harmony requires that, vowels in the word, which is the harmonic domain share the same value of some vowel feature, known as ‘harmonic feature’. In the case of Advanced Tongue Root (ATR) harmony, the harmonic feature is [ATR]. For instance, in languages with ATR harmony where some of the vowels usually have the property [+ATR] while others have the property [-ATR], vowels in a specific harmonic domain in any given word are either all [+ATR] or all [-ATR]. In Gurene, just like most languages with vowel harmony, the vowels fall into two harmonic sets, [+ATR] and [-ATR] (see Stewart 1967; Azagsiba 1977; Dolphyne 1988; Dakubu 1996; Nsoh 1997; Akanlig-Pare 2002; Atintono 2011). Gurene has a nine vowel system which consists of four [+ATR] vowels and five [-ATR] vowels and harmony is triggered by stem vowels. With the exception of /a/ which does not have a [+ATR] counterpart, all the four [-ATR] vowels have their [+ATR] harmonic counterparts as shown in (121). Henceforth, [+ATR] and [-ATR] will be used to represent the full forms of advanced tongue root and unadvanced tongue root respectively.

(123) a.	[+ATR]	b.	[-ATR]
	i u		ɪ ʊ
	e o		ɛ ɔ
			a

In Gurene, only vowels of the same quality or feature can co-occur in a word. In other words, words in which [+ATR] vowels are, [-ATR] vowels do not occur and vice versa as shown in the following examples;

(124)	[+ATR]	[-ATR]
-------	--------	--------

[pirəɣe] ‘remove – sandals’

[pirəɣɛ]

[pugəlum] ‘scatter’

[pugəlum] ‘inflammation’

[koləgo]

[koləgɔ] ‘type of spice’

I demonstrate that ATR harmony operates at two levels, the root and the suffix in the domain of the word. At the root level, vowels that occur in the words belong to either [+ATR] set or [-ATR] set as illustrated in the examples as follows;

(125) **Vowel harmony in CVCV words**

a. [+ATR]

[pike] ‘to discover’

[weke] ‘to hatch’

[kuko] ‘heap’

[yoko] ‘a hole’

b. [-ATR]

[pikɛ] ‘open one’s eyes’

[wɛkɛ] ‘divide by breaking’

[kɔkɔ] ‘ghost’

[yɔkɔ] ‘clay’

In the above examples, all the vowels in the words agree in the feature [\pm ATR]. Thus, all the vowels in examples under (125a) are [+ATR] while those in examples under (125b) are [-ATR]. The data also show that the feature [ATR] is phonemic in Gurenɛ, particularly in CVCV as shown in the above examples (125).

5.1.1.1 Neutral vowels

In Gureɛ, any vowel in word medial position (sometimes realized as schwa /ə/) and the low, back, central vowel /a/ are considered neutral vowels to harmony process. This is because these vowels are transparent to vowel harmony process and tend to co-occur with both sets of vowels. In addition, these vowels do not trigger or undergo the process of harmony. The Gureɛ schwa vowel /ə/ and the low back unrounded vowel /a/ are considered as neutral vowels in this case based on the neutral vowel theory of Van der Hulst and Smith (1986) cited in (Polgárdi, 1998) that neutral vowels belong to one of the two vowel sets defined by harmony and co-occur with vowels of both harmonic sets. That is, they themselves (neutral vowels) either possess the harmonic feature or they lack it. So that, neutral vowels that possess the harmonic feature are transparent, whereas neutral vowels that lack the harmonic feature are opaque (Hulst & Smith 1986 cited in Polgárdi, 1998). Below are words with Gureɛ neutral vowels ([ə] and [a]) co-occurring with [+ATR] vowels in (126) and [-ATR] vowels in (127):

(126) Neutral vowels and [+ATR] vowels

- a. /mitəŋa/ [mitəŋa] ‘straw’
- b. /muka/ [muka] ‘equal’
- c. /kuliga/ [kuliga] ‘the act of going home’

(127) Neutral vowels and [-ATR] vowels

- a. /sitəŋa/ [sitəŋa] ‘chisel’
- b. /mɔka/ [mɔka] ‘termites’
- c. /kɔlɪga/ [kɔlɪga] ‘the stream’
- d. /dakərə/ [dakərə] ‘a poem’

Non-linear representations of the co-occurrence of Gurene /a/ with [+ATR] vowels and [-ATR] vowels respectively:

- (128) a. $\begin{array}{c} k-u-l-i-g-a \\ \diagdown \quad \diagup \\ [+ATR] \quad [-ATR] \end{array}$ b. $\begin{array}{c} k-u-l-i-g-a \\ \diagdown \quad \diagup \\ [-ATR] \end{array}$
- ‘the act of going home’ ‘stream’

5.1.1.2 Vowel harmony in multisyllabic words

Vowel harmony does not only operate in disyllabic words in Gurene, but also in multisyllabic words. In multisyllabic words, all the vowels agree in the feature [\pm ATR] with medial vowels occurring as neutral vowels as shown in the following examples:

[+ATR]

- (129) a. /birigo/ [birəgɔ] ‘stammerer’
 b. /pelege/ [peləge] ‘to become white’
 c. /goroge/ [gorəge] ‘raise your head’
 d. /du:rusi/ [du:rəsi] ‘guitar’

[-ATR]

- (130) a. /birigɔ/ [birəgɔ] ‘type of vegetable’
 b. /pɛrɛsɛ/ [pɛrəsɛ] ‘to iron’
 c. /gɔrəgɔ/ [gɔrəgɔ] ‘bed’
 d. /dɔ:lɪsɪ/ [dɔ:ləsɪ] ‘members of dɔʊləgɔ community’

The data in (129) and (130) show that ATR harmony in multisyllabic words is between stem vowels and suffix vowels, with the schwa as neutral to harmony. In the underlying forms, the stem vowel spreads their $[\pm\text{ATR}]$ feature onto following vowels. However, in the output forms, the word medial vowels are realized as neutral and transparent to harmony. Therefore, it is observed that suffix vowels harmonise with the stem vowels in ATR feature, from the left to the right as in the examples above. Examples (131) are non-linear representations showing the occurrence of schwa with $[\text{+ATR}]$ and $[\text{-ATR}]$ vowels respectively in multisyllabic words:

- (131) a. $\begin{array}{c} [\text{+ATR}] \\ \diagdown \quad \diagup \\ \text{b-i-r-}\text{\textcircled{a}}\text{-g-o} \end{array}$ ‘stammerer’ b. $\begin{array}{c} [\text{-ATR}] \\ \diagdown \quad \diagup \\ \text{b-t-r-}\text{\textcircled{a}}\text{-g-o} \end{array}$ ‘type of vegetable’

5.1.1.3 Vowel harmony and suffixation in Gurene

In Gurene ATR harmony also operates at the suffix level. In this process, suffix vowels harmonise with vowels of the roots in ATRness. Gurene is a suffixing language and harmony propagates from the stem onto suffixes, which results in progressive harmony. Vowels of singular and plural morphemes, which are usually suffixes, agree with the vowels of the stems to which they are affixed in the feature $[\pm\text{ATR}]$. In other words, the suffix vowels assimilate to vowels of the stem in terms of their $[\pm\text{ATR}]$ feature. The following are examples that illustrate this phenomenon. The examples are all nouns, grouped according to the Gurene noun classes (see Nsoh, 1997; 2002) with plural markers in bold.

- | | | | | |
|-------|-----------|-----------------------------------|--|---|
| | | $[\text{+ATR}]$ | | |
| | | Singular | | $[\text{-si}]$ plural |
| (132) | /pese.go/ | [pes.əgo] | | [pĩ:. si] ‘sheep’ |
| | /niiŋa/ | [nĩ:ŋã] | | [nĩ:. si] ‘bird’ |

/zu'a/	[zũ.ʔã]	[zũʔũ.si]	'fly'
/buliga/	[bulə.ga]	[bulə.si]	'well'
/duŋa/	[dũ.ŋã]	[dũ.si]	'animal'

[-ATR]

	Singular	[-su] plural	
(133)	/boʌ/ [bo.a]	[boo.su]	'goat'
	/so'a/ [so.ʔa]	[soʔo.su]	'knife'
	/loŋa/ [lo.ŋã]	[lo.su]	'drum'
	/boka/ [bo.ka]	[boɡə.su]	'stream'
	/seka/ [sẽ.ka]	[sẽȳə.su]	'corners'

[+ATR]

	Singular	[-ro] plural	
(134)	/to'o/ [to.ʔo]	[toʔo.ro]	'baobab fruit'
	/mu'o/ [mu.ʔo]	[muʔu.ro]	'type of fruit'
	/yoko/ [yo.ko]	[yogə.ro]	'hole'

[-ATR]

	Singular	[-rɔ] plural	
(135)	/dɔɔ/ [dɔ:]	[dɔ:.rɔ]	'wood'
	/sɔɔ/ [sɔ:]	[sɔ:.rɔ]	'broom'
	/yɔɔ/ [yɔ:]	[yɔ:.rɔ]	'grave'

[+ATR]

	Singular		[-to] plural	
(136)	/fou/ [fu.o]		[fu.to]	‘dress’
	/deo/ [de.o]		[de.to]	‘room’
	/zonko/ [zon.ko]		[zon.to]	‘hair’
	/zuo/ [zu.o]		[zu.to]	‘head’

[-ATR]

	Singular		[-tə] plural	
(137)	/gɔrɔgɔ/ [gɔrɔ.gɔ]		[gɔ.tə]	‘bed’
	/birɔgɔ/ [birɔ.gɔ]		[bi.tə]	‘veg’
	/dɔrɔgɔ/ [dɔrɔ.gɔ]		[dɔ.tə]	‘ladder’
	/va'am/ [va.ʔam]		[vɔ.tə]	‘farm’

In examples (132 - 137), the suffix vowels agree with the stem vowels in their [±] ATR feature. This kind of harmony is symmetric vowel harmony system where the vowels of the stem determine the series of vowels in the whole word.

5.1.1.4 ATR Harmony in Gureñ loan words

It has been observed that Gureñ loan words are also governed by vowel harmony rules. All vowels in loan words in Gureñ harmonise in the feature [±ATR] as shown in the following loans from English:

[+ATR]

- (138) [teebule] ‘table’
[alopele] ‘aeroplane’
[sukuu] ‘school’
[torogo] ‘truck’

[-ATR]

- (139) [tɛɛla] ‘tailor’
[pɔlɔŋa] ‘police’
[aŋkite] ‘handkerchief’
[bɔgɔtɛ] ‘bucket’

5.1.1.5 ATR harmony in Gurene compounds

In Gurene compounds vowel harmony occurs both within and across constituents of the compound. In this process, the word is the harmonic domain and in cases where harmony occurs across word boundaries (constituents of the compound), vowels in both constituents of the compound agree in [\pm ATR] harmony. Examples of harmony across word boundaries as in bold face are presented below:

(140) a. $/bi.a/ + /woko/ \rightarrow [biwoko]$
 [+ATR]
 ‘child + long \rightarrow tall child’

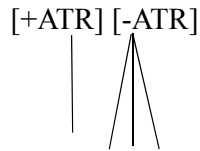
(141) b. $/bi.a/ + /bila/ \rightarrow [bibila]$
 [+ATR]
 ‘child + little \rightarrow little child’

(142) a. $/bɔraa/ + /mɔlɔga/ \rightarrow [bɔramɔlɔga]$
 [-ATR]
 ‘man + red \rightarrow fair in complexion man’

b. $/kɔma/ + /pɪgə-sɪ/ \rightarrow [kɔmpɪgəsɪ]$
 [-ATR]
 ‘children + little-PL \rightarrow little children’

The second type of harmony in compounds is the type that does not occur across the two constituents of the compound. In other words, harmony does not spread across the two words in a compound but is blocked at the end of the first constituent. In this process, only vowels

of the individual parts of the compounds harmonise. For instance, when vowels of the first constituent of the compound agree in the feature [+ATR], vowels of the second constituent will have [-ATR] feature and vice versa. Therefore, the following examples, illustrate compounds containing vowels from both [+ATR] and [-ATR] harmonic sets:



- (143) a. /bi.a/ + /mɔləga/ → [bimɔləga]
 ‘child + red → fair in comp. child’



- b. /bi.a/ + sabeləga → [bisabɔliga]
 ‘child + black → dark in comp. child’



- (144) a. /bɔra:/ + /woko/ → [bɔrawokɔ]
 ‘man + long → tall man’



- b. /kɔma/ + /bibəsi/ → [kɔmbibəsi]
 ‘children + little-PL → ‘little children’

5.2. Vowel-consonant harmony

Consonant harmony is a kind of long-distant assimilation, usually across intervening vowels or consonants. This type of harmony is not common in Gurene. An example of consonant harmony in Gurene is nasal place assimilation (see 5.5). In the vowel-consonant harmony process, vowels and consonants are required to agree with each other in a harmonic feature such as nasalization or pharyngealization (Hansson 2001). According to Hansson (2001), vowel-consonant harmony usually show fixed directionality which could take the form of either leftward or rightward spreading, or sometimes a combination of both. Vowel-consonant harmony is mostly caused by some kind of consonants, just like consonant harmony. However, vowel-consonant harmony is different from consonant harmony in that, all segments, which include both vowels and consonants are affected by the harmonic process. In other words, the harmonic feature in question spreads through every segment in the word.

Rose & Walker (2011), describe harmony as an assimilatory process, which may operate over a string of multiple segments. In other words, harmony may occur from a distance across at least one seemingly unaffected segment as shown in (143a & b above), or it may involve a continuous string of segments as in (145c) below;

- (145)
- | | | |
|----|--------------|-------------|
| a. | [biwoko] | ‘tall boy’ |
| b. | [bɔramɔləga] | ‘fair main’ |
| c. | [dɛɣərɔ] | ‘dirt’ |

In examples (145), we observe that vowels in each word agree in [\pm ATR] feature across a sequence of intervening consonants. However, in (145c), we observe continuous harmony as intervening segments participate in the process. I.e. all the segments except the initial onset are affected or are involved in the harmony process. Thus, the string of segments as indicated in bold; [d**ɛ**ɣ**ər**ɔ] ‘dirt’, agree in the feature [+continuant].

In Gurene, an example of this type of harmonic system involving a continuous string of segments is vowel-consonant harmony, which involves the interaction of /g/ with other segments. In Gurene, vowel-consonant harmony occurs between the oral velar stop and [-ATR] vowels. This process is discussed in the following sections.

5.2.1 /g/ interaction with [-ATR] vowels

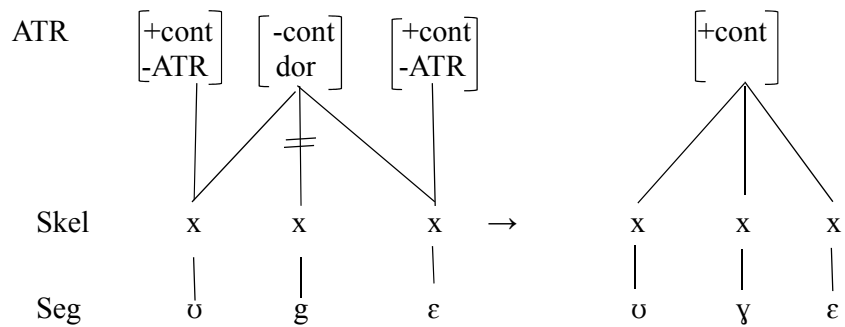
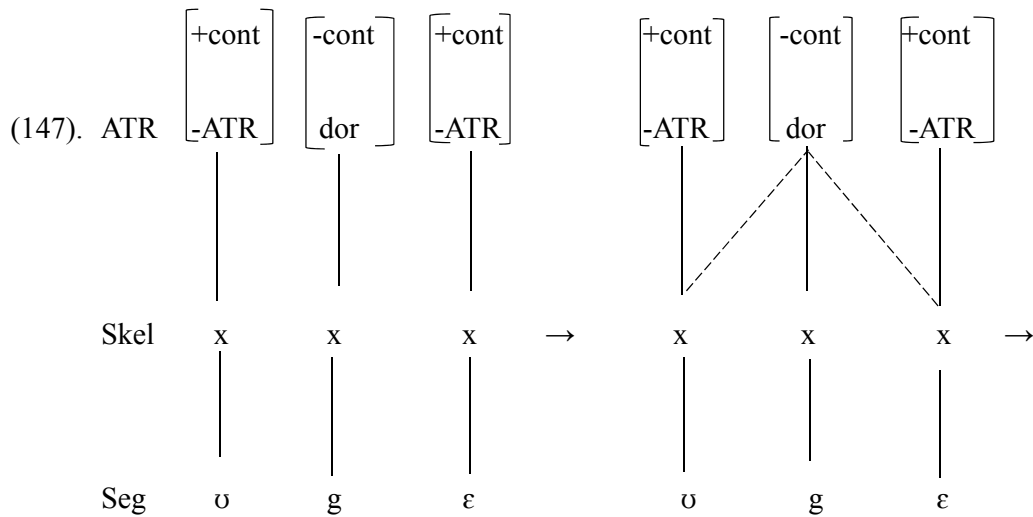
As already indicated above, in Gurene, the voiced velar stop /g/ is realized as a velar fricative [ɣ] when it occurs between [-ATR] vowels. This is a case of spirantization in Gurene where a stop or plosive changes to a fricative as illustrated in (146) below:

- (146) a. /bugɛ/ → [buɣɛ] ‘to hit someone with the fists’
b. /pɔga/ → [pɔɣa] ‘wife’
c. /baga/ → [baɣa] ‘idols’
d. /bagɛ/ → [baɣɛ] ‘to adorn’
e. /degerɔ/ → [deɣɔɔ] ‘dirt’
f. /sagom/ → [saɣom] ‘to go bad’
g. /beɣema/ → [beɣɛma] ‘dirts’
h. /lɔgɔm/ → [lɔɣɔm] ‘to tickle’

The above illustration can be generalised as follows,

$$\text{Rule 10: } /g/ \rightarrow [y] / \left[\begin{array}{c} -\text{ATR} \\ \hline \end{array} \right] \text{ — } \left[\begin{array}{c} -\text{ATR} \\ \hline \end{array} \right]$$

This implies that the voiced velar stop is realized as a velar fricative in the environment of [-ATR] vowels. The following is a non-linear representation of this phenomenon;



In the non-linear representation, we see the vowels spread their [+continuant] feature onto the velar stop, therefore causing the velar stop to change to velar fricative with a [+continuant] feature. In this process, we observe first, an alternation of a segment from stop to fricative and then vowel-consonant harmony which is between [-ATR] vowels and the velar consonant. Thus, in Gurene /g/ changes to /y/ when it occurs between [-ATR] vowels.

5.3 ATR and rounding harmony

Literature shows that, languages that show round harmony usually also show harmony for another feature. Therefore, most languages that show round harmony, also show backness harmony. For instance, in the Niger-Congo languages like Dagaare and Chumburung (spoken in Ghana), and Igbo (spoken in Nigeria), round harmony is said to occur with ATR harmony (van der Hulst and van de Weijer 1995; Krämer 2003) cited in Rose and Walker (2011). This observation is applicable to the Gurene data. For instance, the examples that follow demonstrate that ATR harmony occurs with round harmony. Therefore, the examples in (148a - d) have the features [-ATR], [-round].

	Underlying form	output form		
(148) a.	/dɪkɛ/	‘to take’	/dɪkʉɛ/ [dɪkʉɛ]	‘the act of taking’
b.	/pɪkɛ/	‘to discover’	/pɪkɪɛ/ [pɪkɪɛ]	‘the act of discovering’
c.	/fɪkɛ/	‘to break’	/fɪkɪɛ/ [fɪkɪɛ]	‘the act of breaking’
d.	/pɪkɛ/	‘to open one’s eye’	/pɪkʉɛ/ [pɪkʉɛ]	‘the act of opening the eye’

The data above show that ATR harmony in Gurene occurs with rounding. All the vowels in each word agree in ATRness, and in terms of rounding, all the vowels are [-round]. Rounding harmony in Gurene is triggered by the final vowel of the stem. In this case, harmony is between the final vowel of the verb stem and final vowel of the deverbal noun. The final vowel of the suffix, which is also a nominalizing morpheme of the deverbal noun, harmonises with the final vowel of the verb stem in rounding. Thus, if the final vowel of the stem is [±round], the final vowel of the deverbal noun must also be [±round] including all other vowels in the word as illustrated below;

		Singular	plural	output form	
(149)	a.	/kɔkɔ/ ‘ghost’	/kɔgɔrɔ/	[kɔɣɔrɔ]	‘ghosts’
	b.	/dɔkɔ/ ‘pot’	/dɔgɔrɔ/	[dɔɣɔrɔ]	‘pots’
	c.	/yɔkɔ/ ‘clay’	/yɔgɔgɔ/	[yɔɣɔrɔ]	‘clay-PL’
	d.	/lɔkɔ/ object’	/lɔgɔrɔ/	[lɔɣɔrɔ]	‘objects’

We observe rounding occurring with backness in this data in (149) as all the vowels in the words have the features [+round], [+back], [-ATR]. As already indicated above, it is the final vowel of the stem that triggers rounding. Here, the final stem vowel is a singular marker, which harmonises with following vowels in rounding and backness. This includes the final vowel, which is the plural suffix. Therefore, in the above examples, the rounding harmony occurs in nouns and it is between the singular suffix and the plural suffix vowels. Hence, the singular noun suffix vowel triggers rounding in the plural suffix vowel as shown below;

		Singular	plural	output form	
(150)	a.	/dak-a/	/dag+si/	[daɣəsi]	‘box’
	b.	/vak-a/	/vag+si/	[vaɣəsi]	‘guinea fowls nest’
	c.	/pak-a/	/pag+si/	[paɣəsi]	‘hut’
	d.	/kɔk-a/	/kɔg+si/	[kɔɣəsi]	‘chair’
	e.	/vuk-a/	/vug+si/	[vugesɪ]	‘mound’

The data in (150) above show that the low unrounded vowel alternates with ATR vowels. When the low unrounded vowel /a/ occurs with [+ATR] vowels, the plural suffix vowel is realized as [+ATR], and when it occurs with [-ATR] vowels, the plural suffix vowel is realized as [-ATR]. Also, the low vowel /a/ agrees with the plural suffix vowel in rounding. Therefore, both the singular suffix vowel and the plural suffix vowel are [-round] in feature.

Generally, the data on rounding and backness harmony show that initial stem vowels are not affected by harmony.

5.4 Nasal harmony

Nasal harmony in Gurenɛ can be triggered by a nasal consonant or a nasal vowel, which propagates its nasal feature progressively, regressively or bidirectionally through target segments, which are usually oral vowels and certain oral consonants. For instance, when the trigger is a consonant, the nasal consonant spreads its nasal feature onto the target vowels. The target vowel could be the preceding vowel, the following vowel or both depending on the position of the nasal consonant. Below are examples showing regressive nasal assimilation in Gurenɛ;

5.4.1 Regressive nasal harmony

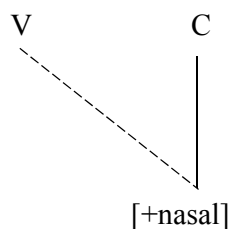
- (151) a. /zim/ [zĩm] ‘fish’
 b. /kum/ [kũm] ‘death’
 c. /zom/ [zõm] ‘flour’

The above data can be formalized and represented nonlinearly as follows;

$$\text{Rule 11: } /V/ \rightarrow [\check{V}] / \text{ ______ } [N]$$

This implies a vowel becomes nasalized when it precedes a nasal consonant.

(152) Nonlinear representation;



/zõm/ ‘flour’

In the above examples, the spreading of the nasal feature is from the right to the left. Therefore, nasal assimilation in this case is regressive. This is because the nasal consonant occurs syllable final.

5.4.2 Progressive nasal harmony

The spreading of the nasal feature in the data in (153) is progressive or rightward as it occurs syllable initial and spreads to the right as follows;

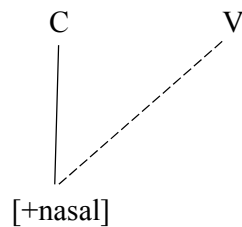
- (153)
- | | | | |
|----|----------|------------|------------|
| a. | /naŋa/ | [nã.ŋã] | ‘scorpion’ |
| b. | /nuŋɔ/ | [nĩ.ŋĩ] | ‘meat’ |
| c. | /ŋmaŋa/ | [ŋmã:.ŋã] | ‘monkey’ |
| d. | /ɲɔ/ | [ɲɔ̃] | ‘to burn’ |
| e. | /ma’ana/ | [mã.ʔã.nã] | ‘okro’ |

The above data can be formalised as in rule (12) and represented non-linearly as in (154);

$$\text{Rule 12: } /V/ \rightarrow [\tilde{V}] / [N] \text{ —}$$

Rule (12) implies that, a vowel becomes nasalized when it occurs after a nasal consonant.

(154) Nonlinear representation of progressive nasal harmony;



(154), illustrates spreading of the nasal from the left to the right. However, there are instances where in multisyllabic words nasal assimilation takes place only within the syllable in which

the nasal consonant occurs. For instance, in example (155), the nasal consonant occurs in coda position and only the preceding vowel in the syllable is nasalised. Thus, nasal assimilation does not operate across syllables in these examples as shown in (155);

- (155) a. /dɪsɔŋkɔ/ [dɪ.sɔ̃ŋ.kɔ] ‘spoon’
 b. /tɔsɔŋkɔ/ [tɔ.sɔ̃ŋ.kɔ] ‘material place on the head when carrying load’
 c. /pɔgɛmĩŋka/ [pɔ.gɛ.mĩŋ.ka] ‘a woman that observes personal hygiene’
 d. /kinkileŋa/ [kĩŋ.ki.lɛ.ŋã] ‘bat’
 e. /kinkirego/ [kĩŋ.ki.rɛ.go] ‘ferry’
 f. /koʔom/ [ko.ʔõm] ‘water’
 g. /zonko/ [zõŋ.ko] ‘hair’
 h. /gbĩŋka/ [gbĩŋ.ka] ‘basket’
 i. /bugum/ [bu.gũm] ‘fire’
 j. /pɔγõm/ [pɔ.γõm] ‘already’

5.5 Consonant nasalization

Another type of harmony that is observed in Gurene is consonant nasalization, a type of nasal harmony. This type of nasal harmony is usually triggered by nasal vowels (Rose & Walker 2011). In this process, a nasal vowel(s) propagates its nasal feature onto an oral consonant, thereby causing the oral consonant to become nasalized. In Gurene, consonants that are affected by nasal assimilation are the glottal stop /ʔ/, the glottal fricative [h], which is in free variation with /s/, and the labial velar approximant [w]. These consonants are discussed under transparency and opacity in section (5.5.1).

5.5.1 Transparency and opacity

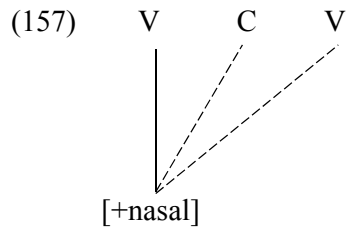
Transparency and opacity occur in Gurene. There are instances where the nasal feature can spread across some consonant. Example of such consonants is the glottal stop /ʔ/, the glottal fricative [h], and the labial velar approximant [w]. Hence, these three consonants are transparent to nasal spread in Gurene while all other consonants are opaque to nasalisation because they block the spread of the nasal feature. The following sections (5.5.1.1, 5.5.1.2 & 5.5.1.3) discuss the three consonants that are transparent to nasalisation.

5.5.1.1 [h] Nasalization

In Gurene, [h] is an allophone of /s/. When either of them occurs in the plural morpheme (suffix) mostly in the domain of plural nouns, the consonant of the plural suffix could be either /s/ or [h]. When the suffix is pronounced with /s/ in the environment of nasal vowels, nasal harmony does not occur. This is because the nasal harmony process does not affect /s/ - the nasal feature cannot spread across it. However, when it is pronounced with its variant /h/, nasalization occurs and it is continuous in a rightward direction. Below are examples,

Underlying form	surface form	
(156) a. /dõsv/	[dõhĩ]	‘animals’
b. /gõsv/	[gõhĩ]	‘kapok tree’
c. /tĩsv/	[tĩhĩ]	‘towns’
d. /sõsv/	[sõhĩ]	‘beauty-PL’

From the data it is realized that while the alveolar fricative /s/ blocks assimilation, its allophonic variant /h/ allows the spreading of the nasal feature from a nasal stem vowel onto it and a following oral vowel. This is represented nonlinearly in (157).



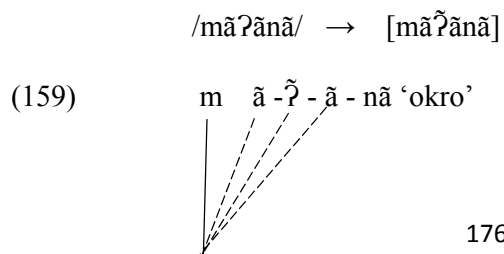
In the above representation, the nasal vowel spreads its nasal feature onto the following segments including the glottal fricative /h/. Therefore, we consider the glottal fricative /h/ as transparent to nasal harmony in Gurene while /s/ is opaque.

5.5.1.2 /ʔ/ nasalization

Another consonant that is affected by nasal assimilation in Gurene is the glottal stop /ʔ/. This consonant is also considered transparent as it allows a nasal segment to propagate its nasality onto it and across it onto adjacent segments as shown in the examples below;

	Underlying form	surface form	
(158) a.	/nyaʔalom/	[nyãʔãlõm]	‘old-age’
b.	/maʔana/	[mãʔãnä]	‘okro’
c.	/dãʔaŋa/	[dãʔãŋã]	‘kitchen’
d.	/nyaʔaŋa/	[nyãʔãŋã]	‘old’

Nonlinear representations of /ʔ/ nasalization;

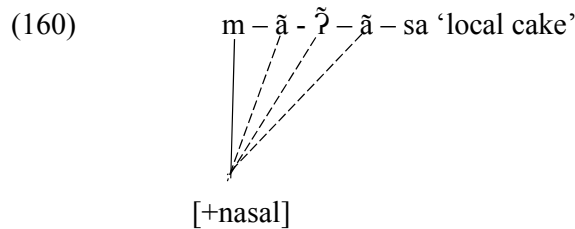


[+nasal]

The glottal stop allows the nasal feature to spread through it progressively. The representation in (159) shows that the nasal consonant spreads its nasality onto the first vowel, which then extends to the glottal stop and onto the third segment (vowel).

However, in example (160), the spreading of the nasal feature ends on the third segment which is the second vowel. This is because spreading of the nasal feature is blocked by the [+strident] segment, /s/. Hence, the last vowel is not affected by the assimilation as shown in (160);

/mãʔãsa/ → [mãʔãsa]



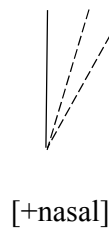
Unlike examples (159 & 160), in (161), it is a nasal vowel that spreads its nasal feature directly onto the glottal stop and the following vowel. The following are nonlinear representations of how nasal vowel spreads its nasal feature onto the glottal stop /ʔ/.

/dãʔaŋã/ → [dãʔãŋã]

/bãʔa/ → [bãʔã]

(161) a. d - ã - ʔ - ã - ŋã 'kitchen'

b. b - ã - ʔ - ã 'sickness'



In the above representations, it is observed that, assimilation is continuous as the nasal segments spread their nasality onto following segments in a succession including the glottal stop. Therefore, the trigger is either a nasal consonant or a nasal vowel of which the glottal stop is a target among vowels.

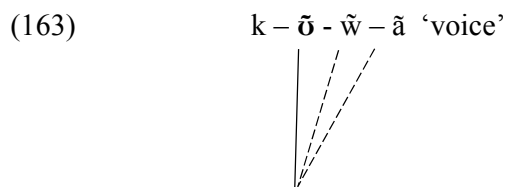
5.5.1.3 /w/ nasalisation

We also observe that the labial-velar consonant /w/ may also undergo nasalisation in Gurene. In the phonetic form, the labial-velar segment acquires the nasal feature of the nasal segment that precedes it, and at the same time allows spreading of the nasal feature to pass through it onto a following vowel. This process can be formalized as follows,

$$\text{Rule 13: } /w/ \rightarrow [\tilde{w}] / \left[\begin{array}{c} +nas \\ \end{array} \right] \text{ ______}$$

Rule (13) shows that the labial velar consonant becomes nasalized when preceded by a nasal segment. In this process, the nasal segment propagates its nasal feature onto the first vowel, through the labial velar consonant onto the final vowel. For example, /moa/, /koa/ and /doa/ have nasal vowels which spread to /w/ and across to the following vowels. The examples in (162) illustrate this process with an autosegmental representation in (163),

(162) a.	/moa/	/koa/	/doa/	underlying forms
b.	[m ^õ wã]	[k ^õ wã]	[d ^õ wã]	nasalisation
c.	[m ^õ wã]	[k ^õ wã]	[d ^õ wã]	surface forms
	‘moshie decent’	‘voice’	‘dawadawa tree’	



[+nasal]

Implied from the above examples is, spreading of the nasal feature is rightward or progressive. The nasal segment spreads its nasal feature to all following segments. The labial velar segment /w/ does not block harmony but allows the spreading of the nasal feature through it to following segments.

5.6 Nasal place assimilation in Gureɛ

Nasal place assimilation is another interesting phenomenon that occurs in Gureɛ. In this process, segments can be grouped together such that particular sets of segments may undergo the same phonological process. Usually, a nasal consonant acquires the place of articulation of a following obstruent (Ewen and Van Der Hulst 2001). Nasal place assimilation in Gureɛ is observed in compound names and the first person possessive pronoun. I will first discuss nasal place assimilation in compound names before I delve into assimilation involving the first person possessive pronoun.

5.6.1 Nasal place assimilation in Gureɛ compounds

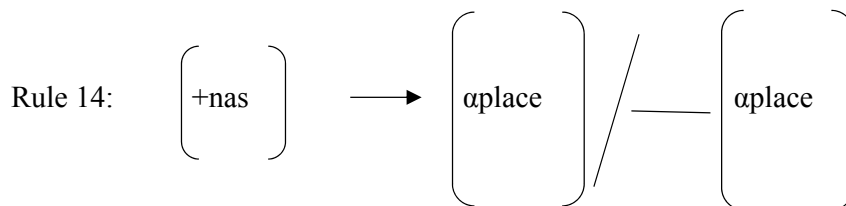
As already indicated in the introduction, in Gureɛ nasal place assimilation is observed in compound names. In this process, usually the velar nasal changes its place of articulation to the place of articulation of a following consonant. This is illustrated using only personal names that are compounds in the following examples.

	Underlying form		surface form
(164) a.	/ayamɲa + pɔka/	→	[ayãmpɔka]
b.	/ayamɲa + dɔ:/	→	[ayãndɔ:]
	Underlying form		surface form

- (165) a. /adɔŋɔ + pɔka/ → [adɔmpɔka]
 ‘adɔŋɔ + woman → a personal name’
- b. /adɔŋɔ + taba/ → [adɔntaba]
 ‘adɔŋɔ + tobacco → adɔŋɔ’s tobacco’
- c. /adɔŋɔ + gɔbɛga/ → [adɔŋgɔbɛga]
 ‘adɔŋɔ + left → a personal name’
- d. /adɔŋɔ + kɔberɛ/ → [adɔŋkɔbɛrɛ]
 ‘adɔŋɔ + bone → adɔŋɔ’s bone’

In examples (164), a bilabial nasal consonant occurs before the velar nasal /ŋ/ whereas examples in (165) do not have a nasal consonant preceding the velar consonant. Hence, in examples (164), the bilabial consonant maintains its bilabial place feature because of the second bilabial consonant following it.

Generally, the final vowel in each of the first words is deleted and creating room for the two phonemes involved in the assimilation process to be adjacent. The place feature of the oral bilabial consonant which begins the second words spreads to the nasal velar consonant and causing it change its place of articulation as velar to bilabial but maintains its nasality. Therefore, the following is a general rule formulated for Gurene nasal place assimilation using distinctive features.



Implied in the above representation is that a nasal consonant's place of articulation changes according to the place of articulation of the consonant that follows it. Thus, any nasal consonant will take the place of the articulation of the consonant that comes after it.

For instance, the nasal dorsal /ŋ/ can be realised as a labial [m] or a coronal [n] depending on the environment. However, when it is preceded by another dorsal ([-nasal]), its dorsal feature does not change. Therefore, whenever a nasal is adjacent to another sound, the nasal changes its place of articulation to that of the first consonant that follows it. However, it is unclear how the nasal consonants surface in the output forms. This is because, [ŋ] in examples (164a & b) is preceded by a nasal consonant whereas in (165) it is neither preceded nor followed by a nasal consonant. Also, it has been observed that there are some intervening segments which have not been captured by these rules. Therefore, we will use the non-linear representations of feature geometry to explain these processes in the next section (5.6.1.1).

5.6.1.1 Feature Geometry representation of Nasal place assimilation in Gurenɛ compound

Feature Geometry is a non-linear representation of the structure of segments. In this theory, features that regularly function together as a unit in phonological rules are grouped into constituents while segments are represented in terms of hierarchically organized node configurations whose terminal nodes are feature values, and whose intermediate nodes represent constituents (Clements and Humes 1996; Clements 1985). In the non-linear representation of feature geometry, relationship between features is expressed explicitly with features organized under hierarchically superordinate nodes known as class nodes, which are dominated by the root node. In this representation, the root is the 'holding position' from where a segment is all 'built up', and the Class nodes branch down to terminal nodes. The following is a representation of Clements and Humes (1996) universal features tree for consonants and vowels;

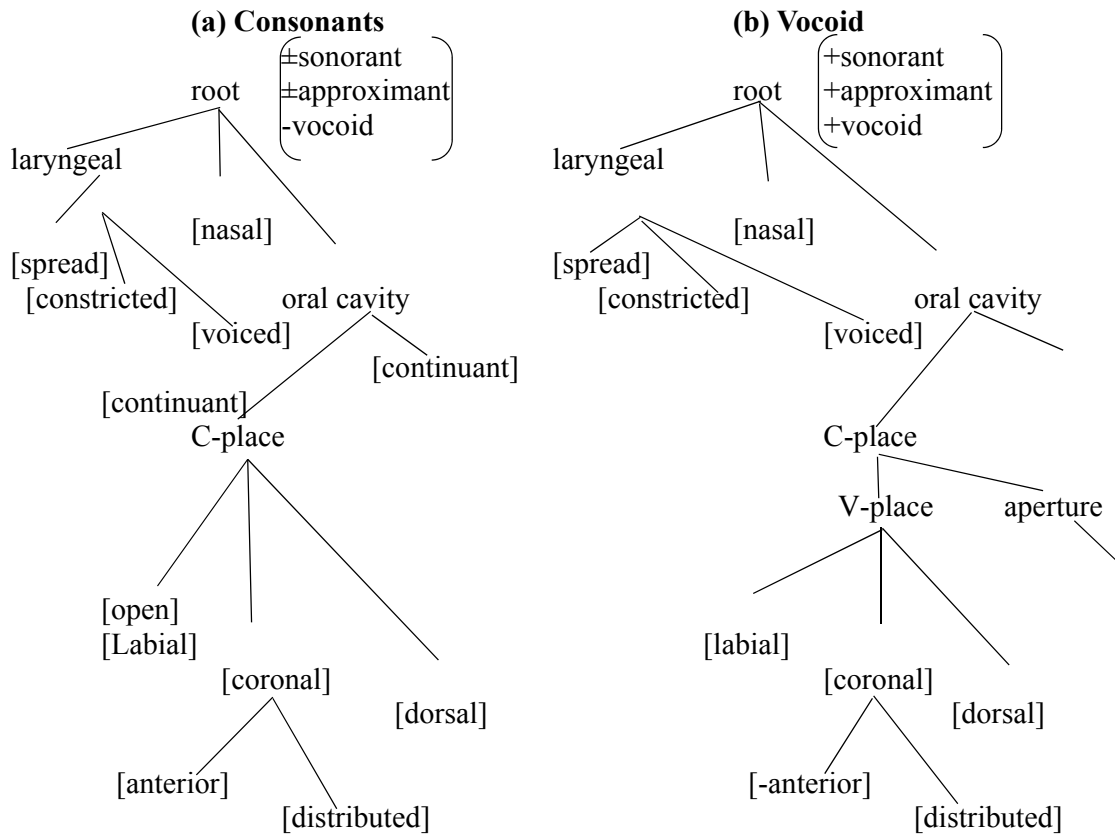


Figure 7: Clements and Humes (1996) universal feature tree

In this representation when a class node is mentioned, it is only the features dependent on it that are affected and not the other nodes. Example is the representation of Gureñ /n/ and /p/ in figure (7) and (8) below;

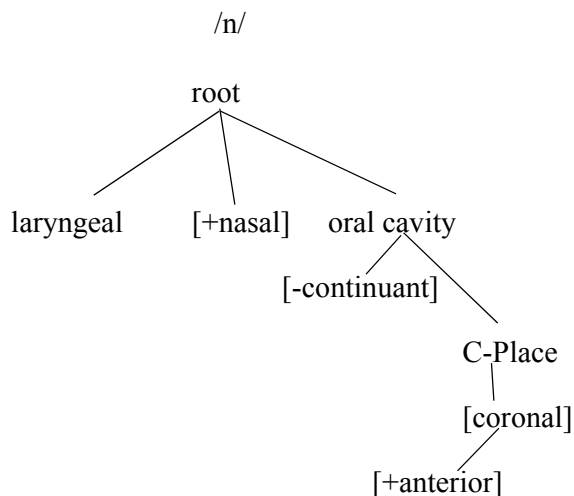


Figure 8: Feature geometric representation of /n/

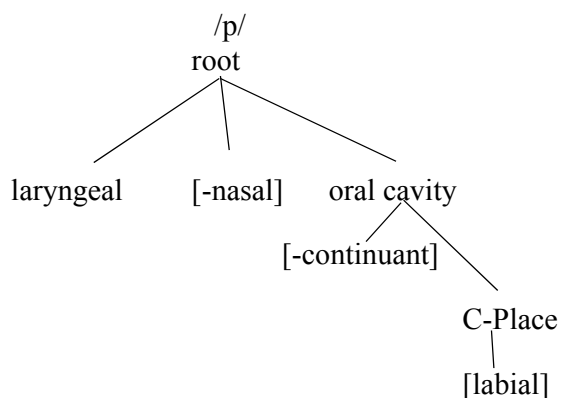


Figure 9: Feature geometric representation of /p/

Here, when the nasal consonant shares the place of articulation of the following obstruent, two processes take place; disassociation/delinking (deletion) of the nasal Place node and spreading of obstruent Place node (assimilation). Before this type of assimilation can take place in Gurene, the initial consonant of the second constituent and the final consonant of the first constituent (usually a nasal) have to be adjacent and for that to happen, first, delinking/deletion has to take place. For instance, the final syllable of the first word in the underlying form has to be deleted as in (166b) so that the two consonants involved in the assimilation process are adjacent to each other as in (166c) and then the final process of spreading takes place to result in the output form as in the derivation in (166d) below;

Underlying form	surface form	phonological processes
(166) a. ayamɲa + dɔ:		(input)
b. ayamɲa + dɔ:		(deletion)
c. ayan + dɔ:		(spreading)
d. ayan + dɔ:	→ [ayãndɔ:]	(output)

The examples in (167) also go through the same processes as the above examples - deletion of intervening segments and spreading of place feature. However, in (167), it is not a whole syllable that deletes but the final vowel, which allows the nasal to be in contact with the adjacent consonant (following).

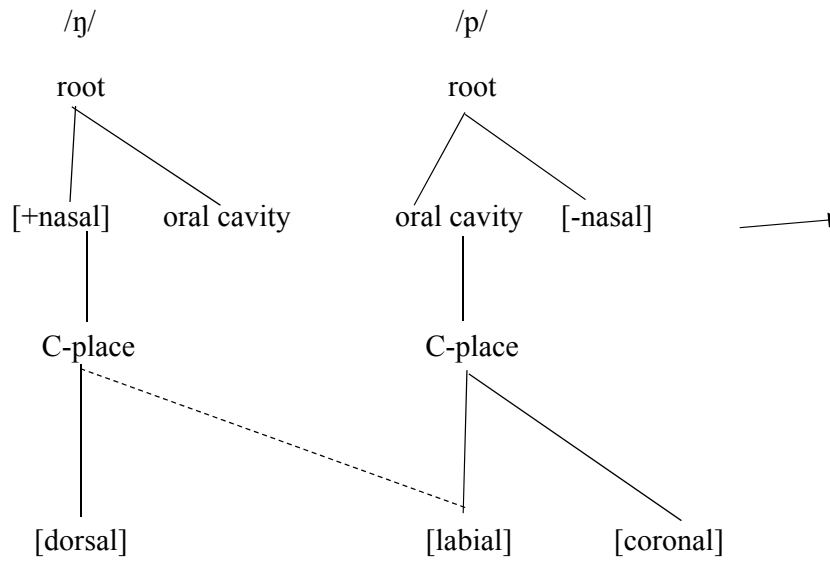
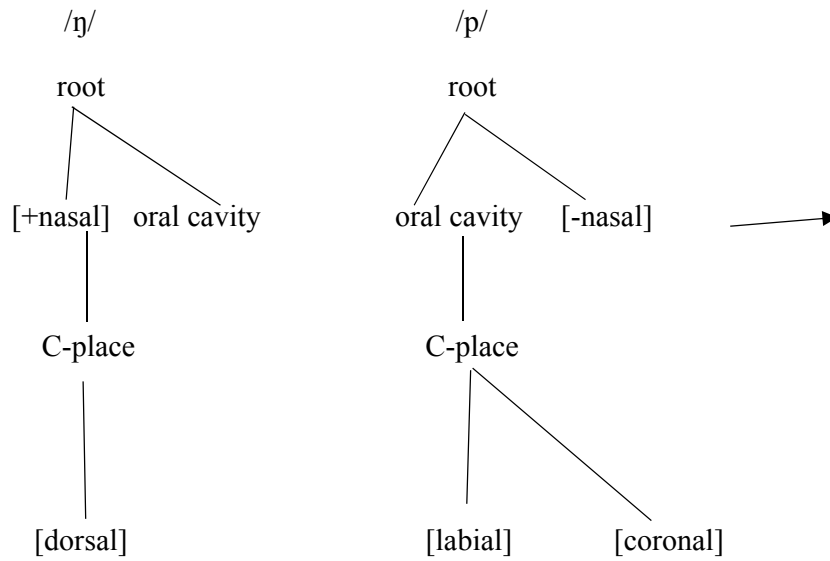
(167) atãɲa	+	pɔka	→	[atãmpɔka]
‘male name (rock)	+	woman	→	a personal name -female’
adõŋɔ	+	pɔka	→	[adõmpɔka]
‘male name (horn)	+	woman	→	a personal name - female’
ayĩne	+	pɔka	→	[ayĩmpɔka]
‘male name (god)	+	woman	→	a personal name - female’

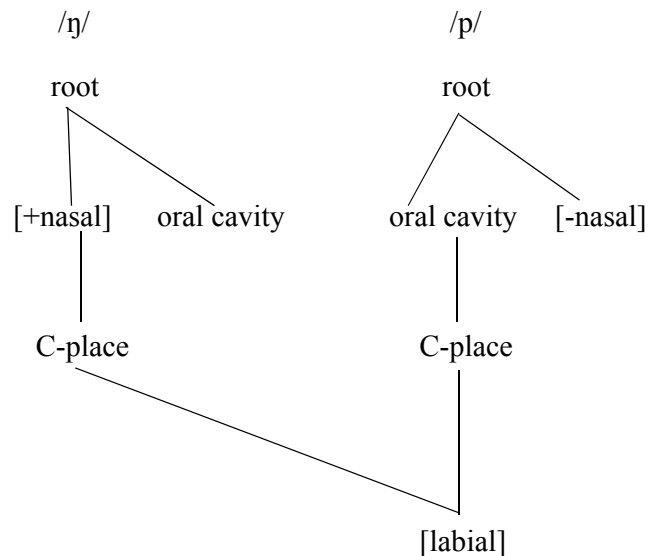
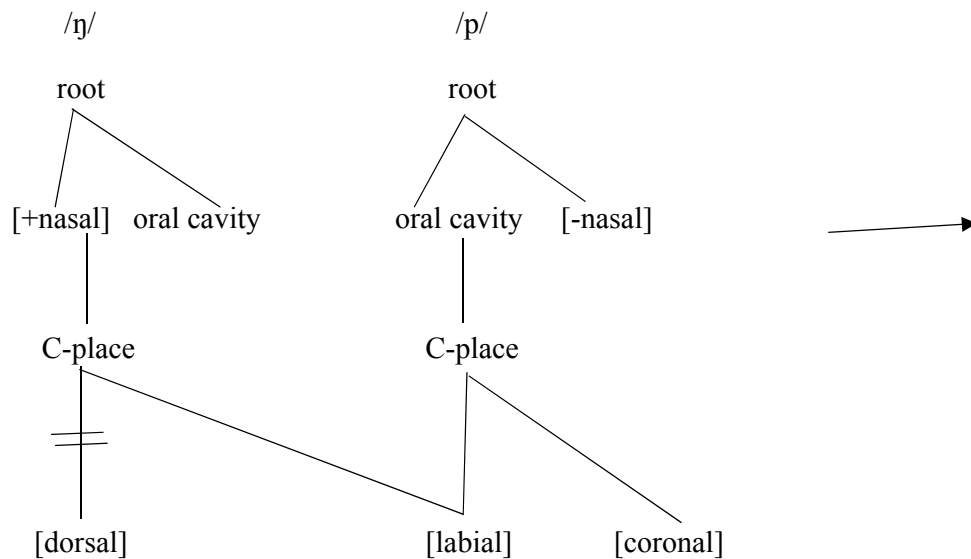
The two processes of disassociation and spreading can be formalised into two rules and applied to the data as follows:

Rule 15: i. Disassociation (delinking) of nasal Place node

ii. Spreading of obstruent Place node

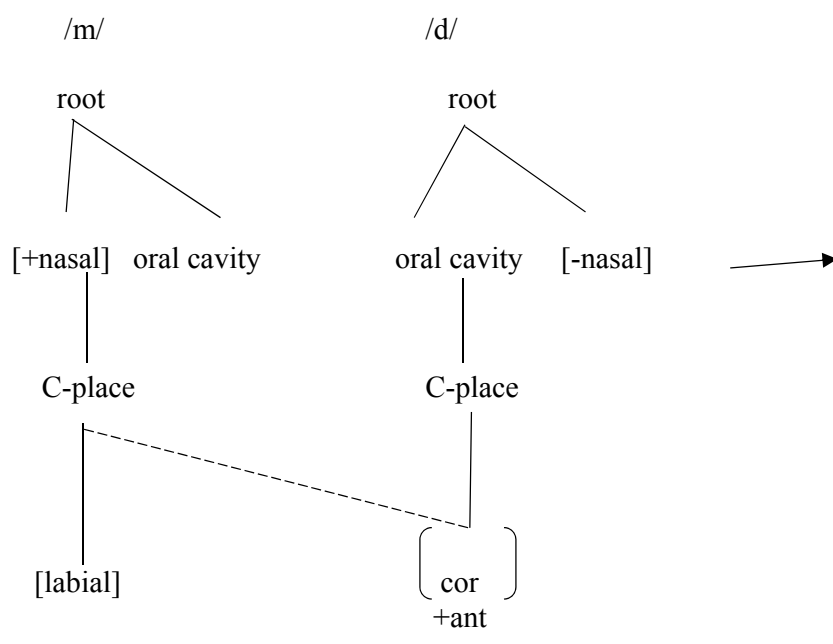
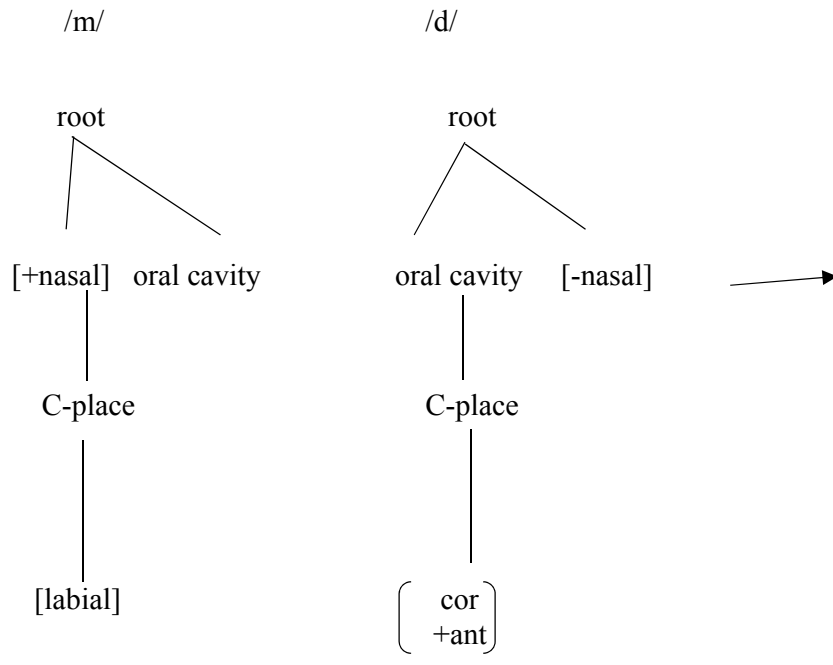
(168) /adõŋɔ pɔka/: /ŋ/ +/p/ = [mp] → [adõmpɔka]

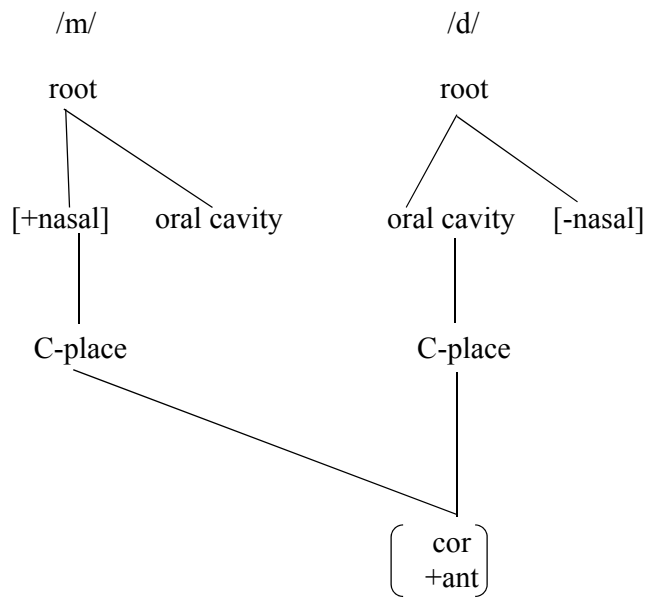
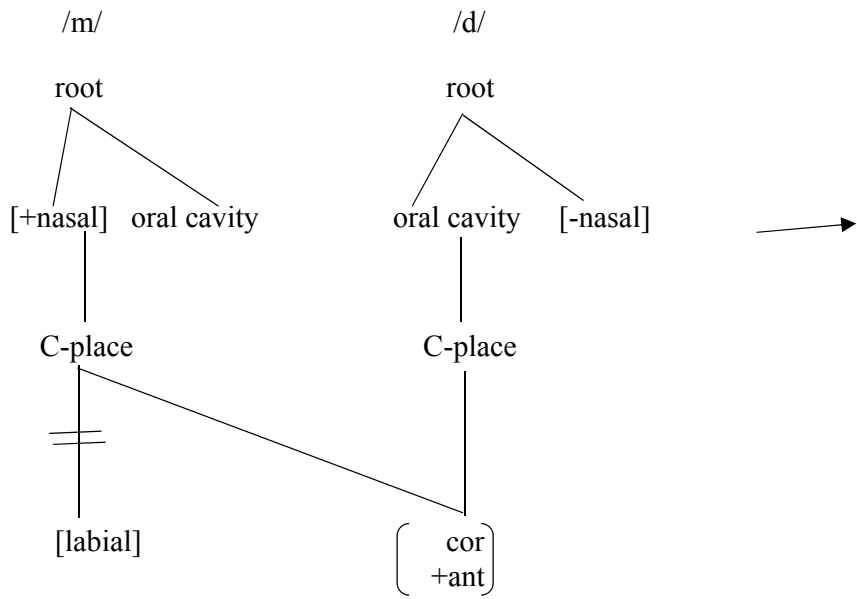




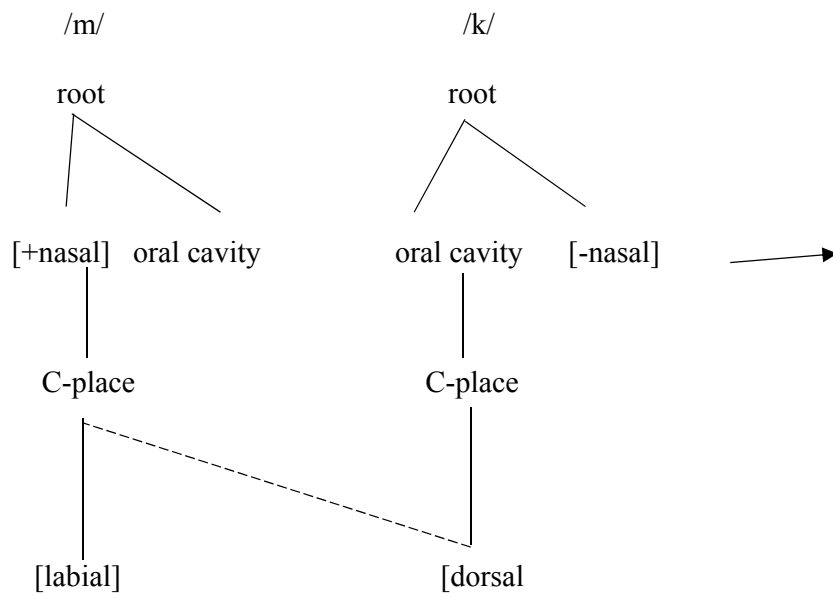
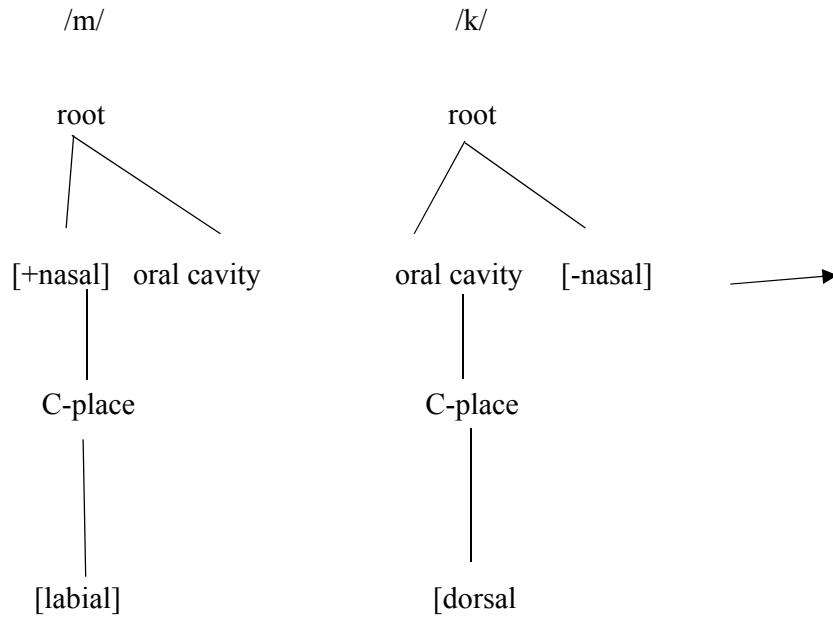
Example (168), the dorsal segment loses its dorsal place feature, which results in it being delinked while the obstruent spreads its place feature onto it thereby changing it from a dorsal sound to a labial sound. A similar process happens in the tree representations in (169) and (170) except that while in (168) the target segment changes from dorsal to labial, in (169) the target segment changes from labial to coronal while in (170) it changes from labial to dorsal sound as illustrated below;

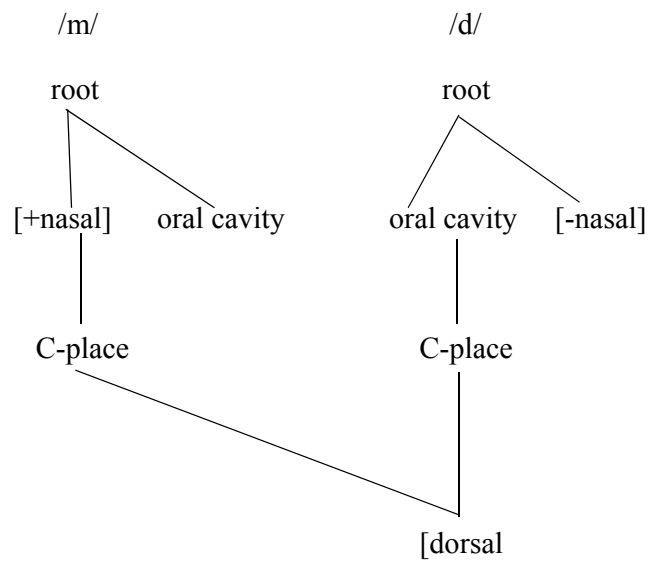
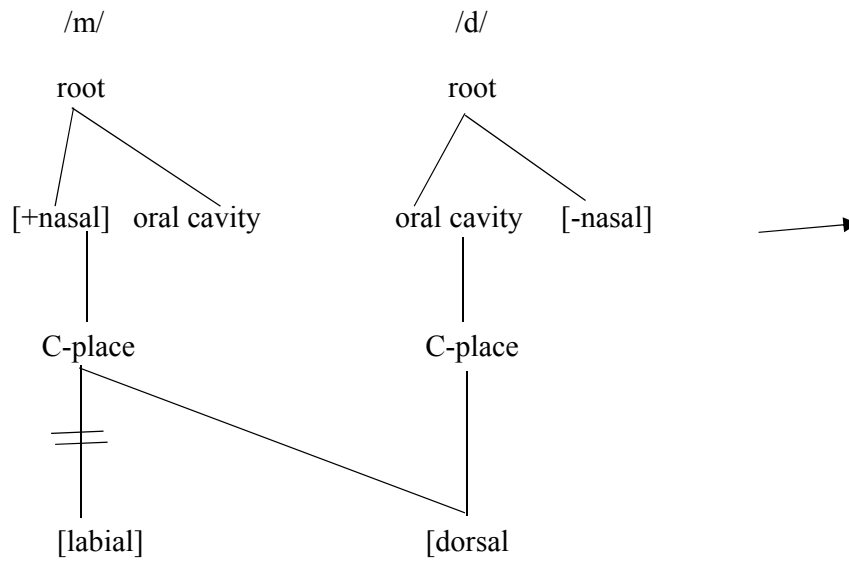
(169) /ayamdo/: /m/ + /d/ = [nd] → [aiando:]





(170) /asumkai/: /m/ + /k/ = [ŋk] → [asʊŋkai]





The illustrations in (168 - 170) show that in Gurene, nasal place assimilation may take place at word boundaries and this kind of assimilation is backward or regressive.

5.6.1.2 Other processes

Other processes that ensued from nasal place assimilation in Gurene compounds are vowel deletion and, consonant deletion and alternation. In these processes, intervening segments between targets and triggers are usually deleted in order for assimilation to take place.

Vowel deletion

We observe that in (171), vowels that occur between the targets and triggers delete in order for assimilation to take place. When the compound is made up of two stems, the final vowel of the first stem deletes and if the compound is composed of three stems, the final vowels of both first and second stems delete as demonstrated below:

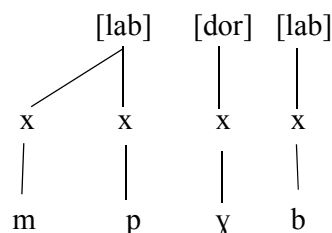
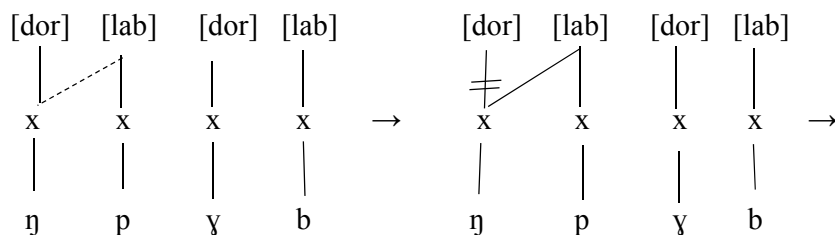
(171) /a.do.ŋɔ - pɔ.ya - bi.la/ → [a.do.ŋɔ.pɔ.yɔ.bi.la] → [adɔmpɔybila]

	Pl	[lab]	[V]	[lab]	[dor]	[V]	[lab]		[lab]	[V]	[lab]	[dor]	[V]
[lab]										≠			≠
	Skel	x	x	x	x	x	x	→	x	x	x	x	x
x													
	Seg	ŋ	ɔ	p	y	a	b		ŋ	ɔ	p	y	a
b													

Consonant deletion/alternation

With consonant deletion and alternation, the coda of the second syllable deletes while the consonant of the third syllable, which is a nasal velar assimilates to the bilabial place feature of the following consonant. Also, the consonant of the fourth syllable, which is a velar stop, changes to a velar fricative in the compound. Thus, the deletion and alternation of these segments allow assimilation to take place as shown in example (172):

(172) /a.yam.ŋa - pɔ.ka - bi.la/ → [a.jaɔ.ŋɔ.pɔ.ɣɔ.bi.la] → [ajampɔɣbila]



5.6.2 Nasal place assimilation in Gurene pronoun

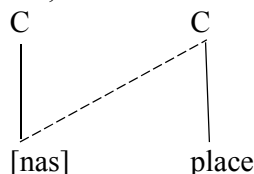
Another type of nasal place assimilation in Gurene is the kind that involves the first person possessive pronoun *m* ‘my’ and its variants *n* and *ŋ*. These are syllabic nasals, which usually occur as V-syllable type. Just like what is discussed above, the environment in which the nasal consonant occurs also conditions this type of harmony. i.e., the first person possessive pronoun ‘*m*’, which is a labial nasal, changes to either coronal when it precedes a coronal consonant as in (173) or to a dorsal when it occurs before a dorsal consonant as shown in (174). Usually, spreading is regressive as illustrated in the data.

(173)	Underlying	deletion	spreading	surface form
a.	/ma sɔ/	m sɔ	n sɔ	[n sɔ] ‘my father’
b.	/ma tã	m tã	n tã	[n tã] ‘my sibling’

- c. /ma daam/ m daam n daam [n dāām] ‘my pito’
- d. /ma ligeri/ m ligəri n ligəri [n ligəri] ‘my money’

In (173), the labial nasal consonant assimilates to the place of articulation of the following consonant that is a coronal. Therefore, the nasal consonant changes from a [LABIAL] to [CORONAL] as shown in (174).

(174) Non-linear representation;



The data in (173) have the same representation as those in (175). The only difference is that in (175), the change of place of articulation is from [LABIAL] to [DORSAL] since the target consonant is followed by a dorsal consonant as shown below;

(175)	Underlying	deletion	spreading	surface form
a.	/ma kɔma/	m kɔma	ŋ kɔma	[ŋ kɔma] ‘my children’
b.	/ma kole/	m kole	ŋ kole	[ŋ kole] ‘my flea’
c.	/ma kūure/	m kūure	ŋ kūure	[ŋ <u>kūure</u>] ‘my hoe’
d.	/ma konko/	m konko	ŋ konko	[ŋ kɔnko] ‘my empty tin’
e.	/ma kugere/	m kugərə	ŋ kugərə	[ŋ kugərə] ‘my stone’

The dorsal consonant spreads its dorsal place feature onto the nasal consonant with spreading from right to the left.

However, where the nasal labial consonant is followed by another labial consonant, its labial feature does not change as in the following examples;

(176)	Underlying	deletion	spreading	surface form
	a. /ma ma/	m ma	m ma	[m mā] ‘my mother’
	b. /ma bia/	m bia	m bia	[m bia] ‘my chid’
	c. /ma ma’ana/	m ma’ana	m ma’ana	[m māʔānā] ‘my okro’
	d. /ma petere/	m petere	m petere	[m petərə] ‘my pant’

In summary, for Gurene nasal place assimilation to take place, the nasal consonant loses its place feature and acquires the place feature of a following obstruent and assimilation is backward or regressive. Two types of nasal place assimilation occur in Gurene. First is the type that involves ‘personal-name’ compounds while the second is the type that involves the first person possessive pronoun. Other phonological processes such as vowel deletion, consonant deletion and alternation are also observed in ‘personal-name’ compounds.

5.7 Summary

This chapter is a discussion on various types of harmony that operate in Gurene. These include tongue root vowel harmony (ATR), vowel-consonant harmony, nasal harmony, consonant harmony, and rounding harmony. We have demonstrated that vowels in Gurene words are strictly governed by vowel harmony rules. Therefore, only vowels of the same qualities or features [\pm ATR] can co-occur in words. With vowel harmony, ATR harmony operates at two levels, the root and the suffix in the domain of a word where suffix vowels agree in the feature [\pm ATR] with vowels of the roots. Vowel harmony operates all through from CV, CVCV, to multisyllabic words. In addition, Gurene loan words and compounds are governed by vowel harmony rules even though, there are cases when harmony is blocked and does not operate across word boundaries, particularly in compounds. Gurene has two neutral vowels, the schwa /ə/ (any word-medial vowel) and the low, back, central vowel /a/. These

vowels are neutral to harmony process as they are transparent, co-occur with vowels of both sets of ATR harmony and do not seem to either trigger or undergo the harmony process.

Another type of harmony that exists in Gurene is vowel-consonant harmony which involves the interaction of the oral velar stop /g/ with [-ATR] vowels. The voiced velar stop /g/ is realized as a velar fricative [ɣ] in the environment of [-ATR] vowels. We have also indicated the presence of rounding harmony in Gurene. ATR harmony in Gurene occurs with rounding such that vowels in a word agree with each other in terms of the features [\pm ATR], and [\pm round]. Nasal harmony is also observed in Gurene. Nasal harmony in Gurene is triggered by a nasal consonant or a nasal vowel, which spreads its nasality onto oral vowels and or certain consonants (target) either progressively or regressively. Nasal harmony does not operate across closed syllables in multisyllabic words. Therefore, syllables preceding a closed syllable and those following it do not participate in the harmony process.

CHAPTER SIX

TONE IN GURENƐ

6.0 Introduction

In tone languages, pitch is used to distinguish words, hence must appear in the lexical entries of morphemes, just like phonemic segmental information (Hayes 2009). Literature on some Gur languages spoken in Ghana show that Kasem has four basic tones - three level tones (L, M and H), and a rising tone (Callow 1965) cited in (Awedoba, 1990). Buli has three level tones: high, mid, and low (Akanlig-Pare & Kenstowicz 2003), while other Gur languages like Dagaare, Dagbani, GurenƐ, Kɔnni and Safaliba contrast only high and low tones with downstep (Dakubu 1996; Atintono 2011; Anttila & Bodomo 1996; Schaefer 2009; Cahill 1999).

GurenƐ is a tone language with the mora as the tone-bearing unit (TBU). Previous studies indicate that there are two basic tones in GurenƐ, which contrast high and low and that at the lexical level, Tone is contrastive mostly on nouns (Atintono, 2011; Dakubu, 2007; 2006; Schaefer 1974). According to Schaefer (1974), GurenƐ has two underlying tones, high, low and their combination in high–low glide (HL), together with a principle of downstepping. Dakubu (2006) posits the GurenƐ verb has no lexical tone because there are no minimal pairs of verbs that show tone contrast. However, Atintono (2011) argues that though it is difficult to find pairs of verbs with contrasting tones at the lexical level, the verb in its citation form has an underlying low tone with few instances where a pair of noun and verb in citation form contrast. The current study agrees with Atintono (2011) that minimal pairs of the GurenƐ verb exist but they are not common. The following is an example of a minimal pair contrasting tone in GurenƐ verbs.

(177) a. gànjè ‘to overtake’ b. gánjé ‘select’

Therefore, tone is contrastive in Gureɛ. The following sections discuss the tonal types, the tonal patterns and tonal processes that occur in Gureɛ as a result of combinations of basic tones. The data present tone minimal pairs or contrast in nouns, nouns vs. verbs and nouns vs. adjectives.

6.1 Gureɛ tone types and combinations

A tone language is that which utilizes tone as a necessary and integral part of every syllable that makes for differences in meaning and marks grammatical distinctions between otherwise identical constructions (Obianika 2014). Ezenwafor (2014) says tone languages over the years have been classified into register and contour tone systems based on the nature of tone. Register tone languages recognise only the points at which the pitch is either raised or lowered. These levels range from high through mid to low (Hulst & Smith 1982 cited in Obianika 2014). Thus, register tones are analysed as being level because they maintain a certain level of stability (Ezenwafor 2014).

Contour tone languages on the other hand are languages, which involve the changing state of the transition from one pitch to the other (Pike 1948; Katamba 1989; Nwachukwu 1995; Uguru 2006; Mbah & Mbah 2010 cited in Obianika 2014). Contour tones are usually analysed as gliding from one pitch level to another. Hence, they are unstable. Therefore, contour tones in African languages are usually a sequence of two level tones and are a surface phenomenon, which needs decomposition into underlying tonal melodies (Ezenwafor 2014). Register tone languages may also have contour tones (Obianika 2014; Hyman 1975). This is because some register tone languages have rules of tonal assimilation (spreading rules) by which falling and rising tones are derived. Such register tone languages may also have contour tones as a result of two morphemes coming together (Hyman 1975). Studies of Tamang, a language of Nepal has revealed that there is not always a perfect one-to-one

correspondence in pitch between a given tone on a monosyllabic versus a disyllabic word. Thus, in Tamang, tone 4 is realized as a L tone in a monosyllabic word where it usually falls on utterance final position while on two syllables it is realized as a L followed by a falling tone from H to M (L-HM) (Mazaudon 1973 cited in Hyman 1975).

Gurene is a register tone language with some instances of contour tones, which are as a result of some phonological processes. The data in (178) show that Gurene has three lexical tones; low (L), high (H) and mid (M) and their combinations in high-low (HL or F) and low-high (LH or R) (see Schaefer 1974). The following are examples showing level tones in Gurene;

(178)	low	high	mid
a.	zò:rè ‘bow down’	zó:rè ‘tail’	zō:rè ‘tail’
b.	là: ‘falling position’	lá: ‘bowl’	dā: ‘past’
c.	dìá ‘a dance’	díà ‘food’	dīā ‘an animal’
d.	dò:rò ‘wood’	yó:rè ‘salary’	yō:rè ‘termite’
e.	kì ‘to die’	kí ‘millet’	fō ‘you’
f.	sìrà ‘husband’	bókó ‘hole’	sīrā ‘true’
g.	zòm ‘to climb’	zóm ‘flour’	būm ‘to mix’
h.	sànè ‘melon’	sàné ‘debt’	bōá ‘goat’

It has been observed that phonetic sequences of Gurene tones can be found in varying contexts, ranging from one syllable to five syllable words. i. e., the domain of these tonal sequences includes monomorphemic, dimorphemic and compound words. It is realised that the number of tonal sequences or patterns on shorter words (one and two syllable words) are

more common than that on longer words (three, four and five syllable words). The following are some phonetic sequences of Gurene tones with examples. The hyphen between tones marks syllable boundary.

One syllable: L (zòm ‘climb’), H (zóm ‘flour’), M (dā - ‘past’).

Two syllables: L-M (sirā ‘true’), H-H (dókó ‘pot’), M-M (zōōrē -tail), L-L (bàṅà – lizard), H-L (tîà -tree), L-H (sàné - ‘debt’)

Three syllables: H-H-L (átíà – name), H-H-L (dógórò -pots)

Four syllables: L- L-H-H (pə̀yèdírí – marriage)

Five syllables: H-H-L-H-L (áyínàyírè), H-H-M-H-H (átíābí:té – atia’s seed)

Most of the one-syllable words are verbs while the two or more syllable words are nouns, with the four and five syllable words being compounds.

6.2 Gurene Tonal contrast at lexical level

Tone is contrastive at the lexical level and this may be manifested in minimal pairs of verbs and nouns, nouns and adjectives and nouns only. In Gurene, tone can be used to distinguish verbs from nouns, even though minimal pairs of this form are not common. The following examples show that tone is phonemic in Gurene:

6.2.1 Tonal contrast between verbs and nouns

	Low tone		High tone
(179) a.	zòm ‘to climb’	b.	zóm ‘flour’
(180) a.	kì ‘to die’	b.	kí ‘millet’

- | | | | |
|----------|------------------------|----|----------------------------|
| (181) a. | sà:lòm ‘to clean’ | b. | sá:lóm ‘type of vegetable’ |
| (182) a. | pòlè ‘to buy millet’ | b. | pólé ‘measuring calabash’ |
| (183) a. | wòlà ‘little calabash’ | b. | wólá ‘to struggle’ |
| (184) a. | dà:m ‘to disturb’ | b. | dá:m ‘pito’ |
| (185) a. | gàná ‘more than’ | b. | gáné ‘leather’ |
| (186) a. | wàʔàrà ‘dance-PROG’ | b. | wáʔará ‘dancer’ |
| (187) a. | lòá ‘a well’ | b. | lóá ‘the act of tie’ |
| (188) a. | mà ‘mother’ | b. | má ‘I’ |

In the above examples, the High (H) and low (L) tones contrast brings about meaning difference between the pairs of words.

6.2.2 Tonal contrast in adjectives vs. nouns

There are few instances where tone may be used to distinguish a noun from an adjective as shown in the following example:

	ADJECTIVE	NOUN
(189)	nà:nà ‘cheap/easy’	nā:nā n bala ‘child’s play’.
	nyà:mà ‘coarse’	dànyá:má ‘in-law’
	tòkàrà ‘big baobab trees’	tókárá ‘baobab tree leaves’
	gmèyǎlè ‘crooked’	zúgméyǎlé ‘oblong head’
	sīrā ‘true’	sírá ‘husband’

The data in (189) show that Gurene adjectives and nouns may be distinguished by low and mid, low and high or mid and high tones.

6.2.3 Tonal contrast in lexical nouns

By far, minimal pairs of nouns only are the most common that contrast tone in Gurene. In these forms, the tonal patterns include L/H or L/M. The data show that two nouns in Gurene can be distinguished by tone variation as illustrated in the following examples:

(190) yò:nè 'year'	yó:né 'song'
sàmà 'melons'	sámá 'debts'
dà?à 'market'	dá?á 'buying'
sànè 'melon'	sáné 'debt'
wà?à 'as in bea game'	wá?á 'dance'
bàṅā 'lizard'	báṅā 'a ring/bangle'

The examples above show tone contrast in Gurene disyllabic nouns

6.3 Tone in compounds

In Gurene compounding, usually vowel or syllable reduction may occur in the first or second constituent of the compound. This process triggers tone shift, tone change or tone spread, which brings about contour tones.

6.3.1 Tone shift in compounds

Tone Shift is a process of delinking and relinking of a tone to an adjacent Tone Bearing Unit (TBU). While tone spread involves copying a linked tone onto an adjacent TBU (Patin 2009). In Gurene, when a segment is deleted, its tone may be preserved in the domain of compounds at morpheme boundaries. In compound formation, the final vowel or syllable of the first

morpheme deletes and the tone which is delinked from its tone bearing unit, shifts and relinks to an adjacent tone bearing unit as shown in the following examples:

$$(191) \quad \begin{array}{ccccccc} \text{lóà} & + & \text{bílà} & \rightarrow & [\text{lôbílà}] \\ \text{'well} & & \text{small} & & \text{small well'} \end{array}$$

In (191), the final vowel of the first constituent **lóà** deletes, but its low tone does not. This low tone shifts leftward and attaches to the preceding TBU /o/, thereby causing a contour in the first vowel /o/, to give us a falling tone as in [lôbílà].

6.3.2 Tone change/sandhi in Gurenɛ compounds

Tone change (sandhi) may also occur in Gurenɛ compounding.

$$(192) \quad \begin{array}{ccccccc} \text{bá: 'dog'} & + & \text{zúò 'head'} & \rightarrow & \text{bá: zúó} & \text{'dog head'} \\ \begin{array}{c} \diagdown \\ \diagup \\ \text{H} \end{array} & & \begin{array}{c} | \\ | \\ \text{H L} \end{array} & & \begin{array}{c} \diagdown \quad \diagdown \\ \diagup \quad \diagup \\ \text{H} \quad \text{H} \end{array} \end{array}$$

In this process, tone of a TBU of the first or second stem of the compound may undergo a change. For instance, in (192) the low tone of the second stem changes to a high tone. The long vowel in /ba:/ has a high tone and /zuo/ has HL in their citation form, while in the compound or contiguous form, the low tone of the final vowel of the second constituent of the compound changes to a high tone. Thus, the only low tone changes to a high tone due to the preceding high tones of the first stem, which results in the consecutive high tones (HHH) instead of HHL.

$$(193) \quad \begin{array}{ccccccc} \text{ná:fɔ̃} & & \text{zō:rē} & \rightarrow & \text{ná:fɔ̃ zó: rɛ} & \text{'cow tail'} \\ \begin{array}{c} \diagdown \quad | \\ \diagup \quad | \\ \text{H L} \end{array} & & \begin{array}{c} \diagdown \quad | \\ \diagup \quad | \\ \text{M M} \end{array} & & \begin{array}{c} \diagdown \quad | \quad \diagdown \quad | \\ \diagup \quad | \quad \diagup \quad | \\ \text{H L} \quad \text{H L} \end{array} \end{array}$$

In (193) however, while the HL tones of the first stem have not changed in the contiguous utterance, the consecutive mid tones of the second stem change to HL in the compound. The

high tone change is because the pitch of the second stem is raised when it is in a contiguous form.

(194) nóa 'fowl' gélè 'egg' → nógélé 'fowl egg'
 / | | | | |
 H H L H H H

In (194), / nóa / and /gélè/ in their lexical forms have a H and HL tones respectively while in the compound, the low tone of the final vowel of the second stem changes to a high tone, which results in three high tones (HHH) as shown in [nógélé].

(195) dò:rò 'wood' kóká 'chair' → dó:rókóká 'wooden chair'
 | | | | | | | |
 L L H H H H H H

In (195), all the tones in the first stem are low while the tones of the second stem are high in isolation. However, the low tones of the first stem change to high tones in the compound [dó:rókóká]. The change of the tones from low to high is the result of high tone spread from the second stem.

(196) àyínē 'a name' yíré 'house' àyínóyírè 'ayine's house'
 | | | | | | | | | |
 L H M H H H H H! H L

In (196), the mid tone of /yínē/ changed to a high tone while the high tone of the final syllable of /yíré/ changes to low in the compound [áyínóyírè].

6.4 Tone contrast in Gurene verbs and deverbal nouns

	Verb		deverbal noun			
(197) a.	lò L	‘tie’	lòà L L	→	lòà ∨ L	‘the act of tying’
b.	tò L	‘pound’	tòà L L	→	tòà ∨ L	‘the act of pounding’

The examples above show no tone contrast between Gurene verbs and deverbal nouns as they both carry low tones. In the examples, the deverbal noun has an additional segment that is a final vowel. This final vowel is the nominalizing suffix. Although, the two vowels in the deverbal noun are of different phonetic qualities, they seem to have one tone. This implies there is a gliding from the first vowel to the second, and for that matter, we have two segments associated with one tone (a Low tone).

6.5 Gurene pronouns and tone

Gurene pronouns also exhibit tone contrasts. When the pronoun occurs in the subject position, it carries a high tone while when it occurs in the object position it has a low tone.

The following phrases are examples:

(198a) á ημέ ì
 he/she beat him/her ‘he/she has beaten him/her’

(198b) bá yí bà

they call them ‘they should call them’

In example (198b), the first *bá* ‘they’ as a subject pronoun has a high tone while the second *bà* ‘them’ as an object pronoun has a low tone. However, the verb *yi* ‘call’, in isolation is has a low tone but changed to a high tone in the phrase because of the preceding high tone on the subject pronoun. Tone on Gurene subject pronoun and object pronoun are given in sections 6.5.1 and 6.5.2 respectively.

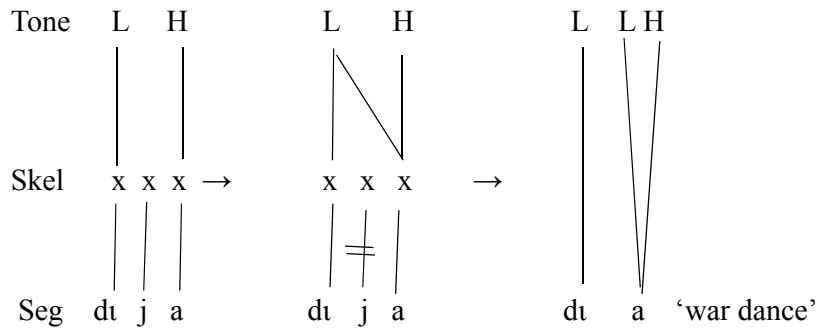
6.5.1 Tone on subject pronouns

(199)	a.	má	dáá	!dé	dìǎ
		1SG	PST	perform	war dance
	b.	á	dáá	!dé	dìǎ
		3SG	PST	perform	war dance
	c.	fǒ	dáá	!dé	dìǎ
		2SG	PST	perform	war dance
	d.	yá	dáá	!dé	dìǎ
		2PL	PST	perform	war dance
	e.	bá	dáá	!dé	dìǎ
		3PL	PST	perform	war dance

In examples (199), apart from the second person subject pronoun (199c), which has a mid tone all the pronouns in subject position have a high tone as already stated in (2.6.7). In addition, the past marker, which is a preverbal particle, has a high tone that triggers the high tone on the verb as the Gurene verb in its citation form has a low tone.

However, the noun in the object position /diǎ/ shows a consistent L/R pattern. In slow speech, a consonant is realised between the two vowels and this consonant serves as an onset to the final vowel [di.já]. However, in fast speech, the consonant deletes and the two vowels, which have a sequence of HL tones, form a contour as the surface form /diǎ/. Since the consonant is deleted, these vowels glide hence, the tones also glide and this gives us the contour as illustrated below;

(200) Autosegmental representation of / di.já / → [diǎ] ‘food’



6.5.2 Tone on object pronouns

Unlike the subject pronoun, the object pronoun in Gurene carries a low tone as shown in (201).

(201)	a.	má	wá	yí	ì	
		1SG	FUT	call	him/her	‘I will call him/her’
	b.	á	wá	yí	ì	
		3SG	FUT	call	him/her	‘he/she will call him/her’
	c.	fō	wá	yí	ì	
		2SG	FUT	call	him/her	‘you will call him/her’
	d.	yá	wá	yí	ì	
		2PL	FUT	call	him/her	‘you (PL) will call him/her’
	e.	bá	wá	yí	ì	
		3PL	FUT	call	him/her	‘they will call him/her’

In (201), all the words preceding the object pronoun (the subject pronoun, the future marker and the verb) have a high tone. However, the tone of the object pronoun has not changed to high but remains as a low tone. The data also show that tones of the subject pronouns as they occur in the present tense are not different from when they occur in past and future tenses. That is, the subject pronouns have high tones, which are consistent. However, the object pronouns in the present tense have high tones, which are different from the low tone of the object pronouns when they occur in the future tense (200). The following are examples showing object pronouns with low tone as they occur in the present tense:

(202)	a.	má	dí-ti	í	
		1SG	eat-IPFV	3SG	'I am eating it
	b.	á	dí-ti	í	
		3SG	eat-IPFV	3SG	'he/she is eating it'
	c.	fō	dí-ti	í	
		2SG	eat-IPFV	3SG	'you are eating it
	d.	yá	dí-ti	í	
		2PL	eat-IPFV	3SG	'you (PL) are eating it'
	e.	bá	dí-ti	í	
		3PL	eat-IPFV	3SG	'they are eating it'

6.6 Gurene contour tones

Gurene contour tones are derived through some phonological processes such as assimilation/tone spread, and deletion or shortening of syllable, which give rise to the combination of level tones. Gurene contour tones are the falling (F) and rising (R) tones. The following are illustrations of contour tones in Gurene:

203.	/ná:fɔ̃/	+	bí:rè/	→	[nâbírɛ]
	‘cow	+	child		‘calf’
	/á.tí.à/	+	/bí.là/	→	[átíbílà]
	NOM.tree	+	little		‘a personal name’
	/lóa	+	bílà/	→	[lôbílà]
	‘a well	+	little		small well’

204.	nâbírɛ
	H L (falling)

Contour tones may occur because of segment/syllable deletion as indicated above. When a segment is deleted the tone of that segment shifts and docks on an adjacent tone bearing unit and this results in contour tones. For instance, in (204), [nâbírɛ] is a compound made up of /ná:fɔ̃/ and/ bí:rè/. The final syllable of the first stem, which bears a low tone deletes when added to a second stem to form the compound but its tone remains. This low tone shifts and docks on the preceding vowel that carries a high tone. Hence, the combination of the two level tones on one segment, which forms a falling tone on the first TBU of the first stem as shown in the data (204).

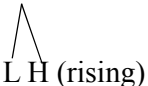
(205)	/bá:	+	bílà /	→	[bábílà]
	‘dog		little		puppy’

In addition, example (205) show that the tone of the first syllable of the second stem changes from a high tone to a falling tone [bábílà]. This is because of the adjacent tone of the nominal stem that precedes it. i.e., the high tone of the nominal stem, which is the preceding low tone

spreads its low tone onto the following TBU, which already bore a high tone and this results in the derived contour tone as shown in (205) above.

(206) /áyínè + póká/ → [áyímpóká] ‘personal name’

/bàŋà + bí:rè → [bàmbí:ré] ‘small lizard’

(207) áyímpókà ‘personal name’


In example (206) however, when the final vowel of the first stem deletes, its tone docks on the following tone bearing unit, which has a high tone. This brings about the rising tone in [áyímpókà] as illustrated examples (207).

In example (208), low tone spread is observed. The low tone of the final syllable of the second stem of the compound spreads onto the TBU of the first syllable, which creates a contour in the second syllable of the compound as shown in [nábîrè].

208. /ná:fɔ̃ + bí:rè/ → [nábîrè] ‘calf’

/sògɔ̃rɔ̃ + piisè → [sòyôpí:sáká] ‘broom’

The data has revealed that contour tones in Gurene compound words occur mostly at word boundaries and this may be on the final syllable of the first constituent or the first syllable of the second constituent of the compound.

6.7 Tone processes

6.7.1 Tone Assimilation

Tone assimilation occurs in Gurenɛ. In the data, a low or high tone at the lexical level may assimilate to the tone of adjacent segments when said in longer utterance like a compound or a phrase. Example is as follows:

(209) zóm + kòʔóm → zóŋkóʔóm
 flour water ‘a type of beverage’

In (209), the first vowel of kòʔóm ‘water’ in isolation is low but changes to a high tone when it is added to zóm to form the compound. This assimilation of high tone in zóŋkóʔóm is caused by the high tone of the preceding syllable.

(210) /sòǵórò + piisè + ká/ → [sòǵôpí:sáká]

Tone tier	L H L + L L + H	L H L + L L + H	
Skel tier	X X X X X X	X X X + X X X	→
Seg tier	ɔ ɔ ɔ + i: ε a	ɔ ɔ ɔ i: ε a	

Tone tier	L H L H H H	
Skel tier	X X X X X X	
Seg tier	ɔ ɔ i: ε a → sòǵôpí:sáká	

In example (210), the final syllable of *sògérò* in isolation has a low tone but it deletes in the compound and the low tone docks on the preceding vowel, which already has a high tone. This brings about a falling tone of the vowel in the second syllable as in [sòyòpí:sóká]. Also, the low tones in /pi:sè/ changed to high tones in the compound. The change from low tone to high is caused by the high tone of the vowel of the nominalising suffix [ká], which carries a high tone.

6.7.2 Segment alternation

Segment alternation at syllable final position does not seem to affect tone or cause a tone change as shown in (211). In (211a), where the verb precedes the noun, the final vowel /ɛ/ has a low tone. However, in (211b), the verb occurs after the noun and the vowel /ɛ/ changes to /a/ but the tone does not change or delete. It is only relinked to the new segment /a/. In addition, the low tone on /a/ as in *dia* (211a) changes to a high tone in (211b). This is because of the following syllable, which carries a high tone, and has triggered the change of tone from low to high. Even though the tone of the initial vowel of *dia* is high in both (211a & b), the one in (211b) is higher than that in (211a). This is due to the high tone that follows it. Therefore, automatic downstepped occurs in (211b). Again, the first syllable of *dúkà* is said at a lower pitch in (211b) than when said in (211a). This is because of the two high tones that precede it as shown below:

211. (a) dúgè dià ‘cook food’ (b) diá !dúkà ‘food cooking’

6.7.3 Downstep

Downstep, which refers to the lowering of the pitch of a high tone in certain specifiable circumstances, has been categorized into Automatic and non-automatic (Stewart 1965 cited in Connell 2001). In non-automatic downstep, lowering of the second high as in a HLH pattern is attributed to the influence of the intervening Low while in automatic downstep, it has been

argued that the lowering of the second high as in HH is due to either an underlying (floating) Low, or one that had been lost historically. However, the lowering of the second H in a HH sequence and the lowering of the second H in a HLH sequence are analogous (Stewart 1965 cited in Connell 2001). Therefore, lexical H-tones are subject to a lowering process after L-tones' (Welmers 1959) cited in Kügler (2016).

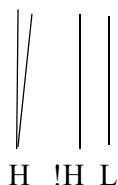
Another tone process called terracing refers to a process where subsequent Hs do not rise above the height of a high tone that has been downstepped. Terracing occurs after downstep. The terracing effect of downstep (the lowering of the ceiling – subsequent Hs) has frequently been described as keylowering (Stewart) or register shift (Snider & van der Hulst 1993 cited in Connell 2001).

Both Automatic downstep and nonautomatic downstep are observed in Gurene, mostly at word boundaries. In Gurene, there are instances where two or more like tones occur in succession without any intervening low tone (automatic) and in some cases, an overt low tone occurs between the high tones (nonautomatic). In either cases, the second high tone is downstepped.

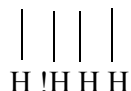
6.7.3.1 Automatic downstep

Examples (212) and (213) are illustrations of automatic downstep in Gurene. Example (212) has three high tones in the phrase with lowering of the high tone of the first syllable in the second word. Hence, in (212), automatic downstep has occurred at the word boundary as shown below;

212. díá !dókà ‘food cooking’



(213) dó:ró kóká ‘wooden chair’

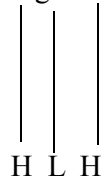


In (212), the downstep occurs on the second and final syllables of the compound. i.e., the high tone of the second syllable of the first stem is lower than the high tone of the first and third syllables. Also, the final syllable is said with a lower pitch than the preceding high tone.

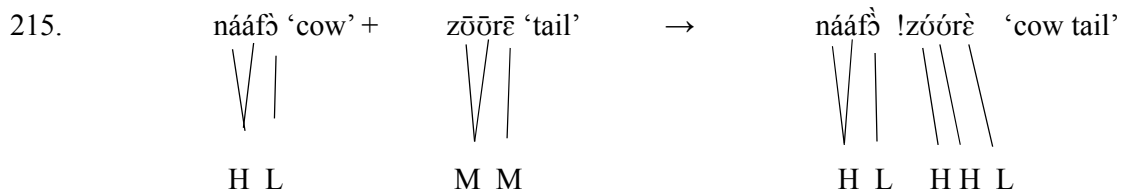
6.7.3.2 Nonautomatic downstep

With nonautomatic downstep, there is usually a low tone between two high tones, which is said to be the cause of lowering of the second high tone. The following are examples showing nonautomatic downstep;

214. b. dógè !díà ‘cook food’

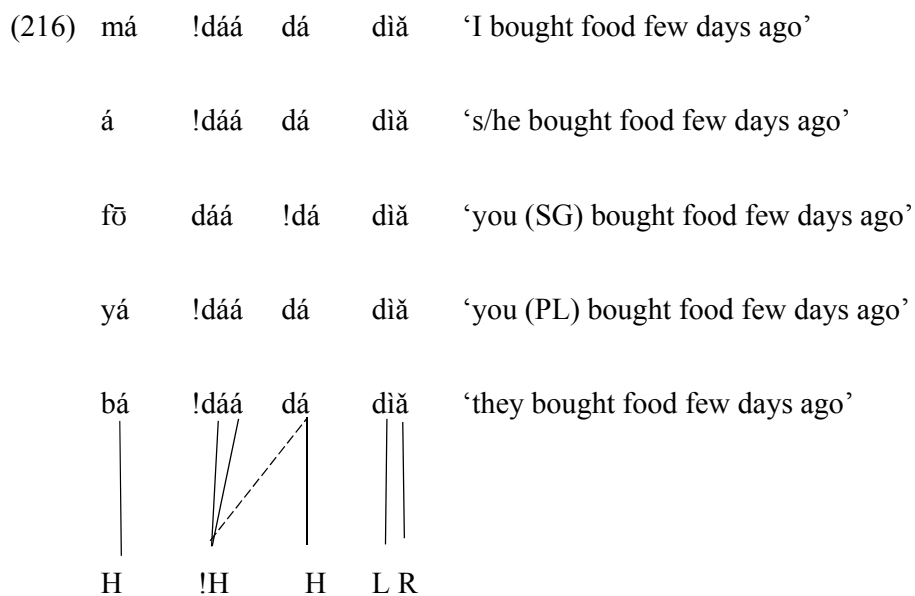


In (214), the high tone of [díà] is said to be lower than the high tone of the initial syllable of [dógè]. The second high tone in (214) is downstepped due to the intervening low. The low tone of the final syllable of the verb [dógè] ‘to cook’, is the trigger of the downstep as illustrated above.



In (215), *zōōrē* in its lexical form has only mid tones but where it occurs in a phrase after *nááfɔ̃*, the high tones of *nááfɔ̃* cause the tones of *zōōrē* to change from mid to high tones. However, its high tone is downstepped because of the low tone that occurs before it.

Automatic downstep is also observed in the noun phrases in (216). In these constructions, the high tone of the past tense particle *dáá* is said at a lower pitch than the preceding high tones of the pronouns, while the subsequent tone of the verb *dá* 'to buy' is said to be terracing. This is because it occurs after the downstepped high tone of *dáá* and this is in line with the argument that terracing occur because subsequent high tones do not rise above the height of a high tone that has been downstepped (see Snider & van der Hulst 1993 cited in Connell 2001). The following are examples downstepped high tone in Gurenɛ:



217.	má	dáá	!ní	kò	kí	‘I used to farm millet’
	á	dáá	!ní	kò	kí	‘s/he used to farm millet’
	fō	dáá	!ní	kò	kí	‘you (SG) used to farm millet’
	yá	dáá	!ní	kò	kí	‘you (PL) used to farm millet’
	bá	dáá	!ní	kò	kí	‘they used to farm millet’
		/				
	H	H	!H	L	H	

In examples (217), there is an intervening element between the past tense particle *dáá* and the verb *kò*. This preverbal particle *ní* absorbs the high tone spread from *dáá* and this causes automatic downstepping of the high tone in *ní*. This implies that the high tone of *ní* is said at a lower pitch than the preceding high tones.

6.7.4 Downdrift

According to Connell (2001), downdrift is somewhat more difficult to describe precisely as the term has been used in different senses by various authors. For instance, it has been used synonymously with automatic downstep by Stewart (1965), it has also been characterized as the progressive lowering of a high tone after a low tone (Hombert 1974; Snider & van der Hulst 1993; and Hyman (2001), while Hombert again, attributes downdrift to an intonational element. He observes that Ls also descend, hence suggests that the term downdrift refers to the lowering of like tones (consecutive or not). Downdrift has most frequently been equated with automatic downstep, as a local interaction between Ls and Hs that is cumulative in its

effect. The term has also been used to describe the progressive lowering sometimes found in like tone sequences; i.e. declination.

Downdrift is another tonal process that occurs in Gurene. There are instances where we have a series of low tones occurring in words in isolation or in compounds or phrases. For instance, where a sequence of three low tones occurs in two words as in *tònò !nèă* (LL!L), downdrift occurs on the second word - the low tone in *!nèă*.

- | | | | | |
|------|-----|-------------------------|-----|-------------------------|
| 218. | (a) | <i>nè tònó</i> | (b) | <i>tònò !nèă</i> |
| | | ‘step mud – to mix mud’ | | ‘the act of mixing mud’ |

In example (218), there is a progressive lowering of low tones in (218b). Thus, the low tone in *nèă* is lower than the low tones in *tònò*. This consideration is based on Hombert’s description of downdrift as the lowering of like tones - consecutive or not (Hombert 1974 cited in Connell 2001). As follows are similar examples of downdrift in Gurene:

- | | | | | |
|-------|---------------|-------------------|---|-----------------------|
| (219) | <i>kà:lè</i> | <i>!gòŋò</i> | → | <i>gòn!kà:lígò</i> |
| | read | book | | ‘book reading’ |
| (220) | <i>sīrā</i> | <i>ēlēgā</i> | → | <i>sīrò-!èlè</i> |
| | husband | marrying | | ‘marriage’ |
| (221) | <i>sògórò</i> | <i>piisè + gò</i> | | <i>sògò !piisègò</i> |
| | rubbish | sweep | | ‘the act of sweeping’ |

6.8 Summary

This chapter discussed tone and tone processes in Gurene. Gurene has three level tones in the form of low, mid and high and their combinations, which result in contour tones such as HL

(falling) and LH (rising). The verb has a default low tone while the tone of the noun varies depending on the context in which it occurs lexically, in a compound or a phrase. However, the subject pronouns have a consistent high tone while the object pronouns have low tones when they occur in the past tense but have high tone when in the present tense. Tone contrast in Gurene is common between only nouns even though there are minimal pairs of nouns and verbs, and nouns and adjectives that also contrast tone. Some tonal processes that occur in Gurene are downdrift, downstep, tone shift, tone change, tone preservation and tone spreading (assimilation).

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

7.1 Summary

This thesis sets out to describe in detail the phonemes, the syllable and syllable structure processes, harmony, tone and tone processes as well as other phonological processes that occur in Gurenɛ.

Chapter one which is the introduction, presents the background of the study, statement of the problem, research questions, objectives of the study, significance of the study, research methodology, and organization of the thesis. The background of study gives a brief description of Farefari as the language, and the five major dialects, which include Gurenɛ, Boone, Talen, Nabt and Nankani spoken in the Upper East Region of Ghana. Even though there has been some controversy as to whether Farefari or Gurenɛ should be used as the language, this thesis supports Nsoh's (2011) position that Farefari be used as the language while Gurenɛ is used as one of the major dialects of which this study is on. The reason for this position is to distinguish the language from the dialect for the purpose of this study and for convenience. With about 441,059 speakers, Farefari has been classified as a Gur language under the Niger-Congo language family. Its closely related languages are Kusaal, Mampruli, Moore, Dagbani and Dagaare. Section 1.2 gives the statement of the problems. In this section, I presented two problems. First, I argue that although, some work has been done on the phonology of Gurenɛ, they were only brief descriptions without any theoretical analysis. Second, there have been some inconsistencies regarding the inventory of the phonemes. Therefore, this thesis filled the gaps in the study of Gurenɛ phonology in that, (1) it is the first work that gives detailed description of the phonology of Gurenɛ with theoretical analysis. (2) It contributes to the understanding of the Gurenɛ phonology. (3) It addresses the

inconsistencies, inadequacies and theoretical issues regarding the description of the phonology of Gurene.

Chapter two is literature review and it covers three areas, which include the phonology of some Gur languages of Ghana, the Farefari language and some theoretical issues. I reviewed works on the phonology Gur languages because these languages are closely related to Gurene and also because some of the topics discussed have direct bearing on the aspects of Gurene phonology that have been discussed in this thesis. Works that I have reviewed include the phonology of Dagbani, (Hudu 2010; Hyman & Olawsky 2000), Buli (Akanlig-Pare 1994; 2005; Akanlig-Pare & Kenstowicz 2003; Schwarz 2003; 2007; Kenstowicz 2005), Dagaare (Anttila and Bodomomo 1996; Anttila & Bodomomo; 2007a & b), Safaliba (Schaefer & Schaefer 2003) and Kɔnni: (Cahill 2004; Akinlabi & Liberman 2001).

Hudu (2010) gave a formal account of Dagbani Tongue-root Harmony using ultrasound. He performed five experiments to test Non-harmonic [ATR] Hypothesis, Harmonic [ATR] Hypothesis, Harmonic versus non-harmonic [+ATR] vowels, distance effects and the Articulatory correlate of dominant tongue-root feature. His results showed the dominant [+ATR] feature in Dagbani corresponds to a distinct anterior position of the tongue-root compared to the neutral position with [+ATR] harmony taking place regardless of a relative distance of the trigger from the target, and that [+ATR] harmony affects vowels of all height specifications, including the low vowel.

I also reviewed Akanlig-Pare (1994:2005), which are also closely related to the current study. In Akanlig-Pare (1994) which is on aspects of Buli phonology, the sounds of Buli have been described using the non-hierarchical binary distinctive features of Chomsky and Halle (1968). His findings indicate Buli has 23 consonants which can all occur syllable onset position with 5 consonants /b, m, n, k, ŋ/ that may occur in syllable coda. This is analogous to the finding of

Gurene consonants as all Gurene consonants can occur syllable onset position and all nasal consonants with one or two oral consonants (Gurene glottal stop and Buli bilabial and velar stops), that can occupy the coda position. The second similarity between Gurene and buli is these languages do not favour consonant clusters within the syllable. Therefore, in cases of consonant clusters, vowel insertion is implored to break up clusters within the syllable to achieve the desired CV syllable type. Another observation is the basic syllable type of CV and CVC in both Buli and Gurene. Other aspects of Buli phonology discussed in Akanlig-Pare (1994) include some assimilatory processes, syllable final nasal consonant truncation and some major tonal and intonational processes. Akanlig-Pare (2005) on the other hand described Buli tone and its interface with the morpho-syntax using autosegmental phonology and lexical phonology. In this study, Akanlig-Pare observes that Buli has three basic tones – High, mid and low contrary to his earlier study (Akanlig-Pare 1994), which identified two tones –high and low. He argues that the mid tone which was not established in the previous study, is as active as the High and Low tones and that apart from its lexical function, the mid tone also carries the heaviest functional load in the morpho-syntax of the verb in Buli. In a Similar vein, Gurene has three basic tones (high, mid and low).

Another aspect of Gur phonology that I reviewed was tone and tonal processes in Gur languages in Ghana. One of such works is Akanlig-Pare & Kenstowicz (2003) tone in Buli. In examining tonal correspondences among Gur languages, Akanlig-Pare & Kenstowicz (2003) observed that data from Moore (Kenstowicz, Nikiema, and Ourso 1988), Dagbani (Hyman 1993), Buli and Dagaare (Bodomo 1997), show some correspondences between these languages. Example is a systematic correspondence between Dagaare and Buli in which it was realized that H + L, L + H, and H + H in Dagaare correspond to H, L, and M in Buli respectively. Also, the contrasting tones in Buli nominalizations correspond to the verbal tone in Dagaare. The second correspondence is between high tone in nominal roots in Konni and

Buli. Some Kɔnni LH nouns correspond with M in Buli (Cahill 1999) with a systematic correspondence between high, low, and toneless roots in Dagaare and high, low, and mid roots in Buli respectively. Like Buli and Kɔnni, Gureɛ has no lexically distinctive verb tone.

On Low tone spreading in Buli, Schwarz (2003) states that Buli has level tones, as well as tone combinations that are associated with stems of monosyllabic nouns, complex nouns and compounds and that Such tonal combinations include the falling tones (HM, HL and ML) and the rising tones (LM, MH). Schwarz argues that the lack of evidence for inherent tones on noun class suffixes in Buli could be attributed to a LH or HL combination that result in the underlying M, associated with the stem. Schwarz claims that a H, M or L tone in Buli should be assigned to the noun stem while their suffixes be considered toneless of which tones of the stem can spread unto.

Anttila and Bodomo (2007) investigated OCP effects in Dagaare and found that, in Dagaare nouns, tonal polarity occurs in H-H type. They claim root tone is lexical and it does not spread in nouns of class A and B types. They explained that the inability of the root tone to spread is what triggers tone insertion on the toneless suffix that assumes a value opposite to the root-final tone.

Anttila and Bodomo make a further claim that in Dagaare /H-H/ could be resolved through Tone polarity, Downstep, tone merger and No change. Therefore, in their analysis of three minor tone patterns in Dagaare, they concluded that in a HH sequence the second H is interpreted phonetically as a lower pitch value than the first. Therefore /H-H/ may trigger either polarity or downstep as in /HH/ →H!H.

Another work that was reviewed is Hyman and Olawsky's (2000) 'High Tone Spreading in Dagbani'. Hyman and Olawsky's study revealed that in Dagbani an underlying H tone spreads to the right, delinking an immediately following L tone. They also showed that HTS

affects two successive L tone-bearing units, thereby delinking the first L, which results in a HL (falling) tone. Hyman and Olawsky (2000) explained that in an utterance such as *ò zàgsì yá* 'he has refused' the subject pronoun *ò* is L tone, while the verb *zàgsì* receives a LH melody as realized on *zagsi* plus *ya* (the perfective marker), when there is no intervening element between them (a). However, when the same verb appears after the H-toned subject pronoun *ń* in a sequence like *ń zàgsì yá* 'I have refused', the H spreads onto the two syllables of *zagsi*, hence creating a H plus HL falling sequence. Hyman and Olawsky (2000) also claim that Low Tone Spread (LTS) occurs in Dagbani and Buli. They argue that in Dagbani, when the sequence is not utterance-final, a L tone spreads onto a following stressless H tone-bearing unit and delinks it.

I also reviewed Anttila and Bodomo (1996) who discussed stress and tone in Dagaare. They describe Dagaare as a two-tone language with lexical contrast between H and L tones, mostly restricted to the penultimate syllable in nominal system with the remaining tones being predictable. Anttila and Bodomo stated that most of the simple nominals in Dagaare fall into three tonal classes of LH, HL and HH, with root morphemes having either H or L tone, while the singular suffix shows tonal polarity. They argue that that L-L nouns are systematically absent in Dagaare and polarity tones are derived and not lexical. In the analysis of downstep and downdrift in various contexts in Dagaare, Anttila and Bodomo used associative constructions in the environments of across root+suffix juncture, across N+A juncture and across N+N juncture. Their findings show that nouns in class D patterns with class B nouns in N+A construction where the root H is not suppressed, and if a H-toned adjective follows an intervening L tone, it is realised either as a downstep (H-[!]H) or an actual contour (HL-H). Other observations Anttila and Bodomo made were that, Lexical tones trigger downstep while derived tones do not in N+N construction where there are adjacent H tones across word boundary. When two

lexical H tones collide due to morphological concatenation, the result is an internal downstep of the class D nouns.

Another work that was of interest to the current study is Akinlabi and Liberman's (2001) "Tonal Complexes". In this article, some tonal complexes in Yoruba, Kɔ̀nni, Dagaare, Lokaa and Tem were discussed. They indicated how constraints on tonal complexes could trigger deletion, epenthesis, spreading or re-ordering of tonal features. In their discussion, Akinlabi and Liberman (2001) claim that most words in Yoruba begin with vowels, which usually carry a Low or Mid tone but not High and that tones occur freely in lexical representations, without obvious restrictions on word melodies. Therefore, Yoruba has three distinctive tones - H, M and L, with H occurring in only word-initial position in marked consonant-initial words in genitive construction. A further claim is that Yoruba exhibit dissimilation of H and L levels in bound sequences. In a comparison between Kɔ̀nni and Dagaare, Akinlabi and Liberman (2001) assert that Dagaare is close to Kɔ̀nni in that both have no LL nouns but there must be a H. Thus, Dagaare has the same tonal complexes as Kɔ̀nni and the same requirement of a tonal complex within a nominal. However, Unlike Kɔ̀nni, the number suffix in Dagaare does not have a Low tone and while the number H-tone suffix polarizes in Dagaare, in Kɔ̀nni, it does not.

Cahill (2004) is another literature that discussed tone polarity in Kɔ̀nni. In this work, Cahill gives an Optimality Theoretic analysis of tone polarity in Kɔ̀nni nouns. In the analysis of tonal behavior of the class 1 plural suffix in terms of a constraint POLAR, Cahill observed that most noun suffixes in Kɔ̀nni have high tone. He also found that rules used to analyse Moore data were not applicable Kɔ̀nni because in Kɔ̀nni, most nouns do not have apparent polarity but only the one suffix that exhibits such. Cahill (2004) indicated High tone spreading and High tone insertion as sources of polar tone in Kɔ̀nni. He claims high tones do spread in Kɔ̀nni but in violation of *H-SPREAD, while High tone insertion is also a violation

of DEP(H) constraint though it satisfies a higher-ranked constraint H-PRES in a word. Cahill argues that even though, contours in general are dispreferred to level tones in kɔnni, nonfinal contour is rare. The results also show Polar violation in plural definite forms in the domain of vowel final nouns. Therefore, satisfying POLAR in the plural definite forms results in unattested forms in Kɔnni.

The literature I review on the Farefari language show that most of the studies tend to focus on Gureɛ, while the other major dialects have received little attention. It was realised that apart from Adongo (2008) who has investigated vowels of all the five major dialects (Gureɛ, Nankane, Boone, Talen and Nabt), most of the studies apparently focus on only Gureɛ. Example of such works is the phonemic inventory of Gureɛ (Dakubu 1996; Atintono 2004, 2011, 2013; Adongo 2008).

Another work that was worthy of reviewing is ‘the prosodic features of the Gureɛ verb’ (Dakubu 2006), which examines the effects of accent, tone and the glottal stop on Gureɛ verb. On Gureɛ word accent, Dakubu indicates that the first syllable of any lexical stem (noun, verb, adjective or adverb) without a prefix can carry accent, and syllables that begin with glottal stops carry accent too as the occurrence of an initial glottal stop is a function of accent. Dakubu argues that the verb carries no lexically contrastive tone but that it copies the tone of its subject that occurs before it when there is no intervening particle. Therefore, in declarative expressions, the subject tone spreads to the verb, while tone of the syllable after the verb polarizes. Dakubu argues further that polarization rule in Gureɛ also applies to the last syllable of polysyllabic verbs, if the verbs appear utterance finally. In her examination of tone patterns associated with particles like *daa* ‘past tense’, *na-ŋ* ‘prospective’, *ka* ‘negative marker’, *wa* ‘ingressive’ and *le* in declarative verbs, Dakubu found that the behavior of these particles is similar to the verbs as they copy the tones of the preceding subjects.

Apeligiba's (2015) study of the aspects of the phonology of the Ninkare showed that the sound inventory of Ninkare (Nankani) is similar to that of Gurene in that they seem to have the same number of vowels which behave in a similar manner. Both dialects have nine vowels, which can all be lengthen. However, while in Ninkare, /e/ and /o/ do not have nasal counterparts, in Gurene, it is found out that only /o/ has no nasal counterpart. Again, the basic syllable structure in Ninkare is a CV syllable type just like Gurene. However, Ninkare differs from Gurene in that it has affricates, which are not found in Gurene.

Chapter three discussed the sounds of Gurene. The chapter started with a phonetic description of the Gurene sounds using distinctive features like the major class features, laryngeal features, manner features and place features. The discussion on the consonants of Gurene revealed that Gurene has twenty-two consonants which consist of eighteen simple phonemes, /b, d, f, g, k, l, m, n, p, t, v, y, z, ɲ, ʔ, w, s, ɳ /, four complex phonemes - /gb, ɲm, kp/ and /nw/, and three consonant allophones [ɣ], [h] and [r]. All voiced plosives with the exception of the glottal stop, have their voiceless counterparts (/b, p, d, t, g, k, gb, kp, ʔ/) and all these plosives can occur in onset position as C in CV syllable structure but only the glottal stop may fill the coda position.

Gurene has six nasal consonants - /m, n, ɲ, ɲ, nw, ɲm/, which can all fill the onset position as C in CV syllable structure. /m, n, ɲ/ can fill the coda position and when used as first person pronoun, they can occur as syllabic nasals. There are six fricatives in Gurene: three voiceless fricatives /f, s, h/ and three voiced fricatives /v, z, ɣ/. Like many other languages, Gurene also has four approximants, which are divided into two glides /j, w/, and two liquids (a lateral /l/ and a trill /r/) and all these approximants occur in onset position only. Gurene double articulated consonants comprise the labial-velar plosives /kp/ and /gb/, the labial-velar nasal /ɲm/, the labial-velar approximant /w/ and the prenasal labial-velar approximant /nw/. All Gurene consonants can occur in onset position but only the nasal consonants /m, n, ɲ/ and the

glottal stop can fill both onset and coda position. Although, Gurene does not permit consonant clusters in both coda and onsets, phonological processes such as vowel weakening and deletion can trigger clustering. Gurene consonant allophones include [ɣ], which is the phonetic realization of the velar stop /g/, [r], which can be realised as an allophone of /d/, and [h], which can be realised as an allophone of /s/ and /f/. This argument is based on the fact that a substitution of one of the phonetic forms for the other only alters the pronunciation but not the meaning of the word in which they occur.

Gurene has sixteen distinct vowels, which comprise nine oral vowels; /i, ɪ, e, ε, a, u, ʊ, o, ɔ/ and seven nasal vowels; /ĩ, ã, ẽ, õ, ã, õ, ã / and one derived (ə). However, all the nine oral vowels can be nasalized – including /o/ as in [zõŋko] ‘hair’, and vowel length is phonemic. All the vowels occupy the nucleus position in CV and CVC syllable types. However, four of the vowels /a/, /ĩ/ and /e or ε/ can occur as isolated vowel syllables in Gurene. That is when /a/ is realised as a 3rd person singular subject pronoun, /ĩ/, as a 3rd person single object pronoun and /e or ε/ as the verb ‘to search’. Gurene has one vowel allophone, which is the schwa [ə]. The data also showed that Gurene has both vowel sequencing and diphthongs. The diphthongs include /ɪɔ, ai, ɔi, ui, oi, uε, εa, ɔa/ as in the words [sɪɔ] ‘rainy season’, [bawai] ‘nine’, [bayopɔi] ‘seven’, [mui] ‘rice’, [boi] ‘present’, [pʊεn] ‘inside’ [tɛa] ‘beans’ and [ɲɔa] ‘nose’. This argument for diphthongs in Gurene is based on three reasons; (1) when any of the sequences of the vowels in each word is deleted, it renders the whole word ungrammatical. (2) All these forms cannot be broken into smaller morphemes. (3) They cannot take on additional morphemes such as the plural marker.

Section 3.5 is distinctive features analysis of the Gurene sounds based on the major class features, laryngeal features, manner features and place features that are relevant to the description and classification of consonants and vowels of Gurene. With the major class features relevant for the classification of the sounds, [±syllabic] is used to classify Gurene

vowels and syllabic nasals are [+syllabic], while obstruents are [-syllabic]. The second feature is [±consonantal], which categorises plosives, fricatives, nasals, and liquids as [+cons] sounds while vowels and glides are [-cons]. Third is the feature [±sonorant] which groups all the vowels, glides, liquids and nasals as [+son] segments whereas [-son] segments are plosives, fricatives, affricates and laryngeal segments. The last major class feature used to describe Gurene sounds is [±approximant]. Here, [+approximant] segments are /l, r, j, w/ whereas all other segments are [-approximant].

Only one laryngeal feature ([±voice]) is relevant to the description of Gurene consonants. Thus, with [±voice] feature, all vowels, sonorant consonants and voiced obstruents are considered as [+voice] while voiceless obstruents are [-voice] sounds. In addition, manner features that are relevant to the classification of Gurene sounds are four and they include [±continuant], [±nasal], [±strident] and [±lateral]. The place features that were used in the categorisation are [LABIAL], [CORONAL], [DORSAL] and [RADICAL].

Chapter four looked at Gurene syllable structure. In this chapter, I discussed the types of syllable with a moraic representation based on their weight. I also described geminates and diphthongs using the mora theory. In addition, autosegmental phonology was used to account for syllable structure processes in Gurene. This chapter began with highlights on syllable structure and the mora theory. I argue that even though the basic syllable type in Gurene is the CV type, other syllable structure types include the V, C, CVC types. There are also the VC and CVCC types, which are found mainly in the Talen and Nabt dialects. The findings also show that all vowels and syllabic nasals occupy nucleus position while all consonants occupy the onset position and only the nasal consonants [m], [n] and [ŋ], and the glottal stop fill the coda position. Section 4.3.0, which gave Moraic representation of Gurene syllables based on weight, classified Gurene syllables into light and heavy. I also used the mora theory to establish that Gurene has geminates and diphthongs in section 4.3.3 and 4.3.4 respectively.

Chapter five discussed the various types of harmony, another phenomenon that is pervasive in Gurene. We demonstrated in this chapter that vowels in Gurene words are strictly governed by vowel harmony rules. Therefore, only vowels of the same qualities or features [\pm ATR] can co-occur in words. The findings showed that ATR vowel harmony operates at two levels, the root and the suffix in the domain of a word where suffix vowels agree in the feature [\pm ATR] with vowels of the roots. In addition, Gurene loan words and compounds are governed by vowel harmony rules. However, there are instances where harmony does not operate across word boundaries, particularly in compounds. The schwa /ə/ and the low, back, central vowel /a/ are considered neutral to harmony process. This is because they are transparent, they co-occur with vowels of both sets of ATR harmony and do not seem to either trigger or undergo the harmony process.

In section 5.2, I demonstrated the existence of vowel-consonant harmony which involves the interaction of the oral velar stop /g/ with [-ATR] vowels. In this section, it was realised that the voiced velar stop /g/ changes to a velar fricative [ɣ] in the environment of [-ATR] vowels but remains as a velar stop [g] when it occurs in the environment of [+ATR] vowels. It was found that rounding harmony exists in Gurene. ATR harmony in Gurene occurs with rounding such that vowels in a word agree with each other in terms of the features [\pm ATR] and [\pm round]. Another interesting finding is the occurrence of nasal harmony in Gurene, which is triggered by a nasal consonant or a nasal vowel. Nasal place assimilation in Gurene is described in section 5.6.2. I assert that this process is mostly observed in compound names, where the velar nasal usually changes in place of articulation to the place of articulation of a following consonant. It was observed that the nasal consonant loses its place feature and acquires the place feature of a following obstruent and assimilation is backward or regressive. Other observations made were that nasal harmony is both progressive and regressive.

In chapter six, autosegmental phonology was used to analyse tone and tone processes in Gurene. The findings showed Gurene is a register tone language with three level tones (low, mid and high), and some instances of contour tones (falling, rising), which are as a result of some phonological processes. The verb has a default low tone while the tone of the noun varies depending the context in which it occurs (lexical, compound or phrase). We also found that, the subject pronoun has a high tone while the object pronoun a low tone. The prevalent tone contrast is one that involves minimal pairs of only nouns even though there are few minimal pairs that show contrast between nouns and verbs, and between nouns and adjectives. The results as well show that Gurene tonal processes include downdrift, downstep, tone shift, tone change and tone spreading or assimilation.

7.2 Conclusions

From the analyses and discussions, the following conclusions have been reached on the aspects of Gurene phonology; Gurene has three consonant allophones [ɣ, h, and r] and twenty-two basic phonemes. These include a prenasalised labial velar consonant [nw], which was not classified in the previous studies (Nsoh (2011; 1997), Dakubu (1996; 2006), Atintono (2002, 2004, 2011 & 2013) and Adongo (2008, 2013). Gurene has sixteen distinct vowels and one vowel allophone (ə). The sixteen vowels comprise nine oral vowels and seven nasal vowels of which /ẽ/ is part of the nasal vowels. Also, all the nine oral vowels can be nasalized including /o/.

In addition, Gurene has isolated vowel syllables, which is similar to what is in Buli (Akanlig-Pare, 2005). The CV and CVC are the basic or core syllables in Gurene with the mora as the tone-bearing unit. Gurene has three light syllables and three heavy syllables based on the syllable weight, and geminates and diphthongs exist in Gurene.

Harmony is widespread in Gurene. Vowels in words are strictly governed by vowel harmony rules (including loanwords and compounds). However, the schwa /ə/ and the low, back, central vowel /a/ are neutral to harmony process. ATR vowel harmony operates at two levels, the root and the suffix in the domain of the word where suffix vowels agree in the feature [±ATR] with vowels of the roots. Other types of harmony that exist in Gurene are vowel-consonant harmony, rounding harmony and nasal harmony, which is both progressive and regressive. ATR harmony is a common feature in most Gur languages like Dagbani, Buli, Kusaal, Dagaare (Hudu, 2010; Akanlig-Pare, 2005, 2002; Musah, 2017, 2010; Abubakari, 2018; Bodomo & Abubakari, 2017). Hence, the finding on ATR harmony is similar to what exist in most Gur languages.

I also conclude that Gurene is a register tone language with three level tones (low, mid and high) and two contour tones (falling, rising), which is similar to what pertains in some of the Gur languages like Buli and Kusaal (see Akanlig-Pare, 2005; Musah, 2010; 2017). The verb has a default low tone while the tone of the noun varies depending on the context in which it occurs. Tonal processes in Gurene include downdrift, downstep, tone shift, tone change and tone spreading or assimilation.

7.3 Future research

Future research could investigate the phonology of the Farefari language with respect to other dialects. Aspects of the phonology of four dialects - Bonne, Nabt, Ninkare (Nankani) and Talen could also be explored. These four dialects are classified among the five major dialects of Farefari. However, they have received little attention from linguists. For instance, to the best of my knowledge, the phonology of these dialects has not been described and this is a gap that needs to be filled. Hence, future research could undertake a detailed phonological analysis with theoretical support. In addition, focus could be on the similarities and

differences in the segmental and suprasegmental structures, the syllable and syllable structure processes, as well as other phonological processes that occur in these dialects. Also, the findings in respect of Bonne, Nabt, Ninkare (Nankani) and Talen dialects could be compared to findings of Gurenɛ

These analyses could be cast within linear and non-linear approaches of generative phonology. Within linear phonology, the Phonemic Theory and Distinctive Features Theory could be used to describe and characterize the vowels and consonants of these dialects. While in non-linear framework, the Mora theory could be used to describe the syllable structure, while Autosegmental phonology could be used to describe tone and other assimilation processes.

References

- Abu-Abbas, K. H., Zuraiq, W. M., & Abdel-Ghafer, O. A. (2011). Geminate and long consonants in Jordanian Arabic. *International Journal of Linguistics*, 3(1), pp. 3-17.
- Abubakari, H. (2018). *Aspects of Kusaal Grammar: The syntax-information structure interface* (Ph.D thesis). University of Vienna, Vienna.
- Adongo, H. A. (2008). *Spectrographic Analysis of Gurene Short Oral Vowels* (M.Phil Thesis). Winneba: University Of Education.
- Adongo, A. H. (2013). Acoustic Analysis of Vowels of the Boone and Nabt Dialects of Farefari. In Fabunmi, F. A. & Salawu, A. S. *Readings in African Dialectology and Applied Linguistics*. Munich: Lincom GmbH.
- Akanlig-Pare, G. (1994). *Aspects of Buli phonology*. Unpublished M. Phil dissertation. University of Ghana, Legon.
- Akanlig-Pare, G. (2002). Vowel Harmony in Buli. *New Directions in Ghanaian Linguistics*, 265-278.
- Akanlig-Pare, G. (2005). *Buli Tonology: a non-linear approach* (Ph.D. Dissertation) University of Ghana, Legon.
- Akanlig-Pare, George, & Kenstowicz, Michael. (2003). Tone in Buli. *Working Papers on Endangered and Less Familiar Languages*, 4, pp. 1-34.
- Akinlabi, A. & Liberman, M. (2001). Tonal Complexes and Tonal Alignment. In Kim, M. & Strauss, U. (Eds.), *Proceedings of the North East Linguistic Society*, pp. 31, pp.1-20.
- Akmajian, A., Farmer, A. K., Bickmore, L., Demers, R. A., & Harnish, R. M. (2003). *Linguistics: An Introduction to Language and Communication*. New Delhi: Prentice-Hall.
- Anttila, A. & Bodomo, A. (1996). *Stress and tone in Dagaare*. NP.
- Anttila, A. and Bodomo, A. (2007a). *Prosodic morphology in Dagaare*. Cascadilla Proceedings Project.
- Anttila, A. & Bodomo, A. (2007b). *OCP effects in Dagaare*. LSA, Anaheim, CA, pp. 4-7.
- Appah, C. K. I. (2013). *Construction Morphology: Issues in Akan complex nominal morphology* (Ph.D. thesis). Lancaster University.
- Apeligiba, P. A. (2015). *Aspects of the phonology of the Nankare dialect of Farefari* (MPhil thesis). Winneba: University of Education.

- Atintono, A. S. (2013). *The semantics and grammar of Gurene positional verbs: a typological perspective*(Ph.D thesis). University of Manchester.
- Atintono, A. S. (2011). *Verb morphology: phrase structure in a Gur language (Gurene)*. LAP LAMBERT Academic publishing
- Atintono, A. S. (2004). *A Morpho-Syntactic-Study of the Gurene Verb*(M. Phil Thesis). Legon: University of Ghana.
- Atintono, A. S. (2002). *The Gurene relative clause* (Postgraduate Diploma Long Essay). University of Ghana, Legon.
- Awedoba, A. K. (1990). Kasem tones and orthography. *Journal of West African Languages*, 20(2), pp. 31-46.
- Azagsiba, A. J. (1977). *Frafra and Nankani: A comparative study*. Legon: University of Ghana.
- Bauer, L. (2009). Typology of compounds. In Lieber, R. & Stekauer, P. (Eds.), *The oxford handbook of compounding*. Oxford: Oxford University Press.
- Beckman, M. E. (1986). *Stress and non-stress accent* (Vol. 7). Walter de Gruyter.
- Blevins, J. (1996). The Syllable in Phonological Theory. In Goldsmith, J. A. (Ed.). *The Handbook of Phonological Theory* (pp.160-179). Retrieved 24/11/ 2016 from <http://www.blackwellreference.com>.
- Bodomo, A. B. and Abubakari, H. (2017). Towards the harmonization of a writing system for the Mbia languages of West Africa. In Prah, Kwesi K. and M, Lazarus M. (Eds.), *Deconstructing the African tower of Babel: Between the harmonization and fragmentation of African language orthographies* (pp. 159 -181, NO.120). South Africa: Centre for Advanced Studies of African Society (CASAS).
- Bodomo, A. B. (1994). The noun class system of Dagaare: A phonology-morphology interface. In: Lars, H., Sætherø, E. & Bodomo, A. (Eds.). *Working Papers in Linguistics* 22. University of Trondheim, Norway, pp. 106–131.
- Broselow, E. (1996). Skeletal Positions and Moras. In Goldsmith, John, A. (Ed.). *The Handbook of Phonological Theory*, pp.137-159. Blackwell Publishing. Retrieved 24/11/2016 from <http://www.blackwellreference.com>.
- Burzio, L., & Luigi, B. (1994). *Principles of English stress* (No. 72). Cambridge University Press.
- Cahill, M. (1993). Diphthongization and Underspecification in Konni.

- Cahill (1999). *Aspects of the morphology and phonology of Kɔnni* (Ph.D. dissertation). Ohio State University.
- Cahill, M. (2004). Tone polarity in Kɔnni nouns. *Studies in African Linguistics*.33, 1.
- Cardinal, A. W. (1920). *The Natives of the Northern Territories of the Gold Coast*. London: George Routledge & Sons Ltd.
- Carlisle, R. S. (2001). Syllable structure universals and second language acquisition. *International journal of English studies*, 1(1), pp. 1-19.
- Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York: Harper and Row.
- Chomsky et al. (1956). On accent and juncture in english. In Halle et al. (Eds.). *For Roman Jakobson*, p. 65 -80.
- Clements, G. N. (1985). The geometry of phonological features. *Phonology*, 2(1), p. 225-252.
- Clements, G. N. (1977). The autosegmental treatment of vowel harmony. In W. U. Dresher & Pfeiffer, O. E. (Eds.), *Phonology*, p. 111- 119.
- Clements, G. N. & Keyser, S. (1983). *CV phonology: a generative theory of the syllable*. Cambridge, Mass: MIT Press.
- Clements, G. N. (1976). *The autosegmental treatment of vowel harmony*. na.
- Clements, G. N., & Keyser, S. J. (1983). Cv phonology: a generative theory of the syllable. *Linguistic Inquiry Monographs Cambridge, Mass.*, (9), 1-191.
- Clements, G. N. & and Hume, E. (1996). The Internal Organization of Speech Sounds. In Goldsmith, J. A. (Ed.). *The Handbook of Phonological Theory* (pp.160-179). Retrieved 24/11/ 2016 from <http://www.blackwellreference.com>.
- Clements, G. N. (1985). The geometry of phonological features. *Phonology*, 2(1), 225-252.
- Connell, B. (2001). *Downdrift, downstep, and declination*. In Proceedings of Typology of African Prosodic Systems Workshop, Bielefeld University, Germany.
- Dakubu, M. E. K., Awinkene A. S., and Nsoh, E. A. (2007). *Gurene-English Dictionary* (Vol.1). Department of Linguistics, University of Ghana, Legon.
- Dakubu, M. E. K., Awinkene A. S., and Nsoh, E. A. (2007). *English-Gurene Glossary* (Vol.1). Department of Linguistics, University of Ghana, Legon.
- Dakubu, M. E. K. (1996). *A Grammar of Gurene*. Legon: University of Ghana.
- Dakubu, M. E. K. (2006). Prosodic features of the Gurene verb. *Gur Papers/Cahiers Voltaïques*, 7. pp. 16-27.
- Dolphyne, A. F. (2006). *The Akan (Twi-Fante) language: its sound systems and tonal structure*. Ghana: WOELI Publishing Services.

- Ewen, C. J. & Van der Hulst, H. (2001). *The phonological structure of words: an introduction*.
UK: Cambridge University Press.
- Ewen, C. (1995). Dependency relations in phonology. In Goldsmith (Ed.). *The handbook of phonological theory*, p. 570 - 585.
- Ezenwafor, C. I. (2014). Contour tones in Igbo: 'where they come from'. *Theory and Practice in Language Studies*, 4(4), 661.
- Féry, C. (2003). Onsets and nonmoraic syllables in German. In Féry, C., & van de Vijver, R. (Eds.). *The Syllable in Optimality Theory*, p. 213-237.
- Firth, J. R. (1948). Sounds and peosodies. *Transactions of the Philological Society*, 47(1), 127-152.
- Fudge, E. C. (1969). Syllables. *Journal of linguistics*, 5(2), p. 253-286.
- Giegerich, H. J. (1992). *English phonology: An introduction*. Cambridge University Press.
- Goldsmith, J. A. (1976). *Autosegmental phonology* (Ph.D. thesis). Massachusetts Institute of Technology.
- Goldsmith, J. (1993). Harmonic phonology. In Goldsmith, J. (Ed.). *The last phonological rule: Reflections on constraints and derivations*, 21-60.
- Gussenhoven, C. & Jacobs, H. (2005). *Understanding Phonology* (2nd ed.). London: Hodder Arnold.
- Gussenhoven, C., & Jacobs, H. (2013). *Understanding phonology* (3rd ed.). London: Hodder Education.
- Hall, T. A (2007). Segment features. In De Lacy, Paul (Ed.). *The Cambridge Handbook of Phonology*. Cambridge University Press. Cambridge: UK.
- Hall, T. A. (1997). *The phonology of coronals* (Vol. 149). Amsterdam: John Benjamins.
- Halle, M., & Stevens, K. N. (1979). Some reflections on the theoretical bases of phonetics. In Lindblom, B. & Ohman, S. (Eds.), *Frontiers of speech communication research*, p. 335-349.
- Halle, M., & Clements, G. N. (1983). *Problem book in phonology*. Cambridge, Mass: MIT Press
- Halle, M. (1959). *The sound pattern of Russian*. Hague: Mouton.
- Halle, M., & Vergnaud, J. R. (1978). Metrical structures in phonology. *Ms. Cambridge, MA*.

- Hansson, G. (2001). *Theoretical and typological issues in consonant harmony* (Ph.D. thesis). University of California, Berkeley
- Hawkins, P. (1984). *Introducing Phonology*. London: Routledge.
- Hayes, B. (2009). *Introductory phonology*. UK: Blackwell publishing
- Hayes, B. (1989). Compensatory lengthening in moraic phonology. *Linguistic inquiry*, 20(2), pp. 253-306.
- Hayes, B. (2011). *Introductory phonology* (Vol. 32). John Wiley & Sons.
- Hudu, A. F. (2010). *Dagbani tongue-root harmony: a formal account with ultrasound Investigation* (Ph.D thesis). University of British Columbia.
- Hyman, L. M. (2011). *Tone: Is it Different?* UC Berkeley Phonology Lab Annual Report.
- Hyman, L. & Olawsky, K. (2000). Dagbani verb tonology. In Manfredi, V. (Ed.) *Proceedings of 31st Annual Conference on African Linguistics*.
- Hyman, L. (1985). A theory of phonological weight. Dordrecht: Foris.
- Hyman, L. M. (1984). On the weightlessness of syllable onsets. In *Annual Meeting of the Berkeley Linguistics Society*. 10, pp. 1-14.
- Hyman, L. M. (1975) *Phonology: Theory and Analysis*. New York. Holt, Rinehart and Winston.
- Jakobson, R. & Halle, M. (1956). *Fundamentals of language*. The Hague, Mouton.
- Jakobson, R., Fant, C. G., & Halle, M. (1951). *Preliminaries to speech analysis: The distinctive features and their correlates*. Cambridge, Mass: MIT Press.
- Jenner, B. (1995). *Diphthongs in English*.
- Kaan, A. T., & Yoo, A. S. (2014). Applicability of the theory of Phonology to the sound system of Tiv language. *IOSR Journal of Humanities and Social Science*, 19(4), 4-80. Retrieved from www.iosrjournals.org
- Kager, R. (1999). *Optimality theory*, UK: Cambridge University Press.
- Katamba, F. (1993). *Morphology*. New York: PALGRAVE Publishers Lld.
- Kaye, J. (1990). 'Coda'licensing. *Phonology*, 7(1), p. 301-330.
- Kenstowicz, M. (2005). *Verbal Tone in Buli: a Morphosyntactic Analysis*. In *Cross-linguistic study of tonal phenomena*. Shigeki, Kaji (Ed.).
- Kenstowicz, M. (2006). Generative phonology. In Brown, K. (Ed.). *Encyclopedia of Language and Linguistics* (2nd ed.), 5, p. 1385- 1396.

- Kenstowicz, M. (1994). *Phonology in generative grammar*, p. 195-249.
- Kiparsky, P. (1979). Metrical structure assignment is cyclic. *Linguistic inquiry*, 10(3), 421-441.
- Kiparsky, P. (1968). *How abstract is phonology?* Indiana University Linguistics Club.
- Kiparsky, P. (1971). Historical linguistics. In Dingwall, W. O. (Ed.). *A survey of linguistic science*, p. 576 – 649.
- Kisseberth, C. W. (1970). On the functional unity of phonological rules. *Linguistic inquiry*, 1(3), 291-306.
- Kügler, F. (2016). Tone and intonation in Akan. In Downing, L. J. & Rialland, A. (Eds.) *Intonation in African Tone Languages* 24, pp. 89-129. Retrieved 3 Apr. 2017, from <http://www.degruyter.com/view/product/474105>.
- Ladefoged, P. (2003). *phonetic data analysis: introduction to fieldwork and instrumental techniques*. USA, Blackwell publishing Ltd.
- Ladefoged, P. (1975). *A course in phonetics*. University of California.
- Ladefoged, P. (1971). *Preliminaries to Linguistic Phonetics*. Chicago: University of Chicago Press.
- Laver, J. (1994). *Principles of phonetics*. Cambridge University Press.
- Laver, J. (2000). Linguistic phonetics. In Aronoff, M. & Rees-Miller, J. (Eds.). *The handbook of linguistics*, 150-179.
- Laycock, D. (1972). Towards a typology of ludlings or play-languages. *Linguistic Communications*, (6), p. 61 113.
- Lewis, M. P, Simons, G. F. & Fennig, C. D. (Eds.). (2015). *Ethnologue: Languages of the world, Eighteenth edition*. Dallas, Texas: SIL International. Retrieved from <http://www.ethnologue.com>, 05/05/2015.
- Liberman, M. Y. (1975). *The intonational system of English* (Doctoral dissertation, Massachusetts Institute of Technology).
- Liberman, M., & Prince, A. (1977). On stress and linguistic rhythm. *Linguistic inquiry*, 8(2), p. 249-336.
- Lieber, R. & Stekauer, P. (2009). Introduction: status and definition of compounding. In Lieber, R. & Stekauer, P. (Eds.). *The oxford handbook of compounding*. Oxford: Oxford University Press.
- Malmkjær, K. (Ed.). (2010). *The Routledge linguistic encyclopaedia* (2010). New York: Routledge Taylor and Francis group.
- McCarthy, J. J. (1988). Feature geometry and dependency: A review. *Phonetica*, 45(2-4), 84-

108.

- McCarthy, J. J. (1979). On stress and syllabification. *Linguistic inquiry*, 10(3), p. 443-465.
- McCarthy, J. Prince, S. (1995). Faithfulness and reduplicative identity. In Jill, N. B., Laura, W. D. & Suzanne, U (Eds.). *Papers in optimality theory*, p. 249 -384.
- McCarthy, J. (1988). Feature geometry and dependency: A review. *Phonetica*, (43), p. 84 108.
- M-minibo, I. J. G. (2014). The Reality of Consonant Clusters in Dagbanli Syllables. *International Journal of Linguistics*, 6(3), pp. 231-242. Retrieved 24/11/2016 from <https://scholar.google.com>.
- Musah, A. A. (2017). *A Grammar of Kusaal* (Ph.D. thesis). Institute of African Studies, Frankfurt University, Frankfurt.
- Musah, A. A. (2010). *Aspects of Kusaal Phonology* (M. Phil thesis). University of Ghana, Legon.
- Naden, T. & Schaefer, R. (1973). "The Meaning of Frafra". *Research Review*. 9(2), p. 5-12.
- Nespor, M. & Vogel, I. (1986) *Prosodic Phonology*. Dordrecht: Foris.
- Noske, R. (1992). *Moraic vs. constituent syllables*. na.
- Nsoh, E. A. (1997). Some aspects of Gurune (Frafra) nominal structure (MA thesis). University of Ghana.
- Nsoh, E. A. (2002). Classifying the nominal in the Gurene dialect of Farefare of Northern Ghana. *Journal Dagaare Studies*, pp. 21-15.
- Nsoh, E. A. (2010). Adjective types in Farefari. *Studies in the languages of the Volta Basin* 6, pp. 113-131.
- Nsoh, E. A. (2011). A lexical-functional syntax of the adjective in the Farefari Language (PhD thesis). University of Ghana, Legon.
- Obianika, E. C. (2014). Tone in abankaleke igbo: an acoustic analysis. *Global Journal of Arts, Humanities and Social Sciences*, 2(6), p. 11-28.
- Patin, C. (2009). *Tone shift and tone spread in the Saghala noun phrase*. *Faits de langues*, 1.
- Raharimanantsoa, R. (2012). *Aspects of phonology in Eboo-Nzikou (Bantu B74)*.
- Pike, K. L. (1962). Practical phonetics of rhythm waves. *Phonetica*, 8(1-3), p. 9-30.
- Polgárdi, K. (1998). *Vowel Harmony. An account in terms of Government and Optimality Theory* (Doctoral dissertation). Leiden University.
- Prince, A., & Smolensky, P. (2008). *Optimality Theory: Constraint interaction in generative grammar*. John Wiley & Sons.
- Rattray, S. R. (1932). *The Tribes of the Ashanti Hinterland*. Vols 1 & 2. Oxford: Oxford

University Press.

- Rhodes, R. (2010). A survey of vowel harmony with special focus on neutral segments, glides, and diphthongs. *Berkeley: University of California, MS. Online: <http://linguistics.berkeley.edu/~russellrhodes/pdfs/Prospectus.pdf>.*
- Rose, S., & Walker, R. (2011). Harmony systems. In Goldsmith, J. A., Riggle, J., & Alan, C. L. (Eds.), *Handbook of Phonological Theory*, 2, pp. 240–290.
- Sagey, E. C. (1986). *The representation of features and relations in non-linear phonology* (Doctoral Dissertation). Massachusetts Institute of Technology.
- Schaefer, R. (1974). Tone in Gurenne. *Anthropological Linguistics*, 16 (9), p. 464-469.
- Schaefer, R. (1975). *Collected Field Reports on the Phonology of Frafra*. University of Ghana:
Institute of African Studies.
- Schaefer, P. (2009). Narrative storyline marking in safaliba: determining the meaning and discourse function of a typologically-suspect pronoun set (Ph.D thesis). University of Texas. Arlington.
- Schaefer, P. & Schaefer, J. (2003). *Collected field report on the phonology of Safaliba*.
Institute of African studies, University of Ghana.
- Schwarz, A. (2003). *Low tone spreading in Buli*. *Cahiers Voltaiques / Gur Papers*, 6, p.121-130.
- Schwarz, A. (2007). *Tonal focus reflections in Buli and some Gur relatives*. 119, p. 950-972.
- Selkirk, E. O. (1980). The role of prosodic categories in English word stress. *Linguistic inquiry*, 11(3), p. 563-605.
- Snider, K., & van der Hulst, H. (1993). Issues in the representation of tonal register. *The Phonology of Tone—the representation of tonal register*, 1-27. Trask R. L. (1996). *A Dictionary of Phonetics and Phonology*. Routledge, London and New York.
- Stewart, J. M. (1967). Tongue-root position in Akan vowel harmony. *Phonetica*, 16, p. 185-204.
- Trask, R. L. (1996) *Historical Linguistics*, London: Arnold.
- Uffmann, C. (2001). Patterns of vowel epenthesis (not only) in Shona loanwords.
In *Proceedings of HILP* (Vol. 5, pp. 193-211).
- Van der Hulst, H., & Smith, N. (1982). An overview of autosegmental and metrical phonology.
The structure of phonological representations, 1, p. 1-45.

Williamson, K. (1977). Multivalued features for consonants. *Language*, p. 843-871.

White, C. (1955). *Backwards languages in Africa*. *Man* (55).

Appendices: Data tool

Appendix 1: Consonant phonemes

	/i/	/ɪ/	/e/	/ɛ/	/a/	/u/	/ɔ/	/o/	/ɔ/
/p/	[pɪke] 'uncover'	[pɪrəŋɛ] 'to force'	[pe]	[pɛ] 'to sew'	[pa] 'slap'	[pu] 'cause to lie down'	[pɔ] 'to share'	[po] 'also'	[pɔ] 'to swear'
/b/	[bɪŋɛ] 'put down'	[bɪrəŋɔ] 'vegetable'	[beere] 'tomorrow'	[bɛ] 'to cover'	[ba] 'they'	[bugum] 'fire'	[bɔ] 'it'	[boko] 'hole'	[bɔ] 'get missing'
/t/	[tɪisi] 'trees'	[tuŋa] 'town'	[tee] 'change'	[tɛ] 'to sieve'	[ta] 'join'	[tuke] 'to drive'	[tɔ] 'we'	[toore] 'mortar'	[tɔ] 'to pound'
/d/	[di] 'eat'	[dikɛ] 'to take'	[dee] 'and'	[dɛ] 'to dance'	[da] 'buy'	[du] 'be close'	[dɔɔɪ] 'spilling'	[doose] 'follow'	[dɔ] 'to brim'
/k/	[ki] 'die'	[kɪŋɛ] 'go'	[ke] 'over there'	[kɛ] 'to cut'	[ka] 'not'	[kule] 'go home'	[kɔ] 'kill'	[koɔɔm] 'water'	[kɔ] 'to weed'
/g/	[gɪrega] 'short'	[gi] 'hold'	[gee] 'and'	[gɛla] 'eggs'	[ga] 'dig'	[gu] 'block'	[gɔ] 'hang on'	[goo] 'forest'	[gɔŋɔ] 'book'
/kp/	[kpɪke] 'lift'	[kpɪrəŋɛ] 'to take'	[kpeŋɛ] 'active'		[kpa] 'to peg'				
/gb/	[gbi] 'break down'	[gbɪkɛ] 'to break'	[gbere] 'thigh'	[gbɛ] 'take'	[gba] 'to button'				
/ɔ/			[ɔɛ] 'to search'	[ɔɛ] 'to search'					
/m/	[mi] 'know'	[mɪ] 'also/too'		[mɛ] 'to build'	[ma] 'mother'	[mui] 'rice'	[mɔɔ] 'grass'		[mɔ] 'do well'
/n/	[ni] 'rain'	[nɪ] 'usually'		[nɛ] 'to step on'	[na] 'here'	[nuɔɔ] 'hand'			[nɔm] 'mix'
/ɲ/	[ɲie] 'angry'			[ɲɛ] 'to see'	[ɲabe] 'shout'	[ɲu] 'drink'	[ɲɔɔɔɔ] 'intestine'		[ɲɔ] 'burn'

/ŋ/			[peŋe] 'borrow'	[kiŋe] 'go'	[paŋa] 'strength'			[loŋo] 'frog'	[noŋo] 'hunger'
/ŋm/	[ŋmibe] 'endure'	[ti] 'that'		[ŋme] 'beat'	[ŋma] 'cut'				
/nw/					[nwani] 'why'				[nwɔnɛ] 'resemblance'
/f/	[fike] 'break'	[fure] 'stuck'	[feebe] 'to whip'	[fɛpi] 'clean'	[fakɛ] 'to shame'	[fu] 'dress'	[fo] 'you'	[fole] 'space'	[fo] 'blind'
/v/	[vi] 'shame'	[vi] 'absent'	[ve] 'to pull'	[vɛ] 'peep'	[va] 'to hit'	[vu] 'pull'	[vɔrɛ] 'pierce'	[vole] 'swallow'	[vɔi] 'be alive'
/s/	[sige] 'get down'	[siɣɛ] 'to name'	[sele]	[sɛ] 'be firm'	[sa] 'over there'	[suure] 'bend down'	[soɛ] 'wither'	[sore] 'road'	[so] 'father'
/z/	[zigi] 'gravel'	[ziɣɛ] 'struggle'	[ze] 'stand'	[zɛ] 'carry'	[za] 'scoop'	[zuo] 'head'	[zoɔ] 'right hand'	[zoore] 'mountain'	[zo] 'friend'
/h/			[yehɛ] 'get out'	[bahɛ] 'stop'	[halɛ] 'yellow'				
/y/				[siɣɛ] 'to name'	[pɔya] 'wife'		[pɔyom] 'even'		
/j/	[ji] 'call'	[june] 'tooth'	[jee] 'stay back'	[jɛ] 'to dress'	[ja] 'you.PL'	[jue] 'delay'	[jo] 'close'	[jo] 'is it?'	[jo] 'pay'
/l/	[lige] 'faint'	[li] 'fill up'	[ke] 'over there'	[kɛ] 'to cut'	[la] 'and'	[lu] 'to fall'	[lo] 'to tie'	[loe] 'select'	[lo] 'harvest'
/t/	[buuri] 'tribe'	[toori] 'pounding'	[teere] 'change'	[fore] 'pull over'	[tara] 'keep it'	[buurum] 'to cry'	[borom] 'malnourish'		
/w/	[wili]	[wisi] 'pure'	[weke] 'hatch'	[wɛke] 'divide'	[wa] 'to dance'	[wuu] 'like'	[wɔlt] 'be in pain'	[woko] 'long'	[wɔɔ] 'type of snake'

Appendix 2: Vowel phonemes

	/p/	/b/	/t/	/d/	/k/	/g/	/kp/	/gb/	/ɔ/	/m/	/n/	/ɲ/	/ŋ/	/ɲm/	/nw/	/f/	/v/	/s/	/z/	/h/	/ɣ/	/j/	/l/	/r/	w
/i/	Pike	bii	ti	di	ki	gile	kpik e	gbi		mi	ni	ɲi		ɲmib e		file	vi	sige	zigi			ji	li ge	buur i	wili
/ɪ/	pikɛ	bɪ	tɪɲa	diɪkɛ	kɪɲɛ	gɪ		gbik ɛ		mɪ	nɪ			ɲmɪ m		fɪrɛ	vɪ	sɪ	zɪɣɛ		sɪɣɛ	ɟɪ nɛ	lɪ	tɔɔ rɪ	wɪsɪ
/e/	Pe	beni	tee	de	ke	ge			ʔe				penɛ			fee be	ve	sele	ze	ye he		je	le	tee re	we ke
/ɛ/	pɛ	bɛ	tɛ	dɛ	kɛ	gɛla		gbɛ	ʔɛ	mɛ	nɛ	ɲɛ	kɪɲɛ	ɲmɛ		fɛ pi	vɛ	sɛ	zɛ	ba hɛ		ɟɛ	lɛ	fo rɛ	wɛ kɛ
/a/	Pa	ba	ta	da	ka	ga	kpa	gba		ma	na	ɲa	paɲa	ɲma	nwa nt	fa ke	va	sa	za	ha	Pɔɣ a	ja	la	ta ra	wa
/u/	Pu	bure	tuke	du	kum	gu				muɪ	nuu	ɲu				fuo	vu	suu re	zuo			ju e	lu	buu rum	wuu
/ʊ/	pʊ	bʊ	tʊkɛ	dʊɛ	kʊ	gʊ				mʊɔ	nʊa	ɲʊɛ				fʊ	vʊr e	sʊɛ	zʊɔ		pʊɣ om	ɟʊ	lʊ	bor om	wʊ lɪ
/o/	Po	bo	tɔɛ	dɔɛ	kom	go										foe	vol e	sor e	zoo re			jo	lo e	wo ko	
/ɔ/	pɔ	bɔ	tɔ	dɔɔ	kɔ	gɔ				mɔ	nɔm	ɲɔ	nɔɲɔ		nwa nɛ	fɔ	vɔɪ	sɔ	zɔ			ɟɔ	lɔ		

Appendix 3: Syllables

V	C	VC	CV	CVC	CVCC
a tia	n sɔ	ɔn	ba	dum	lalsgɔ
a tia pɔka	n ma	uk	di	zom	tobr
a yine	n kɔma			lobge	sayb
a yine pɔka				dok	
a tanga				zug	
a tanga pɔka				bɔk	
a dongo					

Appendix 4: Geminates and Nasal place assimilation

Geminates	Nasal place assimilation
zom mɔnɛ	sum nea → sunnea
kaam mingebɔ	salema nea → salɔnnea
ko'om mi'isum	zom ko'om → zɔŋko'om
sun nea	zim baŋa → zimbaŋa
salɔn nea	ataŋa pɔka → atampɔka
	adɔŋɔ pɔka → adɔmpɔka
	adɔŋɔ bila → adɔmbila
	asum kai → asunkai
	ayamɔŋa pɔka → ayampɔka

Appendix 5: Length and nasality

Vowel length		diphthongs	
Vi	viise	tĩ	tĩĩo
Nɪ	nure	gĩa	gĩĩm
Pe	peere	kē	kēē
tɛ	tɛɛŋa	gũ	gũũre
Ba	baa	tõ	tõõra
Du	duute	kõ	kõõsɛ
kɔ	kɔɔrɛ	bã	bããrɛ
Po	poore		
sɔ	sɔɔ		

Appendix 6: Vowel harmony

+ATR		-ATR		+ATR	-ATR
pesəgo	piisi	boa	bɔɔsɪ	vuke	võkɛ / sɔkɛ
Niiŋa	niisi	sɔʔa	sɔʔsɪ	lobe	lobɛ
zuʔa	zuʔusi	loŋa	losɪ	pike	pikɛ
buləga	buləsi	bɔka	bɔgəsɪ	birego	bɪrɪgɔ / bɛrɪŋa
Duŋa	dusi	sɛka	sɛgəsɪ	biseka	bɛsɪŋa
				lebege	bɔrɪgɛ
toʔo	toʔoro	dɔɔ	dɔɔrɔ	kiseke	kɪsɛgɑ
muʔo	muʔuro	sɔɔ	sɔɔrɔ	dige	dikɛ
yoko	yogəro	yɔɔ	yɔɔrɔ	sige	sikɛ
				zoore	zɔɔrɛ
fuo	futo	gɔrəgɔ	gɔtɔ	fole	fɔlɛ / filɛ
deo	deto	bɪrəgɔ	bɪtɔ	ŋmibe	ŋmɛkɛ
zonko	zonto	dɔrəgɔ	dɔtɔ	kpike	kɪkɛ
zuo	zuto	va'am	vətɔ	mirege	mɛrɛgɛ
		pɪʔɔ	Pɪtɔ	beelee	bɛɛlɑ
				vũule	võɔrɛ
				luke	lɔkɛ
				vue	võɛ

Appendix 7: Diphthongs

Default diphthongs			Vowel sequences		idiophones
nyɔa	deo	pia	tuuge	→ tue	woi
zɛa	fuo	bia	vuuge	→ vue	loi
fɔa	zuo	dɔvia	duuge	→ due	toi
bɛa	topuo	via	puuge	→ pue	boi
goyɛa	tintuo	yia	sooge	→ soe	mui
pokɛa / posea	kusolepuo	sia	booge	→ boe	fɔu
dɛa	zangbeo	lia	wooge	→ woe	lai
sɔa	payeo	tia	fooge	→ foe	kai
vɔa	yeo	via	loge	→ loe	wai
ayɛi	geo	nia	fiige	→ fie	lui
bawɛi	gbeo		nuge	→ nie	soi
bayopɔi	leo		tuge	→ tie	tɔi
mɔa	zupɛo		puse	→ piɛ	bɔi
nanbua	tuntuo		fiise	→ fiɛ	vɔi
gɔa			suge	→ siɛ	pɔi
kasɔa			yɔɔge	→ yɔɛ	fɔu
bunvua			zɔɔge	→ zɔɛ	tai
puɛn			vuuge	→ vɔɛ	fai
lua			yuuuge	→ yuɛ	mɔi
dayɔa			dɔuge	→ dɔɛ	
nyie			kɔuge	→ kɔɛ	
dindio			fupiigo	→ fupiu	
sio					
nyuɔ					
muɔ					
suɔ					
fuo					
vuɔ					
tabevuɔ					

Appendix 8: Tone

(1)	low		high		mid		
a.	zò:rè	‘bow down’	ná:fò	zò:rè	‘cow tail’	zō:rè	‘tail’
b.	là:	‘falling position’	lá:		‘bowl’	dā:	‘past’
c.	dìá	‘a dance’	díá		‘food’	dīá	‘an animal’
d.	dò:rò	‘wood’	yó:rè		‘salary’	yōrè	‘termite’
e.	kì	‘to die’	kí		‘millet’	fō	‘you’
f.	sìrà	‘husband’	bókó		‘hole’	sīrā	‘true’
g.	zòm	‘to climb’	zóm		‘flour’	būm	‘to mix’
h.	sàné	‘melon’	sàné		‘debt’	bōá	‘goat’
2a.	dí	díà	lā				
	eat	food	DEF				
b.	dà	dì	díà	lā			
	NEG	eat	food	DEF			
c.	ń	dí	díà	lá?			
	1SG	eat	food	DEF?			
3a.	á	nyókè	náyí	gà	là		‘he caught the thief’
b.	á	nyókè	náyí	gá	lá?		‘he caught the thief?’
c.	á	wán	nyóké	náyí	gà	là	‘he will catch the thief’
d.	á	kàn	nyókè	náyí	gà	là	‘he will not catch the thief’
e.	á	dáá	nyókè	náyí	gà	là	‘he caught the thief few days ago’

- 4a. á dì ságéǵò ‘he has eaten tz’
 b. á kā dí ságéǵò ‘he didn’t eat tz’
 c. á wá dí ságéǵò ‘he should come and eat tz’
 d. á wā dì ságéǵò ‘he will love to eat tz’
 e. á wán dì ságéǵò ‘he will eat tz’
 f. á wán dì ságéǵó? ‘will he eat tz?’
 g. á kàn dì ságéǵó? ‘wont he eat tz?’
 h. á kàn dì ságéǵò ‘he wont eat tz’
 i. á dáá dí ságéǵò ‘he ate tz few days ago’

- 5a. á nóǵè lá yínè pú?úségò
 b. á nóǵè yínè pú?úségò
 c. á nóǵè yínè pú?úségó?
 d. á kā nóǵè yínè pú?úségò
 e. á kàn nóǵè yínè pú?úségò

- 6a. kúúrè + yírè → kúyírè
 b. nábà + bíà → nábíà
 c. nérà + sààlà → nèrèsààlà
 d. zóm + kò?òm → zónkó?óm
 e. pókà + nyá?áǵà → pógónyá?áǵà