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AN AUTOSEGMENTAL ANALYSIS OF PHONOLOGICAL PROCESSES IN DAGARA.

BY

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(10160616)

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DECLARATION

I, KUUBEZELLE NERIUS, do declare that, with the exception of secondary data, drawn from the works of Dr. S. K. Bemile, and other referemces which have been duly acknowledged, the analysis in this thesis is my original work under the supervision of Dr. George Akanlig-Pare and Dr. James A. N. Saanchi and it has been submitted neither in part nor in whole previously for the award of a degree anywhere else.

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Dr. James A. N. Saanchi

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DEDICATION

This thesis is dedicated to:

My son Nuo-ire Arnold Janssen and my wife Bole Yvonne who I abandoned for two years to pursue this M.Phil. Course.

And

Monsieur et Madame Lotegeh Médah, who are currently at Ouagadougou, for sowing the Mustard Seed of education in me.

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ABSTRACT

The stored information about the grammar in the mental lexicon of the interlocutors does not only include the morphological, syntactic and semantic components of grammar, but also its phonological component. Phonology is a component of the grammar of language which involves the production, perception as well as the interpretation of sounds. This thesis discusses the phonology and phonological processes that are specific to Dagara, a dialect of Dagaare in the Upper West Region, within Autosegmental phonology framework, espoused in Goldsmith in 1976. Assimilatory processes including Vowel Harmony, Consonant Nasalization, Homorganic Nasal Assimilation, Glide Formation, Labialization and Rhotacism, as well as some syllable structure processes are highlighted. Data for the analyses are drawn from both primary and secondary sources and my native speaker's intuition. The primary data are gathered through elicitation using Summer Institute of Linguistics, West African Area Wordlist 1, as well as recordings of recitals using an audio sound recorder. Secondary data are drawn from existing literature on the dialect.

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LISTS OF ABBREVIATIONS AND SYMBOLS

1PL	First Person Plural
2PL	Second Person Plural
3SG	Third Person Singular
Ant	Anterior
-ATR	Unadvanced Tongue Root
+ATR	Advanced Tongue Root
C	Consonant/ Coda
Cons	Consonantal
Cont	Continuant
CV	Consonant Vowel
del rel	Delayed Release
H	High tone
HL	Falling tone
HUM	Human
Hz.	Hertz
Ibid	Ibidem
i.e	that is
L	Low tone
Lab	Labial
LH	Rising tone
M	Mid tone
M. A.	Manner of Articulation
MIT	Massachussetts Institute of Technology
N	Nucleus
NEG	Negation

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O	Onset
OCP	Obligatory Contour Principle
P. A.	Place of Articulation
PL	Plural
PROG	Progressive
SILWL	Summer Institute of Linguistics African Area Word List
Son	Sonorant
SPE	Sound Pattern of English
Sylla	Syllabic
TBU	Tone Bearing Unit
UAC	Universal Association Convention
UCC	University of Cape Coast
UEW	University of Education, Winneba
UG	University of Ghana
V	Short Vowel
V:	Long Vowel
WFC	Well Formedness Condition

SYMBOLS

`	Low tone
´	High tone
ˆ	Falling tone
ˇ	Rising tone
ó	Syllable
/ /	Phonological Brackets
[ ]	Phonetic Brackets
( )	Brackets

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CHAPTER ONE

BACKGROUND STUDIES

1.0 Introduction

This introductory chapter starts with a brief statement on the Language and its speakers with a sketch of dialectal variation in the language. The Problem Statement, the Scope of the research, the Aims and Objectives of the research, the Significance of the research as well as data collection and the Methodology used are discussed. It also contains an explanation of the Theoretical Framework and the motivation for using the framework in the phonological and tonal representations. A Literature review and the Organization of the thesis conclude the chapter.

1.1 The Dagaare Language and its people

Bendor-Samuel (1971:144) classifies Dagaare as belonging to the northern branch of the Western Oti-Volta group of the Gur branch of the Niger-Congo language family. Dagaare shares very close affinity with other languages of the Gur branch of the Niger-Congo language family like Dagbanli, Moore, Gurunɛ, Mampruli, Kusaal and Buli. Bodomo (2000: 3) refers to these West Oti-Volta languages as Mabia.

Geographically, Nanbigne (2008:32- 33) situates Dagaaba within latitudes 9^0 N and 11^0 N and longitude 2^0 W and 3^0 W covering a major part of Upper West Region and some towns in the Northern Region and further stretches beyond the international borders into Burkina Faso and Côte d'Ivoire.

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Dagaare is not however confined to the Upper West Region and part of the Northern Region. Occupational mobility has caused some native speakers to leave their traditonal land to other regions in Southern Ghana for their livelihood. This explains why there are several important Dagaare speaking communities in Accra, Kumasi, Obuasi, Sunyani, Kintampo, Bolgatanga Tamale and other significant towns and villages throughout Ghana. There are no accurate and up-to-date census figures in recent times to account for the number of native speakers of Dagaare. However, it is estimated to be the fourth largest indigenous language in Ghana after Akan, Ewe and Dagbani (Bodomo 1997).

There have been controversies over the years with regard to the right nomenclature to designate the language and the people. Some scholars in Ghana use the term Dagaare exclusively to refer to the language and the term Dagaaba (Dagao, singular) to refer to its speakers (cf. Bodomo 1997, 2000, Saanchi 2006, Nanbigne 2008 etc.). On the other hand, other scholars in Ghana and across the borders of Burkina Faso and Côte d'Ivoire use the term Dagara as a generic term to refer to the language, the speakers and the land (cf Bemile 1983, 1985 Delplanque 1983, Somé 2004 etc).

Despite these controversies, the speakers both in Ghana and beyond recognize the language as one that changes gradually in a "dialect continuum" as one moves from north to south and from east to west (Dakubu 2005: 1). In this thesis, the term Dagaare is used to refer exclusively to the language.

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According to Bodomo (1997), there are four major dialects that make up the language, though other scholars, in Ghana and African francophone linguists in Burkina Faso, would include Wule spoken around Lawra-Babile and across the Black Volta, and others as dialects of Dagaare. They include Dagara (or Northern Dagaare), spoken in and around Lawra, Nandom, Hamile and their surroundings as well as in Burkina Faso in towns such as Dano, Dissin, Gaoua, and Diebougou; Central Dagaare spoken in and around Jirapa, Nadwoli, and Daffiema; Southern Dagaare (Waali) spoken in Kaleo and Wa and; finally Birifor which is mainly spoken in Tuna, Kalba and surrounding areas in the Northern Reigion and in towns across the Black Volta as well as in Côte d'Ivoire. There is however no single standard form recognized by all as there are variations, though some are mutually intelligible.

1.2 Dialect variation in Dagaare

In view of the fact that there is no agreed single standard form of the language, it is important to pay attention to variation when describing the language. The dialects differ considerably at phonological, lexical and grammatical levels, as noted by Dakubu (2005), but since the focus of the thesis is on phonology, it is prudent to limit ourselves only to the phonological variation.

There are some phonological features in Dagaare which are not common to all the four major dialects. Bemile (1983), Bodomo (1997), Dakubu (2005) and Saanchi (2006), all agree that the Birifor and Dagara dialects have some features that other dialects do not have. They all identify the bilabial implosive /ɓ/, the voiceless velar fricative /x/, and the alveolar lateral ingressive / 'l/ as uncommon phonological features in Central dialect and Southern dialect.

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On the other hand, there is a phonological feature common to the Southern and Birifor dialects but which is not in the Central and Dagara dialects. For instance, in the Southern and Birifor dialects, the voiced alveolar fricative /z/ does not exist. It has been replaced by the voiced alveo-palatal affricate /ʤ/. The Central and Dagara dialects however still have both /z/ and /ʤ/ in their sound system. The table 1 below displays some examples of dialect variation at the segmental level.

Table 1. **Dialect Variation at Segmental Level**

Dagara	Central Dagaare	Southern Dagaare	Birifor	Gloss
ɓá	**f**ál	**f**ál	**ɓ**á	to slap
'lé	nyìg**ì**	nyìgì	**'l**í	to light
xãnó	**w**álí	**w**álí	**x**anfó	sweat
zú	**z**û	**ʤ**û	**ʤ**ú	head

Besides the variation at the segmental level, there is also variation in the use of suprasegmentals, especially tone in the four dialects. Some morphemes have different tones in the different dialects. Dakubu (2005) remarks that the Central dialect has a falling tone in some words where other dialects do not. Table 2 displays some examples of variation in tone drawn from Dakubu (2005 :6)

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Table 2 Dialect Variation in Tone.

Dagara	Central Dagaare	Southern Dagaare	Birifor	Gloss
zú	zû	ʤû	ʤú	head
bá	bâ	bâ	badaba	friend
zíɛ́	zíɛ̀	ʤíɛ	ʤíɛ	millet

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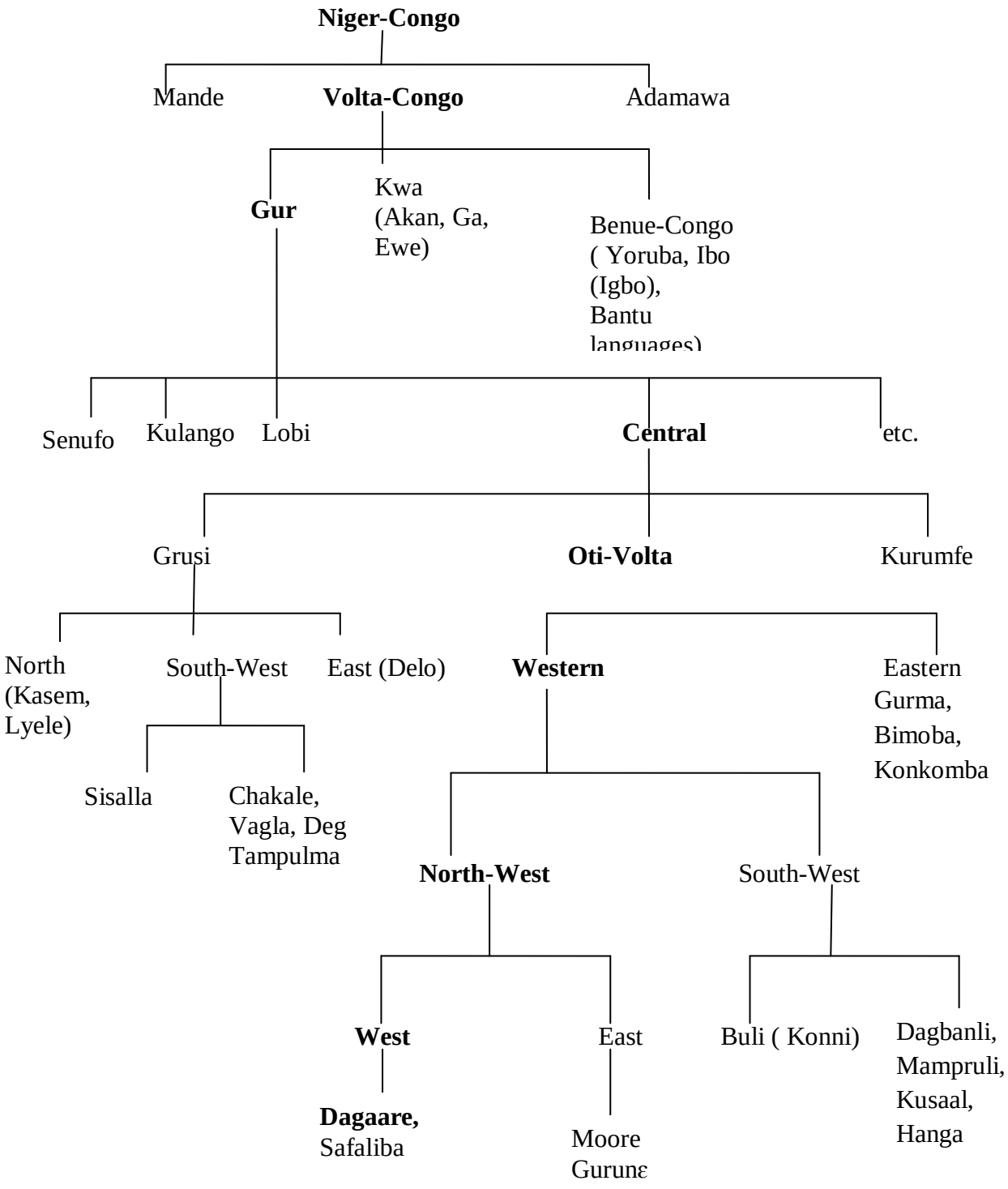
Figure 1. The Genetic-Linguistic Relationships of Dagaare (adopted from Dakubu 2005:4)



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1.3 Problem Statement

Since the Language was reduced to writing in 1929 by Catholic Missionaries, the Central dialect among the four major dialects has been the focus of linguistic research and analyses by both missionary linguists and academic linguists (Saanchi 2006:4-5).

The major dialects exhibit obvious linguistic variation which could be at lexical, phonological and grammatical levels, yet only the Central dialect has received prominent attention in literature and sociolinguistic functions in Ghana to the disadvantage of the others.

It is this dialect that represents the other dialects at the National level and is being taught at the basic schools as well as at the tertiary institutions such as the Training Colleges and the Universities including University of Education, Winneba, (UEW), University of Cape Coast (UCC), and the University of Ghana (UG).

For a holistic development of the language in Ghana, however, there is need for linguistic research and analyses in terms of phonetics, phonology, morphology, syntax and semantics in the other dialects.

Though Dagara phonology is somehow being developed, much of the work is undertaken by francophone African linguists in Burkina Faso. Bodomo (1997:5) attests to this as he admits that, “most of the linguistic analyses of this group of Dagaare [Dagara] have been undertaken by French and francophone African linguists in Burkina Faso”.

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Linguistic works in Dagara in Ghana are but a few (Bemile 1983, 1984, 1985, 1990, 2010 etc.). It is therefore certainly motivating to carry out phonological analyses in this dialect in Ghana. Besides it has been observed that the spoken form of Dagara varies from the written form. Obviously some kind of phonological processes occur in the language which need investigation.

1.4 Scope of the Research

The thesis is limited to Dagara phonology and the phonological processes that are specific to it. It discusses the Dagara sound system, i.e. vowel and consonant phonemes, its syllable structure in relation to other dialects especially the Central dialect. It also discusses the major findings, i.e. the phonological processes specific to Dagara. Since Dagara is a tone language like other African languages, tone is not left out of the discussion. The phonological representation of the analyses is in the autosegmental framework.

The research is carried out in selected villages under Nandom and Hamile. The villages covered include Nandom-Kogle, Nandom-Gengenkpe, Hamile-Kandemegaŋ and Kyebogo. These villages are some of the typical Dagara speaking communities in Ghana and are selected on the score of accessibility.

1.5. Aims and Objectives of the Study

The primary aim of this Thesis is to contribute to the existing literature on Dagara phonology. The specific objectives to meet include the following:

I. To discuss the Dagara sound system.

II. To give an account of the phonological processes in Dagara

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III. To discuss Dagara Tone and Tonal patterns as well as the tonal processes that occurs in Dagara.

IV. To formalize the description of the phonological processes and tonal processes within the Autosegmental framework.

1.6 Significance of the Study

The importance of the findings will be significant in several ways. On the descriptive perspective, this thesis may be the first attempt to elaborately deal with the phonological processes in Dagara in English.

On the theoretical perspective, this is the first attempt to discuss phonological processes and tone representation in the language within the autosegmental framework. It will also help to address the deficiencies in the description of the phonological process and ultimately add to the literature on the dialect in particular and the language in general.

1.7 Data Collection and Methodology

A blend of primary data, secondary data and my native speaker intuition were relied on in this work. Most of the secondary data are drawn from Bemile (1983, 1984 & 1985).

For primary data, I spent about three weeks (in the month of October 2012) in the field eliciting data, using Summer Institute of Linguistics West African Area Wordlist 1 (SILWL 1) in Boone Douglas (1989), through interviews with four native speaker informants. The elicitations were recorded using an audio recorder. Recitations of prayers, with a blind aunt who is a mono-lingual Dagara and non-literate as lead person, were recorded at Holy Family Parish, Hamile.

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A total of about six hundred and thirty (630) words are elicited in the selected Dagara speaking communities. At Nandom-Kogle, the informant, a retired educationist, Mr. Sylvanus Baaro produced one hundred and fifty (150) Dagara words of the SILWL1. Mr. Peter Damian Derzu at Kyebogo, another retired educationist, who prior to his retirement was teaching Dagaare at Tumu College of Education, also produced one hundred and fifty (150) Dagara words of the SILWL1. At Hamile-Kandemegaŋ, Mr. Cyril Bangdome, a retired educationist who is currrently teaching Dagaare at Holy Family Senior Secondary School at Hamile, also produced two hundred (200) Dagara words of the SILWL1. Finally, Mr. George Sagraza at Gengenkpe, a native speaker and a young teacher, produced one hundred and thirty (130) Dagara words of the SILWL1.

I then transcribed the recorded data using my native speaker intuition and also in consultation with the language informants where there was need for clarification and verification. Relevant data are then extracted and used for this analysis.

It must, however, be mentioned that it was not easy carrying out the data elicitation in the field. It was difficult getting the language helpers' audiences. There were a number of disappointments in attempts to meet with them for some reasons. The period of the fieldwork coincided with the peak of the harvest season which, of course, was a very busy period for most of them. Besides, funeral celebrations and bad weather were also contributory factors to the difficulties faced during the data elicitation.

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1.8 Theoretical Framework.

Though the mode of phonological representation is within Goldsmith's (1976) Autosegmental Phonology, a review of Chomsky and Halle's linear generative approach to phonological representation is inevitable. This section, therefore, discusses the limitations of Chomsky and Halle (1968) linear approach to phonological representation. It then explains how autosegmental phonology operates and the motivation for its use in this thesis.

1.8.1 Generative Phonology

The Generative phonology theory espoused in Chomsky and Halle (1968): *Sound Pattern of English* (*SPE*) was a dependable theory for phonetic and phonological analyses before the emergence of autosegmental phonology. It characterized segments as unstructured, homogeneous feature matrices, "where every segment has a specification for each of the two dozen distinctive features orderly bound together as a unit" (Odden 2005: 314).

Phonological representations of segments in generative phonology, therefore, consist of a string of segments arranged in a linear form like the serial arrangement of the orthography. For instance, for the Dagara word **bàŋ** 'know', each segment is broken down into their distinctive features and arranged linearly with each representing an aspect of the pronunciation of the entire word.

Figure 2 below shows the linear generative phonology representation of the word **bàŋ**.

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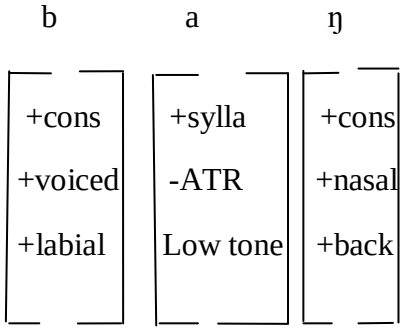
Fig. 2 . Linear representation of segmental and suprasegmental features



In this representation, the Low tone is lumped up with other features and considered as part and parcel of the segment /a/. Viewing segments in this way implies that in the event of segment deletion, every distinctive feature goes with the segment in question.

However sometimes, tone and other suprasegmental phonemes which are neither vowels nor consonants resist the effect of the deletion of a segment. Consequently, generative phonology could not succeed in explaining such facts about sounds. It, indeed, fails woefully in accounting for suprasegmental features of sounds such as Tone in phonological analysis (Odden 2005:314), thus the emergence of new phonological theories.

1.8.2 Autosegmental Phonology.

Autosegmental phonology was developed within the tradition of classical Generative phonological theory of Chomsky and Halle (1968), following the works of Williams (1971) and Leben (1973) on tone systems in West African languages such as Margi, Igbo and Mende. But the principal and remarkable innovations of autosegmental phonology are exemplified in Goldsmith (1976) in his dissertation to Massachusetts Institute of Technology (MIT).

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Autosegmental phonology is not a departure from the principles of Generative phonology codified in Chomsky and Halle's *Sound Pattern of English* (*SPE*) in 1968. It is a Non-linear version of phonological analyses of Generative phonology while SPE is a linear version of phonological analyses.

Indeed, Goldsmith (1990:1) confesses that autosegmental phonology is a "direct continuation of the traditional works in generative phonology codified in Chomsky and Halle's *Sound Pattern of English* in 1968". The only difference between the *SPE* and autosegmental theory is "the development of a multi-linear phonological analysis in which different features may be placed on separate tiers, and in which the various tiers are organized by 'association lines'" in autosegmental Phonology (Goldsmith, 1979:202). It can therefore, best be viewed as an attempt to supply a more adequate understanding of the phonetic side of linguistic representation (Goldsmith, 1976:16).

Goldsmith (1976:16) further explains that autosegmental phonology is a "theory of how various components of the articulatory apparatus, i.e. the tongue, the lips, the larynx and the velum are coordinated" in the process of sound production. It, therefore, implies that phonological features lead their own independent lives and not grouped together in unordered bundles (segments) as it is made to believe in generative phonology.

In this vein therefore, autosegmental phonology places segments and suprasegmentals (especially tone and other prosodic features) on different tiers parallel to each other with the suprasegmentals being linked to the segments by

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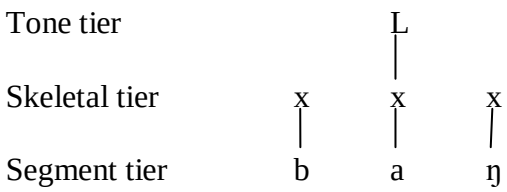
association lines. Every segment on each tier is specified for a set of features specific and unique to that tier and segments on each tier are associated with segments on the other tiers by association lines. Association lines in the derived or phonetic representation indicate a relationship of simultaneity, while at deeper levels of representation they specify a more abstract relationship among the segments on the separate tiers (http://hum.uchicago.edu/~jagoldsm/papers/autosegmentalunderspecificationwnoske.pdf).

The autosegmental phonolgical representation of the Dagara word **bàŋ** will therefore take the form as in Fig. 3 below:

Fig.3. Autosegmental Representation of Segmental and Supresegmental Features.



In the figure 3 above, the segments are arranged on multiple separate and independent tiers and each relates to the other tiers by the association lines. The Low tone and the segment /a/ relate to each other via the skeletal tier signifying the simultaneous co-ordination of the segment and the suprasegmental at the point of articulation. Thus, it is indeed an improvement over linear generative phonology since it allows for representation of sequence of segments and suprasegmentals simultaneously.

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1.8.2.1 Basic Tenets of Autosegemental Phonology

The application of autosegmental phonology is based on some fundamental principles and conditions. These principles and conditions, though originally meant for tone analysis, apply to all other phonological representations. They include the following principles and conditions: the skeletal tier, linkage condition, Universal Principle of association, Obligatory Contour Principle and Well-formedness Condition.

1.8.2.1.1 Skeletal Tier

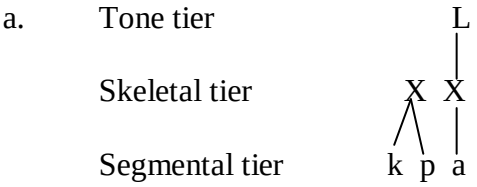
The skeletal tier plays a crucial role in the organization of the entire phonological structure. It is the mediating point on which the elements on the different tiers anchor. A segment which is not linked to a position in the skeletal tier is not phonologically realized.

The skeletal tier holds units represented by consonants and vowels; hence they are sometimes represented as C-slots and V-slots or X-slots. The skeletal tier can relate with other tiers on one-to-one, one-to-many or many-to-one basis.

Fig. 4 below illustrates the position or relation of the skeletal tier to other tiers in autosegmental representation of the words **kpà** 'to lock' and **sábíkúbé** 'hail' in Dagara.

Fig. 4. **Skeletal Tier**

a.



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b. Tone tier H

Skeletal tier X X X X X X X X

Segmental tier s a b i k u b e

In 4a) above, the Low tone on the tonal tier relates to the /a/ on the segmental tier via the V on the skeletal tier in one-to-one fashion, while one C on the skeletal tier relates to the segment / kp/ in a one-to-two fashion, indicating that the segment is a double articulated one. But in 4b) the Vs on the skeletal tier relate to only one High tone on the tonal tier which illustrates the many-to-one fashion of the relationship, whereas the skeletal tier relates to the segmental tier on one-to-one basis.

1.8.2.1.2 Universal Association Convention (UAC)

The UAC embodies three principles which indicate the relationship between tones and Tone Bearing Units (TBUs). These principles guide the assigments of tone to TBUs as outlined by Durand (1990:249) below:

A. **Mapping**: Associate vowels with tones in a one-to-one fashion left to right until we run out of tones or vowels.

B. **Dumping**: If after applying (mapping) some tones are still free (that is unassociated), link them to the last vowel to the right.

C. **Spreading**: If after applying (mapping) some vowels are still free, link them to the last tone on the right.

The following data on Margi (a Chadic language in Northern Nigeria) adapted from Oyebade (1998:129) best illustrate the three principles in Fig. 5.

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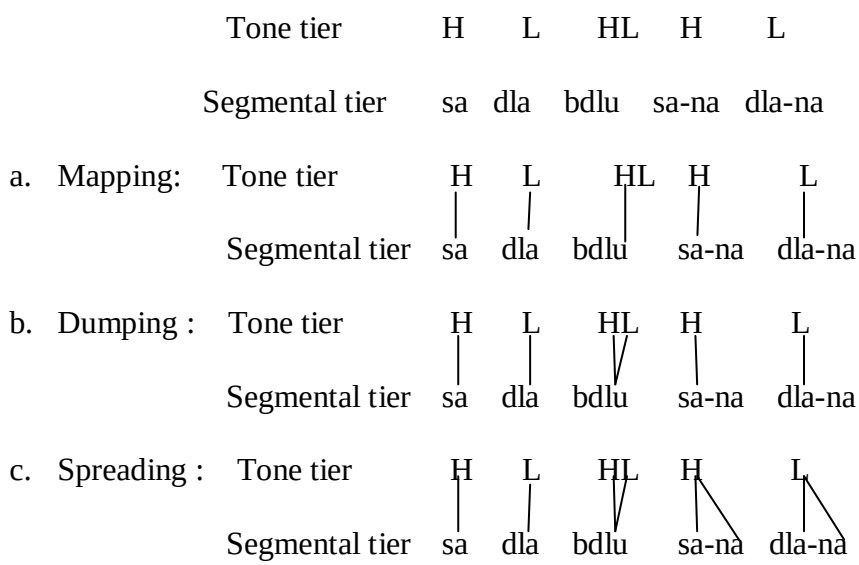
Fig.5. Universal Association Convention



1.8.2.1.3 Linkage Condition

Though segments are represented on autonomous tiers, they are not phonologically realized if they are not linked to other tiers. This condition thus demands each tonal feature and tone bearing segment on the separate parallel tiers be linked to each other via the skeletal tier by association lines before it can be phonologically realized (Goldsmith, 1990:53).

Association lines represent concurrent articulations so that when tone is linked to the segment, then it means that both tone and segment are articulated simultaneously. This condition actually caters for the phenomena of floating tone and tone stability.

A syllable structure process, during fast speech in Latɛ, which results in high vowel deletion, leaves its tone floating but the linkage condition allows the tone to dock on the consonant next to it, thus making the consonant a syllabic consonant as illustrated in Akrofi Ansah (2002:8), demonstrates the import of the linking condition.

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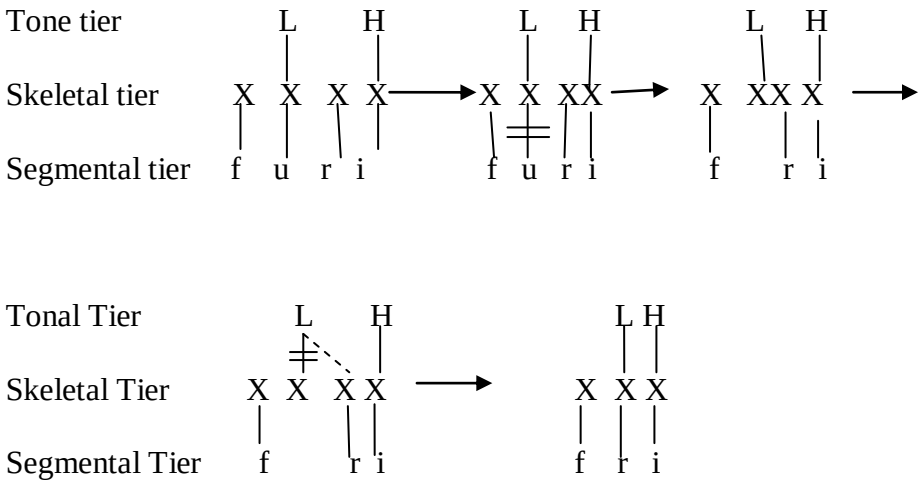
Fig. 6. Linkage Condition



In figure 6 above, the segment /u/ is linked to the skeletal tier in the underlying form but it is delinked during fast speech and for that matter it is not realized phonetically in the pronunciation of the word. The /u/ therefore remains silent while its Low tone docks onto the following sound /r/ hence the resultant is the syllabic consonant formtion in the Language. The word therefore suffaces as [fr̀í] rather than [fùrí] during fast speech.

1.8.2.1.4 Obligatory Contour Principle (OCP)

This principle spells out categorically that concatenation of two or more adjacent, identical tones are fused into a single tone before they are "mapped onto" their corresponding vowels. What this means is that, a word with more than one Low tone vowel such as **nábàglɛ̀ 'hunter'** have to be mapped onto one Low tone (that is, one-to-many) instead of a one-to-one mapping of the two Low tones. The principle also applies perfectly to other segments on the other tiers.

The representation in Figure 7a is in consonance with the OCP whilst 7b is a violation of the principle as shown below:

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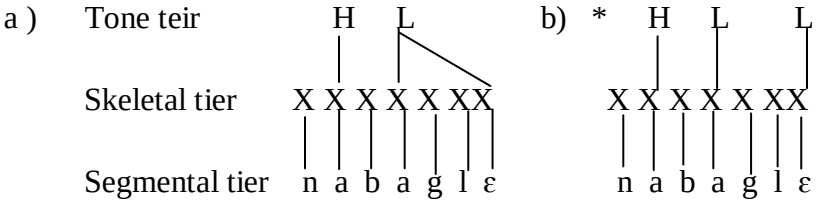
Fig. 7. Obligatory Contour Principle



From the illustration above in Fig. 7a the OCP permits the two Low tones to be merged into just a single Low tone (one-to-may representation).

1.8.2.1.5 Well Formedness Condition (WFC)

Well Formedness Conditions are universal principles which govern the multi-tier structure of autosegmental representation. These conditions actually determine the way tone and vowels are associated on the parallel tiers and allow the addition or deletion of association lines at any point throughout a phonological derivation. These are stupilated in Goldsmith (1979:207) as follows:

1. Each vowel must be associated with (at least) one toneme.
2. Each toneme must be associted with (at least) one vowel
3. Association lines may not cross.

By the Well Formedness Condition, all the tiers remain independent throughout the derivation with association lines linking them. At no point should the association lines cross in the course of the derivation.

The representation in figure 8a) is a violation of the Well-Formedness Condition because the Low tone has crossed the High tone to map onto the last ton bearing unit via the skeletal tier, eventhough the two are not adjacent.

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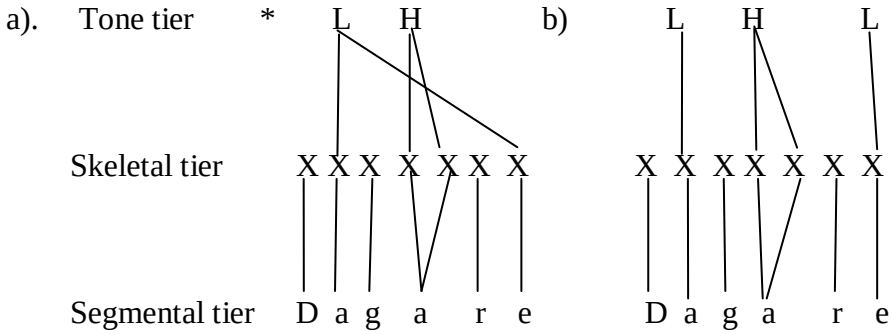
The correct configuration which conforms to the Well-Formedness condition is 8b.

Fig.8 Well Formedness Condition



1.8.3 Motivation for Autosegmental Phonology

The motivation for the use of the autosegmental framework in this thesis is based on its ability and flexibilty in representing complex segments such as, "Contour tone", Tone Stability, Floating tones, double articulated segments and germinates among others and also in providing explanation for their occurrences which were otherwise problematic to deal with in linear generative phonology.

Autosegmental phonology provides an excellent representation for Contour tone and double articulated segments via association lines in one-to- many and many-to-one mapping principle. Contour tone vowel is a vowel "whose surface tone is rising or falling, a situation that can often be the result of a concatenation of Low and High tone" (Goldsmith, 1979:205). Since Dagara is a tonal language and also has double articulated segments, autosegmental phonology is the best option for the phonological representation in this analysis.

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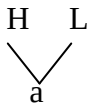
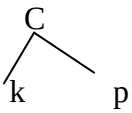
Thus, the segments /**â**/ and /kp/ are represented respectively as in figure 9 below:

Fig9. **Contour Tone and Double Articulated Segment Representation**

a) 

b) 

In 9a) although the segment /a/ is made up of a sequence of articulations and behaves phonologically as a sequence of features, it also behaves phonologically as a single segment. Whilst in 9b) although the segment /kp/ consists of a double articulation and behaves phonologically as a single feature specification, it also behaves as two segments (Sagey, 1986:22). These facts about phonological representation cannot be captured within the linear generative phonology.

"Tone Stability" is another elusive phonological phenomenon which linear generative phonology could not account for in phonological analysis and which autosegmental phonology has successfully accounted for. According to Goldsmith (1979:205) tone "stability refers to the resistance of the tonal features of a vowel to deletion, even when the vowel that bore the tonal features is deleted or desyllabified".

For instance, autosegmental phonology places tonal features and vowels on separate and autonomous tiers such that the deletion of one does not affect the other and with the association conventions and well-formedness conditions in place the tone or the vowel is re-associated to the adjacent tier (http:// hum.uchicago.edu~jagoldsm/papers/autosegmentalunderspecificationwnoske.pdf).

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"Floating tones" are also adequately and better handled in autosegmental phonology than in linear generative phonology. A Floating tone is a tone whose existence is autonomous to major segments and yet has a status in the grammar of a language. Autosegmental representation has a way of dealing with the presence and behaviour of such floating elements, which consisted of autosegments existing purely on the tonal tier. (http://hum.uchicago.edu~jagoldsm/papers/autosegmentalunderspecificationwnoske.pdf.)

Finally, autosegmental phonology makes it possible to account for phonological derivation in a more self-explanatory way with respect to phonological processes, especially in the step by step representation of the assimilatory processes. Word compounding in Dagara sometimes results in consonant nasalization, an assimilatory process which linear phonology has not been able to explain satisfactorily the derivational processes involved. For example,

/ **zòm**+ **bílí** / ⟶ [zòmmílí]
'Fish' + 'small' (pl) 'small fishes'

Figure11 shows graphically, the step by step derivation of the assimilatory process that accounts for consonant nasalization of the above example in Dagara in word formation process.

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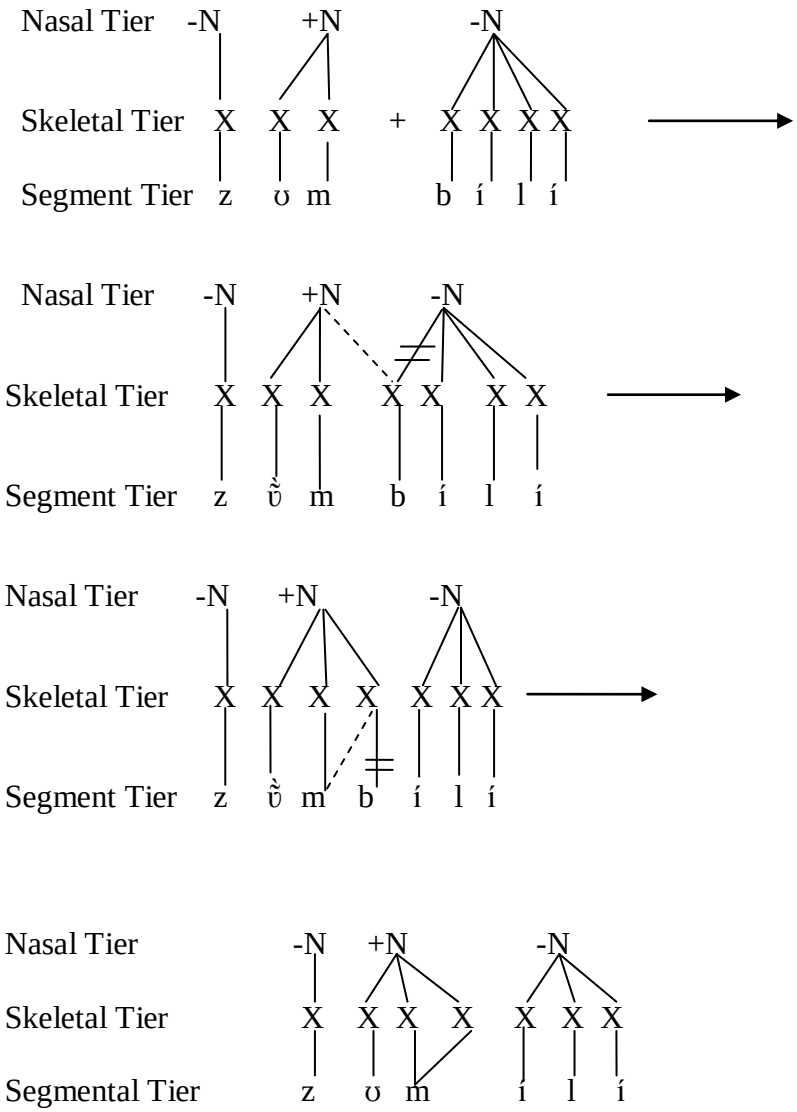
Fig. 10. Assimilatory Derivation Process



In the derivation above, the straight lines (———) are the association lines that link segments and features on the different tiers via the skeletal tier. The broken lines (– – – – – – – –) show a progressive spreading of the Nasal feature onto the oral stop /b/. In the next stage we observe that, the oral segment /b/ is now fully associated to the Nasal feature and is delinked from the minus Nasal (-N) feature. The two parallel lines (=) across the association lines signify the delinking of an association line from a segment either from a feature or the

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skeletal tier. For instance, the segment /b/ is delinked from the –N feature on the Nasal tier as well as from the skeletal tier.

The arrow symbol (⟶) shows the progression of the derivational process.

1.8.4 Tiers used in this Thesis

Tiers are the multi-levels at which the different phonological features are arranged in Non-linear generative phonology. They usually consist of sequences of features which differ from one tier to the other. There are various kinds of tiers that can be specified for various phonological analyses. In this Thesis, the following tiers are applicable to the phonological representation:

i. **Sekeletal / CV Tier**

It is the mediating point on which the elements on the different tiers anchor. The skeletal/CV tier holds units represented by consonants and vowels; hence they are sometimes represented as C-slots and V-slots or X-slots. The skeletal/CV tier can relate with other tiers on one-to-one or one-to-many basis (cf section 1.7.2.2).

ii. **Segmental Tier**

This is the level at which phonetic representation relevant to the description are arranged. In other words, the underlying phonetic segments occupy this tier (cf. Fig. 10 above).

iii. **Place / Manner of Articulation Tier (P. A. /M. A. Tier)**

This tier specifies the Place or Manner of articulation features of the segment that are significant to the phonological analysis. This applies in

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the formalization of phonological processes such as Homorganic Nasal Assimilation, Labialization and Glide formation.

iv. Tonal Tier

The tonal tier specifies whether the underlying tone on the segment is high (H), mid (M), low, (L) or a contour tone (HL, LH). This is applicable in the discussion and representation of tone in the languages (cf. 8b above)

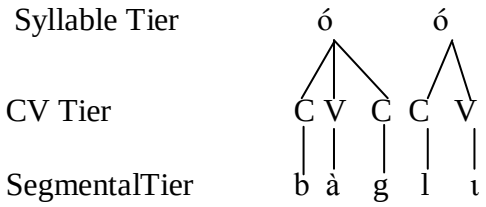
v. Tongue Root Tier

This tier spells out the tongue root position features of the phonological segments whether it is an Advanced Tongue Root feature (+ATR) or Unadvanced Tongue Root feature (-ATR). This tier is very relevant in the discussion of Vowel Harmony as a phonological process in Dagara.

vi. Syllable Tier

This tier indicates the units of sounds that make up a word. It is applicable in the discussion of the syllable type in Dagara and syllable structure processes such as elision, linking, and segment deletion. The CV-tier model of the syllable structure is used in this Thesis. Figure 11 below shows the structre syllable of the word **bàgli** 'to hunt'.

Fig. 11 Syllable Tier



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1.9 Literature Review

The amount of linguistic work on the phonological processes in any of the Dagaare dialects is not comprehensive. Early missionary and academic linguists' works on Dagaare phonology were mainly on the description of the segmental and suprasegmental phonemes with the focus on only the Central dialect. Kennedy (1966), a field work report on Dagaare phonology for instance, is mainly a description of segmental and suprasegmental phonemes. Bodomo (1997) is also mainly a description of the segmental and suprasegmental phonemes of the language. Bodomo (2000) however mentions in passing some phonolgical processes such as vowel harmony, vowel assimilation, and labialization, but with evidence limited to the Central dialect of Dagaare. Saanchi (1997) also discusses vowel harmony pointing out three types including ATR harmony, Rounding harmony, and Cross Height Vowel Harmony drawing data from the Central dialect to support his claim.

Delplanque (1976) is a work on the phonological description of the Dagara language as spoken at Dissine (Burkina Faso). He attempts to satisfy both descriptive and interpretative requirements by developing both static conception of the language (as a system of features and units), and a dynamic conception (as a system of rules). He shows the relevance of the three kinds of unit or tactical level: the phoneme (the minimal distinctive unit), the syllable (the minimal prosodic unit), and the phonological word (the minimal lexical constituent) (Delplanque, ibid: 7). In deed, it is a detail work on the Dagara language with regards to the distinctive features classification of the segments as well as the prosodic features; the syllable and tone. But he has not discussed

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the phonological processes in Dagara and besides, his work is in French language which is only limited to francophone readers to the disavantage of the majority of the readers of anglophone background.

Bemile (1983 and 1984) also follows a similar trend as he discusses Dagara segmental and suprasegmental phonemes. He posits that there are forty-five (45) segmental phonemes in Dagara. He justifies this claim and comes out with a list of six hundred and thirty (630) vowel phoneme oppositions and three hundred and fifty-one (351) consonant phoneme oppositions with examples drawn from Dagara dialect. Bemile (1985) discusses some assimilatory processes including; Vowel Harmony, Consonant Nasalization, Homorganic Nasal assimilation and syllable structure processes such as final Consonant and Vowel Elision as well as some Tonal processes. The analysis is however within the linear generative phonology framework and in German language which is not accessible and comprehensible to the many readers in general.

The current thesis extends the discussion of the phonological processes to include Consonant Labialization, Rhotacism, Glide formation, and Resyllabification in Dagara. The formalization of the phonological processes in this thesis is within non-linear generative phonology theoretical framework, and in a language which is more accessible and comprehensible to the academia in Ghana, in particular, and other Anglophone countries in general.

At theoretical level, there are some works on phonological processes and tone in cognate languages within the autosegmental framework which serve as good guide at the theoretical level. Akanlig-Pare (2005) discusses tone and some phonological processes such as re-syllabification, compensatory lengthening,

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vowel epenthesis and Vowel Harmony in Buli within the autosegmental framework.

Agoswin (2010) also discusses a number of phonological processes in the Kusaal language including Nasalization, Homorganic Nasal assimilation, labialization, palatalization, vowel truncation, consonant deletion, aspiration and glottalization. He also discusses the tonology of the language. Though the phonological processes are discussed within linear generative phonology framework, autosegmental phonology is used for the tonal representation.

Both Buli and Kusaal belong to the Mabia language group with Dagaare. Dagara may exhibit some kind of similarity at the level of the phonological processes and tonology with them, but it is anticipatory that the triggering phonological conditions will not be the same.

There are other works on the analysis of phonological processes within the autosegmental framework in some Ghanaian languages which have been keenly studied for a review. These works include Bota (2002), Akrofi Ansah (2002), Asante (2009) and Frimpong (2009) among others. There are some fundamental errors in some of these works in terms of the use of the tenets of the theoretical framework in the phonological representations.

Though the theoretical framework stresses that the skeletal tier is the mediating point on which the elements of the different tiers anchor, it is observed that in the works such as Akrofi Ansah (2002) and Frimpong (2009), the position of the skeletal tier is seriously inverted.

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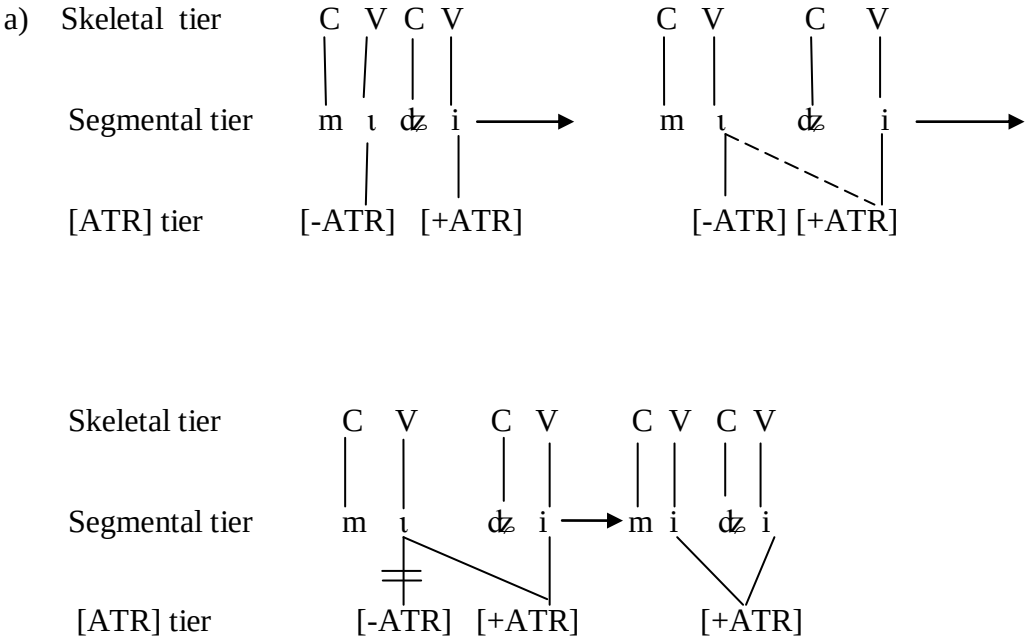
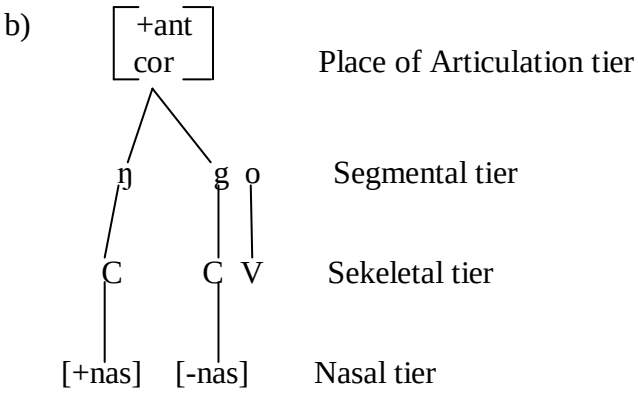
Figure 12 highlights some examples of erroneous placement of the skeletal tier in the parallel arrangements of the various tiers in the works of Akrofi Ansah (2002) and Frimpong (2009).

Fig. 12 . Wrongful Arrangement of Tiers



(Akrofi Ansah, 2002:48-49. Fig. 23).



(Frimpong, 2009: 22).

In the arrangements of the tiers in Akrofi Ansah (2002), the skeletal tier is placed above the other tiers, whereas in Frimpong (2009), the skeletal tier is

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placed below the other tiers. In both cases, the skeletal tier is not assuming that mediating role on which the features and the segments anchor as the theory stipulates. It is rather the segmental tier that is mediating between the feature tier and the skeletal tier. This is a fundamental error which this thesis will avoid or correct.

1.10 Organization of the Work

The Thesis is composed of five chapters. Chapter One consists of the introduction, Dagara and its speakers, a sketch on dialectal variation in Dagaare, the Problem Statement, Objectives and Significance of the study, Data collection and Methodology, Theoretical framework, Literature Review and Organization of the work.

Chapter Two discusses the Dagara vowel inventory and vowel distribution, consonant inventory and consonant distribution, the phonetic description of the sounds, the syllable type and structure of word in Dagara.

Chapter Three contains the phonological processes in Dagara. It discusses assimilatory processes including Vowel Harmony, Consonant Nasalization, Homorganic Nasal Assimilation, Rhotacism, Glide Formation, Labialization and Syllable Structure Processes such as Vowel Elision, Consonant Elision, Liaison (Linking), and Vowel Epenthesis.

Chapter Four dicsusses Tone and the function of Tone in Dagara. Chapter Five is the summary of the thesis and concluding remarks.

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1.11 Chapter Summary

In this chapter, we have given a brief statement on Dagara and its speakers with a sketch of dialectal variation in the language. We have also outlined the problem statement; the scope of the research, the aims and objectives of the research, the significance of the research as well as data collection and the methodology involved in the data collection is highlighted. We have also given an explanation of Autosegmental phonology with emphasis on how it evolved and the basic tenets on which it is applied. We also justified the motivation for using the framework in the phonological and tonal representations. A literature review and the organization of the thesis conclude the chapter.

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CHAPTER TWO

DAGARA SOUND SYSTEM

2.0 Introduction

The knowledge of the sounds of a language is very crucial for any phonological analysis. As Ladefoged (2003:1) rightly points out "without the knowledge of the sounds, one cannot describe the phonology of a language". This Chapter therefore, deals with the inventory of Dagara vowel and consonant phonemes and their distributions. It also outlines the Distinctive Features (DFs) of the sounds since phonological processes are phonetically motivated based on articulatory and auditory systems. It then discusses the syllable and syllable types in Dagara as well as their combination in words.

2 .1 Vowels

Vowels are produced without any obstructions of the airstream from the larynx to the oral cavity during their production. There are eighteen (18) vowels in Dagara (cf Bemile 1983, 1985). These vowels may broadly be categorized as oral and nasal vowels in terms of their places and manners of articulations. They may further be sub-categorized with regards to Tongue root position; Advanced Tongue Root / Unadvanced Tongue Root (+/-ATR).

2.1.1 Oral Vowels

There are nine (9) oral vowels /**i, ɪ, e, ɛ, u, ʊ, o, ɔ, a** / in Dagara, unlike in the Central dialect of Dagaare which is attested to have ten (10) oral vovels (Saanchi 1997). Oral vowels are produced with the velum raised as high as the pharyngeal wall and thereby blocking the airstream in the lungs from passing

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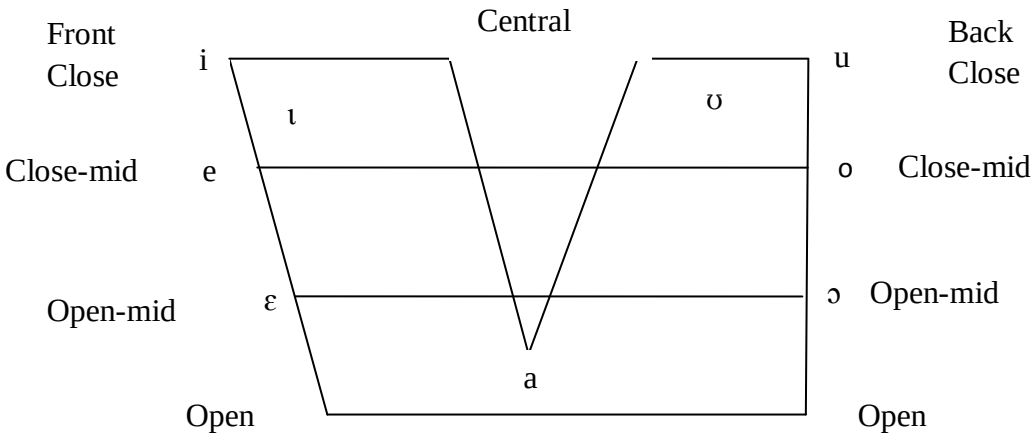
through the nasal cavity in the course of their production. The airstream thus, escapes through the oral cavity.

The chart below shows the places and manners of articulation of the oral vowels.

Fig.13



Short Oral Vowel Chart

From the chart above the oral vowels may be phonetically described as below:

/i/ Close front unrounded advanced

/ɪ/ Close front unrounded unadvanced

/e/ Close-mid front unrounded advanced

/ɛ/ Open-mid front unrounded unadvanced

/a/ Open central unrounded unadvanced

/ɔ/ Open-mid back rounded unadvanced

/o/ Close-mid back rounded advanced

/ʊ/ Close back rounded unadvanced

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/u/ Close back rounded advanced

Table 3. shows word examples of the short oral vowels.

Table 3. Oral Vowel in word examples.

Vowel	Example	Gloss.
/i/	**í.rì**	types / species
	ky**í**	millet
/ɪ/	t**ì**	we, our, us
	d**ì**	to eat, to burn
/e/	d**é**	to take
	tom**e**	work
/ɛ/	ny**ɛ̀**	to shit
	m**ɛ**r	to stick on
/u/	d**ù**	to scrub,
	k**u**l	to marry/go out
/ʊ/	**ʊ̀**	she/he/ it, him/her/, his/her
	bʊ̀r**ʊ**	milk
/o/	d**ó**	to climb
	ɓ**ó**	to take off bark of a tree
/ɔ/	y**ɔ̀**	to roam about
	b**ɔ̀**	to search for somethng
/a/	kp**à**	to nail, to lock
	bà	to stick something

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All the nine (9) oral vowels have their long counterparts. A long vowel is a short vowel whose sound duration is lengthened. Table 4 shows the examples of long oral vowels in words.

Table 4 Long Oral vowels in words

Vowel	Examples	Gloss
/i:/	pì**:**rì	to find something by chance
	v**ì:rì**	to go round / to wander about
/ɪ:/	p**ì:rì**	to sweep
	m**ì:**lì	to mix / to clean
/**e:**/	y**é:**	names
	p**é:**	stomachs
/**ɛ:**/	y**è:**	penises
	n**è:**	mouths
/**u:**/	g**ú:**	to fail to/ not be ble to
	ú:	alligator
/**ʊ:**/	z**ò:**r	tail
	b**ò:**r	goats
/**ɔ:**/	d**ɔ̀:**	man
	y**ɔ́:**	brother
/**o:**/	p**ó:**le	girl
	f**ó:**li	to whistle
/**a:**/	p**á:**r	vagina
	d**à:r**	sticks

Vowel length is contrastive in Dagara consequently, the short oral vowels contrast in meaning with their long vowel counterparts as the table below shows:

Table 5. Short and Long Oral Vowels in contrast

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Vowel	Example	Gloss
/**a**/	b**á**	friend
/**a:**/	b**á:**	to grow
/**ɔ**/	d**ɔ̀**	to weed
/**ɔ:**/	d**ɔ̀:**	man
/**i**/	ky**í**ru	pouring
/**i:**/	ky**í:**ru	taboo
/**ɪ**/	b**ì**	to ripen/cooked
/**ɪ:**/	b**í:**	or
/**e**/	gb**è**	to be blunt
/**e:**/	gb**é:**	boats
/**ɛ**/	ny**ɛ̀**	to shit
/**ɛ:**/	ny**ɛ:**	noses
/**ʊ**/	g**ʊ̀**r	to pluck out
/**ʊ:**/	g**ʊ̌:**r	thorns
/**u**/	g**ù**	take care
/**u:**/	g**ú:**	fail to

2.1.2 Nasal Vowels

All the nine (9) oral vowels have their nasal counterparts phonetically in Dagara.Similary, in the Central dialect all the oral vowels, except /e/, have their nasal counterparts (cf. Bodomo 1997, Saanchi 1997). This phenomenon distinguishes Dagaare from other Gur languages such as Kusaal and Buli, in which vowel nasalization occurs as a result of an oral vowel being in contiguous environment with a nasal consonant (cf. Agoswin 2010 and Akanlig-Pare 1994, 2005 respectively).

In the production of the Nasal vowels, the velum is lowered such that the airstream from the lungs escapes through both the oral and the nasal cavities.

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The nine (9) nasal vowels, / **ĩ, ɪ̃, ẽ, ɛ̃, ũ, ʊ̃, õ, ɔ̃, ã** /, have the same vowel qualities as their oral counterparts except for their spontaneous nasality. They are represented on chart in figure 14 below.

Fig. 14 Short Nasal Vowel Chart

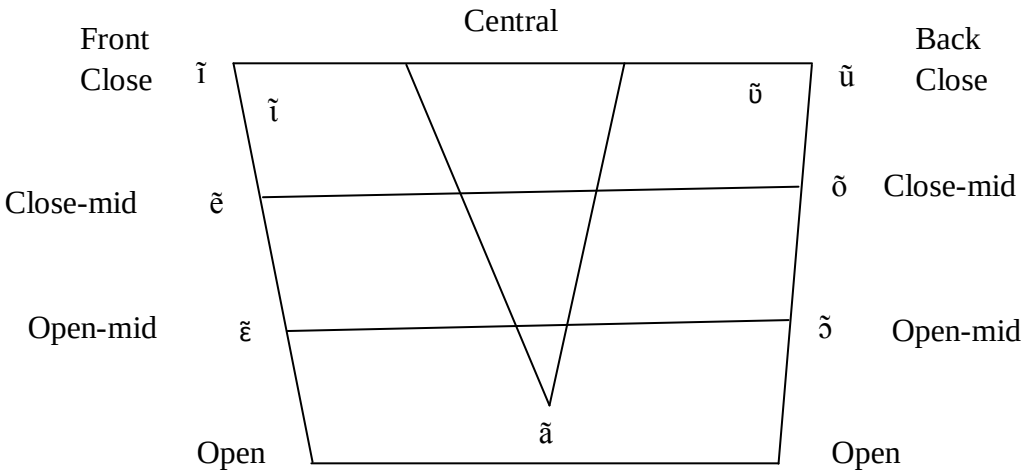

Table 6. **Short nasal vowels in words**.

Vowel Sound	**Examples**	**Gloss**
/ĩ/	p**ì̃**	to hide behind
	v**ì̃**	shame / shyness
/ɪ̃/	**ɪ̀̃**	I / my
	p**ɪ̃**	in the least way
/ẽ/	gb**ẽ**	forehead
	t**ẽtẽ**	alone
/ɛ̃/	t**ɛ̃**	to infiltrate
	s**ɛ̃**	to roast
/ũ/	v**ũvũ**	wasp
	k**ũ:**	death
/ʊ̃/	v**ʊ̃**	to expand

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	kʊ̃	will not
/ɔ̃/	vɔ̃	to pull out
	dɔ̃	to grow lean / hatred
/õ/	gbő	to pile up
	kpõ	to break open an egg
/ã/	pã	to compress something
	kpãkpã	very hot

Like their oral counterparts, all the nine (9) nasal vowsels in Dagara also have their long vowel equivalents. Since vowel lenght is contrastive in Dagara, the short nasal vowels also constrast in meaning with their long nasal vowel counterparts.

The tables 7 and 8 show examples of long nasal vowels and short nasal vowels in contrastive distribution with their long nasal vowel counterparts in minimal pairs or near minimal pairs respectively in the language.

Table 7. Long Nasal Vowels.

Vowel Sound	**Examlpes**	**Gloss**
/ĩ:/	pḯ:	an arrow / a key
	dĩ:	quiet
/ɪ̃:/	bɪ̃:	broth / juice
	tɪ̃:	poison / medicine
/ẽ:/	gbḗ:	on the forehead
	pḗ:	in the belly
/ɛ̃:/	kpɛ̃́:	big / elder brother
	gbɛ́:	on feet/ foot
/ũ:/	kũ:	death

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	vũ:	fire
/ṽ:/	**bṽ̀:** nṵ	what is it?
	kṽ:	probably/ perhaps /
/ɔ̃:/	**tɔ̃:**	exactly
	gyɔ̃:	very tall
/õ:/	**bõ̀:**	mournfully
/ã:/	**tã:**	to erect
	sã:	father

Table 8. Short andLong Nasal Vowels in contrast

Vowels	**Example**	**Gloss**
/ã/	**zà̃**	to scar away
/ã: /	**zà̃:**	yesterday
/ĩ/	**pì̃**	to intercept
/ĩ:/	**pí̃:**	arrow/ key
/ĩ/	**zì̃**	sit down
/ ĩ:/	**zí̃:**	blood
ẽ/	**gbé̃**	forehead
/ẽ:/	**gbé̃:**	on the horehead
/ɛ̃/	**bɛ̀̃**	to seal
/ɛ̃:/	**bɛ́̃:**	slowly (movement)
/ũ/	**nyù̃**	drink
/ũ:/	**nyú̃:**	smell
/ṽ/	**kṽ̀**	will not
/ṽ:/	**kṽ:**	probably
/õ/	**põ̀**	to shave
/õ:/	**bõ̀:**	mournfully
/ɔ̃/	**tɔ̀̃**	to abandon
/ɔ̃:/	**tɔ̀̃:**	exactly

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These nasal vowels similarly contrast with the their oral vowel counterparts as well in Dagara. The table below shows some examples of minimal pairs or near minimal pairs of oral and nasal vowels in contrasts.

Table 9. Oral and Nasal vowels in contrast.

Vowels	Example	Gloss
/a/	kpàkpà	to lock repeatedly
/ã/	kpãkpã	very hot
/ɔ/	dɔ̀	to weed
/ɔ̃/	dɔ̃̀	hatred
/i/	pì	to swell
/ĩ/	pĩ̀	to intercept
/ɪ/	ɪ̀	do
/ĩ/	ĩ̀	I
/e/	gbè	to be blunt
/ẽ/	gbḗ	forehead
/ɛ/	sɛ̀	to sow
/ɛ̃/	sɛ̃̀	to roast
/ʊ/	pʊ̀ɔ̀	stomach
/ʊ̃/	pʊ̃̀ɔ̃̀	to rot
/u/	dù	to scrub
/ũ/	nyũ̀	drink
/o/	kó	to dry
/õ/	kõ̀	to cry

2.1.3 Tongue Root Vowels

All the eighteen (18) vowel phonemes, may further be sub-categorized into two main sets based on the position of the tongue root during their production, ie.

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Advanced Tongue Root position (+ATR) or Retracted/Unadvanced Tongue Root position (-ATR).

The advance tongue root (+ATR) vowels are produced by pushing the tongue root forward, thus enlarging the pharyngeal cavity often raising the body of the tongue as well (Durand 1990:45). These vowels include / **i**, **e, u**, **o**, **ĩ**, **ẽ**, **ũ**, **õ**/. The Retracted/Unadvanced Tongue Root vowels on the other hand, are produced with the tongue root pushed backward toward the pharynx thereby narrowing the space between the pharynx and the tongue root. The set of (-ATR) vowels include / **ɪ**, **ɛ**, **ʊ**, **ɔ**, **a**, **ɪ̃**, **ɛ̃**, **ʊ̃**, **ɔ̃ ã**/.

Bemile (1994) further uses the terms "superior vowels" and "inferior vowels" to refer to the advanced tongue root (+ATR) vowels and the retracted tongue root (-ATR) vowels respectively. This dichotomy of vowels in Dagara is strictly adhered to in writing and in speech. There is a co-occurrence constriction on vowels of the two sets in the same lexical, mono-syllabic or simple multi-syllabic, non-compound word. Compounding process however sometimes voilates the harmonic system, since the it sometimes involves stems of different vowel qualities.

In other words, there is a strict vowel harmony in a simple stem Dagara word, as it demands that only (+ATR) ("superior") vowels co-exist with (+ATR) ("superior") vowels in a simple Dagara word and (–ATR) ("inferior") vowels co-exist with (–ATR) ("inferior") vowels.

The vowels /**a, ã** /, however, by virtue of the tongue root postion during their production, are considered as neutral and may co-occur with (+ATR) (superior) vowel(s) in some words but they are most commonly associated with the (–

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ATR) (inferior) set of vowels. The table below shows examples of the strict co-occurrence constrictions of the two sets of vowels in mono-syllabic or simple multi-syllabic non-compound words.

Table 10. Tongue Root Harmony

[+ATR]	**Gloss**	**[-ATR]**	**Gloss**
túór	load	tʊ́ɔ́r	mortar
kúór	funeral	kʊ̀ɔ̀r	gourd
púó	farm	pʊ̀ɔ̀	within
gbɛ́bír	toe	tíɛ̀ŋkɒblʊ	beard
gbò̰gbókyìlé	jackal	náfɔ́bɛ́glíkɛ̀r	sandals (slippers)

2.1.4 Diphthongs in Dagara

This section outlines the possible ways in which vowels may combine in a simple Dagara word. We have already discussed with examples in section 2.1.1 and 2.1.2 that both oral and nasal vowels length is a consequent of two identical vowels in combination. We shall therefore discuss diphthongs, another type of vowel combination in Dagara.

Westermann & Ward (1966) cited in Bemile (1985:46) defines a diphthong as follows:

> A diphthong is a gliding sound in which the tongue starts in the position of one vowel and immediately leaves it to glide towards another vowel position by the most direct route, without any diminution and subsequent reinforcement of the breath force. A diphthong strikes the ear as one syllable… (Westermann &Ward 1966: 43-44).

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In other words, a diphthong is a combination of two different vowels in a word that surfaces as a single syllable. In Dagara, when different vowels occur in a word, they must strictly adhere to the ATR harmony. The table below shows some possible different vowel combinations in Dagara words. It must however be mentoined that the list given here is not at all exhaustive. Bemile (1984) contains an elaborate list of diphthongs in contrast with practical illustrations in Dagara.

Table 11. Diphthongs in Dagara

Diphtong	**Example**	**Gloss**
/ ie /	b**ie**	child
/ io /	b**íò**g	tomorrow
/ ĩo /	d**ḯõ̀**ŋ	a room
/ ĩɛ /	t**ìɛ̀**m	chin
/ **ĩã** /	d**ḯã**	today
/ **ĩɔ̃** /	s**ĩɔ̃**ŋ	rainy season
/ **ui** /	z**úi**ŋ	because of....
/ **iu** /	d**ìù**	to chase
/ **ue** /	k**ùe**	hoes
/ **uo** /	y**úó**r	name
/ ou /	**òù**	to regurgitate
/ **ũõ** /	**ũõ**n	dry season
/ **õũ** /	k**õũ**	to grow lean
/ **oe** /	k**óe**	funerals
/ **ʊɔ** /	n**ʊ̀ɔ̀**r	mouths

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/ **ɔʊ** /	wɔ̀ʊ̀	to bruise, sustain burns
/ **ʊ̃ɔ̃** /	k**ʊ̃ɔ̃**	water
/ **eu** /	l**eu**	immediately
/ **ɔɪ** /	p**ɔɪ**	oaths
/ **ɪɔ** /	**ìɔ̀**b	saturated
/ **ɪɛ** /	p**ìɛ̀**	basket
/ **ɛɪ** /	k**ɛ́í**	malt, types of malt
/ **ĩɛ̃** /	s**ḯɛ̃́**	witch
/ **ɛ̃ʊ̃** /	sɛ̃ʊ̃	mat
/ **ɔɛ** /	k**ɔɛ**	gourds
/ **aɪ** /	v**aɪ**	leaves
/ **ãĩ** /	m**ã̀ĩ̀**	very red

2.2 Consonants

Consonants are produced with various articulators and degrees of modulations of the airstream in the oral cavity. Ladefoged (1982) describes the production of consonants as radical obstruction in the mid sagittal region (the midline) of the vocal tract. There are twenty-seven (27) consonant phonemes; twenty-five (25) consonants and two (2) approximants (cf. Bemile 1983, 1985). These consonant phonemes are produced at eight (8) different places of articulations and seven (7) different degrees of airstream modulations in the oral cavity during their articulations.

The consonant chart below shows their phonetic values ie. the places and manners of articulations of the phonemes. The horizontal axis shows the eight places of articulations and the vertical axis shows the seven manners of

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articulations. Where sounds are in pairs, those to the left are voiceless and those to the right are voiced. Singly occurring sounds are naturally voiced except the velar and glottal fricatives

Table 12 Consonant Chart

	Bilabial	Labial-Velar	Labio-Dental	Alveolar	Alveo-Palatal	Palatal	Velar	Glottal
(Plosive)explosives Implosive	p b ɓ	kp gb		t d			k g	
Affricates					ʧ ʤ			
Fricatives			f v	s z			x	h
Nasal	m	ŋm		n		ɲ	ŋ	
Laterals egressive Ingressive				l 'l				
Trill				r				
Glides/Approximants		w				j		

All the sounds in Dagara are represented in the orthography as they appear on the phonetic chart except the alveo-palatal affricates [ʧ] ,[ʤ] and the the

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palatal nasal [ɲ] which orthographically appear as <ky>, <gy> and <ny> in the written form, represpectly.

The glottalized bilabial implosive /ɓ/, the glottalized ingressive lateral / ˈl /, and the voiceless velar fricative /x/ are sounds only attested in Dagara and Birifor; the Central and Southern dialects of Dagaare lack them.

The trill sound /r/ is prohibited at word-initial position though, it may occur at word-medial or secondary syllable-initial and word-final positions. All other consonants may occur at word-initial or word-medial position. But at word-final position, only seven consonants, including / b, g, m, n, ŋ, l, r / are exclusively allowed.

Table 13 shows examples of the twenty-five consonants and the two glides distribution in words.

Table 13. Consonant Phonemes Distribution in Words

Sound	**Word initial**	**Word medial**	**Word final**
/p/	**p**ɔ̀g ‘woman**’**	nóbì**p**ɛgr **‘**fingernail**’**	-------
/b/	**b**ɔ̀rɔ̀ ‘animal milk’	pér**b**íé ‘buttocks’	dɛ̀**b ‘**man’
/ɓ/	**ɓ**ár ‘to split’	**ɓ**à**ɓ**à ‘parboil’	----------
/t/	**t**úg ‘to dig’	wõ**t**úó ‘to suffer’	----------
/**d**/	**d**íɛ̀nɪ ‘to play’	bɔ́n**d**írí ‘food’	----------
/**k**/	kɔ̀r ‘to cough’	dá**k**ógle ‘a stool’	----------
/**g**/	**g**ã**g**àà ‘a drum’	zèdú**g**lé ‘earthen pot’	ténsɔ̀**g** ‘gound’
/**kp**/	**kp**àgtir ‘baboon’	nĩ**kp**ɛ̃́ɛ̃́ ‘elder’	----------

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/**gb**/	**gb**ébír 'toe'	nɔ̀**gb**ámbíé 'lips'	----------
/**ʧ**/	**ky**àpóré 'brain'	da**ky**ĩn 'wall'	----------
/**ʤ**/	**gy**êl 'egg'	wɛ́**gy**a 'cloth'	----------
/**f**/	**f**áà 'to sieze'	náfɔ́ɓɛ́glíkɛ̀r 'Sandals'	----------
/**v**/	**v**óórí 'breathe'	**v**ũ**v**ũ 'wasp'	----------
/**s**/	**s**ãã 'father'	pò**s**ǎŋ 'sorrow'	----------
/**z**/	zɛl 'tongue'	**z**ã**z**ãŋ 'bat'	----------
/**x**/	**x**íérí 'to yawn'	**x**ãní**x**ãní 'sweat profusely'	---------
/**h**/	**h**a 'to buy excessively'	**h**el**h**el 'to tear'	---------
/**m**/	**m**òtákv̌ɔ̌ 'tears'	tɛ̃**m**ɛ̃̀ 'tobacco'	zu̍**m** 'fish'
/**ŋm**/	**ŋm**âm 'dove'	náŋ**m**ân 'pigeon'	----------
/**n**/	**n**ǎ̀ŋ 'scorpion'	bǎ̀**n**daa 'lizard'	**n**ããŋmi**n** 'God'
/**ɲ**/	**ny**ǽǽkpi̍̃n 'ghost'	**ny**ǎ̀ǎ̀**ny**ùò 'cat'	----------
/**ŋ**/	**ŋ**à 'this (one)'	kpà**ŋ**kpà**ŋ**nyu̍̃gbíé 'shoulder'	ĩǎ̀**ŋ** 'body'
/**l**/	**l**íl**l**é 'bird'	wù**l**e 'tree branch'	fi**l** 'scar'
/'**l**/	'**l**ɛ 'to enjoy'	dɛ̀pɛ́'lɛrɛ 'spider'	----------
/**r**/	----------	kɛ̀**r**ɪ 'tall'	dɛ̌g**r** 'dirt'
/**w**/	**w**ógrí 'to bark'	**w**ó**w**ó 'confess repeatedly'	----------

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/**j**/ **y**ùón 'year' **y**ir**y**el 'family matter' ----------

2.3 Phonetic Description of Dagara Sounds

This section discusses the inherent properties of Dagara sounds and groups them into natural classes in consonance with the Distinctive feature theory, based on the non-hierarchical binary feature system, outlined in Chomsky and Halle (1968) and in the works of Katamba (1989), and Durand (1990).

An inventory of the sounds of a language alone does not offer enough bases to make general statements about the nature and behaviour of sounds for phonological analysis. The knowledge of "the basic phonological ingredients, called Distinctive Features, which phonemes are made up of" (Katamba, ibid: 35), is very crucial for phonological analysis of any language and for that matter, the description of Dagara.

Distinctive features (DFs) are minimal contrastive units that enter into the composition of sounds. They are in effect, the building blocks of sounds (Akanlig-Pare 1994:18). Oduro Kwarteng (2009:11) following Katamba (1989) also views distinctive features as the acoustic and articulatory features that seek to group sounds into natural classes based on their shared features. But in my view, they are the lenses through which the internal structure of a sound can be defined and distinguished from other sounds, thus making it possible to make general statements about the nature and behaviour of sounds.

Some distinctive features are binary in terms of the presence (+) of the feature or absence (-) of the feature in the sound. Whilst others are unary features because they have a single value and specify only sounds that have them.

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Sounds whose productions involve only the active articulators are tagged with the unary feature.

The sounds are classified and discussed under; Major class features, Cavity features, Tongue Body features, Manner features and Laryngeal features.

2.3.1 Major Class Features

These features define the major classes of sounds that are relevant in phonological analysis. These features sub-divide speech sounds into vowels, consonants, obstruents, sonorants, glides, and liquids. We will classify the sounds in Dagara under the three major class features; Consonantal / non-consonantal, Syllabic / non-syllabic, and Sonorant / non-sonorant, guided by the definitions given in Durand (1990).

2.3.1.1 [+/-Consonantal] Sounds

> Consonantal sounds are produced with a constriction in the vocal tract at least equal to that found in the fricative consonants; non-consonantal sounds are made without such constriction. Obstruents (plosives, fricatives, and affricates), nasals, and liquids are [+cons]. The [-cons] class includes the vowels, the glides (a category made up of the semi-vowels) and the glottal sounds [ʔ] and [h] (Durand, ibid: 42).

However, the consonantal classification include / p, b, ɓ, t, d, k, g, kp, gb, tɕ, dʑ, f, v, s, z, x, h, m, n, ɲ, ŋ, ŋm,l, 'l, r, w, j / in Dagara. The [-Cons] sounds include the 18 vowels only.

2.3.1.2 [+/-Syllabic] Sounds

"Syllabic sounds are those which constitute peak of syllables, non-syllabic sounds are those which are at the margins of syllables" (Durand, ibid: 41). The

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sounds that constitute peak of syllables in Dagara, ([+syllabic] sounds), include the eighteen vowels; / i, ɪ, e, ɛ, u, ʊ, o, ɔ, a, ĩ, ɪ̃, ẽ, ɛ̃, ũ, ʊ̃, õ, ɔ̃ ã / and the liquids / r, l / at coda position.

All other sounds including the stops, nasals, and glides are always at the margins of syllables, thus [-sylla].

2.3.1.3 [+/-Sonorant] Sounds

> Sonorant sounds are produced with a vocal tract configuration sufficiently open for the intra-oral air pressure to be approximately equal to the ambient air pressure. By contrast, obstruents are produced with a constriction sufficient to generate intra-oral pressure much greater than that of the surrounding air (Durand, ibid: 42).

The [+son] sounds in Dagara include the vowels / i, ɪ, e, ɛ, u, ʊ, o, ɔ, a, ĩ, ɪ̃, ẽ, ɛ̃, ũ, ʊ̃, õ, ɔ̃ ã /, the nasals / m, n, ɲ, ŋ, ŋm/, the liquids / l, 'l, r /, and the glides / w, j /. The [-son] sounds include the stops, fricatives, affricates and the glottal stop.

2.3.2 Cavity Features

These features are associated with the places of the articulation of the sounds. They specify where, in the vocal tract, the modifications of the airstream take place during the production of particular sounds (Katamba, 1989: 43). The features relevant for the description of Dagara sounds are under two broad areas; Primary stricture which include Coronal/non-coronal, Anterior/non-anterior, Labial/non-labial; /Round/non-round, and Tongue-body features which include High/non-high, Low/non-low, Back/non-back/Dorsal and Advanced/Unadvanced Tongue Root (-/+ATR). Their definitions are based on what Katamba (1989) has given following those in Chomsky and Halle's *S PE*.

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2.3.2.1 Primary stricture

2.3.2.1.1 [Coronal] Sounds

"All sounds produced with the blade of the tongue raised towards the front teeth, the alveolar ridge and the hard palate are designated with this feature. For non-coronal consonants, the blade of the tongue remains in a neutral position" (Katamba, ibid: 44). This feature is a unary feature as the active articulator, ie. the blade of the tongue, is a reference point for its specification. Dagara sounds with this feature specification, ie. coronal sounds, include / t, d, ʧ, ʤ, s, z, n, ɲ, l, 'l, r, j, i, ɪ, u,ʊ /. Non-coronal sounds include; / p, b, ɓ, k, g, kp, gb, (ʔ), f, v, x, h, m, ŋm, ŋ, w / and the rest of the vowels.

2.3.2.1.2 [+/- Anterior] Sounds

The anterior sounds are produced from the alveolar ridge forward. Katamba (1989) distinguishes the production of anterior and non-anterior sounds as follows:

> In the production of anterior sounds, the main obstruction of the airstream is at a point no farther back in the mouth than the alveolar ridge; for non-anterior sounds the main obstruction is at a place farther back than the alveolar ridge. Labials, dentals, and alveolar are anterior while all other sounds are not (Katamba, ibid: 44).

The [+ant] sounds in Dagara thus, include / p, b, ɓ, t, d, m, n, f, v, s, z, l, 'l, r, w /, while all other sounds are [-ant].

2.3.2.1.3 [Labial]; [+/- Round] Sounds

These features are attributed to sounds whose productions involve a varying degree of the airstream obstruction at the lips or the protrusion of the lips.

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These features draw consonants and rounded vowels into one category; the Labial feature is a consonant specification, whereas Round feature is a vowel specification. Katamba (1989:44) points out that, there is a considerable degree of overlapping between sounds covered by these two features.

Labial sounds include; Bilabial, Labial-velar and Labio-dental consonants as well as rounded vowels. All other sounds are non-labial/ [-round], (Katamba, ibid: 44). The sounds in Dagara that fall under these features are / p, b, ɓ, kp, gb, f, v, m, ŋm, w / and Rounded vowels / o, ɔ, u, ʊ, õ, ɔ̃, ũ, ʊ̃ /. All other sounds are neither Labial nor Round.

2.3.2.2 Tongue Body Features

The features discussed in this section relate to the positions of the tongue body and the tongue root relative to their neutral positions. The neutral position of the body of the tongue is said to be the position which it assumes in the production of a mid front vowel (Katamba, ibid: 45). The features under consideration are; High/non-high, Low/non-low, Back/non-back and Advanced/non-advanced tongue root.

2.3.2.2.1 [+/- High] Sounds

"High sounds are made with the tongue [body] raised from neutral position while non-high sounds are made without such raising of the body of the tongue" (Katamba, ibid: 45). This feature covers both consonants and vowels including alveo-palatal, palatalized, palatal, velar consonants, glides and high vowels. Dagara sounds in this category include / ʧ, ʤ, ɲ, j, w, k, g, kp, gb, x, ŋ, i, ɪ, u, ʊ, ĩ, ɪ̃, ũ, ʊ̃ /. All other sounds are [-high].

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2.3.2.2.2 [+/- Low] Sounds

"Low sounds are produced with the tongue depressed and lying at a level below that which it occupied when at rest in neutral position; non-low sounds are produced without depressing the level of the tongue in this manner" (Katamba, ibid: 45). This feature specification covers open vowels and pharyngeal consonants. All other sounds are non-low. Guided by the description above, sounds that are [+low] are the open vowels / a, ã / since there are no pharyngeal consonants in Dagara. All other sounds are [-low].

2.3.2.2.3 [+/- Back]; [Dorsal] sounds

The features [Back] and [Dorsal] are virtually the same but whereas the feature [Back] is binary and a vowel specification, [Dorsal] is a unary feature for consonant specification. Sounds produced with the body of the tongue retracted from neutral position are [+back] or [Dorsal]. Sounds produced with the body of the tongue either in neutral position or pushed forward are non-back (Katamba, ibid: 46; *SPE: 3*05). The sounds that are described as [+back] in Dagara include back vowels, / u, ʊ, o, ɔ, ũ, ʊ̃, õ, ɔ̃ /; the low vowel / a/ and the consonants that are specified for the feature [Dorsal] are the velar consonants / k, g, ŋ, x /. The Labial Velar sounds / kp, gb, ŋm, w / also take part of their specification from the feature [Dorsal] and from the feature [Labial]. All other sounds are not specified for the feature [+Back] or [Dorsal].

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2.3.2.2.4 [+/- Advanced Tongue Root] Sounds

This is exclusively a vowel feature which pertains to the movement of the tongue root during their productions. In the production of Advanced Tongue Root [+ATR] vowels:

> the tongue root is pushed forward, thus expanding the resonating chamber of the pharynx and possibly pushing the tongue body upward; Unadvanced Tongue Root [-ATR] vowels are produced with the tongue root at neutral position (Katamba, ibid: 47).

This feature divides the vowels of Dagara into two distinct sets. The set of [+ATR] vowels are / i, e, u, o, ĩ, ẽ, ũ, õ /. The set of [-ATR] vowels are / ɪ, ɛ, ʊ, ɔ, a, ɪ̃, ɛ̃, ʊ̃, ɔ̃, ã /.

2.3.3 Manner Features

The manner features characterize the degree and kinds of modulation that the airstream undergoes in the oral cavity as it comes into contact with the articulators during the production of sounds. These features include Continuants/non-continuants, Lateral/non-lateral, Nasal/non-nasal, Strident/non-strident and Delayed Released/ Instantaneous Release.

2.3.3.1 [+/- Continuant] Sounds

Continuant sounds are produced with a continuous airflow in the oral cavity. Durand (1990: 51) explains that continuant sounds are produced with a primary constriction which allows the air to flow through the mid-sagittal region of the vocal tract, while sounds produced with a sustained occlusion are non-continuant. The [+ cont] sounds in Dagara include / f, v, s, z, x, h, l, 'l, r, w, j, / and all the vowels, while the [-cont] sounds are the stops and affricates.

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2.3.3.2 [+/-Lateral] Sounds

"A lateral sound is produced if the airflow through the centre of mouth is blocked and air only escapes over or both sides of the tongue. In non-lateral sounds air flows through the centre of the mouth" (Katamba, ibid: 50). The [+lateral] sounds in Dagara are / l, 'l, /. All other sounds are [-lateral].

2.3.3.3 [+/- Nasal] Sounds

In the production of a nasal sound the velum is lowered to allow air to escape through the nasal cavity. Oral sounds are produced with the velum raised so as to block access to the nasal cavity and to allow air to go out only through the mouth (Katamba, ibid: 50).

Nasal sounds in Dagara include the nasal stops / m, n, ɲ, ŋ, ŋm / and nasal vowels / ĩ, ĩ, ẽ, ɛ̃, ã ũ, ʊ̃, õ, ɔ̃ /.

2.3.3.4 [+/- strident] Sounds

Sounds with the feature are acoustically characterized by a more random noise than nonstrident sounds. Only fricatives and affricates can be strident (Katamba, ibid: 50). Thus, strident sounds in Dagara include / f, v, s, z, x, h, t͡ʃ, d͡ʒ/.

2.3.3.5 [+/- Del. rel] Sounds

The feature delayed release is a tag on sounds produced with a complete closure of the vocal tract and a gradual release of the airstream. Chomsky and Halle (1968: 318) explain that during the delayed release, turbulence is generated in the vocal tract so that the release phase of the affricate is acoustically quite similar to the cognate fricative. The instantaneous release is

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normally accompanied by much less or no turbulence. Sounds with this feature in Dagara are the affricates, / t͡ɕ, d͡ʑ /. The rest of the sounds are instantaneous release.

2.3.4 Laryngeal feature

2.3.4.1 [+/- voiced] Sounds

"Sounds produced with vibration of the vocal cords are voiced; voiceless sounds are produced with a glottal opening so wide that it will prevent vocal vibration if air flow through it" (Durand, ibid: 54). Voiced sounds in Dagara include the vowels, the glides / w, j /, the liquids / l, ˈl, r /, the nasals / m, n, ɲ, ŋ, ŋm / and the voiced obstruents / b, ɓ, d, g, d͡ʑ, v, z /.

2.4 The Syllable

Much as the value of the syllable cannot be overemphasized in phonological analysis, it is, in the words of Kenstowicz and Kisseberth (1979), "probably the most elusive of all phonological and phonetic notions" (Kenstowicz and Kisseberth, ibid: 256). Goldsmith (1990) points out unequivocally that "the syllable is a unit of phonological description which has never ceased to be discussed at length in the phonological literature of this century" (Goldsmith, ibid: 103).

There have been many controversies over the years concerning the definition and nature of the syllable. Various linguists have given various definitions from their individual perspectives, a few of which we will review to enable us attempt establishing the syllable structure in Dagara.

Phonetically, Roach 1991 describes the syllable as follows:

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> ..... as consisting of a centre which has little or no obstruction to airflow and which sounds comparatively loud; before and after that centre (that is, at the beginning and end of the syllable), there will be greater obstruction to the airflow and/or less sound (Roach, ibid: 67)

Inferring from this definition, the centre of the syllable is nothing less than a vowel, while the peripheries of the syllable are consonants. For instance, the Dagara word **gán** 'skin' has /a/, produced with little or no obstruction of airflow in the centre; whilst /g/and /n/, are produced with relatively greater obstruction of airflow.

From the phonological view point, several definitions have been postulated. Laver (1994: 114) gives a phonological definition of the syllable as "a complex unit made up of nuclear and marginal elements." The nuclear elements by his estimation are vowels and syllabic consonants such as nasals and liquids and the marginal elements are consonants. In the case of Dagara, the nuclear position is exclusively for vowels since there are no syllabic consonants in the language. The word **zɛ̀l** 'tongue' is a Mono-syllabic, which consists of the vowel /**ɛ**/ as its nuclear element and /**z**/ and /**l**/ as its marginal elements.

Blevins (1995:20) also considers the syllable as being "the phonological unit which organizes segmental melodies in terms of sonority" with explanation that the sonority of a sound is its loudness relative to other sounds produced with the same input energy.

In Katamba (1989: 153), the syllable is described as "the unit in terms of which phonological systems are organized", while Kenstowicz (1994: 250) says that it is "an abstract unit of prosodic organization through which a language expresses much of its phonology." Goldsmith (1990: 108) however paints a

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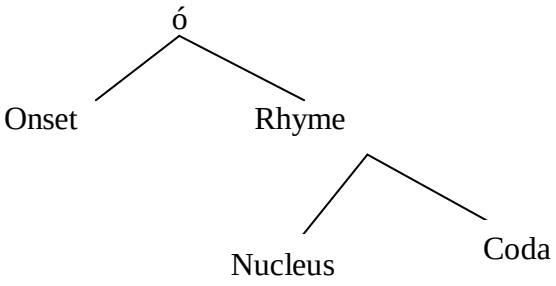
clearer picture of what the syllable is by categorically stating that the syllable is a phonological constituent composed of zero or more consonants, followed by a vowel, and ending with a shorter string of zero or more consonants.

There is however a unanimous consensus that, the internal structure of the syllable is made up of an obligatory nucleus (N), an optional consonantal onset (O), and coda (C), where the onset and the coda are the marginal elements and are filled by non-syllabic sounds, whilst the nucleus is occupied solely syllabic sounds.

There are equally different views concerning the structural representation of the internal structure of the syllable in the literature. Some of the competing models of representation of the internal structure of the syllable in phonological analysis are the Onset Rhyme structural model, the Moraic structural model and the CV structural model. The Onset and Rhyme structural model proponents, (Pike and Pike 1947; Halle and Vergnaud 1978; Fudge 1969 etc.), posit that syllable is composed of a binary intermediary branching with; Onset and Ryhme, with the Ryhme further branching into Nucleus and Coda. The structure adapted from Blevins (1995) illustrates this model.

Fig. 15 Onset and Rhyme Model Structure.



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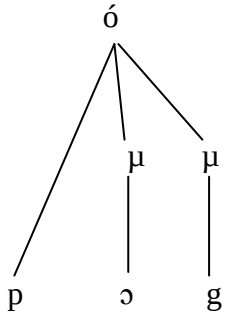
Proponents of the Moraic structural model (Hyman 1985; Hayes 1989 etc.), relate the syllable-internal structure to syllable weight; monomoraic (light) and bimoraic syllable, and posit that initial consonants do not contribute to the syllable weight, thus they are attached directly to the syllable node, whilst vowel and final consonants are moraic simce they contribute to syllable weight. The structure below illustrates this model.

Fig. 16. Moraic Structural Model



The proponents of the CV structural model (Anderson 1969; Khan 1976; Clements and Keyser 1983 etc.) posit that the syllable is a flat structure without subconstituent but the segments themselves. Katamba (1989:156) explains that the CV-model assumes that, the syllable is assumed to be a Three-Tier structure consisting of a Syllable Node 'ó'; a CV-Tier, whose C and V elements dominate consonantal and vowel segments and a Segmental Tier consisting a of a bundle of distinctive feature matrices, which represent consonant and vowel segments. The V element of the CV-model represents a syllable Nucleus while the C element represents a syllable Onset or Margin.

In this work, the CV-model expounded in Clements and Keyser (1983) is adapted in representing the various syllable structures in Dagara because it is

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more convenient model for the representation of double sounds than the other models.

2.4.1. Syllable Types in Dagara

Dagara belongs basically to the language group of V, VC, CV, CVC and C syllable typology. These basic syllables however are modified into various syllable shapes.

2.4.1.1. The V syllable type

The syllable nucleus may stand alone as syllable either as short vowel (V) or a long vowel (V:) in Dagara. Its occurrence is, however, limited to syllable initial position and in few words. Almost every vowel can stand independently as a syllable. Examples of this shape of syllables are given in table 14 below.

Table 14. The V/V: Syllable Shape

Word	**Gloss**
à	definite article
ɪ̀	I/my
ò	S/he, her/his
ù̃:	bury
ʊ̀̃:	yes
i.ri	spicies

The structural representation of the V/V: is shown below in figure17 below:

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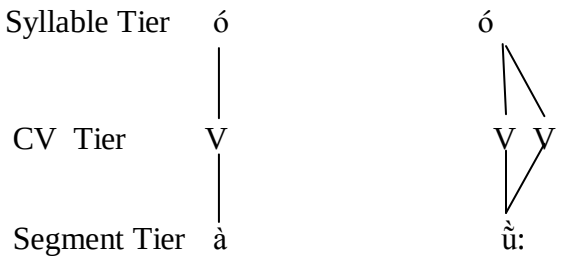
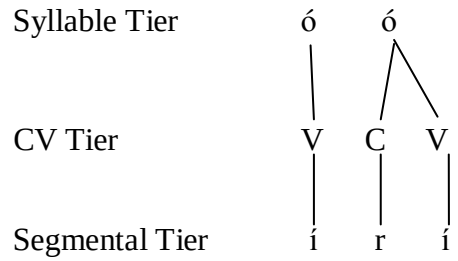
Fig. 17. Structural Representation of V/V: Syllable Shape

a) V syllable shape **b) V: syllable shape**



à 'the' ǔ:'bury'



í.rí **'spicies'**

2.4.1.2 The VC syllable type

This syllable type appears in words in the following shapes: VC, V:C, and VVC,. All the vowel may occupy the V position in these syllable shape in Dagara. Examples of words of these syllable shape attested in Dagara are given in the tables below:

Table 15. The VC/V:C syllable shape

Word	**Gloss**
ìr	get up
ìb	behaviour
ùr	to surprise

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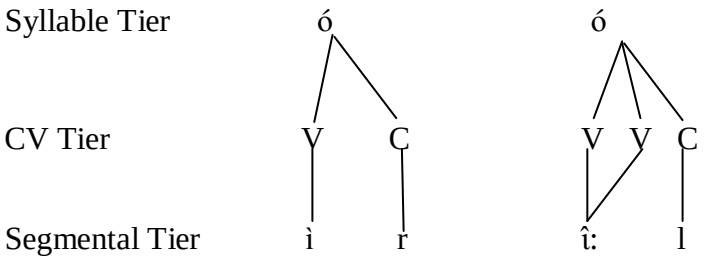
ɔ̂:r	type of fruit
î:l	horn

The representation in the CV-model structure in figuer 18

Fig. 18. Structural Representation of VC/V:C Syllable Shape

ii) VC syllable shape ii) V:C syllable shape



ìr 'get up' **î:l** 'horn'

2.4.1.2.1 The VVC syllable shape

This syllable shape is not attested in other dialects of Dagaare. Vowels that occupy the V position in this syllable shape are different vowels in a permitted sequence. Examples of the VVC syllable shape is attested in Dagara word are in table 16 below:

Table 16. The VVC syllable shape

Word	**Gloss**
ìɛ̀b	to pinch
ìɔ̀b	saturated
ıag	fly
ɪ̀ã̀ŋ	body
ű̀õn	dry season

The structural representation of this syllable shape is shown in figure 19 below.

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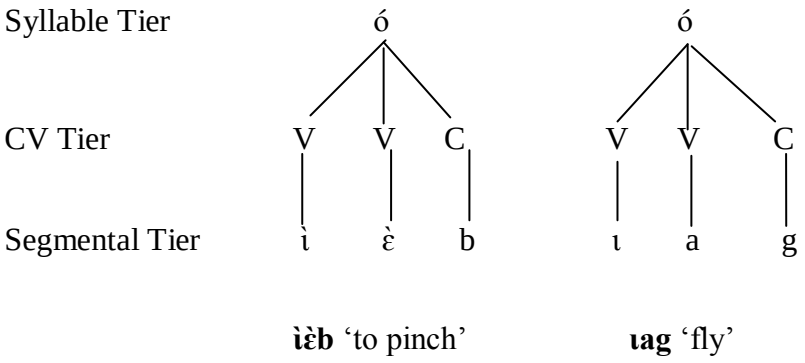
Fig 19. Structural Representation of VVC Syllable Shape



ìɛ̀b 'to pinch' **ɪag** 'fly'

2.4.1.3 The CV syllable type

The CV syllable is a universal phonological notion. Blevins (1995:220) declares that all languages have CV syllables in the same way as Draga (2007) who posits that it figures in all language-specific inventories and has the status as the least marked syllable type. The CV type also appears in words in the following shapes: CV, CV: and CVV.

2.4.1.3.1 The CV/CV: syllable shape

A majority of Dagara words are of this shape. All consonants and vowels can fill the positions of the CV slots in these syllable shapes. Examples of words containing these syllable shapes are given below.

Table 17. The CV/CV: Syllable Shape

Word	**Gloss**	**Word**	**Gloss**
zú	head	sá.bí.kú.bé	hail
gbɛ̃̀	forehead	tá	arrive
tɛ̀.mɛ̀	tobacco	kɔ̀	to cultivate

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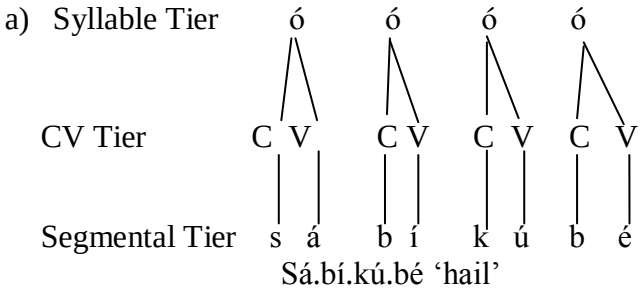
bà:	river	tɪ̃̀:	medicine
kʊ̃̂:	cradle	pɪ́:	arrow

Figure 20. Structural Representation of CV/ CV: Syllable Shape



2.4.1.3.2 The CVV syllable shape

. The vowels in this sequence that occupy the V-slot in CVV syllable shape are constrained by tongue root vowel harmony. In other words, the vowels in sequence must either belong to the set of [+ ATR] or [-ATR]. Some examples

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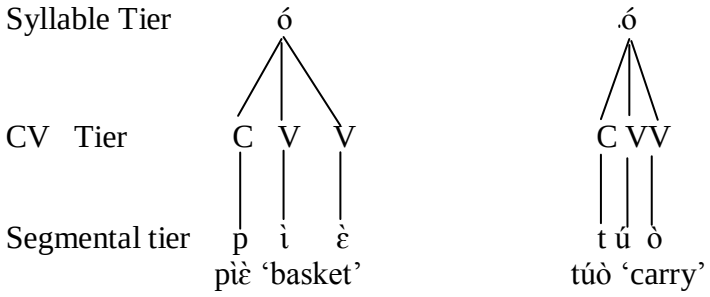
of words composed of this syllable shape include the following in table 18 and the illustration of the structural representation in figure 21.

Table. 18 The CVV syllable shape

Word	**Gloss**
pìɛ̀	basket
pie	ten
kɛ́í	malts
túò	carry
sòɔ̀	knife

Fig. 21. Structural Represention of CVV Sylllable shape.



2.4.1.4 The CVC syllable type

This syllable type is the next preferred after the CV type. It manifests in many words in Dagara in the following shapes: CVC, CVVC, and CV:C,. The V-Slot may be occupied by any vowel, but the coda C-Slot is exclusively reserved for word final consonants which comprise of / b, g, m, n, ŋ, l, r /.

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2.4.1.4.1 The CVC syllable shape

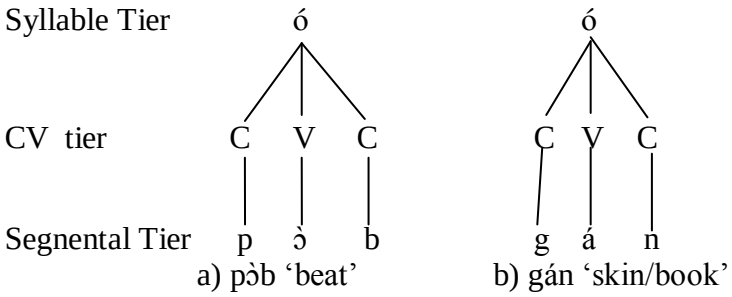
This is yet another least marked syllable shape which is attested in many words in Dagara. Examples of words of this syllable shape are in table 19 below.

Table 19. The CVC Syllable Shape

Word	Gloss	Word	Gloss
táŋ	mountain	tàg	pull
bàl	weak	pɔ̀b	beat
bìr	breast	nyìm	you
gán	skin/book		

The structural representation of this syllable shape is illustrared in figure 22.

Fig 22. Structural Representation of CVC Syllable Shape



2.4.1.4.2 The CVVC/ CV:C syllable Shape

The vowels in sequence in CVVC syllable shape are also constrained by tongue root vowel harmony. Some examples of words with this syllable shape are in table 20 and and the CV-model representation in figure 23 respectively below:

Table 20. The CVVC/CV:C syllable shape

Word	Gloss	Word	Gloss
nóɔ́r	mouth	pì:r	rock
pùòr	back	kù:r	hoe

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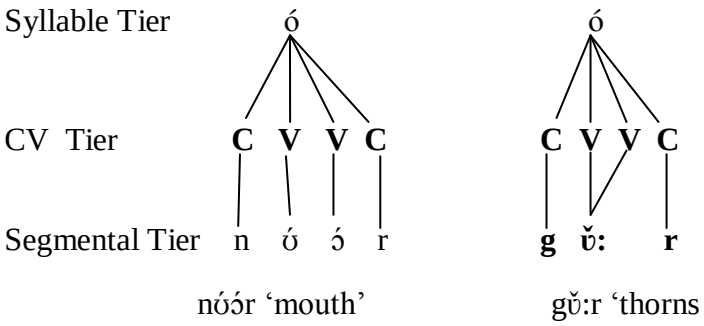
yúór	name	ɓá:.r	cold
túór	load	gŭ:r	thorns
tóɔ̀r	mortar	gó:l	reared

Fig. 23 Structural Representation of CVVC Syllable Shape



2.4.1.5 The C syllable type

This syllable shape is attested only in few disyllabic simple words or compound words with two final consonants in sequence. The only consonants that are syllabic are the liquids / l, r / and they are restricted to word final or Coda positions. The following data in table 21 show words with syllabic consonants at final position.

Table 21. The C syllable shape

Word	**Gloss**
íb.ŕ	cocodiles
ɔ̀b.ɾ̀	painful/ chewing
og.l	dented/ oblong
òg.ɾ̀	separate

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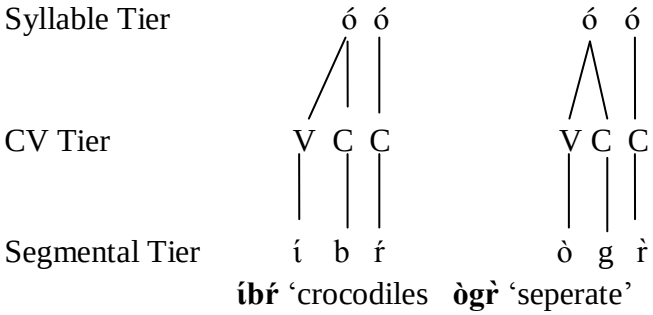
sà̰.sóg.ŕ grasshopper

This syllable shape is structurally representd in CV-model as in figure 24 below.

Fig.24. Structural Representation of C Syllable Shape



2.4.2 Dagara Word Structure

A word is composed of one or more syllables; therefore, there is no gainsaying that the structure of the syllable and that of the word are basically related. Hyman (1975) best describes this relationship in the following words:

> …..the sequential constraints which operate at the beginning of a word should be operative at the syllable, even if this syllable is word-initial. Similarly, the same sequential constraints which operate at the end of a word should be operative at the end of a syllable…. (Hyman, ibid: 189).

There is a direct correlation between the syllable shape and word structure in Dagara in consonance with Hyman’s explanation, since the sequential constraints that operate at the beginning and end of the syllable are also in the word. The words in Dagara may be categorized as simple stem words and complex stem words.

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2.4.2.1 Simple Stem Words

Simple stem words in Dagara range mono-syllabic to quadri-syllabic forms which correspond directly to the different shapes of the syllable discussed above.

2.4.2.1.1 Mono-Syllabic Words

Mono-syllabic words reflect directly the basic syllable shapes. Examples of mono-syllabic words taking the forms of the various syllable shapes are in table 22.

Table 22. Mono-syllabic Simple Words

Syllable shape	word	gloss
V	ì	to do
V:	ù:	to bury
VC	ɔ̂:r	type of a fruit
V:C	î:l	horn
VVC	ű̀ɔ̀n	dry season
VCC	ìbr	crocodiles
CV	pì	to swell
CV:	nĩ:	cattle
CVV	bɔ̀ɔ	goat
CVC	kpeŋ	strong
CV:C	pì:r	rock
CVCC	bàgr	sacrifice

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2.4.2.1.2 Disyllabic words

Words in this category consist of two different syllable shapes in various permutations. Some examples of disyllabic words in different combination of the basic syllable shapes are in table 23.

Table 23. Disyllabic Simple Words

Syllable shape	Word	Gloss
V.CV	ì.rí	spicies
V:.CV	ù:.rù	dust
VC.VC	og.fʊ	separation
CV.CVV	lí.bíé	money
CV.CV	lí.le	chicken
CV.CVC	bì.bír	day
CVC.CVC	bág.loŋ	armpit

2.4.2.1.3 Trisyllabic words

Words in this category consist of three syllable shapes in differnt permutations. Some examples of trisyllabic words in different combinations of the basic syllable shapes are in table 24.

Table 24. Trisyllabic Simple Words

Syllable shape	Word	Gloss
CVC.CV.CV	dàm.bó.lu	fooliness
CVC CV.CV	yel. mì. ŋà	truth
CVC. CV.CV	zàm. pá. gá	light (weight)
CV.CV.CV	kpa̋. ká. rá	hard (sufface)
CV.CVC.CVC	bò.sɛ̀n.dɛr	cheese
CV.CV.CVC	gbɛ́.nà.ɓɛ́l	foot
CV.CV.CV	dà. vò. rò	court yard

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CV.CV.CV	bì.bí.le	child
CVC.CV:.CVV	kúr.nàà.mìɔ̃	tortis (sea)
CVC.C.CVC	bag.r.ŋmàn	collar bone

2.4.2.1.4 Quadri-syllabic words

Words in the category consist of four syllable shapes in differnt permutations. Some examples of possible quadri-syllabic words in different combination of the basic syllable shapes are in table 25.

Table 25. Quadrisyllabic Simple Words

Syllable shape	Word	Gloss
CV.CV.CV.CV	kú. ló.kú. ló	round
CV.CV.CV.CVV	gbɛ́.sá.lɔ́.pɔ̀ɔ́	sole (foot)
CV.CVC.CV.CV	gbɔ̃̀.gbór.kyi.le	jack
CV.CV.CV.CV	dɛ̀. pɛ́.'lɛ.rɛ	spider
CVC.CVC.CV.CVVC	kpãŋ.kpãŋ.nyũ̀.gbìél	elbow

2.4.2.2 Complex Stem Words

They are usally compounds or phrasal words which consist of a concantenation of stems of different syllable shapes or stems and suffixes to designate a concept. The complex stem words are words which usually undergo some kind of morphophonological processes. The combinations of these stems or/and suffixes, usually trigger some assimatory or syllable structure processes which are duely discussed in Chapter Four. Some examples of complex stem words are given in table 26 below.

Table 26. Complex Stem Words.

Underlying Form	Compound Word

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CVVC CVC.CV CVVC.CVC.CV
/ tìɛ̀m / + / kʊb.lʊ/ ⟶ [tìɛ̀ŋ.kʊb.lʊ]
'chin' 'hair' ' beard'

VVC CVC CVC.CV VVC.CVC.CVC.CV
/ ɪ̃ã̀ŋ/ + / gáŋ / + / kʊb.lʊ / ⟶ [ɪ̃ã̀ŋ.gáŋ.kʊb.lʊ]
'body' 'skin' 'hair' 'body hair'

CVV CVC CVC CVC CVC.CVC.CVC.CVC
/ mʊ̃ɔ̀ / + / báŋ / + / yáŋ / + / bíé / ⟶ [mʊ̃ɔ̀.báŋ.yáŋ.bíé]
'grass' ' know' 'sense' 'seeds' 'wheat'

CV CVC CV CV CV CV.CVC.CV.CV.CV
/ gbʊ̃́ / + /gbór + / tɔ / + / zú / + /-ru / ⟶ [gbʊ̃. gbór. tɔ́. Zú. ru]
'pile' 'rush' 'hit' 'head' -PL ' fake door'
'rush and hit heads'

CV CV CVCC CV CVV CV CV.CV.CVCC.CV.CVV.CV
/bá/ + / kà / + / mígr / +/ bè /+ / wɔ́ɔ́/+ /mí/ ⟶ [bá. kà. mígr. bé w ɔ́ɔ́. mí]
'friend́' 'with' 'rope' 'is' 'sack' 'in'
' a friend with as rope in sack'('fake friend')

2.5 Chapter Summary

The chapter discussed the sound system of the Dagara dialect with emphasis on the consonant and vowel inventory, the phonetic description of the sounds, the syllable structure and the structure of words in Dagara.

It has pointed out that, there are eighteen vowel phonemes; nine short oral vowels and nine short nasal vowels, all the eighteen short vowels have their long counterparts which contrast, and that they are subcategorized into Advanced Tongue Root (+ATR) vowels and Unadvanced Tongue Root (-ATR) vowels.

It also pointed out that, there are twenty-seven consonant phonemes; twenty-five consonants and two approximants, the distribution of the consonant

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phonemes is constrained; whereas all consonants can be at word-initial and/or word-medial, word-final position is exclusively occupied by / b, g m, n, ŋ, l, r /, and that there are no syllabic consonants in Dagara.

It further, within the Distinctive Feature theory framework described and classified the Dagara sounds into natural classes, under Major class features, Cavity feature, Manner features and laryngeal feature.

It then examined the syllable structure, highlighting that Dagara belongs to languages with V, VC, CV, CVC and C syllable typology, with a various syllable shapes.

Finally, it examined the structure of words in Dagara and observed that, the sequential constraints that operate at the beginning and end of the syllable are also in the word and that, the words in Dagara may be classified as simple stem or complex stem words.

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CHAPTER THREE

PHONOLOGICAL PROCESSES IN DAGARA

3.0 Introduction

Phonological processes refer to the changes that take place in sounds when segments are juxtaposed. According to Wolfgang (1984:31) "phonological processes serve the communicative function of language by serving their proper functions: pronunceability and perceptibility."

Phonological processes are universal and phonetically motivated based on articulatory and auditory systems. Though these universal processes may apply in all languages, each linguistic community 'selects' a set of processes, (http://www.ling.hawaii.edu/faculty/donegan/papers/201Xhistphon.pdf).

This chapter, thus, discusses the phonological processes that are specific to Dagara, a dialect of the Dagaare language. It discusses both assimilatory and syllable structure processes and formalizes the various phonological processes within autosegmental representation.

3.1 Assimilatory Processes

A phonological process is called assimilation, if as a result of its application two or more segments in form agree in their value for some phonological feature(s) or feature class(es) (Baković, 2007:335). Katamba (1989: 80) further

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explains that, assimilation is the modification of a sound in order to make it more similar to some other sound in its neighbourhood, with the aim of making a smoother, more effortless, more economical transition from one sound to another.

When a sound is modified to look more like the sound that precedes it, the assimilation is in a progressive/preservative direction. On the other hand, when the sound is modified to look more like the sound that follows it, the assimilation is in a regressive/anticipatory direction.

In autosegmental phonology, assimilation is construed as an autosegmental spreading along with a hierarchical feature representation. Adherents of autosegmental phonology, such as Sagey (1986) , advocate that autosegmental spreading is a better representation of the process of assimilation than the linear phonology representation of assimilation, as a changing individual feature in feature matrix, because of the relative simplicity of describing the derivations of the assimilation processes to reflect their relative naturalness (Sagey, ibid: 10). The directions of the autosegmental spreading are described, as left to right spreading and right to left spreading, in tandem with the progressive/preservative and regressive/anticipatory directions, respectively in linear phonology.

The assimilatory processes discussed in this thesis include; Vowel Harmony, Consonant Nasalization, Homorganic Nasal Assimilation, Glide Formation, Labialization and Rhotacism, within the autosegmental phonology representation.

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3.1.1 Vowel Harmony

The phenomenon of vowel harmony has been explained by various linguists from the individual perspective. According to Goldsmith (1990:304) a vowel harmony system is one in which the vowels of a language are divided into two (or more) (possibly overlapping) subsets with the condition that all vowels in a given word (or domain, generally) must come from a single subset.

Kenstowicz (1994) also explains that vowel harmony is a phonological state in which the vowels in a given domain share or harmonize for a particular feature and emphatically states that vowel harmony as a phonological process "differs from other processes affecting adjacent vowels in that, typically all of the vowels within the language participate in the harmonic constraint" (Kenstowicz, ibid: 347).

Clements (1976:57) further says that vowel harmony consists of a co-occurrence restriction upon the vowels that may occur in a word. In other words, all the vowels in a word must be drawn from one or another of two mutually exclusive sets.

Dagara is a natural control-ground, following the definitions or explanations given above, for the confirmation of the phenomenon of vowel harmony. All

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the eighteen vowels are sub-categorized into two distinct sets based on the position of the tongue root during their production (cf. Chapter two section 2.1.3), and there is a strict co-occurrence restrictions of the two sets of vowels in mono-syllabic or simple multi-syllabic, non-compound words.

Invariably, therefore, Dagara exhibits a horizontal harmony. A horizontal harmony, as explained by Akanlig-Pare (1994:86), is the type of harmony involving the root of the tongue. The harmonic processes occur regularly, bi-directionally, between stems and suffixes; with the stem vowel quality usually being the triggers while the suffix vowels are the targets of the harmonic process in a progressive or preservative direction, and the suffix vowels being the triggers while stem vowels are the targets of the harmonic process in a regressive or anticipatory direction.

In a stem vowel triggered harmonic process, the two distinct sets of vowels have equal ability to determine the harmonic process provided they are situated in the stem. But in a suffix vowel triggered harmonic process, [-ATR] stem vowels are usually the targets whilst [+ATR] vowels are the triggers. There is also evidence of a harmony across word boundary in Dagara that operates in a progressive or preservative direction.

From the harmonic patterns discussed above, there is no gain saying that, the domain of the harmony in Dagara is the phonological word. This is characteristic of Gur languages as Hudu (2013:53), following Dakubu (1997), notes that the phonological word in Central Gur languages, to which Dagbani belongs, typically consists of a thematic CV syllable with full range of articulatory contrast and a mono- or bi-syllabic suffix with restricted vowels

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and consonants. In Dagara, however phonological word may consist of other syllable shapes besides the CV syllable.

Under this section we shall discuss the harmonic processes between; verb stem and progressive/ imperfective suffix; verb stem and nominal suffix; noun stem and nominal suffix; verb stem and the split negation morphemes in the indicative and the imperative, all of which operate in the progressive direction. We shall also discuss the harmonic processes between dominant diminutive suffixes and noun stems, as well as a noun stem and a dominant adjectival stem which operate in regressive directions.

3.1.1.1 Verb Stem and Imperfective Suffix Harmony

In Dagara, the imperfective suffix particle is basically **re/rɛ** when the verb stem is an open syllable (CV) type. But where the verb stem ends in a nasal or a nasalized vowel, the alveolar trill /**r**/ is replaced by an alveolar nasal /**n**/ and it becomes **ne/nɛ** and where the verb stem is of a CVC syllable shape, with the coda consonant being a liquid, then the trill is dropped and the mid-vowels /**e, ɛ/** is added to the verb stem to form the imperfective.

The choice of the suffix is based on the [ATR] feature value of the stem vowels, in line with Dakubu (1997) observation that the vowels of suffixes in Gur languages 'tend to be at least partly determined by the features of the thematic syllable vowel' (Dakubu, ibid: 83). The examples in the table below show the harmony between verb stem and the progressive or imperfective:

Table 27. Verb Stem and Imperfective Suffix

[+ATR] Verb	+	**Imperfective Particle**
/ pì /	+	/ -re/ ⟶ [pìre]

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‘swell’ PROG ‘swelling’

/ 'le / + / -ne/ ⟶ ['lẽnẽ]
‘tie’ PROG ‘tying’

/yúó/ + /-re / ⟶ [yúóre]
‘open’ PROG ‘opening’

/ kyír/ + /- e / ⟶ [kyíre]
‘pour’ PROG ‘pouring’

[kõ] +/ -ne /⟶ [kõnẽ]
‘cry’ PROG ‘crying’

/kul / + /-e / ⟶ [kule]
‘marry /go home’ PROG ‘marrying/going home’

[-ATR] VERB + IMPERFECTIVE PARTICLE

/ ɖĩɛ̃ / + / nɛ /⟶ [ɖĩɛ̃nɛ̃]
‘play’ PROG ‘playing’

/tìɛ̀r / + / ɛ / ⟶ **[** tìɛ̀rɛ **]**
‘think’ PROG ‘thinking’

/ pòl / **+ / ɛ/** ⟶ **[pòlɛ]**
‘swear’ PROG ‘swearing’

/ kò / + / rɛ / ⟶ **[kòrɛ]**
‘give’ PROG ‘giving’

In an attempt to explain the above harmonic process, Classical generative phonology posits rules to establish an underlying representation such that, the suffixes regularly alternate for the feature value in agreement with the stem, thereby, systematically varying the quality of their vowels in accord with the stem.

In such simple and discretional positing of one form as the underlying representation, it is often difficult to interprete and explain the naturalness of the assimilation process and thus, shrouding the phenomenon of vowel harmony in a puzzle in the past. This naturalness of the assimilatory process in

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vowel harmony is, however, easily captured in autosegmental phonology, without the need for positing an underlying form for the suffix in the derivation.

For instance, since the domain or the trigger of the harmony is the stem or the suffix, this naturalness is captured by the representation as autosegment spreading from the stem to the suffix or vice versa from the hierarchy of the feature tier onto the segmental tier via the skeletal tier in the representation.

In other words, a [+/-ATR] vowel in a verb stem spreads its feature quality onto a [+/-ATR] vowel in the suffix, causing it to vary the quality of its vowel in accord with the stem, in the case of a progressive or preservatory harmony. While a [+ATR] vowel in a suffix or stem spreads its feature quality onto a [-ATR] vowel in the stem, in the case of a regressive or anticipatory harmony, causing it to vary the quality of its vowel in accord with the suffix or the stem.

An illustration of the autosegmental representation of this naturalness of the assimilatory process in vowel harmony is in figure 25.

Fig. 25. Verb and Imperfective Suffix Harmony Process

[+ATR] stem + [-ATR] suffix ⟶ Output

/ yúó / 'open' + / -rɛ / ⟶ [yúóre]'opening'

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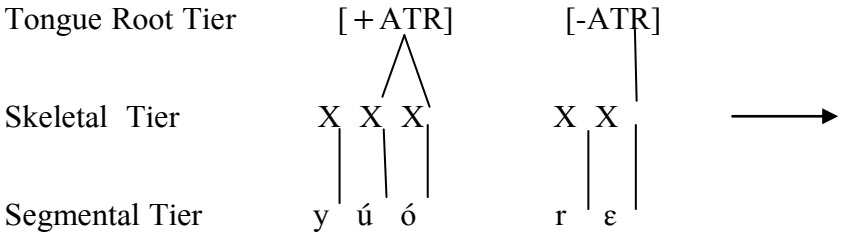
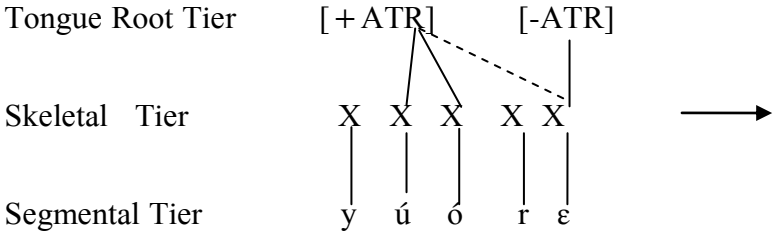
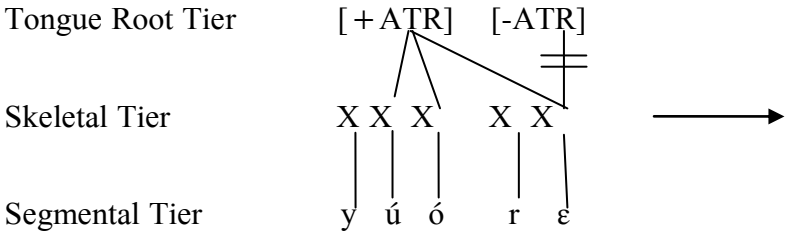
Underlying Form



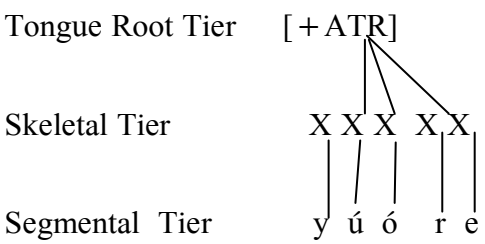
[+ATR] Spreading



[-ATR] Delinking:



Output Form:



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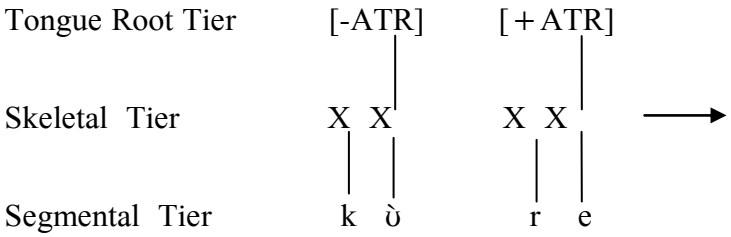
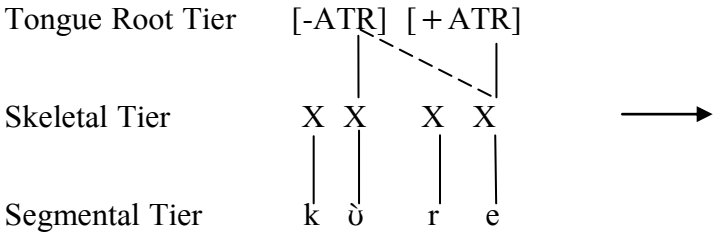
[-ATR] stem + [-ATR] suffix ⟶ Output

/kù/ ‘give’ + /-re/ ⟶ [kùrɛ] ‘giving’

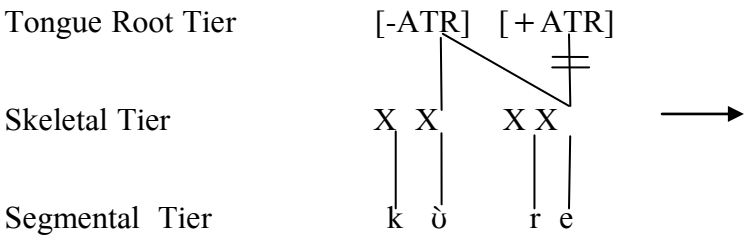
Underlying Form:



[-ATR]Spreading:



Delinking of [+ ATR]:



Output Form:

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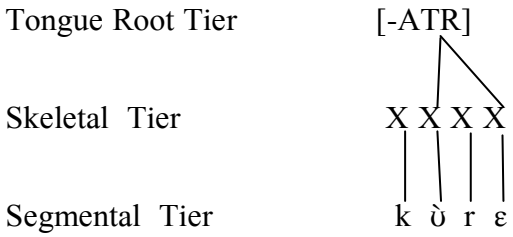

3.1.1.2 Verb Stem and Nominal suffix Harmony

Many nouns are derived from other lexical categories in Dagara with derivational morphemes. A category of verbal nouns are derived from verbs with the addition of the suffixes **-ʊ/ u** or **–fʊ.** While the suffixes **-ʊ /-u** are allophonic, varying depending on the vowel quality in the verb stem, the suffix **–fʊ** is invariable irrespective of vowel quality in the verb stem.

There is a restriction on the spreading of [+ATR] stem vowel quality on the suffix **–fʊ.** The possible explanation of this phenomenon is that, /f/ is an opaque consonant that blocks the spreading of the [+ATR] feature from the stem to the suffix. Segments opacity effects on harmonic process are not uncharacteristic of language with tongue root vowel harmony, especially in the Gur languages. Hudu (2013: 63), in discussing consonantal opacity in Dagbani tongue-root harmony notes that, the continuant coronals [l, ɾ, s] block the spread of [+ATR] from the root vowel to targets such as epenthetic vowels, affix and clitic vowels. The table below shows the harmonic process between verb stems and the nominal suffix

Table 28. Verb and Nomial Suffix

a) [-ATR] Verbs + [-ATR] Nominal suffix

Verb Stem suffix Derived Noun

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/ tɪ̀r/ + / ʊ/ ⟶ [tɪ̀rʊ]

‘ send’ suffix ‘the sending’

/ dɔ̀m / + / ʊ / ⟶ [dɔ̀mʊ]
‘to squat’ suffix ‘the squatting’

/ kyàr / + / ʊ / ⟶ [kyàrʊ]
‘to dowry’ suffix ‘dowry’

b) [+ATR] Verbs + [+ATR] Nominal suffix
Verb Suffix Derived Noun

/ gbɛ̀̀m / + / -u/ ⟶ **[** gbɛ̀̀mu]
‘to tighten’ suffix ‘the tightening’

/ gbòl / + / -u / ⟶ **[** gbòlu]
‘to penetrate’ suffix ‘the penetration’

/ bìn / + / -u / ⟶ **[** bìnu]
‘to put down’ suffix ‘putting down’

c) [+/-ATR] Verbs stem and [-ATR] Suffix

Stem suffix Derived Noun

/ gmɪ̋̋ɪ̋ / + / -fʊ / ⟶ [gmɪ̋̋ɪ̋fʊ]
‘crush’ suffix ‘crushing’

/ dɔ́ɔ́ / + / -fʊ / ⟶ [dɔ́ɔ́fʊ]
‘raise’ suffix ‘raising’

/ tɪ̀ɛ̀ / + / -fʊ / ⟶ [tɪ̀ɛ̀fʊ]
‘support’ suffix ‘supporting’

/ díg / + / -fʊ / ⟶ [dígfʊ]
‘chase’ suffix ‘the chasing’

/ tùó] + / -fʊ / ⟶ [tùófʊ]
‘carry’ suffix the carrying’

/ míí / + /-fʊ /⟶ [míífʊ]
‘shake’ suffix ‘the shaking’

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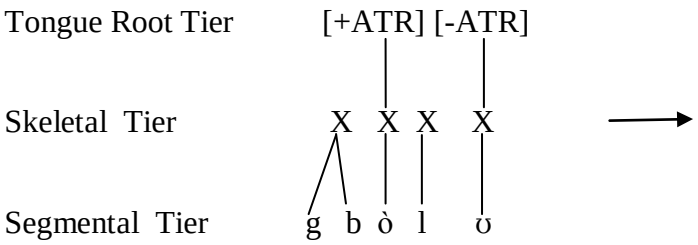
Figure 26 shows the process of vowel harmony in the derivation of the above nouns in autosegmental representation.

Fig. **26. Verb Stem and Nomial Suffix Harmony**

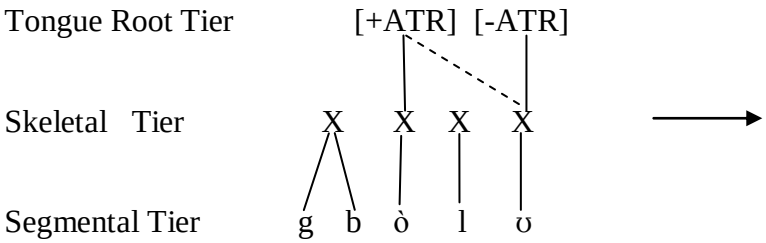
a) [+ATR] Verb Stem Hormonizing [-ATR] Suffix

gbòl ‘to penetrate’ + ʊ ⟶ gbòlu ‘penetration’

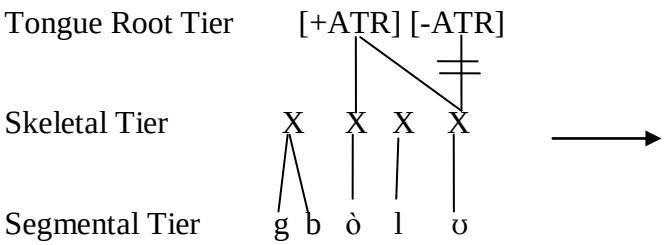
Underlying Form:



[+ATR] Spreading :



[-ATR] Delinking:



Output Form:

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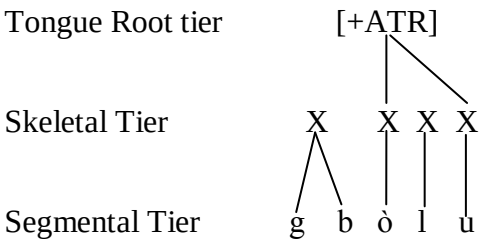
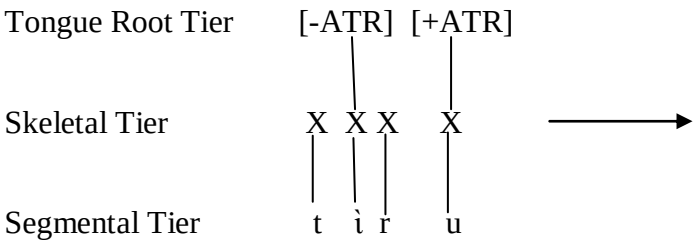


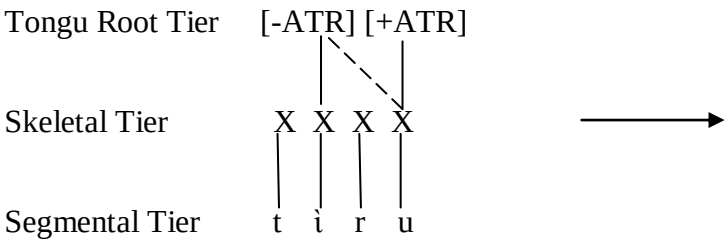
b) [+ATR] Verb Stem Hormonizing [-ATR] Suffix

/ tìr / 'send' + / u / ⟶ [tìrʊ] 'the shaking'

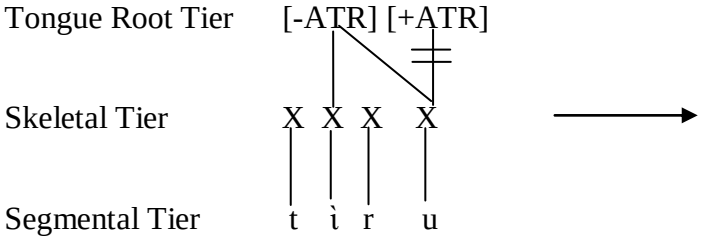
Underlying Form:



[-ATR] Spreading:



[+ATR] Delinking:



Out put Form:

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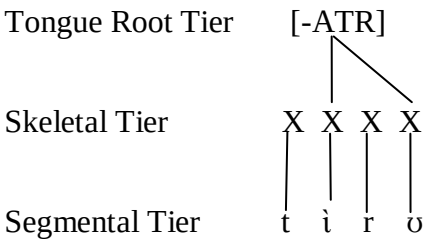

3.1.1.3 Noun Stem and Nominal Suffix Harmony

Some nouns can also be derived from other nouns by adding a nominal suffix to them. Abstract nouns in Dagara are derived from concrete nouns by adding a nominal suffix; **-ʊ/-u** or **-lʊ/-lu** to them. This category of nouns depict character, style, state, size and quality. The [ATR] vowel quality in the noun stem triggers the harmonic process. In other words, a [+/-ATR] vowel in a noun stem spreads its feature quality onto a [+/-ATR] vowel in the suffix to vary in accord with the stem. Table 29 shows examples of nouns derived from other nouns.

Table 29. Noun Stem and Nominal Suffix

a) [-ATR] Nouns and [-ATR] Suffix

Noun	Suffix	Derived Noun
/ pɔ̀g /	+ / -lʊ / ⟶	[pɔ̀glʊ]
‘woman’	suffix	‘womanhood’
/ sʊ̀ʊ̃ /	+ / -lʊ / ⟶	[sʊ̀ʊ̀lʊ]
‘witchcraft’	suffix	‘witchery’
/ sãã̃n /	+ / **-ʊ** / ⟶	**[** sáánʊ **]**
‘guest’	suffix	‘hospitality’

b) [+ATR] Nouns and [+ATR] suffix

Noun	Suffix	Derived Noun
/ yír /	+ / -lu / ⟶	[yíílu **]**
‘house’	suffix	‘patriclan/kinship’
/ bie /	+ [-lu / ⟶	**[** biilu **]**
‘child’	suffix	‘childhood’

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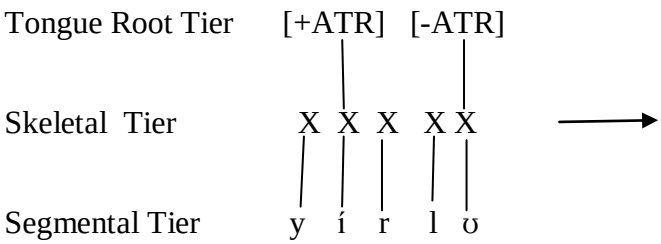
/ dàmból / + / -u / ⟶ **[**dàmbólu]
'fool' suffix 'foolishness'

The above assimilation is formalized in autosegmental phonology in figure 27.

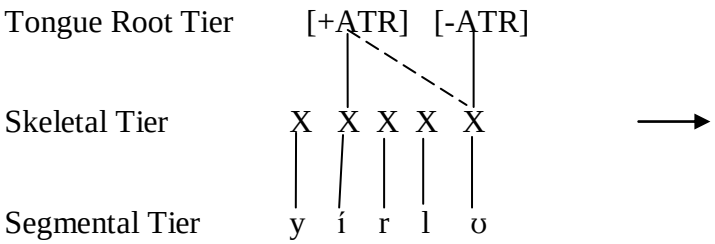
Fig.27 Noun Stem and Nominal Suffix Harmony

/ yír / 'house' + / -lʊ / ⟶ [yíílu] 'patriclan/kinship'

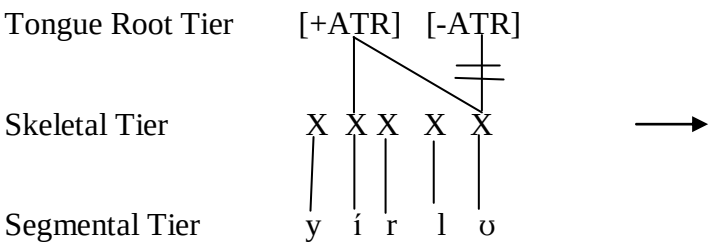
Underlying Form:



[+ATR] Spreading:



[-ATR] Delinking:



Segment Deletion:

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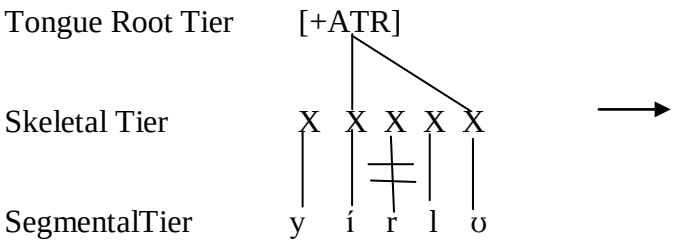
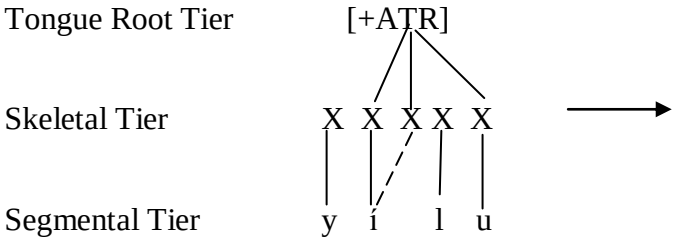
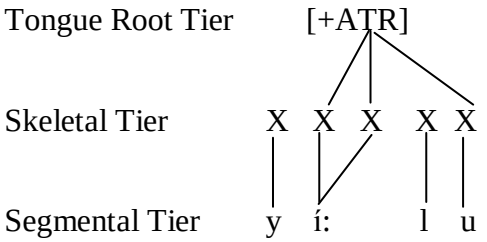


Vowel Lenghtening:



Output Form:



3.1.1.4 [+ATR] Verb and Negation Particles Harmony

Negation in Dagara is expressed in the indicative and imperative by means of two discontinuous morphemes; **bɛ.....ɛ/ɪ** and **ta.....ɛ/ɪ**, for the indicative and imperative structures respectively. The structural arrangements are similar to the structure of a negative clause in French, where the verb is placed between the two negative markers. These morphemes are underlyingly [-ATR], but the second components of the morpheme undergo a [+ATR] harmony when preceded by a verb with [+ATR] vowels, whilst the first components remains invariably [-ATR]. Thus, their allophonic versions are **bɛ……..e/i** and **ta ……e/i,** for indicative and imperative, respectively. It is

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important to note here that, the harmony process is between the verb and the second negation particles and does not affect the first negation particles; hence the process is across word boundaries in the progressive direction.

Somé (2004:34-35) highlights this phenomenon, acknowledging the fact that it is vowel harmony across word boundaries in the progressive direction, but with inaccurate interpretations or explanations. The following negative clauses below illustrate the phenomenon.

Indicative	**Imperative**
Ɔ̀ bɛ bɔ̀r **ɛ**	Ta bɔ̀r ɛ
3SG NEG loose NEG	**NEG loose NEG**
'He / She did not get lost'	'Don't be lost'
Ɔ̀ bɛ dì ɪ	Ta dɪ ɪ
3SG NEG eat NEG	**NEG eat NEG**
'S/he did not eat'	'don't eat'

[+ATR] Vowel and Negation Morphemes Harmony

Ɔ̀ bɛ dó * ɪ ⟶ Ɔ̀ bɛ do i
3SG NEG climb NEG
'S/he did not climb'

Ta dó ***ɪ** ⟶ Ta dó **i**.
NEG take NEG
'Do not climb it'

Ɔ̀ bɛ kúl *ɛ ⟶ Ɔ̀ bɛ kúl e
3SG NEG go home NEG
'S/he did not go home'

Tá kúl ***ɛ.**	**Ta** kúl **e.**
NEG go home NEG	
'Do not go home'	

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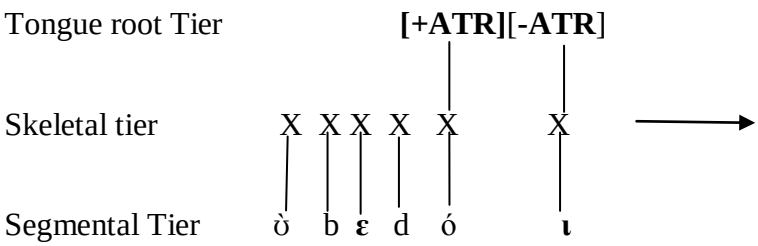
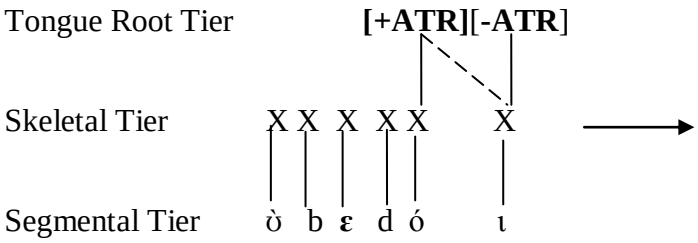
What is linearly desribed above can be formalized in autosegmental phonology, as in figure 28, showing the autosegmental feature spreading from the [+ ATR] verb onto the second conponent of the negation.

Fig. 28. Harmony across Word Boundary

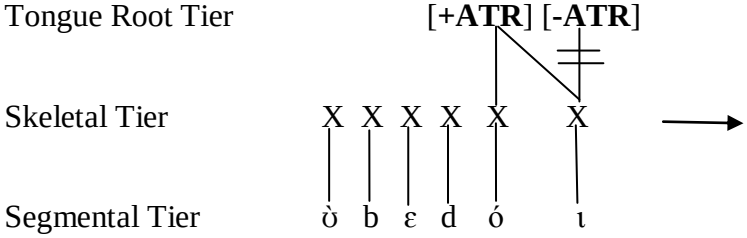
Undrlying Form:



[+ATR] Spreading:



[-ATR] Delinking



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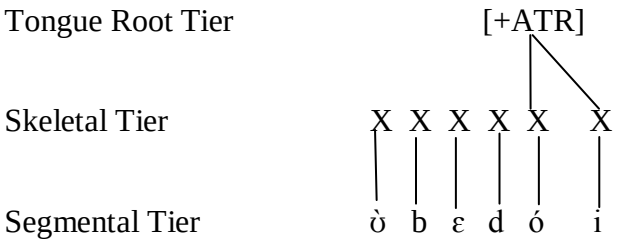
Output Form:



3.1.1.5 [-ATR] Noun Stems and Diminutive Suffix Harmony

The diminutive suffixes –**le (**singular) and **li (**plural) impose their [+ATR] feature value on stems with [-ATR] vowels in word formation process in Dagara. The harmony process thus, is in the regressive direction. In some of the derivations are preceded by some syllable structure processes which are duly discussed in subsequent sections in this thesis. Examples showing this imposition of [+ATR] features of the diminutive suffix are given in table 30.

Table. 30. [-ATR] Noun Stems and Diminutive Suffix Harmony

/ sɔ́r / + / -le / ⟶ **[** sóle]
'path' diminutive 'small path'

/ sɔ́ɔ̀ / + / le / ⟶ [sòle]
'knife' diminutive 'small knife'

/ gbɛ́r / + / -le / ⟶ **[** gbéle **]**
'leg' diminitive 'sheen/ small leg'

/ tɔ̀ɔ́r / + / -le / ⟶ **[** tóle **]**
'mortar' diminutive 'small mortar'

/ lɛ́r / + / -le / ⟶ **[** léle]
'axe' diminutive 'small axe'

/ yɔ̀ɔ̀r / + / -le / ⟶ [yòle]
'penis' diminutive 'small penis'

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/ dàkɔ́g / + / -le /⟶ [dàkógle]
'chair' diminutive 'stool'

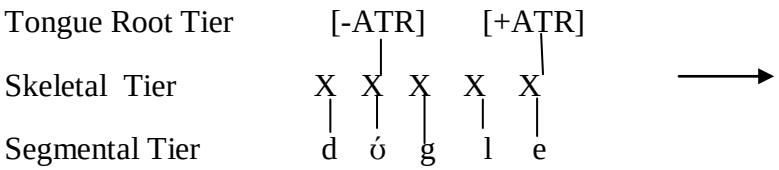
/ dóg / + / -le /⟶ [dúgle]
'pot' diminutive 'small pot'

Figure 29 shows the autosegmental representation of this regressive assimilatory process.

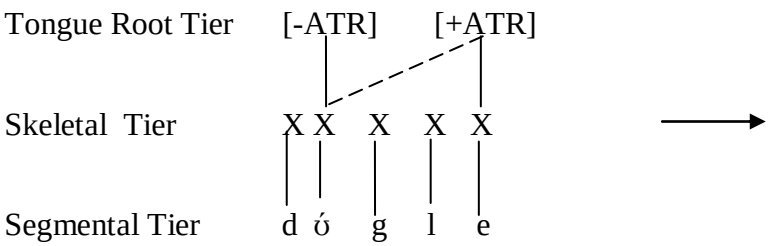
Fig. 29 [-ATR] Noun Stems and Diminutive Suffix Harmony

dóg 'pot' + -le 'deminutive'⟶ dúgle 'small pot'

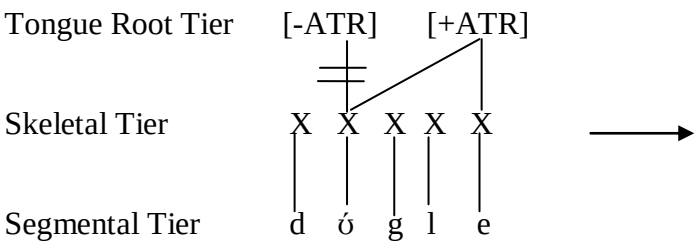
Underlying Form:



[+ATR] Left Ward Spreading:



[-ATR] Delinking:



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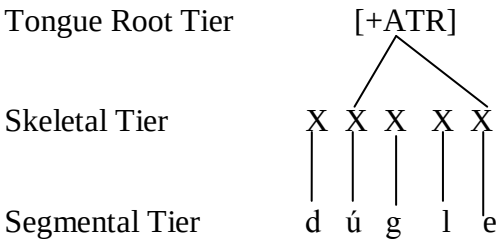
Output Form:



3.1.1.6 [-ATR] Stems and [+ATR] Dominant Stem Harmony

Vowel harmony, in Dagara, do not usually operate in words which are compounds of two different stems consisting of vowels from the two distinct sets; [+ATR] vowels and [-ATR] vowels. There is nevertheless, a dominant [+ATR] vowel adjectival stem, **bír** 'seed' **(bié** 'seeds'), which harmonizes [-ATR] vowel stem in word compounding. Again, some of the derivations here involeve some syllable structure processes which are subsequently discussed. Examples of the exceptional phenomenon are given in table 31.

Table 31. [-ATR] Stems and [+ATR] Dominant Stem Harmony

/ sɔ̀ɔ / + / bír / ⟶ [sòbír]
' knife' 'seed' 'knife blade'

/ gbɛ́r / + / bié / ⟶ **[g**bébié]
'leg' seeds 'toes'

/ lɛ́r / + / bié / ⟶ [lébié]
'axe' 'seeds' 'axe blades'

/ yɔ̀ɔr / + / bír / ⟶ **[**yòbír]
'penis' 'seed' 'tip of penis'

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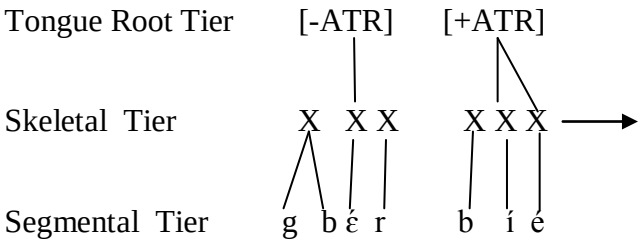
Figure 30 shows an example of the formalization of the above process in autosegmental phonology.

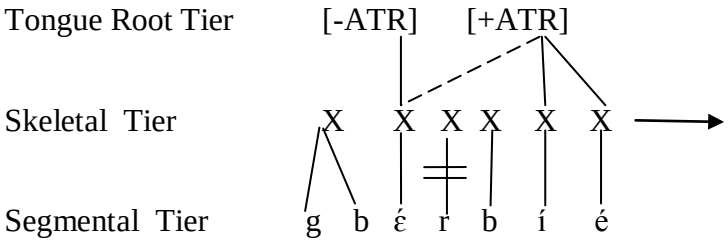
Fig. 30. [-ATR] Stems and [+ATR] Dominant Stem Harmony

/ gbɛ́r / + / bíé / ⟶ **[gbébíé]**
'leg' 'seeds' 'toes'

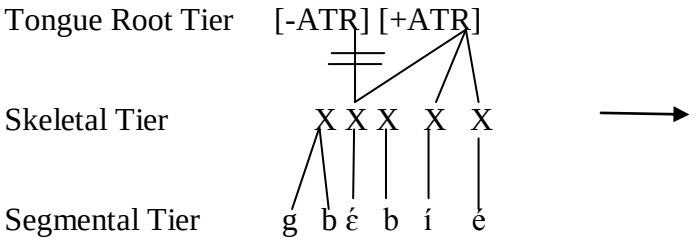
Underlying Form:



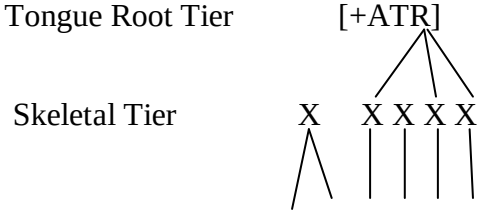
[+ATR] Leftward Spreading and Segment Deletion :



[-ATR] Delinking :



Output Form :



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Segmental Tier g b é b í é

3.1.2 Consonant Nasalization

Nasalization is a Manner of articulation assimilation process, whereby an oral segment acquires nasality from an adjacent nasal segment. In most Gur languages, Kusaal, Buli and Dagaare, in particular and other African languages in general, the process of segment nasalization is a common. For instance, in Kusaal and Buli, oral vowels only become nasalized when they are found in contiguous position to a nasal consonant (cf. Agoswin 2010 and Akanlig-Pare 2005; 1994 respectively).

In Dagara, however, nasalization process strictly involves two voiced oral stops (/b/ and /g/), when they are in contiguous position to a nasal segment. Consonant nasalization is induced by a morphological process, for example, when two stems or a stem and a suffix are put together to form a compound word. When the first stem ends in a nasal and the second stem or the suffix begins with a voiced bilabial oral stop /b/ or voiced velar stop /g/, the nasal feature in the first stem spreads on to assimilate the voiced oral stop. The process is a total assimilation in a progressive direction. The following data adapted from Bemile (1985:101, 104) in table 32 attest to this fact in Dagara

Table 32. Consonant Nasalization

/zòm + -bíl-í/ ⟶ [zùmmílí]

'fish' 'small'- **PL** 'small fishes'

/sãã + -bɛ/ ⟶ [sããmɛ]

'guest' **-PL** 'guests'

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/sɛ̃n + -bɛ/ ⟶ [sɛ̃nmɛ]
'girl friend' - **PL** 'girl friends'

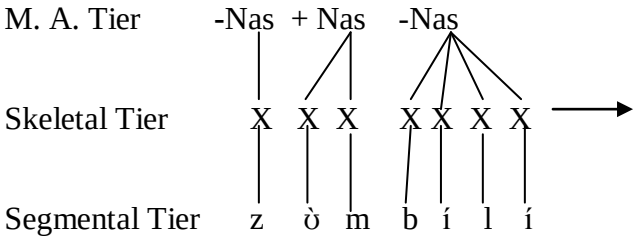
/ t̃ã̃ŋ + gán/ ⟶ [t̃ãŋŋán]
'body' skin skin (human)

Figure 31 shows an illustration of the consonant nasalization assimilation process in the autosegmental representation.

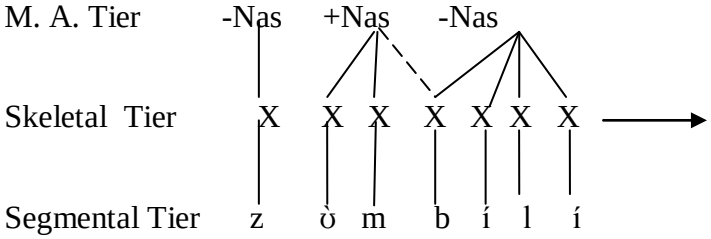
Figure 31 Consonant nasalization

a) / zṍm / + /-bíl-í / ⟶ [zṹmmílí]
'fish' 'small'-**PL** 'small fishes' (keta boys)

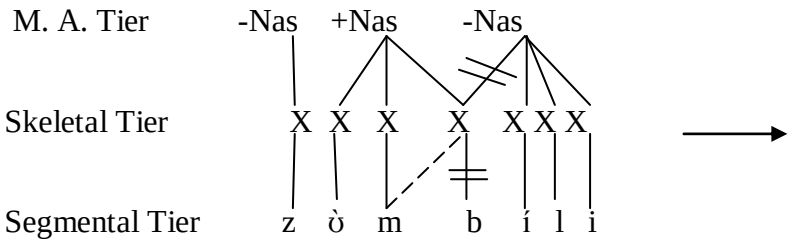
Underlying Form :



[+Nasal] Spreading Rightward :



Oral Segment deletion and Nasal segment germinating :



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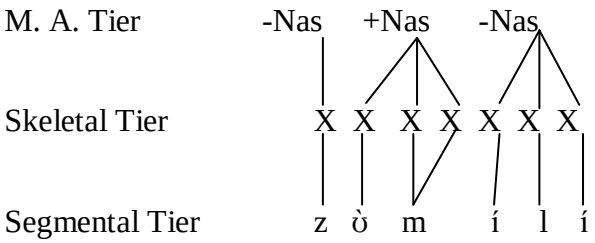
Output Form :



3.1.3 Homorganic nasal Assimilation (HNA)

Homorganic nasal assimilation is one of the commonest places of articulation assimilation attested in a variety of languages in the world. Durand (1990; 100) explains that, it is the assimilation process whereby a nasal consonant inherits the place of articulation of a plosive.

In Dagara, homorganic nasal assimilation process operates during word formation processes. When two stems are brought together; the preposed stem ending in a nasal consonant and the second beginning with an oral plosive or even another nasal to form a compound word, the nasal consonant in the preposed stem, inherits the place of articulation of the initial consonant of the scond stem, whether oral or another nasal consonant.

In Table 33 below are examples of some words in Dagara, showing the homorganic nasal assimilation process during compounding, while figure 32 shows the autosegmental formalization of the process in the regressive direction of the assimilation.

Table 33. Homorganic Nasal Assimilation

/tìèm / + / kʊblʊ / ⟶ /tìèmkʊblʊ/ ⟶ [tìèŋkʊblʊ]
'chin' 'hair' 'beard'

/táné / + /bòg/ + / kp̋ɛ̋ɛ̋ / ⟶ /tánbògkp̋ɛ̋ɛ̋ / ⟶ [támbògkp̋ɛ̋ɛ̋]

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‘earth’ ‘hole ‘big’ ‘lake’

/gán/ + / pɛ̂l / ⟶ /gánpɛ̂l/ ⟶ [gámpɛ̂l]
‘skin’ ‘sheet’ ‘a sheet of paper’

/zʊ̌m / + / daa /⟶ /zʊ̌mdaa/ ⟶ [zʊ̌ndaa]
‘fish’ male’ ‘male fish’

/ tɛ̀mɛ̀ / + / nʊ̌ɔ̌ /⟶ /tɛ̀mnʊ̌ɔ̌/ ⟶ [tɛ̃nnʊ̌ɔ̌]
‘tobacco’ ‘sweet’ ‘sweet tobacco’

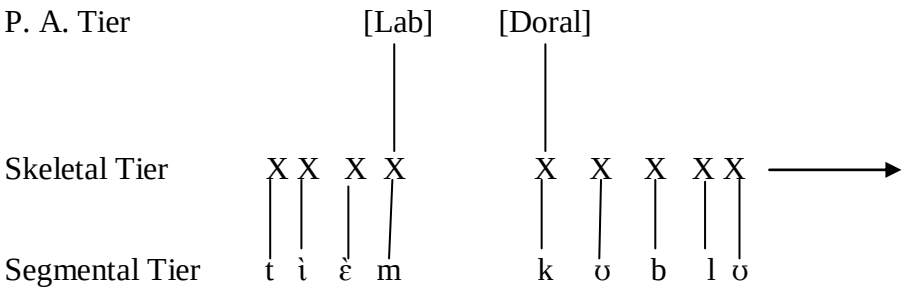
/ gáŋ / + / mimir/⟶ /gáŋmimir/⟶ [gámmimir]
‘cloth’ ‘eye’ ‘attractive cloth’

Figure 32 shows Autosegmental phonology formalization of the homorganic nasal assimilation process.

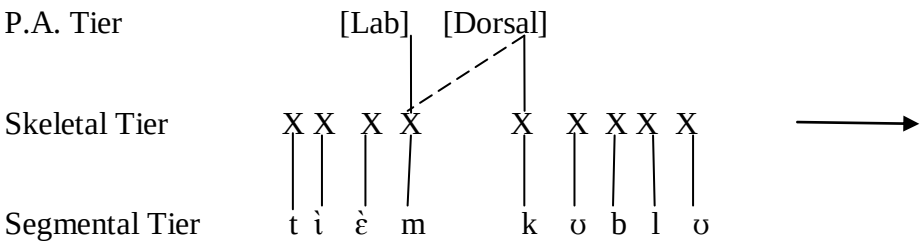
Fig. 32 Autosegmental representation of Homorganic Nasal Assimilation

a) tɪ̀ɛm + kɔ̀blɔ̀ ⟶ /tɪ̀ɛmkʊblɔ / ⟶ [tɪ̀ɛŋkʊblɔ]
‘chin’ ‘hair’ ‘beard’

Underlying Form :



Dorsal feature Leftward Spreading :



Labial feature Delinking :

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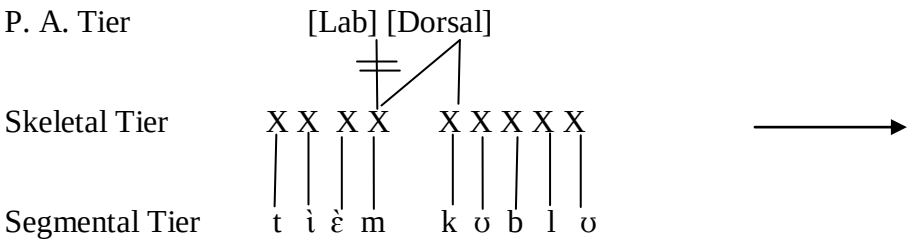
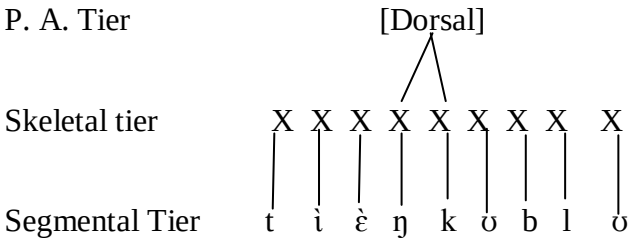
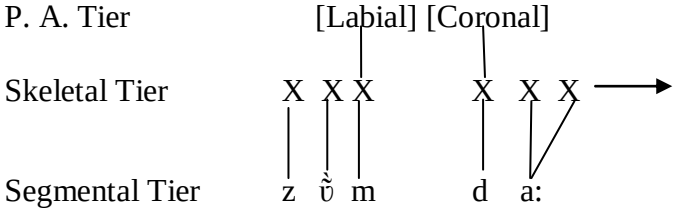


Output Form :

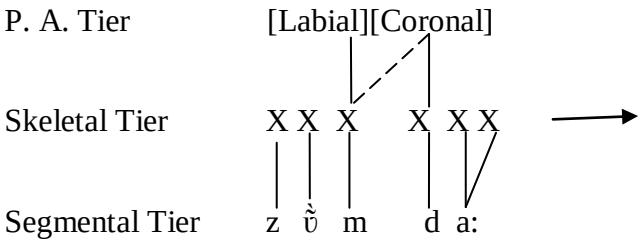


b) zʊ̃m + daa → /zʊ̃mdaa/ → [zʊ̃ndaa]
‘fish’ ‘male’ ‘male fish’

Undrelying Form :



Coronal feature Leftward Spreading :



Labial feature Delinking :

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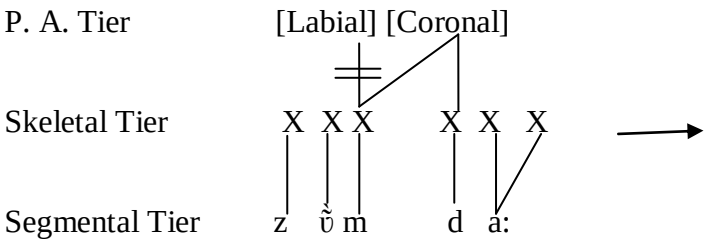
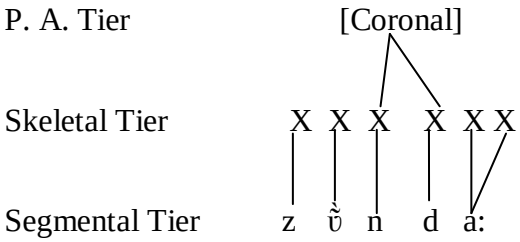


Output Form :



3.1.4 Consonant Labialization

Labialization is a process which consonants acquire by being contiguous to rounded vowels. In Dagara there are no underlying labialized consonants, however, consonants that are followed immediately by rounded vowels are produced with lip rounding in the process. Akanlig-Pare (1994) describes this process as a secondary articulation process, since the primary stricture to which the rounding feature is added, is not altered. Labialization is a regressive assimilatory process. Some examples of consonant labialization are in Dagara in table 34.

Table 34. Consonant Labialization

/ kɔ̀ / ⟶ [k^{w}ɔ̀] ‘kill’

/ gɔ̀ór / ⟶ [g^{w}ɔ̌:r] ‘thorns’

/ tú / ⟶ [t^{w}ú] ‘ to follow’

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/ dú / ⟶ [d^{w}ú] ‘to swim’

/ zɔ̀ / ⟶ [z^{w}ɔ̀] ‘ to run’

/ sɔ́glɪ / ⟶ [s^{w}ɔ́glɪ] ‘to hide’

/ nʊ̀ɔ̀ / ⟶ [n^{w}ʊ̀ɔ̀] ‘sweetness’

/ mʊ̀ɔ́ / ⟶ [m^{w}ʊ̀ɔ́] ‘rippen’

/ bɔ̀ / ⟶ [b^{w}ɔ̀] ‘look for’

/ pɔ̀ / ⟶ [p^{w}ɔ̀] ‘to swear’

/fóóli / ⟶ [f^{w}óóli] ‘whistle’

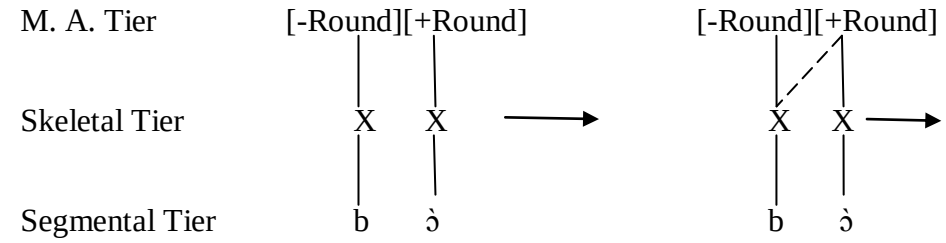
/ vóóli / ⟶ [v^{w}óóli] ‘look into’

Figure 33 illustrates the autosegmental representation of consonant labialization process.

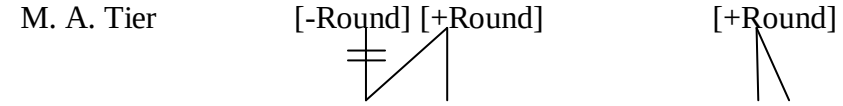
Fig.33 Autosegmental Representation of Consonant Labialization

a) / bɔ̀ /⟶ [b^{w}ɔ̀] ‘look for’

Underlying Form Leftward [+Round] Spreading



[-Round] feature delinking Output Form



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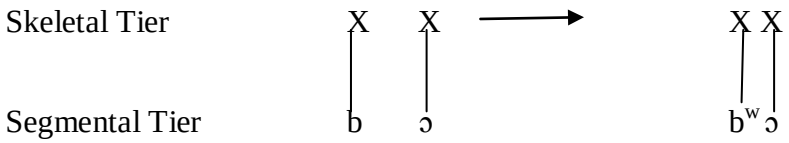

3.1.5 Glide Formation

A glide is a term used in phonetics to refer to a transitional sound as the vocal organs move towards or away from an articulation, (Crystal, 1992: 153). This is a manner of articulation assimilation process whereby a sound takes on the manner of articulation features of an adjacent sound. In CVC words in Dagara, the voiced velar stop / **g** / or the velar nasal /**ŋ** / in coda position becomes a Labial velar approximant, /w/. The manner of articulation feature, [+Cont] of the vowel, spreads in a progressive direction on to the [-Cont] consonants to make them surface as a Labial velar approximant /w/ which is a [+Cont].

Table 35 contains some examples of Dagara words in whose production, the final velar stop and nasal glide to a Labial velar approximant.

Table 35. Glide Formation

/ pɔ̀g/ ⟶ [pɔ̀w] ‘woman’

/ tɛ́g / ⟶ [tɛ́w] ‘to exchange’

/ kóg /⟶ [ków] ‘oak tree’

/ nyàg /⟶ [ɲàw] ‘to mix’

/ nyìg /⟶ [ɲìw] ‘to burn’

/ naŋ / ⟶ [naw] ‘scorpion’

/ bõŋ / ⟶ [bõw] ‘donkey’

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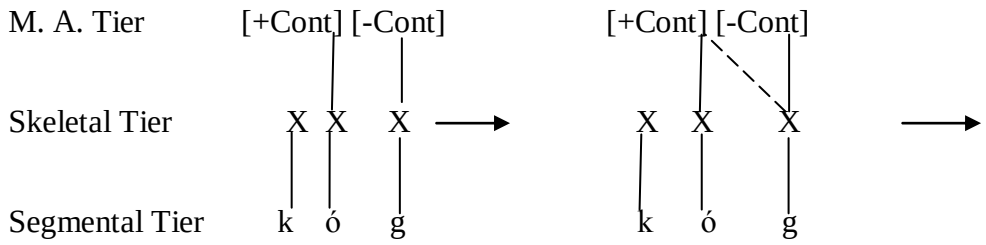
The autosegmental representation of the glide formation process is shown in figure 34.

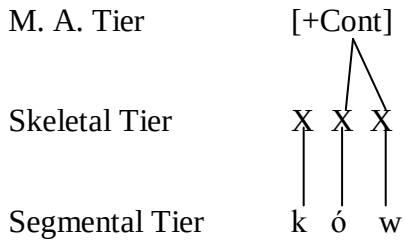
Fig 34 Glide formation in Autosegmental Representation.

a) / kóg / ⟶ [ków] ‘oak tree’

Underlying Form [+Cont] Feature Spreading

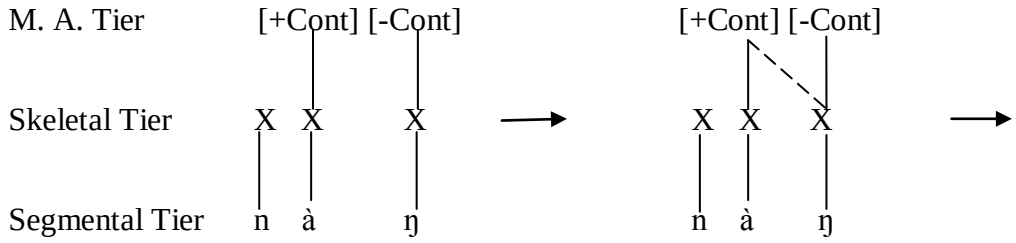


Ouput Form



b) / nàŋ / ⟶ [nàw] ‘scorpion’

Underlying Form [+Cont] Fearure Spreading



Output Form

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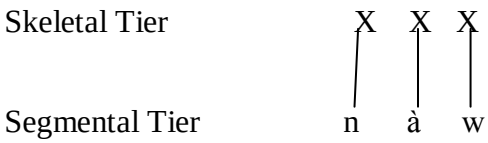

3.1.6 Rhotacism

Rhotacism is a bi-directional Manner of assmilation process identified in Dagara. Gummere (1960:254), defines rhotacism as the change of **/s**/ between vowels to /**r**/, but Saanchi (2006) broadly defines the phenomenon as the conversion of other sounds to /**r**/ and remarks that it is a marked feature of Dagaare, of which Dagara is a dialect, compared to other Oti-Volta Languages (Saanchi, ibid:14). Rhotacism as an assmilation process is an attested fact in other languages, especially non-African languages, as an unmarked process.

Cedẽno (1987) reports of an intervocalical /**d**/ rhotacism in Dominican Spanish. He claims, among others, that /**d**/changes into /**r**/ not because of their large number of shared features but because of the assimilation of certain features of adjacecnt segments would unequivacally produce a predictable tap, (Cedẽno, ibid: 365).

Davies (1982) also sugguests that in Hier.Luwian (an Anatolian language) dentals can change into **/r**/, with the following evidence in the language:

> …….in some texts of the first millennium, we find words written with the **ra**/**ri** and **ru** signs instead of the expected **ta/ti** and **tu** signs. The texts in question are inconsistent in their spellings; KARATEPE has both **"á[mis]-ia-ti"** and **"á-mi-ia +ra/i"** for ablative of **amis-**'my' (Davis, ibid: 245-246).

In fast speech in Dagara, the voiceless alveolar stop /t/ in intervocalic position changes into /r/ across word boundaries in a defined phonological environment. In an utterance that contains a sequence of mono-syllabic words with CV/CV:

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syllable shapes, if the initial consonant of the preceding word is the voiceless alveolar stop, /t/ and the vowel is a high front vowel, the original voiceless alveolar stop /t/ surface phonetically as an alveolar trill /r/, especially in fast speech. What happens is that the [+Cont] features of the non-consonantals spread onto the [-Cont] features of the /t/ to result in the trill. The following examples of such utterances below illustrate the phenomenon.

Table 36. Rhotacism

/ púóri nààŋmĩn kò tì / ⟶ [púóri nààŋmĩn kò rì]
'Pray for us'

/ kàà tì zìé zína / ⟶ [kàà rì zìé zína]
'Take care of us today'

/ zɔ̀ tì nìmbáálʊ / ⟶ [zɔ̀ rì nìmbáálʊ]
'Have mercy on us'

/ ta tú tì ɪ/ ⟶ [ta tú rì]
'Don't follow us'

/ zɔ̀ tí kpɛ̀ / ⟶ [zɔ̀ rí kpɛ̀]
'run and enter'

/ dó tí dé / ⟶ [dó rí dé]
'Go up and collect'

/ wá tí ʧén / ⟶ [wá rí ʧén]
Come and lets go'

Explaining rhotacism within linear generative phonology exposes yet another limitation of the theory because it lacks the formal tool to capture unequivocally the nature and the direction of the assimilation process. Autosegmental approach has the machinery; the multi-tier parallel arrangement of autosegments, to capture explicitly the nature and direction of the process.

Figure 35 illustrates in graphical terms how autosegmental phonology captures

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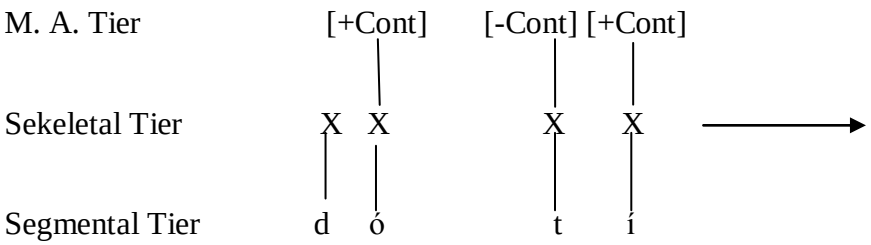
the nature of rhotacism.

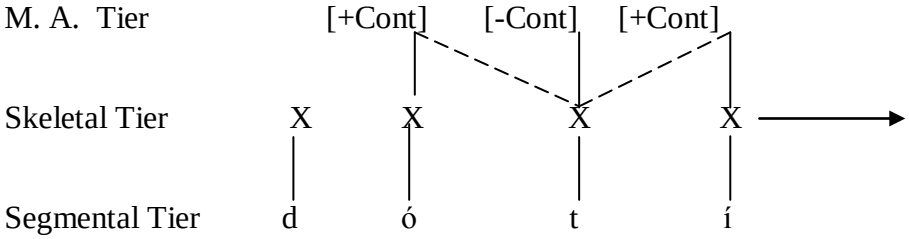
Fig 35 Rhotacism in Autosegmental Representation

/ **dó <u>tí</u> dé** / 'go up and collect' ⟶ **[dó <u>rí</u> dé]**

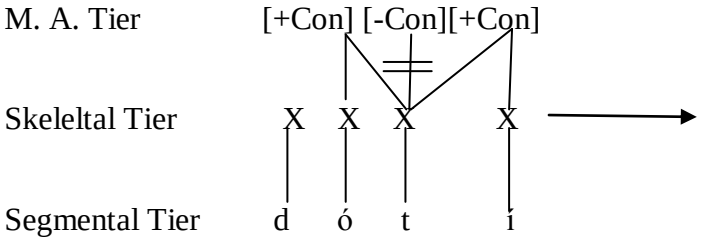
Underlying Form :



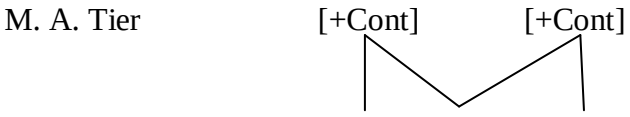
Bi-directional Spreading of [+Cont] Feature :



Delinking of [-Cont] Feature :



Output Form :



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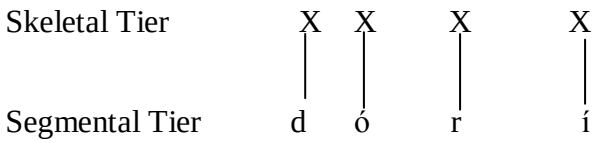

In autosegmental analysis, the derivation can be explained from the view point that, the non-consonantal segments are acting as the triggering context for the assimilation process from the manner of articulation Tier from both directions. The [+Cont] features of the non-consonantal segments spread bi-directionally onto the stop /t/. The stop /t/, thus, assimilates the continuance of the adjacent non-consonantal segments and surfaces as a trill /r/. Though the trill /r/ is also a type of a stop, it is much closer to [+Cont] sounds than a complete stop, since during its production there is still the continuous follow of airstream along the sides of the tongue blade in the vocal tract similar to the production of a [+Cont] Sound.

3.2.0 Syllable Structure Processes

Syllable structure processes are those processes that lead to the lost or addition of a sound in the word for morphophonological reasons. For instance, morphological process of compounding, and also some times in fast speech, sometimes results in segments lost. Similarly, the adaption of loan words into a language also results in segments insertations. These processes affect the basic syllable structure of words in a language by altering syllable shape of words.

In Dagara, the most common syllable structure processes induced by morphological process include apocope, the ommision of final segment of a word, and syncope, the ommision of segments within a word. The syllable structure processes discussed under this section include Elision, Compensatory lenghtening, Resyllabification and Vowel Epenthesis.

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3.2.1 Elision

Elision, in Dagara, takes the form of both apocope and syncope; that is, the omission of final segment of a word and/or the omission of a segment within a word respectively. This commonly occurs in word compounding process during which a vowel or a consonant is elided when two stems are put together to form a new word.

3.2.1.1 Vowel Elision

A vowel can be elided in two instances during word compounding. In the first instance, final vowel of CV or CVV syllable shape of an initial stem is elided before the second stem is added in order to form a compound word. The data in table 37attest to this type of vowel elision.

Table 37. Final Vowel Elision in CV /CVV syllable

Stem[1]	**Stem[2]**	**Compound word**
/ pɛ́rɔ́ / ‘sheep’	+ / pòla / ‘white’ ⟶	[pɛ́rpòla] ‘white sheep’
/ nɔ́rá / ‘cock’	+ / zìɛ̀ / ‘red’ ⟶	[nɔ́rzìɛ̀] ‘red cock’
/ sa̋mɛ̋ / ‘guest’	+ / yágá / ‘many’ ⟶	[sa̋myágá] ‘many guest’
/ bie / ‘child’	+ / dɛ̀b / ‘male’ ⟶	[bidɛ̀b] ‘son’
/ gbɛ́:/ ‘legs’	+ / tɕɛ̋nɪ̋ / ‘walking’ ⟶	[gbɛ́tɕɛ̋nɪ̋] ‘feet’
/ kɛ́: / ‘malt’	+ / kòrá / ‘old’ ⟶	[kɛ́kòrá] ‘old malt’
/ba: / ‘dog’	+ / pì:la / ‘young’ ⟶	[bapì:la] ‘puppy’

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In the second instance, a back, high vowel within a CVV syllable shape of an initial stem is elided before the second stem is added in order to form a compound word. The data in table 38 attest to this type of vowel elision.

Table 38. Vowel Elision in CVV Syllable

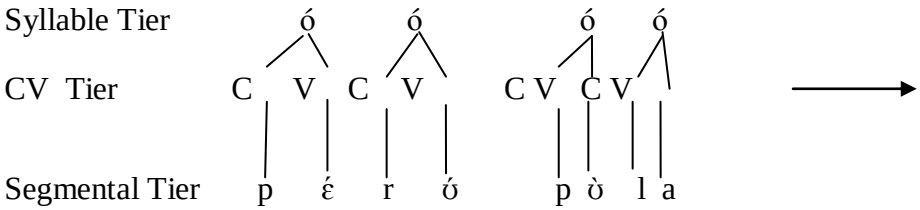
Stem^1		**Stem^2**		**Compound word**
/ nṹ̃ /	+	/ pɔ̀g /	⟶	[nɔ̃́pɔ̀g]
'fowl'		'woman'		'hen'
/ sɔ̀ɔ	+	/ kpár /	⟶	[sɔ̀kpár]
'knife'		'sheave'		'knife sheave'
/ tùó /	+	/ vá:r /	⟶	[tŏvá:r **]**
'baobao'		'leaf'		'baobao leaf'
/ gɔ̀ɔ́ /	+	/ tìɛ̀ /	⟶	[gɔ̌tìɛ̀]
'thorn'		'tree'		'thorn tree'

The autosegmental representation of the above syllable structure process is illustrated in figure 36.

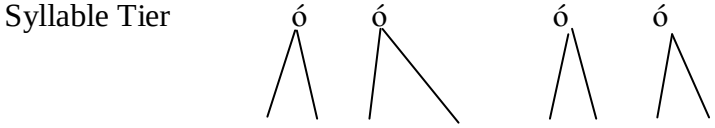
Fig. 36 Vowel Elision in Autosegmental Representation

a) / pɛ́rɔ́ / + / pɔ̀la / ⟶ [pɛ́r-pɔ̀la]
'sheep' 'white' 'white sheep'

Underlying Form :



Final Vowel Elision :



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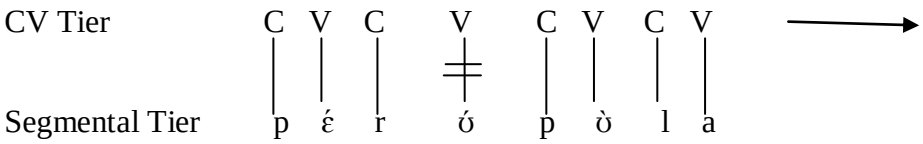
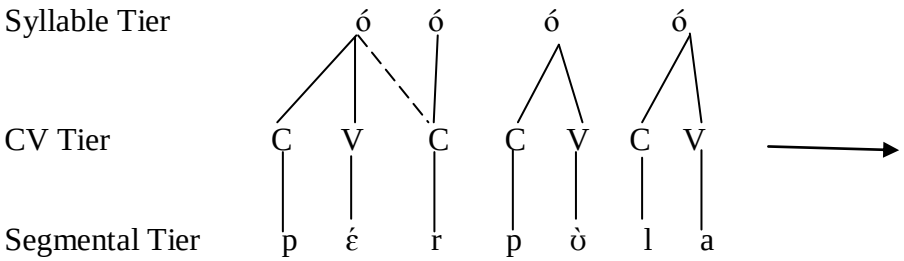
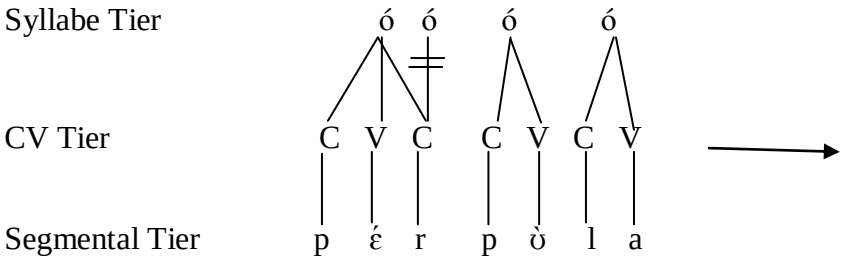


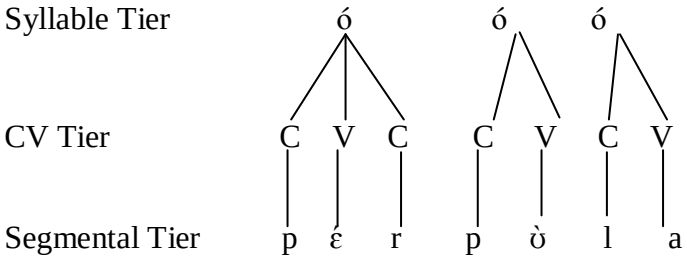
Resyllabification process :



Syllable truncation :



Output Form :



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3.2.1.2 Consonant Elision

Westermann and Ward (1966), cited in Bemile (1985:203), note that, in quick or slovenly speech, it is found out that consonants are pronounced with less vigorous articulations and consequently tend to weaken and drop out. This observation is very remarkable in Dagara as consonant elision is a common practice not only in word formation processes, but also in 'quick' or 'slovenly' speech as noted by Westermann and Ward.

In some compounding processes, final consonants in initial stems of CVC/CVCC syllable shapes are elided when the second stem begins with another consonant or a vowel. Where the Onset consonant of the second stem is the same as that of the Coda consonant of the initial stem, the Coda consonant is elided before a compound is formed.

The data in table 39 drawn from Bemile (1985) attest to the above syllable structure process in Dagara.

Table 39 Consonant Elision in compounding

Stem[1]	**Stem[2]**	**Compound word**
/ lɔ̀b / 'throw'	+ / bèr / 'leave'	⟶ [lɔ̀bèr] 'throw away'
/ sɛ́n / 'girl/boy friend'	+ / nṹ: / 'hand'	⟶ [sɛ́nṹ:] 'girl/boy friends hand'
/ zɔ̃ŋ / 'blind person'	+ / ŋà̰ / 'this'	⟶ [zɔ̃́:ŋà̰] 'this blind person'
/ kál / 'dawadawa'	+ / le / 'diminutive'	⟶ [kále] 'small dawadawa'
/ lɛ̀b / 'turn back'	+ / wa: / 'coming'	⟶ [lɛ̀wa:] 'the return'

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/ pɔ̀g / + / ã̀:n / ⟶ [pɔ̀ã̀:n]
'woman' 'barren' 'barren woman'

/ zɔ̃̀m / + /sà:la/ ⟶ [zɔ̃̀-sà:la]
'fish' 'smooth' 'mudfish'

/ pɛ̃́n / + / ulu / ⟶ [pɛ̃ulu]
'rag' 'grey' 'grey rag'

/ kã̂ŋ / + / gyɛ́lɛ́ / ⟶ [kã́gyɛ́lɛ́]
'guinea fowl' 'eggs' 'guinea fowl eggs'

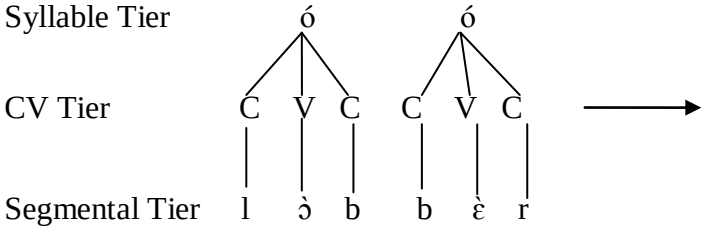
The autosegmental representation of the above syllable structure process is illustrated in fig 37.

Fig.37 Consonant Elision in Autosegmental representation

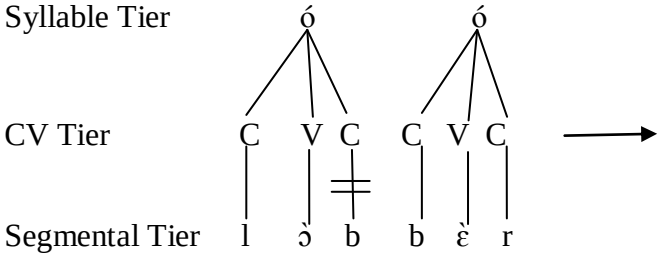
/ lɔ̀b / + / bɛ̀r / ⟶ [lɔ̀bɛ̀r]

'throw' '**l**eave' 'throw away'

Underlying Form :



Consonant Elision :



Output Form :

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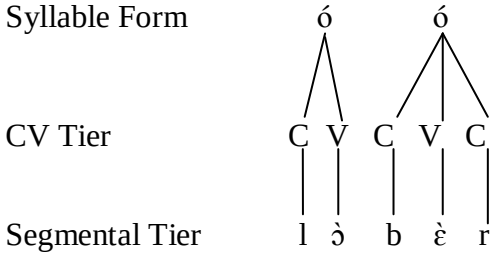

Besides this morphological process during which ssegments are elided, in 'quick' and 'slovenly' speech, as noted by Westermann and Ward, some segments in words or an entire syllable in a stretch of an utterance maybe elided causing a restructuring of the syllable structure of adjacent words. The following utterances exemplify segment elision in speech process.

Table 40. Consonant and Vowel Elision in fast Speech

a) / kul **nḯ** á bì.bì:r / ⟶ [ku.l**ḯ** à bì.bì:r **]**
CVC CV V CV.CV:C CV.CV V CV.CV:C
"go home with the children"

b) / saab **nḯ** zìɛr **nǎ** ǐ dì / ⟶ [saa. b**ḯ** zìɛ. r**á** ǐ dì]
CV:C CV CVVC CV V CV CV:.CV CVV.CV V CV
" T.Z. with soup that I ate"

c) / ɓáb **nǎ** ò ɓá m**ɛ́** / ⟶ [ɓá.bá ò ɓám]
CVC CV V CV CV CV.CV V CVC
"It is slapping that he slapped me"

d) / à fò yɛb **n**ò bɛ nyɔ́g wà n**ḯ** / ⟶ [à fò yɛ.bò bɛ nyɔ́g wǎn]
V CV CVC CV CV CVC CV CV V CV CV.CV CV CVC CVC
"it is your brother that they caught and brought"

3.2.2 Compensatory Lengthening.

Compensatory lengthening can be defined as the lengthening of a segment triggered by the deletion or shortening of a nearby segment, (Hayes, 1989:260). Compensatory lengthening is an attested process in many languages including

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the Gur languages, (cf. Akanlig-Pare 1994; 2005 and Agoswin 2010), in which the lengthened segment is usually a short vowel.When a segment within a syllable is deleted, the sound duration of the short vowel is extended to compensate for the loss of duration that is caused by the loss of adjacent element.

In Dagara, compensatory lengthening is a highly marked phenomenon as all the short vowels have their long counterparts. Its occurrence is conditioned by compouding process. In the derivation of some nouns from other nouns or other word classes using the nominal suffix,**-lʊ,** the final segment of the stem to which it is affixed, is usualy deleted which consequently create the condition for the lengthening of the sound duration of the short vowel that precedes the deleted segment. The deleted segment which triggers the extension of the duration of the short vowel is usually a vowel or the alveolar trill /r/ consonant. This phonological process may entail other processes during its derivation. Table 41 shows some examples of the compensatory lengthening in Dagara.

Table. 41. Compensatory Lengthening

Stem	**Suffix**		**Compound word**
/ zìɛ̀ / + ‘red’	-lʊ suffix	⟶	[zì:lʊ **]** ‘reddness’
/ bie / + ‘child’	-lʊ suffix	⟶	[bi:lu **]** ‘childhood’
/ yír / + ‘house’	-lʊ suffix	⟶	**[** yí:lu**]** ‘kinship’

Figure 38 shows the autosegmental phonology formalization of the compensatory lengthening in Dagara.

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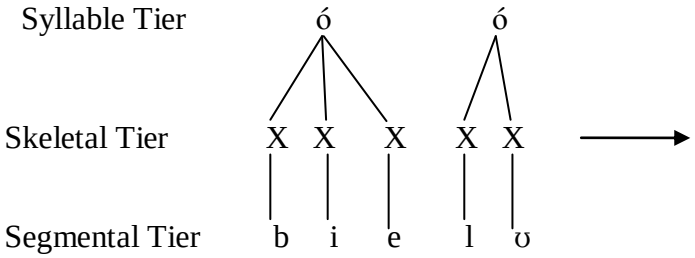
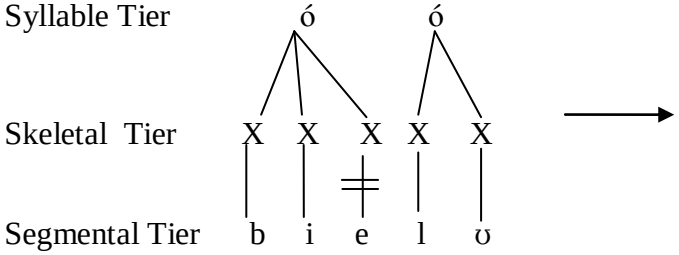
Fig. 38 Compensatory Lengthening in Autosegmental Representation

/ bie / 'child' + /-lʊ / ⟶ [bi:lu] 'childhood'

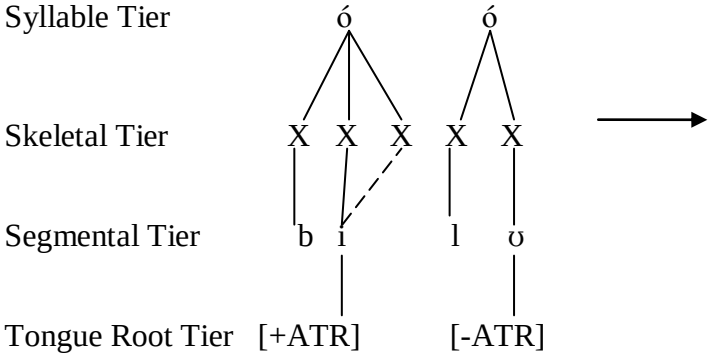
Underlying Form :



Vowel Deletion :



Vowel Lengthening :



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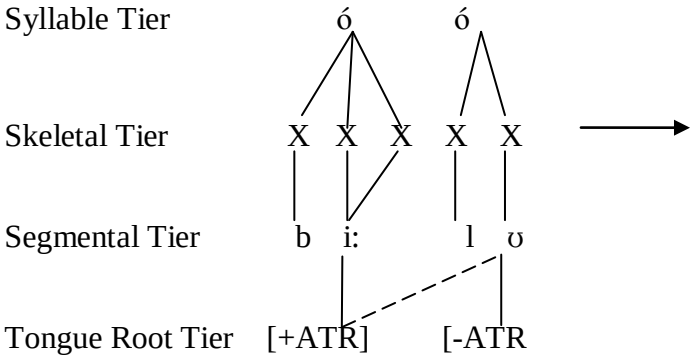
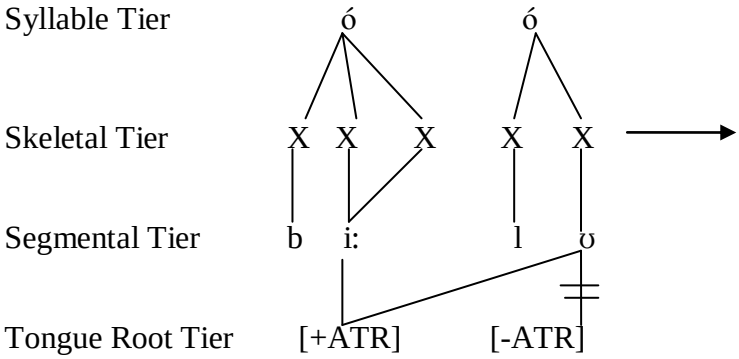
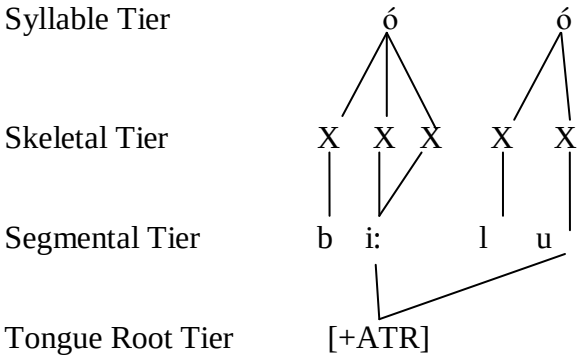
[+ATR] Spreading :



[-ATR] Delinking :



Output Form :



3.2.3 Resyllabification

A type of Resyllabification process whereby the final segment of a word runs onto or is linked to the initial segment of the following word is also attested in

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Dagara. This phonological phenomenon which is similar to liaison, especially attested in French (Durand 1990), is a common phonological process in the Gur languages and other Ghanaian languages.

For instance, resyllabification process attested in Dagara when nouns whose final segment is an alveolar trill, /r/, is followed immediately by the question word, **àŋmin** 'how many', or a numeral beginning with a vowel at syllable initial. When a noun ending in a trill, /r/, is followed by thequestion word, **àŋmin** 'how many' or a numeral beginning with a vowel at initial syllable, the trill is linked to the first syllable of the question word or the numeral in question. This brings about the restructuring of the underlying syllable structure at the surface level. The examples in table 42 are evidence of this phonological fact in Dagara.

Table. 42. Resyllabification in Dagara

Noun	Numeral/ Q-word	Underlying form	Resyllabification
/ pí:r/ 'sheep'	/ à.yi / 'two'	/ pí:r. à.yi / **'two sheep'**	[pí:. rà. yì] CV:.CV.CV
/ bò:r / 'goats'	/ à.ta / 'three'	/bò:r. à.ta / 'three goats'	[bò:. rà. ta] CV:.CV.CV
/dá:r/ 'sticks'	/ à.wàı / 'nine'	/ dá:r. à.wàı / ' nine sticks'	[dá:. rà. wáí] CV:.CV.CVV
/bagr/ 'shoulder'	/a.nũ:/ 'five'	/bagr.a.nũ:/ 'five shoulders'	[bag. rà. nũ:] CVC.CV.CV:
/sòɔ́br/ 'witches'	/ a.nɪ̃ / 'eight'	/ sòɔ́br.a.nɪ̃/ 'eight witches'	[sòɔ́b. ra. nɪ̃] CVVC.CV.CV
/yì:br/ 'twins'	/ à.ná:r/ 'four'	/yì:br. à. nà:r/ 'four twins'	[yì:b. rà. nà:r] CV:C.CV.CV:C

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/bìgr/ + /à.ŋmĩn/ ⟶ /bìgr.à.ŋmĩn/ ⟶ [bìg. rà. ŋmĩn]

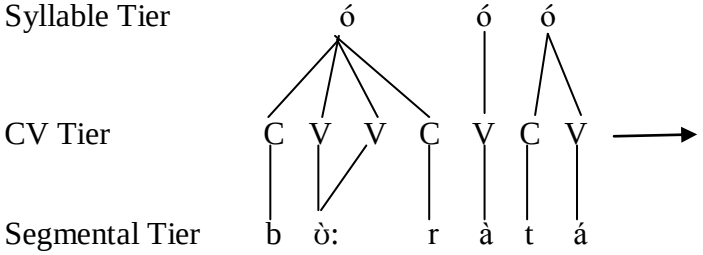
'law' 'how many' 'how many laws' CVC.CV.CVC

The autosegmental representation of this syllable structure process is illustrated in figure 39 below:

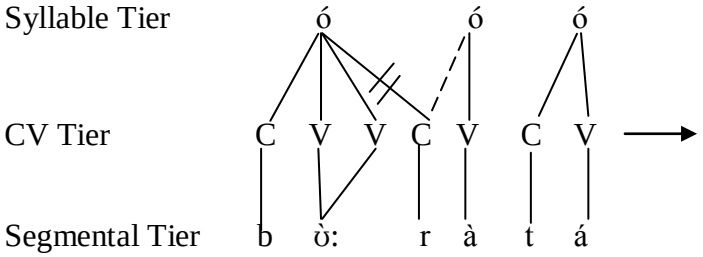
Fig. 39 Resyllabification in Autosegmental Representation

a) /bò:r/ 'goats' + /à.tá/ 'three'⟶ /bò:r. à.tá/ 'three goats'⟶ [bò:. rà. tá]

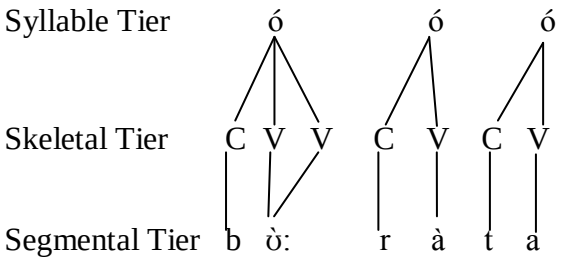
Underlying Form :



Syllable Truncation/Spreading :



Output Form :



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3.2.4 Vowel Epenthesis

Vowel epenthesis is a common phonological process in dealing with loan words in many Languages, especially where the syllable structure of borrowed words do not conform to the syllable structure requirement of the borrowing language. According to Uffmann (2001:1), vowel epenthesis is a process in loan word adaptation in order to satisfy the constraints on phonotactics and syllable structure in the borrowing language. Languages with a preference for CV syllable structure often epenthesize vowels in positions where they serve to break up consonant clusters or resyllabify coda consonants.

Dagara, like most African languages, borrow a lot of lexical items from other languages. Some of the source languages of Dagara loan words include Isaala, Hausa, Akan, French and English. However, in this thesis the discussion on vowel epenthesis is limited to English loan words in Dagara.

The constraints on phonotactics and syllable structure of English and Dagara are not the same. For instance, whereas it is permissible in English to have Onset consonants cluster, Onset consonants cluster is highly constrained in Dagara. Consonant cluster is only permissible at word medial or word final position, where they serve as syllable boundaries, and even then there is still a constraint on the consonant sequencing. Due to this Morpho-phonological constraint that Dagara poses, vowels are epenthesized in English loan words to generate licit output in compliance with the Dagara syllable structure requirements. No conclusive statement can be made with regards to which vowels serve as epenthetic vowels. However, observable pattern in the data

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shows that the epenthetic vowel is often a duplication of the stem vowel or / i / by default.

The data below in table 43, adapted from Bemile (1985), show how vowels are epenthesized in English words to make them comply with the Dagara syllable structure.

Table 43. Vowel Epenthesis in Loan Word

English	**Syllabifcation**	**Dagara**	**Syllabification**	**Gloss**
[brik]	CCVC	[bí.rí.kí]	CV.CV.CV	brick
[gla:s]	CCV:C	[gì.lá.sì]	CV.CV.CV	glass
[traʊze(z)]	CCV.CV(C)	[tòrásá]	CV.CV.CV	trouser(s)
[trʌk]	CCVC	[tó.ró.kó]	CV.CV.CV	truck
[sku:l]	CCV:C	[sú.kú:l]	CV.CV:C	school
[spriŋ]	CCCVC	[sì.pí.rí.ʤì]	CV.CV.CV.CV	spring

The loan word does not only conform to the syllable structure of Dagara, it is also adapted to conform to Dagara tonology since tone is an integral part of the syllable in Dagara. The illustration of epenthetic process formalized in autosegmental representation is in figure 40 below.

Fig.40 Vowel Epnthesis in Autosegmental Representation.

English		Dagara	Gloss
[spriŋ]	⟶	[sì.pí.rí.ʤì]	spring

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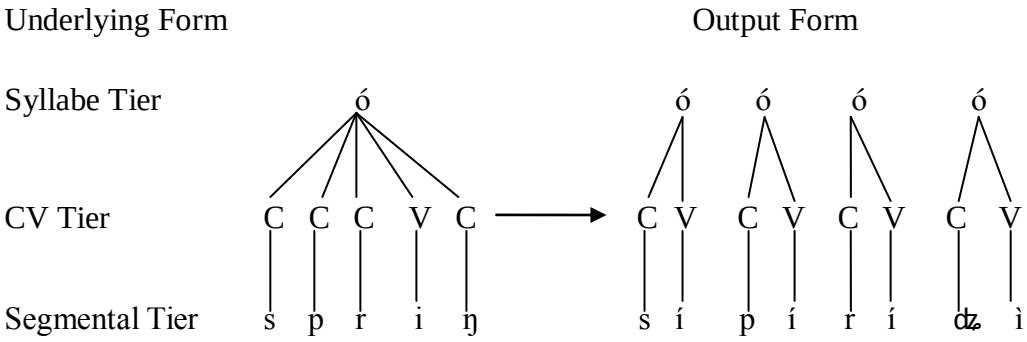

3.3.0 Chapter Summary

This Chapter constitutes the core part of the thesis. It discussed both assimilatory processes and syllable structure processes and formalized them within Autosegmental framework.

For the assimilation processes, it identified and discussed Vowel Harmony, Consonant Nasalization, Homorganic Nasal Assimilation, Glide formation, Consonant Labialization, and Rhotacism. It observed that, there is a very strict vowel harmony system in Dagara, which operates bi-directionally, involving stems and suffixes, [-ATR] noun stems and a [+ATR] dominant stem and across word boundaries as well. It also noted that all the assimilatory processes in Dagara involve Place of Articulation and Manner of Articulation features.

For syllable structure processes, it identified and discussed Elision which involves vowel and consonant, Compensatory Lengthening, Resyllabification and finally Vowel epenthesis. It again, observed that both assimilatory and syllable structure processes are triggered by morphological processes.

From the theoretical perspective, the formalization of the phonological processes within the Autosegmental framework is, “a natural testing-ground for the thesis that autosegmental phonology is not restricted to tonal phenomena,

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but constitutes a general theory of phonological representation", (Clements, 1976: 57).

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CHAPTER FOUR

DAGARA TONE AND TONAL PROCESSES

4.0 Introduction

Dagara tonology has received detailed description in Bemile (1983, 1984, and 1985) within linear generative phonological framework. This chapter, however, presents a description in a non-linear approach using Autosegmental framework. The analysis in this chapter is based largely on the corpus of data in these earlier works and Autosegmental framework is used in order to overcome the challenges of tonal representations that confronted the linear generative phonological analysis in the earlier works. We shall discuss; the relationship between Pitch and Tone, Tone Bearing Unit (TBU), Dagara Tonal System, Tone Combination in Dagara, Tone Stability, Tone Terracing, the Functions of Tone and Tonal Processes.

4.1. Pitch and Tone

The relationship between Pitch and Tone in phonological analysis is of particular interest to Phonologists. Pitch and Tone relationship is such an intricate type that, it is virtually impossible to talk about tone languages without the mention of pitch.

Brosnahan and Malmberg (1970:17) cited in Akanlig-Pare (1994:138) define pitch acoustically as the "perceived impression of frequency or repetition of a wave" which implies that, its feasible to establish the nature of pitch by counting the peaks of air pressure in the record of its waveform.

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Ladefoged (1993:186) also explains that the pitch of a sound is that "auditory property that enables a listener to place it on a scale going from low to high without considering the acoustic property". A speech sound that goes up in frequency also invariably goes up in pitch, thus the pitch of the sound is relative to its fundamental frequency. Frequency is a technical term for acoustic property of pitch and it is measured in Hertz (Hz.).

Pitch can contrast across a wide range of frequencies, depending on several factors. Katamba (1989) notes that, pitch relates to the rate of vibration of the vocal cords. The tauter the vocal cords are, the faster they vibrate and the higher the pitch of the perceived sound. The rate of vibration of the vocal cords is also dependent on the thickness of the vocal cords and the amount of air flow through the glottis, (Akanlig-Pare, 1994: 139). Fox (2000), however, points out that pitch is not in itself a phonological feature; it is a phonetic feature with a variety of prosodic functions based on which languages in the world are categorizes phonologically as tone, accent, or intonation languages.

Tone, on the other hand, "refers to the organization of speech into discrete, linguistically significant categories which serve (as do non-prosodic phonological characteristics) to discriminate among distinct linguistic units" (Clements, 1979:536). Pike (1948) explanation that, a tone language is one that has lexically significant contrastive, but relative pitch on each syllable has been the model definition in the literature. Akanlig-Pare (1994), following Cruttenden (1986), thus describes tone as a feature of the lexicon, in terms of, prescribed pitch for syllable. Yip (2007) also postulates that a "language with

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tone is one in which an indication of pitch enters into the lexical realization of at least some morphemes" (Yip, ibid: 230).

Tone therefore, like segmental phonemes, can be used to distinguish lexical items or to convey grammatical distinctions in many tone languages in the world.

4.2. Tone Bearing Unit (TBU)

Much as tone is a significant phonological phenomenon, especially in Asian and African languages, there have been divergent linguistic opinions on which phonological unit tone should be associated with. Yip (2002:73) admits that it is not always clear whether to associate tone to segments, syllables, or moras.

Scholarly works such as Schachter and Fromkin (1968) and Gandour (1974) on tone in Akan and Thai languages postulate that vowels and consonants segments are Tone Bearing Units in Akan and Thai respectively. Goldsmith (1976) also proposes in autosegmental phonology that tone should be associated with vowels and vowels associated with tones, thus holding the same view as Schachter and Fromkin. However, Bao (1999:134), Fox (2000:217-8), and Yip (2002:67) among others, basing on the phenomena of 'tone stability' and 'Floating tone', debunk the notion that the segment is the tone-bearing unit. They argue that, in the event of phonological processes such as segment deletion, elision or contraction, metathesis and reduplication, tone can remain unaffected.

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Other works including Trubetzkoy (1967), Hyman (1985), Odden (1988) and Hayes (1989), considering syllable quantity, weight and length, also claim that the mora is the tone-bearing unit in phonological analysis.

While works including Clements and Ford (1979), Hyman (1988) and Clements (1984), also hold the view that the syllable should be assigned tone in phonological analysis. For instance, Clements and Ford (1979) cited in Odden (1995:449) argue that:

> There has been some ambiguity in previous uses of the term tone-bearing unit. It is maintained here that tones are not directly associated with vowels or other segments, but rather with higher-level units ('tone-bearing units') such as the syllable or syllable-final (rhyme), in which vowels typically function as peaks of prominence (Clements and Ford, ibid:181).

With dissenting opinions such as the above concerning which phonological unit is associated with tone, Hyman (1988:47) recommends that the issue of tone-bearing units should not be viewed as cross-linguistic but rather as language specific, since tone languages may differ in the choice of the tone-bearing unit.

Akanlig-Pare (2005) consequently suggests a more lucid alternative for the choice of tone-bearing units in tone languages in the following statement:

> ….. if a language displays a situation where there is one to one correlation of a tone to a mora, such that monomoraic light syllable bears only a single and for that matter, a simple tone such as a level, high, mid or low, whilst for a complex tone such as rising or falling contour, there must be a bi-moraic heavy syllable, there is the justification in claiming the mora as the TBU. However, if both light monomoraic and heavy bimoraic syllables can bear the same type of tone, simple and complex in one and the same language, then the TBU in that language must be the syllable (Akanlig-Pare, ibid:153-4).

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In most Gur languages, the syllable is considered the TBU because both light monomoraic and heavy bimoraic syllables can bear the same type of tone, simple and complex. Akanlig-Pare (2005:154) claims that the tone bearing unit in Buli is the syllable, because both light monomoraic and heavy bimoraic syllables can bear the same type of tone, simple and complex in the same language.

Antilla and Bodomo (1996) cited in Yip (2002:141), also claim the syllable to be the tone bearing unit in Dagaare, of which Dagara is a dialect. Bemile (1983, 1984, and 1985) similarly support the claim that the syllable is the tone bearing unit, with emphasis that, "tone is an integral part of the syllable" in Dagara (Bemile 1983:10).

4.3 Dagara Tone Systems

A pioneering work on Dagaare phonology in Kennedy (1966) notes that, the language is a register tone type and postulates two levels of tone; High tone and Low tone, and a Downstepped. Bodomo (1997) and Antilla and Bodomo (1996) support this assertion with data limited to the Central dialect of the Dagaare language. Bemile (1983, 1984, and 1985) also note that there are five tonemes (three level tones) High, Mid, and Low, (and two contour tones) Falling contour tone and Rising contour tone.

However, a critical analysis of tone in this work reveals that, there are three level tones but no underlying contour tone in Dagara, contrary to previous analysis by Bemile. The Rising and Falling Contuor tones are phonetic realization of a sequence of H, M, or L. For instance, a Falling tone could

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could be phonetic realization of H-L, H-M, or M-L, while a Rising tone could be as a result of L-H, L-M or M-H.

In this analysis these tones are represented as follows: High (H) is marked with an acute accent (´), the Mid (M) tone is the default ton and it is not marked with any diacritic sign, the Low (L) is marked with a grave accent (`), the Falling (F or HL) contour tone is marked with a circonflex accent (^) and the Rising (R or LH) contour is marked a haček sign (ˇ). The signs; (H) for High tone, (M) for Mid tone, (L) for Low tone, (HL) for Falling tones and (LH) for Rising tones, are used subsequently for the Autosegmental representation.

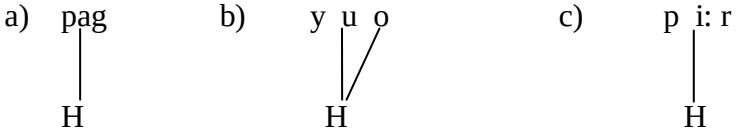
4.3.1 Level Tones

Pike (1948:5) explains a level tone as the type in which, within the limits of perception, involves a level of steady pitch height during the production on the syllable. The three level tones; High tone, Mid tone and Low tone are tonemes, as they contrast in words to show lexical and grammatical distinctions in the Dagara dialect.

4.3.1.1 High (H) Tone

The High Tone is produced with a relatively high pitch of the voice at the phonetic level. It can occur on all syllable shapes of various words types. The examples below show an autosegmental representation of the High tone.

Fig. 41 High Tone



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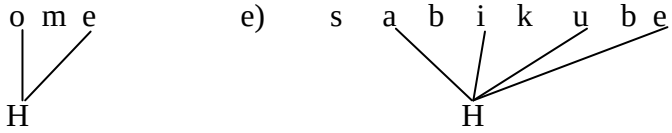
pág ‘to meet’ yúó ‘open’ pí:r ‘sheep’

d) t o m e e) s a b i k u b e



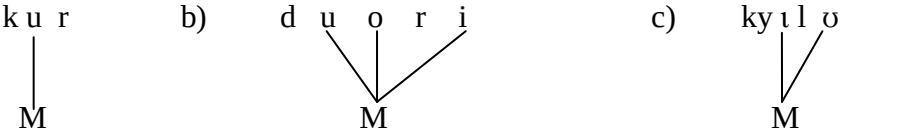
tómé ‘to be bitter’ sábíkúbé ‘hail’

4.3.1.2 Mid (M) Tone

The Mid tones are produced with a relative pitch of the voice not as high as that of the High tones and not as low as the Low tone at the phonetic level. Its occurrence is on all syllable shapes. Some examples of words with Mid tone are shown in autosegmental representation below.

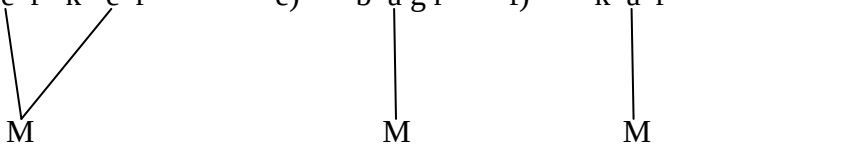
Fig. 42 Mid tone

a) k u r b) d u o r i c) ky ɪ l ʊ



kur ‘iron ore’ douri ‘to pile up’ kyɪlʊ ‘jubilation’

d) k e r k e r e) b a g r f) k a r



kerker ‘raw’ bagr ‘shoulder’ kar ‘break into pieces’

4.3.1.3. Low (L)Tone

The Low tone on the other hand is produced with a relatively low pitch at the phonetic level. It may occur on all syllable shapes as well as on the various word types.Some word bearing Low tones are shown in the representation below.

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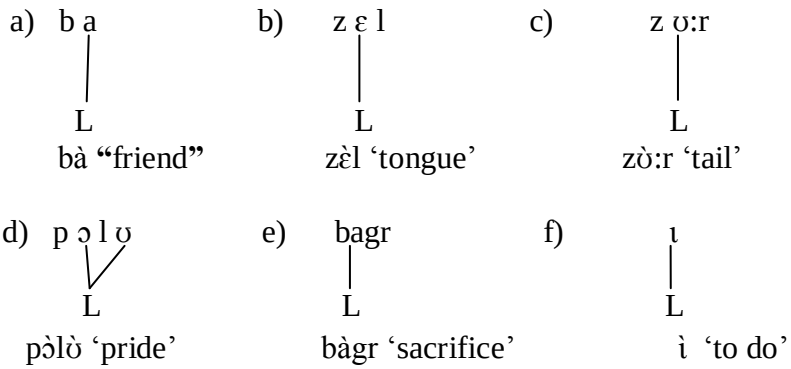
Fig. 43 Low Tone



4.3.2 Contour Tones

Pike (1948:5) explains that, a contour tone is the type in which during the pronunciation of the syllable on which it occurs there is a perceptible rise or fall, or some combination of rise and fall, such as rising-falling or falling-rising.

This research reveals that, contour tones in Dagara, develop as a sequence of level tones either as a result of the tone of one vowel spreading to a neighbouring vowel or as a result of vowel elision or a sequence of different level tones on a long vowel and they are not tonemes as previously analyzed. The following level tone sequences: Low-High, Low-Mid, and High-Low, may develop into Low-Rising, and High-Falling, contours respectively, similar to languages such as Yoruba and Gwari (Hyman and Schuh 1974).

4.3.2.1 Falling (HL) Contour Tone

This is a concatenation of High and Low tones in the same syllable. This tone commonly occurs on syllable shapes such as V:C, and CV:C in monosyllabic or disyllabic words or as derived form resulting from some other phonolgical

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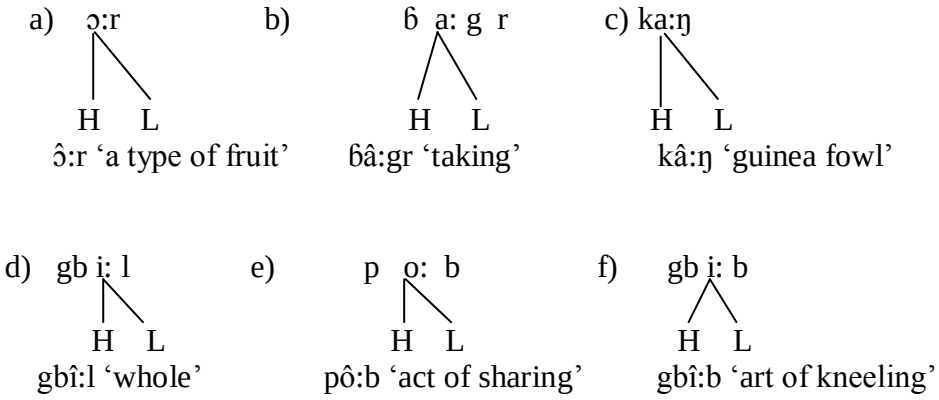
or morphological processes. During the pronunciation of the syllable on which they occur, there is a perceptible fall and rise or some combination of rising-falling of the pitch (Pike, 1948). Some examples of this type of tone in Dagara are shown in the representation below:

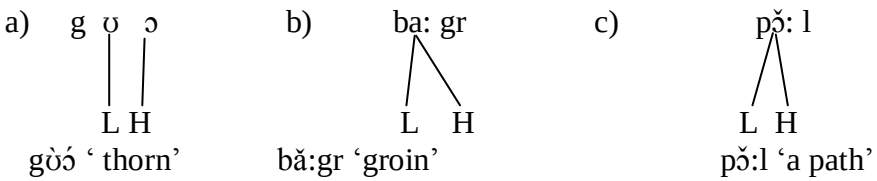
Fig. 44 Falling Contour Tone



4.3.2.2 Rising (LH) Contour Tone

This is a concatenation of Low and High tones in the same syllable. This toneme commonly occurs on syllable shapes such as CV, CVV and CV:C in monosyllabic or disyllable words or as derived form resulting from some other phonological or morphological processes. During the pronunciation of the syllable on which it occurs there is a perceptible rise and fall or some combination of falling-rising of the pitch (Pike, 1948). Examples of this type of tone in Dagara are shown in the representation below:

Fig. 45 Rising Contour Tone



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d) t ɛ:r a
L H M
tĕra ‘had’

e) gb ɔ:b r a
L H L
gbɔ̌:brà ‘pinching’

f) k aso:g
M L H
kasŏg ‘ in the wier basket’

4.4. Tone Combination in Dagara

The five tones may combine to give several different melodies on two or more syllabe words. The table below shows some possible tone melodies with word examples.

Table 44. Tonal Combination

Tone Melody	Word Example	Gloss
HH	púré	tamarind
LL	pɔ̀lɛ̀	paths
MM	pile	mats
HM	péle	small ram
HL	zíɛ̀	millet
LH	bìgrá	obstacle
LM	bìle	be rolling
ML	kasòg	a wierd basket
M LH	kasŏ:g	in a wierd basket
H LH	názǎ:g	in the kraal

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HL HL	'lê:gr'lê:gr	very fast
LHLH	dě:ŋdě:ŋ	straight

4.5 Tone Stability

Fox (2000) describes tone stability as the situation whereby the lost of a syllable or tone bearing unit through elision, contraction, or reduplication does not affect its associating tone, but it is preserved and maybe re-associated with the next syllable. This is a tonal feature which is difficult to explain and represent in linear generative phonology and thus, provides evidence to confirm of the independence of tone from segmental phonemes to support the superiority of autosegmental phonology over linear generative phonology.

In Dagara, compounding processes or fast speech often result in vowel elision, while the tone is maintained. In the event of such syllable structure process, the stranded tone re-associates with the nearest vowel to the left or right. This tonal process is results into derived contour development which does not change the meaning of the word.

The data in table 45 shows the re-association of tone in the event of a segmental deletion or elision.

Table 45. Tone Sability

/ gòɔ́ / + / tìɛ̀ / ⟶ [gɔ̌-tìɛ̀]
'thorn' 'tree' 'thorn tree'

/ gárò / + / vòla / ⟶ [gâr -vòla]
'herbal concoction' 'good' 'good herbal concoction'

/ gàá / + / wùle / ⟶ [gă-wùle]
'ebony' 'branch' 'ebony branch'

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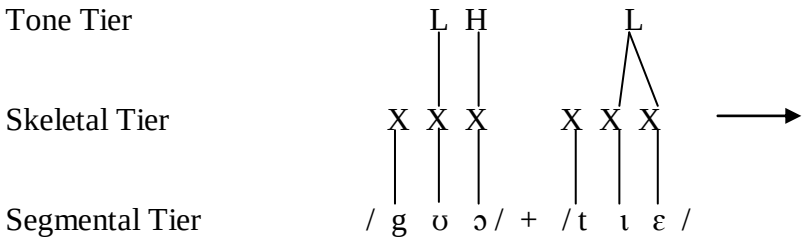
/ kpàrɔ́ / + / faa / ⟶ [kpăr-faa]
'shirt' 'bad' 'bad shirt'

/ wà / + / ní / ⟶ [wăn]
'come' 'with' 'come with'

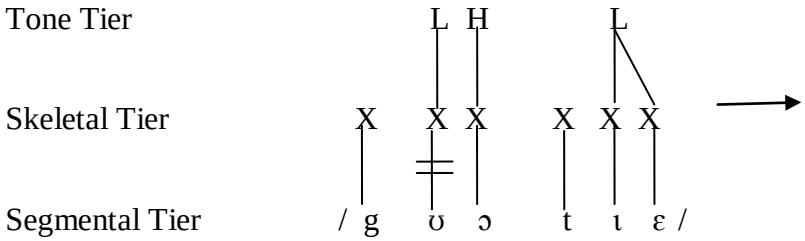
An illustration of autosegmental representation of the above data is below:

Fig. 46 Autosegmental Representation of Tone Stability.

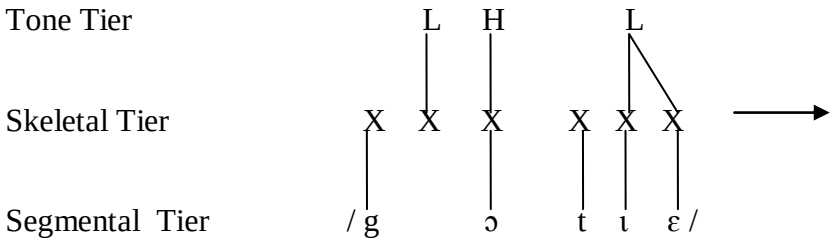
Underlying form :



Back, High Vowel Deletion :



Low tone floating :



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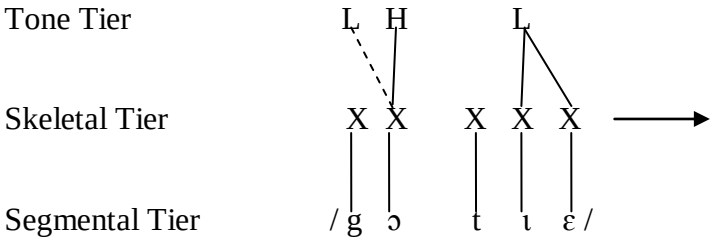
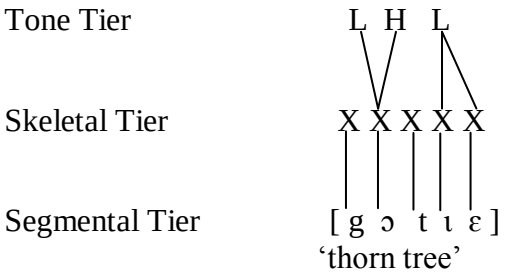
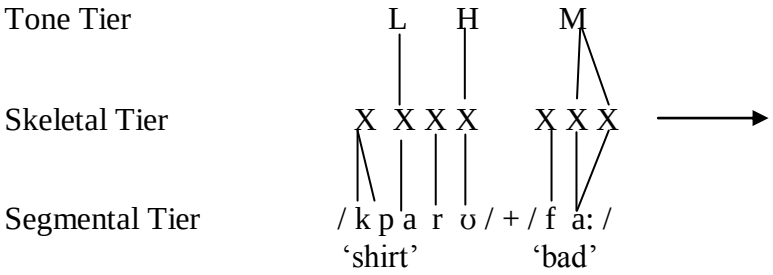
Floating tone re-associating to the right



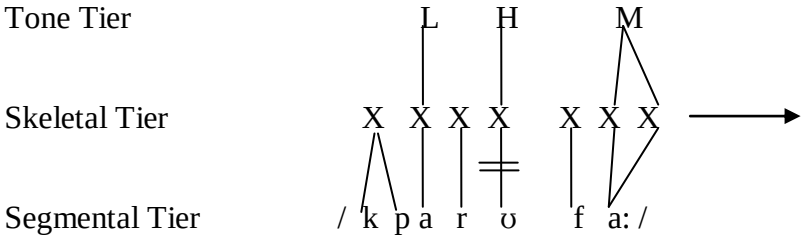
Output Form :



Underlying Form :



Vowel Deletion :



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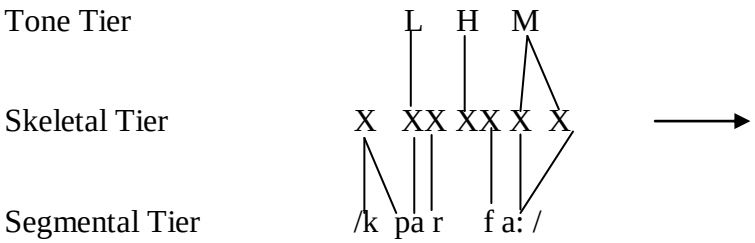
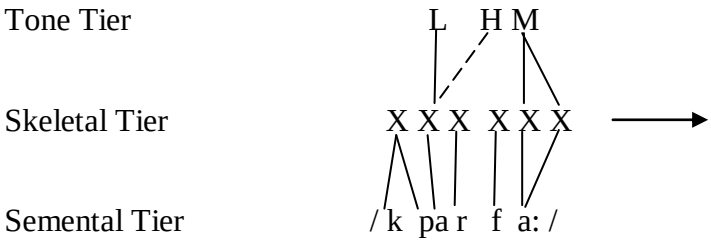
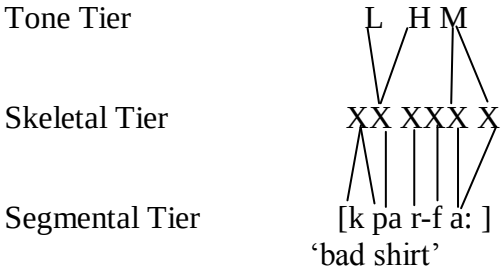
High tone floating :



Floating tone re-associating to the left :



Output Form :



'bad shirt'

4.6 Tone Terracing

Tone terracing is a property of many tone languages, especially, the sub-Saharan Africa languages. Tone terracing occurs in a language when the pitch of successive basic tones are either raised or lowered over an utterance (Akanlig-Pare, 1994:150). Though Dagara is a discrete-tone-level Language, it exhibits such characteristics of tone terracing over an utterance which can be described as "declination", following Connell & Ladd (1990) and (Connell 2001) and downstep .

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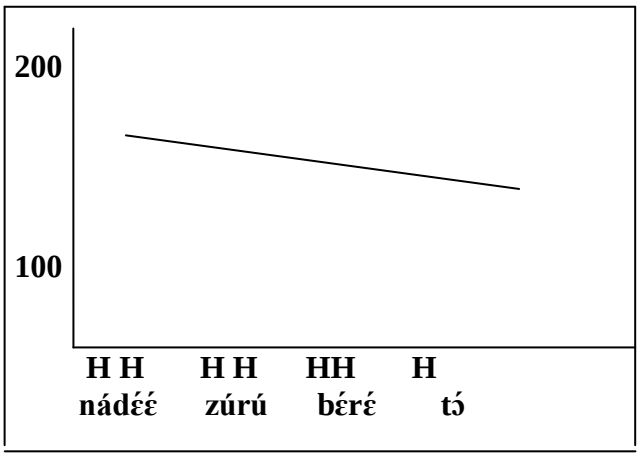
4.6.1 Declination

According to Connell & Ladd (1990:2), declination is "a gradual modification (over the course of a phrase or utterance) of the phonetic backdrop against which the phonologically specified F0 targets are scaled". Connell (2001) further explains that, while in tone languages it can occur regardless of tonal combination (i.e. in mixed tone sequences), the existence and degree of declination can most clearly be seen in a phrase consisting of tones all of which have the same phonological value.

In Dagara, the intonation pattern over an utterance sometimes shows a kind of falling of the pitch level. When an unbroken sequences of high tone spans over an utterance, there is a slight lowering of pitch from the beginning to the end of the utterance. For instance, in the production of the phrase; **nádɛ́ɛ́ zúrú bɛ́rɛ́ tɔ́** 'bulls heads are very big', there is a perceptible declination of the high pitch level from the beginning to the end. This is some what similar to the phenomenon described in Connell and Ladd (1990) and Connell (2001).

Figure 47 illustrates the declination in the sequence of Dagara High tones in the phrase **nádɛ́ɛ́ zúrú bɛ́rɛ́ tɔ́** 'bulls' heads are very big'.

Fig.47 Declination illustrated in sequences of High tones



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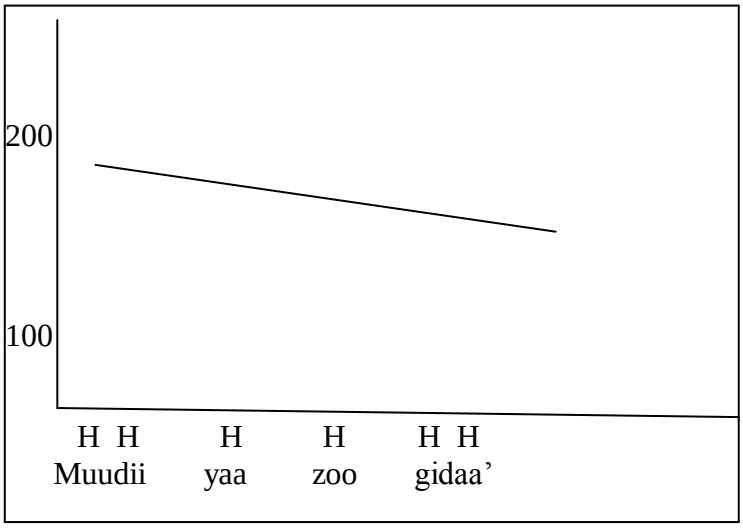
The phenomenon of declination is not only peculiar to Dagara, it is attested in Hausa language in the literature. Lindau (1986) cited in Connell (2001) using data from Hausa illustrates declination in a sequence of Hausa High tones in the sentence 'Múúdíí yáá zóó gídáá' (Muudii came home) as in figure 48 below:

Fig.48 Declination illustrated in sequences of Hausa High tones



4.6.2 Downstep

Downstep refers to the lowering of a High tone in a given environment (Connell 2001). Stewart (1965) first acknowledged that in a sequence of two High tones, the second High tone is lower in pitch than the first tone. Also, in a sequence of High-Low-High tones, the High tone after the Low tone is lowered in pitch than the first High tone.

In Dagara, when Low and High tones are in sequence stretching over an utterance, the High tones following the Low tones drift downward while the Low tones maintain their pitch. For instance, in the production of the sentence; **Dàmból sòb nyɔ́g wòr 'lḗ bàà nɔ́ɔ́r ò fór zɔ̀ dàà** 'a fool caught a horse and

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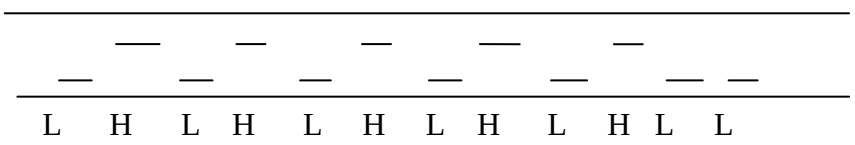
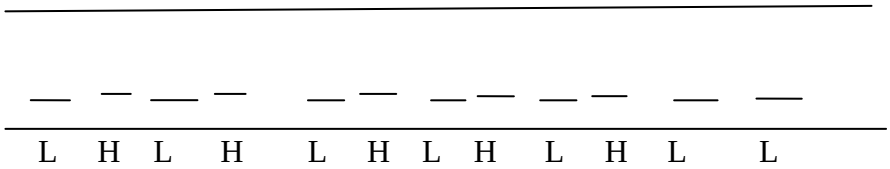
tied it at the river bank and it escaped to the market', the High tone following the Low tone are stepped lower than the underlying High pitch level. This downward trend is illustrated in the diagrams in figure 49 below.

Fig 49 Downstep in the sequence of Dagara Low-High tones



a)



The diagrams above illustrate the sequences of Low and High Pitches in an utterance. Diagram a) illustrates the relative pitch levels in their underlying form, while b) illustrates the out put form in which the High pitch following the Low pitch is lowered to sound lower than its underlying form.

4.7. The Functions of Tone in Dagara

Generally, tone languages employ pitch in speech to depict semantic and syntactic distinctions, otherwise, known as Lexical and Grammatical tone. This section thus, discusses the lexical and grammatical functions of tone in Dagara.

4.7.1 Lexical Tone

When tone is used to differentiate the meaning of lexical items, as they appear in isolation in a lexicon, then it is playing a lexical function. Meanings of lexical items with the same segmental phonemes depend on the tonal patterns

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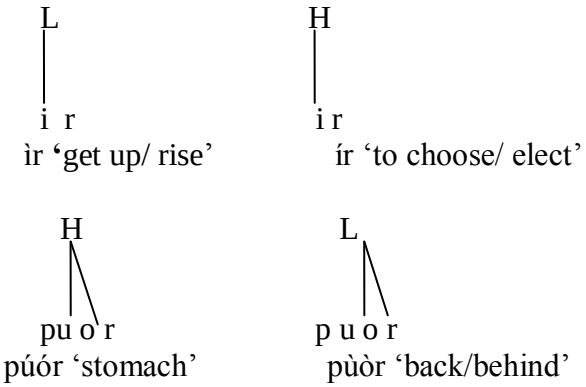
for their distinctions. The lexical items so distinguished by tone patterns may or may not belong to the same lexical or grammatical category. In Dagara, the tonemes can pattern in several different melodies on words for the purpose of distinguishing meanings. Below are examples of some attested contrastive tonal patternings on words to create such semantic distinctions between them.

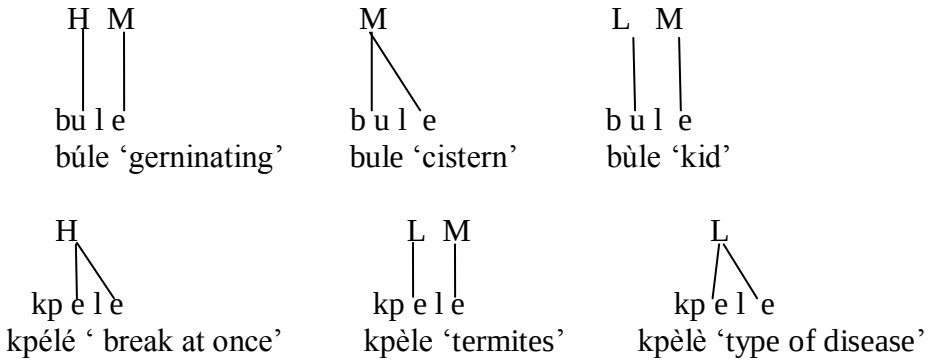
4.7.1.1 Minimal Pairs

Fig.50 Minimal contrastive Pairs



4.7.1.2 Minimal Triplets

Fig. 51 Minimal Contrastive Triplets



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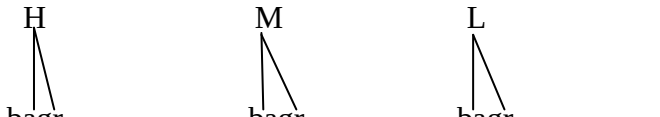
4.7.1.3. Minimal Quadruplets

Fig. 52 Minimal Contrastive Quadruplets



bágr ‘grinding’ bagr ‘shoulder’ bàgr ‘sacrifice’

kógle‘ small oak tree’ kògle ‘small stool’ kogle ‘dried up’ kòglé ‘emanciating

4.7.2. Grammatical Tone

When pitch is employed to indicate tense, aspect and mood, as well as to distinguish content morphemes from functional morphemes which in all respect have the same segmental features, then it is assuming a grammatical tone function in the language. In some tone languages, especially the sub-Saharan African Languages pitch variation in the verb stem or noun stem signals a change in the grammatical category, or different tone patterning over a stretch of an utterance discriminates between tense, aspect and mood.

In Dagara, content words (verbs, nouns, adjectives and adverbs), cannot be associated with any particular tone or tonal patterns in a regular manner. It is rather functional morphemes, (free or bound morphemes), which are identified regularly with some tones in given environments.

This section discusses the type of tonemes that regularly associate with the morphemes to encode grammatical function in the language. Specifically, we shall focus on tones which distinguish; Nominative/Possessive pronouns from

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Accusative/Dative pronouns, Aspect, Mood (indicative, imperative and Subjunctive II), Negations, Locative expressions and Nominal Suffix Morphemes.

4.7.2.1 Nominative/ Possessive and Accusative/Dative pronouns

In Dagara, all the pronouns take the same segmental form. Except for the first person singular nominative and possessive pronouns and their accusative/dative forms, the only means of distinguishing the nominatives/ possessives from their accusatives, is by means of their tone differences. Whereas the nominative/possessive pronouns bear Low tones, their accusative/dative forms are Mid tone in order to distinguish them respectively. The table below shows the Low and Mid tonal contrast that distinguishes the nominative and possessive pronouns, on one hand, from their accusative and dative forms the other hand.

Table 46. Pronouns

Nominative/Possessive pronoun	Accusative/ Dative pronoun
/ ì / 'I', 'My'	/ mɛ / 'me'
/ f ò / 'you', 'your'	/ f ʊ / 'you'
/ ò /'she/he', 'his/her'	/ ʊ / 'him/her'
/ tì / 'we', 'our'	/ tɪ / 'us'
/ nyì / 'you', 'your'	/ nyɪ / 'you'
/ bɛ̀ / 'they', 'their'	/ bɛ / 'them'
/ à / 'it', 'its'	/ a / 'it'

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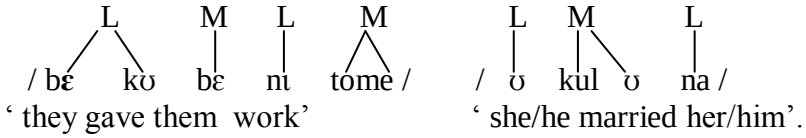
In an utterance which has the same forms, for example, the third person singular or plural [+ Human] forms, it is only by the tonal pattern that the distinction can be made as in the sentences below:

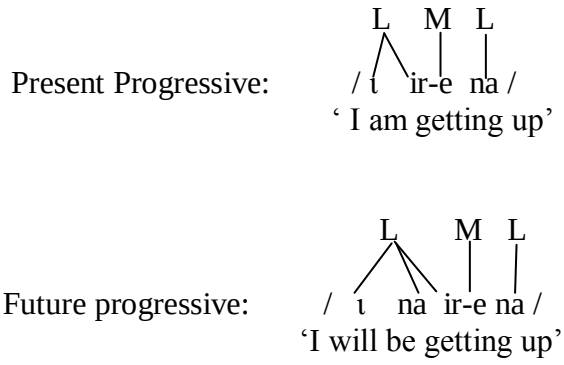
Fig. 53 Use of Tone to Distinguish Pronouns



4.7.2.2. Aspect Tone

Dagara has two aspectual forms; perfective and imperfective or progressive forms. The perfective aspect usually takes the same form as the present and past indicative.The imperfective or progressive, however, is basically marked with a verbal suffix -re/-rɛ or the variants -ne/-nɛ and –e/-ɛ depending on the phonological condition of the verb stem (cf. Section 3.1.1.1 of Chapter Three). The tone of the suffix is always a Mid tone irrespective of the tone in the verb stem. Below are sentences showing the imperfective forms of the verbs.

Fig 54 Mid Tone for Aspect Marking



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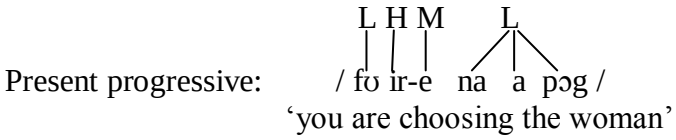

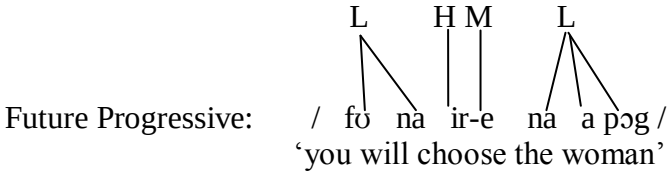

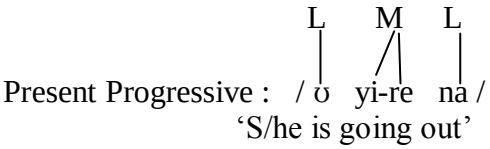

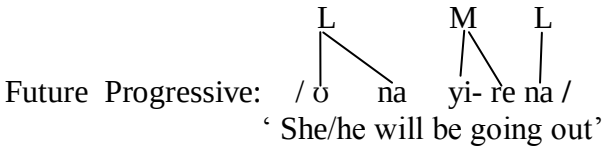

4.7.2.3. Mood (Subjunctive II)

In Dagara, the expression of Mood is in three forms, namely; the indicative, imperative and subjunctive. Though verbal particles maybe used to encode the type of mood, tone also functions on the verb to indicate mood. For instance, the particle that encodes the indicative mood is / **na** / with a low tone and that of the subjunctive II is / **naa** / with a Mid tone. But the imperative mood is expressed in the infinitive form of the verb with its underlying tone without a verbal particle.

In the subjunctive II Mood, the tone of the verb changes to a Mid tone in conformity with tone of the particle, irrespective of the underlying tone of the verb in the infinitive form. The following constructions illustrate the imperative, the indicative and the subjunctive II moods.

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Fig.55 Mid Tone for Subjunctive Expression

Imperative: L

/ ir / 'get up'

Indicative:

Present Progressive: L M L

/ ɪ ir-e na /

' I am getting up'

Subjunctive II: L M L

/fɔ naa ir- e na /

'You should have been getting up'

Imperative : H

/ ir / ' choose'

Indicative:

Present Progressive:

L H M L

/ ɪ ir-e na a pɔg /

' I am choosing the woman'

Subjunctive II:

L M L

/ ɪ naa ir-e na a pɔg /

' I should have been choosing the woman'

4.7.2.4. Negation

Negation in expressed by the use two split morphemes which are characterized by an underlying Mid tone. The first components of the negation morpheme /bɛ/ and /ta/, for indicative and imperative respectively, are invariable. While the second components /i, ɪ, e, ɛ/ are allophonic depending on the [ATR] vowel

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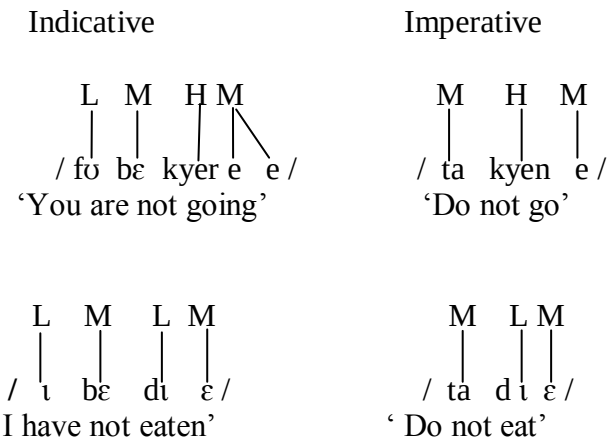
quality of the verb that preceeds them, as in 'bɛ……ɪ/i, bɛ.....ɛ/e' and 'ta……ɪ/i, ta.....ɛ/e', for the indicative and the imperative Moods, respectively.

Below are some negative constructions in Dagara which demonstrate the consistent underlying tone of the negation morphemes.

Fig. 56 Tone for Negation



4.7.2.5. Locative Expressions

Location in Dagara is expressed in two ways; by the use of free morphemes, which are mainly body parts expressions and by the use of tone. When a body part expression is used, it is placed postpositionally relative to the noun that is being located. When tone functions grammatically to show locations, depending on the underlying tone of the noun that is being located, a High tone or Mid tone distinguishes the nominative from the locative form. Where the nominative is mono-syllabic with a Low tone, a High tone is added and it becomes a Rising Contour in the locative form. But in disyllabic or trisyllabic nominatives, if the final syllable bears a Low or Mid tone, it changes to a High tone in the locative form. Finally, if the nominative is mono-syllabic with a

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long vowel of identical High tone, the second tone changes to a Mid tone in the locative form.

The following tonal patterns of the examples below illustrate the distinction between nominative from locatives:

Fig. 57 Tone for Locative Expressions

Nominative	**Locative**
L M / davoro / 'court yard'	L H / davoro / 'in the court yard'
L /dĩ õŋ 'room'	L H / d ĩ õ ŋ ' in the room'
L /bɔg/ 'hole'	L H / bɔg/ 'in the hole'
H /nũ ũ/ 'hand'	H M /n ũ ũ/ 'in the hand'

4.7.2.6. Suffixal Morphemes

Generally, suffix morphemes in Dagara are characterized with an underlying Mid tone. The verbal suffix which encodes the imperfective (cf. Section **4.7.2.3**) always remains a Mid tone irrespective of the tone pattern of the verb stem to which it is affixed.

Similarly, the nominal suffixes; -ʊ/-u, -lʊ/-lu, -fʊ/-fu (cf. Section 3.1.1.2 and 3.1.13 chapter 3), which are affixed to other content word (verb, noun,

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adjectives or adverb) stems to derive new forms of nouns, are also characterized by a Mid tone irrespective of the underlying tone patterns of the stems to which they are affixed. The diminutive suffixes, -le 'singular' or –li 'plural' are also associated with Mid tone.

4.8 Tonal Processes

The juxtaposition of tonemes usually triggers some processes in tone languages similar to the phonological processes that result from the juxtaposition of segmental phonemes. Fox (2000) notes that, tonal processes are phonological processes which affect tones, changing or modifying them in particular contexts and thereby obscuring their identity. Tonal processes are universal phenomena in tone languages but language specific rules apply to account for them.

This section discusses the tonal processes and the phonological conditions that trigger them in Dagara. The processes identified in Dagara include; Tone Assimilation, Contour Tone Simplification and Tone Dissimilation.

4.8.1. Tone Assimilation

Hyman and Schuh (1974) explain that if two syllables differ in tone, the tone of the first syllable naturally enlarges its domain by spreading into the second syllable, a process similar to segmental feature assimilation in the progressive or preservative process. Tone assimilation in Dagara is a synchronic process which takes place always to the right hence it is a progressive or preservative assimilatory process type.

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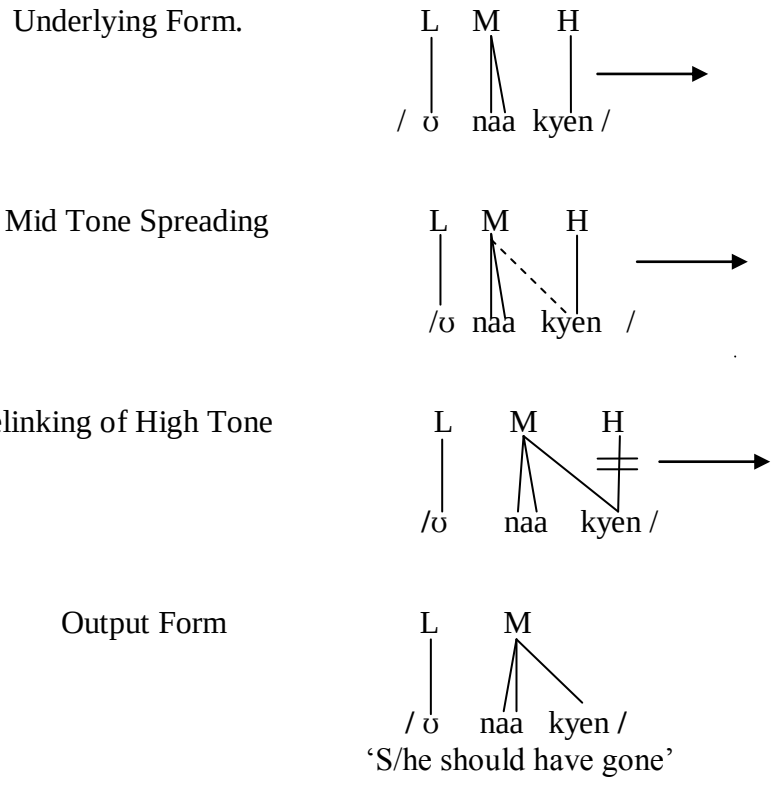
In Dagara, this process involves a Mid tone spreading from a preceding syllable onto the following syllable with either a Low or High tone. Specifically, when a syllable with long vowel bearing a Mid tone precedes a syllable with Low or High tone, the Mid tone enlarges its domain to assimilate the following tone. Evidence of this process is sourced from the resultant change of the underlying tone in the verb in the infinitive to Mid tone when the subjunctive II Mood particle /naa/, which is a syllable with a long vowel bearing a Mid tone, precedes it.

The examples below illustrate the derivation process of the subjunctive form from the verbs **kyén** 'go' and **dì** 'eat' in the infinitive form.

Fig. 58 Tone Assimilation



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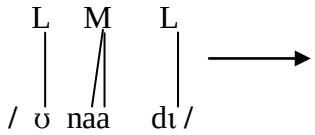
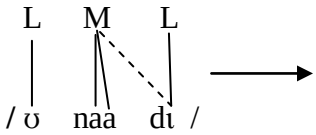
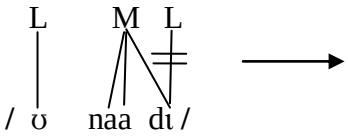
Underlying Form



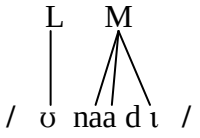
Mid Tone Spreading



Delinking of Low Tone



Output Form



'She/he should have eaten'

4.8.2 Contour Tone Simplification

Tone simplification is a synchronic tone rule like other tonal processes. It is the process where a contour tone tends to be levelled or converted into level tones in a given environment. Hyman and Schuh (1974) note that in some tone languages, contour tones are simplified to a non-low tone in the environment of non-low tones. In Dagara, contour tone simplification is achieved by means of tone absorption and tone deletion.

4.8.2.1 Tone Absorption

According to Hyman and Schuh (1974), the absorption process "involves a contour tone followed by a tone identical to the end point of the preceding contour. [In such sequences], the second component of the contour, by virtue of its identity with the following tone, is absorbed into the next syllable"

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(Hyman and Schuh, ibid: 90). Tone absorption is also a synchronic tone rule in Dagara.

Tone absorption differs from tone assimilation on the basis that, the tone in absorption does not enlarge its domain from the preceding syllable onto the following syllable, it rather moves from its domain to be absorbed by the following tone in the next syllable. The process of tone absorption involves a movement of tone from the end point of the contour to the contiguous syllable of identical tone. Tone absorption is particularly common in tone languages in which contours can develop as a result of sequences of Low-High tones or Low-Mid tones.

In Dagara, the end point of a Rising tone is absorbed when it is followed by a syllable with a non-low tone. Tone absorption usually occurs during compounding process, particularly when a noun is qualified by an adjective. In this compounding process the long vowel with contour tone of the noun stem is shortened and the High tone which remains subsequently gets absorbed by the High or Mid tone of the following adjective. The High point of the Rising contour tone delinks and moves to be absorbe by the High or Mid tone of the following adjective. The resultant tonal pattern of the compound will thus be either L-H or L-M. Evidence of tone absorption is shown in the data in table below:

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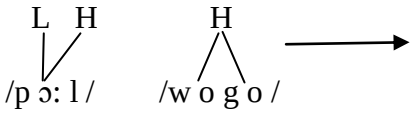
Table 47. Non-Low Tone Absorption

Noun		Adjective		Compound
/ kpă:gl / ‘belt’	+	/ bír / ‘seed’	→	[kpàgl bír] ‘ belt strand’
/ dě:gr / ‘dirt’	+	/ yágá / ‘ plenty’	→	[dègr yágá] ‘ plenty dirt’
/ pɔ̌:l / ‘ path’	+	/ wógó / ‘long’	→	[pɔ̀l wógó] ‘long path’
/ bă:gr / ‘groin’	+	/ kʊblʊ/ ‘hair’	→	[bàg kʊblʊ] ‘pubic hair’
/ pɔ̌:l / ‘path’	+	/ faa / ‘bad’	→	[pɔ̀l faa] ‘bad path’

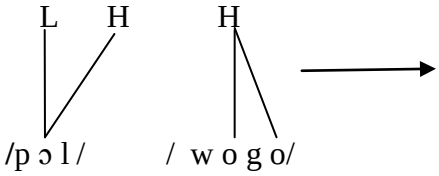
The representations show the absorption process in the non-linear order.

Fig. 59 Autosegmental Representation of Non-low tone absorption

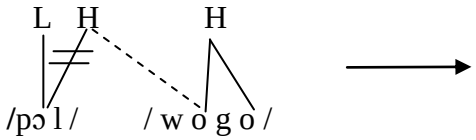
Input Form :



Vowel Shortening



High Tone Delinking and Movement



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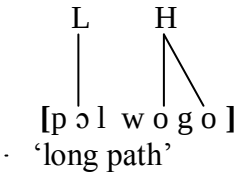
Output Form



'long path'

4.8.2.2 Tone Deletion

This process usually occurs in tone languages in which sequences of High-Low or Mid-Low develop in to a Falling contour, such that when the contour is followed by a High or Mid tone in compounding process, the resultant tonal pattern of the compound will sequences of level tones.

In Dagara, contour tones simplification by deletion pertains strictly to Falling contour tone. A Falling contour tone disintegrates into non-low (High or Mid) level tones when it is followed by a non-low tone (High or Mid tones) in noun-adjective compounds. In this compounding process the long vowel with contour tone of the noun stem is shortened and the Low point of the Falling tone deletes before the adjective with High or Mid tones follows. The resultant tonal pattern of the compound, thus become either High-High or High-mid.

Evidence of tone simplification is shown in the following data below:

Table 48. Contour Tone Simplification by Deletion

Noun		**Adjective**		**Compound**
/ kɔ̂:r /	+	/ kpɛ́ɛ́ /	⟶	[kɔ́:r kpɛ́ɛ́]
'cheeck'		'big'		'big cheek'
/ kâ:ŋ /	+	/ mímír /	⟶	[káŋ mímír]
'guinea fowl'		'living'		'living guinea fowl'
/ pɛ̂:r /	+	/ bír/	⟶	[pɛ́r bír]
'anus'		'seed'		'buttock'

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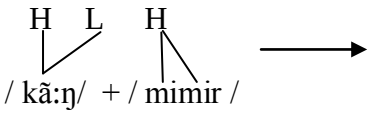
/ kâ:ŋ / + / kũ: / ⟶ [káŋ kũ:]
'guinea fowl' 'dead' 'dead guinea fowl'

/ pɛ̂r / + / koŋ / ⟶ [pɛ́r koŋ]
'anus' 'lean'

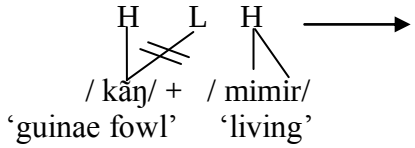
The autosegmental representations of tone simplification are illustrated below

Fig.60 Contour Tone Simplification by Deletion representation

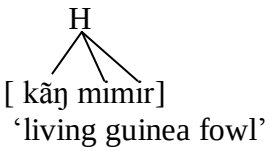
Input Form



Vowel Shortening and Low Tone Delinking



Output



4.8.3 Tone Dissimilation

Another tone process common in tone languages, which is often considered as a synchronic, is dissimilation. Hyman and Schuh (ibid: 100) explain that, a syllable that is assigned an underlying tonal representation, but when it is in proximity with a syllable of an identical tone, it changes its underlying tone. In the literature languages like Mandarin and Fe?Fe? are cited for the case of dissimilation (Hyman and Schuh ibid:101). Hyman and Schuh further note that, McCawley (I970) mentions that, the dissimilation rule of Mandarin is L-L becomes R-L.

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This tonal phenomenon is also observed in Dagara, quite similar to Mandarin, on one hand, when a syllable of an underlying Low tone is in proximity with another syllable of an underlying Low tone, the tonal pattern changes to either Rising-Low in one instance, but differs on another hand when Low-Low pattern results in a Low-Falling pattern in another instance.

In the first instance, when a verb with an underlying Low tone precedes a verbal particle with identical tone or a noun with an underlying Low tone is qualified by an adjective of identical tone, the tonal pattern changes from Low-Low to Rising-Low. Evidence of Low-Low tones dissimilating to become Low-Rising tonal pattern is in the data that follows below:

Table 49. Low –Low Tone dissimilation to become Rising-Low

Verb		**Verbal Particle**		**Verbal Phrase**
/ zɔ̀ŋ /	+	/ nà /	→	[zɔ̌ŋ nà
‘to be blinded’		affirmative		‘made blind’
/ wɔ̀ŋ /	+	/ nà/	→	[wɔ̌ŋ nà]
‘to be made deaf’		‘affimative’		‘made deaf’
/ gbè /	+	/ nà /	→	[gbě nà]
‘to be blunt’		affirmative		‘made blunt’

Noun		**Adjective**		**Adjectival Phrase**
/ zɔ̀ŋ /	+	/ kɑ̀ŋ /	→	[zɔ̌ŋ kɑ̀ŋ]
‘blind person’		‘certain’		‘certain blind person’
/ wɔ̀ŋ /	+	kɑ̀ŋ /	→	[wɔ̌ŋ kɑ̀ŋ]
‘deaf person’		‘certain’		‘certain deaf person’
/ gbɛ̀ /	+	/ kɑ̀ŋ /	→	[gbɛ̌ kɑ̀ŋ]
‘forehead’		‘certain’		‘certain forehead’

The autosegmental representation of the above process is illustrated below:

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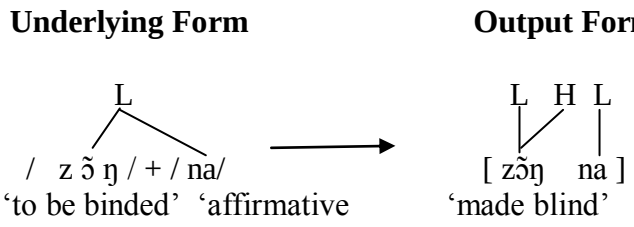
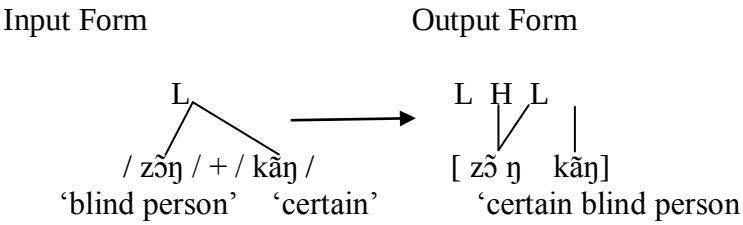
Fig. 61. Representation of Low Tones Dissimilating to Rising- Low pattern





The second instance is, when the subject personal pronouns which bear Low tones precede verbs with underlying Low tones, the tone of the verb changes from Low to Falling tone.

Evidence of Low-Low tones dissimilating to become high-Falling tonal pattern is in the data that follows below:

Table 50. Low Tones dissimilating to Low-Falling tone pattern

Subject Pronoun		**Verb**		**Phrase**
/ ǹ /	+	/ zɔ̀ŋ /	→	[ǹ zɔ̂ŋ]
1SG		'to be blind'		'should I be blind?'
/ fò /	+	/ tɔ̀ /	→	[fò tɔ̂]
2SG		'to touch'		'should you touch?'
/ ò /	+	/ dì /	→	[ò dî]
3SG.+HUM		'to eat'		'S/he should eat'
/ à /	+	/ gã̀ŋ /	→	[à gã̂ŋ]
3SG/PL.-HUM		' to cross'		'it/they should cross'
/ tì /	+	/ kpì /	→	[tĩ kpî]
1PL.+ HUM		'die'		'let us die'

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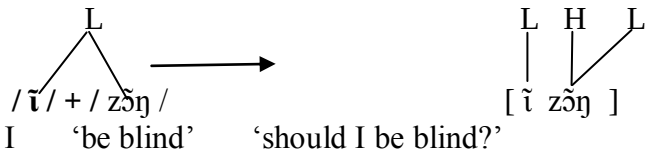
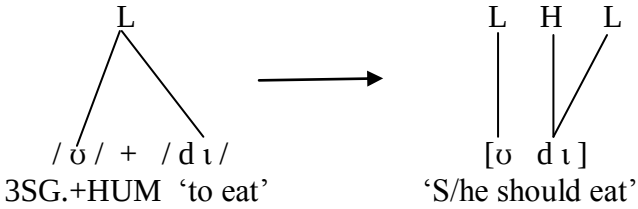
/ nyɪ̀ /	+ / và /	⟶	[nyɪ̀ vâ]
2PL	'thresh'		'you should thresh'
/ bɛ̀ /	+ / yàg /	⟶	[bɛ̀ yâg]
3PL	'take off'		'they should take off'

An illustration of autosegmental representation of the above data below:

Fig. 62 Low Tones dissimilating to Low-Falling tone pattern

Underlying Form **Output Form**





4.9 Chapter Summary

This Chapter discussed genreal issues about tone including Pitch and Tone relationship and Tone Bearing Unit in tone languages. It also examined the nature of tone in Dagara, highlighting tonal feature such as Tone Stability and Declination and Downstep and illustrating how they manifest in Dagara. It finally discussed lexical and grammatical Function of Tone as well as some Tonal Processes in Dagara which include Tone Assimlation, Contour Tone Simplification and Tone Dissimilation. The analysis and phonological representations of tone and tonal processes are done within the framework of Autosegmental Phonology.

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CHAPTER FIVE

SUMMARY AND CONCLUSION

5.0 Introduction

This Chapter contains Summary of what has been discussed in the various Chapters of the Thesis and Conclusion.

5.1. Summary

In chapter One, I have given a brief statement on Dagara and its speakers with a sketch of dialectal variation in the language. I indicated that there are four main dialects: Northern Dagaare (Dagara), Central Dagaare, Southern Dagaare, and Western Dagaare (Birifɔr); which differ considerably at the phonological, lexical and grammatical levels. I then gave a genealogical sketch of Dagaare language family.

I also discussed the Problem Statement, the Scope of the research, the Aims and Objectives of the research, the Significance of the research as well as the data and the Methodology involved in the data collection.

I then gave an explanation of the Theoretical Framework (Autosegmental phonology) within which the work is situated, with emphasis on how it evolved and its basic tenets as well as the motivation for using the framework in the phonological and tonal representations. I ended the chapter with a review of relevant literature in both the language and the Theoretical Framework and the organization of the thesis.

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In Chapter Two, I discussed the sound system of the Dagara dialect highlighting on the vowel and consonant inventory, the phonetic description of the sounds, the syllable structure and the structure of words in Dagara.

I pointed out that there are eighteen vowel phonemes; nine short oral vowels and nine short nasal vowels, with all the eighteen short vowels having their long contrastive counterparts. And also that all the vovels are subcategorized into two distinct sets: [+ATR] vowels and (-ATR) vowels with strict co-occurrence constrictions.

I also indicated that, there are twenty-seven consonant phonemes; twenty-five consonants and two approximants, whose distribution in words are constrained. All consonants maybe at word-initial and/or word-medial, except /r/, which may only be at word medial or in secondary syllable onset position or coda position whilst word-final position is exclusively occupied by / b, g m, n, ŋ, l, r /. I also described and classified the Dagara sounds into natural classes within the Distinctive Feature theory framework, under Major class features, Cavity feature, Manner features and laryngeal feature.

I then examined the syllable structure and observed that Dagara belongs to the group of languages with V, VC, CV, CVC and C type with varied syllable shapes. I also highlighted that the sequential constraints that operate at the beginning and end of the syllable are reflect on words whether simple stem or complex stem.

Chapter Three which constitutes the core part of the thesis, discussed both assimilatory and syllable structure processes and formalized them within

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Autosegmental framework. For the assimilatory processes, I identified and discussed Vowel Harmony, Consonant Nasalization, Homorganic Nasal Assimilation, Glide formation, Consonant Labialization, and Rhotacism. I observed that, there is a very strict vowel harmony system in Dagara, which operates bi-directionally, involving stems and suffixes, [-ATR] noun stems and a [+ATR] dominant stem and across word boundaries as well, except for the nominal suffix /-fʊ/ blocks Vowel Harmony process. I noted too that all the assimilatory processes in Dagara involve Place of Articulation and Manner of Articulation features. For syllable structure processes, Elision (both vowel and consonant), Compensatory Lengthening, Liaison or Linking and finally Vowel epenthesis are identified and discussed.

Chapter Four discussed issues that border on Pitch and Tone distinction, pointing out that, pitch is a phonetic feature whereas tone is a phonological feature like segmental phonemes. I discussed the controversial issue of Tone Bearing Unit in tone languages, the Tone System and Tonal features such as Tone Stability, Declination and Downstep in Dagara. I also looked at the Functions of Tone and finally identified and discussed the phonological conditions which triggered some tonal processes such as Tone Assimilation, Contour tone Simplification, and Tone Dissimilation.

The analysis and phonological representations of tone and tonal processes are within the framework of Autosegmental Phonology.

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5.2. CONCLUSION

Though this thesis may seem quite elaborate, it cannot be said to be exhaustive. There may still be some phonological and tonal processes that have not been identified and discussed in this work. This is just the first attempt to discuss the phonological and tonal processes in Dagara, it is therefore meant to trigger academic review and to set the pace for future research work in the dialect, as well as in other dialects of the Dagaare.

On the theoretical perspective, the formalization of the phonological and tonal processes within the Autosegmental framework is, "a natural testing-ground for the thesis that autosegmental phonology is not restricted to tonal phenomena, but constitutes a general theory of phonological representation", (Clements, 1976: 57).

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APPENDIX A: SUMMER INSTITUTE OF LINGUISTICS, WEST AFRICA AREA WORD LIST 1.

S/N	LIST ID	LIST GLOSS (ENGLISH)	DAGARA WORD
1	10	eye	mímír
2	20	ear	tóbr
3	30	nose	nyɔ̀ɔ̀r
4	40	mouth	nóɔ́r
5	43	tooth	nyìùm
6	45	tongue	zɛ̀l
7	48	lips	nɔ̀gbámbíé
8	60	chin	tìɛ̀m
9	70	jaw	yáglɛr
10	80	beard	tìɛ̀ŋkʊblʊ
11	90	cheek	kɔ́r
12	100	face	níŋe
13	110	forehead	´gbɛ̃́
14	120	head	zú
15	150	hair (head)	zúkʊblʊ
16	160	hair (body)	ìáŋgáŋkɔ̀blɔ̀
17	170	fur	kʊblʊ
18	180	feather (s	nɔ̀kʊblʊ
19	190	horn	ùíl
20	200	neck	nyũũ
21	210	throat	kɔ̀kɔ́r
23	220	shoulder	bagrgmàn
24	230	armpit	bàglóŋ
25	236.1	the bush	mɜ̃̀ɜ̃̀
26	250	breast	bur
27	252	udder	bǎgr
28	260	milk (mother's)	bírkɜ̃̀ɜ̃̀
29	262	milk (animal's)	bɔ̀rɔ̀
30	265	butter	kɜ̀ɜ̀
31	267	cheese	bɔ̀sɛ̃̀ndɛr
32	280	chest	nyáá
33	310	belly	púór
34	320	navel	nyùó
35	340	side of body	lòmbógr
36	342	rib	nyábír
37	360	back	pùòr

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38	370	buttocks	pébié
39	380	tail	zòòr
40	400	leg	gbɛ́r
41	410	hip	sìŋkpígr
42	420	thigh	gbɛ́kpɛ̋ɛ̋
43	440	knee	dũ
44	450	foot	gbɛ́nàɓɛ́l
45	460	sole of foot	gbɛ́sálópòɔ
46	500	arm (forearm)	kpáŋkpáŋ
47	505	wing	bìgr
48	540	elbow	kpáŋkpáŋnyǔgbiél
49	550	hand	nũũ
50	560	palm	nũsálópóɔ
51	580	finger	nóbír
52	582	thumb	nóbídaa
53	585	toe	gbébir
54	590	fingernail	nóbípɛ̀gr
55	591	claw	gbébíɛ̀mɛ
56	600	body	ɪ̃ɪ̃ŋ
57	610	skin (of man)	ɪ̃ɪ̃ŋgán
58	611	hide (animal skin)	gán
59	620	wound	nàtír
60	621	scar	fìl
61	630	bone	kɔ́br
62	640	meat; flesh	nɛ̀n
63	650	fat / grease	kɜ̀ɜ̀
64	651	oil	kɜ̀ɜ̀
65	660	vien	gyíílu
66	680	egg	gyɛ̂l
67	700	blood	zɪ̃ɪ̃
68	710	saliva	mòtáar
69	720	tears	mòtákʊ̃ɔ̃
70	740	urine	dòró
71	750	sweat	xãnó
72	760	feces / excrement	bín
73	761	dung	nágbín
74	800	heart	sókyir
75	830	liver	sarbr
76	860	guts /bowels	nyágɛ̀
77	890	brain	kyapóoré
78	1000	person	nìr/ nɪsaalɛ̀
79	1050	chil (child)	bíbile
80	1080	elder	nìkpɛ̋ɛ̋

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81	1100	man (vir)	dɛ̀b
82	1101	husband	sír
83	1150	son	bidɛ̀b
84	1151	boy	déble
85	1200	woman	pɔ̀g
86	1201	wife	pɔ̀g
87	1250	daugther	pɔ̀gyáa
88	1251	girl	póóle
89	1300	father	sãã
90	1310	mother	mã
91	1320	brother	yɛ́b
92	1321	elder brother	yɛ̀kpɛ̋ɛ̋
93	1322	younger brother	yébile
94	1330	sister	yéépúle
95	1331	elder sister	yéépúkpɛ̋ɛ̋
96	1332	younger sister	yéépúbile
97	1340	friend	bà / bàpɛr
98	1350	mother's brother	mãdɛ̀b
99	1355	father's sister	puré
100	1360	child (offspring	bie
101	1365	twins	yììbr
102	1380	stranger	sããn
103	1385	guest	sããn
104	1390	enemy	dɔ̃̀dɔ̃̀mɛ
105	1400	chief /king	nàà
106	1410	owner	sób
107	1415	slave	gbɑ̋gbáa
108	1430	judge	sɛrdìrɛ
109	1450	God	nàànmín
110	1460	spirit /ghost	nyɑ̃̀ɑ̃̀kpʉ̋n
111	1461	shadow	dàsúle
112	1470	name	yúór
113	1480	voice	kɔ̀kór
114	1485	language	kɔ̀kór
115	1490	story (tale)	sóólu
116	1500	animal	dòŋ
117	1502	wild animal	wɛ́dóŋ
118	1505	domestic animal	yirdòŋ
119	1508	sacrifice	bàgr
120	1610	dog	baa
121	1620	jackal	gbɔ̃̀bgórkyìle
122	1630	hyena	gbõgbór
123	1650	cat	nyɑ̃̀ɑ̃nyʉ̃̀ɔ́

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124	1660	lion	gbɛ̋ŋ
125	1670	leopard	nyu̍ʊ́
126	1710	rat	dɛ́rbaa
127	1720	bat (fruit)	zə̀zə̀bòŋ
128	1750	elephant	wɔ́b
129	1760	hippo	ɪ̌ɛ̋n
130	1770	buffalo	wɛ́nààb
131	1780	monkey	ŋmáám
132	1790	baboon	kpágtɪ̀r
133	1810	goat	bʊ̀ɔ̀
134	1820	sheep	pèrʊ / píír
135	1850	pig	dóbaa
136	1890	horse	wʊ̀r
137	1900	cow (cattle)	nààb /nɪ̃ɪ̃
138	1910	cow (female)	nàpʊ̀g
139	1920	bull	nàdɛ́r
140	1930	ox	nàdɛ̀kʊ̀ɔra
141	2000	bird	lile
142	2010	chicken	lile
143	2012	hen	nɔ̀pʊ̀g
144	2015	cock	nʊ̀ra
145	2020	eagle	sɪ̀la
146	2030	vulture	sigdum
147	2040	guinea fowl	kâŋ
148	2050	dove	ŋmám
149	2060	pigeon	náŋmám
150	2110	tortoise (land)	kùr
151	2111	tortoise (water)	kùrnààmɪɔ̃
152	2120	lizard	bandaa
153	2130	crocodile	ìbá
154	2150	snake	wááb
155	2190	worm (earth-)	sàbɛ́rnyɛ̃
156	2200	fish	zʊ̰̃m
157	2250	crab	gə̃́gáára
158	2310	louse	kyîb
159	2320	fly (house)	nazʊ̀ɔ
160	2330	honey	sɪ̀gr
161	2332	honeybee	sɪ̀gbír
162	2340	grasshopper	sə̃́sógr
163	2350	ant (soldier)	zùlú
164	2360	termite	yágra
165	2370	spider	bàdɛr /dɛ̀pɛ́ɭɛ̀rɛ́
166	2380	scorpion	nə̃́ŋ

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167	2500	tree	tìɛ̀
168	2510	bark (tree)	tìpɛ̀gr
169	2520	leaf	váár
170	2530	branch	wùlé
171	2535	stick/ club	daa
172	2540	root	nyígr
173	2550	thorn	gʊ̀ɔ́
174	2570	flower	pʊ̀ʊ̀rʊ
175	2580	fruit	wɔ̀m
176	2590	seed	bír
177	2600	grain	kàbír
178	2610	wheat	mʊɔ̃báŋyambíé
179	2620	millet	kyí
180	2630	barley	?
181	2640	maize	kamããn
182	2650	rice	mùné
183	2660	banana (s) sweet	kudu
184	2665	plantain	bɔ̀ɔ̀díɛ̀
185	2670	palm tree (eg. Date	bɛ̀tìɛ̀
186	2680	yam	nyùúr
187	2685	manioc /cassava	bɜ̃̀kyĩ̀
188	2690	groundnut /peanut	símír
189	2710	tobacco	tɛ̀mɛ̀
190	2720	grass	mʊ̃̀ɔ̃̀
191	2725	thatch	kámpíl
192	2750	forest	wɛ́gya
193	2760	"the bush"	kárpʊ̀ɔ̀
194	2770	desert /wilderness	gbãgbála
195	2790	field (s)	wíɛ̀
196	2800	place	zíé
197	2810	country	téŋ
198	2820	tribe /ethnic group	kɔ̀kɔ́r
199	2830	village	témbile
200	2840	home /compound	yír
201	2850	house /hut	yír/ gʊ̀r
202	2860	roof	găr
203	2870	loft /granary	bʊ̀ógr
204	2880	wall	dàkyíne
205	2890	door	dìndɔ́r
206	2900	gate	pàn
207	2910	fence	?
208	2930	path	sóle
209	2940	road	sɔ́rkpɛ̃́ɛ̃́

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210	2970	well (water)	bùle
211	3000	thing (object)	bóm
212	3001	thing (affair)	yél
123	3100	clothing	bũsùùrí
124	3110	pagne (wrap-around)	gɑ̃ŋ
215	3120	buobuo /shirt	kpárɔ̀
216	3130	trousers	kúrlan
217	3150	shoe (s)	kógtíɛ́
218	3152	sandals	nàfɔ̀grɓɛ́lìkɛ́r
219	3160	bracelet	báŋ
220	3170	necklace	kɔ̀kɔ́rlɛ́gɛ̀
221	3180	ring (finger)	nùtóba
222	3200	rope	mígr
223	3210	string /thread	fóómígr
224	3220	mat (sleeping)	sɛ̃ŋ
225	3250	hoop net	zɔ̀mkyóg
226	3260	net	kyóg
227	3310	chair	dàkɔ́g
228	3320	stool	dà kógle
229	3350	drum (n)	gãgaa
230	3360	boat /canoe	gbór
231	3410	calabash /gourd	ŋmɑ̃n
232	3420	basket	pélé /pìɛ̀
233	3430	load	túór
234	3450	rubbish / garbage	sàgɛ̀
235	3460	hole (in ground)	bòg
236	3510	mortar (gringing)	tɔ̀ɔ̀r
237	3520	pestle	túlú
238	3550	medicine	tĩĩ
239	3555	poison	lɔ́g
240	3570	salt	nyààrʊ
241	3580	fuofuo /ugali	nyúsaab
242	3600	pot (cooking)	zédúgle
243	3610	water pot (earthern)	yùòr
244	3620	cooking pot (metal)	dããsɪɛ̃
245	3700	iron (metal)	kúr
246	3710	knife	sɔ̀ɔ̀
247	3720	bush-knife	sɔ̀kyɛ́ra
248	3730	axe	lɛ́r
249	3740	hoe	kùùr
250	3750	arrow	pĩĩ́
251	3760	bow (weapon)	tàm
252	3770	spear	káfin

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253	3775	fish-spear	kyòmbòl
254	3780	shield (n)	?
255	3799	war	zèèbr
256	3810	law	bìgr
257	3910	charcoal	saala
258	3920	fire	vũũ
259	3930	firewood	daar
260	3940	smoke	zòór
261	3950	ash(es)	támpèlò
262	3950	fire place	dáŋ
263	4010	night (time)	tĩĩsɔ̀g
264	4011	darkness	lígé
265	4050	moon	ŋmàrà
266	4051	month	kyúg
267	4060	star	ŋmàbír
268	4070	sun	ŋmɪna /mòtɔ́g
269	4071	heat of day	tòlò
270	4072	daylight	vìèlʊ
271	4080	day-time	zínyããn
172	4100	day of 24 hours	bibír
273	4120	morning	bíɓààra
274	4180	evening	zãnòɔ̀ra
275	4210	sky	salóŋ
276	4220	cloud (s)	sàgámɛ /zũzùùr
277	4230	fog /mist	òlú
278	4250	wind	sèsèb
279	4260	storm	sèsèkpɛ̃ɛ̃
280	4300	water	kʊ̃ʊ̃
281	4310	rain	saa
282	4315	lightening	saanyígrʊ
283	4316	thunder	saatánʊ
284	4320	hail	sábíkúbé
285	4340	dew	mìèlʊ
286	4400	watercourse	kʊ̃ʊ̃pɔ̃l
287	4410	river	bàà
288	4420	stream	bagbɛ́r
289	4450	lake	tambògkpɛ̃ɛ̃
290	4460	sea	pòò /man
291	4510	mountain	táŋ
292	4511	hill	kúnkúne
293	4512	rock	pìir
294	4520	stone	kòsíɛ́r
295	4522	pebble	kòsɛ́bír

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296	4550	earth (soil)	táné
297	4551	ground	tíísɔ̀g
298	4560	sand	bííre
299	4570	dust	úúrù
300	4580	clay	yágrá
301	4585	mud	méméré
302	4600	year	yùón
303	4610	rainy season	síóŋ
304	4620	dry season	ùón
305	5000	how many	áŋmín
306	5010	one	bén
307	5020	two	àyí
308	5030	three	àta
309	5040	four	ànáár
310	5050	five	ànúú
311	560	six	àyɔ̀ɔb
312	5070	seven	àyɔ́pɔ́ĩ
313	5080	eight	`ànĩ
314	5090	nine	àwáı
315	5100	ten	pie
316	5120	twelve	pie ní àyı
317	5150	fifteen	pie ní ànúú
318	5160	twenty	lìzér
319	5170	thirty	lìzér ní pie
320	5180	hundred	kɔ̀ba
321	5190	thousand	túr
322	5210	hot weather	tɔ̀lɔ̀
323	5220	cold (weather)	íágr
324	5310	long (thing)	wógó
325	5311	tall	wógó
325	5312	deep	zúlú
326	5320	short (thing)	ŋmɑ̃́ɑ̃́
327	5321	short (not tall)	ŋmɑ̃́ɑ̃́
328	5330	big	kpɛ̃́ɛ̃́
329	5332	thick (thing)	tàg
330	5332	fat	bɛ̀rʊ
331	5240	wide	yɛ̀lʊ
332	5350	small	kyàmpile
333	5352	thin (thing)	mìılʊ
334	5354	thin (person)	gbããle/ baale
335	5360	narrow	fiìrà
336	5380	round (adj.)	kúlókúló
337	5410	heavy	tírbrɔ̀

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338	5412	difficult	kpèŋ
339	5420	light in wieght	zàmpágá
340	5422	easy	mɔ̀lɛ̀
341	5430	hard (surface)	kpãkárà
342	5432	strong	kpèŋ
343	5440	soft (surface)	bààlʊ / lébléb
344	5442	weak	bàl
345	5450	smooth	sáálɔ̀
346	5455	shiny	nyìgrɛ̀
347	7470	clean /pure	fùrùtù
348	5475	defiled	sàŋ
349	5480	good	vʊla
350	5481	well (adv.)	kpɛ́mɛ̀
351	5490	bad	faa
352	5510	bitter	túò
353	5520	sour	míírù
354	5540	sweet	nɔ̀ɔ̀
355	5560	TRUE	yelmiŋa
356	5565	truth	yelmiŋa
357	5580	FALSE	zìirì
358	5585	untruth /lie	zìirì
359	5610	straight	dẽdẽ
360	5620	crooked	gɔ́ŋ
361	5640	right (correct)	miŋa
362	5650	right (side)	dɔ́rɔ̀
363	5660	left side	gɔ̀bà
364	5710	new	páálà
365	5720	young	pɔ́l
366	5750	old (worn)	nyáŋ / kɔ̀rà
367	5810	all	ázà
368	5820	many / much	yágà
369	5830	crowd (of people)	nɪyágà
370	5850	few	bɔ̀laŋ
371	5860	some	amɪnɛ
372	5870	other /different	kàŋ
373	5910	red	zìɛ̀
374	5930	yellow	dɔ̀ɔ̀r
375	5940	green	váár
376	5950	black	sɛ́blà
377	5952	dark- colored	sɛ́blà
378	5953	dark	sɔ̀b
379	5960	blue	sũn
380	5980	white	pɔ̀lá

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381	5982	bright-colored	nyílányílá
382	6000	who?	anɔ̀
383	6010	I	ì̃
384	6020	you (thou)	fɔ̀
385	6030	(s)he	ɔ̀
386	6060	we	tì
397	6070	you (pl.)	nyĩ/ nyɪ̃ìm
388	6080	they	bɛ̀ /bɛ̀l
389	6100	what?	bɔ̀nɔ́
390	6110	this	ŋà
391	6120	that	ɔ̀l
392	6200	where?	nyínɛ́
393	6210	here	ká
394	6220	there	bé
395	6230	yonder	bé púórì
396	6240	at	bèn
397	6250	(going) towards	lóór
398	6260	(coming) from	yí
399	6280	near	píɛ̀lɪ
400	6290	far	zǎǎ̃
401	6300	before	bàŋ
402	6310	behind /after	púórì
403	6350	in	pɔ̀ɔ̀
404	6370	above	sàzú
405	6380	below	pílè
406	6400	how?	ŋmɪ̀ŋmín
407	6420	with	ní
408	6430	also	mĩ
409	6435	and	aní
410	6440	if	mɛ̃
411	6450	when/	débór
412	6460	then / that time	sáŋ
413	6470	today	zína
414	6480	yesterday	zɛ̃ǎ̃
415	6490	tomorrow	bíóg
416	6500	why?	bũũsó
417	6510	because	bónsó
418	6550	no , not	kɔ̀ŋ
419	6610	alive, to be	vɔ̀ɔ̀rɛ̀
420	6615	life	nyɔ̀vʊr
421	6620	dirty /to become	dɛ̀g
422	6630	become dry	kó
423	6640	full /filled	páálɪ

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424	6650	ripe, be	mɔ̀ɔ́
425	6660	rotten	pʊ̀ʊ̀
426	6670	sharp	dɪ̀rɛ́
427	6679	blunt, dull	gbé
428	6690	become wet	ɓàà / bɔ̀r
429	6760	sit (down)	zĩ
430	6761	be seated	zĩ téŋ
431	6762	to remain /reside	kpɪ̀ɛ̀r
332	6770	stand up	ɪ̀r
433	6771	to be standing	àr
434	6772	to stop	bɛ̀r
435	6780	lie down	gã
436	6781	to be lying	gã
437	6840	sleep (v)	gúr
438	6850	dream	zánɪ́
439	6860	fear	dàmbɪ̀ɛ̃
440	6870	angar; be angry	súúr
441	6880	hunger; be hungry	kɔ̃́
442	6890	thirst; be thirsty	kʊ̀ʊ̀nyúúr
443	6900	shame; be ashamed	vĩ
444	6910	illness; be ill	bààlʊ
445	6920	sorrow; be sad	pʊ̀sʌ̃ŋ
446	6930	joy ; be joyful	pʊ̀pɪ̀ɛ̀lʊ
447	7010	to bite	dʊ̃
448	7012	gnaw	nyĩĩ
449	7020	eat	dì
450	7025	food	bɔ́ndírì
451	7030	drink	nyù
452	7032	to smoke (something)	ɔ̃
453	7050	vomit	tì
454	7110	to cough; a cough	kɔ̀r
455	7115	sneeze	kyîr
456	7150	suck	mɔ̀grì
457	7152	suck (breast)	ɪɛnì
458	7170	spit	kyìr
459	7190	blow	pɛ́lbì
460	7192	the wind blows	fú
461	7195	breathe	vʊ̀ʊ̀rì
462	7210	whistle	fʊ́ʊ́lì
463	7230	yawn (v)	xíéri
464	7310	sing	yíéli
465	7315	song	yíélù
466	7320	dance (v)	sɛ̀b

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467	7325	dance (n)	sɛ̀rbʊ
468	7340	play (v)	dɪ̃ɛ̃nɪ̃
469	7350	laugh (v)	là
470	7360	weep	kõ
471	7370	to bark	wógrì
472	7372	cry out	kyìɪrì
473	7375	make noise	pàgɔ̃mɛ̀
474	7400	say	yél
475	7410	to talk / speak	ér
476	7420	answer	sàg
477	7430	tell	yél
478	7440	proclaim	mɔ̀ɔ̀lì
479	7450	ask (question)	sogrì
480	7455	ask for	zɛ̀lì
481	7460	to command	tánì
482	7465	to rule	kàà
483	7470	obey	ság
484	7475	refuse	zagrì
485	7480	to swear an oath	pʊ̀lɪ
486	7490	to curse (someone)	ŋmɛ̀ían
487	7495	insult	tʊ̀
488	7510	see	nyɛ̀
489	7520	look at	kàà
490	7530	show	wùl
491	7535	teach	wùl
492	7550	hear	wõ
493	7560	listen to	kyɛ̀lì
494	7570	to smell (something)	nyùùri
495	7575	smell ; stink	nyʊ̃ʊ̃
496	7600	know (something /one	bàŋ
497	7610	learn	zɑ́ní
498	7614	remember	tìɛ̀rɪ
499	7615	forget	yíírí
500	7620	count (v)	sɔ̀r
501	7622	read	sɔ̀r
502	7625	book	gán
503	7630	write	ŋmɑ̃ɑ̃
504	7650	think	tìɛ̀rɪ
505	7680	to suffer /feel bad	wõtúó
506	7700	to love	nɔ́ŋ
507	7710	to want (something)	bɔbr
508	7715	desire	bɔbr
509	7720	to want (to do	bɔbr

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		something)	
510	7730	need (V)	bɔbr
511	7750	to seek	bɔ̀
512	7760	find (v)	nyɛ̀
513	7790	carry	túò
514	8000	take	dé
515	8002	seize	fáà
516	8004	catch	nyɔ̀g
517	8005	hold	nyɔ̀g
518	8010	to lift / raise	zɛ́g
519	8020	give	kɔ́
520	8022	gift	kyɔ̀gtáa
521	8030	pay	yá
522	8035	money	Líbìr
523	8040	cost	dáárʊ
524	8050	to get /rceive	dé
525	8060	steal	zû
526	8070	to hide (something)	sɔ̀glɪ
527	8080	lie (tell lies)	zíírì
528	8090	deceive	bɛ̀lì
529	8100	buy	da
530	8105	sell	kʊ̀ɔ̀rɪ
531	8110	to marry (a wife)	kul
532	8130	bear child	dɔ̀g
533	8131	bear twins	dɔ̀g yííbr
534	8135	be born	dɔ̀g
535	8210	to die	kpì
536	8220	kill	kʊ̀
537	8250	to live	vʊ̀ʊ̀rɛ̀
538	8310	to leave, depart	bɛr
539	8320	to go (somewhere)	kyén
540	8330	come (to)	wá
541	8335	come from	yí
542	8340	arrive	tá
543	8341	return	lɛ̀b
544	8342	go out	yí
545	8334	enter	kpɛ̀
546	8344	go up	dó
547	8346	follow	tú
548	8347	bring	wánì
549	8350	send (someone)	tɔ̀ɔ̀lì / tõ
550	8410	fly (v)	ɪag
55Í	8415	jump	vár

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552	8430	swim	dú
553	8431	dive	mʊr
554	8432	float	dɔ̀glì
555	8450	walk	kyén
556	8460	run	zɔ̀
557	8465	flow	kyír
558	8470	fall	ló
559	8480	turn	lìɛ́bì
560	8510	scratch	zɑ̃ŋ
561	8512	scratch oneself	zɑ̃ŋ
562	8530	rub	fɔ́fɔ́r
563	8550	wipe	mììlì
564	8650	pour	pór / kyír
565	8660	wash	pɛ́g
566	8662	to bathe (oneself)	sò
567	8662	wash one's hands	pɛ́gnúrú
568	8665	wash (clothes)	pɛ́g bũsúúri
569	8667	to wash a pot	pɛ́g yúòr
570	8670	sweep	píírɪ
571	8675	broom	saar
572	8710	open (v)	yúó
573	8720	shut (v)	pàg
574	8800	break (tr)	kà
575	8810	split (wood)	ɓár
576	8812	tear (v tr)	kyìɛ̀rì
578	8814	divide	pɔ́
579	8820	cut	ŋmɑ̀ɑ̀
580	8830	saw	fɔ̀g
581	8840	chop	kpére
582	8850	stab (pierce)	kyɔ̀r
583	8880	fight	zɛ́b
584	8900	hit, strike	vá
585	9010	beat	ŋmɛ̀ / pɔb/ tʊ̀ɔ̃
586	8930	to hurt someone	?
587	8940	help (v)	sóŋ
588	8950	heal	sãnì
589	8955	healer	sãnɛ̀
590	9010	throw (v)	lɔ̀b
591	9015	throw away	lɔ̀bɛ́r
592	9020	push (v)	dáá
593	9030	pull (v)	vír /tág
594	9050	press	dĩ
595	9052	squeeze (v)	ŋmɔ̀ɔ̀rì

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596	9100	tie	lɛ̃
597	9105	hitch	gbíglì
598	9110	untie	kyɛ́r
599	9200	build	mɛ̀
600	9210	make	máálì
601	9220	do	ì
602	9230	work (v)	tɔ́
603	9235	work	tómé
604	9240	to create	máálì
605	9250	forge (v)	?
606	9255	blacksmith	sɜ̃ɜ̃
607	9260	begin	píílì
608	9270	finish	báárɪ
609	9280	to sew	sɛ̀
610	9290	weave	wób
611	9295	weaver	wóbré
612	9400	dress	sù
613	9410	undress	yaa
614	9450	to braid, to plait	pál
615	9500	hunt (v)	bàglì
616	9505	hunter	nábàglɛ̀
617	9510	shoot	ŋmɛ̀
618	9520	gun	màfál
619	9550	cook (v)	dòg
620	9700	cultivate	kɔ̀
621	9710	to plow	kɔ̀
622	9720	plant (v)	bòr
623	9730	to dig (a hole)	túg
624	9750	bury	ʉ̃ʉ̃
625	9800	burn (something)	nyìg
626	9810	kindle	tɔ̀ŋ
627	9820	to burn / be alight	nyìg
628	9830	extinguish	kpíírì
629	9900	shiver	màg
630	9950	swell	pì

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APPENDIX B: PRAYERS

Tɪ SÃÃ NA BE DAPAARɪ POƆ PUORU

Tɪ sãã na be dapaarɪ pʊɔ, a fʊ yuor ɪ kpɛ̃ɛ̃, a fʊ naaloŋ wa.

ka tɪ sagr fʊ nʊɔr teŋzu, a sɛg lɛ bɛ na sagra fʊ nʊɔr dapaari pʊɔ.

Kʊ tɪ bundɪ zina a sɛg tɪ, dɪ a tɪ yelbebe suur **kʊ tɪ**, a sɛg lɛ tɪ na mɪ dɪrɛ suur kurɛ taar a. Ì k**a tɪ** taa wa sagr bɛlɛ ɛ, ir tɪ yel faar zaa pʊɔ. Amina.

THE LORD'S PRAYER

Our Father, Who art in Heaven, Hallow be thy name, thy kingdom come, thy will be down on earth as it is in Heaven. Give us this day our daily bread, and forgive us our trespasses as we forgive those who trespass against us. And lead us not into temptation, but deliver us from evil. Amen.

YAANɪ MARIA

Yaanɪ Maria, fʊ paali nɪ garasɪɛ, Naagmin be fʊ zie, Naagmin maalɪ fʊ na gan pɔgbɛ za, ɛ a fʊ pʊɔ bie yezu nyɛrɛ puoru. Maria soŋ, puori Naagmin kʊ tɪ, tɪ na ɪ yelbebe dem, pãpãnã anɪ tɪ kũũ daar, Amen.

HAIL MARY

Hail Mary, full of Grace, the Lord is with you, Blessed are you amongst women. Blessed is the fruit of thy womb Jesus. Holy Mary, Mother of God, pray for us sinners now and at sthe hour of our death. Amen.

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