UNIVERSITY OF EDUCATION, WINNEBA

PHONOLOGICAL AND MORPHOLOGICAL ADAPTATION OF LOANWORDS

IN DAGBANI

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MASTER OF PHILOSOPHY

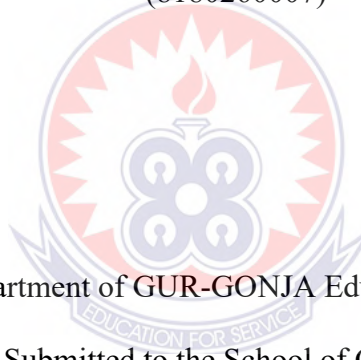2020

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A Thesis in the Department of GUR-GONJA Education, College of Ghanaian Languages Education, Submitted to the School of Graduate Studies, University of Education, Winneba, in partial fulfilment of the requirement for the award of Master of Philosophy (Ghanaian Language, Dagbani) Degree.

2020

DECLARATION

STUDENT'S DECLARATION

I, IDDRISU ABDALLAH, hereby declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: ....

DATE: ....

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis/dissertation/project as laid down by the University of Education, Winneba.

NAME: FUSHEINI A. HUDU (PhD)

Signature: ....

Date: ....

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"He who does not thank people cannot thank Allah (God)" (Bukhari Vol.6 pp 82).

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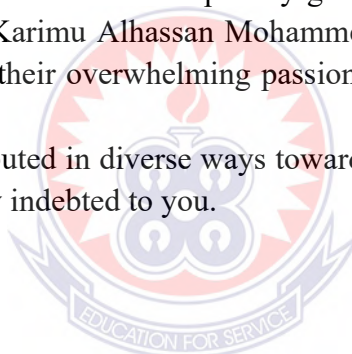
My special thanks also go to Mr Kwasi Adomako, a Senior Lecturer in the Akan-Nzema Department for his input. Indeed, his guidance, insightful comments, suggestions and relevant materials he gave me really helped shape my work. To him I say thank you very much. I also want to send my special thanks to all lecturers in the

DEDICATION

I dedicate this work to my lovely family: my late parents, Mahamah Iddrisu Takoro

and Hajia Rahinatu Alhassan and to the bigger Takoro family.

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LIST OF SYMBOLS/ABBREVIATIONS AND CONVENTIONS

LIST OF SYMBOLS

*	Ungrammatical construction
.	Syllable Boundary
-	Morpheme Boundary
μ	mora
σ	Syllable
→	Is realized as/becomes
/ /	Used for Underlying Realization /phonemic/broad transcription
[ ]	Used for Surface Realization/phonetic/narrow transcription
< >	For orthographic representation

LIST OF ABBREVIATIONS

UR	Underlying Realization
SR	Surface Realization
AP	Autosegmental Phonology
RBT	Rule-Based Theory
FG	Feature Geometry
OT	Optimality Theory
HPSG	Head-Driven Phrase Structure Grammar
BLT	Basic Linguistic Theory

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+ATR   Plus Advanced Tongue Root

-ATR   Unadvanced Tongue Root

WLD   World Loanword Database

CV   Consonant Vowel

IPA   International Phonetic Alphabet

"CC"   Consonant Cluster

LIST OF CONVENTIONS

SG   Singular

PL   Plural

V   Verb

PERF.   Perfective

IMPERF.   Imperfective

MSA: Modern Standard Arabic

ABSTRACT

The study investigates phonological and morphological adaptation of loanwords in Dagbani, a Mabia (Gur) language spoken in the Northern part of Ghana. In contrast to existing literature in the language, this study examines a typology of loanwords adaptation in Dagbani. Data of 260 loanwords were drawn from existing literature, Dagbani dictionary, elicitation and my native intuition, and analysis was cast within the theoretical framework of Basic Linguistic Theory of Dixon (1997). The findings demonstrate that phonological processes which underline loanwords adaption are triggered by syllable structure differences in the adaptor and donor languages. Loanwords that are adapted from languages such as English, Arabic, Hausa and Akan into Dagbani undergo some repair strategies to ensure that those loanwords are adjusted into the syllable structure rules of Dagbani. Some phonological adaptation processes analyzed here include segmental adaptation, segmental processes (e.g palatalization, debuccalization, liquid substitution and fortition) and syllable structure processes including epenthesis, deletion, diphthongs adaptation and importation. The study also analyzed morphological adaptation processes such as inflectional suffixes, derivational suffixes, aspectual markers and compounding. I conclude that Arabic models mostly undergo segmental adaptation in Dagbani whilst loanwords from the four source languages undergo various forms of segmental processes and syllable structure processes. Finally, I contend that the need to fill lexical and semantic gaps, religious and cultural dominance as well as trade license borrowing in Dagbani. The study is important because it approaches the study of loanwords adaptation from a perspective that has not been done in the literature available so far.
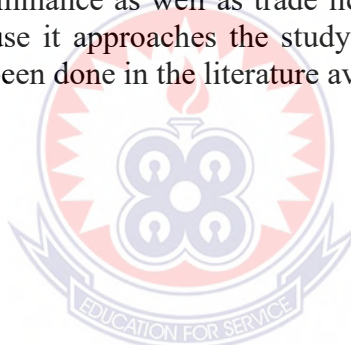
CHAPTER ONE

GENERAL INTRODUCTION

1.0 Introduction

The goal of this current thesis is to provide an account of phonological and morphological adaptation processes in Dagbani loanwords. Universally, languages including Dagbani have borrowed lexical items from different languages they have established contacts with. Dagbani lexicons for instance are marked by quite a number of prominent loanwords from contact languages such as English, Arabic, Hausa and Akan. But, within the loanword phonology in Dagbani, only the English loanwords have been relatively investigated, implying that investigation into loanwords phonology is still not extensively exhausted. This study therefore explores both phonological and morphological adaptation processes of loanwords in Dagbani by casting the analysis within the theoretical tenets of Basic Linguistic Theory of Dixon (1997). This chapter proceeds as follows. In section 1.1, I present an overview of the background to the study while the statement of the problem in outlined in section 1.2. In section 1.3, the objectives that underpin the study are presented whereas section 1.4 is devoted to the research questions of the work. In section 1.5, the significance of the study is outlined. Section 1.6 is devoted to a brief overview of the limitations of the study and in section 1.7, I outline the delimitation. Section 1.8 is devoted to explanation of some operational definition of terms, whereas 1.9 outlines the organization of the study and 1.10 summarizes the chapter.

1.1 Background to the Study

This study examines some phonological and morphological processes words borrowed from other languages undergo when they are adapted into Dagbani, a Mabia (Gur) language of the Western Oti-Volta Branch and a sub-group within the Niger-Congo languages (Naden, 1988; Olawsky, 1999). Dagbani has three major dialects: Tomosili, Nayahili and Nanunli all are spoken in Northern Region (Dagbon). Tomosili is spoken in and around Tamale; Western part of Dagbon (also known as Dagbaŋ), which is also the administrative capital of Northern Region while Nayahili is spoken in Yendi (Eastern part of Dagbon) and Nanunli is spoken in Bimbila (South-east of Dagbon). Dagbani is one of the languages recognized by the Ghanaian government as a teaching language from the basic school up to the university level.

Investigations into the grammar of Dagbani have been quite encouraging as many scholars, both native and expatriate linguists, have done some considerable studies on various aspects of the language (see Bendor-Samuel & Wilson, 1965; Wilson, 1972; Yahaya, 1979; Abu-Bakari, 1980, 1988; Hyman, 1988, 1993; Dawuni, 1993; Dakubu, 1997; Olawsky, 1996, 1999, 2002; 2004; Hudu, 2002, 2005, 2010; 2013, 2014a, 2014b, 2014c, 2016, 2018; Issah, 2011; Nindow, 2017).

With regard to Dagbani phonology, some appreciable investigations have been done by scholars such as Hyman (1993), Olawsky (1999), Abdul-Rahman (2005), Alhassan (2006), Nindow (2017) and Hudu (2002, 2005, 2010, 2014a, 2014b, 2016, 2018). However, investigation into loanword phonology in Dagbani has not been extensively explored (Hudu, 2002; Nindow, 2017).

Wornyo (2016) also noted that investigations into loanword phonology in African languages have not received the desired attention yet as opposed to some Asian

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languages like Chinese, which has occupied a central place in phonological analysis and theory through the study of loanword phonology. Currently in Ghana for instance, languages within my knowledge which have been researched into within the domain of loanword phonology are not many. The few Ghanaian languages which exist in literature as far as the study of loanword phonology is concerned include Dagbani (Hudu, 2002; Alhassan, 2006; Gurindow, 2013), Akan (Adomako, 2008; Apenteng, 2013, 2014), Ewe (Wornyo, 2016) and other Ghanaian languages.

There is however an overwhelming global growing interest in the novel contribution of phonology to the growth and development of languages (Petryshyn, 2014) especially with the introduction of the constraint-based theory of phonology such as Optimality Theory (Prince & Smolensky 1993). To address this linguistic deficit, researchers have turned their attention to the investigation of loanwords phonology. The study of loanwords has attracted more global attention and has become more interesting to phonologists because of the important role it plays in enhancing phonologists understanding of the phonotactic constraints that they display in languages during the borrowing process (Davis, 1993). For example, it brings to bear the native phonological constraints that would never have had the chance to surface, and this provides new and interesting insights that will ultimately help the researcher to better understand the phonological theory of the native language (Guba, 2015; Bueasa, 2015). Many languages including Dagbani have rules that regulate the lexical borrowing to ensure that words that are borrowed overcome certain barriers by undergoing some alterations in order to conform to the phonotactics of the language (Fasold & Connor-Linton 2006 and Haspelmath, 2009 as cited in Petryshyn, 2014). The processes loanwords undergo is variously referred to as *adoption* (Zawawi, 1979; Rosenhouse and Kowner, 2008), *adaptation* (Daulton, 2008), *accommodation*

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(Kerswill, 1994), *assimilation* (Barber, 1993), *integration* (Galstyan, 2012) or *nativization* (Katamba, 2005) cited in Petryshyn (2014), and this explains why those words borrowed are either partially or totally borrowed into the native language (Bueasa, 2015) also known as pure borrowing or adjusted borrowing (Fantini, 1985:146 cited in Adam, 2007). Thus, Bueasa (2015) further elaborates this to mean that when loanword is borrowed into the recipient language, native speakers will either adopt it (that is, the loanword form does not change in the recipient language) or it is adapted (that is, the form of the loanword will undergo some phonological and morphological changes to conform to the phonotactics of the recipient language). Therefore, for the purpose of consistency, this current study adopts the term 'adaptation' to refer to the process loanwords undergo in order to conform to the grammar of Dagbani.

Regarding the study of loanword phonology in Dagbani, Olawsky (1999) previously described how the initial consonant clusters of English-Dagbani loanword deviate from the standard syllable types in Dagbani. Hudu (2002) focused on phonological integration of English-Dagbani loanword while Alhassan (2006) examined the phonological and morphological analysis of English loanword in Dagbani. Olawsky (2004) also examined the morphological structures of loanwords in Dagbani in his study on the classification of nouns and adjectives in Dagbani. Nindow (2017) similarly devoted a section of his thesis to account for vowel epenthesis mainly in English-Dagbani loanwords. In discussing elision in Dagbani, Abdul-Rahman (2013) briefly mentioned that words with vowel initials are either loanwords or interjections and not native lexical items. While Adam (2007) also briefly discussed loanwords in Dagbani in a section within the context of word formation processes, Ibrahim (2013) examined the role of loanwords integration in Dagbani in enhancing communication competence. All these scholars offered a

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descriptive analysis mainly on the English loanwords in Dagbani. It is clear that some research work has been done on loanwords adaptation in Dagbani, but the existing literature on loanwords in Dagbani focused on the English loanwords with little or no attention to other loanwords adapted into Dagbani from languages such Hausa, Arabic and Akan (Twi) which are used by the native speakers consciously or unconsciously to communicate in their daily interactions. According to Ibrahi (2013), the use of loanwords helps speakers of Dagbani to enhance their communicative competence. Loanwords from Arabic, Hausa and Akan (Twi) have not been given any attention yet in Dagbani. Though there has been some kind of studies conducted on the English-Dagbani loanwords, recent studies on Dagbani phonology and more especially on Dagbani loanword phonology point out the need for more data with accurate transcription to offer a detailed discussion on the phonological and morphological adaptation processes of loanwords in the language (e.g see Hudu, 2014b, 2016, 2018 and Nindow, 2017 for detailed analysis of Dagbani phonology). For example, Hudu (2002) referred to /ɪ/ as an allophone of /i/ and therefore used it as a word-final epenthetic vowel in examples such as [bɔllɪ] 'ball', [pɔlinsɪ] 'police', [ʃɪpu] 'ship' and others. Similarly, Alhassan (2006) used /ɪ/ in examples like [te:bulɪ] 'table', and /u/ as in [pa:pu] 'pipe' and Ibrahim (2013) presented loanwords orthographically with examples such as [pəleeyas] 'players', [fɛɛs] 'first' and many others. However, recent studies such as Hudu (2013, 2016) do not find /ɪ/ surfacing in any context in Dagbani, and therefore excluded it from the vowel inventory of Dagbani.

The term loan "is used idiomatically because neither the lender nor the borrower is consented to the loan, nor none of them is under any obligation to repay or to receive the loan" (Haugen, 1950:211) as cited in Hafez (1996). Most often, native speakers are

unaware of the foreignness of many words that are introduced into the borrowing language (Hafez, 1996).

Another domain of loanwords study that requires investigation is the question as to what motivates languages to borrow. There are several reasons for which languages borrow from other languages. However, according to Katamba (2005:138-139) as cited in Petryshyn (2014) "to adopt a word is much easier rather than to make up an original one from nothing". Another reason is globalization where English plays the major role (Petryshyn, 2014) and also the absence of the equivalence of concept or terms in the recipient language and therefore the need for "filling conceptual gaps", is yet another motive for borrowing (De Ridder, 2014). Coupled with above stated reasons for borrowing, linguists have also widely agreed that borrowing has often resulted from reasons such as language contact (Hudu, 2002; Adomako, 2008; Haspelmath, 2009; Ibrahim, 2013; Apenteng, 2014; Bueasa, 2015), prestige (Winford, 2003:37; Durkin, 2009 cited in Ibrahim, 2013), euphemistic expressions, education, advent of religion, politics, and trade (Danesi and Rocci 2009:161; Rosenhouse and Kowner 2008:284; Bator, 2010:41 as cited in Petryshyn. 2014). According to Hoffer (2002), the advent of media communication like radio and television has also introduced and enhanced the spread of other forms of linguistic elements into the native languages and cultures.

Though a language can borrow linguistic items from another language either directly or indirectly, most loanwords in Dagbani are borrowed directly and culturally (Fromkin and Rodman, 1992 cited in Hudu, 2002). Direct borrowing means that the word is not a loanword in the source language and it is transferred into the recipient language whilst indirect borrowing means that the word is a loanword in the language from which it is

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being borrowed and now being transferred into another language (Fromkin and Rodman, 1992 as cited in Hudu, 2002).

As already noted, Dagbani has often borrowed from English, Arabic, Hausa and from Akan because of the historical contact and the social interaction among them (cf. Baldi, 1997: 267 cited in Olawsky, 2004).

English vocabularies for instance, are integrated into Dagbani due to colonization and for the fact that English is used as the official language in Ghana, and as well used as a language for economic and commercial purposes in all parts of Ghana. Besides, the Dagomba (traditionally known as Dagbamba) have had a long historical contact with the Englis speaking people through slave trade where the Ashantis played the middle men role (Staniland, 1975). The Dagomba in the 1930s operated under the 'indirect rule' of British policies (Staniland, 1975), and because of the interaction between the Dagomba and the English-speaking people in various spheres of life, some words such as /wɒtʃmən/→[wasɨmanɨ] 'watchman', /kʌp/→[kɔpʊ] 'cup', /bʌkɪt/→[bɔʔatɨ] 'bucket' /bɛlt/→[balatɨ] 'belt', /lʌɪt/→[la:tɨ] 'torch light', /lɔ:jə/→[lo:ja] 'lawyer', /nə:s/→[ne:sɨ] 'nurse', /hɒspɪtəl/→[aʃibɨti] 'hospital', /dɒktə/→[dɔʔɨta] 'doctor', /draɪvə/→[dɨra:ba] 'driver' and many more found their way from the English language into Dagbani lexicons. Native speakers at public places such as lorry station, hospital, and judiciary and at other social events commonly use the above few examples of English loanwords where people interact. Some examples of Akan (Twi) loanwords in Dagbani include /gɨrawa/→[garawa] 'water-barrel', /borɔdeɛ/→[bɔra:de] 'plantain', /abɛ/→[abe] 'palm nut', /bantʃɨ/→[bantʃɨ] 'cassava' to mention but few.

Again, the dominance of Hausa and Arabic loanwords in Dagbani is not by mere coincidence. The history of the Dagomba is traced to a hunter called Tɔhaʒee 'Red

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Hunter' who "seems to have been of pagans of Hausa origin from Zamfara, one of the old Hausa 'Banza Bakoi' states located in the area of Nigeria to the North of Borgu" (Staniland, 1975: P3).

Historically, it is related in Mahama (2004) that, the Dagomba are descendants of Ad (some other Arabian people), but it was the Hausa people who started Islam in Dagbon (Rattray, 1932; Mahama, 2004; Yakubu, 2013).

In addition, due to the dominance of Islam in Dagbon, quite a number of Arabic words were integrated into Dagbani through Hausa language. However, some of the Arabic words are so basic that they could not have been acquired via other language such as Hausa. Thus, those words found their way into the Dagbani lexicon directly from Arabic because of the contact the Dagomba had with Arab people at the advent of Islam in Dagbon (Yakubu, 2013). Examples of such Arabic words borrowed into Dagbani include /qidr/→[alitʃidɨrɨ] 'pot', /idris/→[jirisʊ] 'a male personal name', /isim/→[jisɨmʊ] 'name of God for supplication', /dhurrijja/→[zulɨja] 'tribe', /sodaqa/→[sara] 'alms', /waʕz/→[wa:zu] 'preaching', /su:ratu/→[su:ra] 'a chapter', /alqalam/→[alɨkalɨmɨ] 'pen', /dʒama:ʕ/→[zama] 'crowd', /waqt/→[wakati] 'time', /alhadʒ/→[alahaʒi], 'a visitor to Mecca for pilgrimage, [arrizq]→[arizitʃi] 'wealth', /addu'a/→[adʊwa] 'supplication', /alsirr/→[aʃilɨ] 'a secret', and many more.

[1]The following are also some examples of Hausa loanwords in Dagbani; /zirigi/→[zilɨdʒi] 'train', /ba:ngida/→[bandʒira] 'toilet', /anzantʃi/→[anzansɨ] 'endurance', /abinfu:ra/→ [abinfu:ra] 'balloon', /daba:ra/→[dabara] 'experiment/trial', /talla/→[talla] 'petty trade', and several other examples. This therefore means that, investigation into loanword

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Dagomba is traditionally known as Dagbamba (plural) and Dagbana (singular) while Dagbon is also known traditionally as Dagbaŋ referring to the land of speakers of Dagbani.
[1]

adaptation in Dagbani still requires a systematic phonological and morphological analysis.

Unlike the relatively elaborate work done in the investigation of loanword in Dagbani, little or no studies have focused on the typology of the phonological and morphological adaptation of loanwords in Dagbani. Though some studies in Dagbani have focused on the phonological and morphological analysis of loanwords in Dagbani, almost all of them focused on English loanwords in Dagbani. Given that there has not been any typological investigation of loanwords in Dagbani, this study will fill that knowledge gap by giving a detailed analysis of words borrowed from English, Hausa, Arabic and Akan (Twi). The main aim of this study is therefore to examine the phonological and morphological adaptation processes that words borrowed from these four contact languages undergo through the investigation of the phonological profiles of Dagbani, English, Arabic, Hausa and Akan (Twi), which of course is crucial in understanding the available repair strategies employed by the Dagbani. This study therefore situates its analysis on segmental adaptation and segmental processes, syllable structure processes and morphological processes involved in the adaptation of loanwords in Dagbani. The issue(s) that necessitates this current study is clearly stated in section 1.2 that follows immediately.

1.2 Problem Statement

Although some amount of investigations has been conducted into the phenomenon of loanwords adaptation in Dagbani as outlined in the preceding section, they focused greatly on the English loanwords in Dagbani without considering other source languages

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such as Arabic, Hausa and Akan (Twi) from which Dagbani has also borrowed quite a number of lexical items. It is therefore clear that there has not been any typological investigation into the phonology and morphology of loanwords adaptation in Dagbani yet. This study will therefore glean more data from other source languages to expound on existing literarure on loanwords phenomenon in Dagbani by offering a detailed empirical account of phonological and morphological adaptation processes of loanwords in the language to find out what phonological and morphological features are displayed in all the contact languages during the process of loanwords adaptation in Dagbani.

It is against this background that, this study sought to fill the knowledge gap regarding a typological study of loanwords adaptation in Dagbani focusing on loanwords drawn from languages such as English, Arabic, Hausa and Akan (Twi) which Dagbani established a historical contact and social interaction with (cf. Baldi, 1997:267 cited in Olawsky, 2004).

The next sections 1.3 and 1.4 respectively outline the research objectives and the research questions for this study.
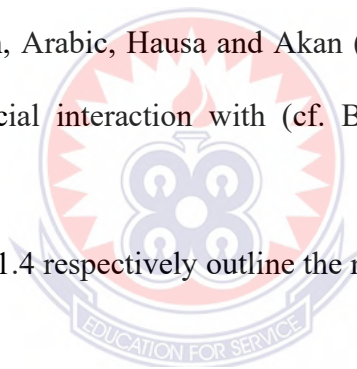
1.3 Objectives of the Study

The objectives of this study are as follows:

      i. To account for segmental adaptation of loanword in Dagbani.

      ii. To examine the segmental processes of loanword adaption in Dagbani.

      iii. To investigate syllable structure processes of loanword adaption in Dagbani.

      iv.   To explore the morphological processes of loanword adaptation in Dagbani.

1.4 Research Questions

The study addresses the following research questions:

i. How are non-native segments of loanwords adapted into Dagbani?

ii. What are the segmental processes of loanwords adaptation in Dagbani?

iii. What are the syllable structure processes of loanword adaptions in Dagbani?

iv. Which morphological processes underlie loanwords adaptation in Dagbani?

1.5 Significance of the Study

The findings of a phonological and morphological analysis of loanword adaptation into Dagbani are significant in many ways. In the first place, loanword phonology serves as a mirror through which phonologists are provided with insights into the phonology of the languages under study (Davis 1994; LaCharite & Paradis 2005; Calabrese & Wetzels 2009:8 cited in Guba, 2016), hence making available certain linguistic inputs that help to expose hidden constraints in the native phonology that would have remained latent (Crawford 2009).

In addition, investigating the phonology of loanword adaptation in Dagbani provides foreign language learners with the` awareness and understanding of the invisible intricacies and differences between the donor language and the receptor language.

The results of this study will complement existing literature in the area of loanword phonology in Dagbani, and this will form the basis for similar studies.

The findings will also enhance the teaching of the language at all levels of educational persuit.

More significantly, research into the typology of loanword phonology in Dagbani has not received attention yet. This work will therefore serve as an interface in the typological study of loanword in Dagbani that has received little or no attention in linguistics research.

Finally, the findings will either confirm or reject existing data on the grammar of loanwords in Dagbani. The next section presents the limitations of the study.

1.6 Limitations of the Study

One major weakness observed about this study has to do with the choice of one dialect of Dagbani to carry out the analysis. Although Dagbani has three major dialects as pointed out in the introduction, the Toonsili dialect was chosen to analyze loanword adaptation processes. This decision was borne out of the fact that the researcher is a native speaker of this particular variant of Dagbani. It is also studied in schools (from pre-school to the university level) and generally, more literature exists in that dialect. Thus, collecting data in all the three dialects requires a lot of financial commitment which is practically not available to me as a student, hence the decision to settle on one dialect for this study.

Another limitation was the issue of time and accessibility. For instance, the willingness and the readiness of respondents to be consulted was a big challenge because consultants lamented that they have been providing information to researchers and yet they have never directly benefited anything from the services they render. These consultants had a mindset that researchers obtain information from them to enrich themselves and for that matter, they (consultants) must also benefit from these services they render. They also feel they are wasting their time by engaging themselves in providing information to

researchers. Due to financial and time constraint, I restricted my analysis to some phonological and morphological adaptation of loanwords in Dagbani as clearly defined in sub-section 1.7 below.

1.7 Delimitation

As already pointed out in subsection 1.1, this study offers only an empirical descriptive analysis of loanwords adaptation in Dagbani focusing on only segmental adaptation, segmental processes, some syllable structure processes and morphological processes such as inflectional suffixes, derivational suffixes, aspect marking and compounding.

Though analysis could have been extended to cover suprasegmental features such as rhythm, intonation and tonal differences that these four languages under study could display, this important aspect of loanword phonology have been excluded because of time constraint. For instance, detailed analysis of suprasegmental features would require more detailed information on the tonal and stress system among others of the other four languages under study.

Besides, the study is restricted to some page limit. Thus, attempt to include every essential adaptation processes of loanword in this analysis will loose its focus.

Finally, some approaches to phonological and morphological processes, which could have been used to carry out analysis in this study, include Autosegmental Phonology (AP), Rule-Based Theory (RBT), Feature Geometry (FG) or Optimality Theory (OT). However, using Basic Linguistic Theory (henceforth BLT) to describe a language can be quite precise, and the meaning of the terms described can be clearly expressed for easy

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understanding. Thus, BLT has been chosen as theoretical framework to guide this study with the primary aim of providing a detailed empirical description of both phonological and morphological processes of loanword adaptation in Dagbani.

In the next section below, I offered definition of some key terms commonly used in the study to enhance clarity for readers.

1.8 Operational Definition of Terms

Important key terms used in this study are explained here. They are a loanword, foreign word, adaptation, adoption, receptor language, source language and repair strategies.

A loanword: A loanword refers to a word that is transferred from one language into another language. Thus, any linguistic item that speakers of one language (e.g Dagbani) import from a different language into the native lexicons is termed a loanword (Hoffer, 2002; Bueasa, 2015; Alvanoudi, 2017). Thus, this study adapts the above definition with some modifications, which state that any linguistic pattern in Dagbani that can trace its source from another language is termed a loanword.

Foreign Word: According to the linguist Suzanne Kemmer, foreign word refers to a word that sounds strange to the hearing of native speakers and they turn to feel such a word is from another language any time they hear it.

Adaptation in this study is viewed from two perspectives: a borrowing process in which unfamiliar segment in the source language is nativized, and according to Bueasa (2015) adaptation is a phonological process in which a linguistic item from a source language undergoes certain alternations in order to ensure grammatical compatibility with the receiving language. It is also called rephonologization (Vratsanos, 2018).

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Adoption is a term used to refer to the process of borrowing the original form of the linguistic item from one language into another language and maintaining its pronunciation as it is in the language from which it is borrowed. Such adopted loanwords are also sometimes called *foreignisms* (Buesa, 2015).

Receptor Language: This refers to the language that borrows, receives, or acquires a word (loanword) from another language (Haspelmath, 2009).

Source language: This refers to the language from which the loanword is borrowed or acquired. It is also called a *donor language* (Haspelmath, 2009).

Repair Strategies: This refers to how segments conspire to ensure that the phonological rules of a language are maintained (Vratsanos, 2018).

Section 1.9 below offers a brief description of how the study is structured.

1.9 Organization of the Study

This study is organized into six broad chapters. Beyond chapter one, the rest of the study is structured as follows:

Chapter 2 reviews relevant literature on the phonology of all the languages (e.g Dagbani, English, Hausa, Arabic and Twi) under study with special focus on segmental inventory and the syllable structure of these languages. Other themes reviewed include the concept of lexical borrowing, overview of Dagbani Phonology, segment inventory of contact languages, typology of syllable structure, the Dagbani syllable structure and the theoretical framework.

Chapter 3 presents the details of the methodology employed for the present study, which include the choice of research design, the sources of data, data collection techniques, data collection procedure, data verification approach and how data was analyzed.

Chapter 4 focuses on providing detailed empirical account of the phonological processes of loanword adaptation in Dagbani focusing on segmental adaptation, segmental processes, and syllable structure processes.

Chapter 5 deals with a detailed empirical analysis of morphological adaptation processes of loanwords in Dagbani including inflection, derivation, aspect marking and compounding.

Chapter 6 is the final chapter of the study, it provides a summary of major findings of the study, and offer concluding remarks and some recommendations for further investigations based on what the analysis reveals. After this, a reference list and a section for appendices containing the data list of loanword corpus for the analysis in this study are provided.

1.10 Summary of the Chapter

This chapter primarily points out to readers what the entire study is all about. For instance, beyond the introduction of the background of the study, I also made it clear the motivation and justification for the current study and how the study will be carried out. The objectives of the study and the research questions addressed in this study are stated. Finally, I offered definition of some key terms, which are very crucial in the analysis, and how the entire thesis is structured into chapters and what is discussed under each chapter were clearly established. Chapter 2 is next, and that provides a detail account of relevant literature review of this study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The focus of this chapter is to provide a review of literature focusing on themes that are relevant to the topic under investigation. The various themes reviewed in this chapter include the concept of lexical borrowing, phonological processes, the phonology of Dagbani and its contact languages such as English, Hausa, Arabic and Akan (Twi). The aim of this review is to find out (a) the segments (vowels and consonants) that interact in loanword adaptation process and (b) the grammatically well formedness of Dagbani syllable structure that determines loanword grammar in Dagbani. The chapter therefore proceeds as follows: In section 2.1, I present on the concept of lexical borrowing and section 2.2 provides an overview of the Dagbani phonology focusing on the consonantal and vocalic inventories. Section 2.3 presents an overview of Dagbani morphology whilst section 2.4 presents on the segment inventory of contact languages of Dagbani. In section 2.5, I present the typology of syllable structure. Then in section 2.6, I examined the syllable structure of Dagbani. In section 2.7, I provide the theoretical framework for this study. Finally, I provide a summary of the chapter in section 2.8.

2.1 The Concept of Lexical Borrowing

Every word in a language whether native or foreign etymologically has an origin, meaning and how it was used and/or still used in various contexts in relation with other

words in the language (Petryshyn, 2014). Native words are considered as the indigenous lexical items that defines the language while the foreign elements also known as loanword are viewed by some scholars as those vocabularies "that have entered the language from other languages at a point in time in its history through the process of borrowing" (Hudu, 2002:4). Borrowing according to Thomason and Kaufman (1988:21) as cited in Petryshyn, (2014) "refers to the incorporation of foreign elements into the speakers' native language". Generally, there is no language in the entire world, which can claim non-existence of loanword in its lexicon (Haspelmath and Tadmor, 2009). Some lexical items but not others are borrowed from languages though there are clear instances where languages appear to have equivalent word for concepts existing in the language (Haspelmath, 2009). For instance, in Dagbani, 'a week' is known as "dakulo" in the native language, but native speakers most often use "bakɔi" from Hausa in conversation. The influx of the foreign words into many natural languages has become more conspicuous in recent development of languages including Dagbani. This and many factors motivate researchers to investigate the phonology of various languages within the domains of loanword.

Many a time, borrowing is misunderstood as code switching. But Myers-Scotton (2006, p. 254) as cited in Petryshyn, (2014), explains their difference as that, words borrowed are integrated into the lexicon of the recipient language, and once the loanword becomes part of the native lexicon, bilinguals can alternate those words with words from other languages in a speech, indicating that, the concept of borrowing is different from code-switching. In code-switching, individual bilinguals, alternate two or more languages in a speech (Montes-Alcalá, 2016). Ross (1991) reported that, either the native speakers or non-native speakers could introduce foreign items into the borrowing language. The

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native speakers can consciously import words from another language or imposition happens to the native speakers when their native language is not the dominant language, thus they transfer some grammatical features acquired from the dominant language onto their native language, but non-native speakers unconsciously impose some of their native features onto the recipient language (Ross, 1991). However, whether words are imported or imposed into the recipient language, the structure of the recipient language regulates the supposedly imported and imposed words (loanword) as discussed in the next subsection 2.1.1.

2.1.1 Principles of Adaptation

Many languages in the world have borrowed some number of lexical items and other semantic sub-domains from other languages (Bueasa, 2015). Loanword contain some phonemes that are not found in the borrowing language, and this usually violates the phonotactics of the borrowing language because their unique phonological features appear different from the native vocabulary (Davis, 1993). For instance, English borrowed words from Latin, and French, Arabic borrowed from various languages such as Latin, Greek, Persian, Syriac, Turkish, and others, Japanese borrowed from Chinese (Bueasa, 2015 and Wornyo, 2016). Ghanaian languages have also borrowed from other Ghanaian languages and also borrow from other foreign languages. When words are borrowed from one language into another language, the grammar of the recipient language compels the loanword to undergo certain alternations before it is allowed into the linguistic context of the recipient language (Fasold and Connor-Linton 2006:294 as cited in Petryshyn, 2014). For example, native languages will have to ensure some

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segment deletion and insertion into foreign words before they are allowed into the phonotactics of the native language (Olawsky, 1999; Hudu, 2002; Adomako, 2008; Hudu, 2010 and Wornyo, 2016).

The processes that these loanwords undergo during adaptation make it interesting to phonologists (Davis, 1993). Dagbani scholars such as Olawsky (1999), Hudu (2002), Alhassan (2006) and Nindow (2017) who have done some research in Dagbani phonology more specifically in English-Dagbani loanwords agreed that, loanwords undergo certain changes before they are adapted into the language. Thus, some of these adaptation processes are discussed and analyzed in chapter four and five.
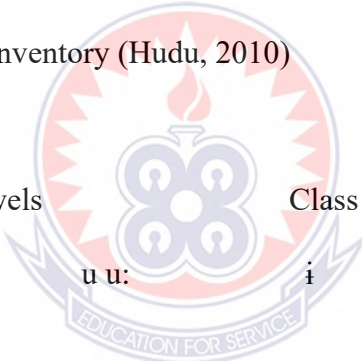
2.2 Overview of Dagbani Phonology

A good description of Dagbani phonology is essential to understand and analyze what is happening in loanword adaptation in the language. This section therefore focuses on segmental inventory (vowels and consonants) and the syllable structure typology of Dagbani and other languages under study in this current thesis. A general overview of vowels and consonants inventory is reviewed to aid the analysis of data in this study and also to enhance readers understanding of how they interact in Dagbani words. This study respectively adopts vowel and consonant inventory of Hudu (2010) and Hudu (2005) to guide my analysis. I present the vowel inventory of Dagbani in subsection 2.2.1.

2.2.1 Dagbani Vowel Inventory

Many scholars have expressed varied views regarding Dagbani vowel inventory. Earlier researchers such as Fisch (1913) as cited in Abdul-Rahman (2005) investigated the grammatical features of Dagbani and identified five vowels such as /i, e, a, o, u/, but later studies in Dagbani such as Abdul-Rahman (2005) identified ten short vowels /i, ɪ, ɛ, e, ə, a, ɔ o, u, ɷ/, and five long vowels /i:, a:, u:, o:, e:/. Hudu (2010, 2013, 2014a, and 2016) examined the phonological processes that influence how Dagbani vowels are realized in a word. For instance, Hudu (2010) also identified ten short vowels and five long vowels through an ultrasound investigation, thus classifying them into Class I ([+ATR]) vowels and Class II ([-ATR]) vowels as shown in table 1 below.

Table 1: Dagbani Vowel Inventory (Hudu, 2010)

Class I Vowels		Class II Vowels	
i i:	u u:	ɨ	ʊ
e e:	o o:	ɛ	ɔ
ə		a, a:	

In view of the vowel inventories in Dagbani, this study adopts the vowel inventory of Hudu (2010) which provides the various forms of the vowels required to aid analysis in this current study. What is crucial in this study and worth pointing out is that, according to Hudu (2016), the [-ATR] variant of [i] is /ɨ/ and not /ɪ/ as claimed in previous studies. According to Hudu (2013), a phonological process that causes the front vowels in

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Dagbani to produce palatalized onsets except /i/ motivates the choice of /i/ over /ɪ/. The examples in 1 are drawn from Hudu (2013) to illustrate the phonological patterning of front vowels in Dagbani.

1. Palatalisation of consonants before front vowels (Hudu, 2013:52)

Ci	Ce	Cɛ	Ci
a. pʲiliɨ 'start.V'	**pʲe** 'milk.V'	**pʲɛ́liɨ** 'group hunt-sg.'	**piliɨ** 'cover.V'
b. bʲih-im 'milk.N'	**bʲe** 'bad.V'	**bʲɛ̀hiɨm** 'doubt.V'	**biɨliɨm** 'roll.V'
c. fʲiliɨm 'belittle'	**fʲe** 'finger.V'	**fʲɛ̀hiɨ'** 'blow nose.V'	**f.rla** 'lantern'
d. vi: 'open.V'	**vʲe** 'smear.V'	**vʲɛ̀liɨ** 'nice'	**viɨliɨm** 'whistle.V'
e. mʲiha 'sour'	**mʲe** 'build.V'	**mʲɛ̀-ri** 'build-impf.'	**miɨliɨgiɨ** 'shift.V'
f. tʲihim 'sneeze.V'	**tʲe**ːŋ-ga 'beard-sg.'	**tʲɛ́riŋ** 'rocky land'	**tiɨri** 'point at'
g. dʲiʔ-i 'mirror-sg.'	**dʲe**ːm-ba 'in-law-sg.'	**dʲɛ̀-hi** 'bush pigs'	**diɨm** 'bite.V'
h. nʲir-a 'person-sg.'	**nʲe**ː 'awake'	**nʲɛ̂m** 'grind.V'	**niɨŋ** 'do.V'

2.2.2 Dagbani Consonant Inventory

This sub-section reviews consonant inventory of Dagbani. Consonant inventory in Dagbani has received some attention (see Wilson and Bendor-Samuel, 1965; Wilson, 1972; Olawsky, 1999; Hudu, 2005, 2010 and 2018). However, this study adopts the

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consonant inventory of Hudu (2005) in table 2 which contain the consonantal phonemes required for analysis and discussion of Dagbani loan word phonology in this study.

Table 2: Dagbani Consonant Inventory (Hudu, 2005:3)

	Plosive		Fricative		Affricate	Nasal	Tap/Trill	Lateral	Glide
Bialabial	p	b				m			
Labio-dental			f	v					
Alveolar	t	d	s	z		n	r/ɾ	l	
Post-alveolar			ʃ	ʒ					
Palatal					tʃ dʒ	ɲ			j
Velar	k	g				ŋ			
Labio-velar	kp	gb				ŋm			w [ʋ]
Glottal	[ʔ]		h						

It has been noted in existing literature that consonants such as /k, g/ are both realized as a glottal stop /ʔ/ in postvocalic position after vowels (Olawsky, 1999; Hudu, 2010, 2018) and also realized as affricates /tʃ, dʒ/ before front vowels (Hudu, 2010, 2018) in Dagbani.[2]

It has been widely agreed that the glottal stop /ʔ/ does not have any phonemic status, and that /ʔ, x/ do not begin a word in Dagbani. It is usually found either in word-medial beginning a syllable or as coda. This is illustrated in examples such as [gɔ.ʔɨ.lɨ] 'a shirt', [zu.ʔʊ] 'head', [paʔ.suŋ] 'nice woman' and many others. This means that consonants such as [m, ŋ, n, r, l, b, ɣ] occur in coda position or word medial in Dagbani (Abu-Bakari, 1977; Olawsky, 1999). Also, consonants such as /r/ and /h/ do not occur at word-initial

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[2] This current study uses /ʔ/ in all surface forms, though /ɣ/ may appear in some contexts where orthographical representation is required for clarity.

position just as the glottal stop in Dagbani but they do occur in loanword where /r/ will alternate with /l/, in which case /h/ still maintains its stricture as it occurs at word-initial (Olawsky, 1999, Hudu, 2005, 2010). However, in the Eastern dialect (Mampruli), /h/ is realized as /s/ as Hudu (2018) posits. The immediate examples showing /h/ occurring at word-initial in loanwords include [hatʃi] 'what is due someone' (Hausa), [haŋkali] 'sense' (Hausa), [himma] 'grace' (Arabic), [haramʋ] 'forbidden thing' (Arabic), [hawa] 'hour' (English), [haaji] 'to hire or rent' (English) to mention but a few. The alternation between /r/ and /l/ also occurs in Hausa loanwords such as [li:ga] 'a shirt', [latʃe] 'sugar cane', [le:mʋ] 'an orange' to mention but few. Naden (1989) who noticed that [r] and [h] do not have wider distribution, and attributed their restricted distribution to the fact that they may have been acquired from languages such as Akan (Twi), Hausa, Arabic, or English. It has also been established that /d/ becomes a trill /r/ in semi-final position of lexical items whilst at intervocalic position, /d/ is realized as a tap /ɾ/ (Olawsky, 1999; Hudu, 2005, 2010 and 2018), and in another environment a tap /ɾ/ is realized as a surface variant of a lateral /l/. In this current study, I will be using the trill /r/ in my analysis.

Again, non-phonemic consonants such as /s/ and /z/ respectively become /ʃ/ and /ʒ/ when they precede front vowels (Hudu, 2005, 2010). In the Eastern dialect of Mampruli, which is mutually intelligible with Dagbani, /s/ is realized as /h/ before short vowels (Hudu, 2018).

Certain combinations of sounds do not occur in Dagbani. For instance, front vowels do not occur with velar consonants /k, g, ŋ/ in a CV syllable (Wilson and Bendor-Samuel, 1965; Olawsky, 1999), and labiovelars /kp, gb, ŋm/ rarely occur with back vowels (Olawsky, 1999). Also, [gi] do not occur in the root of the syllable, except at the stem

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final position as in [gba:gi] 'catch', [da:gi] 'push' etc. Also in Dagbani, some consonants do not occur before schwa.

Finally, consonants, which produce geminates in languages, cannot be left unmentioned in this section, because both lexical and borrowed words in Dagbani contain geminates. Geminates are sequence of identical consonants which abut at syllable boundary (Newman, 1986), or "two identical consonants occurring one after the other with no epenthetic interruption between them" (Almutiri, 2015:3). According to Haruna (1990), the production of geminates involves lengthening both glottal gesture and the oral closure in order to make it easy to maintain the same relative timing. Phonetically, gemination is the co-occurrence of two identical consonant sounds in a word and the time for producing the two identical consonant sounds is longer than their single counterparts (Mubarak, and Jebur, 2018).

According to Carr (2008: 62) as cited in Mubarak, and Jebur, 2018), gemination is "a process whereby a single, non-geminate, consonant undergoes lengthening to become a geminate consonant." Mubarak, and Jebur (2018) exemplify germination in English showing in a word like *unnatural*, where the prefix [un-] is attached to the root [natural], which is realized as /ʌnˈnætʃrəl/, and popularly called fake geminate. Geminates generally surface at either morpheme-internally or as sequences of morphemes or words, and many languages may categorize geminates into three different types including: lexical, assimilated, and concatenated (Mubarak, and Jebur, 2018). They further opine that gemination in Arabic is produced by using a diacritic called 'shadda', which is placed on top of the geminated sounds in writing. Dagbani also has specific consonants which produce geminates unlike Hausa where all consonants can be geminated although nasals and liquids are common in underived words such as *dannèe* 'suppress', *hannuu* 'hand',

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tallee 'soup pot.' In addition, geminates sporadically occur in native words such as *tukkuu* 'bird's crop' and in loanword such as *hajjì 'the* Hajj', *jabbáa* 'sleeveless robe.'

This shows that geminates do occur in most languages including Dagbani (Olawsky, 1999), Hausa (Newman, 1996), English (Mubarak, and Jebur, 2018) and Arabic (Almutiri, 2015; Mubarak, and Jebur, 2018). A few consultations I made with Akan phonology lecturers and postgraduate students of Akan suggest that geminates do not occur in Akan language. Considering the Dagbani native words such as [dabba] 'men', [yɛllɨ] 'trouble', [gbɨnnɨ] 'under', [dimma] 'feast/eating', it is very clear that geminates can be produced from consonants such as /l, b, n, m/ and these are mostly found in intervocalic position. This phenomenon is also observed in words borrowed from English, Arabic and Hausa into Dagbani. Typical examples of such words include [hallɨ] 'temper/character' (Hausa), [himma] 'spiritual preparation' (Arabic), [bolli] 'football' (English) and so on. Nindow (2017) noted that germinates in Dagbani can only occur at word level, unlike English where geminates occur at syllable codas or onsets. When words are syllabified in Arabic and many other similar languages, geminates split so that one portion forms part of the coda and the other portion forms part of the onset (Almutiri, 2015). Languages like English may allow geminates at the syllable level, at the onset or coda. The data in 2 is pulled from Olawsky (1999:256) to illustrate how geminates occur at word level in Dagbani.

 2. Germinates in Dagbani.

<gbali> [gba.li]   'lower limb-Sg'
<gbàlli> [gbàl.li]   'zana mat-Sg'

<yɛli>   [jɛ.li]   'say-V'
<yɛlli>   [jɛl.li]   'problem, matter-Sg'

<tibi>   [ti.bu]   'giving, nominal'

<tibbu>   [təb.bu]   'The craft of some Muslim devices foretelling'

<gbuni>   [gbu.ni]   'bottock-Sg'

<gbunni> [gbən.ni]   'beneath, postposition'

<dima>   [dima]   'eat- imperative'

<dimma> [dəm.ma]   'bite - imperative sentence'

One of the objectives of this current study is to account for how some consonantal segments are adapted from different languages into Dagbani, thus both geminate and non-geminate consonants appear very useful in this study, hence their review. I now provide an overview of Dagbani morphology in next subsection 2.3.

2.3 Overview of Dagbani Morphology

The morphology of a language refers to '…the study of morphemes and their arrangements in forming words' (Nida, 1965:68 as cited in Dada, 2002). Another angle from which morphology is viewed suggest that, it refers to the study of the internal structures of words, which show identical partial resemblances in both form and meaning (Dada, 2002). These internal structures are affixes which occur before the stem or root (prefix), after the stem or root (suffix) or located within the stem or root to either inflect for singular and plural of nouns or cause a change in the syntactic category of the word especially from a verb to a noun and vice versa (Radford et al., 2009).

In the view of Haspelmath (2002: 2), morphology is defined as 'the study of systematic covariation in the form and meaning of words.' In other words, this form-meaning covariation should occur systematically in groups of words so that when two words have partial form-meaning resemblances, it will be considered as merely accidental. This may help avoid a situation where one will consider the fact that the word *hear* is morphologically structured to relate to *ear*. In morphological analysis, parts or constituents of words are identified and separated by hyphen by Orthographical convention. For instance, the word *cats* is made up of two constituents: *cat* and *s* and the constituents are separated as *cat-s*, indicating that the suffix –s and the stem cat are both morphemes. The main aim of the present study is to establish and describe the morphological patterns of loanwords in Dagbani. To analyze loanword morphology requires an overview of Dagbani morphology to enhance understanding of the structure of lexical categories in the language. Interestingly, investigation into Dagbani morphology is quite satisfactory (see Wilson, 1972; Olawsky, 1996, 1999; Hudu, 2005, 2010; Kwame, 2018). What is relevant to this study is the structure of nouns and verbs, which are commonly borrowed from other languages as it is evident from the corpus of loanwords gathered for this study. Loanwords in Dagbani comprise both nouns and verbs, but most of them are found to be nouns, which corroborate the assertion by the World Loanword Database (WLD) that nouns are mostly borrowed than other lexical categories into languages (Pakerys, 2016). Morphologically, nouns in Dagbani consist of the root form and the suffix which marks the singular and the plural form (Hudu, 2010; Issah, 2013). According to Hudu (2010), the root form of a noun provides its lexical meaning and 'the number suffix generally shows the noun class to which the entire word belongs' (pp21). For instance, a word like *paɣ-a* 'woman' has the ROOT *paɣ* and a singular suffix

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/–a/. *Paɣ* also inflects for a plural suffix such as /-ba/ as in /paɣ-ba/ 'women' (Issah, 2013). This phenomenon of root-suffix analysis is also observed in other closely related Mabia (Gur) languages such as Gurenɛ (Nsoh, 2011) and Dagaare (Bodomo and Marfo, 2007). In view of nominal class system in Dagbani more especially with respect to number suffixes, Hudu (2005) established nine patterns as provided in section 5.2, but not all of them are applicable in loanwords. In furtherance, Issah (ibid) opines that loanwords such as *buku* 'book', *pompi* 'stand pipe', and monosyllabic words in Dagbani such as *ba* 'father' and *ma* 'mother' do not fit into this root-suffix analysis, they generally take /-nima/ as a plural default marker because they 'are not marked for a distinct singular suffix in the singular forms (Hudu, 2005:11).

Loanwords are adapted morphologically based on the morphology of the recipient language (Kenstowicz, 2003, La Charite 2005, Alder 2006, Davidson and Rolf 1996 as cited in Dashti and Dashti, 2017). It is also related in Hafez (1996) that loanwords are adapted by conforming to the rules of the recipient language's inflection to some extent. What it means is that "a loanword undergoes morphological modification to harmonize with the established pattern and root system" of a recipient language (Smeaton, 1973: 83 as cited in Hafez 1996). Loanwords in the recipient language display certain morphological features during adaptation such as inflections, derivation and compounding (Radford et al., 2009) and (Al-Athwary, 2016; Jarrah, 2013 cited in Dashti and Dashti, 2017). In Dagbani, loanwords also exhibit similar morphological features such as inflections, derivation, aspectual markers and compounding, which will be examined in different sections in chapter five. Segment inventory of contact languages with Dagbani is presented in section 2.4

2.4 Segment Inventory of Contact Languages

Dagbani had a long historic contact with languages such as English, Hausa, Arabic and Akan (Twi) as already stated in chapter one. The review of these languages is motivated by the fact that they serve as donor languages as far as loanword in Dagbani are concerned. Accordingly, knowledge of the phonological system of these languages will be relevant to understanding the phonological processes that are triggered in Dagbani loanword adaptation. Review of segment inventory of these contact languages are as follows:

2.4.1 English Segment Inventory

English spoken in the world are categorized into two: those spoken within the inner circle of the United Kingdom and the United States of America and those spoken in the outer circle including countries such as South Africa, Nigeria, Malesia, Ghana among others (Kachru, 1983 as cited in Okyere, 2013). It is widely acknowledged in existing literature that the Ghanaian variety of English is not the same as the English from the "home countries" (Okyere, 2013). This study therefore focuses on the Ghanaian variety of the English in both vowel and consonant inventory for analysis.

2.4.1.1 English Vowel Inventory

Considering the English spoken in Ghana, seven pure vowels such as [i,e,ɛ,a,ɔ,o,u] are identified by Koranteng (2006) as cited in Okyere (2013) from the twelve pronunciation received pure vowels [ɪ,e,æ,ʌ,ɒ,ʊ,ə,iː,uː,ɔː,aː,ɜː], and out of the eight diphthongs

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pronunciation received, six Ghanaian English diphthongs /aɪ-ai/, /aʊ-au/, /ɔɪ-ɔi/, /ɪə-iɛ/, /ʊə-ua/ and /eɪ-eə/ are noted. This therefore constitutes the vowel inventory for this study. Comparatively, Dagbani do not have diphthongs. The only rare case of diphthong in Dagbani is Hausa loan as in [alɨkaʊli] 'a promise'. Words borrowed into Dagbani and contain diphthongs are realized as long vowels (Hudu, 2002). Similar observation is made in Adomako (2008) in his analysis of vowel epenthesis and consonant deletion in loanword of Akan.

2.4.1.2 English consonant inventory

English phonemic consonants, especially British, are presented in this section. These English phonemic consonants are presented in table 3 below, and they are described based on their places of articulation, manner of articulation and voicing. It is noted that the Standard British Accent characterizes the English learnt in Ghana, and this is probably because the British colonized Ghana (Okyere, 2013). I therefore adapt the International Phonetics Association (IPA) consonants generally used in Britain as a transcription system, which was derived from one system developed in the 1920s by Daniel Jones and his colleagues at London University to provide some writing systems for the African unwritten languages (Radford, Atkinson, Britain, Clahsen, and Spencer, 2009). Table 3 presents the IPA transcription for the British English consonants adapted from Radford et al. (2009).

Table 3: The IPA transcription for the British English consonants

	Plosive	Fricative	Affricate	Nasal	Lateral	Approximant
Bialabial	p b			m		w
Labio-dental		f v				
Dental		θ ð				
Alveolar	t d	s z		n	l	
Post-alveolar		ʃ ʒ	tʃ dʒ			r
Palatal						j
Velar	k g			ŋ		
Glottal		H				

2.4.2 Hausa Segment Inventory

Though there are several varieties of Hausa such as Katsinanci, Guddiranci, Zazzaganci, Sakkwatanci, Sakkwatanci, this study focused on the Ghanaian Hausa variety (Gaananci form) which native speakers of Dagbani are exposed to most frequently through religious activities and trade. The vowel and consonant inventories of Hausa are therefore adopted from Malah and Rashid (2015). Hausa vowel and consonant inventories are as follows:

2.4.2.1. Hausa Vowel Inventory

Hausa pure vowels are: /iː/, /i/, /eː/, /e/, /ɔː/, /ɒ/, /aː/, /a/, /uː/, /ʊ/ and three diphthongs which are /ai/, /au/, /ui/. Caron (2015) made similar observation except /ui/ which was not included as a diphthong in Hausa. However, according to Newman (1996), /ui/ has monophthongized to /ii/ as in <gwuiɓàa > gwiiɓàa 'sediment'. The only Hausa diphthong viable for adaptation in Dagbani is the /au/.

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2.4.2.2 Hausa Consonant Inventory

The table 4 below presents on a general consonant inventory of Hausa language which reflects most, if not all the consonant phonemes of various dialects of Hausa including the Ghanaian variety.

Table 4: Hausa Consonant Inventory **(**Malah and Rashid, 2015:109)

	Plosive	Implosive	Ejective	Fricative	Affricate	Nasal	Trill/Roll/ Flap	Lateral	Approximant
Bialabial	b	ɓ		ɸ		m			
palatalized bilabial	ɸj								
Labio-dental				f v					
Alveolar	t d	ɗ	s'	s z		n	r/ɾ/ ʈ	l	
Post-alveolar	kj gj			ʃ	tʃ dʒ				
Palatal						ɲ			j
Palatalized Glottal	ʔj								
Palatalized velar			k'j						
Velar	k g		k'			ŋ			
Labio-velar	kw gw		k'w						w
Glottal	ʔ			h					

2.4.3 Arabic Segment Inventory

Arabic language is in three major forms: Modern Standard Arabic which is used in religious ceremony and literature, Educated Spoken Arabic which is used in schools and public arenas, and the Colloquial Arabic which is used at home and in community (Amayreh, 2003). The current study used the standard Arabic language which Buesa (2015:3) describes as "the language that is used in the Holy Qur'aan, newscasts, formal

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writings and speeches". This particular form of Arabic is spoken in Mecca and its neighbouring countries like Yemen. It is also the variety which is being studied in our Ghanaian Islamic schools and also being used for preaching, hence has influence on the Arabic words Dagbani has borrowed into its lexicon. I present in this section the Arabic vowels and consonants drawing data from previous studies such as Amayreh (2003), Huthaily (2003), Owens (2013), Buesa (2015) and Guba (2016). Although there are some variations in the Arabic consonantal inventory in terms of terminologies used for some consonant sounds, scholars in the language recognized the controversial nature of the Arabic consonants in terms of manner of articulation (Abubakr, 1982). However, the consonant sounds also share some common phonetic features on the Arabic IPA chart (Buesa, 2015).

2.4.3.1 Arabic Vowel Inventory

Arabic has six monophthongs and two diphthongs including long vowels; e.g /iː, uː, æː/, short vowels; e.g /ɪ, ʊ, a/ (Huthaily, 2003; Bueasa, 2015) and the two diphthongs /ay/ ([aɪ]) and /aw/ ([aʊ]) (Huthaily, 2003). Arabic letters such as ي [jaːʔ], و [wæw] and ا [ʔalɪf] are used to show the length of the vowels while diacritics such as [fat.Hah] (َ) in the case of /a/, [dˤam.mah] (ُ) in the case of /u/, and [kas.rah] (ِ) in the case of /i/ are used to show the short vowels in Arabic. Another diacritical marks in Arabic are the [su.kun] (°) and the [šad.dah] as placed on top of the Arabic word قِصَّة "Qissah" (which means "story." The consonant with the (°) shows that a vowel is not following it (Huthaily, 2003) while the latter shows the doubling of a letter as already discussed under gemination in section 2.4.2.

2.4.3.2 Arabic consonant inventory

Twenty-eight (28) consonantal phonemes are identified in Arabic (Huthaily, 2003; Amayreh, 2003; Buesa, 2015). Of these phonemes, Huthaily (2003) noted that four (4) are velarized because velarization is phonemic in Arabic, although the velum is not the primary place of articulation of these four phonemes. Again, Classical Arabic is generally known of its guttural consonants such as laryngeals: /ʔ, h/, pharyngeal: /ʕ, h/ and velar fricatives: /kh, gh/ (Bueasa, 2015). The current study adopted the consonant inventory of Buesa (2015) as illustrated in table 5 below.

Table 5: Arabic IPA Chart (Bueas, 2015)

	Stop	Nasal	Trill/Tap/ Flap	Fricative	Affricate	Approxim ant	Lateral Approx imant
Labial	b	m				w	
Labio-dental				f			
Dental	t		r	θ ð ðˤ			
Alveolar	tˤ	n	ɾ	s sˤ z			l ɫ
Palato-Alveolar	d dˤ			ʃ	dʒ		
Palatal				ʒ			j
Velar	k g						
Uvular	q			x ʁ			
Pharyngea l				ħ ʕ			
Glottal	ʔ						

What is worth pointing out here is that, consonants such as /t/, /d/, and /s/ are emphatic consonants in Arabic, and they are articulated with the root of the tongue retracted toward the pharyngeal wall. Again, the trill (/r/) occurs at postvocalic environments while the tap (/ɾ/) surfaces at the prevocalic position. In Dagbani, the trill [r] is actually weakened to a

flap [ɾ] in intervocalic position, while it is being realized as a proper trill [r] elsewhere (Olawsky, 1999).

2.4.4 Akan segmental inventory

Various scholars of Akan language notably like Abakah, (2005) Adomako (2008) and others have discussed about which segments constitute the Akan consonant and vowel inventory. This current study adopts the segment inventory in Adomako (2008) which seem to have provided a good description of the vowel inventory and provided a "unified" consonant chart for Akan especially for the Twi dialect of Akan. This study focused on the Twi dialect of Akan, which is mostly spoken in all parts of Ghana including Dagbon as a second language to enhance communication (Adika, 2012).
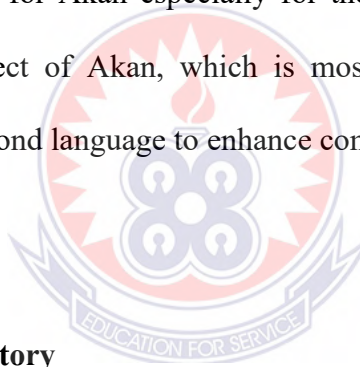
2.4.4.1 Akan vowel inventory

The phonology of the Akan (Twi) recognized ten (10) vowels such as /(i/ɪ), (e/ɛ), (æ/a), (u/ʊ) and (o/ɔ)/ through the feature of the advanced tongue root (ATR) (Adomako, 2008).

2.4.4.2 Akan Consonant Inventory

Concerning the consonantal inventory of the Akan, Adomako (2008) provides a "unified" Akan consonant inventory as detailed out in table 6 below.

Table 6: Akan Unified Consonant Chart (Adomako 2008: 8)

	Bilabial	Labio-dental	Alveolar	Pre-palatal	Palatal	Velar	Glotal
Stop	p, d		t, d			k/kʷ g/gʷ	*ʔ
Fricative		f	s,	ɕ (hy)			h
Labialized Fricative (voiceless)				ɕʷ (hy)			
Affricate				tɕ(ky) dʑ(gy)			
Labialized Affricate				tɕʷ dʑʷ (tw, dw)			
Lateral (voiced)			l				
Nasal (voiced)	m		n		ɲ (ny)	ŋ (n)	
Labialized Nasal (voiced)					ɲʷ (nw)	ŋʷ (nw)	
Glide (voiced)			r		y	w	

Akan has 31 graphemes, which include nine (9) diagraphs plus twenty-four (24) consonants.

2.5 The Typology of Syllable Structure

Various linguists define the syllable in varied ways. However, each of these definitions is based on the notion of sonority hierarchy and the structural point of view (Goldsmith, 1990 cited in Dundaa, 2013). For instance, the syllable is viewed in relation to the number of sonorous peaks found in a word, thus putting the vowels at the peak of the syllable and consonants are relegated to the periphery (Adonae, 2005 as cited in Dundaa, 2013). In this definition, tone plays a vital role in determining word meaning especially in tonal languages such as Dagbani, Akan and others, but this current study does not include a discussion on tone despite its relevance in the phonology of languages.

For instance, the syllable as the head mora in the phonology of languages including Dagbani fundamentally functions as a tone bearing unit in a prosodic word, and used to express phonotactic constraints (Abu-Bakari, 1977; Olawsky, 1999, 2002; Zec, 2009). Structurally, Dundaa (2013) acknowledging Goldsmith (1990:105), as cited in Haris (1951) and Haugen (1956a), opines that, the syllable is "a constituent definable in familiar phrase-structure terms, quite like the sentence." What they imply here is that, some languages will permit certain phonological segments to produce a well-formed utterance, which contain structural hierarchy that is based on binary branching and dominance principle. In other words, the syllable is a phonological unit on which segments are organized (Zec, 2007). It is used to understand phonological structures (Kenstowicz, 1994).

According to Katamba (1989), the syllable has no association in any way with any grammatical or semantic unit. Generally, the syllable is composed of an onset (i. e syllable initial consonant(s)), a nucleus (i.e vowels including long vowels and diphthongs which are the most sonorous in the syllable and the coda (i.e syllable-final consonant or sequence of consonants that occur at the end of the syllable (Kenstowicz, 1994; Zec, 2007), (Hayes 2005; Goldsmith, 1990 as cited in Dundaa, 2013). Syllable structure of languages vary because languages such as English tolerate complex onsets and codas, which are not, allowed in Dagbani (Olawsky, 1999; Nindow, 2017), Akan (Adomako, 2008) and Hausa (Malah and Rashid, 2015). In Dagbani, a vowel and a nasal consonant can be syllabic, but their underlying form are not easy to assign because their surface realization is conditioned by the consonant they precede. Example is the nasal consonants which occur only as preverbal pronouns and usually become homorganic with the

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consonant they precede. According to Yoshida (2013), a syllabic consonant is a consonant that is stretched out in pronunciation and acts as a vowel.

3. Basic Syllable Shape/Sequence

(a) CVC

(b) CV

(c)VC

(d) V

Consonants, which occur at syllable margin, are language specific, and the number of segments allowed at the syllable margins in a language determine the number of syllable shapes for that language (Zec, 2007). For instance, languages such as Arabic and Turkish allow codas, but while Arabic requires onsets (Hayes, 2009), they are optional in Turkish; and while onsets are optional in Fijian, codas are banned. Similarly, while onsets are obligatory in Senufo, codas are banned. This implies that, onsets are generally highly preferred whilst codas are dispreferred in languages. However, Zec (2007) opines that syllables, which have CV and VC shape, should necessarily have V and CVC, and languages with CVC equally have CV syllable as illustrated in 3 above.

The VC sequence refers to vowel and consonant which are independent syllables. Table 7 below is adapted from Zec (2007) illustrating basic syllable shape inventory for the languages under consideration in this current study.

Table 7: Typology of Syllable Shape (Adapted from Zec, 2007:165)

Onset	Coda	Onset Cluster	Coda Cluster	Inventory	Language
	O	X	X	(C)V(C)	Dagbani
R	X	X	X	(C)V	Akan (Twi)
R	O	X	X	CV(C)	Hausa
R	O	X	X	CV(C)	Arabic
O	O	O	O	(C)(C)V(C)(C)	English

R = required, O = optional, X = banned
Onsets are never banned
Codas are never required
Onset clusters are never required
Coda clusters are never required

Clemente (2012) explains that, cluster of consonants such as "CC" or more are allowed in languages such as English, example in words such as [splæt] 'splat', [sɪksθs] 'sixths', hence, noting that English syllable shape is typically $(C)^3V(C)^5$ and he exemplifies it in words such as [strɛŋkθs] 'strengths'. However, languages such as Dagbani, Arabic, Hausa and Akan adhere to the CV syllable structure and do not allow consonant clusters at syllable onset or word initial. Unlike Dagbani, English, Arabic, and Hausa which may tolerate codas, Akan banns the occurrence of coda (Dolphyne, 1988; Abakah, 2005; Adomako, 2008). Only tone-bearing syllabic consonants are allowed word finally in Akan as Dolphyne (1988) illustrates with some Akan examples such as CV.N [so.m] 'hold it.'

Concerning Arabic syllable structure, Owens (2013) claims that, the morphological template of Arabic syllable comprises the CV sequence.

Similarly, Abubakr (1982) observes the dominance of CV or CVC structure in Hausa, which is not different from the three syllable structure types Caron (2015) also noted in

Hausa: CV, CVV and CVC, and tentatively concludes that words with CVC forms are not lexical in Hausa, they are either loans or idiophones. According to Caron (2015), Hausa bans initial vowels, consonant clusters and syllable internal long vowels. Thus, words that begin with vowels require an insertion of a glottal stop [ʔ]. For instance, a word like [aɪki] 'work' is realized as [ʔaɪki], and [amarja] is realized as [ʔamarja] (bride). Hausa and Arabic share similar syllable features in the sense that, most of the Arabic dialects especially those in Mecca and Yemen, highly prefer the CV syllable structure as compared to Moroccan dialects which tolerate CCC syllable sequence, though they also insert epenthetic vowel to break the CCC sequence (Owens, 2013).

What should be noted here is that, languages generally prefer the open syllable type (CV) and this structure has attained the status of being unmarked (Katamba, 1989; Olawsky, 1999; Hudu, 2014b). Thus, languages forbid syllable codas (Clements and Keyser, 1983; Katamba, 1989; Zec, 2007; Hayes, 2009). The open syllable type is mostly preferred by languages because it is a codaless syllable. In considering Dagbani loanword like /mulk/ [multʃi] 'subjects' (Arabic) and /draɪvə/ [dʊrɔba] 'driver' (English, the clusters such as /lk/ and /dr/ are not viable in Dagbani, and according to Nindow (2017), such clusters in the language require some correction through some phonological processes such as epenthesis, deletion or coalescence in order to ensure syllable well-formedness. Thus, [mulk] will be corrected by undergoing further phonological processes such as vowel insertion (Hudu, 2002, Nindow, 2017) and spirantisation (Hudu, 2010, 2018) to become [mʊ.lɨ.tʃi] in Dagbani, turning the codas into onsets. What Zec (2007) also deems necessary and worth pointing out is that, cross-linguistically, the VCV sequence is syllabified as V.CV and not VC.V, as evidenced in the asymmetry of onset or coda. Clements and Keyser (1983) therefore, opine that, the universally unmarked

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characteristics of a syllable structure is such that some languages may not have syllable initial vowels and/or syllable final consonant, but languages generally prefer syllable with onset or syllable with a final vowel.

This suggests that the syllable in languages including Dagbani may have a nucleus with an onset and/or a coda, but it is not all the case that a syllable will have a coda. This is because not every consonant is allowed at the coda position. The rhyme of a syllable is very important in languages, but every language selects the segment that can occur at the rhyme position especially at the syllable-final position (Katamba, 1989). The syllable structure in figure 1 below is adopted from Olawsky (1999) which typically fits into Clements and Keyser's universal proposition of CV-tier syllable structure of languages.
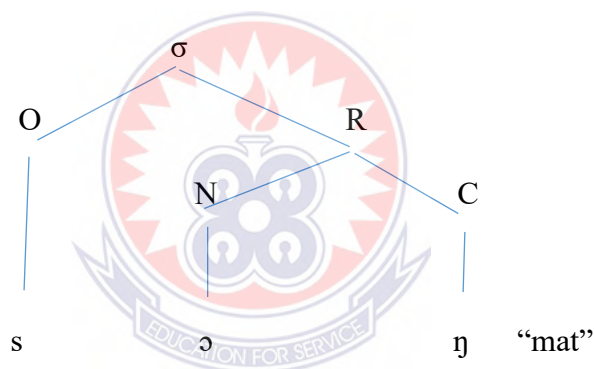
Figure 1: The Syllable Structure (Olawsky, 1999:164)

The focus of this current study is mainly on lexical borrowing, and words borrowed are mostly nominal, which normally have disyllabic structures such as CVC.CV, CV.CV, and CV.V as Hyman (1993) pointed out. This is exemplified in 4, where the monosyllabic stem and the noun class suffix are all contained in the disyllabic structure.

4. Disyllabic Nouns (Adapted from Hyman, 1993:237)

CV.V; [no-o] 'fowel', [do-o] 'man', [na-a] 'chief', [da-a] 'market', [ka-a] 'a car'

CV.CV; [paʔ-a] 'woman', [sa-na] 'stranger', [kpaŋ-a] 'guineafowl', [bu-ku] 'a book'

CVC.CV; [ɲab-ga] 'crocodile', [wab-gu] 'elephant', [dab-lɪ] 'slave', [bol-lɪ] 'football'

Other syllable types in Dagbani are illustrated with examples in table 8 below.

2.6 Dagbani Syllable Structure

The structural composition of the Dagbani syllable is illustrated in table 8 below. The sequence presented in table 8 shows that the nucleus is obligatory in Dagbani while onset and coda are optional.

Table 8: Structural Composistion of Dagbani Syllable (Olawsky, 1999; Issahaku, 2006)

	Syllable Types	**Word example**
a)	V	[a] "second person singular"
		[o] "third person singular"
b)	C(N)	[n/m] "first person singular"
ci)	VC	[an.zan.si] "courage" (Hausa)
cii)		[i:ma:nsɨlɨ] "courtesy/faith" (Hausa)
ciii)		[i:n] "yes"
civ)		[e:ʃija] "Asia" (English)
d)	CV	[za] "millet"
e)	CVC	[dɔʔ.ta] "doctor" (English)
f)	CVN	[gɔm] "sleep"
g)	CVV	[ma:] "determiner"
h)	CVVN	[du:n.si] "mosquitoes"

The above syllable structure types in Dagbani show that words with the initial vowel are loans in Dagbani except 8ciii which is a native word. Loans that have /i/ as initial sound usually employ glide insertion at the onsets in Dagbani, hence, an Arabic expression like

/laa ilaaha ilalaahu/ is usually expressed in Dagbani as [laa jirɨla jilala]. Nindow (2017) made similar observation as he related that in words such as /Isa/ is realized as [jisa] and /ima:nsɨlɨ/ becomes [jima:nsɨlɨ]. Apart from these three vowels, and the two pronouns in 8a-b, there is no other observation of any other vowel occurring at Dagbani lexical word initial not even in loans (Olawsky, 1999). He further opined that words beginning with /e/ are not lexical and that they are even rare in loans because one can only point to few examples as provided by Olawsky (1999) in 8civ. Though languages such as English, Arabic, Hausa and Dagbani do not prohibit syllable codas (closed syllables), but their occurrence in Dagbani are restricted, hence treated as the marked (Katamba, 1989; Nindow, 2017). Segments which are allowed at coda in Dagbani are /m, n, ŋ, r, l, b, ɣ/ (see Abu-Bakari, 1977; Olawsky, 1999; Nindow, 2017 and others). Wilson (1972) also added /h/ to the segments that occur at coda position and this among others is illustrated in 5 h below;

5. Syllable-final codas in Dagbani

/m/   [kom]   "water"

/n/   [kun.duŋ]   "wolf"

/ŋ/   [daŋ]   "family"

/r/   [tarɨ.li]   "share of a gift"

/l/   [gal.li]   "an egg"

/b/   [ŋub.bu]   "chewing"

/ɣ/   [zuʔ.suŋ]   "luck"

/h/   [bihɨ.li]   "breast"

Again, the syllable may have branching depending on the number of consonants a language allows at the syllable margins. The illustration in figure 2 below shows how branching occurs in syllables including Dagbani.

2.6.1 Syllable weight

In many languages, stress plays a vital role in distinguishing syllable weight in terms of it being either heavy or light syllables (Hayes, 2009). Hayes (ibid) further explains that heavy syllable ends with a consonant, a long vowel or a diphthong while a light syllable ends with a short vowel.

Hayes (2009:272) therefore represents a hypothetical word such as /pa.tap.tai.map/ as follows;
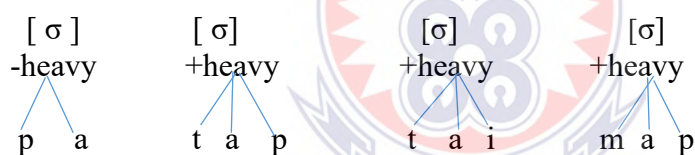
Figure 2: Heavy and light syllables

Syllable weight, according to Guba (2016), is determined generally in languages through the length of the vowel and the coda. Universally, syllables with short vowels are monomoraic and those with long vowels or diphthongs are bimoraic (Katamba, 1989; Guba, 2016). Then syllable-final consonants (codas) are moraic while geminates are underlyingly moraic in languages that have geminates. This confirms the assertion that, both light and heavy syllables in Dagbani contain a mora as Nindow (2017) earlier observed noting that CV sequence constitute light syllables while CVC constitute heavy syllable, as he represents both light and heavy syllables as follows:

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light   **heavy**

a) σ   b) σ

      μ   μ   μ

Figure 3: Light and heavy syllable
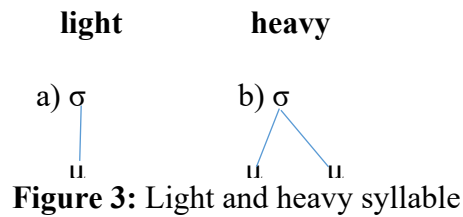
The representation in table 9 below is summarized as follows:

(a) short vowel   μ (one mora)

(b) long vowel   μμ (two moras)

(c) coda consonant   μ (one or no mora)

(d) onset consonant   no mora

The following examples in table 9 show both heavy and light syllables of the various languages under study.

Table 9: Syllable Weight Typology

Sequences	Example	Language
CVC	[dab.lim] 'manhood'	Dagbani
CVV	[ma:] 'determiner'	Dagbani
CV.V	[dĩĩ] 'name'	Akan (Twi)
CVVC	[si:z] 'seize'	English
CV.CVVC	[kita:b] 'book'	Arabic
CVV.CV.CV	[ka:suwa] 'market'	Hausa

According to Odden (2005), many languages prohibit the occurrence of VVC sequence (i.e syllable containing a long vowel and closed by a consonant is disallowed) because, both long vowels and syllable-final consonant contribute extra "weight" to the syllable which is usually expressed as a mora. Thus, a language like Yawelmani ensures that the

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underlying long vowel is shortened to break this pattern that characterize the verbs in the language as illustrated in 6.

6. *CVVC Pattern in Yawelmani (Odden, 2005:170)

	Nonfuture	*Imperative*	*Dubitative*	*Passive aorist*	
CVC	xathin	xatk'a	xatal	xatit	'eat'
	doshin	dosk'o	do:sol	do:sit	'report'
CVVC	saphin	sapk'a	sa:pal	sa:pit	'burn'
	wonhin	wonk'o	wo:nol	wo:nit	'hide'

Unlike English, Hausa and Dagbani which do not prohibit heavy syllable having one syllable-final consonant, in Arabic language, one syllable-final consonant does not make the syllable heavy unless two consonants (Owens, 2013). Then in Akan, since the syllable shape does not include syllable-final consonant, heavy syllable in Akan is CVV where the VV combination is still contested (Adomako, 2008). The CVV sequence is described by Dolphyne (1988) that, the C can be any consonant, but the first vowel (V1) always have the feature [+High +back] (e.g [u] or [ʊ] while the second vowel (V2) is either /e/ or /a/. Which means that just like Dagbani, Akan does not have diphthongs. Thus, a sequence of two vowels either of the same or different quality are considered separate syllables. This therefore, suggests that, syllables in all the languages, which are included in this current study (e.g Dagbani, English, Hausa, Arabic and Akan (Twi), can be classified based on heavy and light syllables.

2.7 Theoretical Framework

This subsection outlines the key tenets of the theoretical framework within which the analysis provided in this thesis is couched. Theory and description are two separate

approaches which are strongly dependent on each other. According to Börjars (2006), a description of a language is based on data and how the data is selected regardless of particular variety one selects. He further explains that although most descriptions rely on a mixture of data collection, a number of types of data are distinguished. According to him, "a description of any language should contain an inventory of the building blocks; sounds and morphemes, roughly. It should also contain the rules for how those elements can be combined; phonotactic constraints, information about which differences between sounds are distinctive, how morphemes can be combined to form words, and how words can be combined to form phrases" (pp 9). Introspection is one of the approaches of descriptive theory in which linguists accept a particular linguistic variable in a particular language based on their intuition and they use these judgments as a basis for the description. It is still however unclear whether linguistically trained persons or non-trained native speakers provide more adequate judgments between 'what is grammatical' and 'what is ungrammatical' in a particular language, a distinction which is crucial both for description and theory (Börjars, 2006).

Where the introspective approach in a certain theoretical context is not appropriate, elicitation could be employed to obtain grammatical judgments from a group of native speakers. However, in a situation where speakers are aware of a particular high-status standard, which is different from their own variety, it could influence their judgments, thus affecting the naturality of the data collected. In an attempt to avoid the use of native speaker judgments, another data collection tool known as corpora could be employed since it has been widely used for the study of all varieties of English (Börjars, 2006). Corpora is a huge written or oral language data collected to serve variety of purposes of a

research phenomenon (Lüpke, 2010). Biber et al. (1999) as cited in Börjars (2006) is an example of a corpus-based grammar of English.

For a linguistic description to become something more abstract and to be regarded as a linguistic theory, Chomsky (1964) as cited in Börjars (2006) defined three properties of a good theory known as 'levels of adequacy': 'observational adequacy', 'descriptively accurate' and 'explanatory adequacy'. Observational adequacy is generally considered by most linguists to be essential, but there is some disagreement as to what exact principles are used in descriptive adequacy, and the fact that a theory requires such principles is relatively uncontroversial. It is also widely agreed that a linguistic theory should explain how and why a phenomenon does occur in a language as emphasized in Chomskyan tradition (Börjars, 2006).

What is important to point out here is that, every theory depends on some kind of description. Thus, there could not be any theory without description. This means that, to model something, we need to ask questions to gain insight into what we are modeling. For example, this current study offers descriptive analysis to address questions regarding what models are considered foreign in Dagbani, what processes do such models undergo when adapted into Dagbani and why do the models exhibit such phonological and morphological properties during the adaptation processes. Indeed, linguistic theory permits us to ask questions about the described data that we could not otherwise have asked in one way or the other, and this explains the need for theory construction (Börjars, 2006). The study and/or analysis of language can be done through a number of possible approaches, which treat linguistics as a natural science. According to Toulmin (1984: 382) as cited in Dixon (2010), "the task of science is to explain actual events, processes

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or phenomena in nature, and no   system of theoretical ideas, technical terms, and mathematical procedures qualifies as scientific unless it comes to grips with those empirical data at some point and in some way and helps to make them more intelligible."

The nature of human language is explained and described in linguistics with particular reference to why every language behaves the way it behaves. This development will lay the foundation for further analysis to be cast in formal theories for prediction that is more scientific and evaluation. Dryer (2006) asserts that four fundamentals of science are crucial in language analysis: description, explanation, prediction, and evaluation. Dryer (ibid) further offers an axplanation of what these four fundamentals scienen in language analysis as follows:

Description: this focuses on the organization of a language; for example, the sound system of the language, how those unit of sounds are combined to form syllables, how syllables are combined to form words and the combination words to form phrases, and the ways in which they fit into the overall grammatical fabric of the language.

Explanation: one ought to offer explanation to why certain sounds are disallowed in one language whilst same sounds are allowed in another language. Why do the phonotactics of languages vary?

Prediction: one may also try to predict what is likely to happen in a particular language over time. For instance, the influx of loanwords in languages is a clear point of reference.

Evaluation: All languages are fairly prestigious and equal in terms of overall complexity. However, the value of every language is different. One may ask; are some languages better than others for certain purposes? Is there a language that easily be learnt than the other? This therefore calls for the need for evaluation, but linguists have not even paid

attention to this aspect of language analysis probably because it is considered offensive to engage in such a debatable topic. In this discussion, the first two: description and explanation are explored. Descriptive theoretical frameworks provide adequate descriptions of what individual languages are whilst explanatory theoretical frameworks talk about why languages are the way they are. These two theoretical frameworks: descriptive and explanatory theories account for how and why languages behave the way do and they are embedded in what Dixon (1997) referred to as 'basic linguistic theory', which I discussed in the next subsection below.

2.7.2 Basic Linguistic Theory

The Basic Linguistic Theory (BLT, hereafter), originated from a pioneering work of Sanskrit and Greek grammarians between 3,000 and 2,000 respective years ago with the aim of enhancing and describing new languages (Dixon, 2010). According to Chomsky (1973) as cited in Dryer (2006), BLT is a single theory that plays a simultaneous role as a descriptive theory and as an explanatory theory giving highlight of what languages are like and why languages are the way they are. This view of Chomsky stemmed out of the belief that "languages are the way they are because of our innate linguistic knowledge" (Dryer, 2006:1).

BLT is widely known for its conservativeness. For instance, it explores ideas from both old and new traditional grammar to describe every language in its own terms without necessarily manipulating the language with models from the European languages, and this makes it different from other contemporary theoretical frameworks (Dryer, 2006).

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Describing language in its own terms reflects on the major contribution of structuralism to BLT and the notion of the phoneme. Though most typologists are trained in generative grammar, in various other respects, BLT has been influenced greatly by the work in typology in ways quite independent of generative grammar (Dryer, 2006). According to Dryer (2006), languages can best be described using BLT despite the failure of linguists to appreciate the status of BLT as a theoretical framework.

Givón (2001: xv) as cited in Dryer (2006) opines that, "if there are functional explanations for why languages are the way they are, we need to have some way of describing the things that are being explained". In the light of language description, Dryer (2006) explains that structuralism and descriptive theory play the same role, whilst functionalism and explanatory theory also play the same role. Dryer (2006) further explains that, describing a language and explaining a language are not the same. However, description and explanation are the core components of BLT as a theory. Many linguists have attached higher prestige to 'theory' to the extent that they often treat any data analyzed in BLT as "merely" descriptive, and consequently dismiss the work, whilst a set of data analyzed using some transient theories such as Minimalism, Optimality Theory (OT), or Head-Driven Phrase Structure Grammar (HPSG) is characterized as "theoretical". Nevertheless, what is interesting and obvious to note about this view is that, every transient theory provides a description of the data analyzed though they go beyond describing the data to make some additional theoretical point about what they are describing.

BLT is not a restrictive theory and because of that it is easy to describe even new phenomenon and such characteristics are of theoretical importance to typological theory

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(Dryer, 2006). The name 'basic linguistic theory' is a theoretical framework employed with the primary aim of providing description of a set of data devoid of any theoretical implications. However, the primary aim of BLT is not limited to description of facts, but also to provide the major source of data for theoretical work in typology since descriptive work in BLT is always of theoretical significance (Dryer, 2006). Thus, this study is guided by the theoretical framework of basic linguistic theory to provide a detailed description of loanwords adaptation in Dagbani. I have found this theory relevant for my work because my intention is to provide an empirical description of a set of data on loanwords adaptation without considering the theoretical implications of the facts described.

2.8 Chapter Summary

The focus of this chapter was to offer an intensive literature review on themes related to the topics under investigation. Some of the themes under which literature was reviewed included the concept of lexical borrowing, overview of Dagbani phonology and segment inventory of contact languages with Dagbani such as English, Hausa, Arabic and Akan (Twi) focusing on the consonantal and vocalic inventories. In addition, other themes under review were the typology of syllable structure, syllable structure of Dagbani and the theoretical framework within which analysis is coached. In the next chapter, I will be presenting on data collection processes.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

In this chapter, various aspects of the methodology employed to achieve the objectives of the study are detailed out. The main areas discussed in this chapter are the research design, study site, sample selections, data collection techniques, and data verification/trustworthiness and data analysis.

3.1 Research Design

A research design according to Kumar (2005:84), is defined as "…the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure". It is explained further that a research design helps the researcher to understand and plan to adequately obtain valid procedure to undertake a study, thus ensuring that the research questions are accurately answered (Kumar, 2005). There are several research designs that a researcher can use for data collection and analysis. Examples of such research designs include longitudinal design, cross-sectional design, experimental design, etc. However, the research design employed for this study is a cross-sectional research with qualitative research approach. A cross-sectional research takes a short period to examine a phenomenon or respondents' attitude, thoughts or emotions at one particular point in time, and it is relatively cheap to obtain quick results since it does not need any follow-ups before analysis is done. This

study is time bound, thus, cross-sectional design is an ideal method especially in describing the characteristics of the population and their attitudes (de Vaus, 2001).

One of the fundamental principles of qualitative research is that human behaviour is based upon meanings which people attribute to and bring to situations (Punch, 2005 as cited in Dornyei, 2007), and that the only way to reveal the meanings and interpretations of participants' experiences regarding a social phenomenon, here in referred as loanwords adaptation is through qualitative approach.

According to Dornyei (2007), qualitative research primarily involves open-ended and non-numerical data collection procedures, and the analytical method is non-statistical. This approach was preferred in this study because data collected for this study involves recorded interviews, various types of texts such as journal papers and theses. Besides, Dornyei, (2007) noted that qualitative research is an approach that describes social phenomena as they occur naturally in the natural settings without any manipulation of issues under investigation. It is stated that a qualitative research is ideal for providing insights into every aspect of language acquisition and uses which is determined or significantly shaped by social, cultural, and situational factors (Dornyei, 2007). The fact that the discourse under discussion (loanwords adaptation) falls within the domain of language acquisition explains the choice of qualitative research approach for this study.

3.2 Research Site

Tamale was the place where data was collected because Dagbani is predominantly spoken there. However, people in Tamale also use other languages such as English, Hausa and Twi in their daily interactions. English language, for instance, is used as an

official language in the Tamale Metropolis and at the same time used by most traders at the Tamale market. This situation has put the speakers of Dagbani into two categories: monolinguals (illiterate native speakers who did not have any form of basic education) and bilinguals (native speakers who had acquired at least some basic education). Apart from the English language, native speakers of Dagbani most especially traders also use Hausa and/or Twi language to interact with customers at the market and other public gatherings. Data was therefore collected from both bilinguals and monolinguals at public places. However, data was mainly pronounced naturally by monolingual speakers for the purpose of transcription to form as input for analysis.

3.3 Target Population

Native speakers of the Tomosili dialect of Dagbani in Tamale constituted the population for the study. Tomosili was employed for this study for the following reasons: it is my native dialect and it is studied in schools (pre-school to tertiary). Generally, more literature exists in that dialect. However, since the speakers of this dialect in Tamale are very large, it was practically impossible to engage everybody during the data collection process, so five key consultants were purposefully selected for this study. I provide in section 3.4 below the steps involved in how purposive sampling technique was used to select the consultants for the study.

3.4 Sample Selections

Purposive sampling technique was employed to select five non-literates (L1) consultants for the purpose of data transcription and verification. These consultants were not from the

same age categories, and they were selected based on their accessibility and willingness as well as readiness to provide me with the needed information for the study. Out of the five consultants, two were females. This was done to avoid being gender bias during data collection and data verification processes. Three of them were in their late thirties whilst the other two consultants were sixty and above. I took their ages into consideration because both the aged and the youth have the potential of providing relevant data based on their experience in life. Also, they were non-literates because the loanwords needed to be pronounced correctly and naturally for transcription to be done.

3.5 Data Collection Techniques

Multiple data sources also known as triangulation was employed which include the use of techniques such as elicitation, my native introspection, from Dagbani dictionary and existing literature (both printed and electronic). These steps were taken in order to crosscheck and strengthen the credibility and validity of the data gathered (Honorene, 2017).

3.6.1 Sources of Data

Data obtained for analysis in this study comes from both primary and secondary sources. According to Kumar (2005), the difference between primary and secondary data is that, primary data refers to data collected directly from respondents from the field. In this study, the processes used to obtain primary data were my native speaker intuition and

elicitations. Secondary data on the other hand, is explained by Kumar to mean information already obtained by researchers for purposes other than the problem at hand and are available in textbooks, journal papers, reports, theses and the internet. Secondary data can easily be located quickly and it is less expensive. This study sourced its secondary data from Dagbani dictionary and previous studies available in printed materials and in the internet.

3.6.2 Data Collection Procedure

Data was obtained from three sources as follows:

Source 1: Data was obtained from previous studies such as Olawsky (1999), Hudu (2002), Alhassan (2006) and Ibrahim (2013). However, data gathered from the available research work as mentioned above were limited to only English-Dagbani loanwords. Therefore, more data on English-Dagbani loanwords and other languages such as Hausa, Arabic and Twi loanwords were gleaned from a Dagbani dictionary (Naden, 2014) which was supplemented and crosschecked with another two Dagbani dictionaries; Blench (2004) and Mahama (2015). Regarding Dagbani dictionary, the work of both Naden and Blench reflect the phonetic feature of the Dagbani lexicons. This is because they are both linguist and used the right keys and forms in their writings. Though Mahama may not be well grounded in the phonetics and phonology of Dagbani, his intuition as a native speaker together with his level of education aided his English translations of the Dagbani words, and which was very useful to this study.

Source 2: Data was complemented with elicitations from spontaneous utterances at public gatherings (e.g religious preaching, wedding grounds, market, etc) and discussions

on radio and television. I present a brief explanation on elicitation and my native introspection as follows:

Elicitation: According to Börjars (2006), is a process by which a researcher completely listens to and obtain grammaticality of judgments from a group of native speakers through picture description or similar processes. Börjars (ibid) further relates that, this process allows a consensus views from people so that peculiarities of individual speakers can be ruled out. Some of ways I elicited data from the native speakers include the following;

Aside eliciting data from the spontaneous utterances of native speakers at public gatherings, I sometimes show a picture of an item and politely require its name in Dagbani. Example,

Elicitation 1: How do Dagombas call the following:

	bolli
	kɔpu
	abe

Also, words that are picturable were presented to speakers for their judgements especially during conversation with colleague native speakers. I will present questions with their consent and request for their judgement. Sometimes, it happens informally but in most cases I informed them before putting forward what I want us to discuss. Example.

Elicitation 2: What word or phrase can be used to mean the same for each of the following words in English:

- Injustice

- An offence

- Wealth

- Dowry

- Kindness

- Menstruation

- Prayer

The above discussed steps were the ways I used to elicit data from the native speakers of Dagbani for my analysis. Though a very good technique for gathering qualitative data, the approach sometimes deviates from naturally occurring data because speakers' judgements are mostly interfered with a particular variety, they consider more standard and different from their own (Börjars, 2006). I also provide explanation of what introspection means in this study.

Source 3: Introspection; It is a data gathering technique where the researcher uses his or her discretion to pass judgement on a particular linguistic phenomenon (e.g pronunciation, a particular phrase or sentence) to form the basis for the description (Börjars, 2006). An advantage of this approach according to Börjars (ibid) might be that persons who are linguistically trained may provide more accurate data than native speakers who are not trained linguistically. This is because, there is the probability that the non-trained persons may not be able to distinguish between 'grammatical and ungrammatical' constructions, which of course is very crucial in both descriptive and

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theoretical analysis. But even a linguistically trained person who is not extra conscious of what he or she says, may not have a good awareness of what they actually say as further claimed by Börjars (ibid).

However, this technique was very useful for my data gathering process because, I was able to use my native intuition together with my linguistic experience to differentiate loanwords from the actual native words in Dagbani both in written text and at public places where I elicited data from the spontaneously utterances by the native speakers of Dagbani.

3.6.3 Data Analysis

The study analyzed a total of 260 loanwords: 148 from English, 46 from Hausa, 50 from Arabic and 16 from Twi. Four objectives were descriptively analyzed in this study, and they were analyzed objectives by objective.

However, before analysis was carried out, loanwords from the source languages under study were transcribed based on the way they are naturally produced. Previous studies such as Hudu (2002, 2005, 2010, 2016, 2018), Adomako (2008, 2013), Caron (2015), Guba (2016) and Bueasa (2015) respectively guided the transcription of words in Dagbani, Twi, Hausa and Arabic. *PhoTransEdit* was mostly used to transcribe English words. *PhoTransEdit* is an open acess online application, which helps to save time when writing English transcriptions. This software provides automatic phonemic transcription, output customization and exporting transcriptions to several formats and many other functions.

3.7 Summary of the Chapter

This chapter presented the methodology used to gather data for this study and how data analysis was done. It also expounded on the main sources of data, how data was verified and the statistics of data analyzed. In chapter four, which follows immediately after this chapter, analysis of loanword adaptation is done with special focus on four aspects: segmental adaptation, segmental processes, syllable structure processes in loanword adaptation and morphological processes in the adaptation of loanword in Dagbani.

CHAPTER FOUR

PHONOLOGICAL PROCESSES OF LOANWORD ADAPTATION

4.0 Introduction

This chapter offers a detailed discussion of the phonological processes a loanword undergoes when adapted into Dagbani, paying attention to the discussion of some observed patterns of loanword adaptation processes in Dagbani. Some of these observed patterns include segmental adaptation (identifying the type of phonemes as well as the number of phonemes, which exist in the native languages to express the sounds of the source language). Also, suprasegmental adaptation such as the phonotactics and syllable structure constraints of the native language including stress or tone system which ensure that output forms conform to the phonotactic constraints of the native language (Kang, 2011; Uffmann, 2015; Wornyo, 2016). This chapter however discusses phonological processes such as segmental adaptation, segmental processes and adaptation of syllable structure processes. According to Kang (2011), phonological processes generally occur to render the adapted forms unmarked in the recipient language. In this chapter, the phonological processes discussed proceed as follows. The first section 4.1 looks at segments that are adapted from the source language especially Arabic into Dagbani. In the second section 4.2, I offer an account of some segmental processes loanwords undergo during adaptation whilst section 4.3 focuses on syllable structure adaptation processes. In section 4.4, I provide a summary of this chapter. I will first turn my attention to segmental adaptation as discussed below.

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4.1 Segmental Adaptation

Segmental adaptation deals with the replacement of the foreign sound in the input with a similar sound in the native language (Kang, 2011). This replacement of sound phenomenon occurs in two forms: either the native language sieves and preserves the input whose phonological features are underlyingly contrastive in the native phonology or the native language preserves the phonetic characteristics of the input, which are salient and mostly preferred over less salient characteristics (Clements 2001, Herd 2005, Dresher 2009 as cited in Kang, 2011). However, during this adaptation process, perception plays a very crucial role in determining which segment is chosen to replace such segments in loanwords which are not familiar to native speakers (Wornyo, 2016).

This phenomenon is observed is some vocabularies borrowed into Dagbani especially from Arabic. It is widely noted that the phonotactics of Dagbani phonology allow all consonants at onset position except /r, ʔ/ (see Olawsky, 1999; Hudu, 2010; Nindow, 2017 and others). Similarly, Ewe does not allow /r/ at the onset position (Wornyo, 2016). As already noted in chapter two, consonants such as /c, q, x/ do not form part of Dagbani consonant inventory, indicating that, when any vocabulary from the source language finds its way into the recipient language herein referred to as Dagbani with those sounds and their likes, such sounds of the loanword will be nativized by replacing the perceived foreign sound with a sound that is phonetically similar in the native language (Uffmann, 2015; Wornyo, 2016). Of the four contact languages of Dagbani, which are under investigation in the present study, only Arabic models display some sounds that do not find their correspondents in Dagbani, and they are therefore adapted. Brierley, Sawalha, Heselwood, and Atwell (2016) present unigram mapping of Modern Standard Arabic

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(MSA) letters to symbols from International Phonetic Alphabet (IPA) symbols in their study for automated transcription of Arabic text, and this is adapted to enhance accurate transcription of Arabic models borrowed into Dagbani.

Table 10: Unigram Mapping of Arabic Letters to IPA Symbols

Arabic Sounds	IPA Symbols	Arabic Sounds	IPA Symbols
ا alif	ʔ	**ط tˤa**	**tˤ**
ب ba	B	**ظ ðˤa**	**ðˤ**
ت ta	T	ع ʕain	ʕ
ج Jim	dʒ	غ ghain	ɣ
ح ħa	Ħ	ف fa	f
خ xa	**X**	**ق qaf**	q
د dal	D	ك kef	k
ذ ðal	**Đ**	ل lam	l
ر ra	r	م mim	m
ز zay	z	ن nun	n
س sin	s	ه ha	h
ش shin	ʃ	و waw	w
ص sˤād	**sˤ**	ي ja	j
ض dˤād	**dˤ**		

[3]When Arabic models with foreign sounds like those sounds bolded in table 10 above are borrowed into Dagbani, the phonotactics of Dagbani will regulate the structure of those loanwords by replacing such foreign sounds with equally phonologically similar sound in Dagbani in order to ensure conformity. An example of segment adaptation is available in 7 through 11 illustrating the adaption of sounds that are unfamiliar to the native Dagbani speakers.

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[3] ق /q/, خ /X/, ص / sˤ/, ظ / ðˤ/, ط /tˤ/ do not have correspondents in Dagbani.

7. ق /q/ adaptation in Dagbani

Source language	Target language	Gloss
a. /ʔalhaq/ 'truth'	/alahɨki/ [alahɨtʃi]	'sin/ offence'
b. /ʔarrizq/	/arizɨki/ [arizɨtʃi]	'wealth'
c. /ħaqi:qa/	/hakiika/ [atʃi:ka]	'truly'
d. /haqi/	/haki/ [hatʃi]	'a due/ a right'
e. /qiyaam/	/kiyaama/ [tʃija:ma]	'judgment Day'
f. /ʔalqidr/ 'pot'	/alɨkidɨrɨ/ [alɨtʃidɨrɨ]	'bucket'
g. /sˤada:qi/	/sada:ki/ [sada:tʃi]	'dowry'
h. /munaafiq/	/munaafiki/ [mʊa:fitʃi]	'hypocrite'
i. /ʔalqalam/	[alɨkalamɨ]	'pen'
j. /ʔalqama/	[alɨkama]	'wheat'
k. /ʔalqa:dˤ/ 'a judge/jurist'	[alɨkalɨ]	'soothsayer'
l. /waqt/	/wakatɨ/ [waʔatɨ]	'time'
m. /qur'an/	[kuraanɨ]	'Holy Qoran'
n. / sˤadaqah/	/sada/ [sara]	'almsgiving'

From the data in 7, the voiceless uvular stop /q/, which does not exist in Dagbani phonology, is adapted into Dagbani as a voiceless velar stop /k/. However, in certain context like 7a—h, the phonotactic rule of Dagbani compels the /k/ to be realized as an

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affricate [tʃ] when preceded by a front vowel as will further receive a detail discussion later in this chapter (see section 4.2 for a detailed discussion). In 8, examples are provided to illustrate how the voiceless uvular fricative خ /X/ is adapted into Dagbani.

8. خ /X/ adaptation in Dagbani

    a. /ʔalxair/   [alɨheːrɨ]   'gift/kindness'

    b. /xadiːdʒa/   [hadiːdʒa]   'female personal name'

    c. /xaidˤaː/   /heerda/ [heːra]   'mensuration'

The closest sound available in the native phonology which speakers deem appropriate to replace /x/ is the voiceless glottal fricative /h/. In some cases, especially in 8b speakers will choose to either drop the first segment /k/ and pronounce the name as [hadiːdʒa] or /x/ will be dropped and the name is pronounced as [adiːdʒa], which is possible in Dagbani because the phonology of Dagbani permits the occurrence of words with vowel initials. However, this is widely observed in loanwords as noted in literature (see Olawsky, 1999, 2004; Nindow, 2017). Interestingly in 8a and 8c, the diphthong /ai/, which is usually adapted as [aa] is realized as [ee] which leaves a puzzle for the attention of phonologists (see section 4.3 for detailed discussion on diphthong adaptation). Also in 8a, other phonological processes such as vowel epenthesis is employed to make the codas /l/ and /r/ onsets as earlier observed in previous studies such as Hudu (2010), Nindow (2017) and others.

Another segment adapted from Arabic is the voiceless dental-alveolar fricative /sˤ/, ص 'sˤād'. Native speakers of Dagbani replace this sound with the voiceless alveolar fricative /s/ in any context it surfaces. The examples in 9 demonstrate this process.

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9. ص /sˤād/ or /sˤ./ adaptation in Dagbani

    a. /sˤala:t/   [sala:tʊ]   'prayer'

    b. /ʔasˤada:q/   /sada:ki/ [sara:tʃi]   'dowry'

    c./ sˤadaqah/   /sada/ [sara]   'almsgiving'

Close study of the data in 9 reveals that inputs from Arabic which contain foreign segment as /sˤ./ undergo segmental adaptation processes. For instance, there is a replacement of /sˤ/ with /s/. Also, there is a substitution of /d/ and /r/ especially in 9b—c which are considered as allophonic variants of /d/, and this will be discussed further in details later in this chapter.

Also observed is the adaptation of voiced dental-alveolar fricative /ðˤ/ ظ 'ðˤa' and /ð/ ذ 'ðal', which are unfamiliar in the Dagbani phonology. Thus, vocabularies containing these sounds are replaced with either /z/ or /ʒ/ during adaptation process because /z/ has an equivalent sound in the Arabic phonology as ز 'zay', which is established in table 10 above. In 10, I provide examples of /ðˤ/ adaptation in Dagbani.

10. ظ /ðˤ/, ذ /ð/, and ز /z/ adaptation in Dagbani

    a. /ðˤa:lim/   [zʊa:limʊ]   'sinner'

    b. /ðˤulm/   [zʊa:linsi]   'fraudulence/sins'

    c. /ðunu:b/   [zunubɨ/ʒinubɨ]   'offence'

    d. /ʔaðˤuhr/   [azafari]   'noon prayer'

    e. /zabbur/   [ʒiɛbu:ra]   'book, Psalms of David'

    f. /zama:n/   [ʒiɛmani]   'a period of time'

    g. /zakka:/   [zaka]   'alms giving'

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The alternation between /z/ and /ʒ/ is expected because they are allophonic variants of the same phoneme (Olawsky, 1999). The data in 10c is expected in Dagbani because /z/ is not preceded by front vowels in Dagbani, hence [ʒinubɨ].

Again, inputs from Arabic which contain the voiceless dental-alveolar stop /tˤ/ are adapted as voiceless alveolar stop /t/ in Dagbani. The data in 11 demonstrate this process.

11. /tˤ/ adaptation in Dagbani

/tˤa:riq/	[tariku]	'male personal name'
/tˤalhatu/	[talɨhatu]	'female personal name'
/tˤa:hidu/	[tahiru]	'male personal name'

This phenomenon is attested in existing literature. For example, in examining English loanwords in Ewe, a Kwa language spoken from the Volta Region of Ghana and Togo to Western Nigeria in Badagry, Wornyo (2016) used the data in 12 below to demonstrate that the segment /ʃ/ is not a phoneme in Ewe, and as the English vocabularies enter Ewe with such unfamiliar sound, it is represented with a native segment /s/, which is closely related to the input in terms of articulatory and/or acoustic properties.

(12) Adaptation of /ʃ/ in Ewe

/ʃʌvəl/	[sofi]	'shovel'
/ʃʊgə(r)/	[sukli]	'sugar'
/stɔ:/	[sitɔ]	'store'
/simɛnt/	[simiti]	'cement'

Unlike in English where /ʃ/ and /s/ contrast, according to Wornyo (2016), /ʃ/ is an allophonic variant of /s/ in Ewe and they are therefore represented identically as shown in (12) above. Similarly, the English interdental fricatives /θ, ð/ do not exist in many languages, and so when English vocabularies with such sounds enter into the borrowing language, those sounds are either adapted as /t, d/ in some languages, or as /s, z/ in others (Uffmann, 2015).

As earlier on stated, during segmental adaptation processes, the inputs further undergo phonological changes through other segmental processes as will be discussed in section 4.2.

4.2 Segmental Processes

The most commonly observed segmental processes and analyzed in this section is consonant mutation, a phenomenon involving phonetic changes that occur in consonants to make them either weak (lenition), strong (fortition) or to cause nasalization (Grijzenhout, 2011). Grijzenhout (ibid) further explains in more specific terms asserting that consonant mutation refers to "a class of processes by which a consonant turn into another segment with a different degree of voicing, continuance or nasality that is not due to neutralization or assimilation to a neighbouring segment of the same natural class" (pp.184). Grijzenhout further noted that consonant alternation is an instance of consonant mutation in the sense that it provides a phonological environment where an oral stop turns into fricative between a sonorant and a vowel, a phenomenon previously observed in Dagbani by Hudu (2002, 2010, and 2018). The major consonant mutation analyzed in this study are palatalization, debuccalization, liquid substitution and fortition. I first present palatalization in the next subsection that follows.

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4.2.1 Palatalization

Palatalization is a phonological Process in which consonants and vowels interact resulting in the acquisition of secondary palatal articulation (Kochevo, 2011). According to Kochevo (ibid), palatalization "usually happens under the influence of the adjacent vowel and/or palatal glide" (pp. 1666). In Dagbani, some phonemes have surface variants before front vowels and such surface variants are because of lenition (Hudu, 2008a), also described as palatalization (Hudu, 2010). Lenition processes such as spirantization and debuccalization are patterns of palatalization before front vowels in Dagbani (Hudu, 2010). Consonants which undergo palatalization before front vowels in Dagbani and are relevant to the present discussion include: /s/→[ʃ], /z/→[ʒ], /ŋ/→[ɲ], /k/→[tʃ] and /g/→[dʒ]. They are illustrated in 13 showing how palatalization is manifested in native Dagbani lexicon.

13. Palatalization of underlying /s, z, k, g, ŋ/ (Hudu, 2010: 13)

a. /s/ → [ʃ]	/si-a/ → [ʃí-ja]	'bee-sg.
b.	/sɛ-ʔʊ/ →[ʃɛ-ʔʊ]	'rainy season'
c. /z/ → [ʒ]	c. /zɛ-ʔʊ/ →[ʒɛ-ʔʊ]	'storm'
d.	/zi-lɨ/ → [ʒi-lɨ]	'load-sg'
e. /k/ → [tʃ]	/kilɨm/ → [tʃilɨm]	'delay'
f.	/kɛ-hɨ/ → [tʃɛ-hɨ]	'rip in pieces'
/g/ → [dʒ]	/gɛ-linsɨ/ → [dʒɛ-linsɨ]	'hatred'
	/gɛba/ →[dʒɛba]	'hate them'

The phenomenon illustrated in 13 is commonly observed in loanword adaptation in Dagbani especially words adapted from English, Hausa and Arabic into Dagbani. This phenomenon is attested in previous studies on loanwords such as Hudu (2002) and Alhassan (2006) where the voiceless alveolar fricative /s/ in the English-Dagbani model is palatalized before front vowels. The present study gleaned more data from other languages such as Hausa and Arabic to expound on the English-Dagbani model. Of the consonants that undergo palatalization as far as segmental processes of loanword adaptation is concerned in Dagbani, palatalization of the coronal (e.g /s/) and the dorsal (e.g /k, g/) are widely observed. This is shown in data 14 illustrate the palatalization of the voiceless alveolar fricative before a palatal vowel [i] of loanwords adapted in Dagbani.

14 Palatalization of /s/ in English loanwords in Dagbani

a. /stɔ:/	[ʃitɔʔu]	'store'
b. /skul/	[ʃikʊrʊ]	'school'
c. /hɒspɪtl/	[aʃibɨti]	'hospital'
d. /skrjudraɪvə/	[ʃikʊrʊdɨra:ba]	'screwdriver'
e. /simɛnt/	[ʃimitɨ]	'cement'
f. /sɪnɪmə/	[ʃini:]	'cinema'
g. /sɪgəɹɛt/	[ʃiga:ri]	'cigarette'
h. /sidi/	[ʃi:ri]	'cedi'
i. /sti:ma/	[ʃitima]	'steamer'

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According to Hudu (2002), there are some ordered rules, which help loanwords to undergo the palatalization processes. For instance, he noted that since Dagbani phonotactics disallows consonant clusters, the inputs from the donor languages first undergo a phonological process such as epenthesis before being subjected to further changes in order to ensure a complete adaptation. For instance, /skul/ 'school' becomes /sikuru/ where there is substitution of liquids as well as insertion of /i/ and /u/ as required by the phonotactics of Dagbani. According to Hudu (2002), /sikuru/ now becomes the input for palatalization where the first syllable with /s/ as the onset in /sikuru/ is realized as [ʃikuru] as sanctioned by a phonotactic rule in Dagbani already stated in the preceding paragraph. Similar phonological processes occur in both Hausa and Arabic loanwords as exemplified in 15 and 16 respectively.

15. Palatalization of /s/ in Hausa loanwords in Dagbani

    a. /sikiri/   [ʃitʃɪri]   'sugar'

    b. /sia/   [ʃija]   'ridicule/joke'

    c. /asi:ri/   [aʃili]   'a secret'

    d. /ko:sai/   [ko:ʃe]   'floppy cake made with beans dough'

    e. /se:da/   [ʃɛhɨra]   'a witness/example'

    f. /masi:fa/   [maʃi:fa]   'trouble'

    g. /ʃe:ge/   [ʃe:dʒe]   'bastard'

16. Palatalization of /s/ in Arabic loanwords in Dagbani

    a. /musˤi:b/   [mʊʃi:ba]   'suffering'

    b. /ʃaitˤa:n/   [ʃintani]   'devil'

However, when /ʃ/ is not preceded by a front vowel in the input, /s/ surfaces in the output which is expected in the phonology of Dagbani as shown in the examples provided in 17 below.

17. /ʃ/ becomes /s/ before any vowel other than front vowel

/ʃɔvəl/	[so:bulɨ]	'shovel'
/ɒpəreɪʃən/	[apole:sa]	'operation'
/pa:tiʃən/	[pate:sa]	'partition'
/steɪʃən/	[te:sa]	'station'
/kwɛstʃən/	[ko:sa]	'question'
/telɪviʒən/	[telivisa]	'television'
/kɒmpətɪʃən/	[kompate:sa]	'competition'

Also observed in segmental processes is the palatalization of /k, g/ before front vowels during loanword adaptation in Dagbani. The data in 18 through 20 illustrate this process. The data in 20 are drawn from Hudu (2018:216) but without tone marking (of course, tone marking is not of interest in the present study).

18. /k, g/ palatalization before front vowels in English loanwords

a. /bæ:g/	[ba:ʤi]	'a bag'
b. /gæŋ/	[ganʤi]	'a gang'
c. /breɪk/	[bɨre:tʃi]	'brake'
d. /kɛndl/	[tʃɛndɨrɨ]	'candle'
e. /brɪks/	[bɨlitʃɨsɨ]	'bricks'
f. /ki:ɒsk/	[tʃijɔsɨ]	'kiosk'

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19. /k, g/ palatalization before front vowels in Hausa loanwords

    a. /girima/   [dʒilïma] 'respect'

    b. /kiriki/   [tʃiritʃi] 'valuable'

    c. /makeri/   [matʃele] 'blacksmith'

    d. /saʊki/   [so:tʃi] 'an improvement in health'

    e. /saʊke/ 'to bring down from the head'   /so:tʃe/ 'trade'

    f. /ba:ngida/   [ba:ndʒira] 'toilet'

    g. /sariki/   [salitʃi] 'chief'

    h. /keke/   [tʃetʃe] 'bicycle'

    i. /zirigi/   [zilidʒi] 'train'

    j. /ʃe:ge/   [ʃe:dʒe] 'bastard'

    k. /gijadi/   [dʒa:ra] kitchen'

20. /k/ palatalization before front vowels in Arabic loanwords

    a. /malik/ 'king'   [malitʃi] 'male personal name'

    b. /mulk/ 'authority/sovereignty'   [mʊltʃi] 'subjects'

    c. /ʔal haq/ 'the right'   [alahïtʃi] 'sin'

    d. /ʔarriziq/ 'wealth'   [arizitʃi] 'wealth'

    e. /ħaqi:qa/ 'truly/indeed'   [atʃi:ka] 'truly/indeed'

    f. /ʔasˤada:q/ 'dowry'   /asada:ki/ [asara:tʃi] 'dowry'

It is obvious from the data in 18 through 20 that, the surface forms of the palatalized consonants are triggered by front vowels, and as such, Hudu (2018) concludes that such palatalized consonants are coronal irrespective of their underlying place specification. In the next subsection, debuccalization is discussed in details.

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4.2.2 Debuccalization

Debuccalization is also a lenition process in which the opposition segments are neutralized at the end of a prosodic domain usually at a syllable coda (Brockhaus, 1995 as cited in Grijzenhout, 2011). According to Hudu (2018), debuccalization is a phonological process that causes a segment to lose its underlying oral constriction. In Dagbani and many other languages for instance, the velar stop /g/ is glottalized as [ʔ] in postvocalic position (Hudu, 2010). This same feature is associated with voiceless velar stop /k/ especially in the Western Dialect of Dagbani where both /k/ and /g/ as the only target consonants are realized as [ʔ] in weak positions such as affixes, particles, and bound roots (Hudu, 2018). This is exemplified in 21 belolw.

21. Debuccalization of /k, g/ in Dagbani native words (Hudu, 2018:212-214).

   a /lʊ́g-ɾɨ́/ [lʊ́ʔ-lɨ́]   "side-sg"

   b /sàkɨ̀/ [sàʔɨ̀]   "be sufficient"

   c. /mɔ́-gʊ́/ [mɔ́-ʔʊ́]   "grass-sg"

This phenomenon occurs across word boundary in Dagbani especially in a rapid speech as expressed in the following:

   <Ya ka a yina> [jaʔa:jina]? 'Where are you coming from?'

   <Bɔ ka a dira> [bɔʔa:dira]? 'What are you eating?'

In loanwords adaptation in Dagbani, only the voiceless velar stop undergoes the process of debuccalization before vowels as shown in 22. There is no instance of /g/ debuccalization in loanwords as opposed to the observed pattern of /g/ debuccalization in the native lexicon shown in 21. The examples provided in 22a-c are pulled from Hudu (2002) with some modification in the transcription.

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22. /k/ debuccalization in Dagbani loanwords; /k/→[ʔ]/ V_

    a. /dɔkte/   [dɔʔta]   'doctor'   English

    b. /spoks/   [sɨpʊʔsɨ]   'spokes'   English

    c. /bʌkɪt/   [bɔʔati]   'bucket'   English

    d. /kəndʌktə/   [kɔndɔʔte]   'conductor'   English

    e. /tikɪt/   [tɨʔti]   'ticket'   English

    f. /pækɪt/   [paʔatɨ]   'packet'   English

    g. /mɪks/   [miʔsɨ]   'to mix'   English

    h. /sɔks/   [sɔʔsɨ/   'socks'   English

    i. /taksi/   [taʔsɨ]   'taxi'   English

    j. /watəwɛ:ks/   [watawaʔsɨ]   'water works'   English

    k. /waqt/   [waʔatɨ]   'time'   Arabic

    l. /yɛkayɛka/   [jaʔa jaʔa]   'a sieve'   Twi

One important observation about the phenomenon in 22 is that, with the exception of 22k which originates from Arabic, the rest (most of the examples) are from English. According to Odden (2005), the voiceless velar stop /k/ and the uvular /q/ do not show any contrast in Kenyang (Cameroon), a phonetic characteristic that is also exhibited in 22. The selection of /k/ versus /q/ is dependent on the nature of the vowel, which precedes the consonant (Odden, 2005). Two alternative explanations are offered by Odden (2005) to this context: the voiceless velar stop becomes uvular when preceded by back non-high vowel or uvular becomes velar when preceded by front vowel or central vowel or high back vowel or consonant at word-final. However, regardless of the origin of the loanword, the change in place specification (i.e from dorsal to glottal) is because of the preceded vowels in the surface forms, which is motivated by the phonotactic rule of

Dagbani. At this point, other segmental processes, which are prevalent in loanword adaptation in Dagbani including liquid substitution and the alternation between liquid and stop, are discussed.

4.2.3 Liquid substitution

Liquid substitution is a common pattern that is observed in the adaptation of loanword in Dagbani as exemplified in 23. This segmental process is expected because the phonotactics of Dagbani disallow the occurrence of the alveolar trill at word-initial, as such when adapting words from the source language, which contain /r/ at word-initial into Dagbani; it is substituted with the alveolar lateral (Olawsky, 1999; Hudu, 2002). The data in 23 illustrate the substitution of liquids, which occur in words borrowed from English and Hausa.

23. Substitution of /r/ and /l/ in English loanwords adaptation in Dagbani

      a. /raɪswata/   [lasweta]   'rice water'

      b. /repɜːra/   [lipeːla]   'repairer'

      c. /rʌbə(ɹ)/   [lɔba]   'rubber'

      d. /ɹɛdʒɪmənt/   [lindʒima]   'regiment'

      e. /f(ɹ)eɪm/   [filim]   'frame'

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24. Substitution of /r/ and /l/ in Hausa loanwords adaptation in Dagbani

a. /re:mʊ/	[le:mʊ]	'an orange'	
b. /ra:kumi/	[la:kum]	'camel'	
c. /rake/	[latʃe]	'sugarcane'	
d. /sariki/	[salitʃi]	'chief'	
e. /zirigi/	[zilidʒi]	'train'	
f. /amarija/	[amɨlija]	'wedding'	
g. /ta:rija/	[ta:lija]	'wedding items'	
h. /du:ra/	[du:la]	'syringe'	
i. /araha/	[alaha]	'cheap'	
j. /fʊra/	[fʊla]	'a ball of cake made with millet	
k. /ko:kari/	[ko:kalɪ]	'Good effort/endeavour'	
l. /fi:ra/	[fi:la]	'conversation'	
m. /tula:re/	[tula:le]	'perfume'	

In 24h—l, the alveolar trill occurs before a front vowel playing the role of an onset, and as already established in Dagbani phonology, /r/ does not occur at word initial.

However, in the adaptation of liquids, it is also observed that English models with the alveolar lateral occuring before and after a vowel changes into the alveolar trill perhaps as aresult of the consonant (preferably a stop) that comes before or after the alveolar lateral, and this is exemplified in 25.

25. /l/ becomes [r] before and after a vowel

a. /kolpot/	[kurʊfo:tʊ]	'coal pot'	
b. /skul/	[ʃikurʊ]	'school'	
c. /polis/	[pirɨnsɨ]	'police'	
d. /smʌgəl/	[sɨmɔgɨrɨ]	'smuggle'	

e. /pedəl/   [pɛdɨrɨ]   'pedal'

f. /kəlɛktə(ɹ)/   [kɔrata]   'collector'

g. /pleɪt/   [parante]   'plate'

According to Hudu (2002), this process can be observed in native words such as 'tikurkua' /tikurɨkʊa/ (red ant), 'kurumbuni'/kurʊmbuni/ (distant past) 'kurugu' /kurʊgʊ/ (iron), 'guruma' /gʊrʊma/ (talismen) and 'gurugu' /gurʊgʊ/ (name of a village)' where the alveolar trill occurs between two vowels [p.19-20].

4.2.4 Substitution of /d/ and /r/

This spirantization process involves the replacement of alveolar stops by either alveolar flap /ɾ/ or the retroflex /ɽ/ (Gurevich, 2011) especially in languages with the alveolar flap. According to Radford et al. (2009), flapping usually involves tapping the alveolar ridge with the tip of the tongue very quickly and the stop is normally found between two vowels. Radford et al. (2009) also noted that, during flapping there could be a change in one or more phonetic features of a consonant sound (that is, a change in voicing, place of articulation, or manner of articulation), and the targeted consonants in flapping include the alveolar stops (e.g /t, d/) as related in Radford et al. (2009) and the alveolar flap /ɾ/ or the retroflex /ɽ/ (Gurevich, 2011). This phenomenon is very common among the varieties of English spoken in North America, Australia and New Zealand, as exemplified in Australian English in 26 where a voiceless sound /t/ changes into a voiced sound /ɾ/.

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26. A voiceless sound changes into a voiced sound (Radford et al., 2009:62)

      [lɪtə] → [liɾɐ] 'litter'

      [bɪtə] → [biɾɐ] 'bitter'

      [gɛtɒf] → [geɾɒf] 'get off'

Another example involving a change with respect to place of articulation appears in a popular instance where [t] changes to [ʔ] in southern British English as illustrated in 27, and also examples in 28 and 29 showing the interdental fricatives /θ/ and /ð/ changing to labiodental fricatives /f/ and /v/ respectively (Radford et al., 2009:62).

27   [bʌtə] → [bʌʔə] 'butter'

       [plɒt] → [plɒʔ] 'plot'

28   [θʌm] → [fʌm] 'thumb'

       [nʌθɪŋ] → [nʌfɪŋ] 'nothing'

29   [bɒðə] → [bɒvə] 'bother'

       [briːð] → [briːv] 'breathe'

The only unique change observed in 27 above is the place of articulation where the alveolar stop changes to a glottal stop, indicating that, the two sounds /t/ and /ʔ/ are voiceless and have the same manner of articulation because they are both plosives. Similarly, the only change observed in 28 and 29 is the place of articulation where an interdental has changed to a labioddental. But in terms of voicing and manner of articulation, they remain the same such that both the interdental and labiodental are voiceless in 28 and they are both voiced in 29.

An example illustrating a change in manner of articulation is when [ɹ] is realized as [ʋ] before a vowel as illustrated in 30 below.

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30 A change in manner of articulation

[ɹɒb] → [ʋɒb] 'rob'

[bɹaʊn] → [bʋaʊn] 'brown'

From 30, the retroflex [ɹ] and a labiodental [ʋ] are both voiced approximants, and have the same place of articulation, but they differ in manner of articulation because, while [ʋ] has the same place of articulation as [v], its manner of articulation is associated with [w]. In a Niger-Congo language such as Calabar-Creek Town dialect of Efik, /b, d, k/ non-initially before vowels are realized as [β ɾ ɣ] respectively; while /b/ and /k/ spirantize, /d/ flaps as illustrated in 31 and 32.

31. Non-initial flapping before a vowel in Calabar-Ceek Town dialect of Efik (Adapted from Dunstan, 1969: 38 as cited in Gurevich, 2011)

a. /b/→[β] in droβ-ebe 'twelve

b. /d/→ [ɾ] in ikoɾ-ekpene 'name of town'

c. /k/→ [ɣ] in ufoɣ-udwa 'market'

32. /b, d, g/→[β ɾ ɣ]/V_V in Somali (Amstrong, 1964 as cited in Gurevich, 2011)

a. laba [laβa] 'two'

b. badag [baðag] 'goose'

c. tidi [tiɾi] 'she said'

In 32a—b, spirantization occurs intervocally after a stressed syllable while /d/ flaps in c. However, languages having trill usually substitute /d/ with [ð] while in languages where a trill is not phonemic, /d/ is substituted with a flap [ɾ] as shown in 31b as noted by Gurevich (2011). In Dagbani however, the voiced alveolar plosive is substituted by an alveolar trill when preceded by a vowel in a compound especially in a rapid speech, thus showing how distinct this type of consonant substitutions is among other consonant

substitutions in loanwords adaptation (Hudu, 2002). With examples in the native lexicon, Hudu (2002) reports on the substitution of /d/ and /r/ in the native lexicon as follows;

/mo do:/   [moro:]   'moshi man'

/bɪdɪbga/   [birɪbga]   'a child (male boy)'

/bɨ da:/   [bɨra:]   'they did'

Similarly, loanwords in Dagbani display the above observed pattern and this is shown in 33. Examples in 33a-e were previously identified in Hudu (2002), and I have expounded on them with some little modification in the transcription.

33. Substitution of /d/ and /r/ in English loanwords adaptation in Dagbani

     a. /hedmæn/   [he:rimanɨ]   'headman'

     b. /fɑ:ðə/   [fa:ra]   'father (reverend)'

     c. /bɔ:dəgɑ:d/   [bɔraga:rɨ]   'border guard'

     d. /kɔdɪneɪtə/   [kɔrine:ta]   'coordinator'

     e. /mʌdgɑ:d/   [mɔrɨga:rɨ]   'mud guard'

     f. /kɑ:d/   [ka:rɨ]   'card'

     g. /jɑ:d/   [ja:rɨ]   'yard'

     h. /paʊdə(ɹ)/   [po:ra]   'powder'

34. Substitution of /d/ and /r/ in Hausa loanwords adaptation in Dagbani

     a. /takada/   [takara]   'a paper'

     b. /ba:ngida/   [ba:ndʒira]   'toilet'

     c. /gjadɪ/   [dʒa:ra]   'kitchen'

     d. /sa:da/   [ʃa:ra]   'expensive'

     e. /fasada/   [fasara]   'explanation'

     f. /la:da/   [la:ra]   'reward'

35. Substitution of /d/ and /r/ in Twi loanwords adaptation in Dagbani

      a. /ɲadewa/   [ɲarɨwa]   'garden egg'

      b. /obiarankɔda/   [abiarankɔra]   'curfew'

What is worth noting in 35 is that, the data in 35b is a clause in Twi that is adapted as a word in Dagbani to mean 'curfew'. Lexically, Twi has no word expressing the meaning of 'curfew'. In Twi, it is expressed as *obiara nkɔda* which literally means 'everybody should go and sleep', and this was usually heard during curfew hours in the past, when information van goes around giving announcement for people to leave the streets and remain indoors. The alternation between /d/ and /r/ is however a phonological requirement. According to Olawsky (1999), /d/ and /r/ are allophonic variants of /d/ in Dagbani. Thus, when /d/ occurs between two vowels in a rapid speech, it surfaces as [r]. Another segmental process discussed is fortition, which is presented in the next subsection.
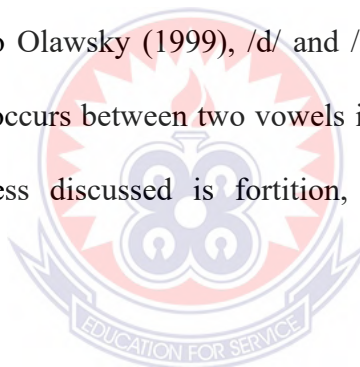
4.2.5 Fortition

This is a phonological process, which involve a consonantal change or strengthening the degree of stricture resulting in devoicing or formation of stops (Grijzenhout, 2011). For instance, a fricative or approximant may become a stop as noted in Goodman (1964) cited in Kirchner (1998) where at word-initial position, /v/ becomes [b] in Creole French. According to Hudu (2018:206), the labial and coronal places are the targets of enhancement in patterns of fortition in Dagbani. The pattern observed in Creole French is similarly displayed in Dagbani as shown in 36 involving only the English models where

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the fricative /v/ becomes a stop /b/ between two vowels while maintain its voicing property (i.e a voiced labiodental fricative surface as voiced bilabial plosive).

36. /v/ and /b/ substitution in English loanwords in Dagbani

a. /draɪvə(ɹ)/	[dɨra:ba]	'driver'
b. /sɪlvə(ɹ)/	[sɨlɨba]	'silver'
c. /sɪvɪlɪən/	[sabi:la]	'civilian'
d. /ʃʌvəl/	[so:bʊlɨ]	'shovel'
e. /grævəl/	[gɨrabʊlɨ]	'gravel'
f. /fi:və(ɹ)/	[fi:ba]	'fever'
g. /sɜvɪs/	[sabinsi]	'service (taxi)
h. /gwɑ:və/	[guabe]	'guava'

The change from /v/ to /b/ occurs at the beginning of syllables in all the contexts as demonstrated in 36. It is also observed that an alveolar nasal is either deleted or inserted in some forms as respectively shown in 36c and 36g. While nasal is deleted to reduce the size of the syllable in 36c it is inserted in 36g to increase the size of the syllable. Diphthongs are also noted in the data, which undergo some form of vowel lengthening (see section 4.3.3 for a detailed discussion). Interestingly, the fortition processes in 36 and (37a--f) involve only labials whilst the process in 37g—h and 38 involves only coronals undergoing fortition process as already attested in Hudu (2018). In 37, there is obstruent final devoicing with /b/ changing to [p] or [f] then /v/ and /z/ respectively change to [f] and [s] all surfacing between two vowels. This is attested in some examples in 37.

37. Obstruent final devoicing

a. /braɪb/	[bɨra:pʊ]	'bribe'
b. /bʌlb/	[bolɨfʊ]	'bulb'
c. /tju:b/	[tupʊ]	'tube'
d. /li:v/	[li:fʊ]	'leave'
e. /sɪv/	[si:fʊ]	'sieve'
f. /stəʊv/	[sɨtufu]	'stove'
g. /ju:z/	[ju:sɨ]	'use'
h. /saɪz/	[sa:sɨ]	'size'

Although some scholars argue that final devoicing is a process of lenition, Gordon (2011a: 828) as cited in Guba (2016) considers it a case of fortition. Final devoicing is motivated by phonetic factor (Hayes, 2004; Gordon, 2007 as cited in Guba (2016), perception (Yu 2011), and markedness criteria which suspend marked features in weak positions (cf. Kiparsky 2006 as cited in Guba (2016).

Close examination of the loanword corpus for the present study also revealed deaffrication process; a phonological process involving affricates changing to fricatives or plosives as commonly observed in words borrowed from Arabic and Hausa. Examples are displayed in 38.

38. /dʒ/ becomes [z/ʒ]

a. /daradʒa/	[darɨza]	'valuable'	Arabic
b. /ʔaldʒanna/	[alɨzanda]	'heaven'	Arabic
c. /ʔaldʒinn/	[alizini/aliʒini]	'jinn/spirit'	Arabic
d. /dʒama:ʔat/	[zama:tu]	'crowd'	Arabic
e. /haadʒara/	[azara]	'female personal name'	Arabic
f. /maga:dʒia/	[maga:ʒia]	'a leader of a group of women'	Hausa
g. /alima:dʒiri/	[alima:nʒiri]	'begger'	Hausa

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Generally, it is expected that /z/ occurs before [a] and /ʒ/ occurs before any front vowel.

Thus, forms that are borrowed from both Arabic and Hausa undergo fortition process at syllable onset position but also maintain its voicing property. In (24f), the occurrence of /ʒ/ before front vowels is commonly observed in the Eastern dialect.

Similarly, /tʃ/ and /s/ are both voiceless obstruents, and they surface in forms in which they are preceded by a nasal in both the donor and the recipient languages. This phenomenon is prevalent in Dagbani lexical such as *ʒilinsi* 'ignorance', *jelinsi* 'hatred' *milinsi* 'familiarization' and others have /-sɨ/ occurring after a nasal. Thus, it is not possible to have forms such as **ʒilintʃi, *jelintʃi, *milintʃi* within the native lexicon. One clear instance where this form is realized is a loanword from Akan (Twi) such as [bantʃi] 'cassava' that of course has the least distribution in the Dagbani phonology. Thus, during loanwords adaption in Dagbani, inputs with /tʃ/ being preceded by a nasal will surface as [s]. These are exemplified in 39.

39. /tʃ/ becomes [s] in Hausa loanwords in Dagbani

a. /hukuntʃi/	[fʊkumsɨ]	'authority/law'
b. /anzantʃi/	[anzansɨ]	'courage'
c. /mʊsulintʃi/	[mʊsulɨnsɨ]	'Islam'

One other aim of this study is to identify and discuss some prosodic processes required to maintain preferred syllable structure of Dagbani. I present this discussion in the next section.

4.3 Syllable Structure Processes

The syllable plays a vital role in the phonological analysis of loanword adaptation. The syllable is core here because it appears most frequently not to be the same in the donor and the recipient languages (Hudu, 2002). According to Schane (1973: 52) as cited in Hudu (2002), "syllable structure processes affect the relative distribution of consonants and vowels within a word". For the fact that languages have different syllable structures and different segment inventory means that, words borrowed from other languages may necessarily have to meet certain structural requirements of the recipient language during adaptation processes (Kager, 1999; Hall, 2011). When the foreign input displays any ill-formed structure in the recipient language, there are different repair strategies that can be employed to deal with such a phonotactic constraint violation. Some of these strategies are discussed in this section. Four major syllable structure processes are discussed in this section which include epenthesis which is discussed in subsection 4.3.1, deletion is discussed in subsection 4.3.2, then adaptation of diphthongs discussed in subsection 4.3.3. Also discussed is importation of loanwords in subsection 4.3.4. I will first offer a discussion on epenthesis in the next subsection below.

4.3. 1 Epenthesis

Epenthesis, also known as *insertion is* the addition of a sound to a word or an utterance (Hall, 2011). In Dagbani and many other languages, the segment that could be added to the word or an utterance could be a vowel, a consonant or a syllable (Nindow, 2017). However, vowel and consonant epenthesis are the focus of the present study especially

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within the domain of loanword phonology in Dagbani. Languages with restrictive constraints on syllable structure reshape words borrowed from other languages with more permissive syllable structure by employing epenthesized segments such as vowels to satisfy these syllable constraints (Uffmann, 2006). Since Dagbani native words do not permit cluster of consonants in syllable initial, syllable medial and syllable final and bans codas, it resorts to vowel insertion to break any form of CC and to make none-codas consonants onsets (Olawsky, 1999; Hudu, 2010; Nindow, 2017). This phenomenon of vowel epenthesis is observed in many other languages in the world (Uffmann, 2006). According to Guba (2016), Ammani Arabic also employs vowel epenthesis to repair complex margins and to render the output unmarked. Vowels are epenthesized to break forms with codas and clusters in Akan (Adomako, 2008; Apenteng, 2013), in Ewe (Wornyo, 2016) and in Dagbani (Hudu, 2010; Nindow, 2017). The data in 40 shows typological epenthetic vowels in bold typeface.

40. Typological Vowel Epenthesis in Loanwords (Adopted from Uffmann, 2006:1080)

Yoruba	kílááas**i**	'class'	(Akinlabi, 1993)
Kikuyu	ng**i**rath**i**	'glass'	(Mwihaki, 2001)
Japanese	s**u**t**o**raik**u**	'strike'	(Park, 1987)
Somoan	s**i**kaut**i**	'scout'	(Cain, 1986)
Fijian	s**i**piinij**i**	'pinach'	(Kenstowicz, 2003)

Comparatively, epenthesis is universally preferred to deletion considering the syllable structure constraints in loanword adaptation, especially among languages who have a tight CV syllable structure (Plag and Uffmann, 1999). In Dagbani, vowel that is commonly epenthesized to avoid consonant clusters is /ɨ/ except when the root vowel is

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/i/, which compels the epenthetic vowel to harmonize with the root vowel and emerges as /i/ (Hudu, 2010). Other vowels commonly used to satisfy phonotactic constraints in non-word-final position in Dagbani include /a/, which has the least distribution. Vowels which are also epenthesized at word-final position especially in loanword are [i, ʊ] (Hudu, 2002). The data in 41 illustrates the epenthetic vowel /ɨ/ in the roots of verbs and nouns in Dagbani as related in Hudu (2010:17-18).

41. Epenthetic vowel /ɨ/ in Dagbani verbal roots.

CVC roots	CVCm	CVCC roots verbs	CVCC roots nouns
lìh[ì] 'look'	tìh[ì]m 'sneeze'	jíʔs[ɨ] 'wake up'	námd[ɨ]-lɨ 'sandalse'
pɨl[ɨ] 'cover'	bɨl[ɨ]m 'roll'	bɨls[ɨ] 'fondle with'	ɲíms[ɨ]-lɨ 'neem tree'
ŋʊb[ɨ] 'chew'	bʊh[ɨ]m 'parasite'	bʊʔs[ɨ] 'describe'	sàbs[ɨ]-gú 'gecko'
fɛb[ɨ] 'whip'	bɛh[ɨ]m 'doubt'	bɛɾg[ɨ] 'rotten'	gbɨʔ[ɨ]n-lɨ 'lion'
bɔʔ[ɨ] 'split'	bɔh[ɨ]m 'learn'	tɔʔs[ɨ] 'speak'	
taɾ[ɨ] 'share for'	gbar[ɨ]m 'be smear'	tab[ɨ] 'stick to'	

It is obvious that when the foreign input displays an ill-formed structure, languages have different repair strategies to deal with such phonotactic constraint violation. For example, when a complex onset is borrowed into languages which ban onset clusters (e.g C_1C_2V), the native phonotactic requirement could be satisfied by vowel epenthesis either in front of the cluster (e.g VC_1C_2V) or between the cluster (e.g C_1VC_2V). Inserting a vowel between the clusters is exemplified in Japanese; *Christmas*→[kurisumasu], and this is not different from what pertains in Dagbani as will be seen in subsection 4.3.1.1. After a

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general examination of epenthesis in Dagbani native lexicon and other languages, I will now turn to loanword phonology and explore the phenomenon of epenthesis in Dagbani. In particular, are vowel epenthesis at word-initial clusters, word-final clusters, and word-final codas, as well as sonorant epenthesis. The next subsection examines vowel epenthesis in loanwords adaptation in Dagbani.

[4]4.3.1.1 Vowel epenthesis in loanwords

Words borrowed from other languages such as English and Arabic display foreign inputs such as clusters and non-coda consonants, which need to be repaired in order to satisfy the phonotactics requirements of Dagbani. For instance, coda position in Dagbani is restricted to consonants such as /b/, /ɣ/, /m/, /n/, /ŋ/, /l/, /r/ as earlier on stated (Olawsky, 1999; Hudu, 2010). Thus, any other consonant at coda position is disallowed or will obligatorily undergo epenthesis to make the coda an onset. The corpus of loanwords gathered for this study reveals most loanwords especially from English and Arabic to have codas, which require vowel epenthesis. The quality of epenthetic vowels in loanwords especially in the present study depends on the root vowel of the input form. Which means that, +ATR root vowel in the input form will require the insertion of +ATR vowel and the vice versa. The data in 42 through 47 demonstrated vowel insertion in loanwords in Dagbani.

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[4] For the sake emphasis, epenthetic segments are in bold. However, while the input is in two slashes / / the output is enclosed in square bracket [ ].

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42. Vowel epenthesis in English loanwords to make codas onsets

a. /bɔ:l/	[bollɨ]	'football'	
b. /bʊk/	[buku]	'book'	
c. /bʌkɪt/	[bɔʔatɨ]	;bucket'	
d. /tju:b/	[tupʊ]	'tube'	
e. /kʌp/	[kɔpʊ]	'cup'	
f. /kuk/	[kuku]	'cook'	
g. /belt/	[balatɨ]	'belt'	
h. /fridʒ/	[firidʒi]	'fridge'	
i. /pʌmp/	[pɔmpi]	'a pump'	
j. //tɪkɪt/	[tiʔɨtɨ]	'tiket'	

43. Vowel epenthesis in Arabic loanwords to make codas onsets

a. /mulk/	[mʊlitʃɨ]	'subjects'
b. /nasr/	[nasara]	'victory'
c. /ʃirk/	[ʃirɨku]	'spell/magic'
d. /muslɪm/	[musulɨmɨ]	'a moslem'
e. /waqt/	[wakatɨ]	'time'
f. /magɾib/	[magarɨbɨ]	'4th daily prayer'
g. /hisa:b/	[hisa:bɨ]	'divination'
h. /ʔazal/	[azalɨ]	'fate/eternity'

44. Vowel epenthesis in Twi/Gonja loanwords to make codas onsets

n. /nkrakra/	[karakara]	'light tomato soup'	Twi
o. /kabre/	[kabɨre]	'spell/charm'	Gonja

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It is very clear from the data in 42 through 44 that, native speakers of Dagbani will at all cost disallow obstruents at the coda position. For instance, all the stops in coda position are corrected by the insertion of a vowel. Though the final coda consonants in Dagbani such as /b, l, r/ as observed in 42 through 44 are of course adapted with vowel epenthesis. Peperkamp (2005) as cited in Kang (2011) describes such cases as unnecessary repair since those segments are coda consonants. This is exemplified in the Korean phonology where voiceless stops are tolerated at coda position, but when English models with voiceless stops are adapted into Korean lexicon, vowel epenthesis is required at coda as shown in cut→[kʰʌtʰɨ] (Kang, 2003 cited in Kang, 2011). However, the context in which they occurred in Dagbani requires an insertion because /l/, /b/ and /r/ are permitted at only coda position within a word but not at word-final position. According to Nindow (2017), the insertion of vowels in loanwords are sometimes not necessarily to satisfy phonotactic constraints, but for the purpose of perceptual similarities that the source and the target language have in common. Dagbani mostly employs vowel epenthesis to break word-final clusters. The data in 45 illustrate vowel epenthesis in word-final clusters.

45 Vowel epenthesis in word-final clusters in English loanwords in Dagbani.

a. /bʌlb/	[bolifʊ]	'bulb'
b. /belt/	[balatɨ]	'belt'
c. /mɪlk/	[milɨtʃɨ]	'milk'
d. /pedl/	[padɨrɨ]	'peddle'
e. /kendl/	[tʃandɨrɨ]	'candle'

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46. Vowel epenthesis in word-final clusters in Arabic loanwords in Dagbani.

a.	/mulk/	[mʊlɨtʃɨ]	'subjects'
b.	/nasr/	[nasara]	'victory'
c.	/ʃirk/	[ʃirɨku]	'spell/magic'
d.	/ʔalqidr/	[alitʃidɨri]	'bucket'
e.	/waqt/	[waʔatɨ]	'time'

In view of this word-final coda position, vowel epenthesis is commonly observed in models from only English and Arabic. It is however not clear whether epenthesis is cross-linguistically preferred over deletion (Kang, 2011). However, what is certain in Dagbani is that open syllables are preferred (Olawsky, 1999; Hudu, 2010; Nindow, 2017). In some languages like Thai, heavy syllables are preferred at syllable final of a word, as such the phonotactic demand is satisfied by either a glottal stop epenthesis as shown in a native word such as /pʰrá/→[pʰráʔ] 'monk' or vowel lengthening as shown in English loanword in Thai as in *coma*→[kʰoːmə:].

Also, in 47 below, it is demonstrated that the inserted vowel at word-initial cluster in Dagbani is mostly /ɨ/. Twi languages mostly prefer /u/ as an epenthetic segment especially between a fricative and a stop as related in Adomako (2008) with examples such as *sʊpɛːsɪ* 'spectacles', *supiːdi* 'speed', *sʊtɔpʊ* 'stop', *kʊlɔkʊ* 'clock' and others. In any case, in both languages (Dagbani and Twi), the epenthetic vowel is determined by the root vowel as earlier on stated. In Dagbani, insertion in word-initial clusters is commonly observed in only words borrowed from the English language.

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47. Vowel epenthesis in English loanwords to break word-initial clusters in Dagbani

a. /braɪb/	[bɨra:pʊ]	bribe
b. /breɪk/	[bɨre:ʧɨ]	'brake'
c. /brɪks/	[bɨliʧɨsɨ]	'bricks'
d. /blu:/	[bʊlu:]	'blue'
e. /grævəl/	[gɨra:bʊlɨ]	'gravel'
f. /presɪnaɪɔn/	[pɨrɛsa:jɔn]	'pressing iron'
g. /skul/	[ʃɨkuru]	'school'
h. /stɔ:/	[ʃitɔʔʊ]	'store'
i. /spektakls/	[sɨpɛsɨ]	'spectacles'
j. /spa:/	[sɨpa:]	'spar'
k. /sleɪt/	[sɨle:tɨ]	'slate'
l. /smʌgəl/	[sɨmogɨrɨ]	'smuggle'
m. /spoks/	[sɨpʊʔsɨ]	'spokes'
n. /traʊza/	[tɨra:za]	'trouser'

Vowel insertion ensures an increase in syllable of all the input forms after syllabification.

Quite apart from vowel epenthesis, loanword phonology in Dagbani also allow sonorant

insertion. This is discussed in the next subsection below.

4.3.1.2 Sonorant epenthesis in loanwords

Just like vowel epenthesis, consonants are epenthesized to provide onsets for onsetless

loanwords (Odden, 2005). According to Odden (2005:247), "the main cause of consonant

insertion is the avoidance of initial vowels or vowel sequences.

In Arabic, all syllables begin with a consonant and if a word has no underlying initial consonant a glottal stop is inserted, thus /al-walad/→[ʔalwalad] (the boy)". Similarly, Hare and Bearlake dialects of Slave insert /h/ to vowel-initial words (Odden, 2005). In Dagbani, sonorants are also epenthesized. For instance, Hudu (2002) reported the insertion of alveolar nasal in loanwords from the English model to create CVC(m) syllable whist according to Nindow (2017) glides such as /j/ and /w/ are epenthesized to form onsets for onsetless loanwords. The data in 48a--e are drawn from Hudu (2002) to illustrate the insertion of the alveolar nasal in loanwords in Dagbani.

48. **/n/** insertion in loanwords (Hudu, 2002:11)

a. /polis/	[pɔli**ns**ɨ]	police
b. /waɪles/	[wala**ns**ɨ]	wireless
c. /maʧis/	[ma**nʧ**isɨ]	matches
d. /kerozin/	[kara**nʒ**ini]	kerosene
e. /pɪkæks/	[pi**ŋ**ga:sɨ]	pickaxe
g. /sɜvɪs/	[sabinsi]	'service (taxi)
h. /təmɑ:təʊ/	[kamanto:ŋga]	'tomato'

From the data in 48, previous studies such as Hudu (2002) reported that the insertion of alveolar nasal in loanwords create CVC(m) syllable. For instance, the words [pɔli**ns**ɨ] and

[kara**n**ʒi**n**ɨ] present syllable shape such as CVCVC(n)CV and CVCVC(n)CVCV respectively. What is really puzzling is the fact that voiceless alveolar plosive being realized as voiceless velar plosive as observed in word-initial position in 48h.

Also observed is glide insertion in loanwords in Dagbani. Though vowel initial words are allowed in the phonology, they equally tolerate glide insertion to the left edge during adaptation in Dagbani. Usually, /j/ or /w/ is inserted depending on the place feature of the

initial vowel. For instance, the glide /j/ is inserted if the vowel initial of the input form is a front vowel, but the glide /w/ is selected in the event that the initial vowel of the input form is a back vowel. The main aim of glide insertion is to provide onset for syllables without onset (Nindow, 2017). Glide insertion is found in words borrowed from both English and Arabic into Dagbani as illustrated in 49 and 50.

49. Glide insertion in English loanwords in Dagbani

/ɛndʒɪnɪə/	[**j**indʒinija]	'engineer'
/ɛngine/	[**j**indʒin]	'engine'
/ɪntənɛt/	[**j**intanɛtɨ]	'internet

50. Glide insertion in Arabic loanwords in Dagbani

a. /ʔusta:z/	[**w**usɨta:**z**u]	'teacher'
b. /ʔusman/	[**w**usiman**u**]	'personal name'
c. /huze:ɾ/	[**w**uze:**ru**]	'personal name'
d. /ʔilias/	[**j**ilija:su]	'male personal name'
e. /ʔishaq/	[**j**isahaku]	'male personal name'
f. /ʔidri:s/	[**j**irisʊ]	'male personal name'

In Dagbani phonology, vowel-initial loanwords especially words borrowed from English into Dagbani undergo glide epenthesis as presented in 49. Similarly, words borrowed from Arabic into Dagbani with glottal stop at the initial position are best corrected through the insertion of a glide as seen in 50, this is because a glottal stop does not begin a word in Dagbani as already established in chapter two. Again in Dagbani, the selection of /j/ or /w/ is dependent on the initial vowel in the input. For instance, it is noted in exisiting literature (e.g Olawsky, 1999 and Hudu, 2010) that the labial velar /w/ does not preceed front vowels in Dagbani. Thus, /w/ is selected when the input initial is a

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non-front vowel whist /j/ is selected irrespective of the vowel quality as illustrated in 49 and 50d—f above.

In addition to the glide insertion, Dagbani phonotactics will never tolerate obstruents at coda, thus vowel insertion is also employed to render such obstruents at coda position onsets. Even the alveola trill, which is permitted at coda in Dagbani, is avoided through vowel epenthesis. This expresses the degree to which codas are not required in the Dagbani phonology.

Apart from glide insertion, the syllable **da** could be inserted to the left of vowel-initial loanwords. According to Hudu (2014b), the major aim of inserting the syllable **da** into the lexical word is to ensure that the vowel-initial lexical word has a consonant at its left edge to license the place of articulation of the nasal clitic that it precedes. I present examples of this phenomenon in 51a-c with additional data drawn from Hudu (2014b:13).

51. Insertion of **da** in English loanwords in Dagbani

English	Dagbani	Gloss
a. /hɛlikɔptə(ɹ)	/ alɨkɔbta/ [n da:likɔbɨta]	'my helicopter'
b. /hɑspɪtl/	/n aʃibɨti/ [n da:ʃibɨtɨ]	'my hospital'
c. /aɪjɔn/	/n a:jɔn/ [n da:jɔn]	'my iron'
d. /ɒpəreɪʃən/	/n apole:sa/ [n da:pole:sa]	'my operation'
e. /əsɛmblimæn/	/n asamblimani/ [n da:sambɨlimani]	'my assemblyman'

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52. Insertion of da in Hausa loanwords in Dagbani

Hausa	Dagbani	Gloss
a. /alikaɔli/	/n alɨkaʊli/ [n da:lɨkaʊli]	'my promise'
b. /ʔanfa:ni/	/n anfa:nɨ/ [n da:nfa:nɨ]	'my grace'
c. /ʔalidʒi:fu/	/n alɨʒi:fʊ/ [n da:lɨʒi:fʊ]	'my pocket'
d. /ʔabinfu:ra/	/n abinfu:ra/ [n da:binfu:ra]	'my balloon'
e. /ʔaŋgo/	/n aŋgo/ [n da:ŋgo]	'my groom'

53. Insertion of da in Arabic loanwords in Dagbani

Arabic	Dagbani	Gloss
a. /ʔalidʒanna/	/n alɨzanda/ [n da:lɨzanda]	'my heaven'
b. /ʔalidʒinn/	/n alɨzini/ [n da:lɨzini]	'my genie'
c. /ʔalʔadʒi:b/	/N alahʒiba/ [n da:lahʒiba]	'my wonders'
d. /ʔadi:n/	/n adi:ni/ [n da:di:ni]	'my religion'
e. /ʔalbasol/	/n alibasa/ [n da:libasa]	'my onion'

54. Insertion of da in Twi loanwords in Dagbani

Akan (Twi)	Dagbani	Gloss
a. /aɱfo:nim/	/n anfo:ni/ [n da:nfo:ni]	'my picture'
b. /amani/	/n amanɨ/ [n da:manɨ]	'my cooking fish'
c. /abɛ/	/n abe/ [n da:be]	'my palm nut'
d. /ampe/	/n ampe/ [n da:mpe]	'my ampe/game'
e. /adaka/	/n adaka/ [n da:daka]	'my box'

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4.3.2 Deletion of Sounds

Another productive phonological process characterizing loanword adaptation is deletion. When there are clusters in coda position, one sound from the cluster (preferably stops) is usually deleted to ensure syllable well formedness (Nindow, 2017). Loanwords adaptation in Dagbani ensures nasal deletion, obstruent deletion and lateral deletion (Hudu, 2002; Abdul-Rahaman, 2013; Nindow, 2017). What makes this current study different from the previous works such as Nindow (2017), Alhassan (2006), Hudu (2002) and Olawsky (1999) is that, their works focused mostly on the analysis of English-Dagbani loanwords. Though Abdul-Rahaman (2013) generally mentioned how vowels begin loanwords in Dagbani, very little was mentioned about other loanwords from languages such as Arabic, Hausa and Twi, which also undergo certain phonological processes during adaptation. As far as segment, deletion is concerned in loanword phonology, evidence from literature show that there are segmental deletion across word boundary in Dagbani including obstruent deletion, alveolar nasal deletion and lateral deletion (Hudu, 2002). These are very prominent in loanwords adaptation processes and they are therefore discussed in the present study. In the native lexicon, deletion is widely noted as a syllable structure process motivated by a morphological phenomenon such as compounding and pluralization (Abdul-Rahaman, 2013). It is further demonstrated in Abdul-Rahaman (2013) that deletion in Dagbani affects segments such as a vowel, a nasal consonant or an entire syllable, and the deletion process is sanctioned by both phonological and morphological reasons. What is different about deletion in loanwords adaptaion in Dagbani as discussed in this study is that, it is phonologically conditioned and occurs within a word as opposed to the Dagbani lexicon where deletion occurs at word

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boundaries. The example in 55 demonstrate the forms of deletion that occur at word boundaries in Dagbani lexicon.

55 Deletion in the Dagbani native lexicon

a. /doo/ 'man' + /dʒia/ 'short'　　[dodʒia] 'shortman'

b. /buŋa/ 'donkey + /nyaŋ/ 'female'　[buɲɲaŋ] 'female donkey'

c. /kom/ 'water' + /duʔu/ 'pot'　　[koduʔu] 'pot of water'

d. /kpam/ 'oil' + /ŋmani/ 'calabash'　[kpaŋmani] 'calabash of oil'

e. /sɔʔu/ 'broom' + /palli/ 'new'　　[sopalli] 'new broom'

f. /zuli/ 'tail' + /sabinli/ 'black'　[zusabinli] 'black tail]

The examples in 55 show that, vowels, bilabial nasal and a whole syllable are deleted in either noun-noun or noun-adjective compounding in the Dagbani lexicon. This observation is similar in Akan (Twi) especially with the deletion of bilabial nasal in the final position where a reduplicant is deleted in syllables with the forms CV1N1, CV1V2N structures where V1 is specified as a high vowel (Adomako, 2008). However, during loanwords adaptation in Dagbani, segments, which undergo deletion, include obstruent, alveolar nasal and lateral. I discuss obstruent deletion in the next subsection.

4.3.2.1 Obstruent Deletion

Obstruents deletion normally occur at coda position to break a cluster of consonants. The data in 56 through 58 illustrate various forms of deletion in loanwords adaptation in Dagbani. Interestingly in some of the cases, two phonological processes simultaneously

take place: deletion and vowel insertion, which in most cases causes an increase in the syllables as exemplified in 56e—l. But in 56a—d, deletion has caused a reduction in the syllable size especially since there has not been any form of insertion in those forms.

56. English Obstruent deletion in loanwords in Dagbani

a. /ministə/	[minisa]	'minister'
b. /mæstə/	[masa]	'master'
c. /steɪʃn/	[te:sa]	'station'
d. /tɹæktə/	[tɨrata]	'tractor'
e. /pɪstəl/	[pi:sɨlɨ]	'pistol'
f. /spektakls/	[sɨpɛsɨ]	'spectacles'
g. /pɒlɪtɪks/	[polati:sɨ]	'politics'
h. /fɔrɪst/	[fo:re:sɨ]	'forest'
i. /post/	[po:sɨ]	'post'
j. /fest ən læst/	[fe:sanla:sɨ]	'first and last'
k. /pentikɔst/	[pentikɔ:sɨ]	'Pentecost'

What is also observed in this deletion process include featural changes such as changes in vowel quality as exemplified in 56 and a syllabic nasal turning into a vowel as exemplified in 56c. Obstruents, which are mostly deleted at word-final cluster, position are /k, t/ as illustrate in 56 but in some cases the alveolar is deleted as shown in 56c and 56f. In the next subsection, nasal deletion is discussed.

4.3.2.2 Nasal Deletion

It is widely noted that bilabial nasal is tolerated at lexical word-final position in the phonology of Dagbani. These are evidence from such lexical words like *bam* 'odor', *tim*

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'medicine', *sɔŋ* 'mat' *kuŋkɔŋ* 'a tin'. In view of the alveolar nasal, it is phonolgically conditioned in words such as *din* 'which/that' as is <buku din doya maa ha> 'the book that is lying there'; *ŋun* 'who' as in <bia ŋun gbihiri maa> 'the child who is sleeping' and others. However, it is very rare for the alveolar nasal to occur at word-final in Dagbani as already established in previous studies such as Olawsky (1999). Thus, in the adaptation of loanwords in Dagbani, the alveolar nasal, which occurs at word-final position, is mostly deleted, resulting in the maintenance or reduction in the size of the syllables, and for easier pronunciation (Hudu, 2002). In 57l, the bilabial nasal is deleted at that word-final position which is expected because bilabial nasal deletion occurs at word-final position even in Dagbani lexicon. The data in 57 therefore illustrate nasal deletion in loanwords adaptation in Dagbani.

57. /n/ deletion in loanwords in Dagbani (Hudu, 2002:14)

a. /pɒntuːn/	[pantuː]	'pontoon'
b. /wɔːtəmelən/	[watamilo]	'water melon'
c. /sʌmɔn/	[sama]	'summon'
d. /sɪvɪlɪən/	[sabiːla]	'civilian'
e. /steɪʃn/	[teːsa]	'station'
f. /laɪn/	[laːi]	'line'
g. /kɔmbaɪn/	[kombaː]	'combine (harvester)
h. /kɒmpətiʃən/	[kompateːsa]	'competetion'
i. /telɪvɪʒən/	[talivisa]	'television'
j. /pɑɹtɪʃən/	[pateːsa]	'partition'
k. /ɒpəreɪʃən/	[apoleːsa]	'operation'
l. /aɱfonim/	[aɱfoːni]	'picture'
m. /tɑpɔːlɪn/	[taːpoːli]	'tarpaulin'

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With the exception of 57l, all the exaples are from the English models. The data in 57a—g are drawn from Hudu (2002) while the rest of the data are gleaned from the Dagbani dictionary by Naden (2014) to expound this phenomenon. Another form of deletion observed in loanwords adaptation is lateral deletion as discussed in the next subsection.

4.3.2.3 Lateral Deletion

Just like the other forms of deletion processes discussed in the preceding subsections, the alveolar lateral gets deleted when it co-occurs in a cluster with another consonant especially in a coda position as the following example in 58 show.

58. English lateral deletion in loanwords in Dagbani

a. /staɪl/	[sita:i]	'style'
b. /soldʒa/	[so:dʒa]	'soldier'
c. /kolta/	[ko:ta:lɨ]	coal tar'
d. /taʊn kaʊnsɪl/	[taŋga:sɨ]	'town council'
e. /kolpɔt/	[kurɨfo:tu]	'coal pot'
f. /petrol/	[patɨro:]	'petrol'
g. /spektakls/	[sɨpɛsɨ]	'spectacles'
h. /ʔalbasol/	[alibasa]	'onion'

It is evident in 58 that, it is the English models, which mostly undergo lateral deletion. Only in Arabic that this form of deletion is also observed as shown in 58h, but it has the least distribution.

4.3.3 Adaptation of Diphthongs

Diphthong is "a combination of two vocoids within the syllable nucleus" (Odden, 2005:334). It involves a complex articulation of vowel sounds whereby the quality of a vowel sound changes from one vowel to another as exemplified in English words such as [baɪt] 'bite', [braʊn] brown, and [bɔi] 'boy', which respectively have specific combination of vowel sounds such as /aɪ/, /aʊ/, and /ɔi/ (Yavaş, 2011). Diphthongs are common in many languages, and at the same time, many languages including Dagbani disallow diphthongs. There are prosodic processes, which eliminate diphthongs in Dagbani. Glides such as /j/ and /w/ are phonologically epenthesized to form onsets for onsetless loanwords whilst /j/ doubles as an epenthetic consonant to the syllable /ja/ to prevent /a/ from forming hiatus (Nindow, 2017).

 Another process by which diphthongs are resolved is by coalescing the two vowels into a single vowel (especially the vowel that preserves characteristics of the other vowel). It is also observed in Kimatuumbi that, /au/ becomes [oo] and /ai/ becomes [ee], but it is noted that such a combination (rule) is optional in Kimatuumbi such that vowel sequence which are not coalesced can also be pronounced (Odden, 2005) as shown in 59.

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a-i-téliike	ee-téliike	'he cooked them'
pa-ú-kaátité	poó-kaátité	'when you cut'
pa-bá-i-káatité	pa-bée-káatité	'when they cut them'
a-u-káatite	oo-káatite	'he cut it'
ka-u-tʋʋmbʋ´ka	koo-tʋʋmbʋ´ka	'when it was falling'
pa-i-taábu	pee-taábu	'where the books are'
pa-u-títili	poo-títili	'where the chicken louse is'
ka-u-méyá	kooméyá	'little white ant'
na-u-čaápu	noo-čaápu	'with dirt'

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From the data in 59, one vowel compromises as /au/ changes to [oo] and /ai/ changes to [ee], thus preserving the height of the initial vowel /a/, and the backness and roundness of the second vowel. This is commonly observed in Dagbani especially in the adaptation of loanwords from languages such as English and Hausa as will be shown shortly in this section.

Sometimes too, through the deletion of one vowel, the sequences of vowel is avoided but without compensatory lengthening. Examples are provided at the phrasal level in Makonde, where word-final /a/ deletes before an initial vowel as illustrated in 60.

60.   lipeeta engaanga→ lipeet engaanga 'the knapsack, cut it!',

        likuka engaanga→ likuk engaanga 'the trunk, cut it!'

        nneemba idanaao→ nneemb idanaao 'the boy, bring him!'.

In Ammani Arabic, almost all diphthongs in English are adapted as related in Guba (2016). However, Dagbani adapts only three diphthongs such as /aɪ/, /eɪ/, and /aʊ/. In Dagbani, /aɪ/ is generally adapted from English as [a:], but it is adapted as [a] when it occurs before a nasal especially in loanwords (Hudu, 2002). The data in 61 displays the adaptation of **/aɪ/** in loanwords Dagbani.

61. **/aɪ/** Adaptation in English loanwords in Dagbani

English	Dagbani	Gloss
a. /baɪdeɪ/	[ba:deɪ]	'by day'
b. /saɪz/	[sa:sɨ]	'size'
c. /paɪp/	[pa:pʊ]	'pipe'
d. /braɪb/	[bɨra:pʊ]	'bribe'
e. /laɪt/	[la:tɨ]	'light'
f. /laɪsəns//	[la:sɨnsɨ/	'license'
g. /laɪnzmən/	[la:sɨmanɨ]	'linesman'

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h. /aɪswɔːtə/	[aːsɨwata]	'ice water'
i. /haɪə/	[haːja]	'hire'
j. /taɪtən/	[taːti]	'tighten'
k. /aɪjɔn/	[aːjɔn]	'pressing iron'
l. /waɪləs/	[walansɨ]	'wireless'

In 61l, **/aɪ/** is adapted as [a] before the alveolar nasal /n/ probably because the occurrence of /aa/ between /l/ and /n/ in Dagbani phonology is not widely distributed. For instance, it surfaces in few inflectional cases such as *arizichilaannima* 'owners of wealth', *pulaani* 'greed', *laanigu* 'guinea fowl', *faralaan' so* 'some poor person' and *laana* 'shake-Impef. Also observed is the adaptation of /aʊ/ in English as [aː] as related in Hudu (2002), and the same diphthong is adapted as [oː] in both Hausa and English just as observed in Kimatuumbi. The data in 62 illustrates this pattern of adaptation of loanwords in Dagbani.

62. /aʊ/ Adaptation in English loanwords in Dagbani

English	Dagbani	Gloss
a. /traʊza/	[tɨraːza]	'trouser'
b. /flaʊəs/	[fɨlaːwasɨ]	'flowers'
c. /kaʊnsəl/	[kaːnsɨlɨ]	'councili'
d. /akaʊntant/	[akaːntantɨ]	'accountant'
e. /paʊda/	[poːra]	'powder'

63. /aʊ/ Adaptation in Hausa loanwords in Dagbani

Hausa	Dagbani	Gloss
a. /saʊke/	[soːtʃe]	'trade'
b. /saʊki/	[soːtʃi]	'better in health'

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The pattern in 62e and 63a—b demonstrates the adaptation of /aʊ/ as [o:] in both English and Hausa. Meanwhile the same diphthong is adapted from English as [a:] as shown in 62a—d. As to why English diphthongs display such flexible properties in Dagbani poses a puzzle which requires the attention of phonologists in future research.

In 64, /eɪ/ is adapted as [e:] as previously observed in Hudu (2002).

64. **/eɪ/** Adaptation in English loanwords in Dagbani

English	Dagbani	Gloss
a. /teɪbl/	[te:bulɨ]	'table'
b. /teɪla/	[te:la]	'tailor'
c. /meɪt/	[me:tɨ]	'mate'
d. /sleɪt/	[sɨle:tɨ]	'slate'
e. /steɪʃn/	[te:sa]	'station'
f. /breɪk/	[bre:ʧɨ]	'break'
g. /beɪbi/	[be:bi]	'baby'
h. /bleɪd/	[bɨle:dɨ]	'blade'
i. /reɪzə/	[le:za]	'razor'
j. /ageɪnst/	[ge:nsɨ]	'against'

Closer observation of the data presented above demonstrates that diphthongs such as /aɪ/ and /eɪ/ are mostly adapted from English whilst /aʊ/ is adapted from both English and Hausa.

Another diphthong that surfaced in both native lexicon and loanwords corpus in Dagbani is /ɔɪ/. It is adapted from Hausa as [ɔɪ] as in a word like **[bakɔɪ]** 'a week', and from English as [o:] as in a word like /pɔɪsən/➔**[po:sin]** 'poison', but it appears to have the least distribution in Dagbani. According to Odden (2005), this pattern of diphthongs

adaptation is an optional rule, which allows sequence of vowels, which are not able to coalesce to also be able to pronounce as, exemplified in Kimatuumbi in (38) above.

4.3.4 Importation of loanwords

Loanwords are sometimes imported from the source language into the recipient language and the native speakers will conceivably produce a form, which is exactly like the source form (Iribemwangi and Karũrũ, 2012). According to Buesa (2015), loanwords from other languages can be adopted by maintaining or remaining faithful to the structure as they are in the source language. Iribemwangi and Karũrũ (2012) posit that some of these segments may not necessarily be present in the native inventory. For instance, loanwords from Kiswahili imported into Gĩ-Gĩchũgũ dialect of Gĩkũyũ language are pronounced the same and are similar orthographically. Some examples are attested in 65 below.

65. Loanwords from Kiswahili(s) to Gĩ-Gĩchũgũ dialect

Kiswahili(s)	Gĩ-Gĩchũgũ	Gloss
/ɲaɲa/	[ɲaɲa]	tomato
/ŋaŋana/	[ŋaŋana]	keep trying
/ndɔ:/	[ndɔ:]	bucket

In Dagbani, there are quite significant examples of loanwords from the contact languages which are imported as the data in 66 through 69 show.

66. Loanwords imported from English into Dagbani

a. /bætəɹi/	[ba:tiri]	'battery'
b. /ka:/	[ka:]	car
c. /ti:/	[ti:]	'tea'
d. /waɪəɹ/	[waja]	wire
e. /manɪdʒa/	[manidʒa]	manager
f. /fæntə/	[fanta]	'fanta'
g. /fæn/	[fan]	'machinery for moving air'
h. /ti:/	[ti:]	'tea'
i. /koʊkoʊ/	[ko:ko:]	'cocoa'

67. Loanwords imported from Hausa into Dagbani

a. /bakɔi/	[bakɔi]	'a week'
b. /aŋgo/	[aŋgo]	'groom'
c. /alikaʊli/	'alikaʊli'	'promise'
d. /adaka/	[adaka]	'box'
e. /buka:ta/	[buka:ta]	'usefulness'
f. /ja:kaza/	[ja:kaza]	'such and such (amount/place)
g. /gaba:daja/	[gaba:daja]	'all together'

68. Loanwords imported from Arabic into Dagbani

a. /niʕma/	[niʔɨma]	'blessings'
b. /hasad/	[ha:sada]	'envy'
c. /fitna/	[fiti:na]	'trouble'

69. Loanwords imported from Twi into Dagbani

a. /bankye/	[bantʃi]	'cassava'
b. /ampe/	[ampe]	'girls' game'
c. /ɲamaɲama/	[ɲamaɲama]	'assorted stuff'
d. /kʊra:ba/	[kʊra:ba]	'chamber pot'
e. /kurɪsakurɪsa/	[kurɨsakurɨsa]	'skin rashes'
f. /samasama/	[samasama]	'sanitary inspector'

The concept of importation in loanwords presents a puzzle; why are certain structures but not others imported into the native phonology, and this requires phonologists' attention (Holden, 1976; Itô and Mester, 1995, 1999, 2001; Davidson and Noyer, 1997; Broselow, 2009 cited in Kang, 2011). In Hawaiian, for instance, an English word *truck* is borrowed and nativized as [kəˈlakə] and *[krakə] as a variant, demonstrating that Hawaiian places less restriction on the English /t/ being adapted as [k] than retaining a complex onset as in *[krakə], and this is judged to be impossible (Adler, 2006 as cited in Kang, 2011).

4.4 Chapter Summary

In summary, loanwords undergo several phonological processes including segmental adaptation, segmental processes and syllable structure processes in Dagbani. Segmental adaptation is commonly observed in Arabic models, which display certain consonants, which are not part of Dagbani consonant inventory. Models borrowed from the four languages into Dagbani undergo some form of segmental processes such as palatalization, debuccalization, liquid substitution and fortition. At the syllable structure level, epenthesis, deletion, diphthongs adaptation and importation are explored. Vowel

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and sonorant epenthesis are the most common strategies applied to repair loanwords from English and Arabic at the syllable level to avoid clusters. Similarly, deletion of obstruent, nasal and lateral are applied to only English models to avoid consonant clusters. Diphthongs from English and Hausa are mostly adapted by means of compensatory lengthening.

CHAPTER FIVE

MORPHOLOGICAL ADAPTATION PROCESSES

5.0 Introduction

This chapter examines the morphological adaptation processes of Dagbani loanwords. The empirical morphological processes that underpin the adaptation processes are accounted for using Basic Linguistic Theory as an analytical tool. The chapter therefore proceeds as follows. In section 5.1, I present inflectional morphology of loanwords in Dagbani in, section 5.2. presents derivational morphology of loanwords in Dagbani, while aspect marking of loanwords in Dagbani is presented in section 5.3. Then in section 5.4, I discuss loanwords compounding in Dagbani, and provide a summary of this chapter in section 5.5.
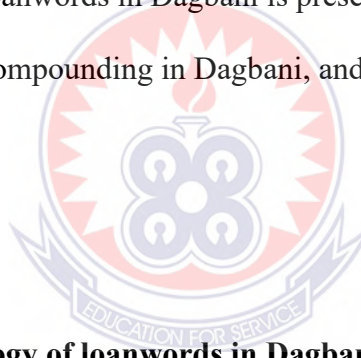
5.1 Inflectional morphology of loanwords in Dagbani

Inflectional morphology refers to 'the relationship between word-forms of a lexeme' (Haspelmath, 2002:15). According to Radford et al. (2009), inflectional marking typically occurs in the form of suffixes to express grammatical relations such as number and tense. Number suffixes are used to determine the noun classes in most languages including Dagbani (Hudu, 2005).

These number suffixes appear in three forms in Dagbani namely 'regular singular and plural suffixes, irregular plural suffixes, and the default plural suffix' (Hudu, 2005:11). Discussion of number suffix in this section is guided by the number suffixes established

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in Hudu (2005) and they are discussed with respect to how they occur in loanwords. Of much particular importance are the inflectional properties displayed by the two lexical categories borrowed into Dagbani: nouns and verbs. These two categories of words take various suffixes for purposes that do not change their grammatical category. While nouns inflect for number (Hudu, 2005, 2014b; Iasah, 2013), verbs inflect for aspect (Hudu, 2014b; Issah, 2015). Thus, discussing their morphology is therefore crucial in this study. Suffixes are used to express the plural forms of nouns in Dagbani (Olawsky, 1999, 2004; Hudu 2005, 2010), in Dagaare (Bodomo and Marfo, 2007) and in Kusaal (Musah, 2018), but in Akan singular and plural are marked by prefixes (Bodomo and Marfo, 2007). I will first present number marking of nouns borrowed into Dagbani by categorizing them into two: singular forms, which are derived from plural forms, and plural forms which are derived from singular form. This is presented in subsection 5.2.1 and aspect marking in relation to verbs borrowed into Dagbani is discussed in subsection 5.2.2. First, I consider number marking of loanwords (nominal).
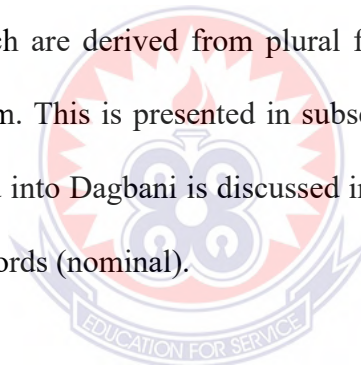
5.1.1 Number marking of loanwords (nominal)

Number marking of loanwords in Dagbani are discussed in two forms: plural forms which are derived from singular forms on one hand and singular forms which are derived from the plural forms on the other hand. In Dagbani, only nouns with nominal root inflect for number, and the variation in the plural suffixes is based on the noun class system of the language (Olawsky 1999, 2004). Plural suffixes, which belong to the various noun class system in Dagbani, are displayed in table 11 (Olawsky, 1999).

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Table 11: Basic distinction of Dagbani number classes of simplex nouns

Class	Singular	Plural	Example	Gloss
1	-li	-a	/dab-li/ [dabli], /dab-a/ [daba]	'slave'
2	-a	-ba	/pag-a/ [paʔa], /pag-ba/ [paʔba]	'woman'
3	-ga	-si	/gab-ga/ [gabga], /gab-si/ [gabsi]	'rope'
4	-gu	-di	/lɛ-hu/ [lɛʔu], /lɛ-di/ [lɛri]	'axe'
5	-gu/ŋ	-a	/gbaŋ/ [gbaŋ], /gban-a/ [gbana]	'skin'

Further examination of the number classes displayed in table 11 revealed nine patterns of plural suffixes in Dagbani (Hudu, 2005). These patterns are summarized in table 12 below.

Table 12: Plural suffixes in Dagbani,

Suffixes	Singular form	Plural form
/-ya/	/pu-li/ [puli] 'stomatch'	/pu-ja/ [puja] 'stomatchs'
	/zo-li/ [zoli] 'mountain'	/zo-ja/ [zoja] 'mountains'
/-ri/	/zu-ʔu/ [zuʔu] 'head'	/zuʔ-rə [zuʔrə] 'heads'
	/zab-gu/ [zabgu] 'hair'	/zab-rə/ [zabrə] 'hairs'
/-ti/	/gbar-gu/ [gbargu] 'cripple'	/gbar-tə/ [gbartə] 'cripple'
	/gor-gu/ [gɔrgʊ] 'sickle'	/gor-ti/ [gɔrtə] 'sickles'
/-si/	/zɔŋ/ [zɔŋ] 'bat'	/ zɔn-sə/ [zɔnsə] 'bats'
	/wub-ga/ [wubga] 'hawk'	/wub-sə/ [wubsə] 'hawks'
/-a/	/wogri-li/ [wɔʔrələ] 'huge'	/wogri-a/ [wɔʔra] 'huge'

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	/gol-li/ [gɔllə] 'dangling'	/gol-a/ [gɔla] 'danglings'
	/kug-li/ [kuʔli] 'stone'	kug-a/ [kuʔa] 'stones'
	/bih-li/ [bihli] 'breaast'	/bih-a/ [biha] 'breaasts'
/-hi/	/bi-a/ [bja] 'child'	/bi-si/ [bihi] 'children'
	/no-o/ [no:] 'chicken'	/no-si/ [nɔhə] 'chickens'
/-nima/	/ba/ [ba] 'father'	/ba-nima/ [banəma] 'fathers'
	/ma/ [ma] 'mother'	/ma-nima/ [manəma] 'mothers'
/-ba/	/pag-a/ [paʔa]	/pag-ba/ [paʔba] 'woman'
suppletive	/do-o/ [do:]	/dab-ba/ [dabba] 'man'
Form	/kpe-e/ [kpe:] 'colleague'	/taba-a/ [taba] 'colleagues'

Some of these patterns as exemplified in table 12 are used for the pluralization of loanwords, which typically consist of a simple root. The common plural suffix of loanwords is the default plural marker /-**nima**/ (Olawsky, 1999, 2002; Hudu, 2005) which is used together with other suffixes to derive the plural forms of loanwords in Dagbani. This is exemplified in 70 through 78.

70. Default plural marker /-**nima**/ derived from English singular forms

English	**Dagbani**	**Gloss**
a. /bʊk/	/buku/ [buku-nima]	'book-PL'
b. /belt/	/alatɨ/ [balatɨ-nima]	'belt-PL'
c. /tʃɑːdʒ/	/tʃɑːdʒi/ [tʃɑːdʒi-nima]	'fare/bill-PL'
d. /aɪjɔn/	/aːjɔn/ [aːjɔn-nima]	'iron-PL'
e. /bʌlb/	/bolɨfʊ/ [bolɨfʊ-nima]	'bulb-PL'

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71. Default plural marker /-**nima**/ derived from Hausa singular forms

Hauasa	Dagbani	Gloss
a. /ʔabinfu:ra/	/abinfu:ra/ [abinfu:ra-nima]	'balloon-PL'
b. /buka:ta/	/buka:ta/ [buka:ta-nima]	'charms-PL'
c. /keke/	/tʃetʃe/ [tʃetʃe-nima]	'bicycles-PL'
d. /ʔaŋgo/	/aŋgo/ [aŋgo-nima]	'grooms-PL'
e. /ri:ga/	/li:ga/ [li:ga-nima]	'blouse-PL'

72. Default plural marker /-**nima**/ derived from Arabic singular forms

Arabic	Dagbani	Gloss
a. /ʔalɨbala:j/	/alɨbala:jɨ/ [alɨbala:jɨ-nima]	'pestilence-PL'
b. /ʔalkalamɨ/	/alɨkalimɨ/ [alɨkalimɨ-nima]	'pen-PL'
c. /haqi/	/hatʃi/ [hatʃi-nima]	'a due-PL'
d. /qur'an/	/kura:ni/ [kura:ni-nima]	'Holy Qoran-PL'
e. /ʔalbasol/	/alibasa/ [alibasa-nima]	'onion-PL'

73. Default plural marker /-**nima**/ derived from Twi singular forms

Twi	Dagbani	Gloss
a. /bantʃi/	/bantʃi/ [bantʃi-nima]	'cassava-PL'
b. /abɛ/	/abe/ [abe-nima]	'palm nut-PL'
c. /bɔ:doba/	/bodua/ [bodua-nima]	'towel-PL'
d. /borɔdeɛ/	/bɔraade/ [bɔra:de-nima]	'plantain-PL'
e. /kʊriwa/	/kuruga/ [kuruga-nima]	'bowl-PL'

Some loanwords are adapted to the regular class system, which consists of a singular and

a plural form of a canonical simplex noun in Dagbani (Olawsky, 2004). For instance,

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loanwords with the suffix /-li/ in the singular form are pluralized with the suffix /-ya/ especially when the root of the word ends with a vowel as illustrated in 74.

74. Plural suffix /-ya/ derived from Enlish singular forms

	English	Dagbani	Gloss
a.	/bʌŋgələʊ/	/bɔŋgu-lɨ/ [bɔŋguja]	'bungalow-PL'
b.	/grævəl/	/gɨrabu-lɨ/ [gɨrabuja]	'gravel-PL'
c	/ʃʌvəl/	/so:bu-lɨ/ [so:buja]	'shovel-PL'
d.	/teɪbl/	/te:bu-lɨ/ [te:buja]	'table-PL'
e.	/kaʊnsəl/	/ka:nsi-li/ [ka:nsɨja]	'council-PL'

75. Plural suffix /-ya/ derived from Hausa singular forms

	Hausa	Dagbani	Gloss
a.	/haŋkali/	/haŋka-li/ [haŋkaja]	'senses'
b.	/zankiri/	/zintʃɨ-li/ [zintʃija]	'delays'
c.	/fo:li/	/fo-li/ [foja]	'queue'

76. Plural suffix /-ya/ derived from Arabic singular forms

a.	/ʔasi:r/	/aʃɨ-li/ [aʃija]	'secret-PL'
b.	/ʔalqaaz/	/alika-li/ [alɨkaja]	'soothsayer-PL'

However, the /-li/ becomes /-a/ as a plural suffix when the root of the word ends with a consonant as illustrated in 77.

77. Plural suffix /-a/ derived from English singular forms

	English	Dagbani	Gloss
a.	/bɔːl/ [bolli]	[bola]	'ball-PL'
b.	/paʊnd/ [pɔŋli]	[pɔŋa]	'pound-PL'
c.	/ʃɪlɪŋ/ [sulli]	[sula]	'shilling-PL'
d.	/haːl/ [halli]	[hala]	'character-PL'- Arabic

Similarly, loanwords with the root ending in a nasal consonant takes /-a/ as a plural suffix as shown in 78.

78. Plural suffix /-a/ derived from the root ending with nasal consonant in English models

English	Dagbani	Gloss
a. /əsɛmblimæn/	/asambɨlimanɨ/ [asambɨlimana]	'assembleman-PL'
b. /fɔːmən/	/foːmanɨ/ [foːmana]	'foreman-PL'
c. /məʃin/	/maʒini/ [maʒina]	'machine-PL'
d. /tʃɛmən/	/tʃaːmanɨ/ [tʃaːmana]	'chairman-PL'
e. /ɔʊldmæn/	/wolimanɨ/ [wolimana]	'old man-PL'
f. /wɒtʃmæn/	/waːsɨmanɨ/ [waːsɨmana]	'watchman-PL'

Other additional suffixes also adapted to the regular noun class system include the following:

79. Plural suffix /-ti/ derived from singular forms

	Singular form	plural form		origin
a.	/ba:ngida/ [bandʒira]	[bandʒiriti] 'toilets'		Hausa
b.	/takada/ [takara]	[takariti] 'papers'		Hausa
e.	/takoro/ [takoro]	[takoriti] 'windows'		Hausa
d.	/kabre/ [kabɨre]	[kabɨriti] 'charms'		Gonja
e.	/skul/ [ʃikuru]	[ʃikuru-ti] 'schools'		English

Loanwords suffixes such as /-sɨ, -ri and -hi/ adapted to the regular noun class system in Dagbani cannot be used for generalizations since they are not widely distributed. However, I show them in this study to create readers awareness of their existence in loanwords adaptation in Dagbani. Data 80 through 82.

80. Plural suffix /-sɨ/ derived from English singular forms

Singular form	Plural form	Gloss
/mæŋgəʊ/	/mo:ngu/ [mo:n-sɨ]	'mangoe-PL'

Loanwords with singular suffix ending with /-ʔʊ/ take /ri/ as a plural suffix. The only example available in loanwords is shown in 81.

81. Plural suffix /-ri/ derived from English singular form

English	Dagbani	Gloss
/stɔ:/	/ʃitɔ-ʔʊ/ [ʃitɔri]	'store-PL'

82.Plural suffix /-hi/ derived from English singular forms

	Singular form	Plural form	Gloss
a.	/ka:/ [ka:]	[kahi]	'cars'
b.	/speɪd/ [sɨpa:]	[sɨpahi]	'spades (in play cards)'

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Quite apart from the plural suffixes of loanwords established above, there are some loanwords in Dagbani with which singular forms are derived from them as exemplified in 83.

83. Singular forms derived from English plural forms

English	Dagbani	Gloss
a. /polɪs/	[poliŋ-ga-SG]	'police'
b. /təmatəʊs/	[kamanto:ŋ-ga-SG]	'tomatoes'
c. /fura/	[ful-li-SG]	'food made with millet into ball'

At this point, I discuss derivational morphology of loanwords focusing on suffixes attached to the base of the loanword to cause a change in its lexical category. This is presented in section 5.2 below.
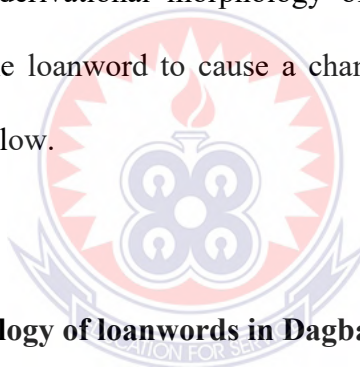
5.2 Derivational Morphology of loanwords in Dagbani

The term derivational morphology refers to 'the relationship between lexemes of a word family' (Haspelmath, 2002: 15). In some examples, derivational suffixes are conjoined with the base of a word to form another word, which may have a different meaning from the original word, and its grammatical category may also change (see Olawsky, 1999; Hudu, 2014b; Issah, 2015). Morphologically, three syntactic categories including nouns, verbs and adverbs are derived from each other in English. In Dagbani, nouns can be derived from verbs and adjectives, and such derived nouns do not have a number suffix (Olawsky, 1999). Derivational suffixes in Dagbani as established in Olawsky (1999) include *-bu, -lim, -sim, -ŋ, -a, -bo, -gu, -da/-ra, -di/-ri, -li, -tali, -lana.* However, the focus

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of the present study is how nouns are derived from verbs through the use of derivational suffixes such as **-bu** and –**da/-ra/-ta**. The data in 84 show how a lexical category such as noun can be derived from verbs in Dagbani.

84. Derivational suffixes –bu and –da/-ra/-ta in lexical words

Verb	Gloss	Nominal	Gloss	Nominal	Gloss
a. [da]	'buy'	[da-bʊ]	'act of buying'	[da-ra]	'buyer'
b. [paŋ]	'borrow'	[paŋ-bʊ]	'act of borrowing'	[paŋ-da]	'borrower'
c. [dɪm]	'bite'	[dim-bu]	'act of biting'	[dɪm-da]	'biter'
d. [bɨri]	'sow'	[bir-bʊ]	'act of sowing'	[bɨri-ta]	'sower'
e. [puh]	'greet'	[puh-bʊ]	'act of greeting'	[puh-ra]	'greeter'
f. [di]	'eat'	[di-bʊ]	'act of eating'	[di-ra]	'eater'
g. [ɲu]	'drink'	[ɲu-bʊ]	'act of drinking'	[ɲu-ra]	'drinker'
h. [du]	'climb'	[du-bʊ]	'act of climbing'	[du-ra]	'climber'
i. [ʃe]	'roast'	[ʃɛ-bʊ]	'act of roasting'	[ʃɛ-ra]	'roaster'

The pattern in 84 are observed in loanwords especially verbs borrowed from English into Dagbani. This is illustrated in 85.

85. Derivational suffixes of English loanwords in Dagbani

Verb	Gloss	Nominal -bu	Gloss	Nominal -ra	Gloss
a. [dɨre:sɨ]	'dress'	[dɨre:sɨ-bʊ]	'act of dressing'	[dɨre:sɨ-ra]	'one who dresses'
b. [fi:li]	'feel'	[fi:li-bʊ]	'act of feeling'	[fi:li-ra]	'one who feels'
c. [fo:sɨ]	'force'	[fo:sɨ-bʊ]	'act of forcing'	[fo:sɨ-ra]	'one who forces'
d. [gɨri:sɨ]	'grease'	[gɨri:sɨ-bʊ]	'act of greasing'	[gɨri:sɨ-ra]	'one who greases'

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e. [miːtɨ]   'meet'   [miːtɨ-bʊ]   'act of meeting'   [miːtɨ-ra]   'one who meets'

f. [miʔsɨ]   'mix'   [miʔsɨ-bʊ]   'act of mixing'   [miʔsɨ-ra]   'one who mixes'

g. [paːsɨ]   'pass'   [paːsɨ-bʊ]   'act of passing'   [paːsɨ-ra]   'one who passes'

h. [paːki]   'park'   [paːki-bʊ]   'act of parking'   [paːki-ra]   'one who parks'

i. [pɨreːsɨ]   'press'   [pɨreːsɨ-bʊ]   'act of pressing'   [pɨreːsɨ-ra]   'one who presses'

j. [pɔmpɨ]   'pump'   [pɔmpɨ-bʊ]   'act of pumping'   [pɔmpɨ-ra]   'one who pumps'

k. [juːsɨ]   'use'   [juːsɨ-bʊ]   'act of using'   [juːsɨ-ra]   'one who uses'

l. [voːti]   'vote'   [voːti-bʊ]   'act of voting'   [voːti-ra]   'one who votes'

As earlier on indicated, few verbs especially from English are observed in the corpus of loanwords gathered for this study, and there is the need to account for the morphological properties they display in Dagbani as they are adapted. Thus, subsection 5.3 presents aspect marking of Dagbani loanwords.

5.3 Aspect marking of loanwords in Dagbani

Aspect markers are common among the verbal suffixes in Dagbani (Olawsky, 1999; Hudu, 2014b; Issah, 2015). The Dagbani verb like many other languages exhibits two aspectual forms: perfective and imperfective forms (Issah, 2015). The perfective form appears morphologically and semantically to be the unmarked one (Olawsky, 1999) and it refers to an action that has already taken place whilst the imperfective form refers to an ongoing action or an action that expresses habitual meaning (Issah, 2015). Aspectual suffixes, which express perfective and imperfective forms, are summarized in table 13.

Table 13: Aspectual suffixes in Dagbani

Perfective		Imperfective		Gloss
∅	-ya	-di/-ri	-ra	
a. [da]	[da-ja]	[da-ri]	[da-ra]	'buy'
b. [paŋ]	[paŋ-ja]	[paŋ –di]	[paŋ-da]	borrow'
c. [dim]	[dim-ja]	[dim-di]	[dim-da]	'bite'
d. [bɨri]	[bɨri-ja]	[bɨri-ti]	[bɨri-ta]	'sow'
e. [puhi]	[puh-ja]	[puh-ri]	[puh-ra]	'greet'
f. [di]	[di-ja]	[di-ri]	[di-ra]	'eat'
g. [ɲu]	[ɲu-ja]	[ɲu-ri]	[ɲu-ra]	'drink'
h. [du]	[du-ja]	[du-ri]	[du-ra]	'climb'
i. [ʃe]	[ʃe-ja]	[ʃɛ-ri]	[ʃɛ-ra]	'roast'

The patterns displayed in table 13 above are also observed as aspectual suffixes in loanwords. This is exemplified in 86.

86. Aspectual forms of loanwords in Dagbani

A PERF ∅	B PERF -ya	C IMPERF -ri	D IMPERF -ra	**Gloss**
a. [dɨre:sɨ]	[dɨre:sɨ-ja]	[dɨre:sɨ-ri]	[dɨre:sɨ-ra]	'dress'
b. [fi:li]	[fi:li-ja]	[fi:li-ri]	[fi:li-ra]	'feel'
c. [fo:sɨ]	[fo:sɨ-ja]	[fo:sɨ-ri]	[fo:sɨ-ra]	'force'

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d. [gɨri:sɨ]	[gɨri:sɨ-ja]	[gɨri:sɨ-ri]	[gɨri:sɨ-ra]	'grease'
e. [mi:ti]	[mi:ti-ja]	[mi:ti-ri]	[mi:ti-ra]	'meet'
f. [miʔsɨ]	[miʔsɨ-ja]	[miʔsɨ-ri]	[miʔsɨ-ra]	'mix'
g. [pa:sɨ]	[pa:sɨ-ja]	[pa:sɨ-ri]	[pa:sɨ-ra]	'pass'
h. [pa:ki]	[pa:ki-ja]	[pa:ki-ri]	[pa:ki-ra]	'park'
i. [pɨre:sɨ]	[pɨre:sɨ-ja]	[pɨre:sɨ-ri]	[pɨre:sɨ-ra]	'press'
j. [pɔmpɨ]	[pɔmpɨ-ja]	[pɔmpɨ-ri]	[pɔmpɨ-ra]	'pump'
k. [ju:sɨ]	[ju:sɨ-ja]	[ju:sɨ-ri]	[ju:sɨ-ra]	'use'
l. [vo:tɨ]	[vo:tɨ-ja]	[vo:tɨ-ri]	[vo:tɨ-ra]	'vote'

In 86, column A either expresses past or present depending on the context especially when tense marking is not explicitly expressed (Olawsky, 2002).

The suffixes in column B and D can occur at clause final, but those suffixes in column C certainly require that some linguistic material should follow the verb (Issah, 2015). In section 5.4, compounding of loanwords in Dagbani, which is another form of derivation, is presented.
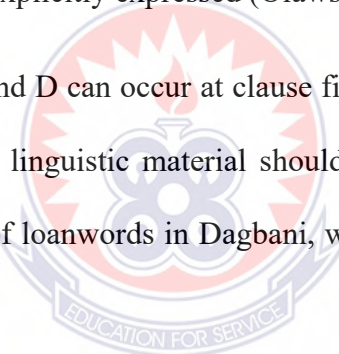
5.4 Compounding of Loanwords in Dagbani

Compounding refers to morphological complex words, which simultaneously belong to two (or more) word families (Haspelmath, 2002). Considering the lexeme FIREWOOD for instance, it belongs to the family of FIRE and the family of WOOD, which explains the assertion by Olawsky (2002) that compounds in many languages including Dagbani mostly consist of only two lexical roots. The meaning of the words in a compound are the same as their meaning in isolation, but with some restrictions in the sense that a noun in a compound plays a generic function rather than a referential function. That is why

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Downing (1977) rightly said, it is not every man brought out of the garbage is a garbage man. The words 'man' and 'garbage' used in the expression have generic meaning rather that referential meaning. Compounds containing three roots are few but compound containing more than three roots are very rare (Olawsky, 2002). For instance, the combinations in 87 contain two roots in English.

87. English Compounds (Haspelmath, 2002:85)

N + N	lipstick	lip + stick
A + N	hardware	hard + ware
V + N	drawbridge	draw + bridge
N + V	babysit	baby + sit
N + A	lead-free	lead + free
A + A	bitter-sweet	bitter + sweet

In Dagbani however, the basic types of compounds commonly identified are: noun + noun compound, noun + adjective compound, and verb + noun compound (Olawsky, 1999, 2002). However, according to Olawsky (1999), verb + noun compound is very rare in Dagbani. The most commonly observed combinations are noun + noun (N+N) compound and noun + adjective (N+A) compounds, and these are frequently observed in loanword adaptation in Dagbani, and they are the focus of the present study. It is argued in literature that the morphological structure of a noun in the Mabia (Gur) language consists of the ROOT + NUMBER AFFIX (Issah, 2013; Nsoh, 2011), and according to Olawsky (2004:129), the root of the noun does not occur in isolation especially in Dagbani and in many other Mabia languages, instead it becomes 'a phonological and grammatical word only through the attachment of the suffix which is inherent to the root'. More importantly, when an attributive adjective and a noun co-occur in a noun

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phrase, the main function of the adjective in that structure is to modify the noun whose root form is used as the semantic head (Issah, 2013). In Dagbani compound formation, the root forms of nouns are added, plus the last suffix of the noun (Olawsky, 2002:213; Hudu, 2005:10) and this is summarized as:

Root + Root ……last suffix of the noun.

The main purpose of the data in 88 is to help readers to understand compound formation in Dagbani and to distinguish a structure that is grammatically acceptable from the one that is ungrammatical in Dagbani and as well aid the analysis of loanwords compounding in Dagbani.

88. Forms of compounding in Dagbani (Olawsky, 1999:122-125).

Noun + Noun Compound

a. /saa/ + /kug-li/ [sa'kuʔli] (rain-stone-SG)　　　'hail'

b. /yili/ + /pag-a/ [jil'paʔa] (house-woman-SG)　　'housewife'

c. /kom/ + /gaga/ [kogaʔa] (water-guard-PL)　　　'guards of water'

Noun + Adjective Compound

d. /saa/ + /kur-li/ [sa'kurɨli] (rain-old-SG)　　　'old rain'

e. /bua/ + /piɛl-li/ [bupjelli] (goat-white-SG)　　'white goat'

f. /wahu/ + /ʒe-gu-PL/ [ʋaʔʒɛri] (snake-red-PL)　　'types of snakes'

The data in 88a--c show that N-N lexical compounds are made of two nominal roots, where the first nominal root deletes its class affix leaving only the root, whilst the second nominal root keeps its regular suffix to serve as the morphological head on which the number suffix is marked though Olawsky (1999) is of the view that some counterexamples can be found. In this compound 88a—c, the first noun functions as an adjective modifying the second noun. Similarly, the data in 88d—f presents noun +

adjective combination where the number suffixes (singular and plural) are marked only on the morphological head (which is the adjective).

According to Issah (2013), when constructing noun-adjective compounds in Dagbani, the root form of the noun and the adjective are combined, and during this process of attaching the adjective to the noun head, the singular or plural suffix of the head noun is truncated and it is indicated by an apostrophe (which is an orthographic convention). In the present study, surface forms (i.e the addition of roots and suffixes of the final nouns) of compounding are phonologically motivated, hence surface forms are presented without any orthographic conventions. The examples in 89 below are drawn from Abdul-Rahman (2013:222) with some modifications in the transcriptions to further illustrate that the structure with the asterisks (*) are not grammatically possible in Dagbani noun-noun compound formation.

89. Grammatical and ungrammatical structures in Dagbani noun + noun compounding

A	B	C (A+B)	*D
a. /nooŋa/ 'bird'	/tiɛɣu/ 'nest'	[noːntʲɛʔʊ] 'bird nest'	*[noːŋatʲɛʔʊ]
b. /saa/ 'rain'	/tahiŋga/ 'thunder'	[satahɨŋga] 'thunder rain'	*[saːtahɨŋga]
c. /noo/ 'fowl'	/galli/ 'egg'	[nogalli] 'fowl egg'	*[noːgalli]

In loanword compounding, the pattern is different with respect to loanword plus adjective (lexical) compound formation in Dagbani. According to Issah (2013), root-suffix analysis is not applicable to monosyllabic words such as ba (father), ma (mother), chi (millet) and also with loanwords such as buku (book), pɔmpi (pipe) which according to Hudu (2005) do not have identifiable suffix in their singular forms. But the data in 90 below show that, in loanwords compound formation, when the loanword precedes another word (whether

loan or lexical) the loanword that comes before the other word can acquire number suffixes in the course of their morphological adaptation as exemplified especially in 90k and 90l.

90. Loanword + Adjective Compounds in Dagbani

Loan Noun	Adjective	Compound	Gloss
a. /abe/	+ /kpilli/	[abekpilli]	'palm kennel' (Twi)
b. /bodua/	+ /biɛʔu/	/bodʊwabjeʔʊ]	'bad towel' (Twi)
c. /abe/	+ /ʒɛri/	[abeʒɛri]	'palmnut soup' (Twi)
d. /adiini/	+ /suŋ/	[adi:nisuŋ]	'good religion' (Arabic)
e. /alizini/	+ /kom/	[alizɨnkom]	'spiritual water' (Arabic)
f. /alikalɨmɨ/	+ /ʒee/	[alɨkalɨmɨʒe:]	'red pen' (Arabic)
g. /balatɨ/	+ /sabinli/	[balatɨsabinli]	'black belt' (English)
h. /baaji/	+ /kurili/	[ba:dʒikurɨli]	'old bag' (English)
i. /shikuru/	+ /duu/	[ʃikurudu:]	'school room' (English)
j. /apoleesa/	+ /bara/	[apole:sabara]	'operated patient' (English)
k. /bolli/	+ /palli/	[bolpalli]	'new ball (English)
l. /poliŋga/	+ /paʔa/	[polimpaʔa]	'police woman' (English)

The morphological adaptation pattern shown especially in 90k and 90l demonstrate that the root-suffix analysis of loanwords in some cases is possible, thus questioning the claim previously held in Hudu (2005) and Issah (2013). In this type of combination, deletion can occur in the root of the noun (loanword) before the adjective (lexical) is attached to it as observed in 90k and 90l. However, due to the simple nature of the noun root in loanwords, deletion does not frequently occur when an adjective is attached to the noun especially when the attached word is also a noun.

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Apart from the combination of noun-adjective compound where the noun is a loanword and the adjective is a lexical word, there are other similar combinations of compounding where the first noun is adjectival. This is exemplified in [5]91 through 93.

91. Loanword (N) + loanword (N) combination

Noun	Noun	Compound	Gloss
a. /alɨbarɨka/	+ /daadam/	[alɨbarɨkada:dam]	'useful person' (Arabic)
b. /alɨbasa/	+ /bɔkatɨ/	[alɨbasabɔkatɨ]	'bucket of onion' (Arabic)
c. /aŋgo/	+ /barɨna/	[aŋgobarɨna]	'dangerous groom' (Hausa)
d. /lɔba/	+ /liiga/	[lɔbali:ga]	'rubber blouse' (English-Hausa)
e. /bol-li/	+ /paaki/	[bollipa:ki]	'football park (English)
f. /laati/	+ /bolifu/	[la:tibolifʊ]	'torch light bulb' (English)
g. /loori/	+ /meeti/	[lo:rɪme:tɨ]	'lorry mate' (English)
h. /loori/	+ /taaya/	[lo:rita:ja]	'lorry tyre' (English)
i. /amani/	+ /kuruga/	[amanikʊrga]	'a bowl of dried fish' (Twi)

The next possible compound formation is a loanword plus a lexical word as illustrated in 92. In this form of combination, deletion occurs in some of the compounding especially in 92c where the final vowel in /alɨzɨni/ gets elided during the process of compounding.

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[5] The data in 90k and 90l which seems to question the claims in literature that loanwords do not have identifiable singular suffix forms (Hudu, 2005) and that root-suffix analysis is not applicable to loanwords (Issah, 2013) will require further morpho-phonological examination to set this linguistic issue right.

92. Loanword plus noun (lexical) combination

Loanword	Lexical	Compound	Gloss
a. /abe/	+ /ʒɛri/	[abeʒɛri]	'palmnut soup' (Twi)
b. /bɔrade/	+ /piɛgu/	[bɔradepjeʔʊ]	'a basket of plantain' (Twi)
c. /kɔdu/	+ /kɔha/	[kɔdukɔha]	'banana seller' (Twi)
d. /alɨzini/	+ /kom/	[alɨzinkɔm]	'spiritual water'(Arabic)
e. /chiyaama/	+ /bugim/	[tʃija:mabʊʔim]	'hell fire' (Arabic)
f. /chicha/	+ /paga/	[tʃitʃapaʔa]	'female teacher' (English)
g. /dɔgite/	+ /paga/	[dɔʔtepaʔa]	'female doctor' (English)
h. /tɨrata/	+ /logu/	[tɨratalɔʔʊ]	'tractor trailer' (English)
i. /dɨraaba/	+ /palo/	[dɨra:bapalo]	'new driver' (English)
j. /tulaale/	+ /koliba/	[tula:lekolɨba]	'perfume bottle' (Hausa)
k. /teeku/	+ /noli/	[te:kunoli]	'sea shore' (Hausa)
l. /yɛda/	+ /lana/	[jɛdalana]	'trusted person'(Hausa)

In 93, I present data on compounding involving lexical words coming before loanwords in which segment deletion is observed. The examples in 93a—g show segment deletion process because of the fact that when a lexical word precedes in compounding as previously attested and exemplified in 88 above in the Dagbani phonology (Olawsky, 1999).

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93. Lexical word plus loanword compounding

Dagbani word	Loanword	Compound	Gloss
a. /bilɛgu/ +	/cheche/	[bilɛtʃetʃe]	'baby bicycle' (Hausa)
b. /ninvuɣ/ +	/chirichi/	[ninvuʔtʃiritʃi]	'worthy person' (Hausa)
c. /dagbana/ +	/dɔgite/	[dagbandɔʔe]	'a Dagomba doctor' (English)
d. /kom/ +	/bɔkati/	[kobɔʔatɨ]	'a bucket of water'(English)
e. /kosurim/ +	/bɔkati/	[kosuribɔʔatɨ]	'bucket for bathing'(English)
f. /naa/ +	/poliŋga/	[napoliŋga]	'a chief who is a police'(English)
g. /daa/ +	/loori/	[da:lo:ri]	'market truck' (English)
h. /tamale/ +	/teesa/	[tamalite:sa]	'Tamale station' (English)
i. /naya/ +	/chaaji/	[najatʃa:dʒi]	'Yendi fare' (English)

The data in 93 b, g, h and i) demonstrate associative construction in Dagbani, where two nouns are combined, showing association between the second noun and the first noun as previously observed in Hudu (2014b). In this type of compound formation, the first noun modifies the second noun. The rest of the data (e.g 93a, c, d, e and f) constitute a compound with two roots in which only the final word suffix is maintained. This type of compounding trigger final vowel deletion of the first noun. For instance, "in compounding, the last vowel of the first noun of a compound may be reduced to [ɨ] or elided all together due to its location within the compound (Hudu, 2014b:8).

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5.6 Summary of the chapter

This chapter offered an account of morphological adaptation of loanwords in Dagbani focusing on inflectional suffixes of nouns, derivational suffixes, aspect marking and compounding. Inflections are presented in two forms: plural suffixes derived from singular forms in the source language and the singular suffixes derived from plural forms in the source language. For example, the default plural suffix /-nima/ marks plurals in all loanwords while some plural suffixes such as *–ya, -ti, -ri, -a, -hi and -si* are adapted to the regular class system of Dagbani by inflecting for number. Derivationally, nouns are derived from loanwords (e.g verbs) with suffixes such as –bu and –ra. Aspectual marking of loanwords in Dagbani also involved the use of both perfective and imperfective suffixes such as /∅, -ya/ and /-ri. –ra/ respectively. Finally, loanword compounding in Dagbani revealed five possible combinations: noun + adjective compound; loanword preceding a lexical word, noun + noun compound; involving only loanwords, noun + noun compound; a loanword preceding a lexical word, noun +noun compound; a lexical word preceding a loanword and noun + noun compound; each noun containing a long vowel in the root. In compounding of loanwords in Dagbani, deletion of segment is not very common when the roots of nouns are added except in few cases where the final vowel of the first noun of a compound is deleted, thus maintaining only the final word suffix in the compounds with two roots.

CHAPTER SIX

SUMMARY OF FINDINGS AND CONCLUSION

6.0 Introduction

This study consists of six chapters and each chapter is focused on a particular theme with the aim of finding answers to the research questions that guide this research project. This chapter however provides highlights on the major findings and conclusive deductions made from the findings of the study. This chapter proceeds as follows: The major findings of the thesis are summarized in section 6.1 while in section 6.2, I discuss the contribution of the findings and section 6.3 presents the conclusion. In section 6.3. Some possible areas for future studies. The chapter ends with a

6.1 Summary of findings of the study

The primary goal of the study was to offer an empirical description of loanwords adaptation in Dagbani focusing on two parts: phonological and morphological adaptation processes. In the first part, I examined some phonological adaptation processes in chapter four including segmental adaptation, segmental processes and syllable structure processes.

Segmental adaptation was commonly observed in Arabic models, which contain some consonant sounds, which were apparently not part of Dagbani consonant inventory. Consequently, varied processes are employed to ensure that such consonant sounds are adapted into Dagbani consonantal system. Examples of sounds adapted from the Arabic

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models are: ق /q/ which is adapted as /k/, خ /x/ is adapted as /h/, ص /sˤ/ is adapted as /s/ and ظ /ðˤ/, ذ /ð/ or ز /z/ are adapted as /z/.

In view of segmental processes, consonant mutation was widely observed in the adaptation of loanwords in Dagbani. The major consonant mutation processes analyzed in this study include: palatalization, debuccalization, liquid substitution and fortition. Words borrowed from English and Hausa are widely observed to have undergone these segmental processes. While some models from English, Arabic and Hausa undergo segmental processes such as palatalization and fortition, other models from English and Twi undergo debuccalization. Sounds such as coronal (e.g /s/) and the dorsal (e.g /k, g/) undergo palatalization before a high front vowel in Dagbani loanwords. This usually involves models from English, Arabic and Hausa. In the case of debuccalization, only /k/ in models from English, Arabic and Twi undergo the process of debuccalization. Fortition process involves fricative /v/ changing to a stop /b/, final devoicing of /b/ to [p] or [f], then /v/ and /z/ reduced to [f] and [s] respectively. These processes are observed with only models from English. Finally, on the process of fortition, words, which contain affricates, change to fricatives or plosives.

Substitution of /d/ and /r/ are generally observed with models borrowed from English, Hausa and Twi. Liquid substitution was also observed among models from only English and Hausa. The pattern of segmental processes displayed by various languages demonstrates how Dagbani phonotactics really regulates the various models borrowed from the source languages in order to rephonologize them to conform to the Dagbani phonology.

In addition, syllable structure processes such as epenthesis, deletion, diphthongs adaptation and importation were explored. In the case of epenthesis, only models from

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English and Arabic contained consonant clusters, therefore vowel and sonorant epenthesis were the most common repair strategy employed to nativize such loanwords at the syllable level to avoid clusters. Vowels which were commonly epenthesized to break clusters in loanwords include [ɨ, i, a, u, ʊ]. Indeed, [ɨ] was commonly epenthesized in word-initial clusters and word-final clusters whilst [i, a, u, ʊ] were usually epenthesized to make codas onsets. Similarly, there was also the insertion of sonorants such as [n] with the same purpose of avoiding cluster consonants, and the insertion of [j, w] purposely to form onsets for vowel-initial loanwords in Dagbani. Also observed was the epenthesis of the syllable [da-] to the left of the vowel-initial loanwords to license the place of articulation of the nasal clitic that comes before it, and form onset for the vowel-initial loanwords.

One other process analyzed was deletion of obstruent, nasal and lateral. These forms of deletion were applied to only English models and on rare cases Arabic models, all intended to avoid consonant clusters in Dagbani.

Diphthongs from English and Hausa are mostly adapted by means of compensatory lengthening. For example, observation of the data analyzed in this study show that diphthongs such as /aɪ/ and /eɪ/ are mostly adapted from only English whilst /aʊ/ is adapted from both English and Hausa. While /aɪ/ is generally adapted from English as [a:] or adapted as [a] especially when it occurs before a nasal in loanwords, /eɪ/ is generally adapted as [e:]. What is puzzling is the adaptation of the diphthong /aʊ/ in English as [a:] or [o:] in Dagbani. The same diphthong is adapted from Hausa as [o:].

Finally, on the part of the syllable structure processes, the concept of loanwords importation was examined, and this was generally observed in all the four contact languages of Dagbani. However, what is puzzling about this process is that, why are

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some models but not others imported into the native phonology of Dagbani? Even in some cases, words are borrowed though there is no any semantic gap. Some linguists may attribute such borrowing to the fact that it enhances communication, I think further examination will help find answers to the puzzle that might be in existence beyond communication enhancement.

The second part of the study examined morphological adaptation processes of loanwords in Dagbani in chapter five. Areas analyzed in this regard include inflectional suffixes, derivational suffixes, aspect marking and compounding in Dagbani. In terms of number marking, two forms were established: plural suffixes derived from singular forms and singular suffixes derived from plural forms. It was established that the default plural suffix /-nima/ marks plurals in loanwords
whilst some plural suffixes such as –ya, -ti, -ri, -a, -hi and -si are adapted to the regular class system of Dagbani by inflecting for number.

Derivationally, suffixes such as –bu and/or –ra are attached to loanwords (verbs) to derive nouns in loanwords adaptation processes. In addition, aspectual marking of loanwords in Dagbani was examined and it was established that suffixes such as /Ø, -ya/ are used to express perfective forms whilst suffixes such as /-ri. –ra/ are used to express imperfective forms.

Finally, I examined compounding of loanwords in Dagbani and the following forms were established: noun + adjective compound where the loanword precedes the adjective, noun + noun compound involving only loanwords, noun + noun compound where the first noun is a loanword and the second noun is a lexical word, and finally noun + noun compound showing association between two nouns in a compound and a compounds with two roots in which only the final word suffix is maintained.

Generally, lexical categories borrowed from the various contact languages (English, Arabic, Hausa and Twi) into Dagbani are mostly nouns and a few cases verbs especially from English. The influx of loanwords into Dagbani is because of factors such as prestige, cultural dominance, education, advent of religion in Dagbon, politics and trade. In the following section, I outline some contributions or significance of the study.

6.2 The contributions of the study

It is worthy of note that this study expounded on existing literature to offer a systematic empirical account of Dagbani loanwords typology, and presented with a comprehensive analysis compared to previously cursory analysis of loanwords in the language. Thus, its contributions to the study of Dagbani phonology and other related languages cannot be ignored.

In the first place, within the domain of loanword phonology in Dagbani, this study has offered an empirical account of segmental adaptation, segmental processes, syllable structure processes and the discussion of morphological adaptation of loanwords which hitherto have not been systematically and comprehensively been described in the previous studies on loanwords in the language. It is therefore my hope that this study will serve as a source of inspiration to other phonologists of various languages to undertake similar investigations in their respective languages, so that the relatively small body of literature on the phonology of our languages, more especially on the part of linguistic typology at large can be given a face-lift.

Another contribution of this study is that, the study of loanwords adds some value to syllable analysis especially concerning the role it plays in the phonological analysis of languages. It is unquestionable to note that, through the study of loanwords and other similar investigations, languages have realized the importance of the CV syllable structure. Loanword rephonologization otherwise known as syllabification is a strategy employed by Dagbani and many other languages to satisfy its syllable structure requirements.

Finally, this typological study of the Dagbani loanword phonology is not only significant to the study of the phonology of Dagbani but also significant to the phonology of other Mabia (Gur) languages. The next section presents some possible areas which are closely related to the discussions advanced in this study for further research.
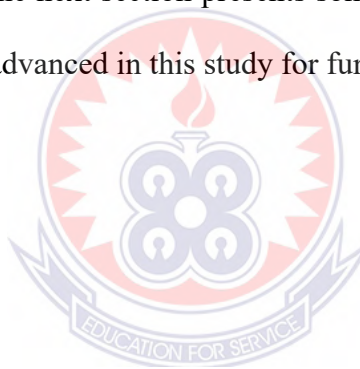
6.3 Conclusion

This study sought to examine some key adaptation processes Dagbani uses to maintain its phonological and morphological structures. Two broad areas were examined: phonological and morphological adaptation processes. This was Two broad areas were examined: phonological and morphological adaptation processes. for the study guided by the theoretical framework of Basic Linguistic Theory. The corpus of loanwords analyzed in this study were collected from dictionaries and previous studies, elicitation and my intuition. The data were however transcribed and verified by five non-literate L1 speakers of Dagbani.

Segmentally, the adaptation of loanwords in Dagbani underwent two broad processes: segmental adaptation involving models from only Arabic, and segmental processes, which are observed in all the models, borrowed from the various languages into Dagbani. Five segments adapted and analyzed in this study include segments such as ق /q/→[k], خ /x/→[h], ص /sˤ/→[s] and ظ /ðˤ/, ذ /ð/ or ز /z/→[z] whilst the segmental processes analyzed here include palatalization, debuccalization, liquid substitution, /d/ and /r/ substitution and fortition.

I also suggest that Dagbani phonotactics disallows consonant clusters and diphthongs. To avoid clusters in Dagbani, vowel and sonorant epenthesis and sound deletion were employed as a repair strategy, and diphthongs borrowed into the language are corrected through compensatory lengthening and in some cases through glide insertion. However, some models from Akan and Hausa with vowel sequence such as [ua, ia] as exemplified in Chapter Four remain unchanged in Dagbani. Perhaps, further investigation could be conducted to find out whether such vowels sequence is actually permitted in Dagbani or there should be an insertion of glide to form onset as the language strictly prefers the CV syllable structure.

Morphologically, the study found that, inflectional suffixes such as */-nima/, –ya, -ti, -ri, -a, -hi and –si* mark plurals whilst *–a, –li*, and *–ga* denote singular in loanwords adaptation in Dagbani. Derivational suffixes associated with loanwords adaptation in Dagbani are *–bu* and *–ra* whilst *Ø, -ya, -ri* and *–ra* mark aspect in loanwords adaptation in Dagbani. Finally, compounding of loanwords in Dagbani involves the forms such as noun + noun compound and noun + adjective compound.

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Considering the statistics of loanwords in Dagbani, it is evident from the corpus of data analyzed here that, Dagbani has borrowed more from the English language than the other languages, and this could be attributed to the fact that, English dominates in all our endeavours (e.g media, trade, official work etc).

6.4 Some possible areas for future studies

Although this study successfully offered a detailed empirical account of loanword adaptation in Dagbani, the discussion is not exhaustive because there are still a number of unanswered puzzles and areas that still require further investigation. This section presents such areas, which were unanswered puzzles in my research work. One area that requires further exploration is the way segmental processes in loanwords adaptation function in Dagbani. Though there is evidence of loanwords which are either adopted or adapted into the language, most words borrowed from the various languages into Dagbani may in future have to be subjected to validity check for a more complete analysis of loanword adaptation in Dagbani.

Another area this study did not examine is the suprasegmental process such as the tone interaction in loanword adaptation in Dagbani. The tonal system of Dagbani is an area that has received little investigation especially within the domain of loanword phonology. Thus, detailed account of the tonal system in the language, particularly in loanword adaptation will especially have the potential of contributing to the understanding of the Dagbani loanword phonology, which also has largely been ignored.

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Again, some data in this study have proven the possibility of root-suffix analysis of loanwords in Dagbani, thus questioning the claim by previous studies on the issue of loanwords not having identifiable singular suffix forms (Hudu, 2005) and that root-suffix analysis is not applicable to loanwords (Issah, 2013) will require further morpho-phonological examination to address this linguistic issue.

Finally, since the analysis in this study is empirically driven, the data described here could be coached in a formal theoretical framework of Optimality Theory in future, so that the study could be situated in a broader context to enable readers establish the limits to the generalizations and to onceptualize the outcome of the study.

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APPENDIX A: English Loanwords in Dagbani

Dagbani	Gloss	UR (Original)
1. \<aasiwata\> [aːsɨwata]	'ice water'	/aɪswɔːtə/
2. \< asamblimani\> [asambɨlimani]	'assemblyman'	/əsɛmblimæn/
3. \<ashibiti\> [aʃibɨti]	'hospital'	/hɒspɪtl/
4. \<aayɔn\> [aːjɔn]	'pressing iron'	/aɪjɔn/
5. \<apoleesa\> [apoleːsa]	'operation'	/□p↔reIΣn/
6. \<akaːntanti\> [akaːntantɨ]	'accountant'	/akaʊntant/
7. \<alikɔbita\> [alikɔbita]	'helicopter'	/helikɔptə(ɹ)/
8. \<baadee\> [baːdeː]	'by day'	/baɪdeː/
9. \<baaji\> [baːdʒi]	'a bag'	/bæːg/
10. \<baatiri\> [baːtiri]	'battery'	/bætəɹi/
11. \<balati\> [bal**at**ɨ]	'belt'	/belt/
12. \<bireechi\> [bireːtʃi]	'brake'	/breɪk/
13. \<beebi\> [beːbi]	'baby'	/beɪbi/
14. \<bileedi\> [bɨleːdɨ]	'blade'	/bleɪd/
15. \<biraapu\> [bɨraːpʊ]	'bribe'	/braɪb/
16. \<bolli\> [boll**ɨ**]	'football'	/bɔːl/
17. \<buku\> [buk**u**]	'book'	/bʊk/
18. \<bolifu\> [bolifʊ]	'bulb'	/bʌlb/
19. \<bɔɣati\> [bɔʔati]	'bucket'	/bʌkɪt/
20. \<bɔŋguli\> [bɔŋgulɨ]	'bungalow'	/bangalo/
21. \<bɔragaari\> [bɔragaːrɨ]	'border guard'	/bɔːdə gɑːd/
22. \<bilichiisi\> [bɨlitʃisɨ]	'bricks'	/brɪks/
23. \<buluu\> [bʊluː]	'blue'	/bluː/
24. \<bulooku\> [bʊloːku]	'block'	/blɒk/
25. \<chendiri\> [tʃɛndɨrɨ]	'kendle'	/kɛndl/
26. \<chaaji\> [tʃaːdʒi]	'fare'	/tʃɑːdʒ/
27. \<chaamani\> [tʃaːman]	'chairman'	/tʃɛmən/
28. \<diraaba\> [dɨraːba]	'driver'	/draɪvə(ɹ)/
29. \<direesi\> [dɨreːsɨ]	'dress'	/dɹɛs/
30. \<dɔɣite\> [dɔʔta]	'doctor'	/dɔkte/
31. \<faara\> [faːra]	'father (reverend)'	/fɑːðə/
32. \<filim\> [filim]	'frame'	/f(ɹ)eɪm/
33. \<fiiba\> [fiːba]	'fever'	/fiːvə(ɹ)/
34. \<fiili\> [fiːli]	'feel'	/fiːl/
35. \<fooreesi\> [foːreːsɨ]	'forest'	/fɔrɪst/
36. \<foomani\> [foːmani]	'foreman'	/fɔːmən/

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37. <foosi> [fo:sɨ]	'force'	/fɔɹs/
38. <feesanlaasi> [fe:sanla:sɨ]	'first and last'	/fest ən læst/
39. <filaawasi> [fɨla:wasɨ]	'flowers'	/flaʊəs/
40. <ganji> [gandʒi]	'a gang'	/gæŋ/
41. <girabuli> [gɨrabʊlɨ]	'gravel'	/grævəl/
42. <giriisi> [giri:sɨ]	'grease'	/gɹi:s/
43. <guabe> [guabe]	'guava'	/gwɑ:və/
44. <geensi> [ge:nsɨ]	'against'	/ageɪnst/
45. <haaya> [ha:ja]	'hire'	/haɪə/
46. <heerimani> [he:rimanɨ]	'headman'	/hedmæn/
47. <kamantooŋga> [kamanto:ŋga]	'tomato'	/təmɑ:təʊ/
48. <kaansili> [ka:nsɨlɨ]	'councili'	/kaʊnsəl/
49. <kaari> [ka:ri]	'card'	/kɑ:d/
50. <kaa> [ka:]	car	/ka:/
51. <karanʒini> [karanʒinɨ]	kerosene	/kerozin/
52. <kɔrineeta> [kɔrine:ta]	'coordinator'	/kɔdɪneɪtə/
53. <kootaali> [ko:ta:lɨ]	'coal tar'	/kolta/
54. <kombaa> [komba:]	'combine (harvester)	/kɔmbaɪn/
55. <kompateesa> [kompate:sa]	'competetion'	/kɒmpətiʃən/
56. <kɔndɔɣita> [kɔndɔʔta]	'conductor'	/kəndʌktə/
57. <kurufootu> [kurʊfo:tʊ]	'coal pot'	/kolpot/
58. <kɔrata> [kɔrata]	'collector'	/kəlɛktə(ɹ)/
59. <kɔpu> [kɔpʊ]	'cup'	e. /kʌp/
60. <kuku> [kuku]	'cook'	f. /kuk/
61. <lasiweta> [lasɨweta]	'rice water'	/raɪswata/
62. <laai> [la:i]	'line'	/laɪn/
63. <laati> [la:tɨ]	'light'	/laɪt/
64. <laasinsi> [la:sɨnsɨ/	'license'	/laɪsəns/
65. <laasimani> [la:sɨmanɨ]	'linesman'	/laɪnzmən/
66. <leeza> [le:za]	'razor'	/reɪzə/
67. <lipeela> [lipe:la]	'repairer'	/repɜ:ra/
68. <liifu> [li:fʊ]	'leave'	/li:v/
69. <lɔba> [lɔba]	'rubber'	/rʚba/
70. <loori> [lo:ri]	'lorry'	/lɔɹi/
71. <linjima> [lindʒima]	'regiment'	/ɹɛdʒɪmənt/
72. <machinsi> [mantʃisɨ]	matches	/matʃis/
73. <masa> [masa]	'master'	/mæstə/
74. <maʒini> [maʒini]	'machine'	/məʃin/
75. <miɣisi> [miʔsɨ]	'to mix'	/mɪks/
76. <miiti> [mi:tɨ]	'meet'	/mi:t/

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77. <minisa> [minisa]	'minister'	/ministə/
78. <milichi> [mɪlɪtʃi]	'milk'	/mɪlk/
79. <meeti> [me:tɨ]	'mate'	/meɪt/
80. <moongu> [mo:ngu]	'mango'	/mæŋgəʊ/
81. <mɔrigaari> [mɔriga:rɨ]	'mud guard'	/mʌd gɑ:d/
82. <paasi> [pa:sɨ]	'pass'	/pɑ:s/
83. <paaki> [pa:ki]	'park'	/pɑ:k/
84. <piŋgaasi> [piŋga:sɨ]	pickaxe	/pɪkæks/
85. <pirinsi> [pɨrinsi] [polinsɨ]	'police'	/polis/
86. <paapu> [pa:pʊ]	'pipe'	/paɪp/
87. <paɣati> [paʔati]	'packet'	/pækɪt/
88. <parante> [parante] [pɨle:tɨ]	'plate'	/pleɪt/
89. <pantuu> [pantu:]	'pontoon'	/pɒntu:n/
90. <pateesa> [pate:sa]	'partition'	/pa:tiΣn/
91. <pɛdiri> [pɛdirɨ]	'pedal'	/pedəl/
92. <pentikɔsi> [pentikɔsɨ]	'Pentecost'	/pentikɔst/
93. <poora> [po:ra]	'powder'	/paʊdə(ɹ)/
94. <pɔmpi> [pɔmpɨ]	'pump'	/pʌmp/
95. <pɔŋli> [pɔŋli]	'pound'	/paʊnd/
96. <polatiisi> [polati:sɨ]	'politics'	/pɒlɪtɪks/
97. <poosi> [po:sɨ]	'post'	/post/
98. <pirɛsaayɔn> [pɨrɛsa:jɔn]	'pressing iron'	/presɪnaɪɔn/
99. <pireesi> [pɨre:sɨ]	'press'	/pɹɛs/
100. <piisili> [pi:sɨlɨ]	'pistol'	/pɪstəl/
101. <saasi> [sa:sɨ]	'size'	/saɪz/
102. <sabiila> [sabi:la]	'civilian'	/sɪvɪlɪən/
103. <sabinsi> [sabinsi]	'service (taxi)'	/sɜvɪs/
104. <sama> [sama]	'summon'	/sʌmɔn/
105. <soobuli> [so:bulɨ]	'shovel'	/ʃɒvəl/
106. <sɔɣisi> [sɔʔsɨ/	'socks'	/sɔks/
107. <siliba> [sɨliba]	'silver'	/sɪlvə(ɹ)/
108. <sipuɣisi> [sipʊʔsɨ]	'spokes'	/spoks/
109. <sipɛsi> [sɨpɛsɨ]	'spectacles'	/spektakls/
110. <sipaa> [sɨpa:]	'spar'	/spa:/
111. <sileeti> [sɨle:tɨ]	'slate'	/sleɪt/
112. <simɔgiri> [simɔgɨrɨ]	'smuggle'	/smʌgəl/
113. <siifu> [si:fʊ]	'sieve'	/sɪv/
114. <situfu> [sɨtufu]	'stove'	/stəʊv/
115. <sitaai> [sɨta:i]	'style'	/staɪl/
116. <sooja> [so:ʤa]	'soldier'	/soldʒa/

117. \<shitɔɣu\> [ʃitɔʔu]	'store'	/stɔ:/
118. \<shikuru\> [ʃikʊrʊ]	'school'	/skul/
119. \<shikurudiraaba\> [ʃikʊrʊdɨra:ba]	'screwdriver'	/skrjudraɪvə/
120. \<shimiti\> [ʃimitɨ]	'cement'	/simɛnt/
121. \<shinii\> [ʃini:]	'cinema'	/sɪnɪmə/
122. \<shigaari\> [ʃiga:ri]	'cigarette'	/sɪgəɪɛt/
123. \<sulli\> [sulli]	'shilling'	/ʃɪlɪŋ/
124. \<taŋgaasi\> [taŋga:sɨ]	'town council'	/taʊn kaʊnsɪl/
125. \<taati\> [ta:ti]	'tighten'	/taɪtən/
126. \<taaya\> [ta:ja]	'tyre'	/taɪə(ɹ)/
127. \<taɣsi\> [taʔsɨ]	'taxi'	/taksi/
128. \<teesa\> [te:sa]	'station'	/steIΣn/
129. \<teebuli\> [te:bulɨ]	'table'	/teɪbl/
130. \<teela\> [te:la]	'tailor'	/teIla/
131. \<talivisa\> [talivisa]	'television'	/telɪvɪʒən/
132. \<tiɣiti\> [tiʔtɨ]	'ticket'	/tikɪt/
133. \<tupu\> [tupʊ]	'tube'	/tju:b/
134. \<tiraaza\> [tɨra:za]	'trouser'	/traʊza/
135. \<tirata\> [tɨrata]	'tractor'	/tɹæktə/
136. \<tii\> [ti:]	'tea'	/ti:/
137. \<vooti\> [vo:tɨ]	'vote'	/voʊt/
138. \<watawaɣisi\> [watawaʔsɨ]	'water works'	/watəwɛ:ks/
139. \<walansi\> [walansɨ]	wireless	/waɪles/
140. \<wolimani\> [wolimani]	'old man'	/ɔʊldmæn/
141. \<watamilo\> [watamilo]	'water melon'	/wɔ:təmelən/
142. \<waasimani\> [wa:sɨmani]	'watchman'	/wɒtʃmæn/
143. \<waya\> [waja]	wire	/waɪəɹ/
144. \<yaari\> [ja:rɨ]	'yard'	/jɑ:d/
145. \<yinjinia\> [jindʒinija]	'engineer'	/ɛndʒinɪə/
146. \<yinjin\> [jindʒin]	'engine'	/ɛngine/
147. \<yintanɛti\> [jintanɛtɨ]	'internet	/ɪntənɛt/
148. \<yuusi\> [ju:sɨ]	'use'	/ju:z/

APPENDIX B: Arabic Loanwords in Dagbani

Dagbani	Gloss	UR (Original)
1. <adiini> [adi:ni]	'religion'	/adi:n/
2. <alibalaayi> [alɨbala:jɨ]	'pestilence'	/ʔalbalaah/
3. <alibarika> [alɨbarɨka]	'useful'	/ʔalbaraqa/
4. <alibasa> [alibasa]	'onion'	/ʔalbasol/
5. <alahachi> [alahatʃi]	'sin/ offence'	/ʔalhaq/
6. <alahʒiba> [alahʒiba]	'wonders'	/ʔalʔadʒi:b/
7. <arizichi> [arizitʃi]	'wealth'	/ʔarrizq/
8. <alichidiri> [alitʃidɨri]	'bucket'	/ʔalqidr/ 'pot'
9. <alizanda> [alɨzanda]	'heaven'	/alidʒanna/
10. <achiika> [atʃi:ka]	'truly'	/ħaqi:qa/
11. <asadaachi> [asada:tʃi]	'dowry'	/ʔaswadaaq/
12. <alikalimi> [alɨkalamɨ]	'pen'	/ʔalqalam/
13. <alikama> [alɨkama]	'wheat'	/ʔalqam/
14. <alikali> [alikalɨ]	'soothsayer'	/ʔalqaaz/
15. <aliheeri> [alɨhe:rɨ]	'gift/kindness'	/ʔalkhair/
16. <alizini> [alizini/aliʒini]	'jinn/spirit'	/alidʒinn/
17. <ashili> [aʃili]	'a secret'	/asi:r/
18. <azara> [azara]	'female personal name'	/haadʒara/
19. <chiyaama> [tʃija:ma]	'judgment Day'	/qiya:m/
20. <daadam> [da:dam]	'human'	/adam/
21. <dariza> [dariza]	'valuable'	/daradʒa/
22. <fitiina> [fiti:na]	'trouble'	/fitna/
23. <halli> [halli]	'character'	/haal/
24. <haasada> [ha:sada]	'envy'	/ha:sada/
25. <hachi> [hatʃi]	'a due/ a right'	/haqi/
26. <heerra> [he:ra]	'mensuration'	/khaidoa/
27. <hadiija> [hadi:dʒa]	'female personal name'	[hadi:dʒa]
28. <kuraani> [kuraanɨ]	'Holy Qoran'	/qur'an/
29. <magaribi> [magarɨbɨ]	'4ᵗʰ daily prayer'	/magɾib/
30. <malichi> [malitʃi]	'a male personal name'	/malik/ 'king'
31. <mulichi> [mʊltʃi]	'subjects'	/mulk/
32. <munaafichi> [mʊna:fitʃi]	'hypocrite'	/munaafiq/
33. <mushiiba> [mʊʃi:ba]	'suffering'	/musi:b/
34. <musulimi> [musulɨmɨ]	'a moslem'	/muslɪm/
35. <nasara> [nasara]	'victory'	/nasr/
36. <niɣima> [niʔɨma]	'blessings'	/niʔɨma/
37. <salaatu> [sala:tʊ]	'prayer'	/swalaat/

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38. <sara> [sara]	'almsgiving'	/swadaqah/
39. <shintani> [ʃintani]	'devil'	/seɪta:n/
40. <shiriku> [ʃirɨku]	'spell/magic'	/ʃirk/
41. <tikuli> [tikuli]	'night of power'	--------
42. <wakati> [waʔatɨ]	'time'	/waqt/
43. <wusitaazu> [wusɨta:zu]	'teacher'	/usta:z/
44. <wusimanu> [wusimanu]	'personal name'	/ɔsman/
45. <wuzeeru> [wuze:ru]	'personal name'	/uze:ɾ/
46. [jilija:su]	'male personal name'	/ilias/
47. [jisahaku]	'male personal name'	/ishaq/
48. <zuaalimu> [zʊa:limʊ]	'sinner'	/zwaalim/
49. <zuaalinsi> [zʊa:linsi]	'sins'	/zwʊlim/
50. <zamaatu> [zama:tu]	'crowd'	/dʒama:ʔat/

APPENDIX C: Hausa Loanwords in Dagbani

Dagbani	Gloss	UR (Original)
1. <abinfuura> [abinfu:ra]	'balloon'	/abinfu:ra/
2. <amiliya> [amɨlija]	'wedding'	/amarija/
3. <alimaanʒiri> [alima:nʒiri]	'begger'	/alima:dʒiri/
4. <alɨʒifʊ> [alɨʒifʊ]	'pocket'	/alidʒifu/
5. <alɨkaʊli> [alɨkaʊli]	'promise'	/alɨkaʊli/
6. <anfa:ni> [anfa:nɨ]	'important'	/anfa:ni/
7. <alɨzama> [alɨzama]	'conversation'	/alizama:/
8. <anzansi> [anzansɨ]	'courage'	/anzantʃi/
9. <aŋgo> [aŋgo]	'groom'	/aŋgo/
10. <baanjira> [ba:ndʒira]	'toilet'	/ba:ngida/
11. <bakɔi> [bakɔi]	'a week'	/bakɔi/
12. <barina> [barɨna]	'dangerous'	/barina/
13. <bukaata> [buka:ta]	'charm'	/buka:ta/
14. <chirichi> [tʃiritʃi]	'valuable'	/kiriki/
15. <cheche> [tʃetʃe]	'bicycle'	/keke/
16. <duula> [du:la]	'syringe'	/du:ra/
17. <fasara> [fasara]	'explanation'	/fasada/
18. <fukumsi> [fʊkumsɨ]	'authority/law'	/hukuntʃi/
19. <foli> [foli]	'que'	/foli/
20. <fula> [fula]	'food made with millet into ball'	/fura/
21. <haŋkali> [haŋkali]	'sense'	/haŋkali/
22. <jilima> [dʒilɨma]	'respect'	/girima/
23. <jaara> [dʒa:ra]	'kitchen'	/gjadɪ/
24. <liiga> [li:ga]	'blouse'	/blaʊz/
25. <magaaʒia> [maga:ʒia]	'a leader of women group'	/maga:dʒia/
26. <machele> [matʃele]	'blacksmith'	/makeri/
27. <musulinsi> [mʊsulɨnsɨ]	'Islam'	/mʊsulintʃi/
28. <laara> [la:ra]	'reward'	/la:da/
29. <leemu> [le:mʊ]	'an orange'	/re:mʊ/
30. <laakum> [la:kum]	'camel'	/ra:kumi/
31. <lache> [latʃe]	'sugarcane'	/rake/
32. <salichi> [salitʃi]	'chief'	/sariki/
33. <sooche> [so:tʃe]	'trade'	/saʊke/
34. <soochi> [so:tʃi]	'better in health'	/saʊki/
35. <shaara> [ʃa:ra]	'expensive'	/sa:da/
36. <shia> [ʃia]	'ridicule/joke'	/sia/

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37. <shichiri> [ʃitʃiri]	'sugar'	/sikiri/
38. <takara> [takara]	'a paper'	/takada/
39. <takoro> [takoro]	'window'	/takoro/
40. <taaliya> [ta:lija]	'wedding items'	/ta:rija/
41. <teeku> [te:ku]	'sea'	/te:ku/
42. <tulaale> [tula:le]	'perfume'	/tura:re/
43. <waache> [wa:tʃe]	'rice and beans'	/wa:tʃe/
44. <yɛda> [yɛda]	'trust'	/yɛda/
45. <zinchili> [zintʃili]	'delay'	/zinkiri/
46. <ziliji> [zilidʒi]	'train'	/zirigi/

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APPENDIX D: Akan (Twi) Loanwords in Dagbani

1. <abe> [abe]	'palm nut'	/abɛ/
2. <adaka> [adaka]	'box'	/adaka/
3. <amani> [amani]	'cooking fish'	/amani/
4. <aɱfooni> [aɱfo:ni]	'picture'	/aɱfo:nim/
5. <ampe> [ampe]	'girls' game'	/ampe/
6. <abiarankɔra> [abiarankɔra]	'curfew'	/obiarankɔda/
7. <banchi> [bantʃi]	'cassava'	/bantʃi/
8. <bɔdua> [bɔdua]	'towel'	/bɔ:doba/
9. <bɔraade> [bɔra:de]	'plantain'	/borɔdeɛ/
10. <karakara> [karakara]	'light tomato soup'	/nkrakra/
11. <kabɨre> [kabɨre]	'spell/charm'	/kabre/ (Gonja)
12. <katayuaaaa> [katajua]	'umbrella'	/katawia/ (Bono)
13. <kuruga> [kuruga]	'bowl'	/kʋriwa/
14. <nyarɨwa> [ɲarɨwa]	'garden egg'	/ɲadewa/
15. <ɲamaɲama> [ɲamaɲama]	'assorted stuff'	/ɲamaɲama/
16. <yaɣayaɣa> [jaʔajaʔa]	'a sieve'	/yɛkayɛka/ 'food made from cassava' (Ewe)