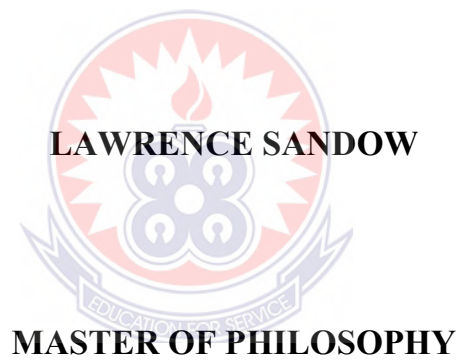


UNIVERSITY OF EDUCATION, WINNEBA

LOANWORD ADAPTATION IN KUSAAL: A PHONOLOGICAL STUDY



2021

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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 in Partial Fulfilment**

**of the Requirement for the Award of Master of Philosophy
(Ghanaian Language Studies)
in the University of Education, Winneba**

SEPTEMBER, 2021

DECLARATION

STUDENT'S DECLARATION

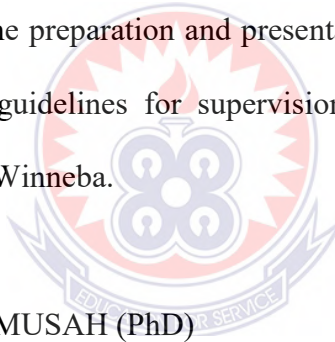
I, LAWRENCE SANDOW, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE:

DATE:

SUPERVISOR'S DECLARATION

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



ANTHONY AGOSWIN MUSAH (PhD)

SIGNATURE:

DATE:

HELEN ATIPOKA ADONGO (PhD)

SIGNATURE:

DATE:

DEDICATION

In memory of my father, Roland Sandow.



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It has been two years since I embarked on this MPhil programme, whose fruition is this thesis. Along these years, I have incurred substantial debts of gratitude to several personalities and I can only partially acknowledge here. First, I wish to thank God the Father and my Lord Jesus Christ for this triumphant procession. I came this far by His pure grace and mercies. Next, my depth of gratitude goes to my supervisors Dr. Anthony Agoswin Musah and Dr. Helen Atipoka Adongo for their invaluable contributions, thought-provoking comments, constructive criticisms and discussions among others, which put this work in good shape. Aside the supervisory role, you provided mentorship which included the opportunity to attend lectures with you. May God Almighty, the God of our forefathers bless you richly for your unflinching support over the years.

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M pv'vsi ya wvsa bedigv!!!

I thank you all very much.

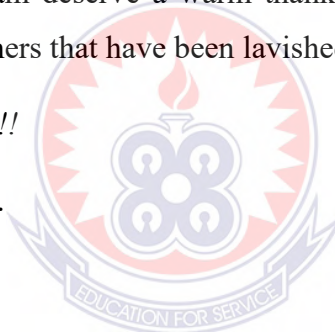


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LIST OF ABBREVIATIONS AND SYMBOLS

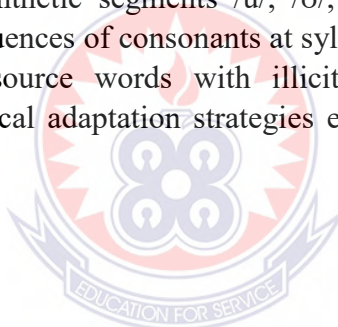
L1	First Language
L2	Second Language
PL	Plural
SG	Singular
1SG	First Person Singular
3SG	Third Person Singular
PHC	Population and Housing Census
TV	Television
OT	Optimality Theory
DFT	Distinctive Feature Theory
MT	Moraic Theory
MST	Metrical Stress Theory
TCRS-LM	Theory of Constraints Repaired strategies – Loanword Model
BLT	Basic Linguistic Theory
SH	Standard Hausa
GhE	Ghanaian English
RP	Received Pronunciation
C	Consonant
C ₁	First Consonant
C ₂	Second Consonant
V	Vowel
EMPH	Emphatic
ATR	Advanced Tongue Root
*	Constraint violation mark

*!	Fatal constraint violation mark
☞	Optimal candidate mark
→	Changes to/becomes
∅	Null/ empty
σ	Syllable node
\$	Syllable boundary
#	Word boundary
_____	Phonological environment



ABSTRACT

This study investigates loanwords from Ghanaian English, Akan and Hausa into Kusaal, a Mabia (Gur) language spoken in northeastern Ghana. The purpose of the study is to investigate how source segments are adapted into Kusaal phonology. It also seeks to investigate the syllable structure processes ongoing in Kusaal loanword adaptation within Optimality Theoretical framework. The study adopts a qualitative research approach where data was elicited from both primary and secondary sources. For the primary source, data was collected through interviews with 25 consultants, together with native speaker intuition, while data from the secondary source was collected from documents. The findings on segmental adaptation show that source segments which do not exist in Kusaal are adapted by means of a replacement with the closest native segment, such as consonant adaptation where the voiced and voiceless affricates are adapted as voiced and voiceless velar stops [g] and [k] respectively. Moreover, the study reveals that voicing assimilation, obstruent devoicing, debuccalisation and fortitioning among others contribute to consonantal changes in Kusaal loanword adaptation. With regard to vocalic adaptation, diphthongs and sequences of vowels are monophthongised by a deletion of the high vowels or coalesced into non-high vowels. On the syllable structure processes, the study finds that the epenthetic segments /u/, /ʊ/, /i/ and /ɪ/ are used to simplify consonant clusters or sequences of consonants at syllable boundaries, while consonant deletion also resolves source words with illicit syllable structures. The study concludes that phonological adaptation strategies ensure that loanwords conform to the phonology of Kusaal.



CHAPTER ONE

GENERAL OVERVIEW

1.0 Introduction

This study is concerned with one of the effects of language contact: loanwords; a phenomenon that is pervasive in almost all natural languages (cf. Winford 2010:170; Matras 2009:146). This phenomenon is usually referred to as *borrowing*, but since borrowing has semantic suggestions like ‘taking and returning’ terms like *adoption*, *importation*, *transfer*, *copying*, *replication* and *loans* are used to refer to the same phenomenon (see Matras 2009; Johanson 2002). Winford (2003) writes that the term lexical borrowing is an extremely common form of cross-linguistic influence and few if any, languages are impervious to it. Tsvetkov et al (2015) also assert that borrowed words are found in all languages. Tadmor (2009) also makes a similar observation that lexical borrowing is universal and that no language in the world is entirely devoid of it. These views suggest that lexical borrowing or loanwords are prevalent in all human languages and therefore, merit a study.

Lexical borrowing, as it were, is universal while the nativisation process is language-specific, thus each language has its strategies or ways of adopting and adapting to foreign words. For this reason, it is attested that from a phonological point of view strategies that are employed by many languages in adopting loanwords are epenthesis, segment deletion and segment substitution among others (see Kenstowicz & Suchato 2004; Uffmann 2006; Rose & Demuth 2006; Aloufi 2006; Kenstowicz 2007; Adomako 2008; Chang 2008; 2009; Mahmood et al 2011; Paradis & LaCharité 2011; Beel & Felder 2013; Alqahtani & Musa 2015; Guba 2016; Wornyo 2016; Abdallah 2020, etc). However, detailed analysis of these strategies in Kusaal have until now not been given the needed attention. Moreover, what underpins this study is Paradis and

LaCharité's (2011) assertion on borrowing. They opine that the study of borrowings opens a large window on the general functioning of languages and ultimately the organisation of the language in the human brain, which allows us to observe how languages react to foreign elements. In a similar observation, Haspelmath (2009) proposes that a better knowledge of lexical borrowing will be important for further progress in historical comparative linguistics, especially in less researched languages.

Bodomo (1995) who maintains a similar view posits that a study of loanwords in a language can provide insights into the cultural, economic and military superiority of one group of people over another. All these views point out that the study of loanwords is essential to understanding how a language behaves when it comes into contact with other language(s). This study, therefore, sets out to investigate loanwords in Kusaal from a phonological point of view with a focus on segmental adaptation, phonological strategies for repairing ill-formed source syllable structures and the formalisation of these strategies within Optimality Theory.

The chapter is organised as follows: 1.1 presents the background of the study language followed by the language and its speakers in 1.2. While 1.3 presents the statement of the problem. In 1.4, the purpose of the study is underlined while 1.5 outlines the objectives of the study and 1.6 presents the research questions. The significance of the study is presented in 1.7 while 1.8 outlines the delimitation of the study and 1.9 outlines the limitations. The organisation of the thesis is presented in 1.10 and 1.11 captures the conclusion of the chapter.

1.1 Background of the study

The study of lexical borrowing dates as far back as the early 1890s and sought to describe the phenomenon whereby foreign materials (words) are adopted into a mother-tongue or a native language by bilinguals or monolinguals (see Paul 1890). The study of lexical borrowing has since attracted the attention of many scholars like Buang, Abdul Halim and Ramakresinin (2017), Zenner, Speelman and Geeraerts (2015), Akrobetoe (2019), Ankrah (2018) among others who investigate loanwords from a sociolinguistic perspective in the Malay, Dutch, Dangme and Bono languages respectively. At the phonological level, the study of loanword adaptation has received considerable attention in languages like Thai (Kenstowicz & Suchato 2004), Punjabi (Mahmood, Hussain & Mahmood, 2011), Ammani Arabic (Guba 2016), Cantonese (Yip 1993), Ewe (Wornyo 2016) and Akan (Adomako 2008) among others. It is widely acknowledged that in adapting foreign materials into native languages, the phonological processes that take place are epenthesis, deletion and substitution among others.

However, what is intriguing is that researchers have divergent opinions on how foreign linguistic items are made to fit into the phonotactics of a native system. Some researchers argue that the adaptation of foreign words into recipient languages is purely perceptual; based on how monolinguals perceive the foreign sounds and not the grammar of the native language (see Yip 1993; Peperkamp & Dupoux 2003; Kenstowicz 2007) and therefore, propose a perceptual approach to the study of loanwords. On the contrary, researchers like Hyman (1970), Paradis and LaCharité (2011) and Mahmood et al (2011) and others are of the view that the adaptation process is phonological; the grammar of the native language is what accounts for how non-native sounds get into the native language. They argue that bilinguals have the

knowledge of the native grammar and therefore, they do not just produce what they hear but what is permitted by the native grammar.

Yet, other scholars like Silverman (1992), Rose and Demuth (2006), Adomako (2008), Adomako (2018) and others neither take sides nor adopt any of these models as a single approach in loanword analysis. Their stance is that loanword adaptation cannot be attributed to only perceptual or phonological considerations but that the two must go together, hence, adopting the perceptual-phonological approach which is a hybrid of the perceptual and the phonological approaches to loanword study. The current study contributes to the argument that the hybrid model gives a better analysis of loanword adaptation than adopting a single model.

Kusaal has many loanwords from English, Twi and Hausa. In English, words like /lɔri/ → /lɔr/ lorry’, /kʌp/ → /kɔp/ cup’, /wɒtʃmən/ → /wasiman/ watchman’, /frɪdʒ/ → /firig/ fridge’, /sku:l/ → /sakur/ school’ and many others have become part of the Kusaal lexicon. Akan (Twi) loanwords in Kusaal are attributed to the fact that there is the need to fill certain lexical gaps. Some Akan loanwords in Kusaal are /bantʃi/ → /banki/ cassava’, /k^wadu/ → /kodu/ banana’, /akekaduru/ → /kakaduru/ ginger’, /mpopaho/ → /papafu/ towel’, /ɔkanea/ → /kania/ lantern’ among others. Similarly, some Hausa words have become part of the Kusaal lexicon and include lexical items such as /bayangida/ → /banɟida/, toilet’ /arziiki/ → /arɪzak/ riches’, /lafiya/ → /laafi/ health’, /fitila/ → /fitir/ lamp’, /turare/ → /tudaari/ perfume’. However, enough attention has not been given to the study of the borrowed lexical items in Kusaal.

It is against this background that this study sets out to discuss how source vowels and consonants are adapted into Kusaal, identify the phonological repair strategies that are used to repair ill-formed source syllable structures and use optimality theory to account for the repair strategies in the adaptation process.

1.2 The language and its speakers

Kusaal is one of the Ghanaian languages spoken in the north-eastern Ghana. The speakers are called Kusaas (pl) and Kusaa (sg), and the land is called Kusaug. Geographically, the language is spoken in six districts of the Upper East region. They are the Bawku Municipal, Pusiga, Garu, Tempene, Binduri and Bawku–West districts. The Kusaas are bordered to the West by the Republic of Burkina Faso and to the East by the Republic of Togo where an appreciable number of Kusaal speakers equally reside. The neighbouring languages to the West are the Farefare, Nabt, and Taln, to the South is the Mampruli and to the East are the Bimoba, Moore, and Bisa. Kusaal has two dialects: Agole or the Eastern dialect and Toende or the Western dialect. The variation in these dialects exists at both lexical and phonological levels. At the lexical level, different words are used by speakers of the dialects to refer to the same item as presented in (1):

1. Agole	Toende	Gloss
<i>bɛŋa</i>	<i>tia</i>	__beans‘
<i>nɪŋ</i>	<i>ɛŋ</i>	__to do‘
<i>gɛɛŋ</i>	<i>zalog</i>	__mad person‘
<i>pɛug</i>	<i>ti’ok</i>	__basket‘
<i>dau</i>	<i>buraa</i>	__male‘
<i>gɔsim</i>	<i>bihim</i>	__to look‘

At the phonological level too, there is a sound difference at word-final and word-medial positions as presented below:

2. Agole	Toende	Gloss
<i>mɔr</i>	<i>mɔt</i>	‘to have’
<i>yɔ’ɔr</i>	<i>yɔ’ɔt</i>	‘name’
<i>nɔɔr</i>	<i>nɔɔt</i>	‘mouth’
<i>basim</i>	<i>bahim</i>	‘to stop’
<i>tisim</i>	<i>tihim</i>	‘to give’

The 2010 Population and Housing Census (PHC) of Ghana reports that the number of Kusaal speakers is 211,521 males and 230,307 females giving a total population of 441,828. Many Kusaal natives are also scattered all over the country, predominantly in the Southern part of Ghana in search of greener pastures. The majority of the inhabitants are followers of African Traditional Religion while there is an appreciable number of Christians and Moslems. The main occupation of the people is farming, specifically of millet and maize together with rearing of domestic livestock such as fowls, guinea fowls, goats, sheep and cattle.

Kusaal is a Mabia (formerly Gur) language of the Niger-Congo languages. It is studied at the university as a subject and also used as a medium of instruction in some primary schools as well as some radio and TV programmes. Kusaal contact with English dates back to when the colonialists (the British) introduced English as the official language (in school, governance, commerce, judiciary, public space among others). This contact has resulted in a heavy lexical borrowing from English into Kusaal to fill lexical gaps and also for prestigious purposes. Moreover, the language has also borrowed words from Twi, Hausa and other languages into its lexicon.

1.3 Statement of the problem

A vast amount of literature has come into being on the subject of loanwords in many languages. However, the literature on loanword adaptation cannot be too much, unless the phenomenon is studied as pertains in all the languages of the world, as all languages behave differently. Although there may be some similarities among them; what is described as language universality, there is however, always bound to be a point of departure. As a result, no literature can adequately address loanword phenomena cross-linguistically and as such the same findings cannot be generalised, or may not hold for other languages. Hence, there is always a gap, especially in less described languages like Kusaal, to fill.

Moreover, most scholars of Kusaal have focused much of their attention on aspects of the phonology and the grammar of Kusaal with less attention to loanwords. Niggli (2014) opines that Kusaal integrates many borrowed words into the language by following as much as possible the normal Kusaal structure. However, that study does not account for the strategies employed by the language to integrate the loanwords into the structure of the language. Similarly, in Abubakari (2011, 2018, etc.), no issue of loanwords is raised as the focus of those studies are on aspects of Kusaal grammar concerning predicate clefting and serial verb constructions and the syntax-information structure interface respectively. Musah (2010; 2018) broaches some of the phonological processes that take place in English and Hausa loanword adaptation into Kusaal. However, these studies are not detailed enough and do not include loanwords from Akan. Moreover, the assertions in these studies are not expressed formally in any theory. In addition, the status of the quality of the epenthetic vowels have not been established in Kusaal loanwords as exemplified below:

3. GH. English	Kusaal	Gloss
a. /stɔː/	/sɪtɔː/	==store'
b. /spana/	/sipana/	==spanner'
c. /sku:l/	/sakur/	==school'
d. /draɪva/	/dɔɪba/	==driver'

In the data above (3a-d), it is observed that all the English words have onset consonant clusters which are simplified by vowel insertion as observed in the surface forms in Kusaal. However, the epenthetic vowels are not the same. In (3a) the epenthetic vowel is /ɪ/ while it is /i/ in (3b), /a/ in (3c) and /ɔ/ in (3d). This, therefore, raises a question of what is the status of the quality of the epenthetic vowels and the process that triggers their occurrence. This study seeks to address issues of this nature among others.

1.4 Purpose of the study

The purpose of this thesis is to study how Kusaal integrates borrowed lexical items from three different languages, that is, English, Akan and Hausa into the language.

1.5 Research objectives

The study seeks to achieve the following objectives.

1. To provide a detailed account of how source segments are mapped or adapted into Kusaal.
2. To identify the syllable structure processes in Kusaal loanwords.
3. To formally account for the syllable structure processes of borrowed items into Kusaal using Optimality Theory (OT).

1.6 Research questions

The study is guided by the following questions.

1. How are source segments mapped or adapted into Kusaal?
2. What are the syllable structure processes in Kusaal loanword adaptation?
3. How can Optimality Theory be used to account for the syllable structure processes of borrowed items into Kusaal?

1.7 Significance of the study

The significance of this study cannot be overemphasised as it will constitute the first detailed work on loanword analyses from an OT perspective in the language. It will also contribute greatly to the growing body of research works in the language. Moreover, the study will provide the basis for further studies in the area of loanwords in Kusaal and related languages. Besides, teachers and students of Kusaal can use this research to enhance their understanding of Kusaal phonology. Finally, the findings of this study will add more to the literature and knowledge of loanword phonology.

1.8 The scope of the study (delimitation)

This study confines itself to only a phonological analysis of loanwords in the Agole dialect only. This dialect is chosen for the purpose of consistency and it is the dialect of the researcher. The study also analyses only loanwords from English, Akan, and Hausa. The reason for considering only loanwords from these languages is attributed to the availability of data. Furthermore, a detailed study of loanwords could have also included studies on stress and tone for tonal languages among many other considerations. However, the present analyses on borrowed items in these languages focuses only on segmental adaptation and syllable structure processes because of limited time, limited resources and limited space.

Moreover, many theories like Distinctive Feature Theory (DFT), Moraic Theory (MT), Metrical Stress Theory (MST), Theory of Constraint Repair Strategies-Loanword Model (TCRS-LM), Basic Linguistic Theory (BLT) and Optimality Theory (OT) could be used to analyse loanwords, however, this study adopts OT because it is widely acknowledged to be effective in formally accounting for the patterning of loanword adaptation. Finally, this study is conducted in five Kusaal communities where the Agole dialect is primarily spoken. They are Bansi, Bazua, Geare, Garu and Sabon-Gari.

1.9 Limitations

The study encountered some challenges with regard to the data collection. Firstly, some participants were not ready to be engaged for interviews even though the researcher had scheduled to meet them. The researcher would have travelled to some participants' residence only to realise that they are gone to their farms or to funerals and the researcher had to go and returned later. Secondly, some participants requested for money before agreeing to participate in the interviews and the researcher had to always spend some time convincing them by explaining to them the purpose of the study and this slowed the interview process. Finally, the study was conducted at a harmattan period – a period where the weather was dusty and windy. Therefore, recording was difficult as it was always interrupted by the harmattan wind. The researcher had to record one session twice or thrice in order to get a better recording for transcription. This affected the recording process and sometimes the researcher had to even go back to a participant for a second time to have him/her interviewed and recorded if the earlier recording was poor.

1.10 Outline of the study

This study contains six chapters. Chapter One provides an overview of the study as well as captures the introduction and the background of the study, the language and its speakers. It also outlines the statement of the problem, the purpose of the study, the objectives and research questions as well as the significance of the study. The chapter finally presents the delimitation and limitations of the study.

Chapter Two presents the literature associated with the study. It reviews the segmental inventories of Kusaal, Ghanaian English, Akan and Hausa. It also reviews the concept of loanwords as well as the factors that motivate lexical borrowing. The chapter further reviews previous studies on loanword adaptation in foreign, African and Mabia languages. Finally, the chapter captures the syllable structure of Kusaal as well as the theoretical framework.

Chapter Three discusses the methodology that was adopted for the study and it underscores the research approach, data collection, data collection strategies, sampling techniques, research sites and ethical considerations.

Chapter Four presents and discusses data on segmental adaptations and the phonological processes that affect segments in Kusaal loanword adaptation while chapter five examines the syllable structure processes in Kusaal loanword adaptation, the quality of the epenthetic vowel and the formalisation of the syllable structure processes within OT. Chapter six provides the findings, recommendations and conclusions of the study.

1.11 Conclusion

This chapter sets the stage for this research by introducing the study, providing a background to the study as well as the background of the language and its speakers. It also states the research problem, the purpose and its objectives. Furthermore, the significance of the research as well as its delimitation and limitations are also discussed. The next chapter reviews relevant studies or literature and the theoretical framework in connection with this research.



CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.0 Introduction

This chapter reviews literature related to this study. It reviews literature on the segment inventory of Kusaal in section 2.1 and the syllable structure in section 2.2, Ghanaian English segment inventory in section 2.3, while Akan and Hausa segment inventories are reviewed in 2.4 and 2.5 respectively. The chapter also captures the concept of loanwords in section 2.6, while studies on motivations or factors that account for loanwords are reviewed in section 2.7. Section 2.8 reviews studies on phonological adaptation of loanwords in some foreign, African and Mabia languages follow by the theoretical framework of the study in section 2.9, while section 2.10 provides a conclusion to the chapter.

2.1 Segment inventory of Kusaal

This section presents consonantal and vocalic phonemes, nasal and oral vowels, diphthongs and the syllable structure of Kusaal.

2.1.1 Consonantal phonemes of Kusaal

Kusaal has 24 consonants which are classified according to the three dimensions of consonant classification; that is, voicing, place of articulation and manner of articulation (see Musah 2010, 2018; Abubakari 2018). The table below presents the consonantal phonemes of Kusaal:

Table 1: Consonant phonemes of Kusaal (Adapted and modified from Musah 2010:31)

	Bilabial	Labio-dental	Alveolar	Palatal	Velar	Labio-velar	Glottal
Plosive	p b		t d[r]		k g	kp gb	ʔ
Fricative		f v	s z	[j]			h
Nasal	m		n	ɲ	ŋ		
Labialised nasal				ɲ ^w			
Approximant				j		w	
Lateral			l				
Trill			r				

Ten of the consonants do not occur at the word-final position and these include, /kp, gb, v, z, j, h, ɲ, ɲ^w, j, w/ and it is also attested that three consonants in the consonant chart /ʔ, ŋ, r/ do not occur at word-initial positions (see Musah 2010; 2018). The Labio-velar stops /kp, gb/ do rarely occur with back vowels. The voiceless glottal stop /ʔ/ is orthographically represented as (‘) and it has a limited distribution; it occurs only at word-medial positions and as a coda to shortened syllables (Musah 2010). The glottal stop /h/ does not occur at word-medial positions. However, in the Toende dialect, the voiceless fricative /s/ alternates with /h/ in intervocalic positions such as in /gohim/ ‘_watch!’, /bahim/ ‘_leave/stop!’ and /tihim/ ‘_give!’ The labialised palatal nasal /ɲ^w/ does not occur with back vowels. For instance, we can have /ɲ^wam/, /ɲ^wɛ/, /ɲ^wiak/ as in ‘_calabash’, ‘_to hit’ and ‘_to squeeze’ respectively but not * /ɲ^wum/, * /ɲ^wɔ/ and * /ɲ^wɔ/. The phonemic status of the voiced alveolar trill /r/ is unclear; whether it should be treated as a separate phoneme or as an allophonic variant of /d/. This is because it alternates with /d/ in intervocalic positions where it is realised as a tap /ɾ/ but becomes a trill at word-final position. However, in the Toende dialect, it is

realised as voiceless alveolar stop /t/ at word-final position as in /mɔt/ *'have'*, /nat/ *'to fit'* and /kʊ:t/ *'funeral'*.

2.1.2 Vocalic phonemes of Kusaal

It is attested that Kusaal has nine vowels [i, u, ɪ, ʊ, e, o, ε, a, ɔ] and five nasal vowels [ɛ̃, ɪ̃, ʊ̃, ɔ̃] (see Niggli 2014; Musah 2018; Abubakari 2018). Positionally, there are four front vowels [i, ɪ, e, ε], four back vowels [u, o, ʊ, ɔ] and one central vowel /a/. The table below presents the distribution of Kusaal vowels according to height and place of the tongue:

Table 2: Vowel system of Kusaal (Adapted from Musah 2018:45)

		Front	Central	Back
High		<i>i</i>		<i>u</i>
		<i>ɪ</i>		<i>ʊ</i>
Mid	High	<i>E</i>		<i>o</i>
	Low	<i>ε</i>		<i>ɔ</i>
Low			<i>a</i>	

Phonetically, all the vowels can be lengthened as in /i: ɪ: u: o: e: ε: ʊ: ɔ: a:/. Musah (2018) posits that the mid-high front /e/ and the mid-high back vowel /o/ together with their long counterparts /e:/ and /o:/ are quite restricted in usage and that they are found more frequently in borrowed lexical items. Moreover, /o/ and /e/ are quite limited in distribution; they rarely occur in open syllable. Musah notes again that /o/ never occurs at syllable initial position either and it is generally more relevant in diphthongs especially after the central and high back vowels such as in *kuos* *'sdl'*, *duom* *'get up!'* including when the glottal stop is at intervocalic position between these vowels. Examples: *ku'om* *'water'*, *bv'os* *'ask'* (Musah 2018:47). Likewise, he notes that /e/

never occurs at syllable initial position and that it generally occurs as a final vowel in diphthongs such as in *nie* wake‘, *pie* wash‘, *paae* reach (2018:47).

2.1.3 Nasal vowels versus oral vowels

The nasal vowels are drawn from retracted tongue root /-ATR/ sounds (Musah 2010). These vowels are different from nasalised vowels. By their nature, the nasal vowels are produced simultaneously through the oral cavity and the nasal cavity while the nasalised vowels take nasality from nasal segments. The nasal vowels and oral vowels are presented below:

4. Nasal Vowels

/ɪ/	/tɪ/	<u>to vomit</u> ‘
/ɛ/	/kɛ/	<u>to gossip</u> ‘
//	/s/	<u>to run diarrhea</u> ‘
/ɔ/	/bɔ/	<u>to make marks</u> ‘
/ʊ/	/tʊ/	<u>to line up</u> ‘

Oral Vowels

/i/	/ti/	<u>we</u> ‘
/ɛ/	/kɛ/	<u>to leave, to remain</u> ‘
/a/	/sa/	<u>here or then</u> ‘
/ɔ/	/bɔ/	<u>why</u> ‘
/ʊ/	/tʊ/	<u>to inset</u> ‘

It is worth noting that these nasal vowels can also be lengthened, as in / / *f* small‘, / / *og* small in sizes‘ among others as observed in Musah (2018).

2.1.4 Diphthongs

According to Hayes (2009), a diphthong is a sequence of two vowels that function as a single sound. It is established that Kusaal has diphthongs (Niggli 2014; Musah 2018; Abubakari 2018). The diphthongs are presented in (2) as observed in Musah (2018).

5. Diphthongs

/uo/	<i>kuos</i>	‘to sd1’	/ɔ/	<i>ayɔpɔ</i>	‘seven’
/æ/	<i>kae</i>	‘not’	/au/	<i>awai</i>	‘nine’
/aʊ/	<i>gbaʊŋ</i>	‘book’	/au/	<i>dau</i>	‘man’
/ia/	<i>siak</i>	‘to agree’	/ie/	<i>biel</i>	‘seed’
/ua/	<i>luak</i>	‘to avoid’	/ɛʊ/	<i>bɛkɛʊŋ</i>	‘dawn’
/ɛɔ/	<i>pɛɔg</i>	‘basket’	/ei/	<i>ayei</i>	‘no’

2.2 The syllable structure of Kusaal

Musah (2018) posits that Kusaal syllable configuration restricts the formation of consonant clusters of any kind and that syllable weight is another important consideration in Kusaal syllable descriptions. He defines syllable weight as the number of syllabic segments that can be found in the nucleus of the syllable. In addition, he notes that syllables with only one segment in the rime are considered light-weight while those with two or more are heavy-weight syllables. With regard to syllable structure, Musah (2017) reports that consonant clusters of any kind are barred from occurring syllable-internally in Kusaal. The four basic syllable shapes or types of Kusaal observed in Musah (2010; 2017; 2018) are presented below:

2.2.1 The peak only syllable

The peak only syllables as Musah (2017) observes consist of only a vowel (V) or a syllabic consonant. Examples are presented below:

6. <i>m</i>	1SG	<i>o</i>	3SG	(Musah 2018:62)
<i>ie</i>	‘to search’	<i>ɛɛ</i>	‘yes’	
<i>a.naŋ</i>	‘Mr. Scorpion’	<i>a.tiig</i>	‘Mr. Tree’	

<i>i.sig</i>	__to awake'	<i>ε.rig</i>	__to shift'
<i>ε.bis</i>	__to scratch'	<i>á.la</i>	__thus'
<i>a.yi'</i>	__two'	<i>a.gol</i>	__up'

Musah (2018) notes that the peak only syllables can be either light or heavy weight, that is, containing one or two moraic elements respectively.

2.2.2 The VC syllable

Musah (2018) postulates that the VC syllable is a closed syllable which has the moraic element at segment initial and that the mora is restricted to only vowel sound, where the vowel could be short, long or a sequence of vowels. With regard to coda position, he opines that all consonants can occur except the following: /kp/, /gb/, /v/, /z/, /h/, /w/, /ŋ/, /ŋ^w /, and /j/. Examples of VC syllable shapes observed in Musah (2018) are presented below:

7. <i>el</i>	__to marry'	<i>εεs</i>	__to wipe'
<i>ok</i>	__to lift'	<i>oɔn</i>	__dry season'
<i>is</i>	__to remove'	<i>iak</i>	__to fly'
<i>ɔb</i>	__to chew'	<i>ul</i>	__hom'
<i>on</i>	__3SG.EMPH'	<i>uak</i>	__to flood'

2.2.3 The CV syllable

Musah (2018) states that the CV syllable is open and yields many lexical items in the language. He further notes that the moraic elements in the CV syllable could be a single or a long vowel or a sequence of vowels but never a syllabic nasal. Examples include the following:

8.	<i>li</i>	__fall'	<i>mɛ</i>	__to build'	(Musah 2018:63)
	<i>fɔ</i>	__2SG'	<i>ā</i>	__3PL'	
	<i>laa</i>	__bowl'	<i>nua</i>	__chicken'	
	<i>pie</i>	__to wash'	<i>naae</i>	__to finish'	
	<i>tāu</i>	__female sibling'	<i>mɔ</i>	__to wrestle'	
	<i>gba</i>	__even'	<i>kpalug</i>	__dawadawa	

Musah postulates that although doubly articulated consonants such as the final examples in (19) may present structures similar to consonant clusters they, in fact, are not. In addition, he states that adjoining consonants at syllable boundaries are also not considered as consonant clusters.

2.2.4 The CVC syllable type

Musah (2018) suggests that unlike some of the languages in the Mabia cluster which simplify final consonants with a vocalic segment, Kusaal syllable structure does not syllabify consonants at word-final position. Similarly, he observes that the vocalic elements can be short, long or a sequence of different vowels. Examples of CVC syllable are presented below:

9.	<i>man</i>	__1SG.EMPH'	<i>bil</i>	__small'	(Musah 2018:63)
	<i>tās</i>	__to shout'	<i>pɔd</i>	__to name	
	<i>bɔɔg</i>	__goat'	<i>wiak</i>	__to hatch'	
	<i>buŋ</i>	__to part open'	<i>piel</i>	__white'	

It is observed so far that even though Kusaal allows onsets and codas, complex onsets and codas of any kind are banned.

2.3 Segment inventory of Ghanaian English

Studies on the English spoken in Ghana, the so-called Ghanaian English (GhE) indicate that the variety is distinct from the Standard British English in terms of phonology, morphology, grammar, lexis and pronunciation (cf. Bobda 2000; Huber 2008; Okyere 2013; Ofori et al 2014). In addition, these scholars Bobda (2000), Huber (2008), Koranteng (2006 as cited in Ofori et al 2014), Okyere (2013) and others agree that there are variations in consonantal and vocalic phonemes in the Ghanaian English. This study is analysed using the Ghanaian English variety model. This is because English loanwords in Kusaal are taken from the variety of English spoken in Ghana which to some extent differs from the Standard British English.

2.3.1 Ghanaian English vowels

Huber (2008) reports that the twelve (12) Received Pronunciation (RP) monophthongal vowels are reduced to five (5) among many Ghanaian speakers. These are /i, ε, a, ɔ, u/, while the English diphthongs /eɪ/ and /ou/ have been monophthongised into /e/ and /o/ making up a total of seven (7) GhE monophthongs, that is, /a, e, i, o, u, ɔ, ε/. This implies that /ʌ, ɒ, ɑ, ə, æ, ə/, which are part of the Standard British English vowels are not realised in the variety of English spoken in Ghana.

In terms of diphthongs, Huber identifies that GhE has six (6) diphthongs out of the eight (8) Standard British English diphthongs. These are /aɪ/ →/ai/, /ɔɪ/ →/ɔi/, /aʊ/ →/au/, /iə/ →/iε, ia/, /eə/ →/εa/, /ʊə/ →/ua/, /ue/ →/uɔ//. In short, GhE diphthongs are /ai/, /ɔi/, /ia/, /ua/, /εa/, /uɔ/ as suggests by Huber.

2.3.2 Ghanaian English consonantal inventory

The description of GhE consonants in this study is adapted from Ofori et al (2014). According to them GhE has twenty-two (22) consonants drawn from the twenty-four (24) RP consonants. These consonants are summarised in table (3) according to manner and place of articulation.

Table 3: GhE Consonantal inventory (adopted and modified from Ofori et al. 2014:51)

	Bilabial	Labio-dental	Alveolar	Alveo-palatal	Palatal	Velar	Labio-velar	Glottal
Stop	p b		t d			k g		
Affricate				tʃ dʒ				
Fricatives		f v	s z	ʃ ʒ				h
Nasals	m		n			ŋ		
Lateral			l					
Glide			r		j		w	

The studies of Ofori et al (2014), Huber (2008) and Koranteng (2006 as cited in Ofori et al 2014) point out that GhE does not have dentals and that the dental sounds /θ/ and /ð/ are often replaced with /t/ and /d/ respectively.

2.4 Akan sound inventory

Akan (Twi dialect) is one of the Ghanaian languages widely spoken in Ghana. Adomako (2008) opines that the majority of the Ghanaian populace speaks or understands the Akan language. This may explain why Akan has many of its lexicon being borrowed into many Ghanaian languages including Kusaal. This section

introduces the Akan phonemic inventory. It presents the consonant inventory in a tabular form followed by the vocalic phonemes classified according to tongue height.

2.4.1 The consonantal inventory of Akan

Akan has twenty-three consonants as observed in Adomako (2018) and these consonants are classified according to manner and place of articulation, though he posits that the number of consonants is debatable. The table below presents the distribution of the consonants according to place and manner articulation.

Table 4: Akan consonantal inventory (Adapted from Adomako 2018:8)

	Bilabial	Labio-dental	Alveolar	Alveo-palatal	Palatal	Labialised alveo-palatal	velar	Labio-velar	Glottal
Stop	p b		t d				k g		
Affricates				te dz		teɥ dzɥ			
Fricatives		f	s			ɛɥ			h
Nasals	m		n		ɲ	ɲɥ	ŋ		
Approximants	(w)		ɹ		j			w	

2.4.2 Vowel inventory of Akan

Adomako (2018) notes that Akan has nine (9) phonemic vowels, that is, [i, ɪ, e, ɛ, u, ʊ, o, ɔ, a]. However, he adds that a tenth vowel which is /æ/ is still being debated by Akan scholars as to whether it is phonetic or phonemic. He states that /æ/ is realised at the phonetic level of representation in both Akuapem and Asante's dialects of Akan. According to Adomako, the vowels can be grouped into two sets in terms of ATR values, that is, +ATR: / i, e, u, o, æ/ and -ATR: /ɪ, ɛ, ʊ, ɔ, a/. The classification of the vowels according to height is presented in (6) as observed in Adomako (2018).

10. Classification of Akan vowels by tongue height

High: i, ɪ, u, ʊ

Mid: e, ɛ, o, ɔ

Low: æ, a

2.5 Hausa segment inventory

Hausa is one of the foreign languages that has entered the Ghanaian soil through trading activities. Kusaal contact with Hausa came about when some of the Hausa migrants settled in Bawku purposely to trade. Bawku is an attractive place for trading or business activities because it shares boundaries with the Republic of Togo and Cote d'Ivoire. The Hausa-Kusaal contact results in some Hausa lexical items finding their way into the Kusaal lexicon as observed in Musah (2010; 2018). As this study considers loanwords from Hausa, its phonemic inventory is worth reviewing for a better appreciation of the analysis of Hausa loans in Kusaal. It is important to state that this study analyses loanwords from the variety Hausa spoken in Ghana, precisely in Bawku.

2.5.1 The consonantal inventory of Hausa

According to Newman (2000) the Standard Hausa (SH) has thirty-two consonant phonemes. The table below presents a chart of the Hausa consonants. The consonants are indicated in standard orthography. This study adapts Hausa consonantal inventory proposed by Newman (2000).

Table 5: Hausa consonantal inventory (Newman 2000:392)

		Labial	Alveolar	Palatal	Velar	Labio- velar	Palato- velar	Glottal- laryngeal
Obstruent	Voiceless	[f]	[t]	[c]	[k]	[kw]	[ky]	
	Voiced	[b]	[d]	[j]	[g]	[gw]	[gy]	
	Glide	[β]	[d̥]	ʼy	ƙ	ƙw	ƙy	ʼ
	Voiceless	[f] [fy]	[s]	[sh]				[h]
	Voiced		[z]	[(j)]				
	Glide		[ts]					
sonorant		[m]	[n]					
			[l]					
			[r]					
			[r]					
				[y]		[w]		

Newman notes that the sounds [c] and [j] represent the affricates /tʃ/ and /dʒ/ respectively while /sh/ represent the palatal fricative /ʃ/. He further posits that Hausa has no contrast between /f/ and /p/ and that /p/ is realised as /f/ because Hausa lacks the bilabial voiceless stop /p/ in its consonantal inventory. Additionally, Newman reports that the phonemes /β, d̥/ are laryngealised segments and/or implosives, while /ƙ/ is considered an ejective. Moreover, he points out that /ts/ is generally pronounced as an ejective sibilant /sʼ/ while /y/ represents a glottalised palatal semivowel which is limited to few high frequency words and the palatalized labial /fy/ is lexically infrequent and that it is often replaced by its plain counterpart /f/.

2.5.2 Hausa vowel inventory

Newman (2000) reports that Hausa has twelve vowels which comprises five short vowels, five long vowels and two diphthongs. They are summarised in the following tables:

Table 6: Hausa vowels (Adapted from Newman 2000:398)

<i>Short</i>		<i>Long</i>			
<i>Diphthongs</i>					
[i]	[u]	[ii]	[uu]		
[e]	[o]	[ee]	[oo]		
[a]		[aa]		[ai]	[au]

Newman postulates that the long [aa] is similar to the long vowel in English as in father while with the short vowel /a/, it is difficult to specify precisely because it ranges over the entire phonetic vowel space below and between /e/ and /o/. Newman further asserts that the vowels /o/ and /e/ are normally pronounced like the vowels in English bait and boat but without the off glide. He intimates that at the final position, they occur both long and short, while at word-medial position they are underlyingly always long and occur only in open syllables. However, if the syllable becomes closed due to any number of morphophonological processes, the vowels /ee/ and /oo/ automatically shorten to /e/ and /o/ respectively. Having reviewed the segmental phonology of the languages under consideration, the concept of loanwords is the point of focus in the ensuing section,

2.6 The concept of loanwords

There are many varying equivalent terms or definitions of loanwords used by different scholars. Haspelmath and Tadmor (2009) use the term lexical borrowing and define it

as a word that at some point in the history of a language entered its lexicon as a result of borrowing, transfer or copying. Thomas and Kaufman (1988) use the term *‘borrowing’* to refer to “the incorporation of foreign elements into the speakers’ native language by speakers of that language: the native language is maintained but is changed by the addition of the incorporated features”. This perspective looks at loanwords as foreign sounds or words that have been integrated into a native language.

However, scholars like Matras (2009) and Johanson (2002) oppose the term *‘borrowing’*. They argue that borrowing will mean that the recipients do not own the linguistic item borrowed, which they contend, is not an accurate assumption. Matras argues that “Bilingual speakers may well be aware of the origin of a word or morpheme in a particular *‘donor’* language, but this awareness may be blurred over time, especially if active bilingualism declines, or when the use of the item spreads to monolingual sectors of the speech community”. What he implies is that there is no intention on the part of *‘borrowers’* of a loanword to return the borrowed item to the donor language. Moreover, with time, speakers of the borrowed item may not be able to trace the origin of the borrowed item. Therefore, he uses the term *‘replication’* to capture even more closely the fact that it is not dealing with issues of ownership or even direct imitation or duplication, but rather with the activity of employing an item in context to achieve a communicative goal (Matras 2009).

Johanson (2002) prefers the term *‘copying’* to *‘borrowing, transfer and interference’*. He opines that copying is the creative use of an item within the *‘recipient’* language. His justification for the choice of *‘copying’* over the other terms is that *‘borrowing’* suggests that an element is taken out of the donor language to be subsequently

returned while *transfer* will mean that an element is taken out but not returned, while *interference* carries a connotation of unwanted disturbance of the workings of the recipient language. Therefore, *copying* avoids these problems as noted by Johanson (2002). Haugen (1950) uses the term *importation* to refer to the adoption of a foreign form and/or its meaning and may involve complete or partial imitation. His view suggests that loanwords are foreign elements whose form or meaning are imported and adopted fully or partially. In this study, the term loanword is adopted to mean a word that has been borrowed and used by native speakers.

Winford (2003) asserts that loanwords may be divided into two categories; “pure loanwords” and “loanblends”. According to him, “Pure loanwords” may consist either of single words like *rendezvous* or compound words like *chincibiri*. While “loanblends” involve the transfer of part of the foreign model and the reproduction of the rest (importation of a foreign morpheme combined with substitution of a native one). For instance, “hybrids” include Pennsylvania German (PG) and “home-Pato” in Tampa Spanish (Weinreich 1953) cited in (Winford 2003).

2.6.1 Motivations or factors that account for loanword adaptation

The literature suggests that there are reasons or motivations for adapting words from other languages into the native or host languages. Winford (2003) suggests “need” and “prestige” as the two main social motivations why bilinguals borrow words. He stresses that all speech communities have experienced the need to modernize and keep abreast with developments in science, technology among others. He reiterates that there is always the need to fill gaps in the lexicon or introduce finer distinctions of meaning not available in native words. Winford’s opinion implies that words are borrowed by bilingual speakers as a way of filling lexical gaps.

In addition, Winford opines that the spread of English loanwords into many languages across the globe since the mid-twentieth is partly motivated by considerations of fashion or prestige. Commenting on prestige, Matras (2009) indicates that the ‘prestige’ hypothesis assumes that speakers imitate elements of the speech of a socially more powerful, dominant community to gain approval and social status. What this implies is that bilingual speakers see that it is rewarding to use certain linguistic elements from a supposedly ‘high or dominant’ language. At this point, studies on phonological adaptation of loanwords is the focus of the next section.

2.7 Studies on phonological adaptation of loanwords

The focus of this section is to review some relevant studies conducted in the area under consideration. First of all, studies on phonological adaptation of loanwords in some foreign languages are reviewed, followed by studies in some African languages and finally studies in some Maba languages.

2.7.1 Studies on phonological adaptation of loanwords in some foreign languages

Guba (2016) conducts a study on phonological adaptation of English loanwords in Ammani Arabic. The study which adopted moraic theory within an OT framework reveals that the adaptation process is mainly phonological, albeit informed by phonetics and other linguistic factors. Guba points out that Ammani native phonology accounts for the numerous modifications that English loanwords undergo. Concerning segmental adaptation, the results show that Ammani maps source segments onto their phonologically closest Ammani phonemes. However, source allophonic features that are contrastive in Ammani are faithfully mapped onto their Ammani phonemic counterparts. For syllable adaptation, the findings of Guba’s study indicate that

loanwords undergo several phonological processes, e.g. epenthesis and germination, to accommodate ill-formed source syllables into Ammani phonotactic structure.

Beel and Felder (2013) discuss the phonological adaptation of English loanwords in Turkish. Their study reveals that Turkish adapts English words through the processes of substitution, deletion and epenthesis to ease the pronunciation of borrowed words. They also report that substitution occurs when one sound is replaced with a more suitable native sound as in the word “-photograph” that is pronounced /fɒtəɡræf/ in English and /fɒtʰɔɟɫɫɫ/ in Turkish where /g/ is replaced with a /ɟ/. Beel and Felder also observe that deletion occurs when a sound is eliminated. For example, the word “-apartment,” /əpɑːtment/ becomes /ɔpɑɟʔman/ where they claim the final consonant /t/ is eliminated. Additionally, they reveal that epenthesis occurs when a new sound is added, as in the word “-studio,” /stɹɪdiəʊ/ becomes /sɹʉtɹɪdiəʊ/ where an extra vowel /ʉ/ is added. This study provides insight into the processes involved in Turkish loanword adaptation and the processes that might take place in Kusaal loanword adaptation.

Chang (2009) provides a descriptive account of the main patterns found in the adaptation of English loanwords in Burmese. Chang reveals that English segments with no close counterpart in the Burmese inventory are replaced by native Burmese segments rather than being imported into the language as in /f/ → /p^h/, /b, w/ → /v/ (2009:80), /æ/ → /ɛʔ/, and /ɔi/ → /w / (2009:82). With regard to cluster resolution, Chang notes that consonant clusters in syllable onsets are resolved through schwa /ə/ epenthesis, while consonant clusters in syllable codas are repaired through consonant debuccalisation (coda obstruents debuccalise to the glottal stop /ʔ/) and deletion (2009:85). This literature helps provide information on how consonant clusters might be repaired in Kusaal.

Mahmood et al (2011) examine the adaptation strategies employed by Punjabi speakers in the production of English loanwords. They observe that substitution is one of the strategies that dominates other types of adaptation strategies such as insertion, deletion, epenthesis among others in Punjabi loanword adaptation. As regards substitution, they postulate that English phonemes /ɒ/ and /ɔ:/ are substituted with /a:/ and /o:/, and if they follow sonorant consonants /m/ and /n/, then they are substituted with the nasalised allophones as /a:/ or /o:/, while the sound /ɜ:/ is replaced with /ɛr/ or /əl/ if it follows /t/ /s/ /v/ (2011: 240). They further argue that epenthesis occurs to make consonant clusters easier to pronounce by Punjabi speakers and that onset clusters are broken down by inserting a schwa vowel /ə/, which is a similar strategy employed by Burmese in onset cluster resolution.

In addition, Mahmood et al report that because Punjabi is a rhotic language, the palate-alveolar approximant /r/ which is sometimes absent or optional in some middle or final English words is retained in English loanwords adapted by Punjabi especially at the end of a word. They, therefore, consider the segment /r/ as an addition. For instance, 'cooler' /ku:lə(r)/ is adapted as /ku:lər/, 'filter' /filtə(r)/ is adapted as /filtər/, 'master' /ma:stə(r)/ as /ma:stər/ (2011:242). They conclude that the process of borrowing is systematic and language-specific and Punjabi phonological constraints are mainly responsible for adapting English loanwords, so prediction regarding the pronunciation of English words that are still to be borrowed is possible. Mahmood et al's (2011) research is not formalised within any theory and this among other things makes the current study differ from their analysis.

Hussain et al (2011) explore the adaptation of English loanwords in Punjabi and Urdu, particularly vowel substitution. They report that with regard to monophthongs, for instance, the English central long vowel /ɜ:/ is adapted as /ər/ in both Punjabi and Urdu, while diphthongs are substituted either by a single phoneme or lose their second elements and the first elements lengthened. An example is /ei/ where it is adapted as /e:/ in both Punjabi and Urdu (2011:8). In triphthong adaptation, they postulate that /aɪə/ is always substituted with /æ/ in Urdu and /æ/ in Punjabi (2011: 10). Hussain et al conclude that both recipient languages reshape English vowels to the closest available vowels in their phonemic inventories and that the similarities are more significant than differences in both recipient languages.

The pattern of diphthong adaptation observed in Punjabi and Urdu loanwords from English is similar to how Kusaal adapts diphthongs, that is, English diphthongs are also adapted into Kusaal either by substitution of a single vowel or the second vowel (mostly the high vowel) is deleted and the first vowel is lengthened and therefore, Hussain et al's study show a similar adaptation pattern in Kusaal. However, their study does not analyse how English consonants are adapted as this current study does. The next subsection focuses on studies in African languages.

2.7.2 Studies on phonological adaptation of loanwords in some African languages

Nyaguthii and Ong'onda (2018) analyse the adaptation of the loanwords in Kikuyu technical words. The study precisely examines loanwords adopted by native Gikuyu speakers to nativise English technology using an optimality theoretical framework. Their study which analyses a sample of 80 words collected from the domain of technology, medicine, education and agriculture, reports that Gikuyu speakers use processes such as insertion, deletion, vowel substitution and preservation to nativise

borrowed word from English. With regard to insertion, they point out that two processes take place, that is, epenthesis and prosthesis, and as epenthesis occurs to break codas as the language syllable structure disallows codas. For instance, /məʊ.dem/ modem becomes /mɔ̃ndemu/ by vowel insertion at the coda position (2018: 114), prosthesis occurs to increase the number of syllables (2018: 115).

In addition, Nyaguthii and Ong'onda suggest that deletion occurs to deal with codas and syllabic consonants that are not allowed in the Kikuyu language. For instance, /sel/ cell is adapted as /sero/ where the sound /l/ is deleted (2018:115). However, this cannot be described as deletion since /l/ is been replaced by /r/ and therefore it will be felicitous to describe it as segment substitution. Their study also reveals that certain loanwords have the following vowels; /i, o, u, a/ preserved in the Gikuyu language which is also the case in English loanwords in Kusaal. However, Nyaguthii and Ong'onda's study did not provide a detailed analysis on vowel insertion and precisely account for the quality of the epenthetic vowel and therefore differs from the current study.

Iribemwangi and Karũrũ (2012) investigate a phonological adaptation of Kiswahili loanwords into G -G chũgũ dialect of G kũyũ language within the Source-Similarity Model. The study focuses on how Kiswahili loanwords are modified phonologically to fit into G -G chũgũ dialect of G kũyũ language. The authors report that G -G chũgũ uses adaptation strategies such as deletion, preservation and substitution as well as the importation of consonants. As regards segment substitution, they argue that Kiswahili consonant phonemes inventory are more than G -G chũgũ consonants and, therefore, Kiswahili segments that do not exist in G -G chũgũ phonemic inventory are substituted with those in G -G chũgũ inventory that are phonetically close to them. To illustrate their claim, they provide some examples which include the following.

11. Kiswahili (s)	Gĩ-Gĩchũgũ	Gloss (Iribemwangi & Karũrũ 2012:58)
a. /ma h ati/	/ma β ati/	__iron sheets‘
b. / h endera/	/ β endera/	__flag‘
c. / p adri/	/ β atere/	__priest‘
d. / p aŋga/	/ke β aŋga/	__machete‘

Iribemwangi and Karũrũ’s data suggest that the bilabial plosives /b/ and /p/ in Kiswahili are perceived by speakers of G -G chũgũ as a voiced bilabial fricative /β/. It does imply that the two bilabial sounds do not exist in G -G chũgũ phonemic inventory, hence they are replaced by /β/ which according to them, is the close phonemic sound to the source sound. However, they did not account for why /f/ and /b/ are also adapted as /β/ and /m/ respectively (2012:60). Additionally, they assert that there are instances of vowel substitution in G -G chũgũ loanword adaptation from Kiswahili where Kiswahili’s high back vowel /u/ is realised as the lower /o/ and /i/ is realised as /e/ in G -G chũgũ after borrowing (2012:60). Their study concludes that the adaptation strategies ensure that the borrowed words stay as similar as possible to the source forms.

The study argues that the adaptation strategies rather ensure that borrowed words conform to the phonology of the borrowing language and not necessarily to ensure that borrowed words stay as similar as possible to the source forms. The knowledge gained from this article will help to appreciate better how Kusaal reacts to foreign elements and also compare whether there are similarities in the adaptation strategies.

Adomako (2008) investigates vowel epenthesis and consonant deletion in Akan loanword. The study which is analysed within the theoretical framework of Optimality Theory discusses the various repair strategies in Akan loanword

adaptation. He asserts that vowel epenthesis occurs to repair illicit phonotactics in source words in Akan loan and it occurs in three main positions in the word, that is, word-initial (against initial consonant clusters), word-medial (against medial consonant clusters), and word-final (to avoid final obstruent and also final obstruent clusters). He provides the following examples to support his assertion.

12. Word – Initial	Word-medial	Word-final
a. <i>Supiidi</i> <u>sp</u> æd'	a. <i>asæmbile/mire</i> <u>æ</u> ssembly'	a. <i>risi:fu</i> <u>r</u> eceive'
b. <i>Sumoku</i> <u>s</u> moke'	b. <i>kɔmpiliti</i> <u>ɔ</u> omplete'	b. <i>repu</i> <u>r</u> ape'

As regards deletion, Adomako reports that it takes place mostly in clusters in word-final positions and of vowels when they occur in word-initially as presented below:

13. Akan	English	(Adomako 2008:33)
a. <i>posu</i> <u>p</u> ost'		
b. <i>pesi</i> <u>p</u> aste'		

He concludes his study that vowel epenthesis, deletion, non-native segmental adaptation and vowel lengthening are the main repair strategies in Akan loanword adaptation. This literature is significant because loanwords from Akan are being discussed in the current study.

Similarly, Apenteng and Amfo (2014) explore the form and function of English loanwords in Akan. Their study looks at phonological, morphological and semantic issues that pertain to English loanwords in Akan. Phonologically, they observe that Akan loanwords comply with the vowel harmony rule in Akan. Moreover, English short neutral half-open vowel /ʌ/, the schwa vowel /ə/ and the back-open rounded vowel /ɑ/ are replaced with more Akan vowels (2014:223). Again, they postulate that

loanwords with consonant clusters are modified by insertion or deletion which confirms similar observations made by Adomako (2008). With regard to morphology, they opine that English stems are borrowed with various inflections from Akan such as *_nom* which marks plurality is attached to loanwords like *refiree* so we have *_refireenom* to mean *_eferees* (2014:230). Semantically, Apenteng and Amfo report that Akan has borrowed words from the domains of security, soccer, health, governance, education and other specialised fields (2014:236). Apenteng and Amfo's work goes beyond phonological adaptation by considering morphological and semantic adaptations of loanwords while this study is confined within the phonological aspect of loanword adaptation.

Wornyo (2016) conducts a study on the phonological analysis of English loanwords in Ewe. The study focuses on the processes that borrowed words from English go through at the phonological level in their adaptation into Ewe. In terms of phonemic adaptation, Wornyo argues that certain sounds in English words borrowed into Ewe are foreign to the speakers of Ewe and therefore, they replace the foreign sounds with the native ones which are acoustically closer to the foreign ones. Examples of such sounds are /ʃ/ and /θ/ where they are adapted as /s/ and /t/ respectively (2016:45-46). He reveals that deletion and insertion are the main operations used to compel foreign syllable structures to conform to the phonotactic constraints of Ewe. With regard to insertion, Wornyo opines that Ewe has very restricted use of consonant clusters and therefore, its speakers insert a vowel to break unfamiliar consonant clusters in loanwords as shown below:

14. Input	Phonotactic Nativisation	(Wornyo 2016:46)
(a) tractor	/trata/	
driver	/drava/	
glass	/glasi/	
(b) school	/suku/	
store	/sito/	
skirt	/siketi/	

Wornyo's data in (10a) implies that the consonant clusters in the output forms are maintained because they are accepted in Ewe. However, those in (10b) are broken by vowel insertion because they are considered illicit structures and need repairs. With regard to deletion, he intimates that when a loanword has a sequence of two consonants at syllable boundaries, the first consonant is deleted to prevent the occurrence of codas, as in tractor → /trata/, picture → /pitʃa/, soldier → /sodʒa/ (2016:47). However, in the same analysis, /daktə/ 'doctor' which has a sequence of two consonants at syllable boundary is adapted as /dɔkita/ by vowel insertion instead of a deletion of the first consonant as claimed by Wornyo. His analysis concludes that English phonemes are mapped onto Ewe phonetic forms but phonotactic constraints that exist in Ewe result in the processes of deletion and insertion of segments into some English words borrowed into Ewe.

It is observed in Wornyo's analysis that Ewe allows certain consonant clusters such as /trata/ 'tractor', /drava/ 'driver', /glasi/ 'glass' and /flawesi/ 'flowers' (2016:46). On the contrary, the syllable structure of Kusaal does not permit clusters of these kind and therefore, they will require vowel insertion in order to be adapted into the language (see discussion in section 2.7 and chapter 5). Wornyo's study did not

include the quality of the epenthetic vowels and the process that triggers their occurrence. Moreover, he did not also discuss how Ewe adapts English vowels, hence, this study sought to fill these gaps in Kusaal. The next subsection introduces studies conducted in Mabia (Gur) languages.

2.7.3 Studies on phonological adaptation of loanwords in Mabia (Gur) languages

Bodomo (1995) investigates the contribution of loanwords to the study of cultural history. His article specifically addresses how the study of loanwords in Dagaare language can be used to gain insight into the cultural history of the people (Dagaaba). With an analysis of twelve loanwords from Hausa, Djula, English and Akan, Bodomo reports that the level of civilisation of the people before they came into contact with the transmitter languages could be assessed by the study of the loanwords. He argues further that before Dagaare contact with English, Akan and Bambara speaking people, items or concepts like school, pineapple or rice were not known to the Dagaaba. This implies that these items or concepts are borrowed words in Dagaare.

In addition, he posits that loanwords contribute to the understanding of the migration history of the Dagaaba people. Bodomo suggests that the presence of a lot of Akan lexical items for forest products and concepts in Dagaare show that many Dagaaba folks migrated to and from the forest regions down south. Moreover, he states that a study of loanwords in a language can provide insights into the cultural, economic and military superiority of one group of people over another. This current study, however, focuses on the phonological adaptation of loanwords by providing a descriptive account of how speech sounds and syllable structures are adapted into Kusaal language without recourse to their contribution to the understanding of the cultural history of the Kusaal people.

Hudu (2002) examines the phonological integration of English-Dagbani loanwords. His study analyses the phonological processes English words undergo when borrowed into Dagbani. With regard to epenthesis, he discloses that the epenthetic segments are vowels and sonorant consonants, where the epenthetic vowels are /u/, /ʊ/, /i/, and /ɪ/ which are used to break consonant clusters and codas (Hudu 2002:10). With regard to sonorants, the alveolar nasal is what is preferred to be inserted as presented below:

15. /n/ Insertion in Dagbani Loanwords (Hudu 2002:11)

- a. polinsi /pɔlɪnsɪ/ police /pɔlɪs/
- b. walansi /walɔnsɪ/ wireless /waɪles.

In segment deletion, Hudu opines that deletion affects obstruents, nasals and laterals where he illustrates obstruent deletion occurrences as follows; /mæstə/ →/masə/ master', /pɪstəl/→/pɪ:sɪl/ pistol' and /træktə/→/tɪrətə/ tractor'. On the part of nasal deletion, he notes that when a loanword ends with alveolar nasal, it gets deleted because the Dagbani syllable structure disallows codas. Laterals are also banned from occurring at coda positions and therefore, they get deleted before adapted into Dagbani (ibid). The study also reports that substitution which is also a syllable structure process affects consonants and vowels. He concludes that the process of borrowing from English into Dagbani is not haphazard and that it is governed by the phonological rules of the language and these rules must not conflict with the existing rules that govern the realisations of native words. However, the current study departs from his study in terms of the theoretical approach. While that study does not use any theory, the current study is analysed within OT.

Similarly, Inusah and Salifu's (2019) article on the phonological structure of borrowed English words in Dagbani indicates that the phonological differences that characterise the borrowed words when subjected to the phonotactics of Dagbani is the insertion of /i/ and the /ʊ/ to reshape the borrowed words. The conclusion of their study corroborates Hudu's study that there are phonological rules of syllable processes of segment addition, deletion and substitution that govern the borrowing of words, which agree with the existing rules that govern the realizations of the native words (2019:290). Even though that study is analysed within Faithfulness and Markedness Constraints, it only considers English loanwords in Dagbani, whilst the present study includes loanwords from Akan and Hausa.

Another study of Dagbani loanwords is the work of Abdallah (2020). Abdallah in his analysis of the phonological and morphological adaptation of loanwords in Dagbani points out that the Arabic phonemes /s^ʕ/, /t^ʕ/, /q/ and /ð^ʕ/ are adapted as /s/, /t/, /k/ and /z/ respectively. This according to him, is because the segments identified in the foreign language (Arabic) are absent in Dagbani and therefore, Dagbani adapts them with phonemes that are closer to the foreign ones. Moreover, he points out that the segmental processes in Dagbani loanword adaptation are palatalization, debuccalisation, liquid substitution and fortition. Abdallah argues that palatalization affects /s/, /k/ and /g/ where /s/ becomes /ʃ/ before front vowels, /k/ becomes /tʃ/ before front vowels and the voiced velar /g/ becomes /dʒ/ also before vowels (2020:71). In liquid substitution, he notes that /r/ is substituted for /l/ in the spoken Dagbani loanwords because /r/ does not occur at word-initial in Dagbani (2020:78). With regard to fortition (mostly in English loanwords), Abdallah reports that the labiodental fricative /v/ in the input changes to the bilabial stop /b/ in the output between vowels but maintains the voicing feature as in /draivə(ɪ)/ → /dɪra:ba/ diver'

/sɪlvə(ɪ)/ → /siliba/ silver /sɪvɪlɪən/ → /sabi:la/ civilian (2020:85). With regard to syllable structure processes, his study reveals that epenthesis and deletion are the major repair strategies.

In addition, Abdallah argues that the quality of the epenthetic vowel in Dagbani loanwords depends on vowel harmony triggered by root vowel in the input form, that is, +ATR root vowel in the input form will require the insertion of +ATR vowel and vice versa as demonstrated below: However, this assertion is not consistent with his data provided below:

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

a. /braɪb/	/bira:pʊ/	<u>biibe</u> '	(Abdallah 2020:94)
b. /breɪk/	/bire:tʃi/	<u>brake</u> '	
c. /brɪks/	/bilitʃisi/	<u>bricks</u> '	
d. /blu:/	/bɔlu:/	<u>blue</u> '	
e. /bʊk/	/buku/	<u>book</u> '	

It is observed in his data that the root vowels in the input forms (12a & b) are diphthongs /aɪ/ and /eɪ/ respectively, therefore, the vowel in the epenthetic sites in the output forms is –ATR /i/. Similarly, the root vowel in the input forms (12c) is –ATR (/ɪ/), therefore, the epenthetic vowel that breaks the cluster in the output forms is also –ATR /i/. This is consistent with vowel harmony triggered by the vowels in the root as opined by Abdallah. However, in (12d & e) the roots contain +ATR vowel /u/ and –ATR vowel /ʊ/ respectively in the input and it is expected that the epenthetic vowels would have reflected as such, but the epenthetic vowels in the output forms are rather /ʊ/ and /u/ in contrast to the +ATR vowel /u/ and –ATR vowel /ʊ/ for which no

explanation was provided. The current work sought to find explanations for issues of this nature that may arise. Also, the current study departs from this study in terms of the theoretical approach, while that study uses basic linguistic theory, the current study uses OT to account for the phonological repair strategies in Kusaal loanwords.

Adongo (2018) on aspects of Gurene phonology reports that the types of syllable structure processes that occur in Gurene loanwords are vowel epenthesis, deletion and consonant alternation. She further argues that vowel epenthesis is the common process in Gurene loanwords adaptation and that it occurs to break up consonant clusters and create open syllables by re-syllabifying the coda consonant of borrowed words into Gurene. This aligns with issues in Dagbani loanword adaptation as well as other languages that ban consonant clusters and codas. It is worth pointing out that Dagbani and Gurene are CV languages. Epenthesis in Gurene loanwords is presented below:

17. English Gurene (Adongo 2018:148)

a. /doctor/ → /dɔktə/ → /dɔgətə/

b. /truck/ → /trʌk/ → /torog/

c. /bucket/ → /bʌkɪt/ → /bɔgətɛ/

Adongo's data imply that clusters are broken by vowel insertion and also codas are avoided by vowel insertion as observed in (13a & b). However, it is observed that another phenomenon is arising where all the voiceless velar stops /k/ are voiced velar stops in the output forms. Adongo explains that voicing assimilation is one of the phonological processes in Gurene loanword adaptation. This occurs when voiceless velar consonants occur between vowels. The consonant assumes the voicing feature of the preceding vowel thereby becoming voiced as observed in the data. A similar

pattern is observed in Kusaal, where /k/ → [g] as a result of a voicing assimilation from the epenthetic vowel as in /bʊks/ → /bugʊs/ ‘books’, /bɔks/ → /bɔgʊs/ ‘box’ (see discussion in chapter 4). Adongo’s study however is not detailed, hence, it leaves us with the question, “What is the quality of the epenthetic vowels and the context of their occurrence and how are non-native segments adapted into Gurene?”

Musah (2010) states that Kusaal has a large number of linguistic items that are borrowed from English and Hausa and that the nativisation process is systematic. His study identifies consonant deletion, consonant replacement, compensatory lengthening and epenthesis as the main nativisation processes in Kusaal loanword adaptation. Musah postulates that consonant replacement systems in the source language with the nearest consonants in the target language are as a result of a deficiency of such consonants in the target language. On the part of epenthesis, he suggests that it is one of the most important processes in Kusaal loanword phonology. Some examples are provided below:

18. English	Kusaal	Gloss (Musah 2010:103)
a. /sku:l/	/s <u>a</u> kur/	‘ <u>s</u> chool’
b. /hɒspɪtl/	/s <u>i</u> piti/	‘ <u>h</u> ospital’
c. /teɪbl/	/te: <u>b</u> ul/	‘ <u>t</u> able’

It is observed in Musah’s data that vowel epenthesis occurs when the underlying forms or structures possess clusters so that the output forms can conform to the structural requirement of the language. Musah’s analysis of Kusaal loanwords form part of his analysis of aspects of Kusaal phonology which only discusses aspect of loanwords in Kusaal, hence, detail analysis of Kusaal loanwords including the quality of the epenthetic vowels and the processes triggering their occurrence are not

examined. In addition, his analysis are not grounded in any theory. The present study provides a detailed account of Kusaal loanwords grounded in OT.

Niggli (2014) in his study on the structure of Burkina Faso Kusaal postulates that while it is normal for Kusaal nouns to end their singular forms in consonants, borrowed words often end in a vowel in their singular form, except for the adverbs. This seeks to give the impression that Kusaal only borrows words which singular forms end in a vowel. Some examples are presented below:

19. *kaneya* « kerosene lamp » (Hausa) *kodu* « banana » (Hausa) (Niggli 2014:116)

googi « musician » (Hausa) *mɔŋɔ* « mango » (English)

dūniy « world » (Hausa) *gūm e* « square drum » (Dioula)

Although Niggli's data suggest that all the loanwords in the data above end in vowels, he did not account for why a closed syllable language like Kusaal will borrow words with only open-syllables. However, it is observed that there are several loanwords whose singular forms end in a consonant too as presented below:

20. *piisil* __pistol' *tep* __tape'
teebul __table'
bēlet __bēt'
kɔp __ap', *fitir* __lamp' (borrowed from Hausa).

The current study argues that Kusaal which is a closed syllable language, can borrow words that end in consonants but not selectively borrowing only words with open syllables as Niggli's study may suggest. (See discussion in chapter four).

The literature that have been reviewed so far, have provided insights into how each unique language reacts to foreign lexical items in terms of the nativisation or the adaptation strategies. The varieties of these strategies or processes point out the distinctive nature of language structures. At this point, the theoretical framework is the next point of attention.

2.8 Theoretical Framework: Optimality Theory

This study is situated in an optimality theory known as OT for short. Optimality Theory is a surface-based linguistic theory that was pioneered by Prince and Smolensky in 1993. The theory assumes that in every grammar is a system of conflicting forces known as constraints (Kager 1999). According to Prince and Smolensky (1993) the basic idea of Optimality Theory is that Universal Grammar (UG) consists largely of a set of constraints on representational well-formedness, out of which individual grammars are constructed. What this implies is that there are constraints in every human language and it is within these constraints that a language constructs its grammar. Kager notes that constraints are intrinsically in conflict and the grammars must be able to regulate the conflicts in universal constraints in order to select a harmonic candidate. This view suggests that constraints are universal and are also in constant ‘conflict’ which require resolution.

Optimality Theory is also predicated on certain principles. The principles underpinning OT are that constraints are universal, that is, they are present in the grammars of all languages (Prince & Smolensky 1993). However, what is language-specific is their ranking. OT mainly centers on constraints (universal) and their ranking (Language-specific). Another principle is that universal constraints are violable and Kager posits that although constraints are violable, violation must be

minimal. The point of this assertion is that in an attempt to resolve the conflicts between the constraints, the grammar of the language will often violate the less serious constraints in the language in order to satisfy the most serious ones. The language does this by not compromising or being bias but by ranking the constraints in a hierarchical order according to the grammar of that particular language and this leads to the principle of dominance. Dominance requires that the higher-ranked among conflicting constraints takes precedence over the lower-ranked one (Kager 1999). Through this mechanism, an output form of a grammar is selected as an optimal or an actual form of that grammar.

As has already indicated at the beginning of this section, OT is a surface or output-based theory. It is interested in an output form as the actual form of the language. However, there cannot be an output form without an input or an underlying form. Kager rightly points out that OT grammar is an input-output mechanism that pairs an output form with an input form. This introduces the architecture or components of OT and Kager suggests that OT grammar consists of the following components:

- i. Lexicon: It is responsible for providing the input form and this input form is given out to the Generator (Gen).
- ii. Gen produces an infinite set of possible or logical Candidates (Cand) from the input form and submits them to the Evaluator (Eval).
- iii. Eval will select only one candidate from this infinite set of candidates to be the winner or the optimal candidate.

The Evaluator does this by ranking the constraints in descending order and assess the candidates based on these hierarchical ranking. For instance, in constraints ranking $[C1 \gg C2]$ implies Constraint 1 is ranked higher than Constraint 2 in a given

language. Therefore, a candidate is ignored or disqualified, if it violates C1 or both C1 and C2 and when that happens, it is signaled by a fatal violation mark (*!). The optimal candidate is usually signaled by a pointed finger (☞) while a violation is marked by (*). The point is, violating a lower ranking constraint is less costly than violating a higher ranking constraint as no language tolerates a candidate that violates a higher ranking constraint.

Constraint ranking is often presented in a tableau (Kager 1999), and in such tableau, Kager suggests that the possible candidates are listed vertically in random order, while constraints are listed horizontally in a descending order, ranking from left to right as demonstrated below:

Tableau 1: A tableau of simple domination

	C ₁	C ₂
a. ☞ candidate a		*
b. candidate b	*!	

From the tableau, (1a) is the optimal candidate because it has satisfied the constraint ranking order by not violating the highest ranking constraint (C₁) and Candidate b in (1b) has failed to be selected because it has violated the highest ranking constraint and it does not matter again the number of constraints that it has obeyed like C₂. Violating a highest ranking is a serious or fatal violation.

Finally, OT has been described as a Constraint-based Theory (see McCarthy 2002). This is because it is predicated on two major constraints: Markedness Constraints and Faithfulness Constraints. These constraints exist in every language and while

Markedness Constraints require structural well-formedness and therefore, evaluate output structures without recourse to the input structures, Faithfulness Constraints require identity between an input and an output candidate under evaluation (McCarthy 2002). Hence, they are always in constant conflict and the only way this conflict can be resolved is by ranking the constraints hierarchically according to the grammar of the language. Kager (1999) identifies some examples of Markedness Constraints that exist in many languages. These are presented below:

- i. Vowels must not be nasal.
- ii. Syllables must not have codas.
- iii. Obstruents must not be voiced in the coda position.
- iv. Sonorants must be voiced.
- v. Syllables must have onsets.
- vi. Obstruents must be voiced after nasals.

It implies that any output structure that goes contrary to any of these requirements has violated the Markedness Constraint. In that case, Faithfulness Constraints in an attempt to preserve an input value of a feature in the output will violate any of these Markedness Constraints. Kager (1999) outlines some Faithfulness Constraints prevalent in many languages as presented below:

- i. The output must preserve all segments present in the input.
- ii. The output must preserve the linear order of segments in the input.
- iii. Output segments must have counterparts in the input.
- iv. Output segments and input segments must share values for [voiced].

It also stands to mean that any output structure that does not preserve some input feature has not been faithful, hence violating or defeating the purpose of Faithfulness Constraints. Hence, constraints interaction through ranking is the heart of OT analysis. Thus, OT analysis is constructed out of these two major constraints. The relevance of this theory is presented in the next subsection.

2.9 The relevance of Optimality Theory to this Study

OT has been widely acknowledged as the most attractive theory in loanword analysis. This is manifested in the way several scholars especially in loanword phonology have shown interest in its use. Examples of some research works that used this theory in the analyses of loanwords include Akan (Adomako 2008; 2018), Ewe (Wornyo 2016) and Burmese (Chang 2009). According to Uffmann (2015), scholars working on loanword adaptation find OT to be a very attractive proposition, offering a principled way of understanding why and how adaptations take place and at the same time, loanword adaptation furnishes theorists with a strong argument in favour of Optimality Theory. This implies that OT provides better explanations of how loanwords are adapted by accounting for the adaptation strategies. This view suggests that OT can adequately account for the different strategies such as epenthesis and deletion, employed by the language in the adaptation process based on the language-specific ranking of constraints. Moreover, the theory will provide an understanding of how Kusaal is different from other languages in terms of constraints ranking. These among others, therefore, make OT a useful theory to this study.

2.10 Conclusion

The chapter has reviewed the segmental phonology of Kusaal, English, Akan, and Hausa. It advances the concept of loanwords and factors that account for lexical

borrowing. These include prestige and the need to fill lexical gaps. Also, phonological adaptation on loanwords in some foreign languages, African languages and Mabia languages are reviewed. The structure of Kusaal has also been reviewed. The chapter finally explores the theoretical framework and its relevance to this study. The next chapter captures the methodology that is adopted for this study.



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter discusses the research methodology that was adopted for this study. It discusses the research approach, research site, target population, sample size, sampling technique, data collection methods, data analysis and presentation and ethical consideration.

3.1 Research Approach

The study employed a qualitative research approach. This is because the researcher provided a descriptive analysis by eliciting data through interviews, discussions and documents. Owu-Ewie (2012) defines qualitative research as involving detailed verbal descriptions of characteristics case and setting by using interviews, observations and documents as the data collection procedure. Moreover, this research approach allows one to collect data from multiple sources, in this case, data were collected from two sources; primary and secondary sources. According to Merriam and Tisdell (2016), the researcher under qualitative research design can expand his or her understanding through nonverbal as well as verbal communication, process information (data) immediately, clarify and summarise material, check with respondents for accuracy of interpretation, and explore unusual or unanticipated responses.

In addition, this approach was selected because the researcher spent some time in the natural setting (field) of the study, often in contact with participants soliciting data. This is in line with Merriam and Tisdell (2016) who suggest that human actions are significantly influenced by the setting in which they occur and that one should therefore, study that behavior in those real-life natural situations. Finally, words other

than numbers are used to convey what the researcher has learned about the phenomenon. This confirms what Merriam et al (2016:17) reported, that the product of a qualitative inquiry is richly descriptive, that is, words and pictures rather than numbers are used to convey what the researcher has learned about a phenomenon. Hence, this approach was adopted for the current study.

3.2 The research site

The study was conducted in Bawku in the Upper East region of Ghana, precisely Bawku East where speakers of Agole dialect reside. However, Marshall and Rossman (2016) point out that one cannot study the universe—everything, every place, all the time, instead that the researcher makes selections of sites and samples of times, places, people and things to study. By this guidance, the samples of communities that were chosen for the study include, Bansi, Bazua, Geare, Garu and Sabon-Gari. The researcher decided to choose these communities because they are areas where the Agole dialect is primarily spoken and also where native speakers are close to some source languages speakers like Hausa. Moreover, the researcher had access to these communities where the study was conducted and reported ethically. Finally, the decision for selecting these communities is that the cost of traveling to these areas was less as compare to other communities.

3.3 Target population

Although the study is concerned with the entire population of the native Kusaal speakers, however, since studying the entire population is not feasible, this study was specific to native speakers of the Agole dialect. The choice of selecting native speakers of the Agole dialect is for the purpose of consistency in the data. Moreover, it is the dialect of the researcher and generally, literature also exists in this dialect. In

addition, the Agole dialect is used as a medium of instruction at the basic schools and also studied as a programme at the University of Education, Winneba.

3.4 Sample size

Participants selected from the target population constitute a sample size. Tavakoli (2012) suggests that the size of the sample should neither be excessively large or too small and that it should be an optimum one that fulfills the requirement of efficiency, representativeness, reliability and flexibility. Guided by Tavakoli's suggestion, twenty-five (25) sample sizes were drawn to represent the entire population for elicitation. The five selected communities had five (5) participants each, which comprises three (3) females, two (2) males. This gives us a total of fifteen (15) females and ten (10) males. The selection of this sample size was determined by the kind of methodology that was adopted. In this case, the elicitation method was adopted, a method which seeks to draw information from participants using pictures is time consuming, and as a result the researcher was unable to select large sample size.

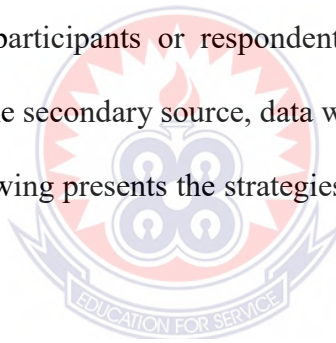
3.5 Sampling technique

Sampling technique refers to the procedures employed by researchers to select some sampling units from which inferences are drawn (Kothari 2004 as cited in Mwikwabe 2019). The researcher selected all participants through the purposive sampling technique. The choice of this technique was informed by the fact that participants must possess or be able to provide the information that the researcher needs. Under this study, participants were selected based on the fact that they do not possess any speech defect and can pronounce loanwords clearly to give a full picture of Kusaal loanword phonology. Moreover, participants were strictly monolingual native speakers of Agole dialect. The way monolinguals pronounce loanwords will give a better representation

of Kusaal phonology. And to ensure this, some of the participants live in the neighbourhood where the researcher lives and knows a lot of information about their linguistic background. Moreover, the researcher has former University mates who live in the communities where other participants live, and therefore, they were contacted to identify participants who are monolinguals for the study. In addition, the researcher also asked participants about their linguistic background, educational background and travelling history in order to verify their monolinguality.

3.6 Data collection methods

A data set of loanwords in Kusaal were collected from two main sources; primary source and secondary source. From the primary source, the researcher collected first-hand information from participants or respondents through interviews and native introspection, and from the secondary source, data was collected from documents, that is, dictionaries. The following presents the strategies that were used to collect the data for the analysis.



3.6.1 Elicitation strategy

According to Richards and Schmidt (2010), elicitation procedure is any technique that is designed to get a person to actively produce speech or writing, for example, asking someone to describe a picture, tell a story, or finish an incomplete sentence. They note that in linguistics, these techniques are used to prompt native speakers to produce linguistic data for analysis. In this study, the researcher elicited the primary data from the selected native speakers through picture naming and description.

Before data was collected, the researcher explained the task to the participants without bringing their attention to the fact that he was concerned with how they pronounced the words in order to limit the researcher and subject expectancy. The researcher

presented a majority of words using pictures where appropriate. First, a picture was shown on an Android phone¹ screen and the participants were asked to identify it. If they could not identify the target word, they were given clues to help them name the target word. To avoid the possible effect of spelling, no word was presented in its written form. The researcher never pronounced a word to the participants and where pictures were not available, the researcher gave a definition or description of the target word to help participants identify it. For instance, “what do we use to control a vehicle?” this will trigger the mentioning of a steering wheel, or how do we call the one who sits behind or controls the steer? With this, the participants mentioned *dɔrɔ a* ‘driver’. Once a word is identified, the researcher asked them to mention it three times. With this method, the researcher was able to collect the data that he needed. Moreover, this strategy posed no danger to any participant neither did it violate any participant’s right.

3.6.2 Documents

Tavakoli (2012) opines that documents constitute the basis for most qualitative research where he defines documents as a wide range of written, physical, and visual materials, including artifacts. In this study, the researcher collected a sample of loanwords from the Kusaal dictionary compiled by Naden. The dictionary indicates words that are borrowed and the language they are borrowed from. Moreover, some loanwords were collected from the Kusaal bible.

¹ Many of the pictures were shown on the phone in order to reduce the cost of printing over 50 pictures.

3.6.3 Native speaker intuition

As a native speaker of Kusaal, the researcher relied on his native intuition to provide data for the study, however the data was cross-checked and verified by two Kusaal linguists to ensure that they were loanwords.

3.7 Data management and presentation

All interviews were recorded with a smartphone modeled *TECHNO POP 2 PLUS* and transcribed following the IPA transcription system. The transcribed data were sorted out according to words borrowed from English, words borrowed from Akan, and words borrowed from Hausa. They were later saved in separate files and stored on the researcher's laptop.

A data set of 300 loanwords was collected for analysis. The data was categorised into themes under the source languages. Having done this, the researcher proceeded to analyse the data in two parts. First, the researcher presented and analysed data on segmental adaptation by describing how Kusaal adapts English non-native consonants and vowels, how Akan sounds are adapted and how Hausa sounds are adapted. Secondly, data on syllable structure processes in Kusaal loanwords was analysed in detail and finally OT framework was used to account for the strategies, where the OT tableaux were used to present the necessary constraints, inputs and possible candidates and the selection of a winning candidate.

3.8 Ethical consideration

Tavakoli (2012) explains that ethics are guidelines or sets of principles for a good professional practice that serve to advise and steer researchers as they conduct their work. This study took into consideration the ethics of research. Before the researcher contacted participants for the data collection, he introduced himself and sought their

consent verbally. He explained the purpose of the study to them that the information he was soliciting are for academic purposes and nothing else. The researcher further assured participants that their anonymity is protected as the information will not be made public without their consent. Moreover, the researcher made participants understood that they have the right to discontinue the process in case they feel so. With these assurances, the participants agreed and participated in the process effectively.

3.9 Summary

This chapter presented the methodology that was adopted for the study. It has pointed out qualitative approach as the research approach that was adopted, it further discussed where the research was conducted, the target population, sample size, and sample technique. Again, it has stated primary and secondary sources as the main source of data collection. How data was collected or data collection methods and data recording have also been discussed. Finally, the chapter progresses on data presentation and analysed as well as ethical considerations.

CHAPTER FOUR

SEGMENTAL ADAPTATION WITHIN KUSAAL LOANWORDS

4.0 Introduction

Borrowing languages have various ways of incorporating foreign sounds into their phonology. In segmental adaptation, foreign segments that do not have equivalents in a recipient language are incorporated or adapted by a careful replacement with the closest native segments available, while the segments that are present are adapted faithfully. However, foreign segments may have multiple realisations in the adapting language.

The chapter presents and discusses data on how source segments² are adapted into Kusaal phonology with particular attention on how non-native sounds are realised or adapted. The chapter also examines the common phonological processes that affect the adaptation of segments. This chapter is, therefore, organised as follows: section 4.1 presents the adaptation of English consonants into Kusaal while 4.2 discusses how English vowels are adapted and the adaptation of Akan consonants in section 4.3. Section 4.4 discusses the adaptation of Akan vowels. 4.5 examines the adaptation of Hausa consonants while 4.6 captures the adaptation of Hausa vowels. In section 4.7, the phonological processes affecting consonantal adaptation are discussed while 4.8 gives an account of the phonological processes affecting vocalic adaptation. Section 4.9 provides a conclusion to the chapter.

² In this study, segments and sounds are used interchangeably to refer to both consonants and vowels.

4.1 Adaptation of Ghanaian English consonants into Kusaal

The Ghanaian English consonants that are present in Kusaal are mostly adapted faithfully, and they do not need to be replaced or substituted with native consonants and, therefore, do not merit a detailed discussion. On the other hand, when an English consonant does not have a correlate in Kusaal, native speakers adapt it by replacing it with a closest native consonant. The section analyses how English consonants that are not part of the consonantal inventory of Kusaal are adapted or realised. Specifically, it discusses how post-alveolar fricatives: /ʒ/ and /ʃ/ and post-alveolar affricates: /tʃ/ and /dʒ/ are adapted.

4.1.2 Adaptation of fricatives /ʃ/ and /ʒ/

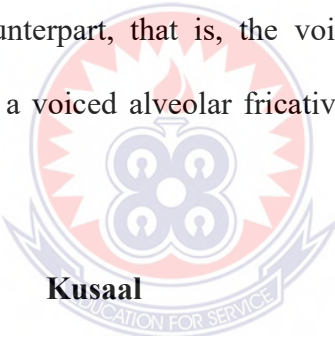
Kusaal consonantal inventory lacks the English affricates /ʃ/ and /ʒ/. Therefore, English loanwords that contain the /ʃ/ or /ʒ/ are adapted systematically into Kusaal as /s/ and /z/, respectively. The examples in (21) demonstrate the consistent pattern where /s/ is selected as the closest consonant suitable to replace /ʃ/.

21. GH. English	Kusaal	Gloss
/ʃ/ → [s]		
a. /ʃɔvl/ ³	[sɔ:bul]	__shovel‘
b. /ʃuga/	[suka]	__sugar‘
c. /steʃn/	site:sɪn	__station‘
d. /kuʃn/	[ku:sɪn]	__cushion‘
e. /maʃn/	[masɪn]	__machine‘
f. /ɛkɔndiʃn/	ɛ:kɔndi:sɪn]	__air condition‘
g. /ɪnʃuarans/	[ɪnsɔres]	__insurance‘

³ In this study all the input forms (sources forms) are in two slashes //, while the output forms (adapted forms) are in square bracket [].

From the examples presented above, it is observed that the voiceless post-alveolar fricative in (21a & b) is adapted into Kusaal as a voiceless alveolar fricative at word-initial position. Similarly, the same consonant is adapted as a voiceless alveolar fricative at word-medial position as seen in (21c-g). The adaptation pattern observed here is quite apparent as the English voiceless post-alveolar fricative /ʃ/ is not in the phonemic inventory of Kusaal and therefore, when a native speaker comes into contact with words that contain it, the voiceless alveolar fricative is selected as the closest segment to replace it. Hence, the pattern is phonological in terms of the closeness of features, that is, voiceless fricative. The only difference is the place of articulation.

Similarly, the voiced counterpart, that is, the voiced post-alveolar fricative /ʒ/ is systematically adapted as a voiced alveolar fricative /z/ by Kusaal speakers. This is exemplified below:



22. GH. English	Kusaal	Gloss
/ʒ/ → [z]		
a. /plɛʒa/	pɪlɛzɔ]	__pleasure‘
b. /tɛp mɛʒa/	tɛp mɛzɔ]	__tape measure‘

It is observed that the voiced post-alveolar fricative /ʒ/ in the English forms is nativised by a replacement with a native voiced alveolar fricative /z/. The adaptation occurs at word-medial position only as observed in (22a & b). This English sound as already pointed out also is adapted by a process of consonant substitution taking into account the closeness of features in an attempt to fill a consonantal gap that will satisfy the requirements of Kusaal phonology. The pattern is simple and

straightforward in that whenever native speakers want to adapt the English voiced post-alveolar fricative /ʒ/, they replace it with the native voiced alveolar fricative /z/.

4.1.3 Adaptation of affricates /tʃ/ and /dʒ/

Another consonants that are not part of the consonantal inventory of Kusaal are the voiceless and voiced affricates. It is attested that the /tʃ/ and /dʒ/ in English words are consistently adapted into Kusaal as [k] and [g] respectively. The consistent pattern of adaptation of these segments is demonstrated in (23) and (24).

23. GH. English	Kusaal	Gloss
/tʃ/ → [k]		
a. /tʃeɪn/	[kɛ:n]	==chain‘
b. /tʃɛ:man/	[kɛ:man]	==chairman‘
c. /tʃɪp/	[kɪp]	==chip (a sim card)‘
d. /tʃɪzəl/	[kɪ:sɪl]	==chisel‘
e. /tɪtʃə/	[tɪkə]	==teacher‘
f. /mætʃɪz/	m η kɛ:s	==matches‘
g. /wɒtʃ/	[wək]	==watch‘
h. /klɒtʃ/	kɒlɔk]	==dutch‘
i. /bentʃ/	bɛk]	==bench‘

It is observable in the examples above that the English voiceless post-alveolar affricate /tʃ/ is replaced by the voiceless velar plosive /k/ in Kusaal. The adaptation also occurs at word-initial position as observed in (23a-d), word-medial position as seen in (23e-f) and at word-final position as seen in (23g-i). The adaptation pattern observed here is that the English /tʃ/ is adapted as [k] regardless of the environment as

[k] is the only closest native consonant deemed fit to it. These segments share the feature [-voice].

As has already pointed out, the voiced post-alveolar affricate /dʒ/ is systematically adapted as a voiced velar stop /g/ whenever it is found in borrowed words from English. This is illustrated in the following data:

24. GH. English	Kusaal	Gloss
/dʒ/ → [g]		
a. / <u>dʒ</u> enereta/	[<u>g</u> enɛre:ta	<u>g</u> enerator‘
b. /tʃa: <u>dʒ</u> a/	kɛ: <u>g</u> a]	<u>g</u> harger‘
c. /sol <u>dʒ</u> a/	sɔ: <u>g</u> ia]	<u>g</u> oldier‘
d. /en <u>dʒ</u> in/	in <u>g</u> in]	<u>g</u> ine‘
e. /fri <u>dʒ</u> /	[fir <u>g</u>]	<u>g</u> idge‘
f. /bri <u>dʒ</u> /	[bir <u>g</u>]	<u>g</u> idge‘
g. /dɔ: <u>dʒ</u> /	dɔ: <u>g</u>]	<u>g</u> o dodge‘

It is apparent that the English voiced post-alveolar affricate /dʒ/ is adapted as a voiced velar stop [g]. The adaptation occurs at word-initial position in (24a), at word-medial position in (24b&c) and at word-final position in (24d-f). The adaptation pattern can be accounted for as there is a close phonological similarity between the non-native segment and the native segment in terms of feature closeness. The native speaker is aware that the source segment is not part of his/her phonemic inventory but has a feature [+voiced] and therefore, he/she carefully searches for its equivalent in the phonemic inventory; a segment that has the same feature. Hence, the selection of the voiced velar stop /g/ as the perfect equivalent segment to replace the voiced post-alveolar affricate.

4.2 Adaptation of Ghanaian English vowels

The vowels present in the variety of English spoken in Ghana are all found in the Kusaal vocalic inventory. This implies that whenever these vowels are borrowed into Kusaal, they preserve their lip quality. In other words, they are realised faithfully when they are processed by Kusaal speakers. This is illustrated in the following examples.

25.	GH. English	Kusaal	Gloss
a.	/a/	[a]dres]	__address‘
	/maʃi:n/	[maʃin]	__machine‘
	/pila/	pila]	__pillar‘
b.	/e/	[pilet]	__plate‘
	/tebul/	[te:bul]	__table‘
c.	/i/	[bile]	__blade‘
	/sigaret/	[siga:r]	__cigarette‘
d.	/o/	[po:s]	__post‘
	/moto/	[moto]	__motor‘
e.	/u/	[bulu:]	__blue‘
	/balu:/	[balu:]	__balloon‘
f.	/ɔ/	[bɔda]	__border‘
	/lɔja/	[lɔja]	__lawyer‘
g.	/ɛ/	[bɛnk]	__bench‘
	/tʃɛst/	[kɛs]	__chest‘

It is observed that in most of the Ghanaian English borrowed words, all the seven vowels are adapted faithfully into Kusaal. However, there are few instances where some English vowels map to different vowels other than their counterparts or equivalents in Kusaal as presented in the following examples:

26.	GH. English	→	Kusaal	Gloss
a.	/a/	→	[ɔ], [ɛ:]	
	/g <u>a</u> ta/		[gɔta]	__gutter‘
	/m <u>a</u> ngo/		[mɔŋgɔ]	__mango‘
	/k <u>a</u> p/		[kɔp]	__cup‘
	/d <u>r</u> am/		[dɔrɔm]	__dum‘
	/tʃ <u>a</u> dʒa/		[kɛ:ga]	__charger‘
b.	/e/	→	[ɛ:]	
	/t <u>e</u> la/		[tɛ:la]	taylor‘
c.	/ɛ/	→	[e]	
	/sk <u>e</u> t/		[sikɛt]	__skirt‘
d.	/i/	→	[ɪ]	
	/f <u>i</u> :s/		[fɪ:s]	__fɛs‘

As already pointed out, the Ghanaian English vowels /a/, /e/, /ɛ/ /i/ are realised differently in Kusaal. In (26a), /a/ is realised as ɔ and ɛ: , while in (26b) /e/ is realised as ɛ: . Likewise, /ɛ/ and /i/ are realised as e and ɪ respectively in (26c & d). Scholars such as Yip (2005) attribute the inconsistent pattern observed in the data above to wrongful perception. Yip notes that the idea is that the perceptual scan misses some or many of the L2 donor language distinctions that are missing in the

host language'. A similar stance is also maintained by Peperkamp and Dupoux (2003) who opine that unfaithful mapping of non-native segments to native segments is largely motivated by phonetic decoding. These claims may account for why some English vowels have different realisations other than their counterparts in Kusaal.

4.3 Adaptation of Akan consonants into Kusaal

The Akan consonants which are absent in the Kusaal consonants inventory are /tɛ, dz tɛɣ, dzɣ, ɛɣ, ɲɣ/. The rest of the consonants which are present in Kusaal are adapted faithfully when they are processed by the native language. With regard to non-native consonants, whenever a borrowed word has any of them, a similar sound in the Kusaal language is selected to replace it as observed in section 4.0. The segments that are attested in borrowed words in Kusaal are the voiceless alveo-palatal affricate /tɛ/ and the voiced labialised alveo-palatal affricate /dzɣ/, the rest are unattested. This section focuses on how the attested segments are adapted into Kusaal.

4.3.1 Adaptation of /tɛ/ and /dzɣ/

The Kusaal consonantal inventory also lacks the Akan voiceless and voiced alveo-palatal affricates. In view of this, it is also attested that loanwords from Akan which contain the /tɛ/ and /dzɣ/ are systematically adapted into Kusaal as [k] and [g] respectively. This pattern of adaptation is illustrated in (27) and (28).

27.	Akan	Kusaal	Gloss
	/tɛ/ → [k]		
a.	/tɛnsɪ/	[kɛmɛsɪ]	__ion roofing sheet'
b.	/kratɛɪ/	[kariki]	__derk'
c.	/bantɛɪ/	b [ki]	__cassava'

The examples show that the voiceless alveo-palatal affricate /tɕ/ in the Akan words is nativised by a replacement with a closest correspondent segment in the Kusaal inventory. In this case, the voiceless velar plosive /k/ is regarded as the closest segment to the Akan segment. The pattern of adaptation occurs in any context regardless of whether /tɕ/ is at word-initial position as observed in (27a) or at word-medial position as observed in (27b & c). The substitution of /tɕ/ with /k/ and not any other segment is that /k/ is the close segment as it has the feature (-voiced) as the source segment and therefore, makes it the only native segment that qualifies to be substituted with the non-native segment.

Moreover, the data that supports the adaptation of the voiced counterpart of the alveo-palatal affricate as a native voiced velar stop is presented below:

28. Akan

/dzɥ/ → [g]

- | | Kusaal | Gloss |
|-----------------------------------|-------------------|---|
| a. / adzɥ ɔa/ | [a g iwa] | __a female name given to a Monday born‘ |
| b. / adzɥ ɪŋɔ/ | [a g ɪŋɔ] | __palm kernel oil‘ |
| c. /k ^w adzɥ ɔ/ | [ak o gɪɔ] | __a male name given to a Monday born‘ |

It is observed that the voiced labialised alveo-palatal affricate in the Akan words is substituted with a native voiced velar stop or a voiced palatal fricative as the nearest counterparts. As has already been pointed out, Kusaal does not have affricates in its phonemic inventory and therefore, all affricates are replaced with velar stops; the voiced affricates are replaced with the voiced velar stops while the voiceless affricates are replaced with the voiceless velar stops. This is because the Kusaal segments are considered phonologically similar to the foreign segments in terms of voicing. In the

examples above, the voiced labialised affricate in (28a - c) is adapted as a voiced velar plosive /g/ at intervocalic position.

4.4 Adaptation of Akan vowels into Kusaal

Akan has ten short vowels *i, ɪ, u, ʊ, e, ɛ, o, ɔ, æ, a* of which nine vowels *i, ɪ, u, ʊ, e, ɛ, o, ɔ, a* have exact representations or counterparts in Kusaal. Although, the vowels that have counterparts in Kusaal adapted faithfully, some vowels also have multiple realisations in Kusaal. With regard to /æ/ which does not exist in Kusaal, it is consistently realised as /o/ at word-medial position and /a/ at word-initial position in Kusaal as the following subsection examines.

4.4.1 Adaptation of /æ/

The Akan low central vowel is adapted as a native low central vowel and a mid-high back vowel as demonstrated below:

29. Akan	Kusaal	Gloss
a. / <u>æ</u> k ^h ia/	[<u>a</u> k ^w ɔja]	__a female name given to Wednesday born‘
b. /k ^w <u>æ</u> du/	[k ^w <u>o</u> du]	__banana‘
c. /k ^w <u>æ</u> dzɔo/	[ak ^w <u>o</u> jo]	__a male name given to Monday born‘
d. /k ^w <u>æ</u> s ^h i/	[ak ^w <u>o</u> si]	__a male name given to Sunday born‘

It is apparent from the data that the Akan low central vowel /æ/ which is not part of the vocalic phonemes of Kusaal is perceived as a native low central vowel [a] by the native speakers and therefore, it is adapted as such at word-initial position as observed in (29a). Phonologically, the native /a/ is the closest segment to the non-native /æ/ in terms of height and frontness. However, /æ/ is also realised as a mid-high back vowel at a word-medial position as observed in (29b-d). It is observed that whenever that the


source /æ/ occurs after a labialised velar in the source form, it is adapted as a back vowel. This is a case of rounding assimilation where an unround segment becomes a round segment as a result of an adjacent round segment. This assimilatory process can be stated in the following rule:

Rule 1: /æ/ → [o] / [k^w] _____

The rule states that /æ/ is realised as [o] when it follows a labialised consonant. This explains that when a source word has an unround /æ/ following a labialised velar consonant, it changes to a round vowel as a result of the surrounding labial feature.

Additionally, some Akan vowels which are present in Kusaal vocalic inventory are mapped onto close counterparts other than their faithful counterparts. This is exemplified below:

30. Akan

		
	Kusaal	Gloss
a. /krate <u>i</u> /	[karik <u>i</u>]	educated person (male)‘
b. /b nte <u>i</u> /	b k <u>i</u>]	assava‘
c. /br <u>o</u> na/	[bur <u>u</u> na	Christmas‘
d. /dɔk <u>o</u> nu/	[dekun <u>u</u>]	kenkey‘

The underlined Akan vowels as observed in the examples above are mapped onto the closest vowels in Kusaal. Their closeness is in terms of height and backness. With the exception of (30c) which has a mid-low vowel in the Akan form and a high vowel in the adapted form in Kusaal, (30a & b) has the [high, front, –ATR] vowel in the Akan form which is mapped onto a [high, front, +ATR] vowel in the Kusaal version. Similarly, in example (30d), the [high, back, –ATR] vowel is mapped onto the [high, back, +ATR] vowel in the output. A similar case is also observed in the adaptation of

Kiswahili loanwords into G -G chũgũ dialect. Iribemwangi and Karũrũ (2012) state that even though Kiswahili's high back vowel /u/ and high front vowel /i/ are present in G -G chũgũ, they are substituted or realised as lower /o/ and lower /e/ respectively in G -G chũgũ as demonstrated below:

31. Kiswahili (S)	Gĩ-Gĩchũgũ (B)	Gloss (Iribemwangi & Karũrũ 2012:60)
a. /kifar <u>u</u> /	keβar <u>o</u>]	__military tank‘
b. /bar <u>u</u> a/	[mar <u>o</u> :a]	__letter‘
c. /k <u>i</u> ti/	ɾ <u>e</u> te]	__chair‘
d. /kal <u>i</u> a/	[ekar <u>e</u> ra]	__sit on‘

The examples above corroborates with matters observed in the Akan vowels mapping onto Kusaal and therefore, it is not always the case that if a source segment is present in the recipient language, predictably it should map onto its equivalent in the recipient language as it is widely believed.

4.5 Adaptation of Hausa consonants into Kusaal

The attested Hausa consonants found in the corpus of data in Hausa loanwords in Kusaal, that is, /tʃ/, /f/, /dʒ/ are the focus of this section. Many of the Hausa words that are borrowed into Kusaal do not have unfamiliar or complex consonants. This implies that a lot of Hausa loanwords contain consonants that also exist in Kusaal consonantal inventory and are faithfully preserved by native speakers. The consonants which natives of Kusaal adapt are discussed in the following subsections.

4.5.1 Adaptation of /j/

The voiceless palatal fricative /j/ does not exist in Kusaal as has already been discussed regarding adaptation of palatal fricatives. All voiceless palatal fricatives are

replaced with the native voiceless alveolar fricative /s/ as the closest segment. The Hausa palatal fricative is no exception, that is, it is also consistently adapted as a voiceless alveolar fricative as exemplified in the data below:

32. Hausa	Kusaal	Gloss
/ʃ/ → [s]		
a. /ʃawara/	[sawaara]	__advice or counsel‘
b. /ʃiwaka/	[siwaka]	__abitter leaf plant‘
c. /ʃa:fi/	[sa:fi]	__akey‘

It is evident that the voiceless palatal fricative /ʃ/ is adapted as /s/, a closest segment in Kusaal. In the data above, it is observed that the closest consonant which has the same voiceless feature to map onto this non-native consonant is the voiceless alveolar fricative /s/.

4.5.2 Adaptation of Hausa /tʃ/ and /dʒ/

The voiceless palatal affricate /tʃ/ and its voiced counterpart /dʒ/ in the Hausa consonantal inventory are also adapted as a voiceless velar [k] and a voiced velar stop [g] respectively. The data in (33) demonstrates the pattern of adaptation of the Hausa affricates.

33. Hausa	Kusaal	Gloss
/dʒ/ → [g]		
a. /aldʒifu/	[gɛfa]	__pocket‘
b. /alhadʒi/	[ala:gi]	__a person (male) who returned from Hajj‘
/tʃ/ → [k]		
c. /masallentʃi/	[masaliki]	__mosque‘

In (33a & b) the voiced palatal /dʒ/ found in the Hausa words is adapted as a voiced velar [g] at word-medial position as has already stated, that is, any segment that is not part of the native sound system is adapted by a replacement with the closest segment. This is what accounts for the phenomenon observed in the data above. Similarly, the voiceless palatal /tʃ/ is adapted as a voiceless velar stop /k/ as observed in (33c).

4.6 Adaptation of Hausa vowels

Hausa has five short vowels which in many cases are all preserved in Kusaal in their adaptations. The point is that whenever a source segment is present in a borrowing language, speakers try as much as possible to adapt it without a substitution or replacement. The following examples in the table provide evidence to this assertion.

Table 7: Adaptation of Hausa vowels into Kusaal

Short vowels	Hausa word	Adapted As	Gloss
/a/	<u>ta</u> aba	ta <u>ba</u>	tobacco
/e/	te <u>ku</u>	ate <u>uk</u>	ocean
/i/	t <u>i</u> las	t <u>i</u> las	must
/o/	ag <u>o</u> g <u>o</u>	g <u>o</u> g <u>o</u>	watch
/u/	t <u>u</u> rare	t <u>u</u> daare	perfume, incense

The table above illustrates that all the five Hausa vowels are preserved faithfully in Kusaal. However, in some Hausa borrowed words, vowels may change their phonetic quality in the Kusaal forms. For instance, the low central vowel and the mid-high back vowel in /k^walba/ ‘bottles’ and [sooso] ‘sponge’ respectively is adapted as ɔ as in kɔliba and ɔ as in soʊso. The plausible reason for /a/ → ɔ is a case of rounding assimilation while /oo/ → ʊʊ is attributed to the fact that the +ATR vowel /o/ rarely lengthens in Kusaal. Moreover, as reported in the literature, a wrongful

perception of source sounds may lead to different realisations of such sounds in the adapting language; sometimes native speakers produce what they hear or perceive and this may result in a change of segment. The next section discusses some phonological processes that cause consonantal changes during adaptation.

4.7 Phonological processes affecting consonantal adaptation

In this section, the phonological processes that cause consonantal changes within Kusaal loanwords are examined. Some of the processes are voicing assimilation, fortition and debuccalisation.

4.7.1 Voicing assimilation

Campbell and Mixco (2007) define voicing or voice assimilation as a sound change in which a sound becomes voiced. They highlight that voicing usually takes place by assimilation from a neighbouring voiced sound and that a frequent voicing environment is intervocalic, for example, Romance intervocalic voiceless stops (p, t, k > b, d, g), as in Vulgar Latin *ispata* ‘sword’ > Spanish and Portuguese *espada*, (res) *nata* ‘bom (thing) (feminine)’ > Spanish, Portuguese *nada* ‘nothing’ and Latin *am ka* ‘fiend (feminine)’ > Spanish, Portuguese *amiga* (Campbell & Mixco 2007:219). This phenomenon is not different from some English loanwords in Kusaal as voiceless stops become voiced when they are at the syllable initial position within words.

In English loanwords in Kusaal, /k/ and /p/ are realised as [g] and [b] respectively because of re-syllabification. In (34) the breaking of word-final clusters by vowel insertion results in a change of a voicing feature of the stops in intervocalic position where the voiceless stops /k, p/ assume the voicing feature from the epenthetic vowel as demonstrated below:

34. GH. English	Kusaal	Gloss
a. /sp <u>o</u> ks/	sɪpu <u>g</u> us]	==spokəs‘
b. /bu <u>k</u> s/	[bu <u>g</u> us]	==books‘
c. /s <u>o</u> ks/	sɔ <u>g</u> us	==sokəs‘
d. /m <u>i</u> ks/	[mi <u>g</u> is]	==to mix‘
e. /b <u>o</u> ks/	bɔ <u>g</u> us	==box‘
f. /sp <u>e</u> ks/	sɪp <u>e</u> gɪs	==spæks‘ (short form of spectacles)
g. /p <u>i</u> k a <u>k</u> s/	pɪŋ <u>g</u> a:s]	==pick axe‘
h. /tʃ <u>i</u> ps/	kɪ <u>g</u> ɪs	==chips‘
i. /k <u>a</u> ptɪn/	[kabi <u>g</u> ɪn]	==captain‘

The data above explicates voicing assimilation where /k/ → [g] and /p/ → [b] in intervocalic positions. It is observed that all the English forms in (34a-g) contain a coda cluster which is made up of a voiceless velar stop and a fricative. However, in the adapted forms in Kusaal, the voiceless velar stop becomes voiced as result of the neighbouring epenthetic vowel. Similarly, in (h & i) the voiceless bilabial stop in the English words takes on the voicing feature from the epenthetic vowel in the Kusaal form. The pattern is that whenever a word contains a coda cluster which is made of a voiceless stop and a voiceless fricative, a re-syllabification by vowel insertion results in the voiceless stops becoming voiced at the modified word or syllable because of the voicing feature of the epenthetic vowel. Voicing rule can be stated as follows:

Rule 2: /k/ → [g]/ V__V, /p/ → [b]/ V__V

The rule states that the phoneme /k/ and /p/ is realised as [g] and [b] respectively when they occur between two vowels.

Similarly, this phonological process is also observed in some English loanwords in Gurene (a close Mabia language). Adongo (2018) highlights that the voiceless velar /k/ changes to a voiced velar /g/ because certain English words that are borrowed into Gurene have to undergo vowel insertion to generate the preferred CV syllables in the borrowed words. This is presented below:

35. English				Gurene (Adongo 2018:148)
a. /doctor/	→	/dɔktə/	→	[dɔgɔta]
b. /truck/	→	/trʌk/	→	[torogo]
c. /bucket/	→	/bʌkɪt/	→	[bɔgɔtɛ]

Adongo's data affirm that voicing assimilation also takes place in Gurene loanwords where a voiceless /k/ changes to a voiced [g] because of the voicing feature of the adjacent vowels.

Meanwhile, a cluster where the voiceless fricative /s/ precedes a stop at word-medial or word-final positions, the stop gets deleted as a structural requirement of the language (see details in chapter five).

4.7.2 Obstruent devoicing

Devoicing is simply a loss of voicing feature in consonants. In Kusaal loanword adaptation, voiced consonants in source languages become voiceless in Kusaal. The study discovers that devoicing phonemes are common in the process of adaptation of lexical borrowings from English and Hausa languages into the Kusaal phonological system. This occurs in an intervocalic and at word-final positions as illustrated in (36 & 37), while in the English loanwords in Dagbani, devoicing affects obstruents at word-final position only (c.f Abdallah 2020:85).

36. GH. English	Kusaal	Gloss
a. /ʃ <u>u</u> g <u>a</u> /	[su <u>k</u> a]	<u>s</u> ug <u>a</u> ‘
b. /ili <u>z</u> ab <u>e</u> t/	[ali <u>s</u> i <u>b</u> e <u>t</u>]	<u>E</u> lizab <u>e</u> th‘
c. /ʃi <u>z</u> il/	ki: <u>s</u> il	<u>d</u> isel‘
d. /ble <u>d</u> /	[bi <u>l</u> e <u>t</u>]	<u>b</u> lad <u>e</u> ‘
e. /tau <u>z</u> ind/	[ta: <u>s</u> in]	<u>t</u> hous <u>a</u> nd‘
f. /ma <u>t</u> f <u>i</u> z/	m ηkɛ: <u>s</u>]	<u>m</u> at <u>c</u> hes‘
g. /sa <u>r</u> iz/	[sa: <u>s</u>]	<u>s</u> i <u>z</u> e‘
37. Hausa	Kusaal	Gloss
a. /tak <u>a</u> r <u>d</u> a/	[tak <u>a</u> t <u>a</u>]	<u>p</u> aper‘

It is apparent that the voiced obstruents /g, z, d/ change to the voiceless [k, s, t] respectively. It is also observed that apart from (36 a & e) where /g/ changes to [k] between high and low vowels and /z/ changes to [s] between the low central vowel /a/ and the high front vowel /i/ respectively, the changes that occur at intervocalic positions happens between vowels of the same quality. In (36a & b) the modified segments occur between the high-front [i] with a +ATR feature, while in (36c) it occurs between the -ATR ɪ . In the Hausa loanword in Kusaal, it is observed that the devoiced consonant occurs between the low central vowels as seen in (37a). It is important to state that devoicing is not a regular feature in Kusaal phonology and therefore, the process observed in this analysis might have been motivated by phonetic factors and not the phonology of the language. Devoicing can be stated in the rule below:

Rule 3: [+obstruent] → [-voice] / $\left[\begin{array}{c} \text{V_V} \\ \text{I_word} \end{array} \right]$

The devoicing rule states that an obstruent is devoiced when it either between vowels or when it occurs at word-final position.

4.7.3 Flapping

Gurevich (2011) explains flapping as a process where a sound is replaced by a flap (usually either alveolar /r/ or retroflex /ɽ/. In Kusaal, flapping is common in fast speech, especially when it occurs in an intervocalic position. The voiced alveolar stop /d/ is normally replaced or alternates with the alveolar trill causing a flap in intervocalic position. In Kusaal loanword adaptation, flapping is found in English and Hausa loanwords in Kusaal as presented below:

38. GH. English

	Kusaal	Gloss
a. /ma <u>d</u> am/	[ma <u>r</u> m]	_madam‘
b. /bo <u>d</u> i:ga:d/	bo <u>r</u> i:ga:d	_body guard‘
c. /pa <u>d</u> a/	po: <u>r</u> a]	_powder‘
d. /ga: <u>d</u> m/	[ga: <u>r</u> m	_garden‘

39. Hausa

	Kusaal	Gloss
a. /la: <u>d</u> a/	[la: <u>r</u> a]	_reward‘
b. /sa: <u>d</u> a/	[sa: <u>r</u> a]	_expensive‘
c. /ja: <u>d</u> i/	[ja: <u>r</u> i]	_a piece of cloth‘

The data above explain that the alveolar stop in the source languages, that is, English and Akan, changes to a trill in an intervocalic environment when loaned into Kusaal. In (38a–d) the voiced alveolar stop /d/ in the English forms changes to alveolar [r] in the Kusaal versions. Similarly, in (39a-c) /d/ in the Hausa forms changes to [r] in the

Kusaal forms. Musah (2018) notes that at the syllable initial position within words, the voiced alveolar stop /d/ is sometimes in free variation with the trill /r/. In rapid speech too, when the voiced alveolar stop /d/ occurs between two vowels (mostly vowels of the same quality), it surfaces as the alveolar trill. It is worth reiterating that /d/→[r] is a regular feature in Kusaal phonology within intervocalic environment where /d/ and /r/ are free variants. Therefore, the /d/→ r phenomenon observed in this analysis is motivated by the fact the trigger and target segments are in free variation in intervocalic contexts. Flapping can be formalised in the rule below:

Rule 4: /d/ → [r] / V__V

This rule explains that /d/ is realised as [r] between vowels. This implies when the underlying form has /d/ at intervocalic context, it is realised as [r].

4.7.4 Liquid substitution

Liquid substitution is also productive in the adaptation of loanwords into Kusaal. In Kusaal, liquid substitution or alternation is not a regular phenomenon. However, in loanword adaptation, the alveolar lateral /l/ at word-medial and word-final positions in English and Hausa words is replaced with the alveolar trill /r/ as illustrated below:

40. GH. English	Kusaal	Gloss
a. /kɔl pɔt/	[k <u>ur</u> ɔpɔt]	<u>co</u> al pot ⁴
b. /sku:l/	[saku <u>r</u>]	<u>sch</u> ool ⁴
c. /funil/	fun <u>r</u>]	<u>f</u> unnel ⁴
d. /ɛrɔplən/	[a <u>l</u> ɔp <u>r</u>]	<u>a</u> eroplane /airplane ⁴

41. Hausa	Kusaal	Gloss
a. /fiti <u>l</u> a/	fitr <u>r</u>]	<u>oil lamp</u> '

The alveolar lateral /l/ at the coda position in the English loanwords as presented above is replaced with the alveolar trill /r/ in Kusaal. It is observed in (40a-c) that the substitution takes place after high vowels both in the Kusaal forms. In (40d), the trill and the lateral in the English form are replaced with a lateral and a trill respectively in the Kusaal form. Similarly, in the Hausa loanwords, the lateral which occurs in an intervocalic position is replaced with a trill after a high-front vowel in Kusaal as observed in (41a). It is lucid that even the pattern of adaptation observed in this data is systematic; liquid substitution occurs after high vowels. Liquid substitution can be formalised below:

Rule 5: /l/ → [r] / $\left[\begin{array}{l} +\text{vowel} \\ +\text{high} \end{array} \right]$ _____

The rule above states that /r/ is realised as [r] after a high vowel.

Therefore, it is not out of place to state that /l/ becomes [r] after high vowels in Kusaal loanword adaptation. It is informative to also point out that /l/ and /r/ are not free variants and the environment in which /l/ occurs in the source forms does not also violate the phonotactic constraints of Kusaal. Therefore, /l/ → r substitution or alternation cannot be attributed to the phonology of Kusaal but by phonetic factors.

4.7.5 Debuccalisation

Debuccalisation is explained by Gurevich (2011) as the loss of a place of articulation to glottal stops, that is, either /h/ or /ʔ/. Iverson (1989) makes a general observation that in debuccalisation, /h/ is derived from fricatives rather than stops and /ʔ/ derives

from stops rather than fricatives. The latter is attested in some English loanwords found in Kusaal. In Kusaal loanword adaptation, it is noticed that when the voiceless velar stop /k/ occurs at word-medial or intervocalic position, it debuccalises to a glottal stop as shown in (42).

42. Debuccalisation of English loanwords in Kusaal

English	Kusaal	Gloss
a. /ba <u>k</u> ɪt/	bɔʔata]	‘bucket’
b. /dɔ <u>k</u> ta/	dɔʔata]	‘doctor’

The examples above demonstrate instances of consonant weakening known specifically as debuccalisation. It is observed that the velar stop has lost its place of articulation to the glottal stop in the intervocalic environment between high and low vowels. This phenomenon can be formalised in rule (6). The rule states that /k/ is realised as ʔ between a back high vowel and a low central vowel.

$$\text{Rule 6: } /k/ \rightarrow [ʔ] / \left[\begin{array}{c} \text{V} \\ +\text{high} \\ +\text{back} \end{array} \right] _ \left[\begin{array}{c} \text{V} \\ +\text{low} \\ +\text{central} \end{array} \right]$$

Additionally, O'Brien (2010) points out that stops are the only sounds that debuccalise to /ʔ/ and that /k/ frequently debuccalises to /ʔ/. He states that in West Tarangan, /k/ debuccalises to /ʔ/ intervocalically at word-internal where both vowels are non-high in fast speech, as it occurs in Kusaal between high and low vowels. Similarly, debuccalisation is productive in the native and loanword phonology of Dagbani. Hudu (2018) explains that in Dagbani and many languages, debuccalisation targets coronals and dorsals, making them glottals as demonstrated in the following;

(/g, k/ → /ʔ/ /V __, /s/ → /h/ / V __ V (light syllable)), (2018:2013). In terms of Dagbani loanwords, the voiceless /k/ consistently debuccalises to /ʔ/ at word-medial position precisely as observed in Abdallah (2020).

The data provided in Kusaal may give a misleading impression that /k/ consistently changes to /ʔ/ in an intervocalic position in all loanwords, but apart from the two loanwords presented in (42), the voiceless /k/ in many cases surfaces as /k/ or deleted in all intervocalic positions. It is therefore, possible to hold the view that these two lexical items might have been borrowed through Dagbani, a close Mabia language where debuccalisation is prevalent (see an extensive analysis of debuccalisation in Dagbani in Hudu 2018). Albeit, further research is needed to establish this fact in Kusaal.

4.7.6 Fortition

Fortition or consonant strengthening is a phonological process that causes a segmental change, mostly from fricatives or glides to stops (Campbell & Mixco 2007). In Kusaal loanword adaptation, fortition is presented in loanwords from English in (43), Akan in (44) and Hausa in (45), where the labiodental fricative /v/ changes to a bilabial plosive /b/ in intervocalic position and the glides /w, r/ become either [b], [g] or [d]. In Dagbani loanwords, Hudu (2002) observes a similar phenomenon which is also confirmed by Abdallah (2020) that the fricative /v/ becomes a stop /b/ between two vowels while maintaining its voicing property. In Kusaal loanword adaptation, the fricative /v/, the approximant /w/ and the trill /r/ change to a bilabial stop [b], a velar stop [g] or an alveolar stop [d] respectively without losing their voicing feature as exemplified below:

43. GH. English	Kusaal	Gloss
a. /drai <u>v</u> a/	dɔrɔ <u>b</u> a]	__driver ⁴
b. /sil <u>v</u> a/	sɪl <u>b</u> a]	__silver ⁴
c. /fi: <u>v</u> a/	fi: <u>b</u> a]	__fiver ⁴
d. /sɛ <u>v</u> in/	sɛ <u>b</u> in	__seven ⁴
e. /sti: <u>v</u> in/	asɪtɪ: <u>b</u> in	__Stephen ⁴
f. /sɛ: <u>v</u> is/	sɛ <u>b</u> is	__service ⁴ (mostly refers to network service or a taxicab)
g. /ʃɔ <u>v</u> l/	sɔ: <u>b</u> ɔl	__shovel ⁴

44. Akan	Kusaal	Gloss
a. /kuru <u>w</u> a/	kurɪ <u>b</u> a]	__abowl ⁴
b. /amari <u>w</u> a/	amari <u>b</u> a]	__koala ⁴

45. Hausa	Kusaal	Gloss
a. /kan <u>w</u> a/	kag <u>u</u>	__potash ⁴
b. /tu <u>r</u> are/	[tu <u>d</u> a:ri]	__perfume ⁴

It is affirmed from the examples that the voiced labiodental fricative /v/ within the English words changes to a voiced bilabial plosive [b] in the Kusaal forms as observed in (43a-g). Similarly, the glide /w/ in the Akan words changes to a bilabial stop [b] in Kusaal as evidenced in (44a & b). However, it is observed in (45a & b) that the /w/ changes to a velar stop [g], while /r/ changes to an alveolar stop [d] in an intervocalic position of high-back vowel and mid-low vowel (see liquids substitution in section 4.7.4 for further discussion). It is unclear what motivations account for these changes since all the source segments exist in the native phonology. On the

⁴ This is a case of a semantic shift from a cup in Akan to a bowl in Kusaal

contrary, in the adaptation of English loanwords into Hausa, /v/ converts to [b] because /v/ does not exist in the Hausa phonemic inventory and /b/ is the nearest counterpart to be substituted with, as pointed out by Alfred (2019). A phonological rule observed in the data above can be stated as follows:

Rule 7:
$$\left[\begin{array}{l} + \text{cont} \\ + \text{voice} \end{array} \right] \rightarrow \left[\begin{array}{l} \text{stop} \\ + \text{voice} \end{array} \right] / [+ \text{vowel}] _ _ [+ \text{vowel}]$$

The rule explains that a voiced continuant is realised as a voiced stop when it occurs between two vowels.

4.8 Phonological processes affecting vowel adaptation

This section examines the processes that affect vocalic adaptation. As part of the nativisation processes, some vowels are modified before they are adapted into Kusaal. The reason for vocalic modifications is not always to cause borrowing items to conform to the structural requirement of Kusaal but to make the borrowed items look or sound like the native forms. This section sheds light on lengthening, shortening, monophthongisation and vowel deletion as the major processes that cause vocalic changes during their adaptation into Kusaal.

4.8.1 Vowel lengthening

In vowel lengthening, short vowels in source words are lengthened in Kusaal. This nativisation process is not as a result of phonotactic need but may be as a result of perceptual effects. Vowel lengthening ensures that borrowed words sound like native forms and not because of a structural requirement of Kusaal. However, this assertion is based on impressionistic data and not on perceptual evidence. The process is

productive in English and Hausa loanwords in Kusaal. The following examples demonstrate vowel lengthening in Kusaal loanword adaptation.

46. GH. English	Kusaal	Gloss
a. /matʃ <u>ɪ</u> z/	maŋk <u>ɛ</u> :s]	__ma <u>t</u> ches‘
b. /ʃ <u>ɪ</u> z <u>ɪ</u> l/	[k <u>ɪ</u> :sɪl	__d <u>i</u> sel‘
c. /b <u>a</u> g/	[b <u>a</u> :gi]	__b <u>a</u> g‘
d. /sp <u>a</u> na/	sɪp <u>a</u> :na]	__sp <u>a</u> nn <u>e</u> r‘
e. /b <u>a</u> s/	[b <u>a</u> :s]	__b <u>a</u> s‘
f. /p <u>i</u> k <u>a</u> ks/	[p <u>i</u> ŋ <u>a</u> :s]	__p <u>i</u> ck <u>a</u> x <u>e</u> ‘
g. /ʃ <u>ʊ</u> v <u>l</u> /	[s <u>ʊ</u> :b <u>ʊ</u> l	__sh <u>ʊ</u> v <u>l</u> ‘
h. /k <u>u</u> ʃ <u>ɪ</u> n/	[k <u>u</u> :sɪn	__c <u>u</u> sh <u>i</u> n‘
47. Hausa	Kusaal	Gloss
a. /may <u>a</u> fi/	[may <u>a</u> :fi	__a large cloth for covering of head or body‘
b. /ʃ <u>a</u> wara/	[s <u>a</u> :wara]	__advice, counsel‘
c. /g <u>o</u> ge/	[g <u>o</u> :gi]	__a string bow musical instrument‘
d. /l <u>e</u> mo/	[l <u>e</u> :mu]	__orange, lemon‘
e. /f <u>u</u> ra/	[f <u>u</u> :ra]	__balls of cooked millet in cultured milk‘

It is apparent in the data above that lengthening does occur in loanwords in Kusaal. In (46a & b) the short final vowel /ɪ/ in the English words is realised and lengthened as a front mid-low nasal vowel $\epsilon:$ and a high-front vowel $i:$ respectively in the nativised form. In (46c-f) the low vowel /a/ in the English words is realised as a long vowel [a:] in Kusaal. Similarly, in (46f & g) the English short back vowels /ɔ/ and /u/ are realised and lengthened as $\text{ɔ}:$ and $u:$ respectively in the Kusaal forms.

Similarly, the Hausa words with short vowels in (47a-e) are modified by lengthening as a way of incorporating them into Kusaal. The low /a/ in (47a & b) is lengthened as [a:] at their respective positions in Kusaal. Similarly, the short back vowel /o/ in (47c) is realised as a long back vowel [o:] while the front vowel /e/ is also realised as a long vowel [e:] as seen in (47d). The vowels /o, e/ are the only vowels in Kusaal which do not have long counterparts in native phonology except in loanwords as demonstrated here. Finally, it is observed that in (47e) /o/ is realised and lengthened as ɔ: . The pattern observed here is that vowel lengthening occurs at word-internal only in English loanwords, while in Hausa loanwords, the lengthening occurs at word-internal and word-final positions. The possible motivating factor for this adaptation is perceptual effects. The lengthening rule can be stated below:

Rule 8:
$$\left[\begin{array}{l} +\text{vowel} \\ +\text{short} \end{array} \right] \rightarrow \left[\begin{array}{l} +\text{vowel} \\ +\text{long} \end{array} \right] / [+cons] ____ [+cons]$$

The rule explains that a short vowel is lengthened between consonants.

4.8.2 Vowel shortening

Vowel shortening is another segmental process of integrating vowels into Kusaal. In this process, long vowels from the source languages are reduced to short vowels in Kusaal. This process is productive in the English and the Akan loanwords in Kusaal. The following examples give evidence to this observation.

48. GH. English	Kusaal	Gloss
a. /sk <u>u:l</u> /	[sak <u>ur</u>]	='school'
b. /lɔ:ri/	lɔr	='lorry'
c. /kɔ:t/	kɔtɔ]	='court'

49. Akan	Kusaal	Gloss
a. /ŋkrata: <u>a</u> /	[karata <u>a</u>]	__paper or letter‘

It is evident in (48a-c) that all the long vowels within the English words are shortened in the nativised forms. Similarly, the long vowel at word-final position in the Akan form in (49a) is shortened at word-final position in Kusaal. It is also observed that mostly shortening occurs in disyllabic words except in the Akan loanword which is a trisyllabic word.

4.8.3 Monophthongisation

Campbell and Mixco (2007) define monophthongisation as ‘a sound change in which two members of a diphthong or members of a vowel cluster are reduced to a simple single vowel, to only one vocalic articulatory gesture (a monophthong), either in the coalescence of its members or by the loss of one member of a diphthong’. The data in this study show that monophthongisation is productive in the English and Akan loanwords in Kusaal. It is observed that the English diphthongs /ai/, /au/, /ɔi/ and the Akan /ie/ are monophthongised either by deleting one element and lengthening the remaining one or the diphthong is coalesced into a single vowel. The following examples provide support to this claim.

50. /ai/ →[a:]/ [+cons] ____ [+cons]

GH. English	Kusaal	Gloss
a. /plaiwud/	pɪla:wud]	__plywood‘
b. / <u>l</u> ait/	[<u>l</u> a:t]	__light‘
c. /n <u>a</u> ilɔn/	[n <u>a</u> :lɔn	__nylon‘
d. /t <u>a</u> im/	[t <u>a</u> :m]	__time‘

- e. /taɪtɪn/ [ta:tɪm] to tighten‘
 f. /saiz/ [sa:s] size‘
 g. /baibl/ [ba:bul] bible‘

51. /au/ → [ɔ], [ɔ:], [a:] / [+cons] ____ [+cons]

- a. /paund/ [pɔŋ] pound‘
 b. /pauda/ [pɔ:ra] powder‘
 c. /tauzin/ [ta:sin] thousand‘

52. /ie/ → [e] / $\left[\begin{array}{l} +\text{cons} \\ +\text{stop} \\ -\text{voice} \end{array} \right]$ ____ $\left[\begin{array}{l} +\text{cons} \\ +\text{stop} \\ -\text{voice} \end{array} \right]$

- | Akan | Kusaal | Gloss |
|---------------------|-----------------|---------------|
| a. /p <u>i</u> eto/ | [p <u>e</u> to] | <u>pant</u> ‘ |

The examples explain that diphthongs are adapted by reducing them to a simple vowel either by a deletion of one vowel and lengthening of the remaining vowel or by replacing the entire diphthong with a different vowel. In (50a-g) the diphthong /ai/ within the English words loses its second element, that is, the high vowel /i/ while lengthening the remaining low vowel. The phonological rule at play in that process states that /ai/ is realised as [a:] when it occurs between consonants. In the same vein, in (51c) the low vowel is lengthened after the deletion of the high-back vowel /u/. The deletion of one vowel and the lengthening of the remaining vowel as observed in (50a-f) and (51c) describe instances of compensatory lengthening, where a segment is lengthened to compensate for the loss of a segment. However, in (51a & b), the diphthong /au/ is coalesced into a mid-low back ɔ . This implies that /au/ is realised as one sound and therefore, adapted as ɔ .

Moreover, in the Akan loanwords, the vowel sequence /ie/ at the word-medial position has its first element /i/ deleted without lengthening the remaining [e] as observed in (52a), though, enough data is needed to establish whether this pattern is consistent in all Akan loanwords at word-medial position. The phonological rule for that process states that /ie/ is adapted as /e/ when it occurs between voiceless stops. However, it is observed that a sequence of two vowels which occurs in open syllables in some Akan loanwords are adapted without a deletion of any element, though the vowel quality in the sequence changes but the same number of vowels are maintained in the Kusaal forms. Examples are /borɔdɪɛ/ → [bɔɔdɪa] 'plantain' and /kaneɛ/ → [kanɪa] 'lantern'. As regards Hausa loanwords, no diphthong or sequence of vowels were found in the data collected.

It is also observed that monophthongisation exhibits a consistent pattern in that the process of deletion affects high vowels in preservation of low and mid vowels in intervocalic environment. It is observed in (50-52) that all the high vowels are either deleted or the diphthongs are coalesced into low or mid vowels. This phenomenon is motivated by vowel sonority hierarchy, that is, the sonority hierarchy scale places low and mid low vowels at the highest in sonority followed by high vowels (c.f Niggli 2014:47). And because these diphthongs do not exist in the language, Niggli suggests that in Kusaal when one vowel of a diphthong is deleted, it is the high vowel because high vowels are less sonorous than mid and low vowels. This assertion receives support from what has been observed in the data above where in a vowel sequence, deletion targets high vowels in preservation of non-high vowels.

4.8.4 Vowel deletion

Vowel deletion in loanwords in Kusaal features mostly in the Akan and Hausa loanwords. Speakers of Kusaal delete vowels in a borrowing word as part of the nativisation process. With vowel deletion, the data show that, mostly, it is the word-initial and word-final positions vowels that are often deleted. The examples in (53) attest to this assertion. Vowel deletion is not motivated by the phonotactic or structural requirement of the language, it is either motivated by perception or economy reasons. It is part of the strategies of integrating foreign lexical items into Kusaal.

53. Hausa	Kusaal	Gloss
a. /lahadi/	lasɪd]	__Sunday‘
b. /laraba/	la:riɓ]	__Wednesday‘
c. /malaʔika/	maliak]	__angel‘
d. /arziƙi/	arɪzak	__riches or wealth‘
e. /labari/	[laba:r]	__news or information
f. /daŋkali/	daŋkal	__sweet potato‘
54. Akan	Kusaal	Gloss
a. /aʙorɔbɛ/	burɔbɛ	__pineapple‘
b. /aʙɔmu/	bɔmɔ	__stew‘
c. /aɔdaka/	[daka]	__box‘
d. /aƙikaduro/	[kakaduru]	__ginger‘
e. /mirɛ/	[amir]	__mushroom‘
f. /bɔ:fiɔ/	[bɔ:fiɔ]	__pawpaw‘

In the examples above, all the final vowels after the stops in (53a-d) and the vowels after the liquids in (53e & f) in the Hausa forms are deleted in Kusaal which consequently cause a reduction in the syllables. It is realised that the deleted vowels under this analysis are /i/ and /a/. It is also observable that the deletion has resulted in a change in syllable structure; CV → CVC. This is because Kusaal is a CVC language which permits codas, unlike Hausa where codas are not permitted.

In the Akan loanwords in Kusaal the pattern is different as observed in the data. Mostly, deletion affects word-initial vowels. It is observed that in (54a-d) the word-initial vowels are deleted when adapted into Kusaal. The point is that while Kusaal does not ban codas, it prefers suffixes to prefixes (prefixes are limited in Kusaal), therefore, segments that appear at word-initial positions which the language considers as ‘unnecessary’ are often deleted as part of its nativisation process. However, it is observed that vowel deletion does not apply in disyllabic or monosyllabic words. For instance, words like *ae* ‘palm nut’, *ankaa* ‘orange’, *amani* ‘smoked fish’ are borrowed from Akan without deleting any vowel as it may distort the meaning of the word or probably they are not too long in the output. Although, an exception is found in (54e and f) where there is a deletion of a final vowel /ε/. Similarly, the possible reason for vowel deletion in Akan loanwords in Kusaal is that suffixes and codas are preferred even though they are not banned. This corroborates with Musah (2017) who postulates that the common syllable type in Kusaal is CVC.

4.9 Conclusion

The chapter examined in detail the adaptation of consonantal and vocalic phonemes of English, Akan and Hausa into Kusaal where it was brought to light that generally non-native consonants are adapted by a replacement or substitution with closest native

consonants. Likewise, vocalic phonemes are mapped onto their equivalents in Kusaal, while those that lack counterparts in Kusaal are mapped onto closest native vowels. Besides, the phonological processes such as voicing assimilation, obstruents devoicing, flapping, liquid substitution, debuccalisation and fortition which affect consonantal adaptation were discussed. Moreover, the chapter proceeded to analyse the phonological processes such as vowel lengthening, vowel shortening, monophthongisation and vowel deletion in vocalic adaptation. Finally, the phonological rules at play in each process are states. The next chapter explores the syllable structure processes within in an Optimality Theoretical framework.



CHAPTER FIVE

SYLLABLE STRUCTURE PROCESSES IN KUSAAL LOANWORD

ADAPTATION

5.0 Introduction

This chapter explores the syllable structure processes that are involved in Kusaal loanword adaptation. Kusaal syllable structure constraints ban consonant sequences and consonant clusters in syllables. This implies that loanwords with consonant clusters have to be modified or re-syllabified following the syllable structure that is allowed in Kusaal.

The chapter is organised as follows: Section 5.1 discusses vowel epenthesis at syllable onset, syllable boundaries and syllable coda positions. Section 5.2 discusses consonant deletion and section 5.3 presents an OT analysis of the data while section 5.4 presents a summary of the chapter.

5.1 Vowel epenthesis

Vowel epenthesis is a common process in loanword adaptation to satisfy constraints on phonotactics and syllable structure in the borrowing language (Uffmann 2006). As has already pointed out in the introduction, the syllable structure constraints of Kusaal do not admit clusters or a sequence of consonants at syllable boundaries. The only consonants sequences permitted at syllable boundaries in the language are syllabic nasals followed by homorganic consonants such as *nindaa* ‘face’, *bvmbɔk* ‘hole’, *tampiinr* ‘a bastard’, *nɔŋɡban* ‘lip’. Therefore, vowel epenthesis is a strategy that speakers of Kusaal employ to repair source words with illicit syllable structures. The following subsections discuss in details how vowel epenthesis is used to ensure that source words with illicit syllable structures conform to the syllable structure

requirement in Kusaal. Some leading ideas are that the epenthetic vowels in Kusaal are /i/, /ɪ/, /u/, /ʊ/ and the selection of any of these segments is context sensitive in that it is determined by the neighbouring vowel, that is, ATR and lip posture [roundness/backness]. For instance, if the vowel close to the epenthetic site in the modified syllable is a +ATR and a back vowel, the epenthetic vowel will copy the same features. In the same vein, if the vowel close to the epenthetic site is a –ATR and a front or back vowel, the epenthetic vowel will also be a –ATR and a front or a back vowel. It is worth pointing out again that the epenthetic vowels harmonise with the close vowel to the right of the epenthetic site.

However, when there is no vowel to the right of the epenthetic site, the vowel to be inserted will harmonise with the vowel to the left (see 5.1.5 for further details on the quality of the epenthetic vowel). Another leading or tentative idea is that vowel harmony fails to apply when the harmonising vowel is /a/ or when the initial consonant of a cluster is /s/ and in such contexts /ɪ/ becomes the epenthetic segment.

5.1.1 Vowel epenthesis at syllable onset at word-initial position

In Kusaal, clusters at syllable onset positions at word-initial position are simplified through vowel epenthesis and the epenthetic vowel is determined by vowel harmony in the adapted form. This phenomenon is active when the initial consonant of a cluster is a labial followed by a liquid. If the vowel close to the cluster is a +ATR vowel, the epenthetic vowel will be a +ATR and if the vowel is –ATR, the epenthetic vowel will be –ATR. This is illustrated in the data below:

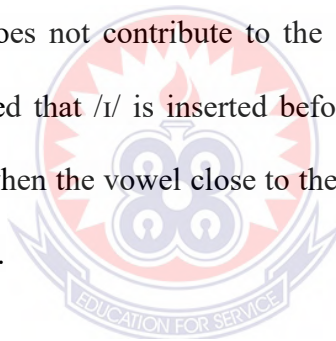
Labial + Liquid clusters at onset position: Copy vowel feature from right unless the vowel is /a/

55.	GH. English	Kusaal	Gloss
a.	/b <u>l</u> u:/	[b <u>u</u> lu]	__blue'
b.	/b <u>r</u> onya/	[b <u>u</u> runya]	__Christmas' (from Akan)
c.	/p <u>l</u> et/	[p <u>i</u> let]	__plate'
d.	/b <u>l</u> ed/	[b <u>i</u> let]	__blade'
e.	/b <u>r</u> idz/	[b <u>i</u> rig]	__bridge'
f.	/b <u>r</u> ek/	[b <u>i</u> rik]	__bake'
g.	/p <u>r</u> esbi/	[p <u>i</u> resibi]	__Presby (short form of the Presbyterian Church)
h.	/f <u>r</u> idz/	[f <u>i</u> rig]	__fridge'
i.	/p <u>l</u> an/	[p <u>i</u> lan]	__plan'
j.	/p <u>l</u> asta/	[p <u>i</u> lasa]	__plaster'
k.	/b <u>l</u> enda/	[b <u>i</u> lenda]	__blender'
l.	/f <u>l</u> af/	[f <u>i</u> las]	__flash'
m.	/f <u>l</u> awa/	[f <u>i</u> lawawa]	__flower'
n.	/f <u>r</u> ef/	[f <u>i</u> res]	__fresh'
o.	/p <u>l</u> og/	[p <u>u</u> log]	__plug'
p.	/p <u>l</u> ot/	[p <u>u</u> lot]	__plot' (usually refers to a plot of land)

It is observed that all the onset clusters at word-initial positions are simplified by inserting a vowel. Three epenthetic vowels, that is, /u/, /i/, /ɪ/, /ʊ/ are identified in the data and these vowels are determined by the vowels that occur after the epenthetic sites in the modified syllables. In (55a & b) the epenthetic vowel is a +ATR back

vowel /u/ because the vowel to the right of the epenthetic site is a +ATR back vowel. Similarly, in (55c-h) the epenthetic vowel is /i/ as a result of the +ATR high-front vowel /i/. However, the epenthetic vowel turns to /ɪ/ when the neighbouring vowel is a –ATR vowel as observed in (1i-m). Similarly, /ʊ/ is the epenthetic vowel in (55n & 55o) because the vowels available to the right of the epenthetic sites are –ATR vowels.

It is also observed that roundness contributes to the selection of the epenthetic segments. It is consistent in the data provided above that if the trigger is a rounded or unrounded vowel, the epenthetic vowel becomes [+round or –round] respectively. However, roundness must agree with ATR feature. It is important to also point out that the low vowel /a/ does not contribute to the selection of an epenthetic vowel, however, what is observed that /ɪ/ is inserted before /a/ as seen in (55 i, j, l & m). What this means is that when the vowel close to the epenthetic site is a low vowel /a/, the epenthetic vowel is /ɪ/.



Similarly, a word-initial onset cluster with a velar as the initial consonant is broken up by vowel insertion and this vowel is also determined by the vowel that is close to the epenthetic site as presented in (56). If the trigger is a +ATR and a rounded vowel, the epenthetic vowel assumes the same feature; [+ATR, +round], on the other hand, if the trigger is [–ATR, –round], the epenthetic vowel also becomes [–ATR, –round]. The data below demonstrate this observation.

A dorsal and a liquid cluster at onset position: Copy vowel feature from the following vowel, unless the vowel is /a/

56. GH. English	Kusaal	Gloss
a. / <u>k</u> lɔtʃ/	[k <u>ɔ</u> lɔk]	__dutch‘
b. / <u>k</u> lɔk/	[k <u>ɔ</u> lɔk]	__dock‘
c. / <u>k</u> ri:m/	[k <u>i</u> ri:m]	__cream‘
d. / <u>k</u> ristofa/	[k <u>i</u> ri:sofa]	__Christopher‘
e. / <u>g</u> ri:s/	[g <u>i</u> ri:s]	__grease‘
f. / <u>g</u> rup/	[g <u>u</u> rup]	__group‘
g. / <u>g</u> lu:/	[g <u>u</u> lu:]	__glue‘
h. / <u>k</u> rɛdit/	[k <u>i</u> rɛdit]	__credit (usually refers to airtime)‘
i. / <u>k</u> lab/	[k <u>i</u> lab]	__dub (a name of alcoholic beverage)‘
j. / <u>g</u> la:s/	[g <u>i</u> la:s]	__glass‘

It is observed that all the initial syllables in the English forms begin with complex clusters and as a result, are being simplified by vowel insertion. It also is evident in the data that both ATR feature and roundness contribute to the selection of the epenthetic vowel, and the epenthetic vowels as observed are /ɔ/ in (56a & b), /i/ in (56 c-e), /u/ in (56f & g), and /ɪ/ in (56 h-j). Thus the harmonic features of the vowels close to the epenthetic sites are copied to the various epenthetic vowels. However, in (56i & j) where /a/ is the vowel close to the epenthetic site, /ɪ/ is selected as the epenthetic vowel.

Additionally, onset clusters with initial coronals at word-initial position are also resolved by epenthesis. In this process too vowel harmony applies. The vowel to be inserted harmonises with the vowel close to the epenthetic site at the modified syllable as presented in (57).

When a coronal consonant and liquid form an onset cluster at word-initial position:

Copy vowel feature from the following vowel unless the vowel is /a/.

57. GH. ENGLISH	KUSAAL	GLOSS
a. / <u>d</u> ram/	[d <u>o</u> r <u>o</u> m]	<u>du</u> m‘
b. / <u>d</u> raiva/	[d <u>o</u> r <u>o</u> ba]	<u>di</u> ver‘
c. / <u>t</u> rakta/	[t <u>r</u> ata]	<u>ti</u> actor‘

The examples in (57) illustrate vowel epenthesis involving clusters of coronal and liquid consonants at syllable onset position. Example (57a) has /o/ as the epenthetic segment before /s/, (57b) also shows a harmony of /o/ before /v/. However, example (57c) demonstrates that vowel harmony does not apply if the vowel to the right is /a/, instead /i/ is inserted.

Besides, it is noted that vowel harmony fails to apply when the initial consonant of the cluster is /s/ at word-initial position. Vowel harmony is blocked when an onset cluster has the voiceless alveolar fricative /s/ as the initial consonant, and in that case /s/ spreads its coronal feature to the epenthetic site. It is observed in this study that the coronal consonant /s/ is the only consonant that spreads its feature to the epenthetic vowel. The data below exemplify this observation.

When the alveolar fricative /s/ is the initial consonant of a cluster at word-initial position: Insert /ɪ/.

58. GH. ENGLISH	KUSAAL	GLOSS
a. / <u>sp</u> ika/	[<u>sɪ</u> pika]	==spæker‘
b. / <u>spa</u> :k/	[<u>sɪ</u> pak]	==to spark‘
c. / <u>spana</u> /	[<u>sɪ</u> pa:na]	==spanner‘
d. / <u>spe</u> ks/	[<u>sɪ</u> pɛgis]	==spɛks‘
e. / <u>spa</u> :/	[<u>sɪ</u> pa:]	==spɑ‘
f. / <u>sp</u> oks/	[<u>sɪ</u> pugus]	==spokɛs‘
g. / <u>st</u> ɔ:/	[<u>sɪ</u> tɔ:]	==store‘
h. / <u>st</u> ɛfn/	[<u>sɪ</u> tesin]	==stæɪn‘
i. / <u>st</u> ia/	[<u>sɪ</u> tia]	==stɛər‘
j. / <u>sk</u> ɛ:t/	[<u>sɪ</u> ket]	==skɪrt‘
k. / <u>st</u> ail/	[<u>sɪ</u> taji]	==stajl‘
l. / <u>st</u> a:/	[<u>sɪ</u> ta:]	==stɑ‘
m. / <u>st</u> amp/	[<u>sɪ</u> tamp]	==stæmp‘

It is observed in the examples that regardless of the kind of vowel close the epenthetic site, the epenthetic vowel is /ɪ/. For instance, in examples (58f & g) the vowels close to the epenthetic site are back vowels, that is, /u/, /ɔ/ and the epenthetic vowels would have been back vowels as observed in examples (55) and (56). However, that did not happen because of the initial consonant of the cluster [s]. Similarly, in example (58 h-j) the vowels after the cluster in the modified syllables are +ATR, that is, /e/, /i/ and /ɛ/, however, the epenthetic vowel is /ɪ/ [-ATR] due to the presence of the /s/ as the initial consonant of the cluster at the onset. This indicates that epenthetic vowel /ɪ/ is influenced by /s/ and not the adjacent vowels. The study observes that consonantal

spreading is restricted to only the /s/ as already pointed out. Rose and Demuth (2006) discuss the special status of the consonant /s/ in Sesotho loanwords which reveal a similar pattern observed in this analysis. In Sesotho loanword analysis, word-initial sC clusters display insertion of the coronal vowel /ɪ/. See details on this discussion in (Rose & Demuth 2006:36).

A phonological rule of vowel epenthesis at word-initial position in Kusaal loanword adaptation can be formalised as follows:

Rule 9: $\emptyset \rightarrow V/ C_C]_{\text{word}}$

The rule states that split an underlying word-initial cluster with a vowel. This implies that all consonant clusters at word-initial position are repaired by vowel epenthesis.

5.1.2 Vowel epenthesis at syllable boundary or word-medial position

A cluster at word-medial position or a sequence of two consonants at syllable boundaries are simplified by either vowel epenthesis or consonant deletion. This section focuses on vowel epenthesis at word-medial position. It is observed that in simplifying a consonant cluster at word-medial position through vowel insertion, the epenthetic vowel harmonises with the vowel after the epenthetic site in the output as observed in word-initial cluster resolution. In repairing a cluster involving the alveolar fricative /s/ and a stop, the epenthetic vowel is always the high-front vowel /ɪ/ regardless of the vowel before or after the epenthetic site as has pointed out in previous analysis. The examples in (59) present vowel epenthesis within a cluster or a sequence of two consonants at word-medial position.

When a cluster or a sequence of two consonants occur at word-medial position: Copy vowel from right, unless the initial consonant is /s/.

59. GH. ENGLISH	KUSAAL	GLOSS
a. /pet <u>r</u> ol/	[pat <u>u</u> ro]	<u>pet</u> rol‘
b. /pat <u>r</u> iʃia/	[apat <u>i</u> riʃia]	<u>Pat</u> ricia‘
c. /kɔŋ <u>k</u> rit/	[kɔŋ <u>k</u> iret]	<u>con</u> crete‘
d. /bi <u>s</u> kit/	[bis <u>i</u> ket]	<u>bis</u> ait‘
e. /pres <u>b</u> i/	[pires <u>i</u> bi]	<u>Pres</u> by, a short form for Presbyterian church‘

The examples in (59a-c) illustrate vowel epenthesis at word-medial clusters while (59d & e) illustrate vowel epenthesis at a sequence of two consonants at syllable boundaries. In (59a - b) the cluster is made up of a coronal [t] and a liquid [r] where /u/ and /i/ are inserted before /o/ and /i/ respectively, while /i/ is inserted before /e/ in a velar and trill cluster as seen in (59c). In (59d) the coronal [s] at word-medial position occurs as a coda to the first syllable while dorsal [k] is an onset to the second syllable and /i/ is inserted in between them, likewise, the example in (e). All the epenthetic vowels identified in the data above harmonise with the adjacent vowels to the right of the epenthetic site in the adapted forms, except when the initial consonant of the cluster is a voiceless fricative /s/ and in that case, the epenthetic vowel is /i/ as seen (59d & e). The harmonisation is in terms of both ATR and rounding.

Similarly, at word-medial position, a sequence of two consonants involving liquids and other consonants require vowel insertion. Below presents Hausa loanwords in Kusaal with consonant sequences occurring at syllable boundaries.

When /a/ occurs after a sequence of two consonants involving a liquid and any consonant at syllable boundary: Insert /i/.

60. HAUSA	KUSAAL	GLOSS
a. /al <u>j</u> anna/	[ar <u>i</u> zana]	<u>h</u> aven, paradise'
b. /al <u>b</u> asa/	[al <u>i</u> basa]	<u>o</u> nion'
c. /gar <u>w</u> a/	[gar <u>i</u> wa:]	<u>a</u> barrel'
d. /gi <u>r</u> ma/	[gir <u>i</u> ma]	<u>r</u> espect / honour'
e. /ar <u>z</u> iki/	[ar <u>i</u> zak]	<u>w</u> ealth or riches'
f. /amar <u>r</u> ya/	[amar <u>i</u> ya]	<u>a</u> bride or the latest junior wife'
g. /bar <u>k</u> a/	[bar <u>i</u> ka]	<u>b</u> lessing'
h. /k ^w al <u>b</u> a/	[kol <u>i</u> ba]	<u>b</u> ottles'
i. /azur <u>f</u> a/	zur <u>i</u> fa]	<u>s</u> ilver'

The data illustrate how vowel insertion or epenthesis takes place to repair consonant sequences at syllable boundaries in Hausa words in Kusaal. The pattern observed here is straight forward, that is, a word-medial consonant sequence that involves a liquid and any consonant is repaired by epenthesis. It is also observed in this data that vowel harmony occurs from right to left in the modified syllable. In (60h & i) the vowels before the sequence of the consonants in the Kusaal forms are back vowels, however, the epenthetic vowel is a front vowel which suggests that it has no feature from any of the adjacent vowels. It is apparent that the presence of the low central vowel occurring at the right of the epenthetic sites results in a default vowel insertion. However, when there is no vowel after the sequence of consonants, the adjacent vowel at the left then becomes the trigger of the epenthetic vowel. From the foregoing analysis a phonological rule can be stated as follows:

Rule 10: $\emptyset \rightarrow V/ [C_C]]_{\sigma}$

The rule stated above explains that an underlying cluster at syllable boundary is simplified by vowel insertion.

5.1.3 Vowel epenthesis at coda clusters

This subsection examines consonant cluster resolution through vowel epenthesis at word-final position. Word-final or coda clusters which are made up of liquids and stops or which are made up of stops and the fricative /s/ are simplified by vowel insertion. The pattern is that the inserted vowel harmonises with the vowel to the left of the epenthetic site since there is no vowel after the cluster. It has been established in previous analysis in (60) that the vowel to be inserted is triggered by the vowel that occurs right of the epenthetic site. However, when there is no vowel at the right of the epenthetic site, the nearest vowel to the cluster becomes the trigger. This is the case in clusters which occur at word-final position as presented below:

When a liquid and a stop constitute a cluster at a coda position: Copy vowel from left.

61. GH. ENGLISH	KUSAAL	GLOSS
a. /f <u>il</u> m/	[f <u>ɪ</u> l <u>ɪ</u> m]	<u>ɪ</u> film'
b. /bɔ <u>l</u> b/	[bɔ <u>ɔ</u> l <u>ɔ</u> b/bɔb]	<u>ɔ</u> bulb'
c. /b <u>ɛ</u> lt/	[b <u>ɛ</u> l <u>ɪ</u> t]	<u>ɪ</u> bɛt'

The examples above illustrate vowel epenthesis at liquid and stop consonant cluster at coda position. It is observed that all the coda clusters in the English forms are simplified through vowel insertion in the Kusaal versions, and the epenthetic vowels are determined by the adjacent vowels. In (61a), a high-front vowel /ɪ/ is inserted after high-front vowel /ɪ/, while in (61b) the /ɔ/ is inserted after a /ɔ/. Similarly, in (61c), /ɪ/

is inserted after /ε/. It is also observed that the harmonising vowels which are -ATR, that is, /ɪ/, /ʊ/ has resulted in the targets having the same harmonic feature.

Similarly, a coda cluster that involves a velar or a labial stop plus the voiceless fricative /s/ is modified by vowel epenthesis where the epenthetic vowel also harmonises with the vowel that precedes the cluster. This is demonstrated in the data below:

When a stop and the fricative /s/ forms a coda cluster: Copy vowel feature from left.

62. GH. ENGLISH	KUSAAL	GLOSS
a. /spe <u>ks</u> /	[sɪpɛ <u>gɪs</u>]	==spæc's
b. /tʃi <u>ks</u> /	[kɪ <u>gɪs</u>]	==dʒeeks'
c. /sɔ <u>ks</u> /	[sɔ <u>gɔs</u>]	==sɔks'
d. /spɔ <u>ks</u> /	[sɪp <u>u</u> g <u>ɪs</u>]	==spɔkɛs'
e. /tʃi <u>ps</u> /	[kɪ <u>bɪs</u>]	==tʃɪps'

It is evident in the data provided above that all the coda clusters in the English forms are simplified by vowel insertion in the Kusaal forms. Again, the epenthetic segments as observed in the data harmonise with the adjacent vowels. It is also noticed that the triggers have the features [+front, -ATR] as seen in (62a), [+back, -ATR] as seen in (62b), [+back, -ATR] as seen in (62c) and [+back, +ATR] as seen in (62d). This consequently results in the epenthetic vowels sharing the same harmonic features such as /ɪ/ after /ε/, /ʊ/ after /ɔ/, /u/ after /u/ and /ɪ/ after /ɪ/ as exemplified in (62a-e). It is worth knowing that not all coda clusters are repaired by vowel insertion, some coda clusters are also repaired by deletion as discussed in subsection 5.2.2. The preference for epenthesis to deletion in this analysis is that the consonants that formed the cluster

do not share the same articulatory position. A general rule for vowel epenthesis at word-final position can be formalised below:

Rule 11: $\emptyset \rightarrow V/ C_C]_{\text{word}}$

This rule states that insert a vowel in between two consonants at word-final position. This implies that input consonant clusters at word-final positions are simplified by vowel insertion as observed in (60) and (61).

5.1.4 Glide prothesis

Kusaal has certain consonants which do not occur at word-initial position. It is attested that when words that are being borrowed into Kusaal have consonants that are not allowed to begin a word, speakers of Kusaal add a permitted segment as a way of banning such consonants from occurring at word-initial position and by extension ensuring that the structural requirement of the language is met. The alveolar trill /r/ is one of such consonants which occurs at word-medial and word-final positions only and it is argued to be a variant of /d/ in intervocalic positions (Musah 2010; 2018). Therefore, Ghanaian English words with the trill at word-initial position are modified by prefixing /w/ before they are incorporated into Kusaal. Examples are provided in (63).

When /r/ occurs at word-initial position: Prefix /w/

63. GH. ENGLISH	KUSAAL	GLOSS
a. /rɔba/	[wɔrɔba]	__rubber'
b. /rɔf/	[wɔrɔf]	__rough'
c. /rɛfiri/	[wɔrɛfiri:]	__referee'

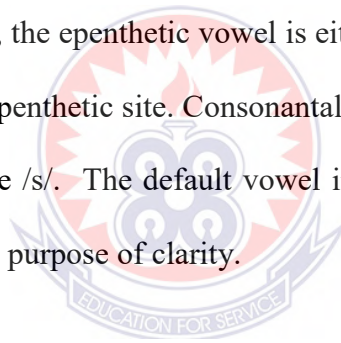
The examples above illustrate a consonant addition at word-initial position. It is observed that the alveolar trill /r/ at word-initial position in the English forms is made to appear at word-medial position in the Kusaal forms by prefixing a glide /w/. More so, adding only the consonant would have resulting in a cluster like /wr/, a structure which is not allowed in Kusaal. Therefore, there is also an insertion of a vowel so that a cluster will not surface. Here, /ʊ/ is selected because it is homorganic with /w/. A similar case is observed in Dagbani. Abdallah (2020) citing (Olawsky 1999; Hudu 2002) intimates that Dagbani disallows the alveolar trill /r/ from occurring at word-initial position and that when adapting words from the source language which contain /r/ at word-initial into Dagbani, it substitutes the alveolar trill /r/ with the alveolar lateral /l/. However, in Kusaal, speakers prefer to re-syllabify by prefixing a glide as exemplified in the data above and the preference of /w/ to any other consonant is premised on the fact that it is the close segment to /r/ in terms of manner and sonority.

5.1.5 The quality of the epenthetic vowel in Kusaal loanword

Generally, the purpose of vowel epenthesis as observed by Uffmann (2006) is to satisfy constraints on native syllable structure and most notably bans codas and complex onsets. It is discussed in this study that vowel epenthesis is one of the preferred strategies for dealing with illicit consonant clusters and consonant sequences. But the fundamental question is which vowel is selected to insert in Kusaal loanword phonology? Basically, three strategies determine the quality of the epenthetic vowel cross-linguistically as postulates by Uffmann. First is the default vowel; a vowel that is inserted context-independently (Uffmann 2006). Second, the epenthetic vowel can take or copy features of the neighbouring vowel and this is known as vowel harmony. The final one is consonantal assimilation where the

epenthetic vowel receives place features from an adjacent (usually preceding) consonant' (Uffmann 2006:1079).

In Kusaal loanword adaptation, as has already been discussed, all the three strategies are active, however, the first two, that is, vowel harmony and default vowel insertion are the dominant strategies for determining the choice of the epenthetic vowel. It is seen in the discussion that the default epenthetic vowel that is applied in the adaptation of word-initial, word-medial and word-final clusters is the /ɪ/. Eddyshaw (2018) opines that the default epenthetic vowel in Kusaal is [ɪ]. Accordingly, in Kusaal loanword adaptation the context that triggers the insertion of the default vowel /ɪ/ is when there is a non-harmonic low vowel /a/ close to the epenthetic site. With regard to vowel harmony, the epenthetic vowel is either /i/, /ɪ/, /o/ or /u/ depending on the kind of vowel at the epenthetic site. Consonantal spreading is restricted to only the voiceless coronal fricative /s/. The default vowel insertion is presented in (64) with repeated examples for the purpose of clarity.



When /a/ occurs after the epenthetic site: A high /ɪ/ is inserted as a default vowel.

64. GH. ENGLISH	KUSAAL	GLOSS
a. /pl <u>a</u> n/	[pɪ <u>l</u> an]	<u>pl</u> aɪn'
b. /fl <u>a</u> wa/	[fɪ <u>l</u> awa]	<u>fl</u> owə'
c. /kl <u>a</u> b/	[kɪ <u>l</u> ab]	<u>kl</u> ʌb'
d. /gl <u>a</u> s/	[gɪ <u>l</u> a:s]	<u>gl</u> as'
e. /azur <u>a</u> /	[zɪ <u>r</u> ɪfa]	<u>zɪ</u> rɪfə'
f. /k ^w alb <u>a</u> /	[k ^w ɔɪ <u>l</u> ɪba]	<u>k^wɔɪ</u> lɪbəs'

Vowel harmony in Kusaal loanword adaptation occurs regressively, unless there is no vowel to the right of the epenthetic site. It is evident in the data above that the low

vowel /a/ which comes after the cluster is responsible for the selection of a default /ɪ/ and not the vowels at the left of the epenthetic site in the adapted forms.

5.2 Deletion

Adomako (2008) states that even though vowel epenthesis is the commonest strategy many languages employ to ensure that source words conform to the syllable structure of recipient language, however, in some instances, the recipient language may also resort to deletion of segments in addition to vowel epenthesis, as a repair strategy. This assertion is true in Kusaal loanword adaptation. Deletion of segments is productive in Kusaal loanwords, although it is not as common as epenthesis. Deletion occurs to prevent a sequence of two consonants from occurring at syllable boundaries and also to repair some coda clusters. It also occurs to disallow certain consonants from occurring at word-initial and word-medial positions. Generally, a sequence of two obstruents at syllable boundaries and word-final clusters are repaired by deletion and in many cases, the least sonorant consonants are deleted. In this case, mostly stops are the targets. It is worth pointing out that syllable deletion at word-medial position is also productive in Kusaal loanword adaptation. This subsection discusses a resolution of consonant clusters/sequences at word-medial position and word-final positions, syllable deletion and consonant deletion.

5.2.1 Consonant deletion at word-medial position

The data show that when a loanword has a cluster at word-medial position or a sequence of two consonants at syllable boundaries, the cluster or the sequence is simplified by a deletion of one consonant. The point as already explained is that while consonant clusters of any kind at word-initial position are not permitted in Kusaal, a cluster of two obstruents involving [s] and [t] at word-medial position is not also

permitted, and it is often repaired by a deletion of the second consonant. This is demonstrated in (65). Deleted consonants are embolden and underlined in the English forms.

When a fricative /s/ and stop form a cluster at word-medial position: Delete the stop.

65. GH. English	Kusaal	Gloss
a. /mast <u>ta</u> /	[masa]	<u>ma</u> ster‘
b. /past <u>ta</u> /	[pasa]	<u>pa</u> stor‘
c. /mist <u>ta</u> /	[misa]	<u>mi</u> ster‘
d. /sist <u>ta</u> /	[sisa]	<u>si</u> ster‘
e. /pist <u>il</u> /	[pisil]	<u>pi</u> stoŋ
f. /minist <u>ta</u> /	[minisa]	<u>mi</u> nister‘
g. /krist <u>ofa</u> /	[akirisofa]	<u>ki</u> ristopher

The examples provided above demonstrate that a word-medial cluster which involves a fricative and a stop is repaired by a deletion of the stop. In (65 a-e) the words contain two syllables, the first one ends in a vowel and the second one begins with a cluster. The cluster /st/ in (65a-e) is simplified by a deletion of the second consonant /t/ in the adapted form. Similarly, in (65f-g) there are three syllables in the English forms, the third syllable in (f) and the second syllable in (g) which all begin with a cluster /st/ is also simplified by deleting /t/ in their adaptation. The demand of the structural requirement of Kusaal as already indicated leads to the deletion of the consonant beginning the syllable as observed in (65a-g).

The possible reasons for the deletion of stops as against fricatives as observed in the data above are associated with sonority hierarchy and perception. The sonority index

as observed by Niggli (2014), indicates that voiceless fricatives [h, s, f] are more sonorous than voiceless stops [p, t, k]. By this, he seeks to suggest that as regards segment deletion, the least sonorous segments are deleted while the more sonorous ones are preserved. Shinohara (2006:1017) on the other hand states that ‘among English sound sequences, perceptually salient sounds tend to be remain in the corresponding loanwords and perceptually weaker ones deletes’ and that in cluster resolution through deletion, fricatives such as [s] and sonorants show a strong resistance against deletion.

Similarly, when a sequence of two obstruents occur at word-medial position, that is, a dorsal and a coronal consonant, the dorsal segment is deleted while the coronal segment is preserved as exemplified in (66).

*When the dorsal /k/ and a coronal consonant form a sequence at a syllable boundary:
Delete /k/.*

66. GH. ENGLISH	KUSAAL	GLOSS
a. /tra <u>k</u> ta/	[tırata]	<u>tr</u> actor‘
b. /inspe <u>k</u> ta/	[sɔpɛta]	<u>insp</u> ector‘
c. /dirɛ <u>k</u> ta/	[da:rɛta]	<u>dir</u> ector‘
d. /kɔntra <u>k</u> ta/	[kɔntırata]	<u>ɔntr</u> actor‘
e. /kɔnɛ <u>k</u> ʃn/	[kɔnɛsɪn]	<u>ɔn</u> nection‘

It is observed that a dorsal and a coronal consonants sequence at syllable boundaries in the English forms are modified in the Kusaal versions by deletion. In (66) the English form in (a) has as a sequence of two consonants, that is, /kt/ with /k/ ending the first syllable and /t/ beginning the second syllable. Similarly, /kt/ in (b-d) and /kʃ/ in (e) occur in different syllables and deletion in this case targets /k/ which ends the

second syllables in the English words in (12b-e). The reason for the deletion of /k/ instead of /t/ is that comparatively, /t/ is perceptually more salient and unmarked than /k/. This receives support from de Lacy (2002) who states that the dorsal [k] is a most marked element and it is eliminated in many languages.

Another interesting pattern of consonant deletion observed in Kusaal loanword adaptation is the deletion of the lateral /l/. It is noted that when there is a sequence of two consonants or cluster with /l/ as the initial consonant, deletion affects the /l/. The examples below illustrate this observation.

When a lateral /l/ and alveolar stops /t, d/ form a sequence or a cluster: Delete /l/

67. GH. ENGLISH	KUSAAL	GLOSS
a. /so <u>l</u> dʒə/	[sɔ̃giə]	=soldier
b. /ko <u>l</u> ta:r/	[kɔ̃ta:l]	=coal tar ⁴
c. /mɔ̃ <u>l</u> t/	[mɔ̃t]	=mat ⁴

It is noted that the lateral /l/ and the affricate /dʒ/ in (13a) belong to separate syllables in the English form as well as /l/ and /t/ in the form in (b). However, /lt/ in (c) is a final cluster to the English form. It is observable that /l/ which occurs as a coda to the first syllables in the English forms in (a & b) is deleted. In (c) it is also deleted due to the structural requirement of Kusaal. The preference for the deletion of /l/ may be attributed to perception and the fact that /l/ as a naturally voiced element is a marked value in Kusaal. Shinohara (2006) also asserts that perceptually weak elements undergo deletion while perceptually salient or strong elements retain. Thus, naturally, the lateral is more sonorous but weak in perception than the alveolar stop /t/ and this may account for its deletion while the voiceless stop [t] is retained. It is also significant to mention that the vowel that precedes the /lt/ sequence or cluster is a

back vowel whose presence might have also contributed to the deletion of /l/ (compare with example 61c). A proposed general rule for consonant deletion at word-medial position and syllable boundary as observed in (65-57) is stated below:

$$\text{Rule 12: } C \rightarrow \emptyset / CC _ \left\{ \begin{array}{l} \# \\ \$ \end{array} \right.$$

The rule explains that a word-medial cluster or a sequence of two consonants at syllable boundary is simplified by a deletion of one consonant.

Moreover, deletion also affects certain segments because the language does not permit them to occur as onsets. One of such consonants found in the corpus of data for this study is the voiceless glottal fricative /h/. Musah (2018) states that the voiceless fricative has a limited occurrence in Kusaal and is permitted to occur at a word or syllable initial position only. However, data in this study reveal that source words with the fricative /h/ at syllable initial position or as a syllable onset are considered ill-form and the right repair strategy is deletion. This is productive in Hausa and English loanwords in Kusaal as presented in (68).

Delete /h/ when it occurs at syllable or word-initial position.

68. HAUSA	KUSAAL	GLOSS
a. /al <u>h</u> amis/	[alamis]	__Thursday
b. /al <u>h</u> adzi/	[ala:gi]	__a person (male) returned from Hajj‘
c. /al <u>h</u> asan/	[ala:san]	__a male given name‘
d. /la <u>h</u> adi/	[alasɪd]	__Sunday‘

GH. ENGLISH	KUSAAL	GLOSS
e. / <u>h</u> aŋkaʃi:f/	aŋkɪtɪŋ	<u>h</u> andkerchief
f. / <u>h</u> andkɔf/	aŋkɔ:ba]	<u>h</u> andcuff
g. / <u>h</u> ɔspɪtɪl/	[asibiti]	<u>h</u> ospital

The examples above illustrate a deletion of the voiceless fricative /h/ at syllable initial positions. The Hausa words with /h/ as an onset to the second syllables in (68a-d) have been modified by deleting the /h/. It is observed in (68d) that /h/ is replaced with /s/ and it is worth pointing out that /h/ is a variant of /s/ in intervocalic environment which features mostly in Toende dialect (see pp. 1 for examples). Additionally, it is noted in (68e-g) that /h/ which occurs at syllable initial position in the English forms is deleted in the Kusaal renditions. Even though Musah posits that /h/ naturally occurs only at syllable initial position in Hausa borrowed words, the examples in (68e-g) indicate that /h/ as an onset in some English and Hausa words is deleted when borrowed into Kusaal. The status of /h/ needs further investigation to establish its phonemic status in Kusaal. /h/ surfaces as a variant of /s/ at word-medial position in the Toende dialect and may not be a phoneme of Kusaal. This phenomenon can be formalised in the rule below:

Rule 13: /h/ → ∅ / [σ ____

The rule states that /h/ is deleted or become empty when it occurs at syllable initial position. This explains that /h/ at syllable initial position in source word is deleted when borrowed into Kusaal.

Another deletion that takes place at word-medial position is the deletion of the voiceless glottal stop /ʔ/. The glottal stop occurs only at word-medial or as a coda in

Kusaal. For instance, such as /pi ʔ d/ = 'words', /siʔa/ = 'something', /di ʔ d/ 'dirt', /ayiʔ/ 'two', /b ʔ/ = 'to ride', /g ʔ/ = 'to hold' and among others. These examples point out that the glottal stop cannot begin a word in Kusaal but can occur at syllable initial positions or as a coda. However, it is observed that Hausa words borrowed into Kusaal, the glottal stop at word-medial position is deleted in the Kusaal forms as shown in the following examples:

Delete the voiceless glottal stop /ʔ/ when it occurs at word-medial position

69. HAUSA	KUSAAL	GLOSS
a. /waʔazi/	[wa:zu]	= 'preaching or a sermon'
b. /malaʔika/	[maliaka]	= 'an angel'
c. /jumaʔa/	[arizum]	= 'Friday'

It is evident that glottal stop in the Hausa forms is missing in the adapted forms. It is observed that the environment of its occurrence in Hausa does not violate the phonotactics of Kusaal as it also occurs at word-medial position, a context which is permitted in Kusaal. Hence, it can be stated that the adaptation pattern which involves the deletion of glottal stop at word-medial position in Kusaal loanwords may be motivated by perception. The glottal stop is said to be perceptually weak and might not have been perceived during the adaptation of these words. The glottal stop deletion can be formalised in rule as presented below:

Rule 14: /ʔ/ → ø / V ___ V

The rule explains that /ʔ/ is deleted when it occurs between vowels. This implies that when a source word contains /ʔ/ between vowels, it is deleted in the borrowed form.

5.2.2 Consonant deletion within coda clusters

Deletion of consonants at coda targets the least sonorous ones as observed in (65). In this case, stops are the least sonorous consonants that undergo deletion in preservation of fricatives or nasals. It is demonstrated in (70 and 71) that if the initial consonant of the cluster is a fricative or nasal followed by a stop, the stop is deleted. All these are as a result of sonority-related constraint hierarchy and perceptual effects as suggested by Prince and Smolensky (1993), de Lacy (2002; 2006), Niggli (2014), Shinohara (2006) among others.

When the fricative /s/ and alveolar stops occur as a cluster at word-final position: Delete the alveolar stops.

70. GH. ENGLISH	KUSAAL	GLOSS
a. /fɛ: <u>st</u> /	[fɛ:s]	__first‘
b. /la: <u>st</u> /	[la:s]	__last‘
c. /fɔ:r <u>ist</u> /	[fɔ:ris]	__forest‘
d. /tʃ <u>est</u> /	[kɛs]	__chest‘
e. /ka <u>ds</u> /	[ka:s]	__cards‘

When a nasal /n/ and alveolar stops occur as a cluster at word-final position: Delete the alveolar stops

71. GH. ENGLISH	KUSAAL	GLOSS
a. /pali <u>ment</u> /	[palamɛn]	__parliament‘
b. /klemi <u>nt</u> /	[akilemɛn]	__dement‘
c. /taʊz <u>nd</u> /	[ta:sɪn]	__thousand‘
d. /dez <u>mɔnd</u> /	[adesimɔn]	__Desmond‘
e. /rem <u>ɔnd</u> /	[aremɔn]	__Raymond‘

The examples in (70) and (71) demonstrate consonant deletion within clusters at word-final position. It is observable that the de-clustering by deletion affects all the final segments in the Kusaal forms. The voiceless alveolar stop is deleted in (70a-e) in preservation of the voiceless fricative. Similarly, the alveolar stops are deleted in preservation of the nasal stop in (71a-e). It is observed that deletion within coda clusters at word-medial or word-final positions occurs when the consonants that formed the cluster share the same articulatory position and in that case, acoustically, the most sonorous consonant is retained while the least sonorous one is deleted. However, when the consonants that constituted a cluster at syllable final position belong to different places of articulation, insertion is preferred as observed in (62). A phonological rule that expresses consonant deletion at word-final position is presented below:

Rule 15: $C_2 \rightarrow \emptyset / C_1 C_2 ____]_{\text{word}}$

The above rule explains that a second consonant of a cluster at word-final position is deleted.

5.2.3 Syllable deletion

As part of the nativisation process, source words may be reduced by deleting a whole syllable to make pronunciation easy. The deletion of a syllable is not informed by the phonotactic constraints of Kusaal but to make source words look like native forms. Examples of syllable deletion in the English and the Hausa loanwords in Kusaal are presented below:

72. Syllable deletion at word-initial, word-medial and word final positions

- | | | |
|------------------------|----------|---------------------------|
| a. / <u>in</u> spekta/ | [sɔpɛta] | __inspɛctor‘ |
| b. / <u>min</u> it/ | [mit] | __minutɛ‘ |
| c. /ba <u>ngi</u> da/ | baŋgɪda] | __to visit the toilet‘ |
| d. /laf <u>i</u> a/ | [la:fi] | __health, good condition‘ |
| e. / <u>a</u> ldʒifu/ | [gɛfa] | __pɒkɛt‘ |

The examples above illustrate syllable deletion at word-initial, word-medial and at word-final positions. It is observed that /in-/ at word-initial and word-medial positions in (72a & b) in the English words is deleted in the adapted forms in Kusaal. Similarly, /-ja-/ is deleted from the middle and the final in the Kusaal forms in (72c) and (72d) respectively, while /a-/ is deleted at word-initial position in (72e).

5.3 Adaptation strategies in OT

This section discusses how vowel epenthesis, the quality of epenthetic vowel and consonant deletion can be formalised within an Optimality theoretical framework.

5.3.1 Vowel epenthesis at word-initial, word-medial and word-final clusters

It would be recalled in chapter 2 section 2.8 that the basic syllable structure of Kusaal is CVC. This implies that complex clusters are marked and therefore, not permitted. In section 5.1 in this chapter it is argued that complex clusters are made simple by epenthesis or deletion, therefore, the constraint that is needed to ensure structural well-formedness is *COMPLEX as proposed by Prince and Smolensky (1993). This constraint is defined in (73). It is a highly ranked markedness constraint in the language as the language does not permit sequence of consonants or clusters.

- 73. *COMPLEX** Not more than C or V may associate with any syllable position
(Prince & Smolensky 1993:16).

This constraint will penalise any candidate that keeps faith with the input form by preserving any consonant cluster. Another constraint that will be active in accounting for the relations that exist between the input and the adapted forms is MAX-IO from Correspondence Theory (McCarthy & Prince 1995). This is a faithfulness constraint that militates against deletion of segment in the output form as defined in (74).

- 74. MAX-IO:** Every segment of the input has a correspondent in the output
(no phonological deletion) (McCarthy & Prince 1995:82).

This constraint will also penalise any candidate that deletes a segment in the output forms. Another crucial correspondence constraint that will also play a leading role in this discussion is identity constraint. This constraint requires that segments or elements in the input are identical in the output. It prohibits changing the value for features/elements associated with a segment between input and output. The identity constraint proposed by McCarthy and Prince (1995:82) is defined below:

- 75. IDENT-IO:** Output correspondents of an input γ^F segment are also γ^F .

In addition, in section 5.1 the analysis reveals that epenthesis over deletion is preferred to ensure structural well-formedness in Kusaal grammar. Consequently, one constraint that will be useful in this regard is DEP-IO which demands that output segments have correspondence in the input. This constraint militates against insertion, however, its violation is minimal because Kusaal prefers segment insertion to deletion in resolving clusters at certain positions. The constraint as proposed by McCarthy and Prince (1995:82) is defined below:

76. DEP -IO: Every output segment has an input correspondent
(prohibits phonological epenthesis).

As Kusaal syllable structure demands that clusters are simplified, it means that any input form that keeps a cluster or a sequence of consonants in the output attracts a fatal violation mark. This, therefore, makes *COMPLEX a highly-ranked constraint in Kusaal as has already been pointed out. However, MAX-IO, IDENT-IO and DEP-IO militate against *COMPLEX. However, a violation of MAX-IO and IDENT-IO is also crucial and therefore, attracts a fatal violation mark. It therefore, implies that these constraints need to be arranged in a hierarchy and any candidate that resorts to vowel insertion to break up the cluster as a way of satisfying the structural phonotactics of the language becomes the optimal candidate. In this case, DEP-IO is the least constraint the language prefers to violate in order to ensure that an input structure conforms to the grammar of Kusaal. This makes MAX-IO ranks above DEP-IO. Therefore, the ranking of these set of constraints in hierarchical order as presented in (77) will produce an optimal candidate in Kusaal.

77. *COMPLEX >> MAX-IO >> IDENT-IO >> DEP-IO

The interaction of these constraints are illustrated in the following tableaux in (2-4)

Tableau 2: Word-initial cluster: Insert a vowel, do not delete

<u>_</u> plot' /pbt/	*COMPLEX	MAX-IO	IDENT-IO	DEP-IO
a. plot	*!			
b. pɔt		*!		
c. bɔlt			*!	*
d. ɔ pɔlt				*

The tableau presented above demonstrates how the ranking of constraints in Kusaal could produce an optimal candidate as the one that conforms to the grammar of the language. In evaluating the candidates, candidate (a) falls out of the competition because it fatally violates the highly ranked *COMPLEX constraints by keeping a cluster in the output. The next candidate to fall out of the competition is candidate (b). Candidate (b) which deletes an element in the output violates MAX-IO, the next highly ranked constraint and therefore, failing to win the optimal slot. The competition is left for candidate (c) and candidate (d) but unfortunately, candidate (c) misses the chance of becoming the winner because it violates a relatively highly-ranked IDENT-IO constraint by changing a segment in the output which is not identical in the input. This makes candidate (d) which violation of DEP-IO constraint (by inserting a segment) is minimal to emerge as the winning candidate, hence becoming the optimal candidate.

Similarly, in tableau (3), candidate (a) violates *COMPLEX, a constraint which is undominated in the language and therefore, is ruled out from becoming the winning candidate, even though it satisfies the succeeding constraints which could not save it. Similarly, candidate (c) could not also go through because it violates MAX-IO by deleting a segment in the output. This shifts the competition to candidate (b) and (d). However, candidate (d) possesses an element [b] in the output which is not identical to elements in the input and this is a violation of IDENT-IO, a relatively high constraint in Kusaal. Owing to this, it fails to become the optimal candidate. Therefore, candidate (b) is selected as the optimal candidate because it satisfies the set of highly-ranked constraints in Kusaal, that is, *COMPLEX, MAX-IO and IDENT-IO and violates the low ranked one, that is, DEP-IO, which violation is not a serious one.

This implies that in Kusaal the violable constraint as far as vowel epenthesis in word-initial clusters is concerned is DEP-IO.

Tableau 3: Word-medial cluster: Insert a vowel, do not delete

'petro' /petro/	*COMPLEX	MAX-IO	IDENT-IO	DEP-IO
a. patro	*!			
b. p^{h} paturo				*
c. paro		*!		
d. baturu			*!	

The tableau (3) demonstrates how vowel epenthesis at word-medial position can be formalised in OT.

Finally, a resolution of word-final cluster also by epenthesis is demonstrated in tableau (4). Similarly, some word-final clusters are resolved through vowel insertion. This therefore, makes DEP-IO still ranks below *COMPLEX, MAX-IO and IDENT-IO which prohibit consonant clusters, segment deletion and unidentical segments respectively. This implies that any candidate that wishes to be considered for the optimality must minimally violate DEP-IO constraint. On the contrary, if a candidate keeps faith with the input by possessing a cluster or either deletes a consonant or changes a segment in the output, it misses the chance of becoming the optimal candidate.

Tableau 4: Word-final cluster: insert a vowel, do not delete

<i>fi m/</i> /film/	*COMPLEX	MAX-IO	IDENT- IO	DEP-IO
a. film	*!			
b. fim		*!		
c. vilum			*!	
d. <u>fi</u> lm				*

In tableau (4), the first candidate to miss the chance of becoming the optimal candidate is candidate (a). It is ruled out of the race because of its fatal violation of undominated *COMPLEX by keeping a cluster in the output and therefore, also falls out of the competition. Candidate (b) which deletes a segment also misses the chance to win the optimal slot as MAX-IO is the next inviolable constraint in Kusaal. Candidate (c) and (d) are left to vie for optimality. However, candidate (c) violates IDENT-IO by keeping a segment which is not present in the input and since IDENT-IO is a relatively high constraint, candidate (d) which violates a minimal DEP-IO, becomes the winner, hence, the optimal candidate.

5.3.2 Constraints on the quality of the epenthetic vowel in OT in Kusaal

Vowel harmony and default insertion determine the quality of epenthetic vowel in Kusaal. In vowel harmony, labial or back vowels /u/, /ʊ/, are inserted before labial vowels and front or coronal vowels /i/, /ɪ/ are inserted before coronal vowels. This implies that feature spreading from vowels to the epenthetic site is the preferred strategy. In addition, it is observed in the data analysis that all the epenthetic vowels are high vowels, that is, /u, i, ɪ, ʊ/ and this also implies that non-high vowels cannot

occur at the epenthetic site and therefore, a markedness constraint will be needed in ensuring that all epenthetic vowels are high. Therefore, the following markedness constraint is proposed:

78. *[-HIGH]: Epenthetic vowels must be high (no insertion of non-high vowels).

This constraint ensures that mid and low vowels do not surface in the output as epenthetic vowels and any candidate that violates this attracts a fatal mark. Furthermore, the analysis also shows that though the epenthetic vowels are high, there must be agreement between the trigger and the target in terms of ATR, such that if the trigger is specified for +ATR, then the target must have a +ATR value and if the trigger is –ATR, the target must also be a –ATR. Therefore, AGREE family of constraints proposed by Lombardi (1999) will be revoked, where the type of agree constraint identified in this analysis is the one that focuses on ATR.

79. AGREE (Lombardi 1999)

AGREE (ATR): The ATR feature of the epenthetic vowel must agree with the ATR feature of the neighbouring vowel.

Moreover, since vowel harmony deals with feature spreading between similar vowels, a Faithfulness constraint DEP (F) which requires that the features in the output should have correspondence in the input will be revoked. However, *MULTIPLE (F) constraint which is another Faithfulness constraint militates against feature spreading. Uffmann (2006) postulates that the default vowel insertion avoids multiple linkage of features by maintaining bijective associations, though it fatally violates Faithfulness constraints as the inserted features do not match any feature in the input. Therefore, the two constraints are proposed for this analysis following Uffmann (2006).

80. DEP (F): Output features have a correspondent in the input
(no insertion of features).

81. *MULTIPLE (F) : Nodes are dominated by one node exclusively
(no multiple linkage of features).

Uffmann comments that the relative ranking of DEP (F) below * MULTIPLE (F) (hence forth MULT (F)), a default insertion will ensue because satisfaction of the anti-insertion constraint is less important than satisfaction of the constraint against multiple linkage. Highly-ranked DEP (F), however, will result in selection of a candidate which satisfies this constraint, at the expense of violating *MULTIPLE. In short, the ranking of these constraints will determine whether a default insertion is preferred or feature spreading is preferred by the grammar of a language.

With these constraints, the following proposed ranking can account for vowel harmony in Kusaal loanwords; *COMPLEX >> MAX-IO >> *[-HIGH] >> DEP (F) >> AGREE (ATR) >> *MULT (F).

This ranking will produce the optimal candidate as demonstrated in tableau (5). In tableau (5), candidate (a) is ruled out as far as optimality is concerned because of its fatal violation of *COMPLEX by keeping a cluster in the output. Candidate (f) also loses the chance of being selected because its violation of MAX-IO which prohibits deletion. Moreover, Candidate (e) violates *[-HIGH] by keeping a non-high vowel in the epenthetic site fails to win the competition. Candidate (d) which violates a relatively highly-ranked constraint DEP (F) by sharing a coronal feature in the output which is absent in the input also fails to be selected as the optimal candidate. This, therefore, gives candidate (b) and candidate (c) the opportunity to compete for the

optimal slot. However, candidate (c) fails to win the competition because of its violation of a relatively highly-ranked AGREE (ATR) constraint by sharing a –ATR feature in the output as against a +ATR feature in the input. Therefore, candidate (b) automatically becomes a winner, even though it violates *MULT (F) by multiplying the labial vowel feature in the input, its violation is minimal as compared to the violation of AGREE (ATR).

Tableau 5: Word-initial cluster repair: Vowel harmony applies

<u>group</u> /grup/	*COMPLEX	MAX-IO	*[-HIGH]	DEP(F)	AGREE(ATR)	*MULT(F)
a. grup	*!					
b. <u>g</u> ur <u>u</u> p						*
c. g <u>u</u> rup					*!	*
d. g <u>i</u> rup				*!		
e. g <u>o</u> rup			*!			*
f. gup		*!				

Similarly, tableau (6) demonstrates vowel harmony as epenthetic strategy in Kusaal loanwords. Candidate (a) and candidate (e) are ruled out of the race because of their fatal violation of *COMPLEX and *[-HIGH] constraints respectively. Besides, candidate (b) which satisfies *COMPLEX and *[-HIGH] constraints, violates DEP (F) by keeping a labial feature which does not have a correspondent in the input and since DEP (F) is the next highly-ranked constraint after *[-HIGH]. It is, therefore, kicked out of the competition. Candidate (c) and candidate (d) are left to compete for the optimal candidature. Although both candidates violate *MULT(F) by sharing coronal features with the input coronal vowel, AGREE(ATR) is undominated and therefore, any candidate that satisfies it becomes a winner, hence candidate (d)

becomes the winner because candidate (c) violates it. This implies that vowel harmony in terms of –ATR is a preferred epenthetic strategy in this analysis.

Tableau 6: Word-initial cluster repair: Vowel harmony applies

<u>bl</u> ender'	*COMPLEX	MAX-IO	*[-HIGH]	DEP(F)	AGREE(ATR)	*MULT(F)
/blenda/						
a. blenda	*!					
b. b <u>o</u> lenda				*!		
c. b <u>i</u> lenda					*!	*
d. <u>ɪ</u> blenda						*
e. b <u>ɛ</u> lenda			*!			*

5.3.3 Default vowel insertion

It has been established in the analysis that the default vowel insertion in resolving some consonant clusters and consonant sequences in Kusaal loanwords is /ɪ/. In order to account for this strategy, Uffmann's factorial constraint typology for default insertion, that is, MULT(F) >> DEP(F) is adopted, however, since the default vowel insertion is –ATR vowel /ɪ/, the AGREE (ATR) constraint will be modified in addition to the markedness constraints discussed earlier to ensure that the default vowel has –ATR value. Therefore, the constraint ranking proposed for the default vowel insertion is presented in (82):

82. *COMPLEX >> MAX-IO >> *[-HIGH] >> *MULT (F)/AGREE (-ATR) >> DEP (F).

From the proposed constraint ranking, it is seen that the re-ranking of *MULT (F) and AGREE (-ATR) will not affect a selection of an optimal candidate. In tableau (7), candidate (a) violates a highly-ranked *COMPLEX constraint only and therefore fails

to be selected, while candidate (e) satisfies *COMPLEX and MAX-IO, but could not satisfy [*HIGH] constraint which violation is fatal and therefore, ruled out of the competition. Similarly, candidate (b) did its best by competing to the fourth constraint, where it could not satisfy *MULT (F) because it has a multiple feature in the output. Therefore, candidates (c) and (d) are left to compete for optimality. And since AGREE (-ATR) is a next highly-ranked constraint, its violation will cause any candidate that satisfies it to win, hence candidate (c) which has a +ATR high vowel loses the chance to becoming the winner. Therefore, candidate (d) which violation is DEP (F) is minimal as compared with candidate (c) violation of AGREE (-ATR) and therefore, becomes the optimal candidate.

The re-ranking of MULT (F) and AGREE (-ATR) will only cause candidate (b) to compete with candidate (d) instead of candidate (c) for the optimal slot, however, candidate (d) will still win, hence the re-ranking will not change the optimal candidate.

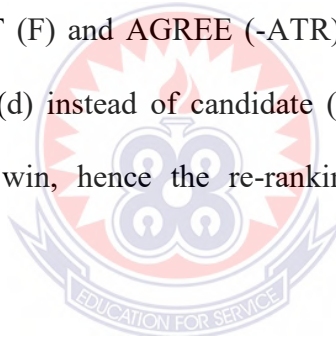


Tableau 7: When vowel harmony fails because /a/ is the harmonising vowel: Insert a default /i/

/k ^w alba/	*COMPLEX	MAX-IO	*[-HIGH]	*MULT(F)	AGREE(-ATR)	DEP-(F)
a. kɔlba	*!					
b. kɔlɔba				*!		
c. kɔliɓa					*!	*
d. kɔliɓa						*
e. kɔlaba			*!		*	*

5.3.4 /s/+C cluster resolution through epenthesis

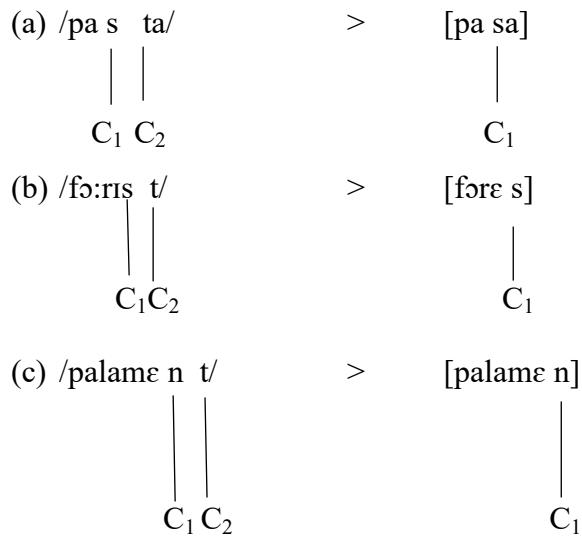
The analysis of the coronal /s/+C cluster in (67) reveals a consistent pattern that whenever the coronal /s/ is the initial consonant of a cluster, vowel harmony is blocked and in that case, the /s/ spreads its coronal feature to the epenthetic site. In order to account for this strategy, *MULTIPLE (F) needs to be defined further as follows: *MULT (LAB) >> *MULT (COR). In this constraint ranking, the grammar of Kusaal prefers the coronal /s/ to spread than the spreading of a vocalic or labial feature and therefore, making *MULT (LAB) relatively highly-ranked above *MULT (COR). In tableau (8), candidate (a) is ruled out of the competition because it has a consonant cluster at the output which is a fatal violation of *COMPLEX and even though it satisfies the rest of the constraints, their satisfaction is not necessary as far as the highly-ranked constraint is violated. The next candidate in line to fall out from the competition is candidate (d). Candidate (d) has a non-high vowel as an epenthetic segment in the output and thus violates a serious constraint; *[-HIGH] and which violation attracts a fatal mark. Now the competition is shifted to candidates (b) and (c) but candidate (b) violates a relatively highly-ranked *MULT (LAB) by harmonising with a labial vowel, while candidate (c) which violates a lowly-ranked *MULT (COR) by showing a coronal spreading from a coronal consonant, becomes the optimal candidate. This shows that consonantal spreading is the preferred epenthetic strategy in this example.

Tableau 8: When vowel harmony fails because of /s/+C cluster: Insert /i/

<u>store</u> /sto:/	*COMPLEX	MAX-IO	*[-HIGH]	DEP(F)	*MULT (LAB)	*MULT (COR)
a. <u>st</u> o	*!					
b. s <u>o</u> t					*!	
c. s <u>i</u> t						*
d. s <u>a</u> t			*!	*		

5.4 Constraints and constraints ranking on cluster simplification through

In the analysis on deletion, it is observed that cluster reduction or simplification through deletion is another adaptation strategy that occurs at two positions, that is, at word-final and at word-medial positions. However, the issue has to do with which consonant should undergo deletion and which consonant should be preserved. As regards word-medial or word-final clusters which comprise fricative /s/ and stop /t/ as presented in (82a & b), the second consonant /t/ undergoes deletion while /s/ is preserved. In accounting for the deletion of /t/ in /st/ cluster, Alber and Plag (2001), de Lacy (2006), Adomako (2008) among others relate this phenomenon to sonority-hierarchy concept where they argue that fricatives are more sonorous than stops and therefore, are maintained at the expense of the least sonorous ones like /t/. Similarly, in nasal-stop clusters, precisely at word-final position, nasals are preserved while stops which are the least in sonority undergo deletion as presented in (83c).

83. Deletion of C_2 in C_1+C_2 at word-medial and word-final position

To account for this repair strategy, the contiguity constraints are adopted. Prince and Smolensky (1993) and McCarthy and Prince (1995) suggest that contiguity be split into two constraints: One evaluating whether elements that are contiguous in the base are also contiguous in the output and a mirror constraint making sure that elements contiguous in the output are also contiguous in the base. These constraints are defined in (84).

84. Contiguity constraints from the Correspondence Theory (McCarthy & Prince 1995; Prince & Smolensky 1993).

- a. I-CONTIG: The portion of input (S1) standing in correspondence forms a contiguous string. (“No Skipping”)
- b. O-CONTIG: The portion of output (S2) standing in correspondence forms a contiguous string. (“No Intrusion”)


McCarthy and Prince further state that the constraint I-CONTIG rules out deletion of elements internal to the input string, while the constraint O-CONTIG rules out internal epenthesis. This implies that the constraints are militating against each other

and their ranking will solve the conflict. In ranking these constraints, *COMPLEX and MAX-IO will be added since the focus is not on epenthesis but on consonant deletion. Therefore, the ranking in (85) is proposed to account for fricative-stop clusters and nasal-stop clusters resolution through deletion in Kusaal.

85. *COMPLEX >> O-CONTIG >> I-CONTIG >> MAX-IO

This constraint ranking will ensure that /st/ clusters at word-medial and word-final positions as well as nasal and stop clusters at word-final positions are repaired by a deletion of the stops (C₂). In a tableau analysis as presented in (9), candidate (a) falls out of the race by its violation of *COMPLEX constraint, a highly-ranked constraint which violation is fatal. The next to lose the chance of winning the optimal slot is candidate (b). It fails to satisfy O-CONTIG constraint which rules against internal epenthesis and since under this analysis, the language prefers deletion to epenthesis, O-CONTIG violation attracts a fatal mark. Now candidate (c) and candidate (d) are left to vie for optimality and although both candidates violate MAX-IO by deleting a segment, I-CONTIG constraint which determines the winner is violated by candidate (c) because the output substring [fɔrɛt] is not a contiguous string to the input string [fɔrɪst] since it has deleted an internal segment /s/. This argument receives support from McCarthy (2008) who states that I-CONTIG is violated when medial segments delete. Therefore, candidate (d) becomes the winner because deleting segments at the edge of the word does not cause any contiguity violations, that is, the output string [fɔrɛs] is a contiguous string in the input.

Tableau 9: Deletion of C₂ at word-final clusters

/fɔrist/ <u>f</u> orest'	*COMPLEX	O-CONTIG	I-CONTIG	MAX-IO
a. fɔrest	*!			
b. fɔresɪt		*!		
c. fɔret			*!	*
d.  fɔres				*

Another interesting pattern of deletion is within a cluster formed by two stops or a sequence of two stops at word-medial or word-final positions. Specifically, dorsal /k/ and coronal /t/ sequence at word-medial position or as a coda cluster is repaired by a deletion of the first consonant /k/. In this case C₁ undergoes deletion in preservation of C₂ as observed differently in (85) where C₂ undergoes deletion in preservation of C₁. In accounting for deletion of dorsal segments, de Lacy (2002) explains that dorsal segments are highly marked for Place of Articulation (PoA) regardless of whether they are in onset, coda, stressed syllable or any other prosodic constituent and further maintains that OT approaches predict a pattern in which the more marked consonant deletes regardless of the position that it would occupy in the cluster. It is informative to state again that sequences of consonants at syllable boundaries are also marked in Kusaal as observed in (85a) and therefore, even though /k/ occurs as coda to the second syllable, PoA hierarchy ensures that /k/ as a more marked segment undergoes deletion in preservation of /t/ which is a less marked segment. This explains why /kt/ has /k/ deleted while /t/ is maintained as presented in (86).

86. Deletion of C₁ in /kt/ at word-medial or word-final positions.

$$\begin{array}{ccc}
 \text{a. } /dair\epsilon k \ ta/ & > & [daar\epsilon t a] \\
 \begin{array}{cc} | & | \\ C_1 & C_2 \end{array} & & \begin{array}{c} | \\ C_2 \end{array} \\
 \\
 \text{b. } /k\text{ɔr}\epsilon k \ t/ & > & [k\text{ɔr}\epsilon t] \\
 \begin{array}{cc} | & | \\ C_1 & C_2 \end{array} & & \begin{array}{c} | \\ C_2 \end{array}
 \end{array}$$

In order to formally account for this strategy in OT, the constraints ranking in (86) will fail because it will select ill-formed */daareka/ or */kɔrɛk/ as optimal candidates, hence there is a need for a constraint that will ban /k/ from being selected. Therefore, following de Lacy (2002), *{dors} markedness constraint from PoA constraints is proposed as defined in (87).

87. Markedness constraint:

*{dors}, *{k}: For every dorsal segment, assign a violation mark
(de Lacy 2002).

With this constraint added, the following ranking is proposed to produce the right candidate for an optimality slot in Kusaal:

88. *COMPLEX >> O-CONTIG >> *{k} >> I-CONTIG/MAX-IO

The ranking of *{k} above I-CONTIG which say “No Skipping” implies that I-CONTIG will no longer determine the optimal candidate as it did in (85), the optimal candidate will now be determined by *{k}. The constraints ranking are presented in a tableau for further analysis.

In the tableau (10), candidate (a) violates a highly-ranked *COMPLEX constraint and therefore, attracts a fatal violation mark. Similarly, since deletion is the preferred repair strategy to epenthesis, any candidate that allows epenthesis is ruled out of the race and candidate (d) falls victim by violating O-CONTIG which prohibits epenthesis. This leaves candidate (b) and candidate (c) to compete for the optimal slot, however, the former candidate wins by violating *{k} once as against the two times that the latter candidate fatally violates. Even though candidate (b) goes further to violate another two lowly-ranked constraints, such violations do not affect its optimality. Besides, it is observed that without the addition of the *{k}, candidate (c) which deletes the second consonant in the cluster would have won the competition as observed in the first case in tableau (9).

Tableau 10: Dorsal /k/ + coronal /t/ cluster: delete /k/

/kɔrɛkt/ 'correct'	*COMPLEX	O-CONTIG	*{k}	I-CONTIG	MAX-IO
a. kɔrɛkt	*!		**		
b. kɔrɛt			*	*	*
c. kɔrɛk			*!*		*
d. kɔrɛkit		*!	**		

Finally, lateral /l/ and voiceless stop /t/ clusters at word-final position are resolved by a deletion of the lateral and this can be accounted formally by applying sonority hierarchy constraint. Prince and Smolensky propose a Universal Margin Hierarchy which ranks individual consonants according to the "...basic assumption that the less sonorous an element is, the more harmonic it is as a margin..." (1993: 141), where "a margin" is a coda or an onset. This constraint takes the form of *M/C which can be

restated as "do not associate some consonant C to a margin." Individual consonants are then ranked along a hierarchy, e.g. *M/n >> *M/s >> *M/t, which reflects a general preference for less sonorous consonants in the margin of a syllable (that is, it is better to make the less sonorous /t/ a margin than the more sonorous /s/, and so on). With regard to the reduction of /mɔlt/ to /mɔt/ such a ranking is successful in Kusaal as presented in tableau (11).

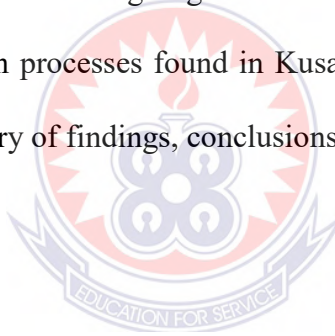
Tableau 11: Lateral /l/ + stop /t/ cluster: Delete /l/

/mɔlt/ <u>alt</u>	*COMPLEX	O-CONTIG	*M/s	*M/t	MAX-IO
a. mɔlt	*!		*		
b. mɔlot		*!		*	
c. mɔl			*!		*
d. mɔt				*	*

In the tableau (11), candidate (a) fatally violates a highly-ranked *COMPLEX and consequently falls out of the competition while candidate (b) which violates O-CONTIG by allowing epenthesis also attracts a fatal violation mark as a result becomes the next candidate to fail in becoming the optimal candidate. The competitive candidates are now candidate (c) and candidate (d), here both candidates receive violations for associating the respective coda consonants with the margin of the syllable and also for deleting segments. However, because *M/s is ranked above *M/t, the violation in (c) is the fatal one. This ranking has the effect of choosing the form with the least sonorous coda consonant as optimal (d), which is correct in this case.

5.5 Conclusion

This chapter has discussed extensively the syllable structure processes in Kusaal loanword adaptation. The major processes discussed in this chapter are consonant cluster resolution through vowel epenthesis and deletion. While vowel epenthesis occurs to repair consonant clusters at word-initial, word-medial and word-final positions, deletion occurs to repair a sequence of two consonants at syllable boundaries and some consonant clusters at word- medial and word-final positions. In addition, the default vowel insertion, the quality of the epenthetic vowels as well as the processes that trigger them are also examined. The chapter has also grounded the analysis of vowel epenthesis and consonant deletion in OT framework, where constraints and constraints ranking together with tableaux are used to formally account for the adaptation processes found in Kusaal loanword adaptation. The next chapter presents a summary of findings, conclusions and recommendations.



CHAPTER SIX

SUMMARY, RECOMMENDATIONS AND CONCLUSION

6.0 Introduction

This chapter is the final or the concluding chapter of the study. It presents the summary of the thesis, summary of major findings, recommendations for future studies and conclusion.

6.1 Summary of thesis

The purpose of the study was to provide a detailed account of a phonological adaptation of Ghanaian English, Akan and Hausa loanwords into Kusaal. The study was organized in six chapters.

Chapter one established the basis and the need for the study where the background of the study, the language and its speakers, the statement of the problem, the purpose of the study, research objectives as well as research questions, the significance and delimitations of the study were discussed.

Chapter two provided a literature review and the theoretical framework. In this chapter, the sounds system of Kusaal, Ghanaian English, Akan and Hausa were reviewed. The chapter also reviewed the concept of loanword, the motivations or factors that account for adaptation of loanword. A phonological study of loanwords in foreign languages, African languages and Mabia languages were reviewed. It also reviewed the syllable structure of Kusaal as well as the theoretical framework of the study.

Chapter three presented and discussed the research methodology. The study adopted a qualitative research approach where data were collected from primary and secondary sources for analysis. The study was conducted in five communities in the Bawku Municipality where twenty-five (25) participants were sampled through purposive sampling technique for data collection. Moreover, data collection methods such as elicitation, documents and native intuition were also discussed.

Chapter four discussed the segmental adaptation within Kusaal loanword adaptation. It examined in detail how Ghanaian English consonants and vowels are adapted into Kusaal, the adaptation of Akan consonants and vowels were also discussed. Additionally, the adaptation of Hausa consonants and vowels into Kusaal as well as the phonological processes such as voicing assimilation, obstruents devoicing, flapping, liquid substitution, debuccalisation and fortition which affect consonantal adaptation were discussed. Moreover, the chapter proceeded to analyse vowel lengthening, vowel shortening, monophthongisation and vowel deletion as some phonological processes that affect vocalic adaptation in Kusaal loanwords.

Chapter five explored the syllable structure processes in Kusaal loanword adaptation. In this chapter, the resolution of consonant clusters as well as consonant sequences at syllable boundaries through epenthesis were analysed. In addition, the resolution of word-final clusters and word-medial consonant sequences by deletion were also examined. The chapter further discussed the quality of the epenthetic vowels and the processes that triggers them. It was pointed out that the quality of the epenthetic vowels is context sensitive, that is, when neighbouring vowels are front vowels or back vowels, the epenthetic vowels must also be front or back vowels respectively among others. To conclude, vowel epenthesis, vowel harmony, default vowel

insertion and /s/ spreading as well as consonant deletion were formally accounted for using OT through constraints ranking.

Chapter six presented a summary of all the chapters, summary of major findings, recommendations and conclusion.

6.2 Summary of major findings

The study sought to achieve three research objectives, that is, how Kusaal adapts source segments, the syllable structure processes ongoing in Kusaal loanword adaptation and how OT can be used to account for such syllable structure processes.

The following are summary of major findings:

6.2.1 Segmental adaptation

As regards segmental adaptation, the study reveals that non-native segments are adapted by a replacement with close native segments, for instance, English /ʃ/, /tʃ/, /dʒ/, /ʒ/ are consistently adapted as /s/, /k/, /g/, /z/ respectively into Kusaal while other source segments that have counterparts in Kusaal are adapted faithfully. English vowels do not always map onto their counterparts in Kusaal but map also onto close native vowels. Furthermore, Akan /tɛ/ and /dzɔ/ are adapted into Kusaal as /k/ and /g/ respectively while its vowels are mapped onto their counterparts in Kusaal except /æ/ which adapted as /a/ at word-initial position and /o/ at word-medial position. Also, the study finds that Hausa consonantal phonemes such as /ʃ/, /j/, /c/, /g^w/, /k^w/ are adapted as /s/, /g/, /k/, /g/, /k/ respectively for the purpose of filling consonantal gaps in Kusaal while the vowels are mostly adapted faithfully into Kusaal. Moreover, the study saw that during consonantal adaptation, certain phonological processes trigger consonants to change, that is, voicing assimilation causes /k/ and /p/ to change to /g/ and /b/ respectively as a result of re-syllabification of a coda cluster while obstruent

devoicing occurs as a result of perceptual reasons among others. Flapping, which causes /d/ → /r/ in an intervocalic environment and liquid substitution which triggers /l/ to change to /r/ are found to be engineered by free variation, while debuccalisation of /k/ → /ʔ/ at syllable boundary is to balance articulatory ease. Additionally, the study reports that fortition as a phonological process triggers /v/, /w/, /r/ from source words to change to /b/, /b, g/, /d/ respectively in Kusaal.

With regard to vocalic adaptation, the study brings to light that diphthongs are adapted by a deletion of high vowels and lengthening the remaining non-high vowels or the diphthongs are coalesced into mid or low vowels. This is as a result of sonority hierarchy where the language prefers the least sonorous [high vowels] to be deleted while the high sonorous ones be retained. Moreover, vowel lengthening and vowel deletion occurs as a result of perception and economy reasons. It is also realised that Kusaal, a CVC language does not simplify codas in its loanword adaptation.

6.2.2 Syllable structure processes in Kusaal loanword adaptation

With regard to syllable structure processes, the findings show that the syllable structure constraint of Kusaal does not permit clusters except homorganic ones at syllable boundaries such as /mb, mp, nd, ŋk, ŋg/ and that vowel epenthesis and consonantal deletion are the major techniques that the language employs to configure or to simplify marked clusters and sequences of consonants from source languages. While syllable onset clusters and some coda clusters are repaired by vowel epenthesis, a sequence of two consonants which is made up of fricative /s/ and any stop at word-medial positions are resolved by a deletion of the stop. However, where stops such as /k/, /p/ precede the fricative /s/ in a cluster, vowel insertion takes place. In the adaptation of Hausa words into Kusaal, word-medial consonant sequences

comprising liquids and other consonants are resolved by epenthesis while in the adaptation of English words, consonant sequences at syllable boundaries and coda clusters involving nasals and stops are resolved by deleting the stops. Deletion in Kusaal loanword adaptation is motivated by Place of Articulation hierarchy and sonority hierarchy where the former targets more marked elements and the latter targets least or most sonorous elements.

Moreover, the study reports that all epenthetic vowels are high vowels and their contexts are determined by frontness or backness and ATR feature value, that is, if the harmonising vowel is +ATR, the epenthetic vowel should also have +ATR feature and if the harmonising vowel is –ATR the epenthetic vowel should –ATR feature. In addition, the low vowel /a/ do not trigger vowel harmony and thus whenever it is the vowel close to the epenthetic site, /ɪ/ is inserted. Similarly, whenever the fricative /s/ + any consonant occurs as a cluster or sequence that require insertion, vowel harmony is blocked and /ɪ/ becomes the epenthetic vowel. Finally, it is worth pointing out that the epenthetic vowels harmonise with the vowel to right of the epenthetic site, that is to say that spreading is regressive, unless there is no vowel at the right and in the case, they will harmonise with the vowel to the left of the epenthetic site. This is opposite in Akan where it spreads from left to right (progressive manner) during epenthesis into word-final positions (Adomako 2008:108).

6.2.3 OT in syllable structure processes in Kusaal loanword adaption

On the formalisation of the syllable structure processes using OT, clusters at word-initial and word-final positions as well as consonant sequences at syllable boundaries that prefer insertion to deletion are accounted for by ranking markedness constraint *COMPLEX and faithfulness constraint MAX-IO over DEP-IO. This ranking ensures

that the optimal candidate systematically avoids a fatal violation of *COMPLEX and MAX-IO while minimally violating DEP-IO. In addition, vowel harmony as a general epenthetic strategy in Kusaal loanwords is formalised in OT where markedness constraints [*COMPLEX, *HIGH] and faithfulness constraints [MAX-IO, DEP (F), AGREE (ATR)] are ranked above *MULTIPLE (F) in order to select the optimal candidate. Moreover, the study reveals that the default vowel of /ɪ/ could be accounted for using the constraints ranking *COMPLEX >> MAX-IO >> *[-HIGH] >> *MULT (F)/AGREE (-ATR) >> DEP (F), while constraint ranking *COMPLEX >> MAX-IO >> [*HIGH] >> DEP (F) >> *MULT (LAB) >> MULT (COR) produces an optimal candidate in /s/ + C cluster or sequence resolution through epenthesis. With regard to consonant deletion where the C₂ is the target, the markedness constraint *COMPLEX and faithfulness constraints [O-CONTIG, I-CONTIG] are ranked above MAX-IO to ensure that the optimal candidate avoids a fatal violation of *COMPLEX and O-CONTIG and I-CONTIG, while PoA constraints which ensure that marked /k/ is deleted is formalised in *COMPLEX >> O-CONTIG >> *{k} >> I-CONTIG/MAX-IO ranking. Finally, the study confirms that sonority hierarchy constraint is responsible for the deletion of most sonorous element such as liquids in liquid-stop cluster at word-final position (Prince & Smolensky 1993, McCarthy & Prince 1995, de Lacy 2002; 2006) and can be formalised in *COMPLEX >> O-CONTIG >> *M/s >> *M/t >> MAX-IO constraints ranking.

6.3 Recommendations for future studies

The study focused on only the segmental and syllable structure processes of Ghanaian English, Akan and Hausa loanwords in Kusaal couched within OT which is purely an aspect of phonology, while leaving out the tonal aspect. Therefore, it is recommended

that future researchers examine the various aspects of loanword tonology, particularly tonal properties that are demonstrated by loanwords.

Again, the scope of this study did not cover the sociolinguistic aspect of loanwords, that is, how age, occupation, sex, cultural setting among others influence the adaptation process in Kusaal loanwords as well as the factors that account for loanword adaptation in Kusaal and therefore merits a study in future.

In addition, it is recommended that future researchers may conduct a study on a morphological and a syntactical analysis underpinning Kusaal loanword adaptation as this study was limited to only a phonological adaptation. A study of a morphological and syntactical adaptation of Kusaal loanword will contribute greatly to the understanding of the morphology and the syntax of Kusaal thereby adding up to the knowledge of the study of loanwords.

Furthermore, this study adopted a qualitative research approach which is purely descriptive in nature and needed only reasonable data for analysis, therefore, future scholars can adopt a quantitative research approach to investigate the extent to which words are borrowed into Kusaal by engaging in a comparative analysis of the two dialects, that is, Agole and Toende and also find out the lexical items that are most borrowed and their frequent of usage.

Finally, this study focused on loanwords from two foreign languages, that is, English – a West Germanic language and Hausa - a West-Chadic language and one Ghanaian language, that is, Akan - a Kwa language and did not include loanwords from Mabia (Gur) languages, therefore, a study can be extended to other Mabia languages for the

purpose of a stimulating cross-linguistic studies on lexical borrowings in the Mabia languages.

6.4 Conclusion

Generally, the study concludes that the adaptation strategies ensure that borrowed lexical items conform to the phonology of Kusaal. This is in direct contrast to Iribemwangi and Karūrū (2012) who assert that the adaptation strategies ensure that the borrowed words stay as similar as possible to the source forms. It is also concluded that both phonetic and phonological factors play significant roles during the adaptation process, therefore, a loanword analysis from one approach may not give a perfect picture of the pattern of loanword adaptation.



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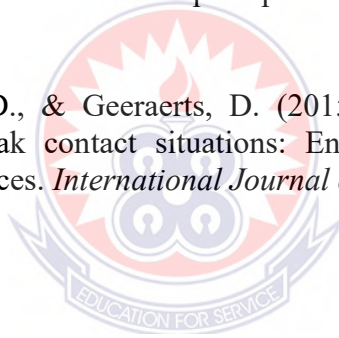
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APPENDIX 1: English loanwords in Kusaal

S/N	ENGLISH	KUSAAL	GLOSS
1.	air condition	ɛɛkɔndisin	
2.	correct	kɔrɛt	
3.	engine	ingin	
4.	acre	eka	
5.	amp	am	
6.	iron	ayɔŋ	
7.	Ice water	asiwata	
8.	against	gɛɛns	
9.	office	ɔfis	
10.	aeroplane	alopir	
11.	advance	alivans	
12.	address	adires	
13.	insurance	insɔres	
14.	minister	minisa	
15.	minute	mit	
16.	machine	masin	
17.	maison	mɛɛsin	
18.	mango	mɔŋɔ	
19.	motor	moto	
20.	matches	mankeɛns	
21.	pastor	pasa	
22.	master	masa	
23.	operation	pirensin	
24.	director	dirɛta	
25.	pistol	piisil	
26.	christopher	kirisofa	
27.	first	fɛɛs	
28.	last	laas	
29.	tape measure	tep mɛza	
30.	test	tɛɛs	
31.	teacher	tika	
32.	torch light	tɔkilai	
33.	forest	fores	
34.	film	filim	
35.	post	poos	
36.	pear	paya	
37.	desmond	adesimon	
38.	raymond	areemon	
39.	parliament	palamɛn	
40.	bomb	bɔm	
41.	number	namma	
42.	thousand	taasin	
43.	ball	bɔɔl	
44.	bible	baabɔl	
45.	balloon	baluu	

46.	battery	batir	
47.	bench	bɛnk	
48.	box	bɔɔs	
49.	books	bugus	
50.	bucket	bv'ata	
51.	bridge	birig	
52.	brake	birik	
53.	belt	bɛlet	
54.	blade	bilet	
55.	bear	biya	
56.	chewing gum	kigɔŋ	
57.	coffee	kafi	
58.	carpenter	kapinta	
59.	cigarette	sigaar	
60.	connection	kɔnɛsin	
61.	colour	kala	
62.	cocoa	kooko	
63.	coat	koot	
64.	coal tar	kɔtaal	
65.	court	kɔɔtɔ	
66.	computer	kɔmputa	
67.	chest	kɛs	
68.	cassette	kaset	
69.	cement	sameti	
70.	silver	siliba	
71.	captain	kabitin	
72.	tube	tub	
73.	valve	vɔliba	
74.	school	sakur	
75.	socks	sɔɔs	
76.	spokes	sipugus	
77.	spanner	sapaana	
78.	station	siteesin	
79.	steer	sitiya	
80.	style	sitai	
81.	star	sitaa	
82.	store	sitɔɔ	
83.	sugar	sikir	
84.	shovel	sɔɔbul	
85.	soldier	sɔgia	
86.	cup	kɔp	
87.	cushion	kuusin	
88.	chairman	kɛɛman	
89.	charger	kɛɛga	
90.	chain	kɛɛn	
91.	chisel	kisil	
92.	chest	kɛs	
93.	chip	kip	

94.	chips	kibis	
95.	clutch	kułok	
96.	cream	kirim	
97.	dodge	doog	
98.	doctor	du'ata	
99.	watchman	wasiman	
100.	watch	wak	
101.	hammer	hamma	
102.	generator	genereta	
103.	kiosk	kiyos	
104.	fridge	firig	
105.	flash	filas	
106.	park	pak	
107.	party	paati	
108.	plate	pilet	
109.	plan	pilan	
110.	photo	foto	
111.	powder	poora	
112.	poison	poosin	
113.	politics	politis	
114.	pound	pon	
115.	parliament	palamen	
116.	petrol	paturu	
117.	pick axe	pingaas	
118.	pistol	piisil	
119.	pen	pen	
120.	tea	tii	
121.	test	tees	
122.	ticket	tigiti	
123.	tire	taya	
124.	time	taam	
125.	tighten	taatim	
126.	five	fiiba	
127.	driver	duriba	
128.	gutter	gota	
129.	spar	sipaa	
130.	speaker	sipika	
131.	malt	mot	
132.	storm (an energy drink)	sitoom	
133.	handcuff	ankooaba	
134.	handkerchief	ankitiŋ	
135.	Table	teebul	
136.	tailor	teela	
137.	wire	waya	
138.	light	laat	
139.	vote	voot	
140.	old man	oliman	
141.	tractor	tirata	

142.	bulb	bɔb/bɔlɔb	
143.	plug	pɔlɔg	
144.	plot	pɔlɔt	
145.	screw driver	sakudɔriba	
146.	phone	fɔn	
147.	blender	bilɛnda	
148.	service	sɛvis	
149.	seven	sɛbin	
150.	taxi	taazi	
151.	credit	kirɛdit	
152.	concrete	kɔnkirɛt	
153.	paint	pɛnti	
154.	lorry	lɔr	
155.	lawyer	lɔya	
156.	lucky	lɔkin	
157.	Size	saas	
158.	Gallon	galam	
159.	head pan	hɛlipan	
160.	Nylon	naalon	



APPENDIX 2: Hausa loanwords in Kusaal

S/N	HAUSA	KUSAAL	GLOSS
1.	fura	fura	balls of cooked millet in cultured milk
2.	fitila	fitir	lamp-kerosene lamp
3.	gafara	gafara	pardon for forgiveness
4.	garwa	gariwaa	barrel
5.	girma	girima	respect, prestige, honourable
6.	goge	googi	a large one-string bowed musical instrument
7.	goro	gɔɔr	kola nut
8.	hankici	ankita	handkerchief
9.	aljifu	gefa	pocket
10.	duniya	dunia	world, earth
11.	jumma'a	arezum	Friday
12.	kanwa	kanɔɔ	potash, saltpeter
13.	labari	labaar	news, information
14.	lafiya	laafi	health, good condition
15.	lahadi	alasad	Sunday
16.	laraba	alaarib	Wednesday
17.	leemo	leemu	orange, lemon
18.	lissafi	lisaafi	counting, reckoning a bill, accounting
19.	mala'ika	maliak	angel
20.	mamaki	mamaki	astonishment, surprise
21.	masallenci	masaliki	a mosque
22.	nasara	nasaara	a Christian, white man
23.	aniya	ania	determination, zeal
24.	siminti	sameti	cement
25.	sooso	sooso	sponge
26.	taba	taba	tobacco
27.	talotalo	tolotolo	turkey
28.	takarda	takata	paper, letter
29.	turare	tudaare	perform, incense
30.	wa'azi	waazu	sermon, preaching
31.	wanzam	wanzam	barber
32.	asibiti	sibiti	hospital/clinic
33.	arziki	arezak	wealth, prosperity
34.	amarya	amariya	bride, the latest junior wife
35.	albasa	alibasa	onion
36.	mayafi	mayaaafi	a large cloth for covering of head or body
37.	alhaji	alaazi	a person who returned from Hajj
38.	alhamis	alamisi	Thursday
39.	alewa	alewa	sweets
40.	barka	barika	blessing
41.	agogo	gogo	watch
42.	basukur	baasakut	bicycle
43.	bayangida	banɔɔgida	toilet
44.	buta	buta	a water jug, kettle
45.	saada	saara	expensive

46.	shawara	saawara	advice, counsel
47.	asuba	asuba	early dawn
48.	batir	batir	battery
49.	albarka	albareka	blessings, prosperity, grace gift from God
50.	teku	atevk	ocean
51.	alhamis	alamis	Thursday
52.	tilas	tilas	must
53.	baaba	ababa	dad
54.	bawa	abawa	slave
55.	azurfa	anzurifa	silver
56.	dankali	dankal	sweet potato
57.	koko	kooko	a drink made from the flour of gero beaten up in a trnmi and drunk hot ,
58.	kwalba	koliba	bottle
59.	lada	laara	reward, commission
60.	shiwaka	siwaka	a bitter herb from which a medicine is made , from
61.	yaadi	yaari	a piece of cloth
62.	malik	amaaliki	a male given name
63.	shaafi	saafi	a key



APPENDIX 3: Akan loanwords in Kusaal

S/N	AKAN	KUSAAL	GLOSS
1.	krakye	karaki	an educated person (a man)
2.	bronya	budinya	Christmas
3.	bɔɔfire	bɔɔfir	pawpaw
4.	krataa	karata	paper, letter
5.	bankye	banki	cassava
6.	mpopaho	papafɔ	towel
7.	kyense	kemesi	iron zinc
8.	akekaduro	kakaduro	ginger
9.	adaka	daka	box
10.	kuruwa	kuruba	a bowl
11.	amariwa	amariba	koala
12.	nkrante	karantɛ	a machete
13.	kanea	kanea	a lantern
14.	mmere	amir	mushroom
15.	mpopaho	papafɔ	towel
16.	sapɔ	sapɔ	sponge
17.	pieto	peto	pant
18.	aborɔbɛ	bɔrɔbɛ	pineapple
19.	borɔdee	bɔɔdia	plantain
20.	pɔn	pɔŋ	to close an event/close from an event
21.	abɔmu	bɔmɔ	stew
22.	takoro	takoro	window
23.	ntaabo	taabɔ	slabs
24.	abɛ	abɛ	palm nut
25.	bankan	banʒkan	cocoyam
26.	bɔtɔ	bɔtɔ	a sack
27.	panoo	paano	bread
28.	kwadu	kɔdu	banana
29.	ankaa	ankaa	orange
30.	adwengo	agiŋgɔ	palm kernel oil
31.	amani	amani	smoked-fish
32.	gyeene	geen	onion
33.	dɔkono	dɛkunu	kenkey
34.	ampe	ampe	a game played by girls
35.	kojo	akojo	a Monday born (male)
36.	adwoa	agiwa	a Monday born (female)