

**VOWEL EPENTHESIS AND CONSONANT DELETION IN
LOANWORDS: A STUDY OF AKAN**

By

Kwasi Adomako



Master`s Thesis in Theoretical Linguistics

LIN - 3990

Department of Language and Linguistics
Faculty of Humanities
University of Tromsø
Spring 2008

Supervised by: Dr. Martin Krämer

TABLE OF CONTENTS

Table of contents.....	ii - iv
Acknowledgement.....	v
Chapter 1	
1.1. Introduction.....	1-2
1.2. General discussion on loanword phonology.....	2-4
1.3. Speaker groups: Monolinguals compared with bilinguals....	4-5
Chapter 2	
2.1 Background information on Akan.....	6
2.2 Segment inventory.....	6-10
2.3 Consonant- vowel combination.....	10-12
2.4 Vowel harmony.....	12
2.4.1 Stem harmony.....	13
2.4.2 Prefix harmony	13
2.4.3 Suffix harmony.....	14
2.4.4 Rounding harmony.....	14-15
2.5 Syllable structure.....	15-19
2.6 The default vowel	19-21
Chapter 3	
Database and methodology.....	22-24
Chapter 4	
4.0 The general repair strategies in Akan loanwords.....	25
4.1 Vowel epenthesis.....	26
4.1.1 Epenthesis into initial consonant clusters.....	26-27
4.1.2 Epenthesis into medial consonant clusters	27
4.1.3 Epenthesis into final obstruent position.....	28
4.1.4 Epenthesis into word-final clusters.....	28-30
4.1.5 Default vowel insertion.....	30
4.1.6 The special case of palatals.....	30-32
4.2 Deletion	32-34
4.3 Vowel lengthening.....	34
4.3.1 Vowel lengthening after consonant deletion.....	34
4.3.2 No vowel lengthening after consonant deletion.....	34-35

4.4 Non-native segment adaptation	35-36
4.5 Perceptual adaptation?.....	36-37
4.6 Interim summary.....	37
Chapter 5	
5.0 Formalization of major repair strategies in Akan loanword adaptation.....	38
5.1 Segmental representations of place features.....	38-56
5.2 Adaptation strategies in OT.....	56
5.2.1 Constraints on the quality of the epenthetic vowels.....	56-61
5.2.2 OT on vowel epenthesis.....	62-64
5.2.3 Skipping intervening consonants.....	64-68
5.2.4 Default vowel insertion.....	68-70
5.3 Vowel epenthesis into consonant clusters.....	70-71
5.3.1 Vowel epenthesis into word-initial clusters.....	70-73
5.3.2 Vowel epenthesis into word-medial clusters.....	73-74
5.4 Consonant cluster reduction and vowel epenthesis in OT.....	75-82
5.5 Open issues.....	82-84
Chapter 6	
6.1 Akan compared with Sesotho and Shona.....	85-86
6.1.1 Akan compared with Sesotho	86-91
6.1.2 Akan compared with Shona.....	91-95
6.2 The quality of the epenthetic vowels into clusters.....	95-96
6.2.1 Akan compared with Shona.....	96
6.2.2 Akan compared with Sesotho.....	96-97
6.3 The quality of the epenthetic vowels in OT.....	97-106
6.4 Open issues, etc.	
Chapter 7	
General discussions and conclusions.....	107-109
References.....	110-113
Appendices:	
1. Akan loanword corpus (dataset).....	114-119
2. Consonant- vowel combination in Akan.....	120-122

Acknowledgement

First and foremost, I wish to express my deep appreciate to my supervisor, Dr. Martin Krämer for his patience, determination, and guidance that have seen me through this project. His comments and clarifications have been of immense help to me in writing this thesis. I also thank Dr. Christian Uffmann, Dr. Bruce Morén and the members of the CASTL Phonology reading group 2007/8 for their very helpful comments and suggestions towards this project.

Second, I thank all who contributed in the data collection both in Ghana and in Norway. Special mentioning goes to my grannies, Nana Afia Nyarko, Nana Akua Afriyie, and Nana Ama Serwah, who doubled as part of my informants. Also I would like to acknowledge the contribution of my colleague Ghanaian students at the University of Tromsø who in diverse ways helped in my data collection.

Finally, to my entire family and friends whose support, encouragement, and inspiration have seen my through all my education up to this level.

CHAPTER 1

1.1 Introduction

The study of loanword phonology holds a key to our understanding of many phonological processes and theories. This field has over the years received some attention in terms of research and scholarship. Akan is one of the major African (Niger-Congo) languages that have enjoyed some appreciable amount of study especially in the areas on vowel harmony and reduplication. However, there is another area in Akan which has the potential to contribute immensely to the current research on loanword phonology, but has not yet been research into. Akan is observed to have extensive borrowings from many European languages, particularly English integrated into its vocabulary to the extent that hardly does a sentence or a phrase end without one noticing a loaned word being used.

It is the aim of the current study to shed light on the loanword adaptation phenomenon in Akan, a majority language spoken in the West African country of Ghana. Akan has a strict syllable structure with preference for the basic open syllable structure (CV) or at its tolerating best, CrV shape (Dolphyne, 1988). This presupposes that foreign words with sequences of obstruents as in /st/, /sp/, /pl/, /sk/, etc. and word-final obstruents, being adapted into the language have to go through some repair processes to conform to this structural well-formedness requirement in the native grammar. The repair strategies that apply to these illicit- foreign words include vowel epenthesis, consonant deletion, etc. Among these strategies, vowel epenthesis is the dominant strategy that usually applies in the process. In this thesis, I discuss two of such repair strategies such as vowel epenthesis and consonant deletion in Akan.

I begin the discussion on this subject by presenting the loanword corpus in Akan, showing the various major phonological processes that adapted forms ('nativized' source/foreign words) go through. I will make generalizations thereof based upon which I will present formalizations of such generalizations to be made. Regarding the issues of the quality of the epenthetic vowel in Akan loanword adaptation, it will be observed that the high vowels (both front and back) are the preferred epenthetic vowels based on the data to be discussed in this thesis. However, between the two high vowels, it will be observed that the labial/round vowel is favoured in many environments as the epenthetic vowel contrary to the high front

vowel which is universally attested as the epenthetic vowel even in many cases in loanword adaptation. These contexts or environments include the epenthesis strategies such as the consonant to vowel feature spreading and vowel to vowel

feature spreading, even across some intervening coronal consonants (except palatals), though consonantal assimilation is observed to be the preferred epenthesis strategy in Akan loanword adaptation. A reverse of the vowel harmony process by coronal vowels across an intervening labial consonant, that is, coronal vowels spreading across labial consonant is almost impossible, from the data. The analysis of the epenthesis strategies observed in the Akan loanword adaptation processes will be compared with what has already been done in loanword adaptations in other languages such as Shona (Uffmann, 2001, 2004, 2006), and Sesotho (Rose & Demuth, 2006) in chapter 6. It will be concluded that the three languages exhibit more similar patterning than they differ and that the major differences that exist between them are accounted for in the language-particular phonological system differences. In OT terms, the language-specific ranking of the same set of constraints, and in some cases, adding extra constraints accounts for the major differences in strategies employed by the three languages that will be compared in this thesis.

Organization of the thesis:

Chapter 1 will give a general introduction to the topic of this thesis with brief discussion on loanword phonology in general.

Chapter 2 will give brief background information about the Akan language and its phonology with specific emphasis on its sound inventory and syllable structure. In this chapter also, I will discuss the different speaker groups of Akan loanwords including monolinguals and bilinguals who constituted my informants for the corpus being analyzed in this thesis. Their main difference lies in the way they adapt source words into their lexicon.

Chapter 3 will summarize the database/corpus and the methodology I used in performing the study with discussion on issues such as the background of the informants used, the mode of data collection used, and how the loanword corpus was analyzed. The results of the study done will be analyzed in this chapter.

Chapter 4 will present the Akan loanword data and generalizations to be made about the data presented based on the main strategies used in repairing illegalities in the foreign/source words. The outcome of the generalizations to be made will be applied to the formalizations of feature representations in chapter 5.

Chapter 5 is divided into two main parts. The first part discusses the formalization of the various repair strategies observed in Akan loanword corpus in chapter 4 through feature representations. For the second part, I will present the optimality-theoretic (OT) analysis of the general repair strategies found in Akan loanword adaptation which will later on in chapter 6, be compared with similar analyses already done in two Bantu languages such as Shona and Sesotho to determine the universality of the patternings in the loanword phonology.

In Chapter 6, I present the general similarities and differences observed among three languages such as Akan, Shona, and Sesotho in both their native and loanword phonologies/grammars. I also discuss the issue of directionality effects found in Akan loanword adaptation where it will be observed that Akan exhibits two directions in its spreading of features to the epenthetic site. It displays right-to-left direction as its main directionality effect to repair initial and medial cluster illegalities, while it shows left-to-right directionality in spreading place feature to repair illegal codas. The latter directionality effect is also predictably attested in Shona and Sesotho in which spreading to all positions is basically unidirectional. I also do major comparisons of strategies in adapting from donor languages into their phonologies between Akan and Shona on the one hand, and Akan and Sesotho on the other hand. In addition to this, I will attempt an OT account for the vowel insertion into clusters (word-initial) observed in the three languages.

Chapter 7 will summarize the findings to be made in the study and the general conclusions to the present work.

1.2 General discussion on loanword phonology

In this chapter, I give a very brief discussion on loanword phonology in general with focus on a quick discussion of what researchers are arguing should be the approach or model in analyzing loanword adaptation.

The study of loanword phonology has gained some appreciable prominence in the field of phonology in general because of the crucial role it plays in our comprehension of many phonology processes and their interaction in particular languages and cross-linguistically, which leads to making phonological theorization. This assertion is supported by all loanword specialists with data from language-particular and cross-linguistic evidence.

However, there is sharp division among experts in this field due to differences in opinion as to which approach/model is best in analyzing the loanword adaptation phenomenon. To date, three main different opinions have emerged as to which approach comprehensively accounts for the loanword adaptation phenomenon. One of the extreme sides simply postulates that from language-particular and cross-linguistic evidence, loanword adaptation processes are purely phonological/representational and that they have little or nothing to do with phonetics/perception. Notable researchers with this opinion are Jacobs and Gussenhoven (2000), Uffmann (2001, 2004, 2006), Paradis and La Charité (1997, 2005), etc. At the diametrically opposite side are views by such notable experts as Silverman (1992), Dupoux and Peperkamp (2003), Vendelin and Peperkamp (2006), Davidson (2007), Kenstowicz (2005), etc. that loanword adaptation is mostly or wholly influenced by phonetic/perceptual factors and as a result, it has very little or nothing to do with phonology/representation. The third opinion, which juxtaposes between the former and the latter views postulates that both phonology/representation and phonetics/perception play equally important roles in explaining loanword adaptation. Scholars such as Kenstowicz (2003), Heffernan (2005), Rose and Demuth (2006), Yip (2006), Kenstowicz and Suchato (2006), among others are prominent with this intermediate opinion on loanword adaptation model.

In this thesis, I favour the third approach, which seeks to draw explanations from both representational and perceptual means of analyzing loanword adaptation and in this thesis, it will be realized, with the evidence from the loanword corpus from Akan, that neither pure phonology only nor pure phonetics only can adequately and comprehensively account for the all processes that loanwords undergo in their adaptation in a particular language or across languages. Rather, there is the need to draw explanations from both fields. The question that seems to separate those two extremist sides such as those who argue that either phonology or phonetics has a 'minimal' role to play is, how much of phonology is considered enough to

play any ‘meaningful’ role in our understanding of the entire adaptation process or vice versa?

1.3 Speaker groups: monolinguals compared with bilinguals

The Akan loanword adaptation behaves in symmetrical way as the three different strata of Japanese such as Yamato, Sino-Japanese, and Foreign sources (Itô and Mester, 2006) where the higher you go up the strata, the less strict the grammar becomes to the native phonotactic well-formedness. However, unlike Japanese where the level of faithfulness to the native grammar’s structural well-formedness grows thinner with new generations, it is the level of education and lingualism that determines the level of faithfulness of one’s loanword form to the structural constraints of the native grammar. In the Akan loanword adaptation situation, people with very little or no formal education (mostly older people) form the monolingual group, while those with formal education (those who have gone through the basic form education up to the tertiary level), on the other hand, constitute the bilingual group. The monolinguals strictly subject the foreign sources/inputs to strict native syllable structure well-formedness, contrary to the way the bilingual speakers whose major focus is usually on avoiding illicit word-final obstruents adapt foreign words. For instance, the following are examples of some borrowed words in Akan included in the list of words collected in the fieldwork for the analysis in this thesis and how the two groups adapt them. The use of the sign ‘-’ in (iv) indicates that the word is not attested in the group.

	Monolinguals	Bilinguals	Gloss
i.	sutɔpu	stɔpu	‘stop’
ii.	kɔmpiliti	kɔmpliti	‘complete’
iii.	kɔlɔku	klɔku	‘clock’
iv.	-	askɪ	‘ask’

From the data above, the conclusion one can make is that, while the bilingual form is relatively more faithful to the source word, but less faithful to the native grammar because it maintains clusters, the monolingual form, on the other hand, is strictly faithful to the native

syllable structure by repairing all illicit clusters and word-final obstruents at the expense of being largely unfaithful to the source/input.

CHAPTER 2

In this chapter, I give general background information about Akan with respect to its segment inventory, consonant-vowel interaction, vowel harmony, and syllable structures. The main issues to be discussed in this chapter are (a) which phonotactics are permissive in the native grammar, which also help explain why some vowels are not allowed to spread across certain consonants in loanword adaptation leading to the opacity of some consonants in chapter 4, (b) what the size of the syllable of the native grammar is, which also, to a large extent, determines how source/foreign words are adapted into the native lexicon.

The chapter is organized into the following sections. Section 2.1 discusses the background of Akan in terms of its genetic affiliation and the number of its speakers. Section 2.2 shows the segment inventory that has been identified in Akan. In section 2.3 on the other hand, I present the possible consonant-vowel combinations in the native lexicon, while in section 2.4, I present vowel harmony and other related harmonies observed in the language. What constitute the permissive syllable structures in Akan are finally discussed in section 2.5.

2.1 Background of the Akan language

Akan is a Niger-Congo language of the Kwa language family spoken mainly in Ghana and some parts of Côte d'Ivoire both in West Africa. The three main dialects of the Akan language are Asante, Akuapem, and Fante. The Asante and the Akuapem dialects together form the Twi group. According to O'Keefe (2003), the vast majority of the 7 million (L1) speakers of Akan also speak English, which is the official language of Ghana and also a medium of instruction in education, as their second language (L2). Together with its non-L1 speakers, it is estimated that far more than half of Ghana's over 20 million population either speak or understand the Akan language. This section has briefly introduced the background of Akan. In the next section, I present the segment inventory identified in the Akan language.

2.2 Segment inventory of Akan

In this section, I will discuss Akan consonant sounds inventory as debated by scholars. In my proposal, I will try and come up with a 'unified' chart for some of the consonants that will embrace most of the different proposals by other scholars.

Akan consonant sounds have been a subject of debate among scholars for over half a century now and it seems there is still no consensus as to what should constitute the ‘true’ Akan consonants. Schachter and Fromkin (1968), claim that there are only 8 ‘true’ Akan phonemic consonants, that is, [-VOCALIC] namely; /p,b,d,f,s,t,k,g/ and the rest, they classify as vocalic consonants. Therefore, they count consonants such as the nasal, liquids, lateral, etc as phonetic sounds and variant forms of the ‘true’ consonants. They make no mention of affricates in their analysis as members of the Akan consonant inventory. However, their argument has been disclaimed by Abakah (2005), who argues from the perspective of feature geometry and posits that /r/ is C-Place [CORONAL] and therefore, it is [+Consonantal, -Vocalic]. And on the status of the lateral sound, he continues that, in Akan, [l] is a variant form of /r/.

On their part, Dolphyne (1988) and Abakah (1993) have added 8 more segments and identified the following as the consonant inventory of Akan; /j, w, p, b, f, d, t, s, m, n, k, k^w, h, h^w, g, g^w/. However, these 16 consonants have not been accepted by all as the standard consonant sounds of the language. Other scholars differ as to the number and which segments constitute the ‘true’ Akan consonants and they have come up with their different proposal on the consonant inventory which space will not permit to discuss in some detail. In my opinion, I think the argument on the classification of the ‘kind’ consonants in Akan could be based on the fact that some scholars based their argument on the underlying forms, but not on the surface representations of the segments. In their proposal, for instance, labialized palatal nasal /ɲ^w/ will be discounted by them as a ‘true’ consonant in Akan. Other scholars, on the other hand, may base their argument on allophony. For instance, surface representation of an underlying segment like the velar /k/ which surfaces as /tɕ/ before high front vowel should be classified as a ‘true’ phoneme. In (1) below, I propose a full chart of a ‘unified’ consonant inventory as proposed by some authorities in the Akan language including Dolphyne (1988), Abakah (1993), and an anonymous writer.

“Unified” Akan consonant chart.

1) “Unified” Akan consonant inventory

	Bilabial	Labio-dental	Alveolar	Pre-palatal	Palatal	Velar	Glottal
Stop	p, b		t, d			k/k ^w , g/g ^w	*ʔ
Fricative		f	s	ç (hy)			h
Labialized Fricative (voiceless)				ç ^w (hw)			
Affricate				tʃ(ky) dʒ(gy)			
Labialized Affricate				tʃ ^w , dʒ ^w (tw,dw)			
Lateral (voiced)			l				
Nasal (voiced)	m		n		ɲ (ny)	ŋ (n)	
Labialized nasal (voiced)					ɲ ^w (nw)	ŋ ^w (nw)	
Glide (voiced)			r		y	w	

Notes on the chart.

- Voiced stops /b/ and /d/ become nasals /m/ and /n/ respectively, when preceded by those nasals, though they are still written as “mb” and “nd”.
- /h/ and /ç/ are in complementary distribution; the former occurs before oral front vowels and the latter before other vowels.
- In the Fante dialect, /n/ becomes /ɲ/ before the front vowels and the central vowel /a/.
- Labialized velar and palatal nasal /ŋ^w/ and /ɲ^w/ are in complementary distribution: the former occurs before the central vowel /a/ and the latter everywhere else.
- The issue of the status of palatal sounds still receives much debate among scholars as to whether they are phonemes or phonetic sounds, which cannot be discussed

fully in this thesis. The commonest claim about palatals is that before front vowels, all consonants are palatalized.

- The glottal stop is not considered as an Akan consonant, according to Dolphyne (1988:48-50). Aside its very limited distribution, she argues that it only occurs in spoken Akan i.e. it is only within phonetic contexts that it surfaces. For further details, please refer to Dolphyne (1988) and Eshun (1993).
- The status of the alveolar lateral is not clear. It is more or less a loaned segment than a native. It alternates with the alveolar glide /r/ and sometimes the alveolar stop /d/.

According to Abakah (2005), only four of these consonants can occur at the word-final positions in Akan. These, according to him, are nonvowel sonorants, which are as follows; /m, n, r, w/. But only the two nasal sounds; /m/, and /n/ can occur word-finally in the Asante-Twi dialect. However, as Dolphyne (1988:48-50) discusses, the glottal stop can also occur word-finally in Akan i.e. after short vowels and shortened syllables, though it has very limited distribution. Therefore, though the glottal stop shows up within some phonetic contexts as in § 2.6, it cannot be added to what Abakah (2005) argues to be the only possible word-final consonants.

To facilitate better understanding of this topic, I build on Dolphyne's (1988) list of Akan vowel inventory in (2) below.

2) Vowel inventory

Akan has the following 5 basic vowel units /i, e, o, u, a/ (Dolphyne, 1988:17) and each has vowel quality (ATR variant) associated with it as follows.

High front vowels (i /i)

Mid front vowels (e /ɛ)

Low central vowels (æ /a)

Mid back vowels (o /ɔ)

High back vowels (u /u)

i	u
I	U
e	o
ɛ	ɔ
*æ	
a	

However, Clements (1981), Baković (2003), among others leave out the low vowel /æ/, the +ATR variant of the basic unit /a/ in their harmonic pairings in agreement with earlier postulation by Dolphyne (1988) that the former is a phonetic variant of the latter having a very restricted distribution. The /æ/ also usually does not trigger vowel harmony.

This section has discussed the Akan consonant and vowel segment inventories as it has been claimed by different scholars and a proposed chart has been provided to capture some of what have been assumed to constitute those segments in Akan. It has also briefly presented what constitute Akan word-final consonants. It is not all the consonants that can combine with every vowel in the native phonotactics. In the next section, I present some examples of consonant-vowel combination with specific focus on palatal and alveo-palatal fricatives/affricates. A table showing consonant-vowel combination/interaction of all the consonants in Akan has been provided in the appendix 2 for an overview. This table helps explain why certain phonotactics are not allowed in the loanword grammar of Akan.

2.3 Consonant-vowel combination

In this section, I present some examples of palatal fricatives and alveo-palatal affricates and their interaction or combination with the vowels in Akan segment inventory. It will be observed and later concluded that the phonotactic rules of the native phonology do not permit all the vowels to combine with these consonants. This phonotactic restriction, as it will be observed later in chapters 4 and 5 might account for why in loanword adaptation, certain vowels are blocked from spreading across those consonants. The data in (3) show palatal and alveo-palatal fricatives/ affricate in combination with the vowels in Akan. For the full list of such combinations, please refer to appendix 2. The forms with asterisks are not phonotactically allowed. Further examples on this can be inferred from Appendix 2.

3) Palatal/alveo-palatal fricatives/affricates- vowels combination

	<u>i/ɪ</u>		<u>e/ɛ</u>		<u>æ/a</u>		<u>o/ɔ</u>	<u>u/ʊ</u>
a. /ʃ/	ʃɪ	‘burn’	ʃɛ	‘wear’	aʃasiɛ	‘beginning’	*ʃo	*ʃu
b. /dʒ/	dʒina	‘stop’	-		dʒata	‘lion’	*dzo	*dzu
c. /tʃ/	tʃi	‘dislike’	atʃɛdiɛ	‘gift’	atʃatʃa	‘hunch back’	*tʃo	*tʃu
d. /ɲ/	ɲini	‘grow’	ɲɛ	‘it’s bad’	ɲa	‘get’	*ɲo	*ɲu

It could be deduced from the data in (3) as well as in appendix 2 that palatal and alveo (pre)-palatal consonants do not interact/combine with labial vowels (factoring out their labialized consonant variants exemplified in appendix 2, which have secondary articulation). Even labialized pre-palatal fricative /çʷ/ also behaves like the plain palatal and pre/alveo-palatal fricatives by being impervious to labial vowels harmony.

The obvious question to ask from this generalization is, how does Akan adapt a source word which has a vowel other than either a high vowel or a low following the palatal/alveo-palatal consonants? For instance, how will the word like *German*, with a central mid-vowel following an alveo-palatal consonant be adapted into Akan? The example in (4) is an Akan loanword form for the word.

4) ɔ̄a:man/(-ɪ)¹ ‘German’

The mid-vowel is adapted by lowering its height to conform to the phonotactic constraints on alveo-palatal combining with certain vowels in the native phonology. Since from the example in (4) alveo-palatal affricatives do not occur with the mid-vowels, the language opts for the low vowel /a/, which seems to be phonetically closer to the open-mid central vowel than a high vowel.

¹ In the case of the Asante-Twi dialect of Akan, the final nasal /n/ is usually replaced by a high front vowel as in the case of (4). A reverse of this process has been observed in Yoruba, where it is rather the high front vowel that assimilates into the nasal (Akinlabi, 2007; Morén, 2007)

From the data above therefore, the prediction should be that the palatal and alveo-palatal coronals should become opaque to labial vowel spreading across them since they do not combine with such vowels. This prediction is tested in chapter 4 with Akan loanword examples to ascertain whether the same constraints apply to adapted forms into Akan.

The next section discusses vowel harmony in Akan.

2.4 Vowel Harmony

On Akan vowel harmony, very pioneering works have already been done on this subject by prominent scholars such as Christaller (1881/1933), Stewart (1967), Dolphyne (1988), among others. A more recent research on this same subject has been carried out by O’Keefe (2003) who comments in his thesis that Akan “exhibits a robust system of harmony for tongue root position” (O’Keefe, 2003: 1). In his thesis, he explains that a language with vowel harmony should have two sets of vowels with a highly marked co-occurrence. He identifies tongue root position and lip rounding as the two kinds of vowel harmony in Akan.

The mid-back and high-back vowels are rounded. The rest are unrounded. Therefore, when there is a round vowel in the root or stem, the affix vowel turns out to also be a round in harmony with the root or the stem vowel or vice versa. This is what Dolphyne (1988), O’Keefe (2003), among others, describe as rounding harmony. The other feature used to describe Akan vowels is Advanced Tongue Root [\pm ATR]. From Dolphyne’s (1988) Akan vowel classification above, all the five first vowels; /i, e, æ, o, u/, which have the tongue root advanced during articulation are classified as [+ATR], while the rest; articulated with the tongue root retracting are classified as [-ATR]. The high-front vowel /ɪ/ has sometimes been represented as a mid-front vowel /e/ and it is given the value [-ATR] in some literature. Some still represent it orthographically as <e>, but phonemically, it is /ɪ/; which is distinct from the mid vowel, according to Dolphyne (1988).

On the domain this harmony occurs, O’Keefe identifies three main domains in Akan words, which are stem, prefixes, and suffixes. For reasons of space and the scope of this thesis, I will not be able to discuss this in detail.

2.4.1 Stem harmony

This is where there is vowel harmony within a stem in terms of ATR. The following are some examples illustrating this harmony. (The harmonic vowels are in bold faces this section).

- 5) a. **si**e ‘hide/burly’
- b. **ti**e ‘listen’
- c. **etuo** ‘gun’
- d. **sɛɪ** ‘destroy’

However, there are exceptions to this harmony. As O’Keefe (2003) following Dolphyne (1988) points out, the low vowel /a/ happens to be one of the two vowel violators within the stems. He gives examples of words with such violations (with both advanced and unadvanced vowels) as *bisa* ‘ask’, *kura* ‘hold’, etc. Another vowel violator of the harmony has been identified by Dolphyne (1988) to be /ɛ/. She argues that this is due to the alignment of vowels and that the vowel only appears after palatalized consonants in this context. For example, in a word like *nyinsɛn* ‘pregnancy’, there is vowel disharmony between the two stem vowel /i/ and /ɛ/.

Akan is very well noted for its extensive affixations. These affixes, O’Keefe (2003), among others, group into verbal prefixes (pronominal, future, progressive, perfect, ingressive, and egressive), nominal prefixes (singular), verbal suffixes (past, nominalizing), and nominal suffixes (Asante nominal, person, diminutive, personal pronoun, kinship plural) (O’Keefe, 2003:10). I will be selective here and briefly discuss some few that are relevant to the focus of this thesis.

2.4.2 Prefix harmony

In the pronominal prefixes, O’Keefe cites the examples below to support the idea of the ATR harmony between the stem and the prefix. I suppose the examples are from the Asante dialect.

- 6) a. **mi-** **di** ‘I eat’ (Habitual) (+ATR)
- b. **mɪ-** **kɔ** ‘I go’ (Habitual) (-ATR)
- c. **mɛ-** **kɔ** ‘I will go’ (-ATR)
- d. **me-** **di** ‘I will eat’ (+ATR)

2.4.3 Suffix harmony

Under suffix harmony, I will discuss the past suffix in the Asante-Twi dialect, which has two forms. First, Asante-Twi marks past by the suffix vowel /i/, depending on the ATR specification of the vowel in the stem after lengthening the vowel in the stem. Hence, it will be /i/ when preceding [-ATR] vowel in the stem. Below are some examples in (7a) and (7b).

An important question to ask about vowel harmony in morphological derivations of words in Akan is, which component controls the ATR vowel harmony in the derived word? Is it the vowel in the stem that determines/dictates the kind of vowel the affixes should have within the ATR or vice versa? From the examples below from the Asante-Twi dialect, it seems in many cases it is the stem/root (i.e. root-controlled) that controls the ATR harmony, which is in agreement with what have already been observed in other languages (Hyman, 2002; Krämer, 2001, 2002, etc.)

- 7) a. e- **fi**e ‘a house’
 b. ε- **da**n ‘a room’

2.4.4 Rounding harmony

On rounding harmony, I will not devote so much attention for it in this thesis as it is not very prominent feature in Akan as ATR harmony. There are usually both ATR and rounding harmony in Fante (O’Keefe, 2003). He continues to assert that, the future, progressive, ingressive, and egressive prefixes all exhibit both tongue root and rounding harmony in Fante, and that it is only tongue root harmony that exists in both Akuapem and Asante dialects (O’Keefe, 2003:32-33). Since the focus of this thesis is on the Asante dialect, which does not exhibit much rounding harmony, I will not discuss rounding harmony in any detail, but references for further discussion are (Dolphyne, 1988; Osam, 1994, O’Keefe, 2003; among others).

Rounding harmony, like vowel harmony in Akan, divides vowels in Akan into two place features labial and non-labials. The labial vowels are /o, ɔ, u, ʊ/ and the non-labial vowels are /i, ɪ, e, ε, æ, a/. This topic has not received much attention from scholars because it is not a well-known phonological process in the language as compared to ATR harmony. This

process is realized during affixations in Akan. In the rounding harmony, while the shape of the suffixes is stable and predictable in (8), that of the prefixes is not that straightforward. In the suffixes, there is always rounding harmony between the root or the stem vowels and the suffixes as in all the examples in (8). But such rounding harmony does not seem to be predictable between the prefixes and the root or stem vowels as in (8c-d) where the labial shape of the stem vowel does not spreading into the prefix. Or even between the prefixes and the onsets of the stems as in (8e-f) where the labiality of the onsets does not assimilate into the prefixes in the noun formation. In addition to the shape of the affix that the stem vowel controls, it also determines the ATR value of the affixes as in the following examples from Akan (the Asante dialect).

	Verb	Gloss	Noun	Gloss	
8)	a. wu	‘die’	o + wu + o	‘death’	*?ewuo
	b. bu	‘to respect’	o + bu + o	‘respect’	*ebuo
	c. tu	‘eject’	e + tu + o	‘ejection’	*otuo
	d. ku	‘fight’	a + ku + u	‘war’	*ɔkuu
	e. wu	‘give birth’	a + wu + ɔ	‘birth’	*ɔwuɔ
	f. bu	‘cheat’	e + bu + o	‘cheating’	*obuo
	g. fi	‘to vomit’	ɛ + fi + ɛ	‘a vomit’	*ofiɛ

This section has discussed the issue of vowel harmony in Akan. It has also briefly explained rounding harmony as another form of harmony in Akan, which is prominent only in the Fante dialect. The next section discusses the size of the syllable permissible in Akan.

2.5 Akan Syllable structure

As regards the syllable structure, Akan is among the languages that mostly prefer open syllables to closed ones. This is very prominent in its verbs in particular, which have CV syllable structure. Following Dolphyne (1988:52), the syllable in Akan is also described in terms of the tone the segment which forms the syllable is uttered. This, coupled with the fact that it is only syllabic consonants which are tone-bearing segments that can occur word-finally in Akan, is illustrated in the following words taken from Dolphyne (1988:53-54) and syllabified as follows.

9)	N.CV	n.su	‘water’	*NCV
	CV.N	so.m	‘hold it’	*CVN

On vowels, she argues that every vowel in Akan constitutes a syllable on its own. So a sequence of the same vowel or vowels of different height should not belong to the same syllable. Therefore, the following words are syllabified as follows in (10).

10)	CV.V	ti.e	‘listen’	*CVV
	CV.V	mi.I	‘be full/eat enough’	*CVV

Therefore, based on the argument posited above the syllable structures as follows; *CVC, *VC, *CCV, *CVV, *CVVC, etc. are not permissible in Akan. On which unit of segments constitutes a syllable, she posits that every syllable in Akan is a tone-bearing unit. Therefore, all vowels and all syllabic consonants including nasals, liquids (non-laterals), and glides are tone-bearing segments in Akan (Dolphyne, 1988), (Schachter and Fromkin, 1968), (Abakah, 2005), etc. Liquids (non-laterals) bear tones in situation that Lovins (1971), Goldsmith (1976a), Yip (2006), etc describe as “Stability” i.e. where deleted vowels refuse to delete with their tones and instead pass the tones on to the following segment especially in the Asante dialect as in the data in (11). (For detailed discussion of tone in Akan, please refer to the reference mentioned above as this discussion is outside the scope of this thesis). From Dolphyne’s argument above, every syllable that contains more than one tone-bearing segment should be perceived as non-monosyllabic. However, as to whether the CVV structure, where the C is a dorsal, really exists in Akan, has not always been clear and a lot of debates are ongoing in this regard.

According to Hall-Lew (2006), Akan has CVV syllable type in either a long vowel or a diphthong, and that when the underlying initial vowel is a [+ATR] such as /u/, then it turns out as labio-palatal glide [ɥ] as in the Akan name *Akua* [akɥia] ‘the name of a Thursday-born (fem), but it becomes a labial glide [w] when the underlying initial vowel is [-ATR] such as /u/ particularly in the Asante dialect (Hall-Lew, 2006:3) in the word *akoa* [ak^wua]. In acknowledging the lack of clarity on this issue, she cites works by Leben (1999) and Welmers (1973) to argue that though it is always not very clear whether Akan, a member of

the Kwa language group has CWVV structure instead of CVV syllable type, she believes the latter structure exists in Akan and continues to give further explanations. She gives the breakdown of the CVV structure as follows where she describes the onset C as any consonant; the first vowel, V1 as vowels which are always [+High, +Back] i.e. /u/ or /ʊ/; and the second vowel V2, vowels such as /e/ or /a/. On the effect of the labio-palatalization process on the onset consonant, Hall-Lew (2006) after mentioning the kinds of consonants prone to glide formation concludes that, “by acquiring this (labio-palatalization) secondary articulation, the consonant undergoes a change in manner, acquiring the feature [+VOCALIC]” (Hall-Lew, 2006:6).

Other Akan scholars such as de Jong and Obeng (2000), on the other hand, argue that the labio-palatalization in Akan is to be analyzed on phonetic grounds. They continue that there is a strong consonant-vowel overlap such that the formant values of the vowel immediately following the consonant were measurable before the consonant closure. They finally conclude that, “labialization and palatalization are an integrated unit in the synchronic system, and not just a chance temporal convergence of two independent articulations” (de Jong & Obeng, 2000:692). As to how this process results in Akan, it has not been made clear by scholars such as Schachter & Fromkin (1968), Dolphyne (1988), Abakah (1993) among others. I would treat the labio-palatal glide /w/ and its effect on the preceding consonant as a secondary articulation as one sound segment such as /tɛ^w/, /ɛ^w/, /ɲ^w/, etc. as provided on the “unified” consonant chart in §2.2 instead of treating the glides as distinct sound segments on their own in the syllable structure as proposed by others. Therefore, the syllable type CWVV, as proposed by Leben (1999), Welmers (1973), etc. would be assumed to be of CVV shape and following Dolphyne (1988), further syllabified as [CV.V].

On CVC syllable type in Akan, Abakah (2005) argues that there can never be a word or syllable with final consonant (obstruent) as he posits in the following.

“there is no morpheme in Akan that is consonant-final at the systematic phonemic level and, for this reason, any analysis that posits an underlying consonant as a morpheme-final consonant starts on a faulty note”
(Abakah, 2005:7).

He says this to buttress earlier arguments made especially by Dolphyne (1988) that only sonorant consonants can occur word-finally in Akan. Therefore, there is no CVC structure in Akan, but rather CVN where the [N] is nasal consonant. In furtherance of his argument, he posits that the [N] has two realizations. While it surfaces as [m] in all the three dialects, it becomes [n] in the Fante dialect, [ŋ] in the Akuapem dialect, but a high vowel in the Asante dialect depending on the shape of the stem vowel. This is further illustrated in (11) and (12) respectively below. On the status of the final nasals in the Asante dialect, Abakah continues that the intervocalic nasals are deleted in Asante and they are replaced with [+High] vowels depending on the ATR value of the stem and roundness of the stem vowel. He further argues that the deleted nasals spread their nasal feature to the epenthesis vowels before they delete. Therefore, the high front vowel /i/, will thus become /ĩ/ as in (11). Concluding his views on word-final sonorants, especially the nasals, Abakah (2005) posits that they are penults in the underlying representations and they become word-final in the surface representations when they precede [+High] vowels, which delete in the surface representations in the Fante and the Akuapem dialects as in (11). But on the contrary, it is the intervocalic nasal that deletes in the Asante dialect as in (11) taken from Abakah (2005:49).

11) UR	Fante	Akuapem	Asante	Gloss
a. sinĩ	sĩn	sĩn	sĩĩ	‘not full, short’
b. dinĩ	dzĩn	dĩŋ	dĩĩ	‘strong, hard, difficult’
c. kanĩ	kān	kaŋ	kāĩ	‘to count’
d. fɔnɔ	fʷɔn	fʷɔŋ	fʷɔũ	‘to be emaciated’

The labial nasal is the same in all the three dialects of Akan as follows in (12).

12) UR	Fante	Akuapem	Asante	Gloss
pamɔ	pām	pām	pām	‘to sew’
tamɔ	tām	tām	tām	‘to lift’
pimɔ	pīm	pīm	pīm	‘to head-butt, crash into’

In the Akuapem and Fante dialects, labial glide /w/ and the liquid /r/ can occur word-finally.

On consonant clusters, it has been observed that it is only obstruent-liquid ‘clusters’ as in CCV which are permitted in Akan in word-initial and word-medial positions such as *pra*

‘sweep’, *tra* ‘cross’; in word-initial and *ɔbra* ‘life’, *nsra*, ‘visitations’, etc. in word-medial positions, which is represented on the surface as CVrV in emphatic or slow speech (Dolphyne, 1988). This is further discussed in § 2.6.

2.6 The Default Vowel

The claim that the high vowels have the role of the epenthetic/default vowel in Akan gains some support from Dolphyne (1988). In her analysis of the syllable structures from Akan diachronic data, she postulates that this vowel is present in syllable structure that superficially looks like CrV. This structure is found in native words such as *pra* ‘to sweep’, which in slow or empathetic speech is realized as *pera* [pɪra], i.e. with the insertion of a high front vowel to get the structure C(V)rV. Plag & Uffmann (2000) make a similar claim about the epenthetic/default vowel, which they say is unclear in Akan from diachronic data. They do, however, make reference to the mid vowel /e/ as what seems to be the epenthetic/default vowel in Akan with the following list of corpus to support their argument (Plag and Uffmann, 2000)².

- | | | |
|-----------|---|--------|
| 13) glass | > | girase |
| copper | > | kobere |
| book | > | buku |
| tub | > | topo |

Now focusing on the first two examples, their transcription will give credence to the claim that it is rather the high vowel which serves as the epenthetic/default vowel in Akan (both native phonology as argued by Dolphyne, 1988) and not the mid vowel. The first two loans in (13) above are transcribed below in (14).

- | | | |
|--------------|----------|--------|
| 14) [gɪrɑsɪ] | girase > | glass |
| [kɔbɪrɪ] | kobere > | copper |

From the transcription above, it can be deduced that there has been a diachronic change in the height of what the epenthetic/default vowel might be in Akan. It has changed from the mid vowel /e/ in the ‘Old’ Akan orthography to the high vowel /i/ in the ‘Present-day’ Akan

² The data examples in (16) are cited from Plag and Uffmann’s (1999:23; revised to 2000).

orthography. I believe the claim of the mid vowel as the epenthetic /default vowel here might have been motivated by the old Akan orthography which used to represent the lax i.e. [-ATR] variant of the high vowel by the symbol /ɛ/. This practice is very common in Dolphyne’s (1988:7) book as well. This claim I am making receives support from Abakah (2005:50- in his footnote). Lombardi (2002) also mentions the high front vowel as the epenthetic vowel in a closely-related language, Gur, also with the ATR harmony. The use of the high front vowel as the epenthetic/default vowel has also been observed in Akan reduplication (Christaller, 1875; Welmers, 1946; Schachter and Fromkin, 1968; Wilbur, 1974; Marantz, 1982; Dolphyne, 1988; McCarthy and Prince, 1995, 1999; Raimy, 2000; Hyman, 2003; etc). In the course of reduplication, all labial vowels in the stem surface as the high back vowel in the reduplicant., while all non-labial vowels in the stem become the high front vowel in the reduplicant depending on the ATR value of the stem vowels as in (15) below. In (15), non-high vowels in the stems become high in the reduplicants, but high vowels in the stems still maintain their vowel height in the reduplicants as in (16).

15) <u>Stem</u>	<u>Reduplicated</u>	<u>Gloss</u>
a. kaʔ	kɪkaʔ	“bite”
b. hawʔ	hɪhawʔ	“trouble”
c. tɛʔ	tɪtɛʔ	“spy on”
d. sɔʔ	sɪsɔʔ	“peck”
e. tɔʔ	tɪtɔʔ	“buy”

However, high vowels surface as high in the reduplicant as in (16).

16) <u>Stem</u>	<u>Reduplicated</u>	<u>Gloss</u>
a. siʔ	sisiʔ	“wash”
b. diʔ	didiʔ	“eat”
c. suʔ	susuʔ	“carry (on head)”
d. tuʔ	tutuʔ	“throw”

The conclusions from the two datasets above are that, in Akan reduplication, whenever a stem vowel has a labial place feature as in (15d-e) and (16c-d), the vowel in the reduplicant comes out as a high back vowel, /u/ or /ɯ/ depending on the ATR value of the stem vowel.

Similarly, whenever the stem vowel is coronal or dorsal as in (15a-c) and (16a-b), the vowel in the reduplicant becomes a high front vowel /i/ or /i/.

Interestingly, it will be observed in chapter 4 that it is these two high vowels which are always used as the epenthetic vowels in Akan loanword adaptation.

To sum up, this section has discussed the general background of the Akan language with specific focus on its segment inventory and to some extent, illustrated on its consonant-vowel combination with emphasis on the palatal and alveo-palatal coronals. The issue of harmony has also been discussed in this section. The two harmonies discussed included ATR harmony and rounding harmony. We have also looked at some possible syllable structures in Akan with a brief comment on the ongoing debate on the place of glides in labio-palatalisation in Akan syllable structure system. The next chapter looks at the database and the methodology used for the thesis work.

CHAPTER 3

Database and Methodology

In this chapter, I present the kind and source of database used for this present study. I also present in brief, the methodology used in collecting the loanword corpus for analysis in this thesis.

The database, which serves as the basis of this study, is a collection of loanword corpus from Akan (the Asante-Twi dialect). As indicated in chapter 2, Akan language has had some contact with some European languages, especially English, the official language of Ghana, since the colonial times. This situation has created at least bilingualism among many Ghanaians and for that matter, Akan speakers. It is very hard to hear a complete sentence or a phrase in Akan without noticing a loaned word in it. It is also worth mentioning here that there are some borrowings from other major European languages such as Portuguese, Dutch, German, French, etc. but they are not as frequent in Akan as English. There are also evidence of Akan words, on the other hand, been borrowed into some Ghanaian languages including Lelemi (Buem) (Höftmann, 1971). An initial set of loanword corpus of over 200 words was collected in the field from two sets of informants at two different locations. The monolingual speakers are predominantly illiterates i.e. they do not have any formal education, while the bilingual speakers, on the other hand, are either literates or semi-literates i.e. the members constituting this group have, at least, basic formal education. The data from the former group was collected in Kumasi, Ghana, during my summer vacation in Ghana in 2007. Regarding the data from the bilingual speakers, I did the data collection in two different locations. The first part of the data collection was done in Tromsø, Norway among colleague Ghanaian resident students who are also pursuing their masters' programmes in different fields. Though not all of them speak Akan as their L1, the majority of them do speak Akan (Twi) very frequently in their communication. At some point also, few words were collected from a handful of non-student Ghanaian residents in Tromsø. The other part of the data collection from the bilingual speakers was done in Kumasi, Ghana, from predominantly semi-literates during the summer vacation.

The data from the monolingual speakers was gathered solely at one location, Kumasi, Ghana, which is predominantly Akan (Asante-Twi) speaking area, though it is the second largest city in the country. The older generation forms overwhelming majority of the illiterate group,

since education reform policies as such Free Compulsory and Universal Basic Education (FCUBE) have been put in place since the 1990s to get majority of the school-going children in school. The ubiquity of the use of some foreign words in daily conversations has forced the loanword phenomenon among the general populace.

All the words collected during a fieldwork during the summer vacation in 2007 and they were hand recorded and later transcribed based on Akan orthography and IPA (revised 2005). Due to the robust presence of loanwords in daily communication (interpersonal, radio, etc.), recordings were done through listening to conversations and also given some token of English words and asking the informants (the bilingual) to produce them in sentential form. For instance, a token such as *stop* in a phrase like “Peter will **stop** him”, focusing on the verb, would come out as something like, [Pita bɛ-**stɔpu** nɔ]. In order not to cause misperception of segments, to the monolingual speakers, who are overwhelmingly older people of 60+ years and also double as my grandmothers, I had to record them unconsciously during their conversations.

It is worth pointing out that it is not all forms present in the bilingual speakers’ loans which could be found in the monolingual version. Sometimes a source word which is adapted by bilingual speakers would rather be avoided by monolingual speakers and instead they resort to using the native variant forms. The reason behind this, I suppose, could be that the monolingual feel more comfortable using the native variant. The sometimes preference for the native variant forms here, means how widespread and how frequent a particular source word features in everyday communication. For instance, in an English word like *ask*, the monolingual prefer the native alternative, *bisa* ‘to ask’. It is adapted by the bilinguals as [aski], which is not frequently heard in interpersonal communication. In such cases, I have provided the adapted forms by the bilinguals and put the mark ‘-’, indicating the absence of an example of such loaned word in the monolingual loans repertoire as could be observed from the corpus in the appendix. Later in my search for any existing work on this subject of study, I came across the only work (not specifically wholly on Akan loanwords per se) by Addo (2002) and added some extracts from a section/chapter of her work which discusses syntagmatics of English loanwords into Akan. Her work does not discuss the methodology used for the elicitation of the corpus either and since the focus of the book is on syntax and

semantics (i.e. *lexical innovations in Akan*), it does not discuss much of phonology of the loanwords.

In conclusion, this chapter has briefly discussed the dataset being used for analysis in this thesis by way of the source and the methodology used in collecting it. It has also been discussed in this chapter, the type of informants used where it came out that the data was elicited from two main groups of informants; monolinguals and bilinguals. In the next chapter, I present the dataset collected and also make generalizations about how they are adapted into Akan.

CHAPTER 4

4.0 The general repair strategies in Akan loanword adaptation

This chapter gives a brief introduction to the Akan loanword adaptation patterning; the main focus being on the discussion and making generalization about the main strategies used in repairing illegalities in loanword adaptation in Akan. All the data used are from the Akan dataset. The major repair strategies to be discussed in this chapter include vowel epenthesis, consonant deletion, vowel lengthening, and non-native segmental adaptation. However, much of this section will be devoted to the discussion of two of the repair strategies, vowel epenthesis and consonant deletion. These two strategies are the major ones observed in the adaptation process. In this section, it will be observed that the epenthetic vowel in Akan loanword adaptation is always high vowel and its shape or quality is determined by two main factors such as the surrounding environment (segments) and where the insertion is being carried out i.e. whether in word-initial or word-medial (clusters) or to avoid final obstruents.

This chapter is organized as follows: Section 4.1 will discuss vowel epenthesis found in three main positions of the input form i.e. the word-initial, the word-medial, and the word-final positions. Subsection 4.1.1 discusses vowel epenthesis in initial consonant (obstruent) cluster. Subsection 4.1.2 illustrates vowel epenthesis in medial consonant clusters. Subsection 4.1.3 on the other hand, presents how illicit word-final obstruents are repaired through vowel epenthesis. Subsection 4.1.4 discusses vowel epenthesis in repairing word-final consonant clusters. Subsection 4.1.5 discusses default vowel insertion, while 4.1.6 discusses the special case of palatals. Section 4.2 discusses another repair strategy, deletion, while section 4.3 discusses vowel lengthening, which usually results the deletion of some consonants i.e. as a side effect of deletion. The last strategy to be discussed is non-segmental adaptation in section 4.4. In section 4.5, I raised the issue of perceptual adaptation with example from the Akan dataset. In 4.6, I summarize all the discussions and generalizations made in this section.

4.1 Vowel epenthesis

Vowel epenthesis to repair illicit phonotactics in source words in Akan loan adaptation can occur in three main positions in the word. These are word-initial (against initial consonant clusters), word-medial (against medial consonant clusters), and word-final (to avoid final obstruents and also final obstruent clusters). In the following subsections, I discuss in some

detail with illustrations from the Akan dataset how phonotactic illegalities are repaired through vowel epenthesis.

4.1.1 Epenthesis into initial consonant clusters

In repairing initial consonant (henceforth, ‘consonant’ is used throughout this thesis to refer to obstruent) clusters, which comprise a fricative and a stop, the illicit phonotactic in the source (input) is corrected by inserting a round vowel (a) when the second consonant of the cluster (C₂) is a labial i.e. either bilabial or labio-dental as in (17), or (b) when the following vowel is a round vowel as in (18). Similarly, when the C₂ is labial and the following vowel is a low vowel, the vowel inserted is a round vowel as in (19). However, when the C₂ is not labial and the following vowel is a low vowel, the high front vowel is inserted as in (20). The ATR value of the vowel that is inserted is determined by the ATR value of the neighbouring vowel(s).

When the C₂ of the initial consonant cluster is labial: A round vowel is inserted into the epenthetic site.

- | | | |
|----------------|---------------------------|--|
| 17) a. supɪ:di | ‘speed’ | |
| b. sumoku | ‘smoke’ | |
| c. sʊpɛ: | ‘spare’ | |
| d. supre | ‘spray’ | |
| e. sʊpɛ:si | ‘spectacles’ ³ | |

When the C₂ of the initial cluster is a non-labial and followed by a round vowel: A round vowel is inserted into the epenthetic site.

- | | | |
|---------------|---------|----------|
| 18) a. sʊtɔpʊ | ‘stop’ | |
| b. kʊlɔkʊ | ‘clock’ | * kɪlɔkʊ |

When the C₂ is a labial and followed by a low vowel: A round vowel is inserted into the epenthetic site.

- | | |
|-----------|---------------------|
| 19) supa: | ‘spar’ ⁴ |
|-----------|---------------------|

³ The adapted form seems to come from the input form from the Ghanaian variety of English (GhE) where the word *spectacles* is commonly shortened as ‘*spects*’.

When the C₂ is a coronal and followed by a low vowel: A high front vowel is inserted into the epenthetic site.

20) sɪtampɔ ‘to stamp’

It is worth pointing out that the generalization made above about the vowel epenthesis process is not always straightforward as in the examples above. In (21) below, it can be observed that neither of the two scenarios observed in (17) through (19) will be able to explain the insertion of the round vowel when the C₂ is not a labial consonant nor the following vowel is a round (but a mid front vowel). This exceptionality is an instance of a very rare example of such process.

21) sʊtrɛʃɪ ‘stretch’ * sɪtrɛʃɪ⁵

4.1.2 Epenthesis into medial consonant clusters

In the word-medial consonant clusters, just as in the initial cluster, the epenthetic vowel is always a high vowel. In repairing a cluster of labial stop and lateral followed by a high front vowel in the middle of a word, it is a high front vowel that is inserted into the epenthetic site and not a round vowel as in (22). Similarly, just as in (20), in a sequence of fricative and a stop, followed by a low vowel, it is the high front vowel is epenthesized as in (23) below.

In a medial cluster CC, where the C₂ is a liquid followed by a high front vowel: High front vowel is inserted into the epenthetic site.

22) a. asæmbɪle/mɪre ‘assembly’ * asæmbule/mure

b. kɔmpɪlɪtɪ ‘complete’ * kɔmpulɪtɪ

When /a/ follows a medial coronal cluster CC: High front vowel is inserted into the epenthetic site.

23) a. masɪta ‘master’

⁴ This is a common name for playing cards. Its origin is not certain.

⁵ The form in the right column (with asterisk) is highly predicted though it is not the one speakers produce.

b. pasɪta ‘pastor’

4.1.3 Epenthesis into final obstruent position

In correcting illegalities in word-final position, two factors are observed to influence the shape or the quality of the vowel that is inserted into the epenthetic site. These are (a) the shape of the preceding vowel in the input as in (24), and (b) the shape of the preceding consonant or the input word-final consonant as in (25). It is observed that in most of the contexts, it is the round vowel that is inserted. When a non-round vowel is preceding a non-labial word-final consonant, it is a high front vowel that is inserted as in (24a-c). On the other hand, when a round vowel precedes a non-labial coda, it is a round vowel that is inserted as in (24d-f) below. In similar a vein, when a non-round vowel is preceding a labial vowel, still it is the round vowel that is epenthesized as in (25). Again, in all the examples, it is a high vowel that acts as the epenthetic vowel, irrespective of the height of the input or preceding vowel.

When a non-labial consonant occupies the word-final position: A high front vowel is inserted into the epenthetic site when preceded by high front vowel as in (24a-c) and round vowel is inserted into the epenthetic site when preceded by round vowel as in (24d-f).

- | | |
|----------------|---------|
| 24) a. supɪ:di | ‘speed’ |
| b. mɪsɪ | ‘miss’ |
| c. bɪ:gɪ | ‘big’ |
| d. bu:ku | ‘book’ |
| e. sumoku | ‘smoke’ |
| f. bɔ:du | ‘ball’ |

When labial consonant occupies the coda position and is preceded by a non-round vowel: A round vowel is inserted into the epenthetic site.

- | | |
|----------------|-----------|
| 25) a. risi:fu | ‘receive’ |
| b. repu | ‘rape’ |
| c. ta:pʊ | ‘type’ |

4.1.4 Epenthesis into word-final clusters

Clusters in coda position are also repaired in Akan loanword adaptation in the same way as single word-final consonants. It can be realized that from the discussion on the possible syllable structure in Akan in chapter 2, it was stated that nasals, together with labial glide and non-lateral liquid (in some dialects) qualify to appear in word-final positions. In (26a), the sequence of the last two consonants superficially, is seen as cluster, it is only one epenthetic vowel that is inserted between the final two consonants contrary to (26b) where two epenthetic vowels are inserted. This asymmetry in the number of the epenthetic vowels in both examples could be attributed to the last consonant of each cluster. While /m/ as in (26a) is a permissive word-final consonant in Akan, /s/ in (26b) is an illicit word-final consonant and there needs a repair.

When there is a cluster of lateral and nasal in the coda position preceded by a high front vowel: A high vowel is inserted into the epenthetic site.

26) a. film ‘film’ * filɒm

When there is a cluster of labial consonant and non-labial coda: A round vowel and a high front vowel are inserted into the epenthetic sites respectively.

b. tʃɪpʊsɪ ‘chips’ *tʃɪpɪsɪ

The example in (26b) can further be interpreted as a repair of two illegal word-final consonants at two different adaptation stages by two different adapters/speakers judging from the adaptation process the borrowing word (input) goes through before they get to the final adapted forms (output). It is hypothesized here that through the transition, the form [tʃɪpɪsɪ] is predicted to be the one by bilingual speakers who usually seem to focus much more on the repair of illegal word-final obstruents than any other position. By epenthesizing the high vowel to realize a form like [tʃɪpɪsɪ], it is assumed that this form well fits the bilinguals’ form. Subsequently, monolingual speakers, are believed, might have picked up the bilingual form as their source/input form. They then try to make it more ‘native-like’ by repairing the second illegal coda /p/ left unrepaired by the bilingual adapters in an input syllabified form like [tʃɪp.sɪ]. And as it has already been observed, when a labial consonant occupies the coda

position, it is a round vowel that is inserted into the epenthetic site. This should explain why /tʃɪps/ comes out as form [tʃɪ.pʊ.sɪ] and not [tʃɪpsɪ]. A more formal explanation on this will be given in chapter 5; in the section on OT analysis.

In the next section, I discuss which vowel has been claimed to be the default/epenthetic vowel in Akan. The subsequent section will then illustrate default vowel insertion in Akan loans with some data.

4.1.5 Default vowel insertion.

It is observed from the Akan loan corpus that there is a default vowel insertion which mostly occurs to repair illicit word-final obstruents when there is a sequence of dorsal segments such as a low vowel and a velar consonant (i.e. /a/ + velar) as in the examples (27). From the examples below, it can be observed that the default insertion is well defined within a particular environment/context. That is, when the coda consonant is velar (dorsal) such as /k, g/ and it is preceded by the low vowel /a/, then usually it is the high front vowel that is inserted into the epenthetic site in a kind of default vowel insertion as in (27).

When a coda velar is preceded by the low vowel /a/: A high front vowel is inserted into the epenthetic site.

- | | |
|-------------|----------------|
| 27) a. lakɪ | ‘lack’ |
| b. ba:ɡɪ | ‘bag’ |
| c. hangɪ | ‘hang’ |
| d. pakɪ | ‘to park/pack’ |

In the next section, I discuss instances where it is always the high front vowel that is inserted as the epenthetic vowel whenever it is preceded by palatal or alveo-palatal consonants irrespective of the shape of the preceding vowel.

4.1.6 The special case of palatals

In the previous discussions of which of the high vowels is usually inserted into the epenthetic sites, it came out that in more contexts it is the high back vowel that is used as the epenthetic vowel. However, there are instances where when either palatal or alveo-palatal in word-final position is preceded by any vowel, it is always the high front vowel that is epenthesized as in

the following examples in (28) and (29). In the literature, this instance has been described as opacity or triggering of some feature. In chapter 5, I will give formal explanation for this phenomenon.

When word-final palatal or alveo-palatal fricative/affricate is preceded by a round vowel: A high front vowel is inserted into the epenthetic site.

28) a.	wɔ:tʃɪ	‘watch’	* wɔ:tʃɔ
b.	puʃɪ	‘push’	* puʃu
c.	wɔʃɪ	‘wash’	* wɔʃɔ
d.	dɔ:ʒɪ	‘dodge’	* dɔ:ʒɔ

When word-final palatal or alveo-palatal fricative/affricate is preceded by the low vowel /a/: A high front vowel is inserted into the epenthetic site.

29) a.	brantʃɪ	‘branch’	* brantʃa
b.	tʃa:ʒɪ	‘charge’	* tʃa:ʒa
c.	braʃɪ	‘brush’	* braʃa

However, when other obstruents in the word-final position are preceded by the round vowel, it is the round vowel that is inserted into the epenthetic site as in (30) below.

When word-final plain fricative is preceded by a round vowel: A round vowel is inserted into the epenthetic site.

30) a.	hɔ:tu	‘halt’	* hɔ:ti
b.	fɔ:tu	‘vote’	* fɔ:ti
c.	krɔsu	‘cross’	*krɔsi
d.	kɔ:du	‘call (phone)’	*kɔdi

In summary, this section has discussed the general epenthetic patterns observed in the Akan loanword corpus. The epenthesis has been observed to be repairing illicit consonant cluster in word-initial and word-medial positions and also to repair illicit word-final obstruents. It has

been observed from the discussion that it is always the high vowels that are inserted into the epenthetic sites in contexts where a neighbouring segment is either a coronal or labial. Default vowel insertion has also been discussed in this section together with the special case of palatal and alveo-palatal coronal consonants. In the next section, I discuss another repair strategy observed in Akan loanword adaptation; deletion, which also applies alongside vowel epenthesis.

4.2 Deletion

In many of the loanword adaptation cases studied cross-linguistically, the commonest strategy employed to ensure that source words (inputs) conform to the syllable structure(s) of the recipient language is usually vowel epenthesis. However, in some instances, the recipient language may also resort to deletion of segments, in addition to vowel epenthesis, as a repair strategy. Deletion is also one of the repair strategies Akan employs in its loanword adaptation process. Though this strategy is not very common in Akan as vowel epenthesis, it presents a very interesting pattern that deserves some attention. Deletion of consonants usually occurs in two main ways, mostly in the word-final and rarely in the word-medial positions. Either, the C_1 of the cluster is deleted as in (31) through (33), or the C_2 of the cluster is deleted as in (34). In the former case, the vowel that precedes the cluster is usually lengthened as in (31b-c). This can be explained as ‘compensatory lengthening’ which will be discussed in some details later in this thesis. In chapter 5, this deletion will be explained as the result of markedness reduction (de Lacy, 2002a, 2006; etc).

In a word-final cluster of velar + fricative or stop: Delete the former consonant.

- | | |
|--------------|-----------|
| 31) a. faɪ | ‘fax’ |
| b. kɔ̃nta:tɪ | ‘kontakt’ |
| c. ta:si: | ‘taxi’ |

In a word-final cluster of lateral + alveolar stop: Delete the former

- | | |
|---------------|-------------------------|
| 32) a. hɔ̃:tʊ | ‘halt’ |
| b. mɔ̃:tʊ | ‘malt’ (Malta Guinness) |

In a word-final cluster of bilabial stop and alveolar stop: Delete the former

33) atɛmtɪ ‘attempt’⁶

However, there is an exception to this process where it is rather the C₂ of the cluster that is deleted whenever a voiceless coronal fricative /s/ precedes a voiceless coronal stop /t/ in the word-final position as in (34) below.

In a word-final cluster of fricative /s/ + stop /t/: Delete the latter consonant.

34) a. posu ‘post’ *potu⁷
 b. bosu ‘boast’ *botu
 c. pesi ‘paste’ *peti

Vowels also get deleted in the initial position since except some very few instances in the Akan phonology; Akan in general does not allow any vowel in the initial position⁸. Therefore, initial vowels in source/input words are deleted (especially in the Asante and the Akuapem dialects) as in (35) below.

Vowels in word initial positions: Delete all initial vowels.

35) a. nkɔransɪ ‘insurance’
 b. nfæsigɛ:ti ‘investigate’
 c. nsɔpɛta ‘inspector’

This section has discussed deletion, as another important strategy Akan uses to adapt foreign words into its lexicon. It has been observed that deletion takes place most in clusters in word-final positions and of vowels when they occur word-initially. From the segment inventory chart in chapter 2, it could be deduced that not segments in the source forms are present in the

⁶ Assimilation fails to apply in the case of (33) where we would predict the alveolar stop /t/ to assimilate into the preceding labial nasal. This can be explained in terms of the native speakers trying to achieve a closer phonetic match between the source and the adapted forms though the adapted form [atɛmtɪ] looks more predictable and articulatorily easier. In chapter 5, it will be realized that the unattested form [atɛmtɔ] on the other hand, will violated the constraint NCC.

⁷ The forms with the asterisk marks indicate that they are not attested in the Akan loanword data.

⁸ It is only in the Fante dialect where only the high vowel is permitted in the initial position (Dolphyne, 1988; etc).

borrowing language. This necessitates adapting such non-existing segments into closer matched segments in Akan. In the next section, I discuss how in Akan loanwords, non-native segments are adapted into the native phonemic system.

4.3 Vowel lengthening

Vowel lengthening is yet another strategy in Akan loan adaptation, which is not primarily aimed to ensure well-formedness of inputs. In subsection 4.3.1, I will discuss vowel lengthening after deletion of C_1 (mostly liquids) in coda position. In subsection 4.3.2, on the other hand, we will see cases where after velar as C_1 is deleted the preceding vowel is not lengthened as in (31b).

4.3.1 Vowel lengthening after consonant deletion

Consonants, mostly liquids, are deleted when they precede other consonants as a member of word-final cluster. After such deletion, the preceding vowel is lengthened.

When the C_1 of the word-final consonant cluster is deleted: Lengthen the preceding vowel.

- | | |
|--------------|-----------|
| 36) a. hɔ:tu | ‘halt’ |
| b. kɔnta:ti | ‘contact’ |
| c. wɔ:ku | ‘walk’ |
| d. rɪpɔ:tu | ‘report’ |

4.3.2 No vowel lengthening after consonant deletion.

It is worth noting that not all input forms undergo this lengthening which is observed mostly in the word-final clusters as in (36) above. Again, let us remind ourselves that all the words below are bilingual forms where emphasis seems to be placed more on repairing illegalities in the word-final positions than the other positions. Therefore, though the phonotactics of the words (especially sequence of some consonants) are in general disallowed in the native phonology, this is what is found in the bilingual forms.

When the C₁ of the word-final consonant cluster is deleted: Do not lengthen the preceding vowel.

- | | | |
|-------------------|--------------|---------------|
| 37) a. kɔ̃nstratɪ | 'construct' | *kɔ̃nstra:tɪ |
| b. kɔ̃ntradɪtɪ | 'contradict' | *kɔ̃ntradɪ:tɪ |
| c. rɪʒɛtɪ | 'reject' | *rɪʒɛ:tɪ |

This section has discussed vowel lengthening in Akan loanword adaptation process where it has been observed that usually vowels that precede deleted liquids are lengthened, while those that precede deleted velars are, on the other hand, usually not lengthened. The next section presents how non-native segments are adapted into Akan loanwords.

4.4 Non-native segment adaptation

From the Akan consonant sound inventory, it is observed that some segments that are found in English are not present in Akan. In adapting such non-native segments in loanwords, Akan replaces them with the phonetically closest segments in its inventory.

When voiced fricative: Adapt as voiceless fricative.

a) z > s

- | | |
|--------------|------------|
| 38) a. si:si | 'seize' |
| b. ta:sɪn | 'thousand' |
| c. sa:sɪ | 'size' |

In adapting the English voiced labio-dental fricative /v/ into Akan loans, two options are available depending on the position of the adapted segment in the word. When it occurs in either in word-initial or word-final positions, it is always adapted as [f] as in (39a) - (39d), elsewhere, it is usually realized as [b] as in examples (39e) - (39f).

When voiced labio-dental fricative: Adapt as voiceless labio-dental fricative/ voiced bilabial stop

b) v > f/b.

- | | |
|--------------|----------|
| 39) a. fodum | 'volume' |
|--------------|----------|

b. fidio	‘video’
c. fo:tu	‘vote’
d. drafu	‘drive’
e. adabansi	‘advance’
f. drɔba	‘driver’

When voiceless dental fricative: Adapt as voiceless alveolar stop

c) $\theta > t$.

40) a. tru	‘through’
b. ɔtɔrasi	‘authorize’
c. tɪnkɪ	‘think’
d. ta:sm	‘thousand’

4.5 Perceptual adaptation?

It is not only non-native consonants that get adapted in Akan loans. Glides are also adapted, the explanation to which does not seem to be grounded in the phonology of the native grammar, but phonetics/perception. For instance, the palatal glide /j/, which is present in the Akan inventory is rather adapted by monolingual Akan speakers as labial counterpart /w/ as in (41) even though the native phonotactics allow the palatal glide /j/ in onset position as in (42).

Labialized palatal glide becomes labial glide

41) a. wunifasiti	‘university’
b. wi:su	‘use’

There are native words with plain palatal glide (45a-b) and labialized palatal glide (45c-d).

42) a. jaw	‘pain/agonny’
b. jarɛ	‘disease/sickness’
c. jɔnkɔ(ɔ) ⁹	‘friend’

⁹ The suffix vowel is present only in the Asante dialect of Akan.

d. juu¹⁰

'mass movement (of people or things in one direction)'

The question, therefore, is why the replacement of a segment which is legally present in the native segment inventory and also allowed in this position, which occurs as in the native phonotactics? The labialisation in (41a) is phonetically predicted because of the presence of the following labial vowel, which assimilates into the preceding palatal glide to realise a labio-palatal glide. A similar explanation should hold for (41b), but in the latter case, what makes the explanation more perceptual is the replacement of the labial vowel in the input by a coronal vowel and still the palatal glide changes into a labial glide as in the case of (41a). A detailed explanation of this will be given in Chapter 5.

4.6 Interim summary

In this chapter, I have discussed the main strategies adopted in Akan loanword adaptation. The major repair strategies discussed in this section included vowel epenthesis, deletion, non-native segmental adaptation and vowel lengthening. In each of the strategies, examples were drawn from the Akan data to illustrate the patterns observed and generalizations were also made to describe the processes observed.

In the next chapter, I will present the formalization of the various major repair strategies observed in Akan loans adaptation above and also give analysis of the strategies within the framework of Optimality Theory (OT) with some tableaux with the evaluation of autosegmental representations.

¹⁰ The example is taken from Dolphyne's (1988:47) discussion on semivowels/glides in Akan segment inventory and transcribed from the orthography /y/ to [j] based on IPA Chart 2005.

CHAPTER 5

5.0 Formalization of major repair strategies in Akan loanwords

This chapter is divided into two main parts. In the first part, I discuss the formalization of the various major repair strategies observed in Akan loans adaptation in the previous chapter. In the second part, I also present a proposed analysis of the strategies within the framework of Optimality Theory (OT) and illustrate them with some tableaux. The formalization of the generalizations made in the previous chapter about the shape of the epenthetic vowels will help determine which features i.e. place feature(s) are specified for spreading to the epenthetic vowels and the direction from which they spread place feature to the epenthetic vowels.

This chapter is organized as follows. In section 5.1, I present a segmental representational analysis of place features under segmental representation following Clements and Hume, 1995; Avery and Rice, 2003; etc. In section 5.2, I present the optimality- theoretic analysis of two of the major strategies observed in Akan loans adaptation such as vowel epenthesis and consonant deletion. The findings from this analysis will later be compared with what have already been done in other languages such Shona (Uffmann, 2001, 2004, 2006), Chimhundu (2002) and Sesotho (Rose and Demuth, 2006) in chapter 6 to establish the (a)symmetry of the patterns found in loans adaptations in these languages.

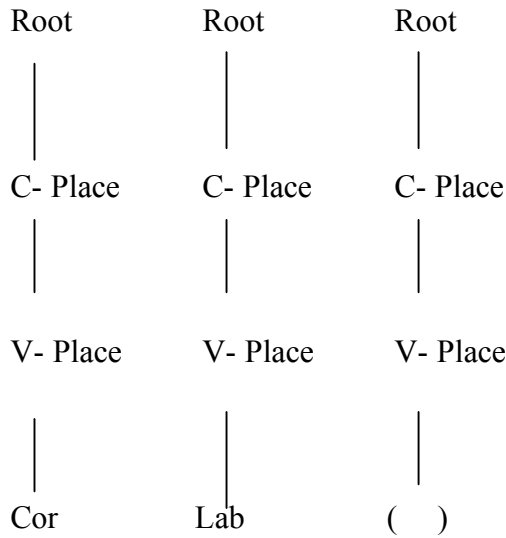
5.1 Segmental representations of place features

By assuming Clements and Hume's (1995) unified feature specification, I specify front vowels in Akan for the feature Coronal, back/rounded vowels for the feature Labial, and the low vowels, the Dorsal place feature. The central low vowel /a/ contrasts with the front low /æ/ (according to Dolphyne (1988), the advanced counterpart of the back /a/) only in terms of the ATR value. I adopt the place feature representation models by Clements and Hume (1995) and Avery & Rice (1993, 2004) in the analysis of the segmental feature representations in this thesis.

The following are place feature specifications for consonants and vowels based on Avery and Rice's (1993, 2004) Contrastive Specification adopted by Rose and Demuth (2006) whereby only features that mark a contrast are captured in segmental representations.

43) Place structure representations for vowels

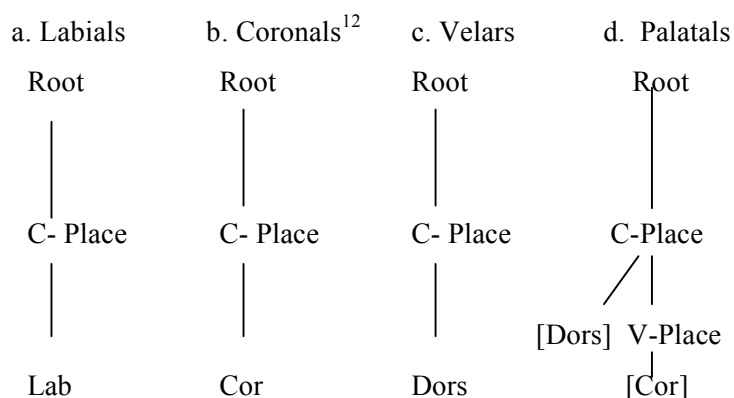
a. Front vowels b. Back/rounded c. Central/low vowel



Following Rice and Avery (1993, 2004), we cannot posit segmental representations for the two central (low) vowels in Akan since they do not mark a contrast between the front low /æ/¹¹ and the back low /a/. Their only contrast is in the ATR harmony. While the former is [+ATR], the latter is [-ATR]. This is also supported by claims already made by other authors and discussed in chapter two that the +ATR low vowel /æ/ is a phonetic variant of the –ATR low vowel /a/. More so, since all vowels are underlyingly specified for the feature Dorsal, we can infer from this that the low vowel /a/ in Akan should not be able to contribute any distinctive place feature to epenthetic slot as the other vowels do, hence, its empty place feature node. The other way to analysis this can also be to state Dorsal place feature for the low vowel and redundantly adding the same place feature to both the Labial and the Coronal. Having looked at the place feature representations for vowels, I now attempt presentation of place feature representations for consonants in Akan segment inventory.

¹¹ It is worth noting here that /æ/ only exists in Twi- Asante and Akuapem dialects and not in Fante dialect. Also it has restrictive distribution, unlike the –ATR counterpart /a/.

44) Place structure representations for consonants in Akan.



The inactiveness of liquids to contribute place features to the epenthetic vowel is explained, following Avery and Rice (1993) and Rose and Demuth (2006) that liquids are phonetically specified for the feature Coronal, however, they are phonologically placeless, and as such they cannot contribute features to the epenthetic vowels. This claim receives some support from the Akan loanword data where liquids are always transparent to vowels spreading features across them but they themselves are inactive to spread such place features to the epenthetic vowels within any context as will be observed in (44b), etc. Again, Rose and Demuth (2006) contend that segments specified for the feature liquids only contrast in the feature [±lateral].

Now on the inactiveness of dorsal segments, starting with dorsal vowels, following Sagey (1986), Halle (1992) low vowels are inactive to contribute place feature to the epenthetic vowels because the feature Dorsal is a mother node for backness and height and all vowels are inherently specified for the feature. Therefore, they will not have any distinctive place feature to contribute to the epenthetic vowels, hence, their inactiveness. This also receives support from Clements and Hume (1995) where within their segmental representation model, vowels are not necessarily specified for the Dorsal place feature to avoid redundancy. Dorsality can also be underspecified in the Akan loanword phonology because labiality or coronality is also redundantly specified for dorsality in Akan vowel system. This should account for why the low vowel /a/ in Akan, though has a contrast only for ATR harmony, according to recent proposals, including Morén's (2003a), among others proposal, is

¹² Rose and Demuth (2006) argue that liquids are inherently coronal therefore; they do not require place feature specification, hence, they have bare C-Place node. According to them, liquids contrast with other coronals on sonority levels. This means the liquids are phonetically coronals, but phonologically placeless.

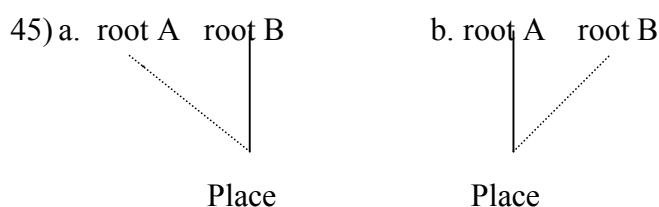
inherently inactive in sharing place feature with the epenthetic vowels. On the inactiveness of the dorsal (velar) consonants to contribute place feature, while Uffmann (2004), de Lacy (2006), among others have attributed this to their relative markedness (i.e. their least markedness), Rose and Demuth (2006), on the other hand, factor in their inactiveness in terms of feature specification. The latter's argument is under the similar assumption already made about the low vowels that they are inherently specified for Dorsality. Therefore, velars will not have any distinctive place feature to contribute to the epenthetic vowels. As the latter note, either of the two explanations i.e. markedness or underspecification achieves the same result. The basic difference between the two explanations, as can be seen, is in the approach one chooses to analyze it.

Clements (1990b, 1993), Clements and Hume (1995), among others make a similar argument about the dorsal segments that both the low/back vowels and the velar consonants share a natural class making both segments inactive in terms of place feature sharing. This argument is believed to hold and is subscribed to for the analysis of the two segments in the Akan loanword dataset analysis in this thesis. The rest of the chapter formally analyzes the various major phonological processes such as consonantal assimilation and vowel harmony that come into play in loanword adaptation processes in Akan as already observed in chapter 4.

From the observations made in chapter 4 and their subsequent generalizations, it could be observed that the main repair strategy found in Akan's loanword adaptation is vowel epenthesis. The epenthesis in a loaned word is observed in all three positions viz, word-initial, word-medial, and word-final positions. Again in the epenthetic process, it was observed that consonantal assimilation was prioritized above other strategies such as vowel harmony and default vowel insertion. In terms of place feature interaction, it was observed from chapter 4 that the epenthetic vowel usually shared its place feature with either a segment preceding it or a segment following it. This directionality of place feature sharing between the epenthetic vowels and the neighbouring segments will be given further analysis in the following chapter.

Here, I assume Clements and Hume's (1995) assimilation rules theory and Uffmann's (2006) adopted autosegmental representations for epenthetic strategies to formal account for the patterns observed in Akan. The kind of assimilation rule that applies in the loanword

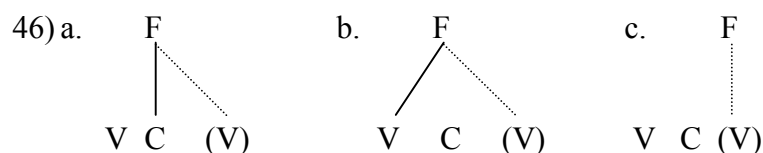
adaptation is argued here to be incomplete/partial (Clements and Hume, 1995) whereby in most cases observed, it is only place feature that spreads to the epenthetic vowels as in representational structures (45a) for the interaction between the following segment and the epenthetic vowel, and (45b) for the interaction between the preceding segment and the epenthetic vowel. In both structures in (45), two root nodes are linked by a single (place) feature. There are very few instances of complete assimilation in the Akan loanword data which will not be discussed in any detail in this thesis. In this kind of assimilation, spreading takes place at the higher root node where a single root node has a linkage with two skeletal positions. There is spreading of all the features of a single root to another root node. Further details could be referred from Clements and Hume (1995:258).



In (45a), there is a place feature spreading from one root node (B) to another root node (A) in a kind of regressive assimilation to account for the general right-to-left (place) feature assimilation rule observed in repairing word-initial and word-medial clusters. In (45b), on the other hand, the structure shows assimilation in the opposite i.e. left-to-right (or progressive) direction. A (place) feature spreads from root node (A) to root node (B), which is mostly observed in insertion into the epenthetic site after illicit word-final obstruents. It is also worth noting that as Clements and Hume (1995) point out, the same structure can cater for the general vowel harmony rule as observed in loanword adaptation in Akan. This observation about vowels spreading across intervening consonants and in both directionalities has been made cross-linguistically over the years and as Morén (2003a:199) recently opines about the harmony asymmetry between consonants and vowels, vowels can spread across intervening consonants, without the latter participating in the feature sharing, with impunity.

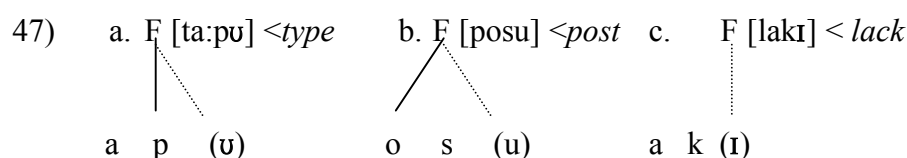
Now narrowing the discussion down to the three main epenthetic strategies observed in Akan loanword adaptation in chapter 4, I adopt Uffmann's (2006) structure for the autosegmental representations of the epenthesis strategies such as consonantal assimilation, vowel harmony, and default vowel insertion as represented in (46a), (46b), and (46c) respectively below. (All the epenthetic segments are put in the parentheses and all new association lines are marked

with the dotted lines. This practice is maintained in autosegmental representations throughout this chapter).



A segment (V) is inserted to fill the epenthetic site in the representational structures above in the following three different ways; (a) the consonant C spreads a place feature to the epenthetic vowel (V), (b) the neighbouring vowel V spreads (most often a place) feature to the epenthetic vowel (V), and (c) the epenthetic vowel (V) shares place feature with neither the neighbouring consonant C nor the neighbouring vowel (V).

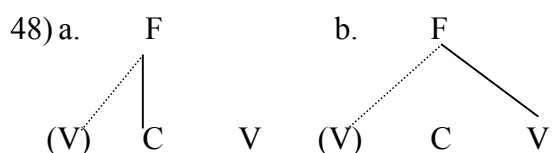
The following examples from the Akan loanwords data in (47) illustrate the diagrams in (46) above respectively where (a) is consonantal assimilation, (b) is vowel harmony, and (c) default insertion of vowel.



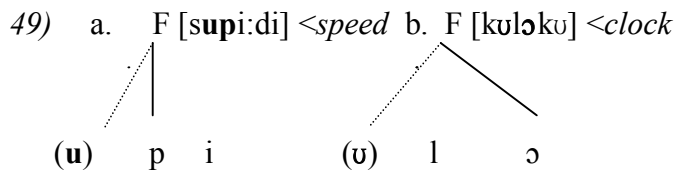
In (47a) the epenthetic vowel gets its Labial feature from the preceding labial consonant /p/. This choice of consonantal assimilation as the strategy for epenthesis into the epenthetic site can be partly explained to result from the inactiveness of the preceding low vowel to contribute place feature to the epenthetic vowel. In (47b) however, it is the neighbouring vowel /o/ that spreads its Labial feature to the right, across the intervening coronal consonant, to the epenthetic vowel. In both cases discussed, feature spreads from a segment to the left of the epenthetic vowel thereby drawing the picture that feature spreading to repair illicit word-final obstruents is directed from left to right. Default insertion of vowel, as it is observed in (47c); on the other hand, arises as a result of the inability of the segments to the left of the epenthetic vowel to contribute their place feature to the epenthetic vowel. And from the observations and the generalizations made about the epenthetic vowels in the Akan data in the previous chapter, it is the sequence of the low vowel and velar consonants (i.e. dorsal

segments) that necessitates such default vowel insertion. The high vowel has been observed to be the inserted vowel whenever the low vowel is preceding velar consonants in the word-final position to avoid illicit word-final obstruents. So far from the Akan loanword data, such insertion has been observed to usually occur in the word-final positions and rarely in word-initial clusters as in Plag & Uffmann' (2000) examples of loanword data in Akan in (16).

From the above account in (46) and (47), it can be realized that feature spreading to the epenthetic vowel follows one direction; left to right. However, from the Akan data discussed in the previous chapter, epenthesis to repair word-initial and word-medial clusters, unlike the observation made in Sesotho loanword data (Rose & Demuth, 2006) and generally in Shona (Chimhundu, 2002), follows the opposite directionality. That is, from a segment to the right of the epenthetic vowel. This means there is a two-way spreading of the place feature in what has been termed in the literature, *bidirectionality* effect in feature sharing in Akan loanword adaptation. To account for this bidirectionality effect of feature spreading, I propose two additional structures to those in (46) above; the two derived from both (46a) and (46b) respectively. (46c) on the other hand, has been observed to almost always following left-to-right directionality (i.e. insertion of feature after the word-final obstruent from a segment to the left of the epenthetic vowel). Therefore, there will be no need to produce any variant structure of it to account for the opposite directionality effect (i.e. right-to-left) as in the Plag & Uffmann's (2000) examples. The two additional (offshoot) structures based on those in (46a) and (46b) are as follows in (48a) for consonantal assimilation towards the left and (48b) is vowel harmony towards left respectively.



The following are examples from the Akan loanword data illustrating the structures in (48) showing the right-to-left spreading of place feature to the epenthetic vowel as in (49) below.



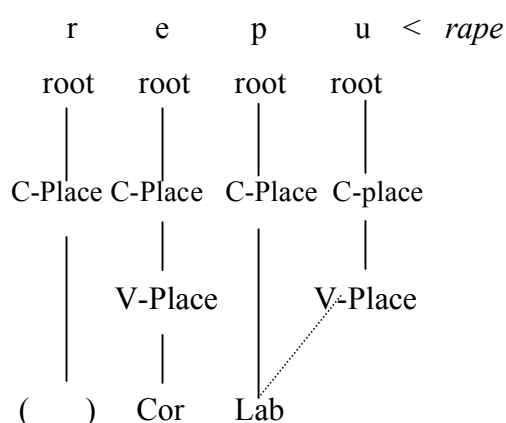
In (49a), the Labial feature spreads from the labial consonant /p/ to the epenthetic vowel in a kind of assimilation without the same locality, thereby blocking the following coronal vowel from spreading across it. In (49b), on the other hand, the labial vowel /ɔ/ links its Labial feature to the epenthetic vowel across the intervening liquid consonant /l/. From the behaviour of the two intervening consonants in the illustrations above in relation to which feature spreads, it can be deduced that the labial place feature is more favoured for spreading in Akan loanword adaptation, unlike the coronal place feature observed in loanword adaptation in other languages such as Sesotho (Rose & Demuth, 2006) and Shona (Uffmann, 2001, 2004, 2006), among other languages. In the markedness theory sense, the labial feature is the most marked feature for spreading in Akan loanword phonology. This point of argument will be further strengthened later in this chapter with further analysis on Optimality Theory where in constraints ranking, the constraint against spreading or multiple linkage of the labial feature will rank below a constraint against multiple linkage of the coronal feature in Akan loanword adaptation.

In the following sections, I flesh up the illustrative representations made so far to account for the mode of spreading in Akan loanword adaptation with some concrete examples from Akan loans data. It will be argued in this chapter, in support of claims made earlier so far in this thesis, that (i) except in some very few instances; the preferred place feature for spreading to fill the epenthetic slot is labiality. Also, in (ii) the preferred epenthesis strategy in Akan loanword adaptation is consonantal assimilation. The two claims are in contrast with the coronality and vowel harmony as the preferred feature for spreading and preferred epenthesis strategy respectively that Rose & Demuth (2006) observe in Sesotho and Uffmann's (2001, 2004, 2006) observation of the coronal vowel as the epenthetic vowel in Shona. Even though the coronal vowel (the high front vowel), as has been discussed already in the previous chapter, has a special role as the default vowel in both the native phonology and the loanword adaptation of Akan. The unmarked coronal feature emerges as the epenthetic feature whenever the labial feature cannot spread in Akan loanword adaptation.

5.1.2 Formalization of epenthesis into the word-final position

To start with, the autosegmental representation in (50) serves as an instance of consonantal (local) assimilation of labiality whereby the vowel filling the epenthetic slot gets its place feature from the preceding (labial) consonant. As has been discussed already, spreading of labiality is the preferred choice of feature spreading in epenthesis in Akan loans adaptation. The choice between coronal and labial, the only two place features specified for spreading to the epenthetic site almost always favours the latter as in the case of example (50) and later example in (51) thereby making the labial feature the preferred place feature specified for spreading in Akan loanword adaptation.

50) *Consonant/local Assimilation (CA) of labial place feature spreading*



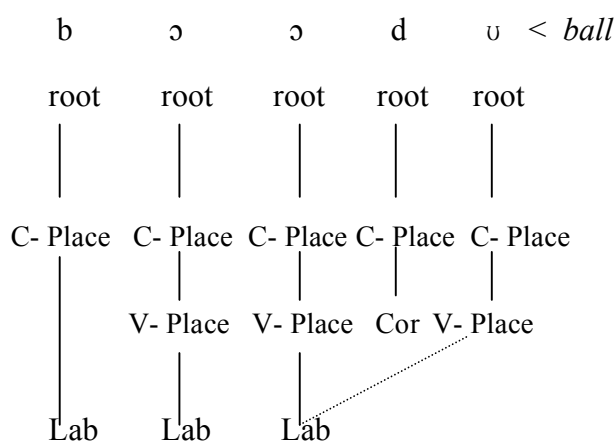
In (50) above, there is feature to V-Place spreading in a feature-filling mode, which emphasizes that there is a partial assimilation (of place feature) of the epenthetic segment. In this instance, it is the preferred epenthetic feature (labial) that spreads. There are two choices of feature spreading to the epenthetic vowel to be made here between the two neighbouring segments; the coronal vowel /e/ and the labial consonant /p/. Since it becomes predictable that the preferred feature, under normal circumstance, is expected to fill the epenthetic slot, preference is given to the labial consonant /p/, therefore resulting in local assimilation as the preferred epenthetic strategy in this instance. This makes the case for preference for particular place feature spreading stronger because vowel harmony in this case would not have resulted in violation of the No-Crossing Constraint (NCC) by Goldsmith (1976)¹³, since

¹³ Oversimplified, the NCC ensures that spreading of a feature does not happen across an intervening segment specified for the same feature being spread.

the intervening consonant is not specified for the V-Place node to block the vowel from spreading across it. In (51) on the other hand, however, the intervening consonant (coronal) is transparent to such vowel harmony involving labial vowels. The epenthesis strategy therefore, becomes vowel harmony, instead of consonantal assimilation observed in (50) above.

The following is an example of feature spreading between two vowels. The choice of which feature to spread is again between coronal (consonant via consonantal assimilation) and labial (vowel via vowel harmony) in (51) below. It will be observed that the determining factor is not just syllable boundary, but rather what the preferred place feature specified for spreading is in the grammar.

51) *Labial vowel spreads across intervening coronal consonant*

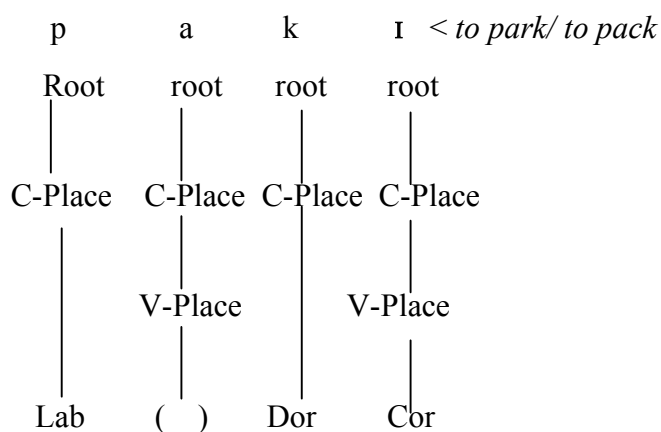


From the representation above in (51), the epenthetic vowel gets its labial feature spread from the feature node of the preceding neighbouring vowel and not from the preceding neighbouring consonant (coronal) with which it shares the same syllable boundary as in the case of (50) in vowel-to-vowel spreading. This is not a complete or a total assimilation because though there is sharing of labiality, there is a height difference between the trigger and the target vowel. Therefore, there cannot be root node to root node assimilation, but instead there is a spread of vocalic place feature (of labiality) from the trigger vowel to the target vowel. The rule spreading across an intervening coronal consonant satisfies one important constraint; the NCC. Following Goldsmith (1976), Clements and Hume (1995)

among others, the intervening consonant (coronal) in the above example does not have vocalic place node, therefore, does not share any same V-Place feature to block such an interaction across syllable boundary. Also it does not have secondary articulation to block the neighbouring labial vowel from spreading across it to the epenthetic site, therefore, by inference; the vowel harmony does not violate the NCC.

The next discussion centres on an illustration of autosegmental representation of an instance of default vowel insertion with an example from Akan loanword data in (52) below. As it has already been discussed in chapter 4, the sequence of the low vowel /a/ and the velar consonant /k/ in the word-final position results in default insertion of a vowel to repair the illicit word-final obstruent /k/ in the source word. Also from the discussion on the autosegmental representations for vowels and consonants in (43) and (44) respectively, both the low vowel and the velar consonant share a common natural class that makes them inherently underspecified to contribute a place feature to the epenthetic site in the Akan loanword grammar. I provide an example below with the English source word *park or pack*, which is adapted into Akan as [pakɪ]. The default vowel in Akan has already been talked about in chapter 2 and also observed in chapter 4, to be the high front vowel. Its ATR value is determined by the ATR value of the neighbouring vowel.

52) *Default vowel insertion when the surrounding (dorsal) segments are inactive*



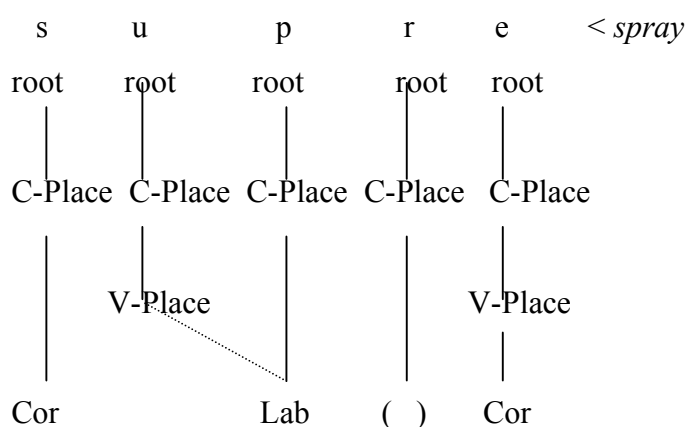
In (52), the default vowel epenthesis results from the inability of both the neighbouring low vowel and the velar consonant to contribute any distinctive feature to the epenthetic vowel since they are both dorsals and dorsals have already been explained in section 5.1 to be inactive to spread any distinctive feature. Therefore, an active place feature has to come from

somewhere else. This coupled with the fact that consonantal assimilation is local, rules out the word-initial labial consonant from spreading feature across two intervening segments in avoidance of violating the NCC. The coronal (high front) vowel, which has been observed to be the default vowel, therefore, intervenes to rescue the situation. From the representation in (52), the low vowel which has the Dorsal feature just as the neighbouring velar consonant, does not spread for the reason just given above. Other than that, we would have expected it to spread its dorsal place feature to the epenthetic site to realize an unattested adapted form like [*paka]. Similarly, the velar consonant, which is specified for dorsal place feature does not have any distinctive feature either to share with the epenthetic vowel.

5.1.3 Formalization of epenthesis into word-initial and word-medial clusters

So far in this section I have been discussing vowel epenthesis into word-final positions through consonantal assimilation, vowel harmony, and default vowel insertion to avoid illegal word-final obstruents in adapted forms in Akan loanword adaptation. This feature spreading into the epenthetic sites reflects the left-to-right directionality effect. I now turn to similar epenthetic strategies to correct both word-initial and word-medial clusters showing the right-to-left spreading mode of place features to balance the bidirectional mode of feature spreading in Akan loanword adaptation. I start with the discussion and the illustration of vowel epenthesis into word-initial clusters in (53).

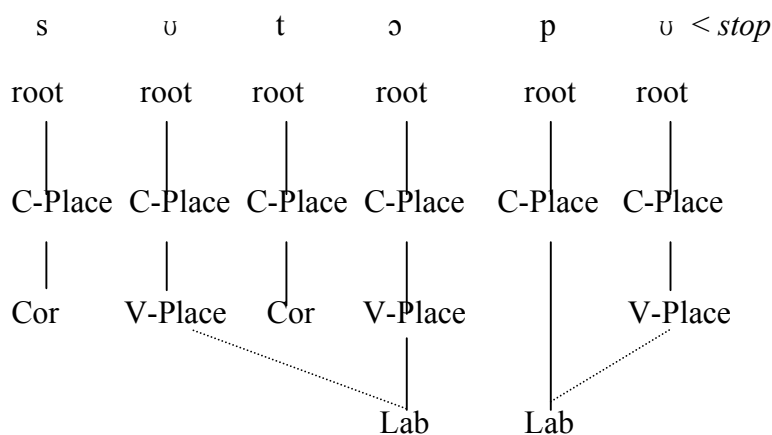
53) *In word-initial Coronal (C₁) + Labial (C₂) cluster: Copy a (place) feature from C₂ into the epenthetic site.*



From the representation in (53) above, we see a reverse of the direction of feature spreading from the example in (50) involving the same set of segments, labial consonant and labial

vowel. Whereas in the former example the choice of which feature should spread to the epenthetic slot was between labial consonant and a neighbouring coronal vowel, this time it is between onset coronal consonant /s/ and following labial consonant /p/. Another notable difference between the two examples is that while in the previous example in (50) the consonant-vowel interaction was local and within the same syllable boundary, the one in (53) is also local, but across the same syllable boundary i.e. onset of the following syllable interacting with the nucleus of the preceding syllable. Again, while in (50) the place feature sharing is progressive, i.e. from left to right, place feature sharing in (53) is regressive, i.e. from right to left. In the word-initial position such as in (53), it would straightforwardly be correctly predicted for the labial consonant to spread its place feature to the epenthetic vowel in a feature-filling mode, i.e. partial assimilation reflecting the right-to-left directionality effect. Any contrary prediction in terms of directionality will produce an ill-formed adapted form such as [*sɪpre], which is the highly predictable form judging from requirement for local interaction between consonants and vowels within the same syllable. But in this example, the epenthetic vowel receives its place feature from the consonant to the right in violation of the General Alignment constraints especially CRISPEDGE (CV,σ) (Itô and Mester, 1994; Rose and Demuth, 2006; among others). Also because the feature-filling mode is local, it is a spreading from a place feature node to the vocalic place node of the epenthetic element. The following representation shows labial vowel spreading across intervening coronal consonant.

54) *In word-initial C₁ + C₂ followed by labial vowel: Copy the feature from the following vowel*

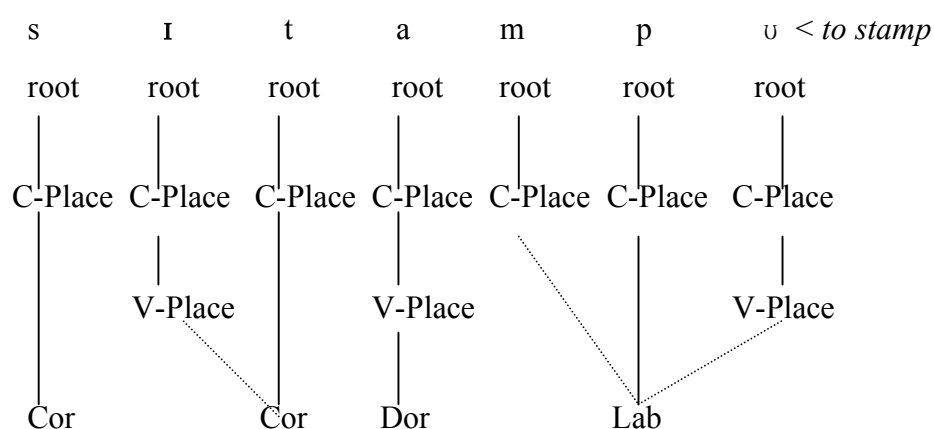


The representation in (54) receives the same explanation as the one in (51) where the target position for repair was word-final unlike the word-initial cluster repair strategy in this present example. It has been argued in this thesis that whenever it comes to making a choice between the labial and the coronal features to the epenthetic site, in most cases it is the former that comes out as the preferred feature for filling epenthetic slots. In this instance, vowel harmony with place feature spreading from right to left is preferred to consonantal assimilation.

In the next example, I discuss vowel epenthesis between two coronals in sequence followed by a low vowel and argue that with the two consonants involved in the word-initial cluster sharing the same coronal place feature and in the absence of the neighbouring labial vowel, either of the two segments in the cluster can contribute the place feature to the epenthetic vowel as in (55).

In the representation below, two coronal consonants form the word-initial cluster followed by a low vowel in the input form as in source *to stamp*. It becomes hard to argue which of the two coronal consonants contributes the feature since both coronal consonants can spread place feature to the epenthetic site in the absence of the labial place feature, which is the general feature specified for spreading.

55) *Is it Consonantal Assimilation - right-to-left spreading or Default Vowel Insertion in the onset Coronal + Coronal cluster?*

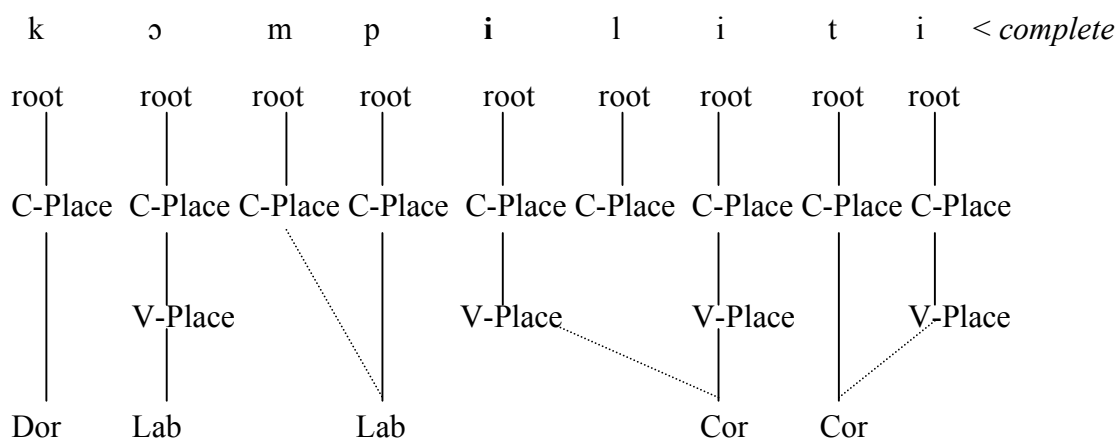


Following the general right-to-left directionality effect in spreading to repair word-initial clusters, it can be argued that the feature comes from the neighbouring segment to the right

/t/. However, in constraints ranking, the constraint, CRISPEDGE will decide in favour of the candidate with the feature spreading from /s/ as the optimal candidate vis-à-vis the one with the feature spreading from /t/. This decision is outside the scope this thesis and so it is left for future research.

In the following example, I discuss another example of cluster but this time in word-medial positions and also involves a sequence of labial consonant and liquid respectively followed by a coronal vowel. From the discussions made so far about which feature will usually spread to the epenthetic vowel (factoring out the influence of directionality effect), at a first glance, it will be expected that the labial consonant will spread place feature to the epenthetic vowel, but in the following example in (56), we observe a contrary pattern.

56) *In Labial + Liquid cluster: which strategy applies? Vowel Harmony, Consonantal Assimilation, or Default Vowel Insertion?*



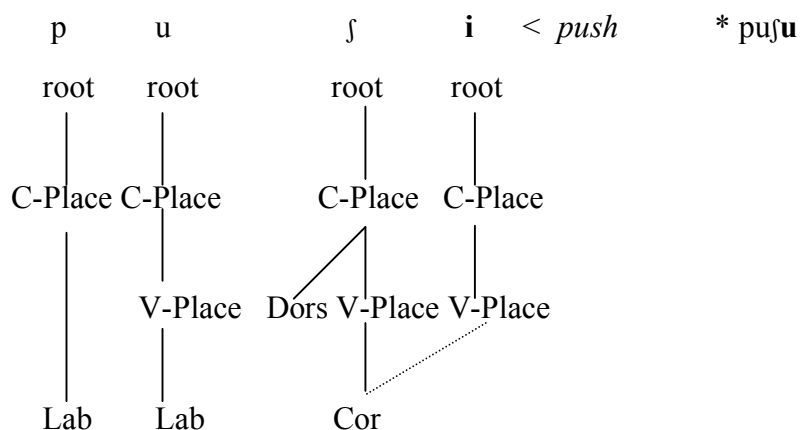
From (56) above, it could be deduced that directionality matters more than labiality when it comes to filling the epenthetic slot. The labial feature is prioritized over the coronal feature when it comes to the issue of which feature is spreading to the direction imposed by the directionality rule. Given the general preference for the labial feature for spreading observed elsewhere, we would have expected the unattested form [*kɔmpuliti] to be the adapted. This unexpected insertion of the coronal feature within the context of neighbouring labial consonant will be explained later on to result from constraint interaction. This means the epenthesis strategy preferred in this instance is vowel harmony vis-à-vis the anticipated consonantal assimilation.

From the data analyzed in Sesotho loanword by Rose & Demuth (2006) and in Shona by Chimhundu (2002), Uffmann (2001, 2004, 2006), the form will be predicted to be [kɔmpuliti] with an epenthetic labial vowel, which is an ill-formed output in Akan loanword adaptation. This prediction is based on the strong tendency for the epenthetic vowels to receive their place feature from the consonant to the left observed in most cases in the data from these two languages. In the case of Sesotho, it is observed from Rose & Demuth's (2006) data that it is the consonant to the left (except velars) that contribute the place feature to the epenthetic. A very similar observation is also made about Chimhundu's (2002) data on Shona loaned words except in few exceptional cases, the coronal vowel to the right rather spreads into the epenthetic site in the /br/ clusters as in the adapted forms [birifi] [*burifi] 'brief', [biridʒi] [*buridʒi] 'bridge', etc. (:136-137). But there are adapted forms such as [puraizi] [*piraizi] 'praise', [purasikiti] [*pirasikiti] 'plastic', etc. (:135-136).

It is not always that straightforward for vowels to spread a (place) feature to the epenthetic vowel across intervening consonants without any hinderance. From the discussions made in chapter 4, it was pointed out that both palatal and alveo (pre-) palatal coronal consonants block labial vowels from harmonizing across them. Instead, these coronal consonants would rather trigger coronalization with the epenthetic vowels. Such instances of labiality blocking or coronality triggering by the palatal and alveo-palatal coronals are formalized in the following structure representations in (57) and (58).

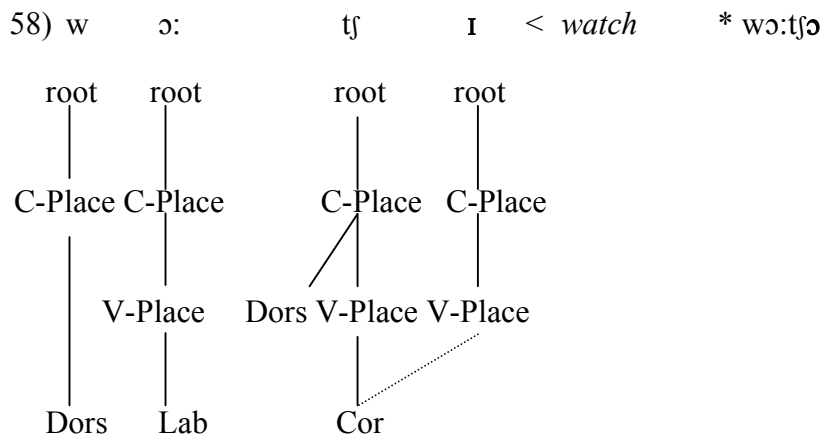
5.1.4 Palatal & alveo-palatal coronals' coronality triggering formalized

57) *Palatal and alveo-palatal coronal consonants block labial vowel harmony, but trigger coronal feature spreading.*



From (57), unlike in previous examples from which it would be predicted that there would have been labial vowel harmony between the input labial vowel /u/ and the epenthetic vowel *[u], this time such harmony is blocked and instead, consonantal/local assimilation is the preferred strategy for vowel epenthesis. The epenthetic vowel receives its place feature from the preceding coronal consonant as the input labial vowel is blocked from spreading. This is explained to result from the fact that the intervening consonant also has V-Place making spreading across it a violation of NCC discussed earlier in this chapter. From wherever the spreading from the input vowel will spread i.e. either from the vocalic place node or the feature place node, the association line will have to cross over a line of the intervening consonant.

In (58), I provide a similar example to further the explanation given above regarding the opacity of the palatal coronals.



In both representations in (57) and (58), the labial vowels harmonizing across the intervening consonants, also specified for V-Place (Cor) as in both examples above, constitutes a violation of the NCC. That is, the association line, no matter which node it emanates from, will have to cross over another line in the intervening consonant in violation of the NCC. To avoid this violation, the intervening consonant blocks the neighbouring vowel from spreading across it and instead it spreads its active coronal place feature to the epenthetic vowel as in the illustrative representations above.

To sum up, this section has discussed formalizations of place features spreading to the epenthetic vowels in loanword adaptation in Akan. Some of the straightforward cases discussed include vowel harmony, consonantal assimilation, and default vowel insertion. It has been argued that there is no default epenthesis strategy that applies in the Akan loanword but that which of the three strategies applies depends on certain factors such as the surrounding segments and also the direction to which the spreading is to take place (directionality effect). Even though the labial place feature is the most specified for spreading in Akan loanword adaptation, it may not be able to spread in two main contexts, (i) its position in the word, particularly its position in a cluster i.e. the directionality of spreading as in (48) where it is not able to spread because it is the first consonant of the word-medial cluster and feature spreads from the segment that follows the epenthetic vowel and not the one that precedes it, (ii) when followed by palatal and alveo-palatal coronals as in (57) and (58). In the latter case, it was explained that such attempt to spread across those intervening consonants which also have the V-Place node will constitute a violation of the NCC. In the next section, I give account of the formalizations made in Optimality Theory. Finally, it has

been shown that in the event of the labial feature not being able to spread as in (56), the coronal feature can spread. In the next section, I analyze some of the formalizations presented in this section in OT. In addition, I will also analyze generalizations made about consonant deletion, which applies where vowel epenthesis becomes the suboptimal strategy in OT in this same section.

5.2 Adaptation strategies in OT

In this section, I give an account of two of the main epenthesis strategies found in Akan loanword adaptation such as vowel epenthesis and consonant deletion in an optimality-theoretic (OT) model. This analysis will later in chapter 6, be compared with what has already been done in other languages such Shona (Uffmann, 2001, 2004, 2006), and Sesotho (Rose and Demuth, 2006) in the same model. In the ranking of constraints in the tableaux to be presented, it will be observed that the choice of which place feature to spread within particular contexts will depend, to a large extent, on two main factors such as the place feature of the surrounding segments and also the directionality of the spreading. The lower-ranking of the constraint against multiple linkage of the labial feature in relation to simple constraints on other place features will mean that all things being equal, the labial feature becomes the favoured feature to spread to the epenthetic vowel.

The main epenthesis strategies to be analyzed in this section within the OT framework include constraints on the quality of the epenthetic vowel in § 5.2.1 and OT on vowel epenthesis in §5.2.2 through 5.2.3. In section 5.3, I discuss OT analysis on consonant deletion, and finally in section 5.4, I present OT analysis on vowel epenthesis into consonant clusters. I will devote much attention to section 5.2 because vowel epenthesis as a repair strategy has been observed so far to be more common than the other repair strategy, consonant deletion and as such, it does some special attention.

5.2.1 Constraints on the quality of the epenthetic vowel

In the vowel epenthesis process, three main epenthetic strategies are observed in Akan loanword adaptation. The first one is consonantal assimilation. As it could be observed from the data analysis done so far, this mode of epenthesis seems to be the most preferred strategy in Akan loans adaptation as it takes precedence over vowel harmony and default vowel insertion. For instance, in almost all instances, labial consonants block coronal vowels from

spreading across them to the epenthetic sites and instead, they spread to those sites in a kind of local assimilation. The second strategy is vowel harmony. Vowel harmony thrives when the intervening consonants are non-labials. As it has been pointed out already, it is the preferred strategy next after consonantal assimilation fails to apply within a particular context in Akan loans adaptation. In most cases, we observe vowels spreading a (place) feature to the epenthetic sites only when the intervening consonants are non-labials. In other words, the epenthetic vowels harmonize with the neighbouring vowel only when the intervening consonant is non-labial. Conversely, whenever the intervening consonant is a labial consonant, then it is likely consonantal assimilation will ensue as the preferred strategy for vowel epenthesis. It is worth pointing out here that in the case of Akan loans adaptation, unlike what has been observed in Shona, Sranan, and Sesotho where the epenthetic vowels are the exact copy of the trigger segment, the feature copying is focused primarily on place feature (partial assimilation) and in the case of the trigger vowels, the ATR value, but not all the features of the trigger segments (i.e. vowels and consonants). The third epenthesis strategy is default vowel insertion of a high vowel, which has been argued in the latter part of chapter 4 to be the front high vowel /i/.

The default insertion, according to Uffmann (2001, 2004, 2006), 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. On the other two epenthesis strategies, he comments that their faithfulness to the input forms, by way of avoiding such insertion of new material, is their main strength. However, they violate the constraints against multiple linkage of features because there is always some feature(s) shared between the trigger and the target segments (be it vowel or consonant). In addition to this, while the vowel harmony strategy commits additional violation of locality, the consonantal assimilation presents dissimilar segments between the trigger (consonant) and the target (vowel), which according to Itô et al. (1995), Hume (1996), Uffmann (2006), among others, have little chances of sharing material.

The shortcomings of each of the three main epenthesis strategies such as consonantal assimilation, vowel harmony, and default vowel insertion as briefly presented above can then be transformed into OT constraints as follows in (59).

59) The three main epenthesis patterns in Akan and their constraints (building on Uffmann, 2006)

- a. DEP(F) - Output features have a correspondent in the input
(no insertion of features)
- b. *MULTIPLE - Nodes are dominated by one node exclusively
(no multiple linkage)
- c. *SKIP - Interaction is local
(segments are not skipped in multiple associations)
- d. *LINK (C,V) - Place features are not linked to both a C-Place and a V-Place node
(no place feature spreading from consonants to vowels)

The following relative rankings in (60) of the above constraints will result in making each of the three strategies the preferred epenthesis strategy or the optimal choice of strategy in Akan loanword adaptation.

60) Factorial typology of the constraints in (59) above.

- a. *MULTIPLE >>> DEP (F)

This ranking will yield default insertion as the optimal choice of epenthesis strategy.

- b. DEP (F) >>> *MULTIPLE / *LINK(C,V) >>> *SKIP

This ranking will make vowel harmony the preferred choice of epenthesis strategy. The reranking of the last two constraints in (51b) will produce a different epenthesis strategy as in (60c) below.

- c. DEP (F) >>> MULTIPLE /*SKIP >>> *LINK(C,V)

The ranking in (60c) will, on the other hand, produce consonantal/local assimilation as the optimal strategy for vowel epenthesis in Akan loanword adaptation.

Each of these constraint rankings produces a different strategy observed in the loans adaptation. However, as Uffmann (2006) observes in the interaction of the three epenthesis strategies in Shona and Sranan loanword adaptations, all the three epenthesis strategies also interact in Akan to produce its loanword grammar. For instance, superficially speaking, while the constraint ranking in (60c) results in consonantal/local assimilation as the general

epenthesis pattern observed in both Akan and Shona, the one in (60b) produces vowel harmony as the general epenthesis strategy as observed in Sesotho (Rose & Demuth, 2006). However, as it has been observed in the analysis of the loanword corpora in the three languages mentioned, the three different rankings in (60) interact to produce the different grammars in both Akan and Shona loanword adaptations since the two languages do not exhibit the same way of interaction of the same processes in the same environments. Therefore, following Uffmann (2006), there will be the need to invoke the scalar constraints on spreading adapted from Padgett (2001) to account for each of the contexts in which the spreading processes take place. Aside these markedness constraints, there will also be the need to draw some constraints from the sonority domain to adequately analyze spreading across consonants. Before I move straight into the analysis in detail, I first present the behaviour of vowels in Akan loanword adaptation on the markedness hierarchy in (61). This will help determine which of the vowels in Akan has any chance to contribute a place feature judging from their markedness status.

The following are the observations in the behaviour of Akan vowels in the native phonology.

- 61) a. Low/dorsal vowels do not spread.
- b. Rounded/labial vowels are preferred to spread.
- c. Front/coronal vowels likely to spread when (b) fails.

Since it is the labial feature that is more prone to spread in the Akan loanword adaptation, following de Lacy (2006), I propose the following hierarchy for feature spreading in Akan loanword adaptation in (62).

- 62) |Labial > Coronal > Dorsal|

From (62), the inference from the behaviour of vowels in Akan loanword based on the markedness hierarchy is that the round or the labial vowel is the marked vowel to spread feature, while the dorsal vowel becomes the unmarked vowel to spread. The coronal vowel, on the other hand, is juxtaposed between the labial vowel and the coronal vowel and becomes less marked to spread feature. It spreads feature only when the labial vowel does not spread.

The markedness hierarchy for the feature that spreads observed in Akan loans adaptation basically differs from that of Shona (Uffmann, 2001, 2004, 2006) and Sesotho (Rose & Demuth, 2006). Whereas Akan prioritizes the labial feature as the preferred feature for spreading, Shona and Sesotho, on the other hand, prioritize the spreading of the coronal feature.

Now fusing the markedness hierarchy for place of articulation (PoA) for Akan loanword in (62) with the markedness constraints on feature spreading in (59b) - (59d) (by using the anti-multiple linkage constraint *MULTIPLE), we get the constraint ranking in (63) to account for the vowel epenthesis pattern observed in Akan loans adaptation.

63) *MULT (Dor) >> *MULT (Cor) >> *MULT (Lab)

The prediction from the ranking in (63) is that in Akan loanword adaptation, the feature Dorsal which does not spread (place) feature is the unmarked feature to spread, while the feature Labial is the marked feature to spread to the epenthetic vowel in that hierarchical order. The Coronal feature becomes the less marked to spread feature, only when Labial does not. By ranking the constraint against multiple linkage of the labial feature; *MULT (Lab) below the constraint the against spreading of the coronal feature *MULT (Cor) will mean that all things being equal, we would expect the labial feature to always spread at the expense of the coronal feature to fill the epenthetic slot. However, this generalization seems to work perfectly when the epenthetic feature is to spread from one direction as in epenthesis to repair illicit word-final obstruents. As we will see later on in this section, additional constraints regulating the directionality from which the epenthetic feature should come will settle the issue of clusters involving segments with the labial and the coronal features respectively as observed in the example (56). In (56), going by the ranking in (63), we would expect the suboptimal candidate with the form [*kɔmpuliti] to emerge as the winner instead of what is the actual adapted form [kɔmpiliti]. It will be proposed later in the discussion that constraints from the general Alignment family (Itô & Mester, 1994; Prince & Smolensky, 1993, 2004, etc) will help decide which of the two potential segments, i.e. the labial consonant /p/ or the neighbouring coronal vowel /i/ is to contribute its place feature to the epenthetic vowel.

Now scaling it down to the special cases of the constraints against multiple linkage of features in the epenthesis strategies such as consonantal assimilation and vowel harmony, I propose a parallel organization of the hierarchically ordered PoA constraints on feature spreading in (59b) and the markedness constraint against consonantal assimilation as in (59d) *LINK (C,V) in (64) below following Uffmann (2006).

64) *LINK (C,V)/dor >> *LINK (C,V)/cor >> *LINK (C,V)/lab

We can predict from the constraint ranking in (64) that spreading from dorsal consonants is the unmarked feature epenthesis (in the case of Akan loanword adaptation, also attested in Shona and Sranan by Uffmann, 2004, 2006, and in Sesotho by Rose & Demuth, 2006. They do not spread at all). On the other hand, labial consonants are the marked ones to spread their place feature into the epenthetic site in the Akan loanword adaptation.

As it has been observed in the data analyzed so far, feature spreading across an intervening consonant does not thrive on the sonority of the intervening segment per se, but rather the place of articulation of such intervening segments. We have observed that the coronal vowels harmonize across all intervening consonants except labial consonants. In almost all the cases analyzed so far, it is only the labial vowels that can spread across all consonants of any place of articulation with the exception of palatals. Coronal vowels, on the other hand, can spread across all consonants except when followed by labial consonants in which case there will rather be consonantal assimilation (i.e. local assimilation) than vowel harmony involving coronal vowels. In constraint ranking to account for the vowel harmony, also another special case of multiple linkage of feature, following Uffmann (2006), the constraint against skipping intervening segments in multiple association, *SKIP would have to account for this scenario. However, for economy reasons, I believe the constraint ranking in (63) can adequately account for this situation without adding more constraints.

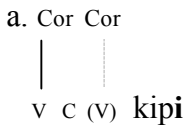
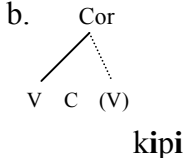
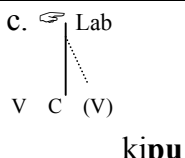
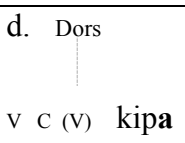
Having discussed the constraint set that will be used for the analysis in the tableaux in the following section, I move on to present an account for vowel epenthetic strategies observed in the Akan loanword adaptation observed so far.

5.2.2 OT on vowel epenthesis

In this subsection, I provide detailed analysis with illustrative tableaux to account for the epenthesis strategies discussed so far in the Akan loanword adaptation processes starting with vowel epenthesis.

In the previous section, the consonantal or local assimilation (CA) was identified to be the general vowel epenthesis strategy observed in Akan loans adaptation. Similar observation in this regard has also been made in Shona where consonantal assimilation is the general vowel epenthesis strategy in its loanword phonology (Uffmann, 2001, 2004, 2006). This means in most of the cases, spreading of place feature to the epenthetic vowel is preferred between a consonant and the epenthetic vowel. Therefore, what we can infer from this mode of place feature spreading is that the general constraint against feature spreading *MULTIPLE should be ranked below the constraint against feature insertion DEP (F) since the feature of the epenthetic vowel has a correspondence in an input segment. Moreover, as we have observed already, default vowel insertion applies within a very limited context. To start with the candidates' analysis, I present the following tableau in (65) to illustrate what has been said so far as I begin some detailed discussions on the two repair strategies; vowel insertion and consonant deletion. In candidate (a), there is a default vowel insertion, in candidate (b), there is vowel harmony, while in candidate (c), there is always consonantal assimilation. Candidate (d) represents a special form of default vowel insertion as in candidate (a). The inserted segments in the feature representations are in parenthesis. All the segments that interact in the candidates are shown in bold face. This practice is maintained throughout this section of the thesis. The tableau in (65) is proposed to account for consonantal/local assimilation to repair illicit word-final obstruent.

65) *Tableau for Consonantal/local assimilation*

'keep' /kip/	*MULT (Dors)	DEP (F)	*MULT (Cor)	*MULT (Lab)
a.  v C (V) kipi		*!		
b.  v C (V) kipi			*!	
c.  v C (V) kipu				*
d.  v C (V) kipa		*!		

From the tableau above, candidates (a) and (d) are ruled out completely because they fatally violate the high-ranked DEP(F) constraint i.e. the constraint against insertion of features. The competition for the optimality therefore falls to candidate (b) and candidate (c). Candidate (b) loses out on the optimality because though it violates the same number of constraints as the eventual winner, candidate (c), it violates a crucially-ranked constraint against multiple linkage of the coronal feature *MULT(Cor). This makes the violation of the lowest-ranked constraint; *MULT(Lab) by candidate (c) irrelevant in affecting its optimality. Candidate (c), which exhibits assimilation of the labial feature into the epenthetic site therefore, emerges as the winner. This, therefore, means consonantal assimilation (local assimilation in this instance) is the preferred epenthesis strategy in tableau (65). The proposed ranking for the constraints in (65) is as follows: *MULT(Dors)/ DEP(F)/ *MULT(Cor) >> *MULT(Lab). The relative ranking of DEP(F) and *MULT(Cor) means that even their relative reranking will not affect the winner candidate in any way. In a similar vein, the relative ranking of DEP(F) and *MULT(Cor) means that candidate (b) is as bad as candidates (a) and (d).

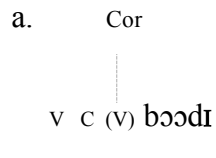
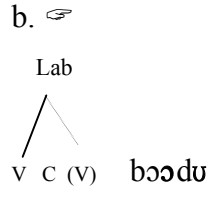
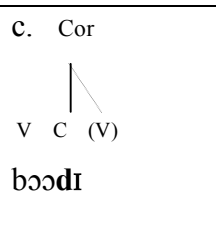
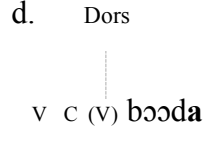
The above example has discussed an instance where the labial feature from an intervening labial consonant has spread into the epenthetic site by way of consonantal assimilation as the epenthesis strategy, but not vowel harmony involving coronal vowels. In the next tableau, I account for a situation where the intervening consonant becomes transparent to vowel harmony.

5.2.3 Skipping the intervening consonants

As it was claimed in the first part of this chapter on the representations for the formalization of the epenthetic patterns observed in Akan loanword adaptation, intervening non-labial consonants i.e. coronals (factoring out the alveo-palatal and palatal affricatives/fricatives) and dorsals are always transparent to labial vowel harmonizing across them. However, the converse is not the case. From the observations made so far, intervening labial consonants always block coronal vowels from spreading across them. In (66), the epenthetic vowel skips the intervening coronal consonant to harmonize with the neighbouring labial vowel.

From the tableau in (66), again both candidates (a) and (d) are ruled out on the grounds that they fatally violate a high-ranked DEP(F). Candidate (c), which shows interaction between the input obstruent coda and the epenthetic vowel fails to win the competition because there is another candidate that bests it by violating a lower-ranked constraint *MULT(Lab). The decision on the winner candidate drops to the last two constraints. Candidate (b) competes out candidate (c) because while the former violates the lowest-ranked constraint, the latter, on the other hand, violates a relatively higher-ranked *MULT(Cor) by sharing its input coronal place feature with the epenthetic vowel. Candidate (b), which shows labial feature spreading across an intervening coronal consonant, becomes the optimal candidate. Vowel harmony then becomes the optimal strategy for vowel epenthesis in this example. The proposed ranking for the tableau above on vowel harmony is as follows: *MULT(Dors) /DEP(F)/ *MULT(Cor) >> *MULT(Lab). Both *MULT(Dors) and DEP(F) cannot change the winner candidate but instead, it is the (re)ranking of *MULT(Cor) and *MULT(Lab) that can impact on the choice of the optimal candidate.

66) *Vowel harmony skipping intervening coronal consonant*

'ball' / bəl /	*MULT (Dors)	DEP (F)	*MULT (Cor)	*MULT (Lab)
a. Cor 		*!		
b. 				*
c. Cor 			*!	
d. Dors 		*!		

In tableau (66), we have seen a constraint ranking for vowel harmony where it has been realized that unlike in the previous tableau where the intervening labial consonant blocks a coronal vowel from harmonizing, in this example, the intervening coronal consonant was transparent to labial vowel harmony. In (67), we will see another example akin to (65) where an intervening labial consonant /f/ blocks preceding coronal vowel from spreading across it to the epenthetic vowel. This example further strengthens the point made earlier in this section that the sonority of the intervening consonant does not matter much in Akan loanword as it does in Shona.

In the tableau in (67), two candidates that show default insertion of a segment are eliminated from the competition for the optimality among the candidates for violating the high-ranked DEP(F) constraint. Going by the argument being made in this thesis regarding the labial segments, coupled with the further illustration made in example (65), whenever a labial

consonant occupies the word-final position as in the input of the tableau in (67) the usual repair strategy is spreading of the labial feature from the word-final labial to the epenthetic vowel. It is on this ground that candidate (b), which shows vowel harmony between the input coronal vowel and the epenthetic coronal vowel loses out on the optimality to candidate (c) which applies consonantal (local) assimilation as its epenthetic strategy. Here again, the candidate that displays blocking of vowel harmony, and instead shows consonantal assimilation wins the competition. The proposed constraint ranking for the tableau in (67) therefore becomes as follows: *MULT(Dors) / DEP(F) / *MULT(Cor) >> *MULT(Lab). Both *MULT(Dors) and DEP(F) do not count in the decision on the optimal candidate since their reranking will not affect the optimality of candidate (c). Similarly, candidates (a) and (d) are ranked on the same stratum as candidate (b). The decision therefore falls to the constraints *MULT(Cor) and *MULT(Lab) each of which is violated by both candidate (b) and candidate (c) respectively. Since the former constraint outranks the latter, violating the former becomes more fatal. Candidate (b) loses for fatally violating the higher-ranked constraint *MULT(Cor).

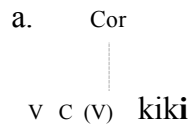
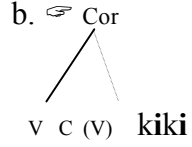
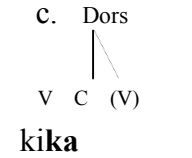
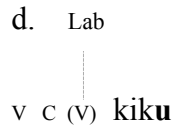
67) *Consonantal/local assimilation can also block vowel harmony*

'receive' /risiv/	*MULT (Dors)	DEP (F)	*MULT (Cor)	*MULT (Lab)
a. Cor v C (v) risiifi		*!		
b. Cor v C (v) risiifi			*!	
c. Lab v C (v) risiifu				*
d. Dors v C (v) risiifa		*!		

It is not always the case that intervening consonants block the epenthetic vowel from harmonizing with the lexical or neighbouring coronal vowel. In the next example, we look at an instance where the intervening consonant becomes transparent to coronal vowel harmony as in (68) below.

From the discussions made so far, it has been argued that as it has been universally claimed, dorsal segments do not trigger assimilation. In the tableau in (68), with a dorsal consonant in the word-final position in the input, this time the two candidates that resort to default vowel insertion as in candidates (a) and (d) fare better than candidate (c) which spreads the dorsal feature to the epenthetic vowel. Candidate (a), though inserts the default vowel after the dorsal consonant, the insertion is done without the right context. The default insertion, as has been observed from the data discussed so far applies only when the surrounding segments specified for place feature contribution are not in a position to do so. However, in the input in this tableau, the preceding vowel can spread place feature in the circumstance. Therefore, the candidate with vowel harmony becomes the optimality candidate. With the elimination of the other three candidates i.e., candidates (a), (c), and (d), the optimality easily falls to candidate (b), which spreads coronal feature across the intervening consonant into the epenthetic site. The following ranking is proposed for the tableau below: *MULT(Dors) /DEP(F) >> *MULT(Cor) >> *MULT(Lab). The first two constraints again play no significant role in selecting the optimal candidate. And since the other three candidates violate these two constraints, the decision automatically falls on next higher-ranked constraint *MULT(Cor), which is violated by the winner candidate. The lower-ranked constraint *MULT(Lab), also plays no crucial role as all the candidates in the tableau satisfy it. However, unlike the previous three tableaux discussed, the reranking of DEP(F) and *MULT(Cor) will result in two suboptimal candidates, candidates (a) and (d) emerging as the joint-winners of the competition for the optimality. Hence, the need for the ranking of the two constraints in the tableau in (68) to rule out either of the two suboptimal candidates from winning the competition.

68) *When consonantal assimilation fails, vowel harmony applies*

'kick' /kik/	*MULT (Dors)	DEP (F)	*MULT (Cor)	*MULT (Lab)
a. 		*!		
b. 			*	
c. 	*!			
d. 		*!		

It is not always the case that vowels spread across word-final dorsals to harmonize with the epenthetic vowel. As it has been discussed already, when the low vowel precedes the velar consonant, it results in default vowel insertion. In the next subsection, I discuss default insertion in constraints and provide a tableau to account for the strategy which applies when either consonantal assimilation or vowel harmony fails to apply.

5.2.4 Default vowel insertion (DVI)

Having looked at the two epenthesis strategies that apply in Akan loanword adaptation such as consonantal/local assimilation and vowel harmony, I now turn to provide OT analysis for the third strategy, default vowel insertion as an epenthesis strategy for repairing illicit word-final obstruents in Akan loanword adaptation. As it was discussed earlier in the previous chapter as well as in section 5.1, the sequence of a low vowel /a/ and a word-final velar in the input form is repaired by epenthesis of the default high front vowel /ɪ/. To account for the inactiveness of the low vowel (dorsal) /a/, we need additional constraints that will ban the

vowel from spreading or harmonizing with the epenthetic vowel. Two constraints from the Output constraints for the major PoA based on the PoA hierarchy (de Lacy, 2006:3; etc) are stated below.

69) Output constraints for major PoA

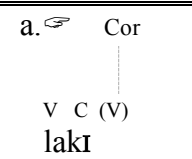
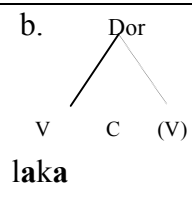
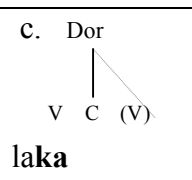
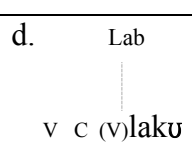
- a. *{dors, lab} ‘Assign a violation for each [dorsal] and each [labial] feature’.
- b. *{dors, lab, cor} ‘Assign a violation for each [dorsal], each [labial], and each [coronal] feature’.

With these two additional constraints, I provide the tableau in (70) to account for a case in the Akan loanword adaptation process where the candidate with the default vowel insertion becomes the optimal candidate.

In the tableau in (70), the two candidates with the previously discussed two epenthesis strategies such as vowel harmony and consonantal assimilation as in candidates (b) and (c) respectively are eliminated for their fatally violation of the highest-ranked constraint, *MULT(Dors). While in candidate (b) there is a copy of the input vowel into the epenthetic site, in candidate (c), there is a spread of the dorsal feature from the intervening dorsal consonant into the epenthetic site. Candidates (a) and (d) are therefore left to vie for the optimality slot. Though both candidates violate the high-ranked constraint against insertion of foreign material, DEP(F), the decision on the winner candidate is not made by this constraint. It is rather a low-ranked constraint; *{dors, lab} that makes the decision. Again, both competing candidates violate this deciding constraint, but the judgment of the optimality is made on gradient grounds. While candidate (a) violates this constraint twice for having two dorsal segments, candidate (c) violates it thrice and loses out for having an additional violating epenthetic labial vowel. Candidate (a) therefore becomes the automatic winner of the competition. As it can be observed from the candidates in the tableau below, the crucial difference between candidate (a) and candidate (d) is the shape of the epenthetic default vowel. The following is the ranking proposed for the tableau in (70) below: *MULT(Dors) >> DEP(F) >> *MULT(Cor) / *MULT(Lab) >> *{dors, lab} / *{dors, lab, cor}. From the constraint ranking proposed, it comes out that two rankings or rerankings will not affect the optimal candidate in the tableau. The first one is the reranking of the constraints *MULT(Cor) and *MULT(Lab) which are not violated by any of the candidates. The second

one is the reranking of the last two constraints, *{dors, lab} and *{dors, lab, cor}. The latter is violated equally by all the candidates i.e. by the same number of time. Therefore, its swapping in position with the former constraint, *{dors, lab} will still produce the correct optimal candidate.

70) In /a/ + velar consonant sequence: Insert the default high front vowel

'lack' /lak/	*MULT (Dors)	DEP (F)	*MULT (Cor)	*MULT (Lab)	*{dors, lab}	*{dors, lab, cor}
a.  lakt		*			**	***
b.  laka	*!				***	***
c.  laka	*!				***	***
d.  laku		*			***!	***

5.3 Vowel epenthesis into consonant clusters

So far the discussion and the analysis have centred on repair strategy in coda positions i.e. repairing illicit word-final obstruents through vowel epenthesis. All the tableaux we have looked at have shown us the quality of the epenthetic vowel which is determined by the neighbouring segments. In the next discussion, I look at another repair of illegality through vowel epenthesis, but this time it is a repair of clusters. It would be recalled from the discussion on the syllable structure in Akan in chapter 2 that a sequence of obstruents in the source forms is not allowed in the adapted. To repair such illegality, two strategies apply depending on the position of such clusters in the word. In clusters in both word-initial and

word-medial positions, it is usual vowel epenthesis that applies to repair it, while very often consonant deletion is resorted to in repairing such clusters in word-final positions. In the next two subsections, I discuss the repair strategy through vowel epenthesis into word-initial and word-medial positions.

5.3.1 Vowel epenthesis into word-initial clusters

Since word-initial and word-medial clusters are repaired through epenthesis and not deletion, three additional constraints to the previous ones used to determine the quality of the epenthetic vowel (which will not be repeated in the following tableaux) will be useful here to account for the process. Two structural wellformedness constraints that will ban a sequence of obstruents as well as word-final obstruents in the source forms such as *COMPLEX and CODACOND (Prince & Smolensky, 1993, 2004; McCarthy & Prince, 1993a, Itô, 1988; Itô & Mester, 1994; Kager, 1999; among others) will be needed. These constraints will penalize any candidate that keeps faith with the input form by preserving such sequence of obstruents and word-final obstruents. Another constraint that will be useful in this regard is MAX-IO, the constraint from the Correspondence Theory (McCarthy & Prince, 1995; Kager, 1999, among other) that maps the input forms to the output forms (adapted forms). This constraint will penalize any candidate that deletes a segment present in the input, in the output form. The constraints have been defined as follows in (71) below.

The following are the faithfulness constraint in (71a) and the markedness (structural) constraints in (71b,c) to account for the vowel epenthesis into word-initial and word-medial clusters observed in the Akan loanword dataset.

- | | |
|---------------|--|
| 71) a. MAX-IO | Every segment of the input has a correspondent in the output.
(McCarthy & Prince, 1995; Kager, 1999, etc) |
| b. *COMPLEX | No more than one C or V may associate to any syllable position node. (Prince & Smolensky, 1993, 2004; Kager, 1999, etc) |
| c. CODACOND | A coda consonant can have only Coronal place or place shared with another consonant. (Itô, 1988; Itô & Mester, 1993a, 1994; Prince & Smolensky, 1993, 2004; McCarthy & Prince, 1993a; etc) |

Now with these additional constraints, the input form with either word-initial or word-medial clusters will have the clusters broken up instead of reduced as in the tableau in (72), in which all the candidates that preserve the cluster in the output forms fatally violate the undominated *COMPLEX constraint. In a similar vein, any candidate that maintains the final obstruent in the output also fatally violates another high-ranked constraint, CODA COND. Similarly, any candidate that satisfies the structural wellformedness constraints by way of resorting to the reduction of the word-initial cluster is penalized because of the relatively high ranking of MAX-IO above DEP-IO. With these constraints and their rankings in mind, let us consider some illustrative examples in the following tableaux in (72) and (73) below. In evaluating the candidates, both candidates (a) and (c) are ruled out for their fatal violation of the highest-ranked *COMPLEX constraint. Candidate (d) follows out of the competition for violating the next high-ranked CODA COND constraint. The next casualties are three candidates, (e), (f), and (g) who violate the same constraints with the same number of times. They fatally violate the last two constraints, but it is their violation of the crucially ranked MAX-IO that gives the optimality out to candidate (b), who violates the lowest-ranked DEP-IO more than once. The proposed ranking for the tableau in (72) is as follows: Ranking for the optimal winner: *COMPLEX/CODA COND >> MAX-IO >> DEP-IO. This ranking is the same for the tableau in (73).

72) *Word-initial C₁+ C₂ cluster : Insert a vowel, do not delete*

'stop' /stɔp/	*COMP LEX	CODA COND	MAX-IO	DEP-IO
a. stɔp	*!	*		
b. sɔtɔpu				**
c. stɔpu	*!			*
d. sɔtɔp		*!		*
e. tɔpu			*!	*
f. sɔtɔ			*!	*
g. sɔpu			*!	*

73) Word-initial C₁+ C₂ cluster : Insert a vowel, do not delete

'stamp' /stamp/	*COMP LEX	CODA COND	MAX-IO	DEP-IO
a. stamp	*!	*		
b. \leftarrow sitamp \cup				**
c. stam	*!		*	
d. stamp \cup	*!			*
e. tamp \cup			*!	
f. sitam			*!	*
g. samp \cup			*!	*

From hindsight, based on the discussions made so far, within any context when there is the labial feature in the environment, it is expected to spread into the epenthetic site. However, in word-medial clusters involving a sequence of the labial consonant /p/ and the liquid /l/ followed by the coronal vowel, it is the coronal vowel, and not the labial consonant as expected, that spreads into the epenthetic site. This unexpected spreading of the coronal feature in a context where the labial feature is present is proposed to be accounted for within the OT framework to result from the higher ranking of the constraints, AGRR above AGRL, while ranking the alignment constraint CRISPEGE very lowly. I discuss this exceptionality in detail in the subsection 5.3.2 below. Later on in this chapter, I will show why through constraint interaction, epenthesis of the coronal feature, at the expense of the labial feature, within the context is the optimal option by proposing additional constraints to account for this situation.

5.3.2 Vowel epenthesis into word-medial clusters.

So far in all the tableaux where there is neighbouring labial segment in the environment, we see the dominance of the labial feature over the other place features to spread. However, it is not always the case that the labial segment dominates in terms of contributing place feature. As we saw in example (56) of section 5.1, in a sequence of /p/ and /l/, followed by the

coronal vowel /i/ in a word-medial position as in the adapted form [kɔmpiliti] ‘to complete’, we realized in the structure representation that it was rather a coronal vowel, and not a labial vowel that filled the epenthetic slot. This exceptionality poses a challenge to the generalization which has been made in this thesis about the dominance of the labial feature within all contexts, and also our constraint ranking on the quality of the epenthetic vowel that always seeks to rank the *MULT(Cor) constraint above the lowest-ranked *MULT(Lab) in order to give preference for the labial feature to share place feature with the epenthetic vowel. In tableau (74) below, I provide an example of such an adapted form with a repaired word-medial cluster where an unexpected coronal feature, instead of the labial, spreads into the epenthetic site. This makes our constraint rankings above run into problem because it would produce a suboptimal candidate that spreads feature from the initial labial consonant /p/. This is when the constraints that were used in the earlier tableaux to determine the quality of the epenthetic vowels are ranked below those in (73) above in tableau (74) below. Candidates (b) and (d) will tie at DEP-IO, but candidate (d) will emerge the winner when the decision is to be made by *MULT(Cor) and *MULT(Lab)- not repeated in the tableau. The relatively higher ranking of *MULT(Cor) over *MULT(Lab) will make the expected winner, candidate (b) lose out the the suboptimal candidate (d). The ranking for the tableau in (74) that produces the suboptimal candidate becomes as follows: *COMPLEX /CODACOND >> MAX-IO >> DEP-IO >> (*MULT(Cor) >> *MULT(Lab)).

74) Word-medial C₁+ C₂ cluster : Insert a vowel, do not delete

‘complete’ /kɔmplit/	*COMP LEX	CODA COND	MAX-IO	DEP-IO
a. kɔmplit	*!	*		
b. ^ɛ kɔmpiliti				**
c. kɔmpliti	*!			*
d. ^ɰ kɔmpuliti				**
e. kɔmliti			*!	*
f. kɔmputi			*!	**

In the next section, I discuss a repair of another cluster, but this time word-final clusters in Akan loanword adaptation within the OT framework. The strategy that usually applies to the repair of word-final clusters, unlike the previous strategies discussed, is the deletion of a consonant in the clusters. This strategy applies along side the vowel epenthesis in repairing word-final clusters.

5.4 Consonant cluster reduction and vowel epenthesis in OT

In this section, I give an account of conditions under which consonant deletion and vowel epenthesis observed in the Akan loanword data apply side by side in adapted forms within the OT framework. I will provide illustrative tableaux to facilitate the discussions to be made in this section. Regarding deletion of segments in clusters, in the adaptation process, two main observations are made in this respect. First, it is worth noting that in almost all cases, it is a segment in the word-final clusters that gets deleted. Word-initial and word-medial clusters are usually repaired through vowel epenthesis. Second, from the Akan data, it is not always straightforward to tell which of the consonants forming the clusters deletes except perhaps by the sonority of the target consonants. Superficially, it can be explained that deletion, instead of epenthesis, applies perhaps due to two main factors, (a) to attain phonetic/articulatory match between the input form and the adapted form; and (b) for economy reasons- to adapt inputs into the bearest minimum syllables in the adapted forms. From the data provided below, it is observed that usually it is two different kinds of segments in the clusters in two different positions in the clusters that get deleted. The first one is where the second consonant in the cluster is deleted as in (75) below, and the second situation is where the first consonant in the cluster is deleted as in (76)- most of the examples repeated here are from chapter 4.

When the C₂ of the final CC is deleted

- | | | |
|-------------|------------|----------|
| 75) a. posu | ‘to post’ | * posutu |
| b. bosu | ‘to boast’ | * bosutu |
| c. pesi | ‘to paste’ | * pesiti |

When the C₁ of the final CC is deleted

- | | | |
|--------------|-----------|----------|
| 76) a. hɔ:tu | ‘to halt’ | * hɔlotu |
|--------------|-----------|----------|

- b. wɔ:kʊ ‘to walk’ * wɔlʊkʊ
- c. rɪpɔ:tʊ ‘to report’ * rɪpɔrɔtʊ
- d. kɔnta:tɪ ‘to contact’ * kɔntakɪtɪ

With the exception of (76d), all the consonants that delete are liquids and also the first or initial consonant of the cluster. It is also noteworthy that there is compensatory vowel lengthening after the deletion in the examples in (76). The two factors mentioned in the introduction of this section observed in the deletion process determine whether first, every single segment in the input form should have a correspondent in the output (adapted) form and instead the grammar should resort to vowel epenthesis to repair the illicit word-final clusters, or second, the clusters are reduced by way of deletion. For the second part, if the consonants are to be reduced, then the follow up question is, which of the two is to delete while still perserving the phonetic or the articulatory match between the input form and the adapted form. The rest of this section discusses these issues in detail and it will be observed that the resolution to these issues is made by constraint ranking which determines which consonant is deleted and which one is preserved.

Starting with the deletion process observed in (75), one of the explanations could be drawn from the markedness theory with particular reference to recent works by de Lacy (2006); Rice (2007), etc., in addition to the demand to preserve a match between the input and the adapted forms. It can be argued from Broselow and Finer’s (1991) Sonority Hierarchy concept that the alveolar stop /t/, which is among the least sonorous segments is more marked than the alveolar fricative /s/ on the sonority hierarchy. This therefore explains why the former will be deleted, while the latter is preserved due to what de Lacy (2006) terms ‘markedness reduction’. Similar observations have been made by Rice (1991a,b), de Lacy (2002a), among others in other languages where on sonority grounds, fricatives are maintained at the expense of stops.

In (76) however, unlike the previous case, the deletion results in assimilation. The trigger and the target segments seem to be the preceding vowels and the first consonant of the cluster respectively. Following Mohanan (1993), de Lacy (2002a, 2006), etc, it can be explained that by assessing the two segments, the triggering input vowels and the targeted first consonants

are on two common hierarchies- voicing and sonority. While the former is less marked than the latter on the sonority hierarchy, the markedness of the two can be conflated on the voicing hierarchy. Even though the targeted consonants (except the velar one in (76d)) are at least phonetically coronals, and as such more marked in relation to the triggering vowels (labial and dorsal) on place of articulation (PoA) hierarchy, the sonority hierarchy seems to take precedence over the PoA hierarchy in this case. This should explain why the target consonants assimilate into the preceding vowel, and the latter lengthens in compensation for the consonant ‘lost’. This, Baković (2000) argues is a kind of markedness reduction where fewer feature values (of the trigger vowel and the targeted consonant) would mean fewer violations of markedness. Rice (2007) also makes a similar argument from the analysis of Mackridge’s (1985) work on Modern Greek vowel deletion that while marked features within a class are maintained, unmarked features on the other hand, are eliminated. To account for the asymmetry in which of the word-final consonants that form the clusters deletes, I adopt constraints from the contiguity constraints as in (77) in addition to those constraints which have been used for the epenthesis into the clusters discussed above.

The following are the markedness constraints to account for the two different modes of deletion of consonants in clusters observation in Akan loanword dataset in (75) and (76) above.

77) Constraints from Prince & Smolensky (1993, 2004), McCarthy & Prince (1995:295), Morén (2006) on Contiguity from the Correspondence Theory.

- | | |
|-------------|--|
| a. I-CONTIG | The portion of input (S_1) standing in correspondence forms a contiguous string. (“No Skipping”) |
| b. O-CONTIG | The portion of output (S_2) standing in correspondence forms a contiguous string. (“No Intrusion”) |

For economy and space reasons, I will not reproduce all the constraints that were used in the previous subsection in the following tableaux. Since the focus of this section is not primarily on epenthesis into clusters, but on which of the consonants in the word-final cluster deletes, I assume that once the same epenthetic vowels are used throughout in all the candidates in a particular tableau, there will be no need to over expand the tableaux by repeating all of those

constraints in the following tableaux. The essential ones that will be needed include *COMPLEX, CODACOND, and MAX-IO. Unless otherwise stated, this economy practice is maintained for the rest of this section.

In the following example, I present a tableau to analyse the cases we saw in (75) where the C₂ in the word-final cluster is deleted in (78) below.

In the tableau below, the repair strategy is a reduction (deletion), and not epenthesis in the cluster. This, therefore, means all the candidates that resort to epenthesis into the clusters, instead of reducing them are ruled out. So candidate (b), which epenthesizes is ruled out. However, it is a better candidate than those candidates such as (a) and (f) that maintain the illicit cluster. Between candidate (a) and candidate (f) on the other hand, the latter, though ruled out, outperforms the former by satisfying the highest-ranked constraint, *COMPLEX. The competition for the optimality therefore scales down to candidates (c), (d), and (e). The decider constraint becomes MAX-IO which is violated by all the three candidates. Candidate (e) falls out of the competition because it violates that constraint twice, more than the other two do, by deleting the whole cluster of consonants. This leaves the choice between the two candidates that delete only one consonant of the cluster. The competition for the optimality between candidate (c) and candidate (d) is finally decided by the lowest-ranked constraint, I-CONTIG, which is fatally violated only by the former candidate that deletes the first consonant of the cluster. This, therefore, hands the optimality to candidate (d), which deletes the first consonant of the cluster instead. I propose constraint ranking for the example in the tableau in (78) as follows: *COMPLEX / CODACOND >> O-CONTIG >> MAX-IO >> I-CONTIG. From the tableau above, it is only the reranking of *COMPLEX and CODACOND, which are violated only by the two suboptimal candidates (a) and (f) that will not affect the optimality of candidate (d).

78) *Word-final C₁+ C₂ cluster : Delete C₂*

‘post’ /post/	*COMPLEX	CODA COND	O-CONTIG	MAX-IO	I-CONTIG
a. post	*!	*			
b. posutu			*!		
c. potu				*	*!
d. \varnothing posu				*	
e. po				*!*	
f. postu		*!			

In the next tableau, I present an example of the other case of consonant cluster reduction just seen in the data in (76) where the first consonant of the cluster rather deletes. The next discussion also focuses on cluster reduction in word-final position as in the previous one in (80) below, but this time the deletion involves a consonant of different position in the cluster. While it was the second consonant of the cluster that was deleted in (78) above, it is going to be the first consonant of the cluster that will be deleted in (80). The same set of constraints and their ranking as in (78) will not select the optimal candidate to reflect the latter scenario. Therefore, additional constraints to help select the right candidate without having to rerank the constraint set will be introduced. The tableau for the data in (76) has the constraint *{dors, lab} introduced to help decide on the optimal candidate. I present this constraint on PoA hierarchy following de Lacy (2002a, 2006) who built on others, etc. in (79) below.

79) *{dors, lab} ‘Assign a violation for each [dorsal] and each [labial]
feature’ (de Lacy, 2002a, 2006; etc.)

In (80) below, I present the tableau and its analysis of the constraint set to account for the case where the first of the consonant clusters is deleted as in (76) above.

For the analysis of the various competing candidates, candidate (a) becomes the worst candidate since it remains faithful to the input form by perserving the illicit word-final cluster. By keeping faith with the input form, it very fatally violates the two highest- ranked

constraints, *COMPLEX and CODA COND in that order and it is ruled out of the competition. Candidate (b) follows to fall out of the competition also by violating another high-ranked constraints, O-CONTIG. Even though it satisfies the phonotactic rules in the language and also applies the right epenthesis strategy by inserting the default vowel within this particular context as it has been analyzed in tableau (70), usually the language resorts to consonant deletion, not vowel epenthesis, in repairing word-final clusters. This leaves only three candidates; candidates (c), (d), and (e) to vie for the optimality in the tableau. And among the three, candidate (e) becomes the worst candidate for violating the next high-ranked MAX-IO, which prohibits deletion of segments which have correspondents in the input in the output forms. Though all the three candidates fall foul to this constraint, it is candidate (e) which suffers most for violating it twice as against the once by the other two candidates. The next constraint, *{dors, lab} then decides on the winner between candidate (c) and candidate (d). The former candidate wins by violating this constraint only thrice as against the four times that the latter constraint fatally violates. Even candidate (c) violates another lower-ranked constraint which is not violated by candidate (d), its lower- ranking does not affect the former's optimality. From the tableau, without the addition of *{dors, lab}, the suboptimal candidate (d), which deletes the second consonant in the cluster as observed in the first case would have won the competition. The ranking for the tableau in (80) below is proposed as follows: Ranking: *COMPLEX / CODA COND >> O-CONTIG >> MAX-IO >> *{dors, lab} >> I-CONTIG.

80) Word-final $C_1 + C_2$ cluster : Delete C_1

/kɔ̃ntakt/	*COMPLEX	CODA COND	O-CONTIG	MAX-IO	*{dors, lab}	I-CONTIG
a. kɔ̃ntakt	*!	*			****	
b. kɔ̃ntaktı			*!		****	
c. kɔ̃ntatı				*	***	*
d. kɔ̃ntakı				*	**!*	
e. kɔ̃nta				*!*	***	

Now having looked at deletion in word-final clusters affecting the first consonant in the cluster, I provide another example where the constraint ranking in (80) will not produce the optimal candidate unless another constraint is added.

The additional constraint to those used in (80) will be drawn from onset sonority constraints based on Prince & Smolensky's (2004) natural hierarchy of margins. On the hierarchy of margins, ONS/O(bstruent), which requires onsets of syllables to be obstruents is higher on the onset hierarchy than ONS/L(liquid); requiring onsets of syllables to be liquids. Therefore, the inclusion of the constraint *ONS/L (Zec, 2007), which prohibits onsets to be liquid, will make sure that all non-obstruent onsets violate this constraint and this will help in the selection of the right optimal among competing candidates. Especially in the tableau in (81), it will help settle the antagonism between candidate (81c) and candidate (81d). For reasons of space and since the constraint *ONS/O will not play any important role in the selection of the optimal candidate, I leave it out of the constraint set in the tableaux following in the meantime except when it becomes necessary.

From the tableau below in (81), just as it was in (80), the candidates that preserve all segments in the input and those that resort to vowel epenthesis are ruled out of the competition from the start as in candidates (a) and (b) respectively. Candidate (e) also, similar to counterpart in (80) gets out of the competition. The choice of optimality between candidate (c), which deletes that last obstruent and has a liquid onset, and candidate (d), which on the other hand, deletes the first liquid consonant and has an obstruent as a syllable onset is made by the added constraint, *ONS/L which outranks I-CONTIG. By fatally violating the former constraints, candidate (c) loses out on the competition for the optimality to candidate (d), which though violates the additional lower- ranked constraint. The ranking of the constraints will thus look like: *COMPLEX / CODACOND >> O-CONTIG >> MAX-IO >> *ONS/L >> I-CONTIG. As pointed out earlier, without the addition of the *ONS/L constraint, we would expect candidate (c) to emerge as the winner.

81) *Word-final C₁+ C₂ cluster : Delete C₁*

/hɔlt/	*COMPLEX	CODA COND	O-CONTIG	MAX-IO	*ONS/L	I-CONTIG
a. hɔlt	*!	*				
b. hɔlutu			*!		*	
c. hɔlu				*	*!	
d. hɔtu				*		*
e. hɔ				*!*		

5.5 Open issue

Now with regard to the instance of the unexpected insertion of the coronal feature within the context of neighbouring labial consonant as observed in the tableau in (74) above, it looks quite complicated because it seems there is a strong drive for the epenthetic vowel to agree in place feature with a segment to its right, contrary to the dominance of high favour the labial feature enjoys to spread irrespective of position in the word. I suppose future research will help unravel this exceptionality, but in the interim one can explain that the situation arises perhaps out of constraint interaction whereby through the addition and ranking of the AGREE constraints, where high-ranking AGRR constraints rank above AGR L constraints will make sure that the epenthetic vowel is in agreement in place feature with a segment to its right rather than the consonant to its left. Therefore, the constraint ranking as follows will select the candidate with the epenthetic coronal vowel as in [kɔmpiliti] vis-à-vis the candidate with the epenthetic labial vowel as in [kɔmpuliti]: *COMPLEX >> CODACOND >> MAX-IO >> AGRR(VPI) >> AGRR(CPI) >> AGR L (VPI) >> AGR L (CPI). The ranking of the AGRR constraints above AGR L constraints is a reversal of what we observe in Rose & Demuth's (2006) proposal to account for such clusters in Sesotho.

Below is the tableau for the proposed account for the exceptional coronal spreading adding the AGREE constraints.

82) *Word-medial C₁+ C₂ cluster : Insert a vowel, do not delete*

/kɔmplit/	*COMP LEX	CODA COND	MAX-IO	AGRR (VPI)	AGRR (CPI)	AGRL (VPI)	AGRL (CPI)
a. kɔmplit	*!	*					
b. kɔmpiliti						*	*
c. kɔmpliti	*!						
d. kɔmpuliti				*!	*		
e. kɔmliti			*!				

However, irrespective of the proposed tableau in (82) above in an attempt to solve the exceptional case just discussed, still the dataset collected for this thesis does not contain more examples of adapted forms with repaired word-medial cluster. Therefore, I suppose it will be too presumptive on my part to assume that such constraints and their ranking will be able to account for all such word-medial clusters in Akan loanwords without having analyzed more of such data in this thesis. I think this issue can be better resolved by the collection and further analysis of more of corpus with such word-medial clusters in future research.

In this section, I have discussed vowel epenthesis, which has been observed to be the most dominant repair strategy in Akan loanword adaptation. The discussion touched on vowel epenthesis to repair illicit word-final obstruents, and illicit sequence of obstruents such as in word-initial and word-medial clusters. It was realized that constraints against multiple linkage of features were very important in determining the quality of the epenthetic vowel in repairing illicit final obstruents. However, in repairing word-initial clusters, the addition of the two structural wellformedness constraints *COMPLEX and CODACOND as well as the faithfulness constraint MAX-IO and their higher ranking above the markedness constraints, *MULT(Cor) and *MULT(Lab) was enough to account for such repairs within the OT framework. However, in repairing word-medial clusters, it was realized that the same set of constraints and their ranking yielded a suboptimal candidate. Therefore, there was the need to add more constraints and constraints from the Agreement family to regulate the directionality of the feature spreading into the epenthetic site as in the proposed tableau in (82) were

proposed.

In summary, this chapter has discussed the Akan dataset within the OT framework in two ways. First, the repair patterns observed in chapter 4 have been formalized in structure representations in the first part of this chapter (i.e. section 5.1 and subsequent subsections) and in the second part (i.e. section 5.4 onwards), I have presented Optimality-theoretic analyses of the patterns observed in chapter 4 and latter formalized in section 5.1. Among the arguments made in this section, it has come out that though there are two major repair strategies observed in the Akan loanword data such vowel epenthesis and consonant deletion, they do not present two different grammars, but in OT term, addition of relevant constraints to the same set of constraints, without resorting to reranking the constraints, to account for the two different strategies is enough to accommodate the two interacting strategies in one grammar or constraint ranking.

In the next chapter, I do a comparative study of some similarities and differences observed between Akan and Sesotho loanword adaptation on one hand, and Akan and Shona loanwords on the other hand. Prominent issues to be discussed in the next chapter will include directionality effects in place feature spreading among others.

CHAPTER 6

6.1 Akan compared with Sesotho and Shona

In this chapter, I do comparative analyses of few of the similarities and differences observed between Akan and Sesotho (Rose & Demuth, 2006) on one hand, and Akan and Shona (Uffmann, 2001, 2006; Chimhundu, 2002) on the other hand, on how loanword adaptation in the three languages behaves. Though this work is on loanwords adaptation, I will extend the comparisons to some aspects of the native phonology of the languages under investigation here. First, I will compare the general differences and similarities observed in the three languages' phonologies (including their loanword and native grammars). The conclusion at the end of the discussions in this chapter is that though there are considerable differences identified between the two Bantu languages vis-à-vis the Kwa language, there are more that the languages have in common than they differ in their loanword adaptation strategies. This comparative study and its conclusion thereof help us make cross-linguistic generalizations about loanword adaptation patterns. In the next section, I will present the differences and similarities in directionality effects observed in both Akan and Shona and Akan and Sesotho, where it will be argued that the place feature favoured to spread in both Akan and Shona determines which feature (place) is epenthesized, but in Sesotho, other factors such as the directionality of spreading of place feature in a particular environment, etc play a crucial role in determining the shape of the epenthetic vowel. In line with this discussion, I will present OT analyses with tableaux to account for the differences in the shape of the favoured epenthetic vowels in these languages, where it will be argued that reranking of language-particularly favoured constraints on multiple feature linkage is enough to account for the cases in Akan and Shona. However, in the case of Sesotho, additional constraints on directionality effects, as stipulated in Rose & Demuth (2006), will be crucial to determine the quality of the epenthetic in that language. It is worth noting here that the OT analyses focuses only on repair of some illicit clusters as will be seen in the tableaux.

The chapter is organized into the following sections. Section 6.1 discusses the similarities and differences between Akan loanword adaptation and Sesotho loanword adaptation. In section 6.1.1, I discuss the similarities and differences between Akan and Shona, while the same comparison is made between Akan and Sesotho in 6.1.2. Section 6.2, on the other hand, summarizes analyses made in the previous two sections by drawing comparisons between the three languages. Section 6.4 discusses the similarities and differences in directionality effects

in place feature spreading between Akan and Shona on one hand, and Akan and Sesotho on the other hand. In section 6.5, I present OT analyses of the observations made in § 6.4 where it will be argued that the differences in directionality effects result from the reranking of some constraints in both cases (the two comparisons).

6.1.1 Akan compared with Sesotho

Starting with the differences observed in some permissive clusters in both Akan and Sesotho languages, while certain sequence of some consonants or ‘clusters’ such as C+ Liquids (especially non-laterals) as in /tr, kr, gr, pr, ... etc/ as already seen in chapter 4 and repeated in (83) below are permissive in Akan phonology, and for that matter in its loanword adaptation, such consonant sequences are not allowed neither in the native nor in the loanword phonologies in Sesotho. However, instead, there is always vowels inserted, and in most cases through local assimilation, into the epenthetic site, from Rose & Demuth’s (2006:1118-1119) data on Sesotho provided to the right of (83).

83) Akan		Sesotho	
a. brantʃɪ	‘to branch’	heberu	‘hebrew’
b. sotrɛtʃɪ	‘to stretch’	tironi	‘throne’
c. krɔsu	‘to cross’	kiripi	‘crib/manger’

In adapting lateral liquids, Akan employs three strategies since the lateral consonant is not a ‘true’ Akan consonant. First, since the lateral liquid /l/ alternates with its non-lateral counterpart /r/, the former in the source word is usually replaced with the latter in the adapted form and the ‘cluster’ is left intact in the adapted form as in the Akan metathesized adapted form in (84a) as against the Sesotho counterpart from (p. 1118). Second, the cluster can be repaired by epenthesis. As it has already been discussed in chapter 4, the vowel, except the low vowel, that immediately follows the cluster copies its place feature into the epenthetic site as in (84b) below as against Sesotho data from (p. 1133). The third strategy is a kind of merger of both the first and the second strategies. The two previous strategies apply at the same time as rare examples such as the one in (84c) repeated from section 2.6 as against the Sesotho’s adapted form from (p. 1119). In (84c) below, the input /l/ as in ‘glass’ is adapted as [r] but still the default vowel is inserted since it is the low vowel /a/ that follows the dorsal-liquid cluster. Though the [gr] sequence is permissive in Akan, the epenthesis in this instance

could be explained to be as a result of the slow manner in which such words are pronounced (Dolphyne, 1988:54).

84) Akan		Sesotho	
a. prosi	‘police’	pøreisi	‘price/quotation’
b. kɔmpiliti	‘to complete’	sipolaʃe	‘splash’
c. girasi/grasi	‘glass/grass’	xalasi	‘glass’

Now regarding behaviours of some segments in loanword adaptation in both languages, it has been observed that the low vowel /a/, in most cases, is inactive to spread into the epenthetic site. However, while in situations such as in word-initial position, where a cluster of a velar and a liquid (Dorsal + Liquid) followed by the low vowel as in (85a) and also in word-final position where a velar is preceded by the low vowel (a + Dorsal) as in (85b) below repeated from chapter 4, Akan’s loanword adaptation resorts to default vowel insertion, rendering the low vowel completely inactive, it is a different case for the low vowel /a/ in Sesotho. On the contrary, in the situation where there is a velar and liquid cluster (Dorsal + Liquid) followed by the low vowel /a/ in word-initial position, the choice of which segment is to spread into the epenthetic site falls on the low vowel in Sesotho’s loanword adaptation (Rose & Demuth, 2006:1118 (9)) as in (85a) and the same low vowel spreads to repair word-final dorsal (:1118(7d)) as in (85b).

85) Akan		Sesotho	
a. girasi	‘glass/grass’	karamafoni	‘gramophone’
b. ba:gi	‘bag’	kanapasaka	‘knapsack’

The next segment whose behaviour poses significant difference between the two languages under discussion is the high front vowel /i/. The coronal vowel has been analyzed, though not clear and still being debated (Plag & Uffmann, 2000), as the default vowel in the native phonology especially in reduplication (Schachter & Fromkin, 1968; Dolphyne, 1988; McCarthy & Prince, 1995; Baković, 2000; Raimy, 2000; among others) and in the loanword phonology of Akan (Plag & Uffmann, 2000), but not the epenthetic vowel especially in loanword adaptation as has been observed so far in the present thesis. The reverse is the case in Sesotho, according to Rose & Demuth’s (2006) analysis. [i] is argued to be the epenthetic

vowel in native Sesotho phonology for word minimality effects (Doke & Mofokeng, 1985: 36-37 cited in Rose & Demuth, 2006: 1115). However, as Rose & Demuth (2006) contend, this vowel is not the default vowel in Sesotho loanword phonology rather; the epenthetic vowel gets its feature from the surrounding vowels.

Now talking about what the epenthetic segments are in the two languages, consonants can also serve as epenthetic segments in both languages. While the glottal stop /ʔ/ has been identified as the epenthetic consonant in Akan, especially in reduplication (Schachter & Fromkin, 1968; Dolphyne, 1988; McCarthy & Prince, 1995; Raimy, 2000; etc), but not in loanword phonology, it is the velar stop /k/, which acts as the epenthetic consonant in Sesotho native phonology (Doke & Mofokeng, 1985, cited in Rose & Demuth, 2006: 1116). However, what the two languages have in common in this regard is that the velar consonants do not spread feature in the loanword adaptation process in both languages.

The difference between the two languages also manifests in instances of opacity in their loanword adaptations. Starting with Akan, as discussed in chapter 5 (section 5.1), the palatal and alveo-palatal fricatives are impervious to the labial vowel harmony in Akan loanword adaptation. That is, labial vowels are blocked from spreading across the intervening palatal or alveo-palatal coronals, and instead these consonants spread their coronal feature into the epenthetic site. This opacity of the palatal and alveo-palatal coronals is accounted for by the strict native constraint on the kind of vowel that can combine with those coronals as discussed in § 2.3. In addition to the language-particular phonotactic constraints on those coronals, under the representations in chapter 5, it was argued that palatals are specified for two place features on the C-Place node, i.e. [Dors] and [Cor]. This makes the intermediate V-Place node, which is the [Cor] block any place feature attempting to spread across it and instead it spreads its coronal feature to the epenthetic vowel.

The two languages also differ in how source words with final Liquid + C clusters are adapted. While Akan most often deletes the liquids in such clusters as in (86), Sesotho, on the other hand, prefers to maintain them, and instead rather resorts to vowel epenthesis to repair such clusters (p: 1119 (12)) as in (86) below.

86) Akan		Sesotho	
a. tʃɔ:kʊ	‘chalk’	balaka	‘(balk) beam/rafter’
b. rɪpɔ:tu	‘report’	maraka	‘mark’

Finally, it is also observed that the general epenthesis strategy in Sesotho is vowel harmony, while that of Akan is consonantal/local assimilation.

It is not in everything that Akan loanword adaptation and that of Sesotho differ in. There are things that the two languages are observed to have in common. Starting with their sound segments, as just mentioned above, unlike the dorsal vowel which can spread in Sesotho but does not spread in Akan, the dorsal consonants /k,g/ do not spread at all in both languages. Explanation for this has already been given in the preceding chapter.

Now on moving to the syllable structure of both languages, it has been observed that both Akan and Sesotho are among the world’s languages that have the basic CV syllable type. This means the two languages prefer open syllables to closed ones. In the case of Sesotho, all its syllables are monomoraic, meaning binary feet are disyllabic and in the event of monosyllables, the epenthetic [i] is affixed to attain this word minimality effect as discussed in the last but one paragraph above. In optimality-theoretic term, the two languages, to a large extent, disprefer closed syllable or rank the constraint against coda relatively high. This raises the two questions as to (a) whether the languages entertain word-final consonant(s) at all, or (b) if they do, which consonant(s) can occur in the word-final position in the two languages. From the discussion made so far in this thesis in word-final consonants in Akan and Rose & Demuth’s (2006) analysis of Sesotho, it appears it is only the nasals which are allowed in all positions i.e. word-initial, word-medial and word-final positions in both languages. Now concentrating on syllable-final nasals, examples of loans with final nasals in Akan can be seen in (87), repeated from chapter 4 and in (88) from Sesotho (Doke & Mofokeng, 1985: 15-18) cited in Rose & Demuth, 2006: 1116-1118). However, the final nasals in Sesotho are considered as syllabic nasals.

87) Syllable-final nasals in Akan loanwords

- a. si.tam.pu ‘to stamp’
- b. fi.lim ‘film’

88) Final syllabic nasals in Sesotho

- a. ra.taŋ ‘love’
- b. piŋ.ki ‘pink’

The similarities and differences observed in Akan and Sesotho discussed so far are summarized in the table below in (89).

89) Summary of some similarities and differences between Akan compared with Sesotho

	Narrations/features	Akan	Sesotho
1.	Basic CV syllable structure	Yes	Yes
2.	Syllable-final nasals are permitted	Yes	Yes, but only syllabic nasals
3.	Opacity of some coronals in loanwords	Yes, phonological	Yes, phonetic
4.	Epenthetic consonant in native phonology?	Yes, /ʔ/	Yes, /k/
5.	The high vowel is the epenthetic vowel in loanword adaptation	Yes (both front & round)	Yes (only front vowel)
6.	Liquids in the final Liquid + C cluster: Delete liquids	Yes	No
7.	Initial C + Liquid clusters allowed	Yes	No
8.	The low vowel /a/ can fill the epenthetic slot	No	Yes, as a last resort
9.	The high front vowel /i/ is the default vowel in loans adaptation.	Yes	No
10.	The general epenthesis strategy is local assimilation	Yes	No(Vowel harmony)

To sum up, this subsection has discussed some of the main similarities and differences observed in Akan and Sesotho, especially in their loanword adaptation processes. It has been concluded that though the two languages differ in many instances, there are similarities that exist between the two that helps us make cross-linguistic generalizations about loanword adaptation patterning. The next subsection discusses similar topic, but this time the comparison is between Akan and Shona, another Bantu language.

6.1.2 Akan compared with Shona

In this section, I give similar analysis as that in the previous subsection by discussing the similarities and the differences observed in both Akan and Shona, especially in their loanword adaptations.

Regarding the differences observed in the native phonologies of Akan and Shona, we will see a repeat of the asymmetrical behaviour discussed in §6.1.1 above that exists between Akan and Sesotho here. Certain clusters such as C+ Liquids (especially non-laterals) as already discussed in section 6.1 (83) are permissive in Akan. On the contrary, according to the data from Uffmann's (2001, 2006) analysis of Shona, such consonant sequences are not allowed in loanword adaptation in Shona. In most cases, there is vowel epenthesis into such clusters, where the shape of the epenthetic vowel is received from the preceding consonant, except velars as (90) below taken from Uffmann (2001:2 (2)).

90) **Shona**

- a. sitirecha 'stretcher'
- b. porofiti 'profit'

When it comes to the question of which vowel is preferred as the epenthetic vowel, the two languages generally have the high vowels as their preferred epenthetic vowels in loanword adaptation. However, while the labial vowel is most often observed to fill the epenthetic slots in the Akan loanword data in many contexts, following Uffmann (2006), it is not very clear which vowel quality is the generally preferred epenthetic vowel in Shona loanword adaptation.

Similarly, while all the five vowels in Shona, including the low vowel, can spread into the epenthetic slots according to Uffmann's (2001; 2006) and also Chimhundu's (2002) data on Shona loans, it is only the high vowels that are always used as the epenthetic vowels in Akan loanword adaptation. The exception to this is the idiosyncratic example of the highly unmotivated spreading of the low vowel as in (91) below.

- 91) [adabansi] "advance" *[adibansi]/[adubansi]

Another asymmetrical behaviour between the two languages which is worthy of note is premised on what the preferred place feature for epenthesis is in the two languages. As it has already been observed from the Akan data discussed so far, the coronal place feature does not spread across an intervening labial place feature to the epenthetic site, but it does so in Shona. This has been explained as a result of the preference for the labial feature in Akan loanword adaptation for place feature spreading. Shona seems to have the converse case. In Shona

loanword phonology, the coronal vowels can spread across labial consonants. This difference can be explained as a result of the grammar favouring coronal place feature the more to spread. In OT terms, while the constraints against multiple linkage of the labial feature will be ranked below the constraint against multiple linkage of the coronal feature in Akan, reranking of these two constraints (in addition to other constraints) will basically account for the Shona feature spreading pattern.

Similar to the observations made in the previous comparisons, there are a lot more details that Akan and Shona share than they differ in. Shona shares the vowel inventory with Akan's basic vowel units of /i, e, o, u, a/. The only difference here is that Akan has additional 5 contrastive lax vowels i.e. ATR variants of these basic vowels (for further discussion, please refer to section 2.2). Also, the two languages share the same default vowel; the high front vowel /i/. However, whereas it has not been clearly established which vowel acts as the epenthetic vowel in Shona loanword (Uffmann, 2001, 2006, etc), the labial seems to be the preferred epenthetic vowel occurring in many environments/contexts.

Another important similarity observed between the two languages is their basic syllable structure. Akin to Sesotho, Shona also has CV (open) syllables as Akan. This means all source words that do not conform to this structure should be resyllabified through epenthesis. This is strictly so in Shona where unlike Akan, it does not allow even word-final nasals in its loanword lexicon as in the following adapted forms from Uffmann (2006:1085) in (92).

92) Akan		Shona	
a. aitem	'item'	aitemu	'item'
b. kɔndɔm	'condom'	kondomu	'condom'
c. tim	'team'	timu	'team'

One more commonality between Akan and Shona observed is that the two languages employ consonantal/local assimilation as their preferred epenthesis strategy in loans adaptations. It is when this strategy fails to apply that vowel harmony and as a last resort, default vowel insertion apply.

In adapting the lateral liquids, Akan employs three strategies, which have already been discussed in section 6.1.1 above depending on their positions in the source word, since the lateral /l/ is not a ‘usual’ Akan consonant. The ‘usual’ here means the segment has a very low frequency in native words. They mostly occur in nativized words and they are adapted as follows in word-initial and word-final positions as in [lɔɔɾɪ] < *lorry*, [bɔɔlɔ] < *ball*, etc. respectively. When the laterals form part of word-initial clusters, they are usually adapted replaced with the non-lateral liquid /r/ in a similar way as in Shona in the data below in (93) except in the bilingual form that maintains almost all segments in the source form. Since /l/ and /r/ alternates in Akan, both liquids are tolerated more in Akan than in Shona where it almost always surfaces as /r/ (Uffmann, 2006:1085-1086) as in (93).

93) Akan		Shona	
a. klipu	‘to clip’	kiripi	‘clip’
b. saladi	‘salad’	saradhi	‘salad’

The similarities and the differences discussed so far in this section are summarized in the table below in (94).

94) Summary of some differences and similarities in Akan compared with Shona

	Narrations	Akan	Shona
1.	Basic CV syllable structure	Yes	Yes
2.	Preferred epenthesis strategy is consonantal/local assimilation	Yes	Yes
3.	The basic vowel inventory are /i, e, o, u, a/	Yes	Yes
4.	The high vowels are usually the preferred epenthetic vowels	Yes	Yes
5.	The default vowel is the high front vowel	Yes	Yes
6.	The preferred place feature to spread is coronal	No (labial)	Yes
7.	All vowels can be epenthetic vowel	No	Yes
8.	Coronal vowels can spread across labial consonants	No	Yes

To conclude, it can be observed that Akan and Shona share a lot in common more than Akan and Sesotho. For instance, while Akan and Shona employ consonantal assimilation as their epenthesis strategy, Sesotho uses vowel harmony as its epenthesis strategy. However, both Shona and Sesotho have coronality specified for place feature spreading contrary to labiality observed in Akan. The next section discusses special form of differences in directionality effects between the three languages under study in this paper.

6.2 The quality of the epenthetic vowel into clusters

Directionality effects have been studied in Akan by scholars, prominent among them being Clements (1981) who argues that analysis of vowel harmony in Akan should be couched in the frame of the underspecification theory, in which he postulates that the root vowel, which controls the harmony feature value of the affix vowel is specified, while the affix vowel, which becomes the target of the harmony process is the unspecified. This analysis on underspecification, together with others such as directionality, etc has been challenged by works by other authors such as Baković (2000, 2003), Krämer (2001, 2003), among others who have proposed an alternation analysis, stem identity mechanism in analyzing vowel harmony with additional facts from other languages.

Similar work on directionality in Akan has also been done by Dolphyne (1988) on tone spreading in Akan where she posits that the general directionality effect in tonal spreading in Akan is left-to-right, but the opposite effect, i.e. right-to-left is also possible after a High tone assimilates into the following Low.

There seems to be such directionality also observed in loanword adaptation in Akan where feature spreading into epenthetic sites in word-initial and word-medial clusters follows from right to left, while feature spreading to avoid word-final obstruents follows left-to-right direction. However, no such work on directionality has been done in Akan's loanword adaptation where the direction of the spreading of the feature (place) is crucial in determining the shape of the epenthetic vowel in certain contexts. In the next section, I compare the directionality effects observed in Akan loanword adaptation with those observed in Shona and Sesotho loanword adaptations. Since all the three languages under investigation here

obviously do show the same direction effect, though different place features spread, in spreading to repair illegal word-final obstruents, I will not stress this common left-to-right directionality effect in the subsequent discussions.

6.2.1 Akan compared with Shona

In Shona, spreading of place features to repair clusters in the word-initial position usually follows the left-to-right directionality (that is, from the first consonant in the cluster, except velars) as in epenthesis to avoid word-final obstruents in a kind of ‘unidirectionality’ effect. Examples of such words can be referred from Uffmann (2001, 2006) and also in Chimhundu (2002). For instance, generally, whereas in word-initial clusters of Cor + Lab the epenthetic vowel will come from the C₂, especially when it is a labial consonant in Akan loanword adaptation, it will come from the C₁ Coronal in Shona except velars as in examples from Chimhundu (2002:141). This is contrary to what is observed in Akan, which exhibits bidirectionality in filling the epenthetic slots where spreading of place feature to resyllabify word-initial clusters as in (95) is right-to-left, i.e. from the second consonant, except velars, but by default, it becomes left-to-right towards the word-final position. There are few exceptional cases in Shona where we seen such spreading from the opposite direction as noted in Akan where coronal vowel spreads from the following neighbouring vowel as the data in (96) below from Chimhundu (2002:137).

95) Akan		Shona	
a. sumoku	‘smoke’	simoka	‘smoke’
b. sukuu	‘school’	sikuru	‘school’

96) Shona	
a. birifi	‘brief’
b. biridzi	‘bridge’

6.2.2 Akan compared with Sesotho

The directionality of consonant place feature spreading to repair word-initial (and word-medial) clusters in Sesotho loanword adaptation is observed to be from the first consonant of the cluster i.e. C₁, except in case where the first consonant is velar. This means Sesotho

exhibits a bias for left-to-right directionality (for consonant-vowel place interaction) as has been observed in Shona the same as spreading to the word-final positions in a kind of unidirectional way. This is contrary to Akan's right-to-left directionality of spreading into the same epenthetic site. Put differently, this means that while consonant (input) and vowel (epenthetic) interaction in Sesotho loanword adaptation is strictly local within the same syllable, such interaction has been observed in the Akan data to be across syllable boundaries in repairing word-initial or word-medial clusters. That is, the interaction between the triggering consonant and the target (epenthetic) vowel is between the nucleus of one syllable and the onset of another (following) syllable in Akan's word-initial and word-medial cluster repairs. This interaction is schematized in (97) where the 'CC' represents the illicit consonant cluster, and the 'V' is the epenthetic vowel. The arrow points to the direction to which the feature spreads.

97) a. Onset CC = C → V C in Sesotho

b. Onset CC = CV ← C in Akan

6.3 The quality of the epenthetic vowels in OT

In this section, I present optimality-theoretic analyses of the directionality effects observed in comparisons between Akan and Sesotho on the one hand, and Akan and Shona on the other hand. The focus of the discussion here, as pointed out in the preceding section, is on word-initial or word-medial cluster repairs for that is where the major differences in directionality between the languages reside. In this section, I will propose OT account for the (a)symmetry observed between Akan and Sesotho on the one hand, and Akan and Shona, on the other hand, in how these languages repair word-initial or medial clusters. For reasons of space and focus of this section, I will limit the scope of the discussion to few word-initial clusters such as /sp/, /st/, etc followed by Labial V, and /sk/ followed Labial V. It is worth to note that while both Sesotho and Shona repair C+r clusters, Akan generally permits such a sequence in loanwords because as has already been discussed in chapter 2, the native grammar allows it.

From the data analyzed so far, the following two generalizations have been made regarding the spreading of place feature in Akan loanwords that (a) the preferred feature for spreading is the labial feature, it is only in its absence that the coronal feature can spread, and that (b) the general epenthesis strategy is consonantal assimilation.

From the above generalizations, the conclusion one can make is that, in the context of the labial consonant and another consonant forming a cluster, it is usually the labial feature that is favoured to spread into the epenthetic site. In addition to this, in a similar context as the above-mentioned, when such cluster is followed by a coronal vowel, still it is the labial feature that will usually be favoured to spread. An exception is what we have seen in (22) as in [kɔmpiliti] ‘to complete’. These are in contrast with what have been observed in the Sesotho loanword data (Rose & Demuth, 2006) and Shona loanword phonology (Uffmann, 2001, 2004, 2006) and Chimhundu (2002) where the coronal feature seems to be the preferred feature to spread in both languages, in addition to vowel harmony as the preferred strategy for vowel epenthesis for the former, but consonantal assimilation for the latter.

Since the focus of this section is to account for the quality of the epenthetic vowels into word-initial clusters in OT, I suppose stipulating for the constraints regulating directionality of feature spreading as has been discussed about the Akan dataset will not be necessary for the discussion here. Because all things being equal, within a particular context, when a choice is to be made between two potential contributors of place feature, for instance, as in the clusters in (95), the prediction should be that it is the (place) feature that is favoured in a particular loanword grammar that will spread, but not necessarily the particularly required direction from which the epenthetic vowel should get its feature. This is so because unlike in Sesotho where the dorsal vowel /a/ can spread or copy into the epenthetic site in an adapted form such as in [kanapasaka] ‘knapsack’ (Rose & Demuth, 2006:111), an epenthetic coronal vowel into the initial cluster would be predicted in this case in Akan following the fact that the alveolar nasal can contribute place feature and also that the dorsal vowel cannot spread in Akan. I therefore propose here a repeat of the same set of constraints used to determine the quality of the epenthetic vowel as used in Uffmann’s analysis of the Shona loanword data and also adopted in chapter 5 (section 5.2) of this thesis for the analysis of the vowel epenthesis into word-initial clusters in Akan and in Shona, and I attempt reanalysing the Sesotho loanword data using the same set of constraints.

The constraints in question are from (59) above and the subsequent ranking of the *MULTIPLE constraints in (63) in section 5.2 above. Later on, as it becomes necessary, I will add more constraints in this section. The motivation for the use of these constraints is

that in all the three languages, feature filling into the epenthetic site is through spreading or multiple linkage of features (from all segments, except dorsal segments which applies sometimes as a last resort strategy in both Sesotho and Shona. The spreading or copying of the dorsal feature is more relevant and visible in Sesotho which applies vowel harmony as the general epenthesis strategy) and not by default insertion. This means DEP will outrank *MULTIPLE constraints in all the three languages. The difference, however, that distinguishes each of the three languages under investigation here is account for by the relative ranking of the special forms of the constraints against multiple linkage of a particular place feature, such as say, *MULT(Dors), *MULT(Cor), and *MULT(Lab). *MULT(Dors) is ranked relatively high in all the three languages, except in Sesotho where it should rank lower because the dorsal segment can spread easier than in Shona, while it does not spread at all in Akan.

The constraints to account for the two strategies for vowel epenthesis in the three languages such as consonantal assimilation and vowel harmony are the *LINK(C,V) and the *SKIP respectively. Again, their relative ranking defines the epenthesis strategy employed in each of the three languages. As has been already discussed earlier in this chapter, both Akan and Shona generally employ consonantal assimilation as their strategy for vowel epenthesis, whereas Sesotho, on the other hand, employs vowel harmony except in repairing word-initial clusters where it will resort to consonantal assimilation, if possible. Therefore, a word-medial cluster /br/ as in ‘hebrew’ becomes [heberu] *[heburu], whereas in word-initial cluster /tr/ as in ‘(trunk) prison’ becomes [tirɔnkɔ] *[tɔrɔnkɔ] (Rose & Demuth, 2006:1118). Going by this, *LINK(C,V) will be dominated by *SKIP constraint in both Akan and Shona, while the reverse relative ranking will account for the case of Sesotho.

In accounting for the asymmetries in loanword adaptation process in the three languages, focusing on word-initial clusters, I begin by first presenting the analysis of how Akan adapted source words with initial clusters into its loanword lexicon with the tableau in (98). Again, let us remind ourselves that the clusters being considered here are those such as /st/ followed by the labial vowel, /sp/, and /sk/ followed by the labial vowel as in (98) below. In each of the clusters in the input, two competing candidates are provided; one exhibiting epenthesis of the labial feature as in (a), the other showing epenthesis of the coronal feature as in (b). Unlike in the similar tableau in (73) where repeating the constraints on the quality of the epenthetic

vowels was not necessary, this time such a repetition is important to rule out all the candidates in (b).

98) Word-initial cluster repair: Akan

1./stɔp/ ‘stop’	*COMP LEX	CODA COND	MAX-IO	*MULT (Cor)	*MULT (Lab)	*SKIP	*LINK (C,V)
a. \varnothing stɔ					*	*	
b. stɔ				*!			*
2./sprei/ ‘spray’							
a. \varnothing supre					*		*
b. sipre				*!			*
3./skul/ ‘school’							
a. \varnothing suku					*	*	
b. siku				*!			*

In tableau (98), two candidates, candidate (a) always spreads a labial feature from a segment following the epenthetic vowel, while candidate (b) always spreads a coronal feature from the first consonant in the cluster. Since the tableau is to account for the form in Akan, all candidates in (a) will always win due to the ranking of the constraints which skews towards their favour. The constraints ranking does not take into account which epenthesis strategy applies as the optimal candidates in (1) and (3) apply vowel harmony, while the one in (2) always uses consonantal assimilation. That decision is made by the relative higher ranking of *SKIP over *LINK(C,V), though these two constraints do not affect the optimality of the winner candidate in this tableau in any way. In evaluating the candidates, it is always a straightforward competition between candidates (a) and (b). The winner always emerges after the violation of the higher-ranked constraint *MULT (Cor) by candidate (b). Even though the eventual winner, candidate (a) violates the next high ranking constraint *MULT(Lab) and even one more constraint than candidate (b) violates, all the constraints dominated by *MULT (Cor) become irrelevant in changing the optimality of candidate (a). The ranking for the tableau in (97) therefore becomes: *COMPLEX /CODACOND/*MULT(Dors)/MAX-IO >> *MULT(Cor) >> *MULT(Lab) / *SKIP / *LINK(C,V). The reranking of the first four

higher-ranked constraints in the tableau above will not have any effect on the winner candidate.

In the next discussion, I provide constraints analysis for the epenthetic pattern into word-initial clusters similar to those analyzed above for Akan as in /st/, /sp/, and /sk/ observed in Shona.

The loanword data to be used for the analysis in this section is adopted from Chimhundu (2002), the original work was a PhD dissertation awarded in 1983. The adoption of the corpus from the source has become necessary because the main papers on this language by Uffmann (2001, 2004, 2006) analyzed so far in this thesis do not provide examples or data of Shona loanword with word-initial clusters such as in /st, sp, sk, etc/ as in the English words ‘store’, ‘speed’, and ‘school’ that are relevant for this analysis. From the data taken from Chimhundu (2002), Shona adapts English source words with such word-initial clusters into its lexicon in a parallel way as observed in Sesotho. In all the examples of adapted forms with such initial clusters as /st, sp, sk/, the general pattern was that it is always the first consonant, in this case /s/ that spreads place feature into the epenthetic sites regardless of the place feature of the following vowel. This means, like Sesotho, Shona also exhibits left-to-right directionality effect in epenthesis into word-initial clusters as those stated above. However, there were some few exceptions to this directionality pattern where sometimes the epenthetic vowel got its place feature from a segment to the right as in adapted form such as *birifi* ‘brief’, *sutu* ‘suit’, etc. for further details, please refer to the Chimhundu (2002). The selection of the adapted forms with the three word-initial clusters is to verify asymmetry, if any, between the two Bantu languages’ loanword adaptation pattern vis-à-vis Akan, a Kwa language.

The case in Shona is different from that of Akan in that, there is a crucial reranking of two constraints, *MULT(Lab) and *MULT(Cor). In ranking the tableau for Akan as in (98), *MULT(Cor) outranked *MULT(Lab) because we have observed that the labial feature is the preferred feature for spreading in Akan contrary to the coronal feature in Shona. Therefore, in ranking the constraint for the Shona word-initial cluster repairs, there should be a reverse ranking for the two constraints to reflect the situation. However, with regard to the last two

constraints against consonantal assimilation and vowel harmony *LINK(C,V) and *SKIP respectively will not change since both languages display the same preference for consonantal assimilation in their broader loanword grammar. I present the tableau and constraint ranking for the Shona word-initial /st, sp, sk/ cluster repairs in (99). In the tableau below, candidate (b) always emerges winner of the competition at the expense of candidate (a) because the latter, which always contribute place feature from a labial segment violates a crucially ranked constraint, *MULT(Lab), which is ranked above *MULT(Cor). This is a reverse of the ranking we saw in tableau (98) above for Akan. Again, *SKIP and *LINK(C,V), as well as the higher-ranked constraints, *COMPLEX, CODACOND, and DEP(F) do not decide on the optimal candidate in the tableau below. The proposed ranking therefore becomes: *COMPLEX/ CODACOND / MAX-IO >> *MULT(Lab) >> *MULT(Cor) >> *SKIP/*LINK(C,V).

99) *Word-initial cluster repairs: Shona*

1./stɔr/ 'store'	*COMPLEX	CODACOND	MAX-IO	*MULT(Lab)	*MULT(Cor)	*SKIP	*LINK(C,V)
a. tʃɔtoro				*!		*	
b. ^ɛ tʃɔtoro					*		*
2./spid/ 'speed'							
a. supidi				*!	*		*
b. ^ɛ sipidi					**		*
3./skul/ 'school'							
a. sukoro				*!*		*	
b. ^ɛ sikoro				*	*		*

The above tableau has accounted for some word-initial clusters in Shona where it has been observed that the candidate that employs feature spreading from the initial consonant becomes the optimal candidate as against the case of Akan in (98) where such feature to the epenthetic vowel comes from a segment (always labial in the input forms) following the

epenthetic vowel. In the next tableau, I present a similar instance to that of Shona in Sesotho where it is always the initial consonant that contributes the feature to the epenthetic vowel in (100) below.

In Sesotho, in word-initial position, it is always the first consonant that spreads otherwise, the following vowel, but not the second consonant. All vowels in Sesotho; labial, coronal, and dorsal vowel can spread/copy into the epenthetic site. Therefore, as a first step in repairing word-initial cluster, according to Rose and Demuth (2006), the first consonant copies its place feature to the epenthetic, or incase the first consonant is a velar, then the following vowel, irrespective of the place feature, copies into the epenthetic site. For the word-medial clusters, it is quite different. It is the preceding vowel that copies its place feature into the epenthetic site, and not the first consonant as in the word-initial clusters. This will make it difficult to stipulate the constraints against multiple linkage of feature and rank them in relation to each to account for the broad cases of epenthesis in word-initial, word-medial, and word-final positions. Because any of the vowel can spread given the chance. However, with the input clusters, it becomes straightforward to account for such cases without using the agreement constraints. In (100), I present tableau using the input forms and candidates similar to those used in the above tableaux for the case of Sesotho.

100) *Word-initial cluster repair: Sesotho*

1. /stɔp/ 'stop'	*COM PLEX	CODA COND	DEP (F)	*MULT (Dors)	*MULT (Lab)	*MULT (Cor)	*LINK (C,V)	*SKIP
a. sʊtɔ					*!			*
b. ʃ sɪtɔ						*	*	*
2./sparletɔ/ 'Sparletta'								
a. sʊpa					*!		*	
b. ʃ sipa						*	*	
3. /skɔl/ 'school'								
a. sʊkɔ					*!			*
b. ʃ sikɔ						*	*	

Two of the set of constraints used in the tableau in (98) for Akan are reranked in the tableau in (100) above. *MULT(Lab) outranks *MULT(Cor) to ensure that it is always the coronal feature in the environment that is favoured to copy into the epenthetic site. Again, *LINK(C,V) ranking above *SKIP means in a context where there is a choice between consonantal assimilation and vowel harmony, it is the latter strategy that would be preferred. The two constraints do not have any effect of the candidates in the tableau above, but just to show the preferred strategy in a broader case. In evaluating the candidates, candidate (b) each of the examples will always win the competition on grounds that it candidate (a) fatally violates a crucially high-ranked constraint against multiple linkage of the labial feature, *MULT(Lab), which ranks out *MULT(Cor). Candidate (b) also violates a constraint, but that constraint, *MULT(Cor) is ranked lower and it makes such a violation less fatal. The other constraints do not crucially participate in selecting the optimal candidate, therefore, they being shaded. Since neither of the two candidates violates any of the two higher-ranked constraints, their reranking will also not affect the optimal candidate. The following are the constraint ranking for the tableau in (100) above: *COMPLEX/ CODA COND / MAX-IO / *MULT (Lab) >> *MULT (Cor) / *LINK(C,V) / *SKIP.

The tableau in (100) seems to fall short of accounting for other Sesotho word-initial clusters such as in /kn/ as in [kanapasaka] ‘knapsack’ where a suboptimal candidate such as *[kinapusaka] will emerge winner, going by the ranking in (100) above. To avoid this, I present a tableau that will holistically account for the pattern observed in epenthesis into clusters, including word-initial and word-medial, I add more constraints from the Agreement family as adopted by Rose & Demuth (2006) in their analysis of the Sesotho loanword adaptation process in (101) below.

In evaluating the candidates in tableau (101) below, candidate (a) becomes the worst offender by fatally violating the highest-ranked *COMPLEX through preserving some part of the input in it. Candidates (d) and (e) following as bad candidates since both violate a crucially high-ranked constraint, AGRL(VPI) that demands the epenthetic vowels to agree with the preceding vowel in terms of place feature. Though both candidates are ruled out of the competition, candidate (e), which applies two strategies, vowel harmony and consonantal assimilation in repairing the two clusters fares better than candidate (d) because later violates all the remaining constraints in addition. The choice of the optimal candidate therefore narrows down to candidates (b) and (c). Though both candidates violate the same highly-ranked constraint, AGRL(CPI), the former wins the optimal because the latter violates that constraint twice, as against just once, that the former violates it. By this ranking, it becomes clear that the candidate that applies vowel harmony, by copying/spreading the dorsal place into all the epenthetic sites is the preferred candidate. The proposed ranking for this tableau becomes as follows: *COMPLEX >> CODACOND >> DEP(F) >> AGRL(VPI) >> AGRL(CPI) / AGRR(VPI) /*MULT(Lab) /*MULT(Cor).

101) *Word-initial and word-medial clusters repair: Sesotho*

1. /næpsæk/ 'knapsack'	*COM PLEX	CODA COND	*MAX- IO	AGRL (VPI)	AGRL (CPI)	AGRRL (VPI)	*MULT (Lab)	*MULT (Cor)
a. knapsaka	*!							
b. ☞ kanapasaka					*			
c. kinapasaka					*!*	*		*
d. kinapusaka				*!	*	*	*	*
e. kanapusaka				*!		*	*	

From the tableau above, three constraints used in the previous tableau in (100) become irrelevant in determining the optimal candidates in tableau (101). Leaving out the constraint, *MULT(Dors), which should be ranked far lower than its previous position in the tableau in (100). The absence of the other two constraints, *SKIP and *LINK(C,V), both of which determine which epenthetic strategy applies does not have any influence on the choice of the optimal candidate.

CHAPTER 7

General conclusions.

In this chapter, I present the general summary and conclusions made to all that have been discussed in this thesis.

In this thesis, I have discussed loanword adaptation in Akan. I have shown that in Akan loanword adaptation, two major phonological processes such as vowel epenthesis and consonant deletion apply in repairing illicit structures in the source/foreign words adapted into the native vocabulary. It has been observed that while vowels are inserted to repair illicit word-initial clusters, word-medial clusters and word-final obstruents, consonant deletion has been observed to apply only to word-final clusters. It has been observed from the Akan loanword dataset that in the consonant deletion or in the word-final cluster reduction, the sonority level of the target consonants determines which one deletes. In an OT account for the repairs strategies, I showed that it is basically the same set of markedness constraints that account for all these repair strategies and that each of these strategies occurs at different strata of the loanword grammar. This therefore means more constraints are added as a repair strategy moves up from one stage or level to another.

As regards the quality of the epenthetic vowel in Akan loanword adaptation, I have shown that generally it is always the high vowels that are inserted into the epenthetic sites contrary to what have been observed in other loanword grammars such as in Sesotho, Shona, etc. where vowels of other heights can also spread place feature into the epenthetic sites. It has also been observed that it is usually the high back/round, and not the high front vowel that is favoured as the epenthetic vowel in the Akan loanword grammar. This means the labial feature is more prone to share place feature with the epenthetic vowel than the coronal feature, though the coronal has been observed in the literature on Akan to be very active in the native phonology in processes such as palatalisation, reduplication, etc. The coronal feature only spreads when the labial vowel does not spread. In OT terms, this has been accounted for by higher ranking of the marked coronal feature above the labial feature. The quality or the shape of the epenthetic has been observed to depend on two main factors; (a) the shape of the neighbouring segment, and (b) the directionality of spreading of the feature. In (a), it has been shown that usually it is labial segments that are favoured to contribute place feature to the epenthetic. In (b) on the other hand, it has been observed that epenthesis

into both word-initial and word-medial clusters usually follows one direction, i.e. right-to-left, while spreading into word-final epenthetic position follows the opposite direction, i.e. left-to-right. In OT account for this feature spreading process, it has been shown that Akan does not need constraints from the Agreement family to account for its place feature spreading but the markedness constraints against multiple feature linkage, *MULTIPLE are enough to account for this spreading pattern.

It has also observed in this thesis that not all the phonological processes that exist in the native Akan phonology apply in the the loanword grammar. One of the interesting exceptionalities to the phonological processes in the native grammar observed in the loanword adaptation was the dominance of the labial feature over the coronal feature. The latter has been observed in the literature on native language to be active in phonological processes such as reduplication, palatalisation, etc. By this, we would have expected the coronal feature to be the preferred feature to spread in loanword adaptation as well. But from the analysis made so far in this thesis, it has come out that preference is usually given to the labial feature. Another idiosyncratic instance of the native process failing to apply has been in assimilation. For instance, in the Akan native phonology, assimilation is likely to take place with a sequence of /n/ and /f/ as in the compound *ahene* ‘chiefs’ + *fie* ‘house’ becoming *ahemfie* ‘palace’, but in the loanword dataset, a sequence of these consonants fail to undergo the assimilation process as in the adapted form [atɛmtɪ] ‘attempt’ *[atɛntɪ]. However, in another adapted form such assimilation applies as in the adapted form [dambro] ‘down-below’, etc. This kind of asymmetry observed in loanword adaptation gives credence to the claim among some loanword phonologists that the loanword grammar, to some extent, differs from the native grammar.

The findings from the analysis of the Akan loanword dataset have compared with existing ones made in loanword grammars in two Bantu languages, Sesotho (Rose & Demuth, 2006) and Shona (Uffmann, 2001, 2004, 2006). In comparing these two Bantu languages with Akan, I have shown that though differences exist between these languages, they have more in common than they differ in in terms of how they adapt foreign words. Their differences are accounted for in OT to result from the different rankings of the place features favoured in each of these three languages to spread, together with the differences in the general

epenthesis strategy preferred in the languages. Sesotho calls for additional constraints on directionality on its spreading pattern.

For the constraint ranking, it has also been realized that the language-specific rankings of the constraints *LINK(C,V) and *SKIP account for one of major differences observed between these three languages. It has been observed that while Akan and Shona rank *SKIP higher above *LINK(C,V), the reverse is the ranking in Sesotho. Another difference between the three languages has been observed to be their relative ranking of the constraints against multiple linkage of features, *MULT(Cor) and *MULT(Lab). In Akan, *MULT(Cor) outranks *MULT(Lab) because of the preference for spreading of the labial feature, but in both Sessotho and Shona loanword *MULT(Lab) ranks above *MULT(Cor). In addition to these constraints, it has been observed that Sesotho presents a different case whereby vowels of any place feature can spread. This called for the reanalysis of the OT account for the patterns in Sesotho by resorting to constraints from the Agreement family as adopted in Rose & Demuth (2006), to regulate the directionality of its feature spreading/copying.

In conclusion, it has been realized in chapters 5 and 6 that explaining the patternings in Akan loanword adaptation is not always that simple and straightforward. There was an instance of an 'unmotivated' spreading of coronal place feature, as well as other issues which could not be addressed in this thesis. I therefore, recommend further research into these and other related issues in this regard to attempt to give more comprehensive explanations that will facilitate our full understanding of Akan's loanword adaptation processes. I also conclude that I cannot conclude on which of the approaches to explaining loanword adaptation in general best suits the patterns observed in this thesis since my data collection and analysis thereof were devoid of experimental research, though all my explanations have been virtually phonologically-oriented. I therefore recommend that a broader research, including experimental research, be conducted in the future on the patterns observed in Akan loanword adaptation phenomenon to be able to conclude on its approach to loanword adaptation.

References

- Abakah, Emmanuel. 2005. Phonological analysis of word-final consonants in Akan. *African & Asia*, No.5, pp 47-65.
- (1993). *Some aspects of the phonology of the Mfantse dialect of Akan*. MPhil thesis, University of Ghana, Legon.
- Addo, G.N. (2002). *Lexical Innovation in Akan*. MPhil thesis, University of Ghana, Legon.
- Akinlabi, A. (2007). Category Change As Vowel Reduction. The thirtieth Generative Linguistics in the Old World conference (GLOW XXX). Tromsø, Norway.
- Bakovic, E. (2000). *Harmony, Dominance, and Control*. PhD dissertation, Department of Linguistics, Rutgers University, New Brunswick, NJ.
- (2003). Vowel harmony and Stem identity. ROA- 540, Rutgers Optimality Archive. <http://roa.rutgers.edu>.
- Broselow, E. & Daniel Finer. (1991). Parameter setting in second language phonology and syntax. *Second Language Research* 7, 1:35-59.
- Dolphyne, Florence A. 1988. The Akan (Twi-Fante) Language: *Its sound systems and tonal structure*. Ghana Universities Press, Accra.
- Chimhundu, Herbert. (2002) [1983]. Adoption and Adaptation in Shona. PhD dissertation, The ALLEX Project, the African Languages Research Institute, University of Zimbabwe and the Dept. of Scandinavian Studies and General Literature, University of Oslo, and Unipub As, Oslo.
- Christaller, J.G. (1875). *A Grammar of the Asante and Fante Language Called Tshi*. Gregg Press.
- (1888/1933). Dictionary of Asante and Fante Language called Tshi (Twi). Basel: Basel Evangelical Missionary Society.
- Clements, G.N. 1990. The role of the sonority cycle in core syllabification. In John Kingston and Mary E. Beckman (eds), *Papers in Laboratory Phonology I: Between the grammar and physics of speech*, 283 – 333. Cambridge University Press.
- Clements, G.N & Elizabeth Hume. 1995. *The Internal Organization of Speech Sounds*. The Handbook of Phonological Theory. In John A. Goldsmith (Ed.). Blackwell Publishers.
- Davidson, Lisa. (To appear). The relationship between the perception of non-native phonotactics and loanword adaptation.
- de Jong, K.& Obeng, S.G. (2000). Labio-Palatalization in Twi:Constrative Quantal, and Organizational Factors Producing an Uncommon Sound. *Language*, 76.682-703.
- de Lacy, Paul. 2006. Markedness: Reduction and Preservation in Phonology. CUP, U.S.
- (2002a). *The formal expression of markedness*. Ph.D. dissertation, Department of Linguistics, UMass, Amherst, MA [Available on ROA.].
- Doke, C.M., Mofokeng, S.M. (1985). Textbook of Southern Sotho Grammar. (Cited in Rose & Demuth, 2006). Maskew Miller Longman, Cape Town.
- Eshun, F.B. (1993). Aspects of Akan Phonology. PhD thesis. University of Wisconsin-Madison.
- Goldsmith, John. 1976a. *Autosegmental Phonology*. Doctoral dissertation, MIT. New York: Garland Press, 1979.
- Hall-Lew, L. (2006). Glides Harmonize, Too: Evidence from Akan Dialects. www.stanford.edu/dialect/Hall-Lew%20QP2.

- Halle, M. (1992). Phonological features. In: Bright, W., (Ed.), *International Encyclopedia of Linguistics*. Oxford University Press, pp. 207-212.
- Heffernan, K. 2005. Phonetic similarity and phonemic contrast in loanword adaptation. *Toronto Working Papers in Linguistics* 24: 117-123.
- Höftmann, Hildegard. 1971. The structure of Lelemi language. Leipzig: VEB Verlag Enzyklopadie, Pp 130. M 28.00.
- Hume, Elizabeth. (1996). Coronal Consonant, Front Vowel Parallels in Maltese. *Natural Language and Linguistic Theory*, vol. 14: 165-203.
- Hyman, Larry, M. 2003. Why describe African languages? Keynote Address, World Congress of African Linguistics & Annual Conference on African Linguistics, Rutgers University, June 17- 22, 2003. Submitted to proceedings.
- (2002). Is there a right-to-left bias in vowel harmony? To appear in John R. Rennison, Friedrich Neubarth, and Markus A. Pochtrager (eds), *Phonologica 2002*. Berlin: Mouton.
- Itô, Junko. 1988. *Syllable Theory in Prosodic Phonology*, Published by Garland, New York.
- Itô, J & Armin Mester. 2006. Lexical classes in Phonology. To in Shigeru Miyagawa and Mamoru Saito, eds., *Handbook of Japanese Linguistics*, OUP.
- (1994). Reflections on CodaCond and Alignment. In J. Merchant, J. Padgett, and R. Walker (eds.), *Phonology at Santa Cruz [PASC] 3*. Linguistic Research Center, University of California, Santa Cruz. 27-46.
- (1993a). 'Licensed Segments and Safe Paths'. In C. Paradis and D. LaCharité (eds.), *Constraint-Based Theories in Multilinear Phonology*. Special issue of the *Canadian Journal of Linguistics*. 197-213.
- Itô, et al. (1995). Licensing and Redundancy: Underspecification in Optimality Theory. *Linguistic Inquiry* 26, 571-614.
- Jacobs, H & Carlos Gussenhoven. 2000. Loan phonology: perception, salience, the lexicon, and OT. In: Dekkers, J., et al. (Eds.), *Optimality Theory: Phonology, Syntax, and Acquisition*. Oxford University Press, Oxford, pp. 193-210.
- Kager, R. (1999). *Optimality Theory*. Cambridge University Press, Cambridge, U.K.
- Kenstowicz, M. (2005). The phonetics and phonology of Korean loanword adaptation. Paper presented at First European Conference on Korean Linguistics, Leiden University, Leiden.
- (2003). Salience and similarity in loanword adaptation: A case study from Fijian. Ms. ROA-609. Cambridge, MA: MIT
- Kenstowicz, M. & Atiwong Suchato. 2006. Issues in loanword adaptation: A case study from Thai. *Lingua* 116, 921-949.
- Krämer, Martin. (2001). *Vowel harmony and correspondence theory*. Doctoral dissertation, University of Düsseldorf.
- (2001). Yucatec Maya Vowel Alternations- Harmony as Syntagmatic Identity. *Zeitschrift für Sprachwissenschaft* 20:2. pp. 175-217.
- Leben, W.R. (1999). Weak Vowels and Vowel sequences in Kwa: Sounds that phonology can't handle. *Proceedings of LP '98*, ed. by O. Fujimura, B.D. Joseph and B. Palek. Charles University, Prague: The Karolinum Press. 717-32.
- Lombardi, L. (2002). Coronal epenthesis and markedness. *Phonology* 19.2:219-51.
- (1999). Positional faithfulness and voicing assimilation in optimality theory. *Natural Language and Linguistic Theory* 17, 267-302.
- Lovins, Julie. 1971. Melodic conspiracies in Lomongo tonology. In *Papers from CLS 7*, (pp. 469-478). Chicago: CLS.
- Mackridge, P. (1985). *The Modern Greek Language: A descriptive analysis of standard*

Modern Greek. Oxford, OUP.

- Marantz, Alec. (1982). Re reduplication. *Linguistic Inquiry* 13.435- 482.
- McCarthy, John. J, Alan S. Prince. (1999). Faithfulness and identity in prosodic morphology. In Harry van der Hulst, René Kager & Wim Zonneveld (eds), *The prosody-morphology interface*, 218-309. Cambridge University Press.
- McCarthy, J. and Prince, A. 1995. Faithfulness and reduplicative identity. In Beckman, Walsh Dickey, and Urbanczyk. 249-384.
- (1993a). *Prosodic Morphology I: Constraints Interaction and Satisfaction*. Ms., University of Massachusetts, Amherst, and Rutgers University. [Forthcoming MIT Press.] Available on ROA-482.
- Mohanan, K.P. 1993. Fields of attraction in phonology. In Goldsmith (ed.), *The Last Phonological Rule: Reflections on Constraints and Derivations* (pp. 61-116). Chicago: University of Chicago Press.
- Morén, Bruce. (2007). The Parallel Structure Model. A minimalist Phonological Feature Theory. Department of English Linguistics and Theoretical Linguistics Programme at Eötvös Loránd University. Budapest, Hungary.
- (2003a). The parallel structures model of feature geometry. In Brugman, J., Riehl, A (Eds.), *Working papers of the Cornell Phonetics Laboratory*, vol. 15. Ithaca, New York, pp. 194-270.
- O’Keefe, M. (2003). Akan Vowel Harmony. Department of Linguistics, Swarthmore College: BA Thesis.
- Osam, E.K. (1994a). Aspects of Akan Grammar. A Functional Perspective. PhD thesis, University of Oregon.
- Padgett, Jaye. (2001). ‘Constraint conjunction vs. grounded constraint subhierarchies’. Ms. University of California at Santa Cruz. [ROA 530]
- Paradis, C., and La Charité, D. (2005). Category preservation and proximity versus phonetic approximation in loanword adaptation. *Linguistic Inquiry* 36, 223-258.
- (1997). Preservation and minimality in loanword adaptation. *Journal of Linguistics* 33:379-430.
- Peperkamp, S & Emmanuel Dupoux. 2003. Reinterpreting loanword adaptations: the role of perception. In: *Proceedings of the 15th International Congress of Phonetic Sciences*, Barcelona, pp. 367-370
- Plag, I., Uffmann, C., (2000). Phonological restructuring in Creole: The development of paragogue. In: Neumann-Holzschuh, I., Schneider, E. (Eds.), *Degrees of Restructuring in Creole*. Benjamins, Amsterdam, pp. 309-336.
- Prince, A. and Smolensky, P. 2004. *Optimality Theory: Constraint interaction in generative grammar*.: Blackwell Publishers.
- (1993). *Optimality Theory: Constraint interaction in generative grammar*. ROA 537, Rutgers Optimality Archive, <http://.roa.rutgers.edu>.
- Raimy, Eric. (2000). Remarks and Replies: Remarks on Backcopying. *Linguistic Inquiry*, Vol. 31, No. 3, 541–552. MIT.
- Rice, Keren. (2007). *Markedness in phonology*. In Paul de Lacy (Ed.), *The Cambridge Handbook of Phonology*. Cambridge, CUP.
- (1999a). Featural markedness in phonology: Variation. Part I. *GLOT* 4.7:3-6.
- (1999b). Featural markedness in phonology: Variation. Part II. *GLOT* 4.8:3-7
- Rice, K & Peter Avery. 2004. The presentational residue: the role of contrast in phonology.

- In: Paper delivered at the 12th Manchester Phonology Meeting, Manchester, UK.
- Rice, K & Peter Avery. 1993. Segmental complexity and the structure of inventories. Toronto Working Papers in Linguistics 12, 131-154.
- Rose, Y & Katherine Demuth. 2006. Vowel epenthetic in loanword adaptation: Representational and phonetic considerations. *Lingua* 116, 1112-1139.
- Sagey, E.C. (1986). The representation of features and relations in nonlinear phonology. PhD thesis, MIT.
- Schacter, P & Victoria Fromkin. 1968. A phonology of Akan: Akuapem, Asante & Fante. Working papers in phonetics 9, University of California, Los Angeles.
- Silverman, D. 1992. Multiple scansions in loanword phonology: evidence from Cantonese. *Phonology* 9, 289-328.
- Stewart, J.M. (1967). A Theory of the Origin of Akan Vowel Harmony. Proceedings of the Sixth International Congress on Phonetic Sciences held at Prague 7-13 September 1967, ed. by Bohuslav Hala, Milan Romportl and Premysl Janota, 863-64. Prague: Academic Publishing House of the Czech Academy of Sciences.
- Uffmann, C. 2006. Epenthetic vowel quality in loanwords: Empirical and formal issues. *Lingua* 116, 1079-1111.
- (2004). Vowel epenthesis in loanword phonology. Ph.D dissertation. Phillips-Universität Marburg.
- (2001). Patterns of epenthesis (not only) in Shona loanwords. In: Fery, C., Dubach Green, A., van de Vijver, R. (Eds.), Proceedings of HILPS 5. Universitat Potsdam, pp. 193-211.
- Vendelin, I & Sharon Peperkamp. 2006. The influence of orthography on loanword adaptations. *Lingua* 116, 996-1007.
- Welmers, William. (1946). *A Descriptive Grammar of Fanti*. Language dissertation 39. (Language vol. 22, no. 3 Suppl.).
- Wilbur, Ronnie. 1974. *The phonology of reduplication*. Doctoral dissertation, University of Illinois.
- Yip, M. 2006. The symbiosis between perception and grammar in loanword phonology. *Lingua* 116, 950-975.
- Zec, Draga. 2007. *The Syllable*. The Cambridge Handbook of Phonology (Ed. by Paul de Lacy). CUP.

APPENDICES:

Appendix 1

AKAN LOANWORDS CORPUS (DATASET)

Transcriptions based on the International Phonetic Alphabet (revised to 2005).

Akan		English Gloss
Group 1	Group 2	Gloss

a). Verbs

No cluster

1. supi:di	spi:di	speed
2. kəmpiliti	kəmpliti	complete
3. sʊtrətʃɪ	strətʃɪ	stretch
4. sumoku	smoku	smoke
5. sʊtəpʊ	stəpʊ	stop
6. sʊpɛ:	-do-	spare
7. supre	-do-	spray

No Coda

8. nil	ətərəsɪ	authorize
9. nil	kərətɪ	correct
10. sɪŋɪnɪ	-do-	singing (band)
11. da:lɪ	daɪlɪ	dial
12. nil	rɪpɪlesi	replace
13. rɪsi:fu	rɪsi:vʊ	receive
14. wɪrɪŋɪ	rɪŋɪ	ring
15. ʃi:ti	hi:ti	heat
16. tʃa:ʒɪ	tʃa:ʒɪ	charge
17. mɪsɪ	mɪsɪ	miss
18. nil	kipu	keep
19. nil	li:di	lead
20. səpə:tʊ	səpə:tʊ	support
21. ropu	repu	rape
22. nil	rapʊ	rap
23. nil	lakɪ	lack
24. nil	teki	take
25. bu:ku	bu:ku	book
26. do:du	lɔ:du	load
27. kə:dʊ	kə:lʊ	call
28. puʃɪ	puʃɪ	push
29. krosu	klosu	close
30. mi:ti	mi:ti	meet
31. drafʊ	draɪvʊ	drive

32. breki	breki	break
33. ʃa:tu	ʃaʊtu	shout
34. ʃeki	ʃeki	shake
35. hɔ:tu	hɔ:tu	halt
36. nil	maneʒi	manage
37. printɪ	printɪ	print
38. faksɪ	faksɪ	fax
39. nil	tru	through
40. nil	ridi	read
41. nil	dɛdiketi	dedicate
42. tʃa:mu	tʃa:mu	charm
43. panɪʃɪ	panɪʃɪ	punish
44. nil	kaʊntu	count
45. prɛsɪ	prɛsɪ	press
46. nil	pɔlɪʃɪ	polish
47. braʃɪ	braʃɪ	brush
48. nil	drɪnkɪ	drink
49. wɔ: tʃɪ	wɔ: tʃɪ	watch
50. tɛ:nɪ	tɛ:nɪ	turn
51. lɔ:ku	lɔ:ku	lock
52. presi	presi	praise
53. nil	rɪvili	reveal
54. nil	wɔ:ku	walk
55. nil	askɪ	ask
56. penti	pentɪ	paint
57. rɔbu	rɔbu	rob
58. tʃi:ti	tʃi:ti	cheat
59. nil	ʃe:pu	shape
60. katɪ	katɪ	cut
61. nil	tʃɔpu	chop
62. nil	pɛmitɪ	permit
63. nil	kɔmpleni	complain
64. nil	wɔʃɪ	wash
65. disa:dɪ	disa:dɪ	decide
66. so:ku	so:ku	soak
67. nil	kɔɪlɪ	coil
68. nil	sɪtɪ	sit
69. nil	rɪsɛ:tɪ	reset
70. ta:pu	ta:pu	type
71. fi:di	fi:di	feed
72. fi:di	fi:li	feel
73. fi:di	fi:lɪ	fill
74. nil	dareti	direct

75. nil	sɔ:si:di	succeed
76. po:su	postu	post
77. nil	tɪŋkɪ	think
78. nil	ɪŋkri:si	increase
79. nil	arɛstɪ	arrest
80. blemu/bremu	blemu	blame
81. nil	dɪska:sɪ	discuss
82. mi:ti	mi:ti	meet
83. nil	spi:kɪ	speak
84. nil	fokʊsʊ	focus
85. prɪsɛntɪ	prɪsɛntɪ	present
86. nil	lɔ:ʒɪ	lodge
87. nil	hɛtɪ	hate
88. nil	hɪtɪ	hit
89. brantʃɪ	brantʃɪ	branch
90. nil	dɑ:bʊ	dub
91. krɔ:sʊ	krɔ:sʊ	cross
92. tɛstɪ	tɛstɪ	test
93. ki:si	ki:si	kiss
94. bi:ʒɪ	-dɔ-	big
95. dɔ:ʒɪ	dɔ:ʒɪ	dodge
96. nil	kɔntɑ:tɪ	contact
97. bɔmbʊ	bɔmbʊ	bomb
98. nil	blɑstɪ	blast
99. ta:pʊ	ta:pʊ	type
100. nil	sɛndɪ	send
101. me:ti	me:ti	mate (driver's assistant)
102. fɔ:tu	vɔ:tu	vote
103. rɔpɔ:tu	rɪpɔ:tu	report
104. pa:sɪ	pa:sɪ	pass
105. nil	mɑkɛtɪ	market
106. si:si	si:zi	seize
107. nil	kækuleti	calculate
108. nfæsige:ti	ɪnvɛstige:ti	investigate
109. nil	klɪkɪ	click
110. bu:ku	bu:ku	book
111. nil	pɔlɪtɪsɑɪsɪ	politicize
112. prɪtʃɪ	prɪtʃɪ	preach
113. nil	ɑsɛptɪ	accept
114. nil	rɪʒɛtɪ	reject
115. tʃu:su	tʃu:su	choose
116. nil	tɛ:pʊ	tape
117. rɔkɔ:du	rɪkɔ:du	record

118. nil	hangɪ	hang
119. tʃantɪ	tʃantɪ	chant
120. kiki	kiki	kick
121. nil	bɔɪlɪ	boil
122. nil	weɪtɪ	wait
123. nil	braʊzʊ	browse
124. nil	sti:li	steal
125. nil	pɒkətɪ	pocket
126. nil	spɑɪsɪ	spice
127. nil	sk ^w i:zi	squeeze
128. nil	rimu:vu	remove
129. nil	travʊ	travel
130. nil	bɪldɪ	build
131. nil	kɒndɛmʊ	condemn
132. nil	wɪnɪ	win
133. nil	kɒnstratɪ	construct
134. nil	kɪtɪsɑɪzɪ	criticize
135. nil	kɒntradɪtɪ	contradict
136. wi:su	yu:su	use
137. mɪsɪ	mɪsɪ	miss
138. nil	pə:sʊ	pause
139. nil	fɔwədɪ	forward
140. nil	klini	clean
141. nil	dɪʃɪ	dish
142. dɒntʃɪ	lantʃɪ	launch
143. nil	kreti	create

b). Nouns

No cluster

144. adabansɪ	advansɪ	advance
145. nsʊpɛtɑ	-do-	inspector
146. kʊlɔ:kʊ	-do-	clock
147. asæmbɪlɛ/-mɛrɛ	-do-	assembly
148. ba:bʊlʊ	-do-	bible
149. fɪlm	-do-	film
150. tʃɪpʊsɪ	-do-	chips
151. kɒnfɪrɛnsɪ	-do-	conference
152. gɪrɑ:sɪ/gra:sɪ	-do-	grass

No Coda

153. sʊpɛ:sɪ	-do-	spects(spectacles)
154. bu:kʊ	-do-	book

155. kansılı	-do-	council
156. prosı	poli:si	police
157. tʃakapu	tʃekap	check-up
158. drɔba	-do-	driver
159. bokiti	-do-	bucket
159. tekiti	-do-	ticket
160. ɔtɔditi	ɔtɔriti	authority
161. kwere	kweri	query
162. ta:tri	ta:tis	tactics
163. drɔba	-do-	driver
164. towuro	-do-	towel
165. na:fu	-do-	knife
166. mobadi	-do-	mobile
167. tɛdɛbiʃin	-do-	television
168. pensiri	-do-	pencil
169. bɔ:su	-do-	boss
170. fidio	-do-	video
171. milo	-do-	(water) melon
172. wunifasiti	-do-	university
173. ta:sin	taʊsin	thousand
174. fodum	-do-	volume
175. helipan	-do-	head-pan
176. sofi	sofi	shovel
177. da:fu	-do-	life
178. bongro	-do-	bungalow
179. kɛbeʒi	kɛbeʒi	cabbage
180. da:ti	-do-	light
181. be:di	-do-	bill
182. adupre	-do-	plane (airplane)
183. rumotu	-do-	remote (control)
184. mankiʃi	-do-	matches - stopping
185. ta:si	-do-	taxi
186. dampo:	-do-	land poll
187. nkuransi	-do-	insurance
188. drinki	-do-	drink
189. kwe:	kwe:	coil (an insecticide)
190. bɔ:du	bɔ:lu	ball
191. ʃɛ:ti	ʃɛ:ti	shirt
192. tʃɔ:ku	tʃɔ:ku	chalk
193. pɔn	-do-	Pound Sterling (currency)
194. pa:pɔ	-do-	pipe
195. ko:ku	-do-	coke
196. walɛʃi	-do-	wireless (radio set)
197. kodeʒi	-do-	college

198. wɪ:ɡɪ	-do-	wig
199. ɡɛ:dl	-do-	girl
200. sa:sɪ	-do-	size
201. adɔrɪn	-do-	outdooring
202. kɔmpre	kɔmplen	complaint

- a. Group 1 comprises people who are monolingual. They do not have formal education and therefore do not use English constructions (sentences or phrases) in their conversations. Other members of this group are school dropouts who have very little background in formal education. Hardly do they also use English sentences or phrases in their conversation. However, they both use some few borrowed English words in their conversations as sometimes the avoidance of it becomes almost impossible.
- b. Group 2 on the other hand, comprises people who at least bilingual. That is, they speak two languages including English. They have formal education taught in the English language. They do code-mix of Akan and English a lot in their conversations.

From the data above, it could be deduced that members of Group 2 always maintain the closest similarity between the borrowed words and the adapted words. At times they use the borrowed words without subjecting them to any adaptation process. In such instances where the loanwords do not undergo any phonological processes, it is indicated by the mark ‘-do-’; meaning the *gloss* is the same as the loanwords (in Group 2). Also, there are some loanwords in Group 2 which are not present in Group 1. The explanation for this absence is that members of Group 1 normally do not produce or use such words in their conversations often and especially the elderly informants labeled them as “terminologies of the younger clique”, hence, their reluctance to produce or accept them in their conversations. They always prefer to replace those words with their Akan versions where possible. Those words which are not present in Group 1 are marked ‘nil’.

For the members of Group 2, the form they produce is what they will usually do produce when speaking with their colleagues. However, they try as much as possible to imitate the Group 1 forms especially when they are speaking to the elderly in the society (the less educated). For instance, when they want to talk about insurance with their grandparent, to facilitate better understanding, they will rather using the form *nkuransɪ* than say *insurance*.

Appendix 2.

Consonant- vowel interaction

	i	ɪ	u	ʊ	e	ɛ	o	ɔ	æ	a
p	pɪi <i>plenty</i>	pɪa <i>spear</i>	pusu <i>shake</i>	pʊ <i>reject</i>	dompe <i>bone</i>	pɛ <i>like</i>		pɔ <i>bark</i>	pæ <i>loin</i>	pa <i>fade</i>
b	bisa <i>ask</i>	bɪa <i>place</i>	bu <i>break</i>	bʊ <i>beat</i>		abɛ <i>palm</i> <i>fruit</i>	bodua <i>whisk</i>	bɔ <i>hit</i>	*	*
t	tɪ <i>chase</i>	tɪ <i>pluck</i>	tu <i>move</i>	tʊ <i>throw</i>		tɛ <i>hide</i>		tɔ <i>buy</i>		pata <i>resolv</i> <i>e</i>
d	di <i>eat</i>	adɪɛ <i>somethi</i> <i>ng</i>	du <i>heavy</i>	dʊdʊ <i>plenty</i>	dede <i>noise</i>	dɛ <i>sweet</i>		dɔ <i>love</i>		da <i>sleep</i>
f	fɪri <i>borrow</i>	fɪ vomit	efunu <i>corpse</i>	fʊru <i>climb</i>	afei <i>now</i>	fɛrɪ <i>shy</i>		fɔ <i>get</i> <i>wet</i>		fa <i>take</i>
s	sɪɛ <i>bury</i>	sɪrɪ <i>laugh</i>	su <i>cry</i>	sʊm <i>worship</i>	seseɪ <i>immedi</i> <i>ate</i>	sɛɪ <i>destroy</i>	som <i>hold it</i>	sɔrɪ <i>stand</i> <i>up</i>	sæ <i>finish</i>	sa <i>dance</i>
k	kɪta <i>hold</i>	kɪtɪwa <i>small</i>	kusɪɛ <i>rat</i>	kʊkʊ <i>chest</i>	keteke <i>a train</i>	kɛsɪɛ <i>big</i>	kosua <i>egg</i>	kɔ go	kæ <i>drive</i>	ka <i>bite</i>
g	*	*	g ^w u <i>sow/cast</i>	g ^ʊ ease	*	*	ag ^w oo <i>knock-</i> <i>ing</i>		*	*
h	hɪni <i>open</i>	hɪna <i>who</i>	hu <i>see</i>	hʊnʊ <i>mix</i>		hɛɔɔa <i>drowsy</i>	ohonini <i>giraffe</i>	hɔhʊɔ <i>visitor</i>		ha(w) <i>worry</i>
m	minɪm <i>I know</i>	minɪ <i>swallow</i>	muna <i>frown</i>	ɛmʊʊ <i>rice</i>		mɛn <i>horns</i>	moɔɔa <i>blood</i>	mmɔɔɪn <i>forcefuln</i> <i>ess</i>		ma <i>give</i> <i>out</i>
n	nɪm <i>know</i>	ɛnɪ <i>voice</i>	nu <i>stir</i>	nʊm <i>drink</i>	anene <i>crow</i>	ɛnɛ <i>today</i>		akɔnnɔ <i>lust</i>		nan <i>leg</i>

l	*	*	*	*	*	*	*	lɔɔɾɪ ¹⁴ <i>lorry</i>	*	*
r	biribi <i>someth ing</i>	bɾɪ <i>get ripe</i>	kukru <i>lift up</i>	pɾʊ <i>shrug off</i>	bebre <i>plenty</i>	tɾɛ <i>expand</i>	aburo <i>maize</i>	nɾɔ <i>lies</i>		bra <i>come</i>
ʃ/ç	ʃira <i>bless</i>	ʃɪ <i>burn</i>	*	*		ʃɛ <i>wear</i>	*	*	*	aʃa- sɪɛ ¹⁵ <i>begin ning</i>
ç ^w	ç ^w ie <i>pour</i>	ç ^w ɪ <i>beat</i>	*	*	ç ^w ee <i>empty</i>	ç ^w ɛ <i>look</i>	*	*	ç ^w æn <i>extri- cate</i>	
tʃ, ɖ	tʃi <i>dislike</i>	ɖɪ <i>collect</i>	*	*		tʃɛ <i>share</i>	*	*		ɖa <i>leave</i>
tɕ ^w , ɖɕ ^w	ɖɕ ^w iri <i>pull down</i>	adɕ ^w ɪ <i>palm- nut</i>	adɕ ^w uma <i>work</i>	ɖɕ ^w ʊ <i>to cool down</i>	ɖɕ ^w ɛɾɛ <i>capital</i>	ɖɕ ^w ɛɾɛ <i>money</i>	ntɕ ^w o <i>defeat</i>			edɕ ^w a <i>mar- ket</i>
ɲ	ɲini <i>grow</i>	ɲim <i>be preg- nant</i>	*	*	*	ɛɲɛ <i>it is bad</i>	*	*		ɲa <i>get</i>
ŋ	*	*		ŋŋʊ <i>palm oil</i>	*	*	*	*	*	*
ɲ ^w	ɲ ^w ira <i>weed</i>	ɲ ^w ini <i>weave</i>	ɲ ^w unu <i>cold</i>	ɲ ^w ʊnʊ <i>bitter</i>	*	*	*	*	*	*
ŋ ^w	*	*		ŋ ^w ʊma <i>leather</i>	*	*	*	*		ŋ ^w aŋ ^w a <i>won- der</i>
y	ji <i>pick</i>	jiɾɪ <i>wife</i>	ajuo <i>millet</i>	ajua <i>earthen-</i>		jɛn <i>to rear</i>		jɔnkʊɔ <i>friend</i>		jaw <i>pain</i>

¹⁴ [lɔɔɾɪ] *lorry* itself is considered a loanword and not a native word.

¹⁵ In [aʃasɪɛ], there is assimilation at the morpheme boundary of the compound word as in [a] + [ʃɛ] + [asɪɛ]. The [a] is the nominal prefix marker.

				<i>ware</i> <i>bowl</i>						
w	<i>wie</i> <i>finish</i>	<i>wɪ</i> <i>chew</i>	<i>wu</i> <i>die</i>	WUSU <i>shake</i>	*	*		ɔwɔ <i>snake</i>		<i>wari</i> <i>marry</i>

- Boxes are marked with asterisks when neither the “+” nor “-” ATR of a particular vowel is present. On the other hand, when either the +ATR or –ATR is present, no such mark is marked. For instance, if a +ATR of a mid- vowel /e/ is present, but not the –ATR variant, the other box will not be marked.

From the chart in §2.2 above, the following generalizations can be made with regard to the palatal and alveo (pre)-palatal coronals.

- All palatal and alveo-palatal coronals combine well with high front vowels.
- All palatal and alveo-palatal coronals can combine with front mid-vowels, particularly /ɛ/ in the Asante dialect.
- Almost all palatal and alveo-palatal coronals combine with low vowels except from the examples, the plain pre-palatal fricative /ʃ/, which can be followed by the low vowel after a phonological process of assimilation has taken place.