THE REPHONOLOGIZATION OF HAUSA LOANWORDS FROM ENGLISH: AN OPTIMALITY THEORY ANALYSIS

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Declaration

I, Damun Dakom Alfred declare that this work is my own, that all sources used or quoted have been indicated and acknowledged by means of complete references, and that this thesis was not previously submitted by me or any other person for degree purposes at this or any other university.

Signature……………   Date……………..

Abstract

This study investigates how Hausa, a West Chadic language (Afro Asiatic phyla) remodells loanwords from English (Indo – European) to suit its pre-existing phonology. Loanword adaptation is quite inevitable due to the fact that languages of the world differ, one from another in many ways: phonological, syntactical, morphological and so on (Inkelas & Zoll, 2003, p. 1). Based on this claim, receptor languages therefore employ ways to rephonologize new words borrowed into their vocabularies to fit, and to conform to native structure demands. Hausa disallows complex onsets, preferably operates open syllables and avoids consonant clustering in word-medial positions as at its best can tolerate no more than a single consonant at a syllable edge (Clements, 2000; Han, 2009). On the contrary, English permits complex onsets as well as closed syllables (Skandera & Burleigh, 2005). Such distinctions in both phonologies motivate for loanword adaptation. Hausa therefore employs repair strategies such as vowel epenthesis, consonant deletions and segmental substitutions and/or replacements (Newman, 2000; Abubakre, 2008; Alqhatani & Musa, 2014) to remodell loanwords. For analytical purposes, this research adopts theoretical tools of Feature Geometry (FG) (Clements & Hume, 1995) and Optimality Theory (OT) (Prince & Smolensky, 2004) to clearly illustrate how loanwords are modified to satisfy Hausa native demands (Kadenge, 2012). Vowel epenthesis in Hausa involves two main strategies: consonantal assimilation and default insertions. During consonantal assimilation, coronal and labial segments spread place features unto the epenthetic segment in the process determining the vowel type and/or quality, while in the case of default insertions, fresh segments are introduced context independently. Concerning segmental substitutions, most notably are English consonants /p/ and /v/ maximally replaced with similar ones, [f] and [b] that exist in Hausa on the basis that former and latter segments share same phonation features.

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[ ]   Phonetic Transcription

//   Phonemic Transcription

.   Syllable Boundary

→   is realized as/changes to

ˉ   Long vowel

ˈ   Main stress

ˌ   Secondary stress

>>   Constraint dominance (hierarchy)

List of Abbreviations

C   Consonant

V   Vowel

FG   Feature Geometry

OT   Optimality Theory

UG   Universal Grammar

SIL   Summer Institute of Languages

CHAPTER 1

1.1 INTRODUCTION

This study investigates how Hausa (West Chadic) a major language of Nigeria and of a few West African countries, employs repair strategies such as vowel epenthesis, (Abubakre, 2008; Musa & Alltakhaineh, 2015) and segmental replacements (Newman, 2000) in remodeling borrowed words from English. Loanword repair strategies aimed at achieving syllable structure adjustments vary across languages due to language variation (Sahayi, 2007, p. 255). There may be phonological processes that commonly occur cross-linguistically (Uffmann, 2004; 2006) but languages adopt different ways in resolving loanword conflicts. Vowel epenthesis, glide formation, vowel elision, segmental substitutions and replacements, feature spreading, consonant deletions, amongst many others, are frequently known processes as exemplified by many languages towards achieving loanword phonological adaptations (Khumalo, 1984; Campbell, 2004; Adomako, 2008; Kadenge & Mudzingwa, 2011; Kadenge & Simango, 2014). In Hausa loanword phonology a few of these processes aforementioned apply, with the major repair strategies: vowel epenthesis and segmental replacements. Abubakre (2008) and Alqahtani and Musa (2014) mention consonant deletions, a similar repair strategy in Akan, a major language of Ghana (Adomako, 2008) as an adaptation process in Hausa loanword rephonologization. Leben (1996; 2002) and Kenstowicz (2006) both note tonal adaptations a repair strategy active in Hausa phonology. Both authors suggest that tones maximally replace stress to effect syllable structure adjustments.

Languages of the world every now and then borrow or exchange linguistic materials from each another (Campbell, 2004). According to Yalwa (1992, p. 101), "No community can live without having contact with other communities around it. It is through this contact that communities influence one another at various levels – linguistic, cultural, social, and in some cases religious as well". Due to the fact that linguistic materials borrowed from one language (donor) into another (receptor) are generally considered foreign, it then means that the new set of materials (input) borrowed would definitely need to undergo some sort of repair or adaptation, to ensure they conform to the structural requirements and demands of the borrowing language (Kang, 2010, p. 2). This is the sole bedrock and/or justification for loanword phonology research.

The study of loanword phonology has widened our horizons and conceptual abilities towards phonological processes and the evolution of linguistic theories. Loanword phonology has enjoyed much research from various fields in linguistics for quite some time now (Antilla, 1989; Newman, 2000; Campbell, 2004; Hoffer, 2005; Sahayi, 2005; Kang, 2010; Kadenge & Mudzingwa, 2011; 2012; Kadenge, 2012). Campbell (2004, p. 62) within the field of historical linguistics, suggests that not only lexical items (words) can be borrowed into a language, but any other linguistic material e.g. sounds, phonological rules, syntactic patterns, discourse strategies, semantic associations, grammatical morphemes and so on. In similar vein, Herbert (1990, p. 120) suggests that the clicks found in isiZulu and isiXhosa, /c/, /q/, /x/, the most prominent of the languages of South Africa, were not originally present in these languages (isiZulu and isiXhosa) but were borrowed through contact with speakers of the Khoisan languages, mostly speakers of Khoe. Similarly, Khumalo (1984) and Batibo (1994) observe that the alveolar sound /r/ was never a registered phoneme in the isiZulu inventory, but was later incorporated into isiZulu's segment inventory as a result of borrowing. So far from this survey, it is evident that a wide range of linguistic items or materials can in fact be borrowed and/or exchanged. This thesis however, aims to focus only on the phonological adaptation of loanwords (lexicons). Hausa borrowed a lot of lexical stock from English as a result of the British colonial rule in pre–independence Nigeria (Baldi, 1988; Newman, 2000; Philips, 2004). Philips (2004) suggests that in the areas of education, military, administration and technology, many words were borrowed into the Hausa vocabulary (pp. 59-80).

The case for phonological adaptation is original and quite inevitable, due to the fact that languages of the world differ one from another in many ways – phonological, syntactical, morphological, and so on (Inkelas & Zoll, 2003, p. 1). For instance, Hausa at its best tolerance has syllable structures of CV, CVV, CVC, essentially reflecting a widely preferred syllable pattern typical of a CV shape (Lindau-Webb, 1985, p. 162). English on the other hand is known for its notorious complex syllable constructions: V, VC, CV, CVC, CCC, CCVC, CCCVCC, CCCVVC, and CCCVCCC (Kadenge & Mudzingwa, 2011, p. 142). Hausa's listed syllable structures above imply or suggest that it operates simple onsets and prefers open syllables, while English grammar exhibits complex onsets and closed syllables. If this claim is true, it is expected that borrowed word forms show faithfulness to their parent (donor) patterns hence violable to the receptor patterns, since every language has a pre-existing grammar or phonology unlikely to

exchange for another. Plausibly, it then becomes more accurate to say that it is quite easy to source lexicons or any other linguistic material from one language into another, but rather difficult or unusual to borrow along its grammar or phonology (van der Spuy, 2007, p. 132). Conflicts exemplified by distinct phonologies often become the crux for a scholarship of this nature, hence saddled with the task of unravelling the most suitable ways to achieve remodelling and/or rephonologization. The need therefore to identify and examine the processes these loanwords go through so as to conform to the receptor language's structure becomes the primary aim for this research.

Major repair strategies employed by Hausa in retaining its preferred phonological structures include vowel epenthesis and segmental/phoneme substitutions, as observed so far. With theoretical tools of Feature Geometry (hereafter FG) and the overall analysis cast within Optimality Theory (hereafter OT), this study hopes to appropriately and explicitly account for the procedure of remodelling. Vowel epenthesis is maximally the addition or insertion of segments or sounds into words to restructure the word form (input). In cases of adaptation, segments usually inserted to satisfy grammar constraints are vowels in most cases aimed at retaining allowed and/or permissible syllable structures (Uffmann, 2004; Kenstowicz, 2006). This by no means suggests that other segments cannot be inserted, as we know consonants and glides to widely trigger epenthesis as well in many languages of the world (Kadenge, 2012; Kadenge & Mudzingwa, 2012).

In Hausa, vowel epenthesis is mostly used to simplify complex onsets [CC] as shown in examples (1) and (2) below.

[CC] → [CV]

1. /bred/ → [būrodì] 'staple food'
2. /spanər/ → [sūfanà] 'spanner'

Vowel epenthesis is also used to open up closed syllables as Hausa grammar widely prefers open syllables reflexive of the CV shape (Caron, 2013) as shown in examples (3) and (4) below.

[CVC] → [CVCV]

3. /blak/ → [bāk**i**] 'black'

4. /tʃəːtʃ/ → [cōci] 'church'

Examples (1) and (2) show essentially how vowels are inserted to break up consonant clusters. Using insights from FG, we can predict specific epenthetic materials which are conditioned by particular environments (Kadenge, 2012). In example (1) [burodi], [u] is specifically inserted not any other vowel; [i], [a] etc. This is because identical features shared between segments result in grouping within the same class or category (Kadenge, 2012, p. 66). Labial consonants and rounded vowels share a common class: they both are labial. More insight on the FG model with regards to predictability of epenthetic materials will be expatiated on later in this study. Examples (3) and (4) depict how closed syllables are modified to obtain open syllables, a widely preferred pattern of Hausa, where vowels end words.

Although this thesis works solely with English as the source or donor language for loanwords, it is important to state that the present corpus of loanwords in the Hausa vocabulary was not only sourced from English, but also from Arabic (Baldi, 1988; Yalwa, 1992; Newman, 2000; Alqahtani & Musa, 2014) and other languages like Yoruba and French (Newman, 2000). Yalwa (1992, pp. 101-102) maintains that through trade and religion (Islam), Hausa speakers were able to borrow many words from the Arabs. Statistical data puts English to have influenced Hausa on a scale of 55%, Arabic 45%, and other languages like the few just mentioned make up the remainder of 5%. Hence examples can be drawn from Arabic, which is also known for having a notorious complex grammar structure (Forbes, 1863; Baldi, 1988) into Hausa.

Vowel epenthesis,

5. /dunyaː/ → [dūniyā] 'world',

6. /kaːfiɍ/ → [kāfiri] 'un-believer'.

Evidently seen in example (5) above, vowel [i] is inserted word-medially to fix the non-permitted form of [CC] as exemplified in [ny] of the borrowed word. Also in example (6) above, vowel [i] is epenthesized word-finally to open up the closed syllable (Musa & Alltakhaineh, 2015, p. 33; Abubakre, 2008, p. 84).

Smirnova (1982, p. 25) however, states that, "Recently, the flow of Arabic words into Hausa has greatly decreased, to be replaced as a source of new vocabulary by English, and English

borrowings have penetrated all areas of Hausa public and everyday life". Based on this claim lies the justification for this research's sole reliance on English as the major source of loanwords supplied in Hausa. For research to achieve relevance there is a need to work within the recent scope of Hausa's evolving grammar.

Segmental replacements are substitutions of native phonemes or sounds considered closest to new or foreign (input) phonemes which are not found in the phonetic inventory of the receptor language (Campbell, 2004, p. 66). In other words, segments that exist in the receptor language considered either articulatorily, acoustically or auditorily similar to foreign sounds are used as replacements for non-realized inputs (Kadenge, 2012). According to Hoffer (2005, p. 61), due to differences in the phonological systems of languages, they are bound to exhibit dissimilar or distinct segment inventories. Again we see language variation constantly a stimulant or conditioner for peculiar outcomes within the grammar of different languages. However, resemblances usually occur as local sounds seem to share identical properties with other foreign sounds found in the contact languages. Therefore Hausa maximally replaces segments [p] and [v] with nearest sounds [f] and [b] respectively, as former segments [p] and [v] are not realized in its segment inventory.

Examples (7) through (10) illustrate these reconstructions as shown below:

[p] → [f];

      7. /**pr**əfɛsə/ → [**fū**rofesà] 'professor'

      8. /**pr**ʌiməri/ → [**fī**rāmàrē] 'primary'

[v] → [b];

      9. /**v**i:zə/ → [**b**īzà] 'visa'

      10. /**v**ɛtərinəri/ → [**b**ītinari] 'veterinary'

Examples (7) and (8) above show substitutions of [p] with [f], while examples (9) and (10) show substitutions of [v] with [b]. This seems to suggest that they are segmental markedness constraints that are high ranking in Hausa: *p and *v, which ban the occurrence of the consonants [p] and [v], respectively and both are non-realized segments in the Hausa inventory.

Procedural analysis in latter stages of this research which adopts theoretical tools of FG (Clements & Hume, 1995) and OT (Prince & Smolensky, 2004) illustrate in detail how these processes manifest within Hausa phonology. Contributions of adopted theoretical frameworks FG and OT, insightfully shed light on the rephonologization of loanwords conceptualized as a case of formal patterning, rather than a case of default insertions or arbitrary arrangements.

1.2 AIMS AND OBJECTIVES OF THE STUDY

As mentioned earlier, the way and manner languages incorporate loanwords to become part of their vocabulary is the focal point of this survey. It is expected that loanwords show faithfulness constraints to satisfy the grammar of the language from which they are sourced, and by implication exhibit lexical contrasts to the rest of the native words in the receptor language being admitted into (Sahayi, 2005, p. 253). Since we expect the markedness constraints of receptor grammar to conquer or dominate faithfulness constraints of these loans as they belong to another grammar, objectives for a study of this nature are to:

1. Identify and describe repair strategies used in Hausa loanword phonology.
2. Determine, since in OT terms, linguistic variation is a consequence of difference in rankings of the same universal set of constraints (Prince & Smolensky, 2004), native phonotactic and segmental constraints (permissible and violable) that are applicable to the Hausa grammar (Silverman, 1992, p. 290). Hence, identifying the language specific constraint rankings pertinent to Hausa is important (Flack, 2009, p. 1).

1.3 JUSTIFICATION FOR THE STUDY

Hausa speakers have had contact with English speakers since pre-independent Nigeria. The advent of colonial rule brought Nigerian languages into contact with English as British rule was spread throughout the country. English at present still operates as the official language, hence a *lingua franca* of Nigeria. As a result, Hausa along with the other approximately 450 native languages in Nigeria has had to borrow words from English (Josiah & Udoudom, 2012). This sociolinguistic situation has led to native languages borrowing and adapting loanwords to suit their pre-existing phonologies. Therefore this study will describe and illustrate in detail, how Hausa rephonologizes lexical stocks from English. Much research has actually been conducted on various topics and areas in Hausa. However, only a few have applied demonstrative tools of FG and OT to analyze Hausa loanword phonology. This study therefore seeks to contribute and

to provoke more accounts of literature, which will attempt to explain the predictability of reconstructions done across a board of formal patterning rather than arbitrarily (Kadenge, 2012).

1.4 DELIMITATION OF THE STUDY

This research dwells on loanword phonology entirely, and examines how English loanwords are rephonologized in Hausa. It adopts the Hausa variety spoken in Kano (Northern Nigeria), which many notable works have been written (Schuh & Yalwa, 1999; Newman, 2000). Schuh and Yalwa (1999, p. 90) note that the Hausa variety spoken in Kano is widely considered as standard, and mostly used for national, regional and international broadcasting, such as the BBC (British Broadcasting Corporation), Deutsche Welle (Germany Radio) amongst others. Hausa loanword research has been a common area of interest and/or research for many linguists for quite some time now. However, many of these studies have examined Arabic loanwords in Hausa (Baldi, 1988; Yalwa, 1992; Abubakre, 2008; Alqahtani & Musa, 2014). Unlike these previous studies, this present one examines English loanwords, a more recent donor to the Hausa language. This is a deliberate attempt made so as to conceptualize Hausa's evolving grammar in recent times (Caron, 2013). This study adopts core tools of Feature Geometry (Clements & Hume, 1995) and Optimality Theory (Prince & Smolensky, 2004) which provide solid basis for straightforward analysis as to how phonological adaptation processes occur. More so, these theoretical models are recent, hence relevant to obtain an almost complete research.

1.5 OUTLINE OF THE THESIS

Chapter 1 gives a general introduction of the subject matter of the thesis (loanword phonology), highlighting the aims and objectives of the study, as well as offering justification for the study. Chapter 2 provides brief background information on the languages under study, Hausa and English. It will specifically expose the distinct phonologies of both languages. Segment inventories and syllable structures of Hausa and English will be discussed and examined in this study. This section also provides language classification details and sister languages related to Hausa and English will be given in order to demonstrate the distinctiveness of both languages under study. The chapter also reviews relevant works of notable scholars within the same field of interest.

Chapter 3 provides details for data collection and verification methods. This chapter introduces theoretical frameworks, in other words, analytical tools for unpacking this study. Models of

Feature Geometry (Clements & Hume, 1995) and Optimality Theory (Prince & Smolensky, 2004) remain the core tool-kits for this research. Chapter 4 identifies the general repair strategies employed by Hausa in remodelling loanwords. Foreign words and their rephonologized forms will be supplied as evidence for an adoption or validation of the key strategies used in phonological adaptations which will be mentioned throughout the thesis. This chapter will also identify phonotactic constraints which apply to Hausa grammar, and will also present a sort of schemata and/or ranking of constraints violable in Hausa grammar through insightful contributions of Optimality Theory (OT). The rationale behind specific epenthetic and phoneme substitutive materials in particular environments will also be accounted for using feature trees. In other words, association of segments which share place features will be presented. This will hopefully be achieved through amiable efforts of Feature Geometry (FG), (Clements & Hume, 1995). Chapter 5 provides general outcomes and findings, and conclusions for the study. References and a data corpus or wordlist (loanwords) for this work will also be supplied in this chapter.

1.6 SUMMARY OF CHAPTER

In summary, this first chapter has provided a brief statement on the subject matter of this research - loanword phonology. Contributions of loanword phonology help explain and account for the various phonological processes employed in remodelling loanwords into native forms suitable and acceptable by receptor languages. This study notes that loanword adaptation strategies differ per language. Widely known processes include: vowel epenthesis, glide formation, vowel elision, segmental substitutions and replacements, feature spreading, consonant deletions, vowel hiatus resolution, amongst many others. This research investigates Hausa (West Chadic) a major Nigerian language, as its case study. Through Hausa's syllable structures and word forms, it identifies key repair strategies inherent in its grammar geared towards rephonologizing loanwords from English. Repair strategies include vowel epenthesis, segmental substitutions, and consonant deletions. This chapter also states the objectives of the study providing rationale as to why and how these adaptation processes operate, and also justifies why loanword phonology is apt within the discourse of language evolving grammar. This study also aims to identify, describe and analyze syllable structure requirements, as well as grammar restrictions and/or demands hence, revealing language specific constraints that apply in Hausa.

CHAPTER 2

SOCIOLINGUISTIC AND PHONOLOGICAL ASPECTS OF LANGUAGES UNDER STUDY

2.1. BACKGROUND INFORMATION ON ENGLISH SEGMENTAL PHONOLOGY

English stems from the Germanic subgroup of the Indo-European language family (Campbell, 2004, pp. 167-168). It is widely spoken across Europe, the Americas, Africa and other parts of the world. However, English has many variants or types spoken across these aforementioned areas. Essentially, these variants can be considered dialects. Sister languages found to belong to this same subgroup include German, Italian, French, Swedish and Dutch among others (Campbell & Poser, 2008). A few examples showing cognates of sister languages with English are shown in Table (1) below.

Table 1: Cognates of English and sister languages, Campbell (2004, p.124)

	ENGLISH	**ITALIAN**	**FRENCH**
11.	Beat /biːt/	Battere /battere/	Batter /batr/
12.	Valley /væli/	Valle /valle/	Val /val/
13.	Ball /bɔːl/	Bolla /bolla/	Boule /bul/

Greenberg (1960) drawing from Sapir (1921), suggest English resembles an agglutinative language, and in some cases fusional (p. 183). Greenberg however stresses that English even appears to score in all portions of Sapir's eventual fourfold divisions of language based on typology namely fusional, isolating, agglutinating and symbolic (1960, p. 193). A few examples depicting fusional and agglutinative tendencies for English's grammar include: 'dep-th' where /dɛp/ is fused with the dental /TH/, a case of fusional, and in 'good-ness' where /nəs/ is suffixed

to /gUd/ to reflect agglutination. By implication, English resembles a complex language in terms of grammar and structure.

2.1.1. ENGLISH SEGMENT INVENTORY

English has a more complex phonetic inventory as compared to Hausa and many other African languages (Katamba, 1989; Kadenge, 2012). Segments in the English inventory constitute between 24 to 25 consonants, 7 short monopthongs, 5 long monopthongs and 8 diphthongs (Skandera & Burleigh, 2005; Fromkin et al, 2011).

2.1.1.1 Vowels

English has 20 vowels: 12 monophthongs and 8 diphthongs (Deterding, 2005). As Skandera and Burleigh (2005) opine, several different sets of phonetic vowel symbols have been supplied by many scholars, which has complicated the realization of a universally acclaimed representation for the English vowel system (p. 35). This is however not only peculiar to English, as authors design and represent language segments drawn from pronunciation in diverse forms. Although there could be many charts and representations for English vowels, due to extensive research, representations have gradually become identical overtime hence widely accepted literatures such as Skandera and Burleigh (2005), and Fromkin, et al, (2011) can be adopted and made reference to, in a study of this nature. A chart of English vowels is shown in Table (2) below,

Table 2: English vowels (Fromkin et al., 2011, p.205)

Monophthongs	Diphthongs
[i] [ɪ]	[ɪə]
[u] [ʊ]	[ʊə]
[e] [ɛ]	[eɪ] [eə]
[o] [ɔ]	[əʊ]
[ə] [ɜ]	[ɔɪ]
[æ] [ʌ]	[aɪ] [aʊ]
[a] [ɑ]	

7 short monophthongs

[i]   14. /fɪʃ/ 'fish'

        15. /sit/ 'sit'

[e]   16. /eg/ 'egg'

        17. /ten/ 'ten'

[æ]   18. /æpl/ 'apple'

        19. /kæt/ 'cat'

[ʌ]   20. /bʌtər/ 'butter'

        21. /kʌp/ 'cup'

[ɒ]   22. /ɒl.ɪv/ 'olive'

        23. /gɒt/ 'got'

[ʊ]   24. /pʊdɪŋ/ 'pudding'

        25. /pʊt/ 'put'

[ə]   26. /spəgeti/ 'spaghetti'

        27. /mʌðər/ 'mother'

5 long monophthongs

[iː]   28. /biː/ 'bee'

        29. /iːgl/ 'eagle'

[ɜː]   30. /bɜːd/ 'bird'

        31. /ɜːli/ 'early'

[aː]   32. /stɑːt/ 'start'

        33. /fɑːðər/ 'father'

[ɔː]   34. /hɔːs/ 'horse'

        35. /sɔː/ 'saw'

[uː]   36. /guːs/ 'goose'

        37. /tuː/ 'too'

8 diphthongs

[eə]   38. /eər/ 'air'

        39. /heər/ 'hair'

[aɪ]   40. /maɪnd/ 'mind'

        41. /maɪ/ 'my'

[aʊ]   42. /maʊθ/ 'mouth'

         43. /naʊ/ 'now'

[ɪə]   44. /ɪər/ 'ear'

         45. /nɪər/ 'near'

[ʊə]   46. /tʊər/ 'tour'

         47. /pjʊər/ 'pure'

[eɪ]   48. /feɪs/ 'face'

         49. /seɪ/ 'say'

[ɔɪ]   50. /vɔɪs/ 'voice'

         51. /bɔɪ/ 'boy'

[əʊ]   52. /nəʊz/ 'nose'

         53. /gəʊ/ 'go'

Word examples (14) through (53) with featured English vowels shown above are sourced from (Skandera & Burleigh, 2005).

2.1.1.2 English consonants

Following Deterding (2005, p. 23), English has about 24 consonants, 6 plosives /p, b, t, d, k, g/, 9 fricatives /f, v, θ, ð, s, z, ʃ, ʒ, h/, 2 affricates /ʤ, ʧ/, 3 nasals /m, n, ŋ/, 1 lateral approximant /l/ and 3 approximants /w, j, r/. A chart is shown below (Fromkin, et al., 2011):

Table 3: English consonants (Fromkin et al., 2011, p.205)

Labial	Dental	Alveolar	Pre-Palatal	Palatal	Velar	Glottal
[p]		[t]			[k]	[ʔ]
[b]		[d]			[g]	
				[tʃ]		
				[dʒ]		
[f]	[θ]	[s]	[ʒ]			
[v]	[ð]	[z]	[ʃ]			[h]
[m]		[n]			[ŋ]	
		[r]				
[w]		[l]		[j]		

2.1.2. ENGLISH SYLLABLE STRUCTURE

English has quite a complex syllable structure as compared to many African languages (Kadenge & Mudzingwa, 2012). It can consist of multiple outcomes of V, VC, CV, CVC, CCC, CCVC, CCCVCC, CCCVVC, CCCVCCCC and many more, ranging from simple to complex onsets, nucleus and codas. This phenomenon can only pose problems for Hausa, along with many other African languages which operate a fairly simple CV structure or slightly more, but not as compounding when compared to English. English permits consonant clustered words in all positions: word initial, medial and final stages (Silverman, 1992, p. 290). A few examples of such words include; 'school', 'apt', 'plank', 'corridor', 'break', 'gloss', etc. This pattern essentially exhibits many syllable structures which are permissible in English grammar.

Table 4: Examples of English syllables

	Lexical item	Transcription	Syllable shape
54.	I	/aɪ/	V
55.	me	/miː/	CV
56.	At	/æt/	CV
57.	Ban	/bæn/	CVC
58.	Sky	/skī/	CCC
59.	Spats	/spæts/	CCVCC
60.	School	/skuːl/	CCCVVC

Word examples (54) through (60) above depicting English syllable structures are sourced from (Skandera & Burleigh, 2005).

Syllable structures shown in Table 4 above, confirm English's compounding word forms and presents a definite reason and/or cause for phonological adaptation and/or rephonologization. This study is therefore concerned with how English syllable structures (complex) are simplified in Hausa.

2.2 BACKGROUND INFORMATION ON HAUSA SEGMENTAL PHONOLOGY

Hausa is one of the most spoken languages of Africa with over 35 million speakers on the continent (Newman, 2000; Caron, 2013). According to Abubakre (2008, p. 77), the Summer Institute of Languages (SIL, 2008), ranks Hausa as the second most spoken language across Africa only after Swahili which is ranked first. Hausa belongs to the West - Chadic sub-family of languages of the Afro Asiatic phyla (Newman, 2000; Baldi & Jungraithmayr, 2004; Jaggar, 2011). Other West Chadic languages include Tangale, Ngas, Ngizim, Mwaghavul, Bole amongst others. Hausa is spoken widely across the Northern and Central parts of Nigeria, Southern parts of Niger, Northern Cameroon, Western and South-Central parts of Chad. Jaggar (2011, p. 1)

suggests that even at present, new areas where Hausa is spoken are still occasionally being discovered. In Nigeria, three major languages (local) are known with Hausa, Yoruba and Igbo making up the list. The Hausa language has many dialects spread across the aforementioned geographical areas, with a standard variety spoken in Kano State, Northern Nigeria, which is home to the largest speaking population (Abubakre, 2008, p. 78). A few examples of cognates showing sister languages of Hausa, is shown in the Table (5) below:

Table 5: Cognates of Hausa and sister languages, Schuh (2008, p.274)

	Hausa	Bole	Ngizim	Gloss
61.	sha /ʃā/	sa /sə/	sau /səu/	"to drink"
62.	sani /sāni/	san /sən/	sanda /səndā/	"to know"
63.	mutu /mu:tu/	motu /mɔtu/	matu /mətu/	"to die"
64.	doki /dōki/	duwaka /duwəkə/	duka /dukə/	"horse"
65.	suruki /suruki/	surko /surkō/	saurak /sāurāk/	"in-law"

2.2.1. HAUSA SEGMENT INVENTORY

Hausa has a total of 10 vowels, comprising 5 short vowels and 5 long vowels, /a/, /e/, /i/, /o/, /u/, /a:/, /e:/, /i:/, /o:/, /u:/ and has 2 diphthongs, /ai/, /au/ (Lindau-Webb, 1985, p. 161). However, scholars like Smirnova (1982, p. 6) suggest that Hausa has 4 diphthongs, /ai/, /ei/, /ɔi/, /au/, not two. These diverse views and opinions are only based on dialectal variations since the Hausa language realizes many dialects and/or variants (Carnochan, 1951; Schuh, 2003).

For purposes of this thesis, I adopt the Kano dialect, a widely acknowledged variety (Leben, 1996; Newman, 2000; Jaggar, 2011) that has enjoyed extensive research. All ten vowels in Hausa (long and short) have phonemic status as they convey distinct meaning (Abubakre, 2008, p. 79). Hausa has 32 consonant phonemes of Kano's variety (Newman, 2000, p. 392). Other dialects realize between 23 to 25 consonants, as opposed to the Kano standard variety. Dialects of Hausa include: Kano Hausa (spoken in Kano), Western Hausa (spoken in Sokoto, Tahoua

(Niger)), Northern Hausa (spoken in Katsina, Maradi and Zinder (Niger)), Southern Hausa (spoken in Zaria and Bauchi), Eastern Hausa (spoken in Had'eja, Azare and Katagum), Ghanaian Hausa (spoken in Ghana), and finally non-native Hausa, which is a diluted but accepted version of the language spoken by non-native Hausa speakers. It is noteworthy to mention that throughout the aforementioned areas where Hausa is spoken, it is remarkably uniform in pronunciation, vocabulary and structure (UCLA Hausa Homepage, 2008). Again I reiterate that for purposes of this research, I adopt the Kano variety of Hausa, hence the use of the 32 consonants.

2.2.1.1 Vowels

Hausa has 12 vowel phonemes (Newman, 2000). Other dialects realize 12 to 14 phonemes (Smirnova, 1982). Due to dialectal variations, only information concerning diphthongs has resulted in different inventories. So far, segment inventories supplied by various literatures on Hausa have exemplified an almost similar or identical pattern of segments registered (Newman, 2000; Caron, 2013). The case for vowel lengthening (long vowels) can be aligned to tonal interactions, as observed in studies of Leben (1996) and Kenstowicz (2006), where Hausa maximally replaces stress with tones. This phonological adaptation of some sort motivates, explains and provides evidence for the realization of long vowels in Hausa's grammar (Na' Allah, 1991). Tonal adaptations as a repair strategy in Hausa will not be elaborated in this study as it only dwells on segmental phonology not auto-segmental phonology as I have mentioned earlier.

Table 6: Hausa vowels, Newman (2000, p.398)

```
┌─────────────┐
│ [i]     [u] │
│             │        ┌─────────────────┐
│ [e]     [o] │        │ [ii]      [uu]  │      ┌─────────────┐
│             │        │                 │      │             │
│      [a]    │        │ [ee]      [oo]  │      │  [ai] [au]  │
│             │        │                 │      │             │
└─────────────┘        │       [aa]      │      └─────────────┘
                       │                 │
                       └─────────────────┘
```

Shown above in Table (6) is a chart for Hausa long and short vowels, and diphthongs that exist in the language. Examples (43) through (54) of Hausa words with the vowels featured are also sourced from Newman (2000) and shown below:

5 Short vowels

65.   /i/   /mija:/ [mìyā] 'soup'

66.   /e/   /ka:ʃe/ [kāshè] 'to kill'

67.   /u/   /u:ku/ [ūkù] 'three'

68.   /o/   /ago:go/ [àgōgo] 'wrist watch'

70.   /a/   /dafa:/ [dàfā] 'cook'

5 Long vowels

71.   /i:/   /ga:ri:/ [gàrī] 'town'

72.   /e:.   /ʃe:ka:ra:/ [shēkārā] 'year'

73.   /u:/   /i:hu:/ [īhū] 'shout'

74.   /o:/   /abo:ki/ [àbōkì] 'friend'

75.   /a:/   /da:ga/ [dāga] 'to lift/carry up'

2 Diphthongs

76.   /ai/   /aiki:/ [**ai**kī] 'work'

77.   /au/   /jau/ ['y**au**] 'today'

The long vowels in orthography are realized with a small slash bar on top of the segments, e.g. [ī, ē, ā, ō, ū] Newman (2000). However, some scholars represent them as double segments [aa, ee, oo, uu, ii] (Leben, 1971, 1996; Jaggar, 2011). Both representations wherever used in Hausa works are widely accepted, although in this research, the notation with slash bars on top of the vowels is used. All ten vowels of Hausa, both long and short enjoy phonemic status (Smirnova, 1982). Consider the minimal pair shown below;

78.   (a). [bāki] 'guests'

(b). [baƙi] 'black'

Quite clearly, the long and short vowels [ā] and [a] construe different meanings as captured in example (78) just above.

Hausa has no occurrence of central vowels which can be found in other West-Chadic languages (Blench, 2014; Abubakre, 2008; Newman, 2000). For instance, the central vowel [ɨ] is realized in Mwaghavul, a sister West Chadic language spoken by an estimated 400,000 people situated in the central parts (Mangu and Panyam) of Plateau state, Nigeria (Blench, 2014, p. viii). Caron (2013) notes that occurrence of the central vowel [ɨ] in loanwords is substituted with the closest vowel [i] available in the Hausa inventory. Examples (79) and (80) with central vowel [ɨ] in sister West Chadic language (Mwaghavul) cited in Blench (2014) are shown below:

79. [ngɨris] 'cartillage', 'biscuit bone'

80. [ngɨrok] 'to snore, snoring'

Although Hausa lacks nasalized vowels, nasalization is known to occur in Hausa. Abubakre (2008, p. 79) suggests that oral vowels become nasalized when preceded by a nasal consonant in Hausa. Abubakre's claim seems accurate, as nasalization is a widely known phonological process which commonly occurs in many languages of the world. Similarly, Beddor et al. (1986, p. 212) suggest that oral vowels adjacent (either before or after) to nasal consonants are produced

with a partial lowering of the velum and thus become technically realized as nasalized vowels eventually. However, Beddor et al (1986) note that as a result of the partial process, nasalization is usually less noticed among speakers (p. 214). In the same vein, Campbell (2004, p.41) states that vowels often become nasalized in the environment of nasal consonants hence nasalization is a common process in phonology. Consider Abubakre's (2008) few examples below:

81. [ts'anĩ] 'to know'

82. [gēmũ] 'beards'

Examples (81) and (82) above show vowels [i] and [u] inherit the nasality of segments [n] and [m] respectively, basically nasals. The diacritic mark ˜ on top of segments [i] and [u] represent nasality.

Hausa is a tone bearing language and as Hyman (2003, p. 155) points out, most African languages, if not all, are tonal. Tone bearing segments are usually vowels [+syllabic] (Clements, 2000).

2.2.1.2. Hausa consonants

The consonants of Hausa constitute 32 phonemes as realized in the Kano dialect (Newman, 2000). Consonants consist of simple and complex segments. Table 7 below presents a chart of consonant segments that exist in Hausa.

Table 7: Hausa Consonants chart, Newman (2000, p.392)

		Labial	Alveolar	Palatal	Velar	labiovelar	palato-velar	glottal-laryngeal
Obstruent	Voiceless	[f]	[t]	[c]	[k]	[kw]	[ky]	
	Voiced	[b]	[d]	[j]	[g]	[gw]	[gy]	
	Glide	[ɓ]	[ɗ]	[’y]	[ƙ]	[ƙw]	[ƙy]	[’]
	Voiceless	[f] [fy]	[s]	[sh]				[h]
	Voiced		[z]	[(j)]				
	Glides		[ts]					
Sonorant		[m]	[n]					
			[l]					
			[r]					
			[ɽ]					
				[y]		[w]		

It is critical to mention that every instance of [p] is realized as [f] in Hausa. This is because Hausa lacks the bilabial voiceless stop [p] in its segment inventory (Newman, 2000; Smirnova, 1982). Indigenous word examples (83) through (86) captured below are sourced from Newman (2000) to help buttress this claim.

[f] → [p]   83. [faata] /paːta/ 'hope'

              84. [fiita] /piːtaː/ 'to go out'

              85. [faashe] /paːʃe/ 'break'

86. [fuska] /puska:/ 'One's face'

It is also interesting to note that in other environments [f] is usually realized as glottalized [h] when it occurs before vowels, in most cases, back rounded vowels, (Newman, 2000, p. 393). Consider these few examples shown below,

[f] → [h] /__u [+back, +round]　　　87. *dafuwa → [dah**u**wa] 'to cook'

88. *aifu → [aih**u]** 'to give birth'

89. *makafo → makah**o** 'blind person'

Examples (83) through (86) above show the alternation of segments [f] and [p] during speech (with the /p/ variety represented in phonetic slashes), and in all cases of orthography segment [f] maximally replaces [p]. Examples (87) through (89) above, demonstrate the environments in which [f] changes to [h] when followed by back round vowels [u] and [o].

The claim for segmental replacements is evidently accounted for, through contributions of loanword phonology. Lexicons sourced from donor languages inherent with /p/ in their input forms are adapted with [f] as seen in earlier examples (7) and (8) above. Therefore a phonotactic constraint in Hausa would lie: *p, which disallows the occurrence of consonant [p].

Implosives /ɓ, ɗ, ƙ/ are found in Hausa. Newman (2000) considers phonemes /ɓ, ɗ/ as laryngealized segments and/or implosives, while /ƙ/ is considered an ejective. Extensive studies on implosives, a common phoneme in the phonological inventory of many African languages (Igbo, Shona, Dida, Hausa, etc) have been widely conducted with diverse generalizations (Ladefoged, 1964; Greenberg, 1970; Welmers, 1973, Hyman & Schuh; 1974, Kaye, 1981, p. 78). Aforementioned scholars have considered them voiceless obstruents (Hyman & Schuh, 1974) while others consider them as liquids (Kaye, 1981, p. 78). Despite divergent attempts by linguists to distinguish and/or classify these segments, drawing from Javkin (1977, p.559):

> Glottalic consonants are produced by closing the glottis and using movements of the oral cavity, particularly the upward or downward movements of the larynx, to compress or rarefy the air in the oral cavity. Implosives involve a downward movement of the larynx and produce a relatively low pressure; ejectives involve an upward movement and produce a compression of air in the oral cavity.

We can unanimously agree that their manner of articulation patterns in an identical way and belong to same category 'glottalic consonants' with the only difference being 'direction' (Javkin, 1977; Kaye, 1981; Maddieson, 2005). While implosives involve downward movements of the larynx, ejectives involve an upward movement (Javkin, 1977; Kaye, 1981; Ladefoged, 2005; Maddieson, 2005). Implosives are independent phonemes as they all enjoy phonemic status (Smirnova, 1982, p. 4). With a minimal pair test, word examples can be generated and established as shown in pair examples (90) and (91) below:

90. (a). [baƙi] 'black',

    (b). [bāki] 'guests'

91. (a). [hābā] 'why',

    (b). [haɓā] 'chin'.

Phoneme /n/ occurs as velarized [ŋ] in word final positions. Consider examples (92) and (93) shown below:

92. nan → [naŋ] 'here'

93. can → [caŋ] 'there'

In other dialects /m/ is also realized as the velar [ŋ] as in malam → [malaŋ] 'teacher' at word final positions (Lindau-Webb, 1985; Newman, 2000). The palatals /c, j/ are realized as affricates of English's [tʃ] and [dʒ] respectively, as in English 'church' and 'judge' respectively. The [sh] segment represents the palatal fricative /ʃ/, [kashē] /kaːʃẽ/ 'kill' (Newman, 2000, p. 393). Studies of (Schuh & Yalwa, 1999; Newman, 1980; 2000; Newman and Newman, 2011) all confirm the existence of two R's in Hausa grammar; the trill /r/ and the retroflex tap /ɽ/. Newman and Newman (2011, p. 265) suggest both phonemes are however not distinguished in text. The authors also note that the retroflex /ɽ/ occurs at word final positions while the trill /r/ occurs at initial and medial positions.

Examples (94) through (96) below show the trill /r/ in word initial and medial positions:

94. [raɓa] 'fog'

95. [baɾa] 'servant'

96. [ɓeɾa] 'rat'

Examples (97) and (98) below show the retroflex /ɽ/ at word final positions:

97. [bataɽ] 'to lose something'

98. [gūgaɽ] 'the act of rubbing'

Worthy of note is that the retroflex /ɽ/ which occurs at the word final position is usually added as a possessive suffix to show possession or to identify specific objects (Newman, 1986, p. 257). The /ɽ/ is rolled with the tongue tip reaching for contact with the hard palate during articulation (Smirnova, 1982, p. 9). Pair examples (99) and (100) below are indigenous words.

99. (a). [riga] 'shirt'

     (b). [rigaɽ-sa] 'his shirt',

100. (a). [ūwà] 'mother'

     (b). [ūwàɽ] 'his/her mother'

The velar /ŋ/ is also considered a possessive suffix and can be realized as [rigaŋ-sa] 'his shirt' (Yalwa, 1992, p. 112). Examples (94) through (100) as shown above are sourced from Caron (2013) and Newman (1986). On the account that a clear distinction is needful to show possessive forms differently, Hausa thus tolerates final segments [r] and [ŋ] word-finally hence exhibiting a CVC syllable structure. Asides this reason, native root words reflex the preferred pattern typical of the CV shape as examples (94) through (96), (99a) and (100a) demonstrate.

Hausa consonants constitute complex segments which can be considered as singletons, besides simple segments (Clements, 2000; Newman, 1997). Kadenge and Mudzingwa (2011) drawing from Sommerstein's (1977) definition of complexity, interpret a complex segment as a unit having two or more specifications in terms of feature [type] (p. 208). Put differently, these segments are regarded complex due to the nature of their production, because their production requires more than one single point of constriction in the oral cavity (Kadenge & Mudzingwa, 2011, p. 209). This presupposes that simple segments are not doubly articulated Sagey (1982).

Complex segments exemplify secondary articulation, a phenomenon quite common of many African languages (Williamson & Blench, 2000, p. 37). Hence for Kadenge (2012, p. 64) such segments are better referred to as single complex segments, namely, C, rather than clusters, CC. The notion for complexity can be clearly illustrated with the aid of the FG model.

$$k^w$$
$$|$$
$$C - Place$$
$$[dor] \quad V - Place$$
$$|$$
$$[lab]$$
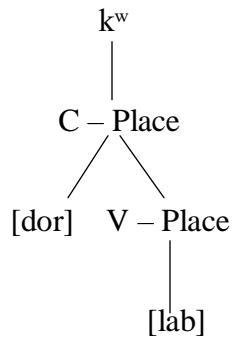
Figure 1: Representation of [k^w]

The illustration captured in Figure (1) above, is drawn from Clements and Hume (1995) and Kadenge and Mudzingwa (2011), stating that the secondary place of consonants is dependent on the V – Place (Vowel Place) node, which in turn is dependent on the C – Place (Consonant Place) node (Kadenge & Mudzingwa, 2011, p. 210). A similar construction can be drawn from another Nigerian language, Igbo (Niger Congo), a major language of Nigeria predominantly spoken in Eastern parts of Nigeria. Clearly expedient in its name [igbo], the sequence [gb] essentially a combination of labial-velar sounds, is considered a single segment and not a cluster (Clements, 2000, pp. 149-150).

Table 8: Hausa complex segments (Newman, 2000)

Voiceless alveolar affricates	ts
Voiceless labio-velarized plosives	kʷ
Voiceless palatalized velars	kʲ
Voiced labio-velarized plosives	gʷ
Voiced palatalized velars	gʲ
Labio-velarized glides	ƙʷ
Palatalized-velarized glides	ƙʲ

The alveolar affricate /ts'/ is a voiceless ejective and a member of the /s, z, tz/ triad (Newman, 2000, p. 394). From extant data, labialization and palatalization seem to only occur with the velar plosives, /k, g/ [dorsal]. Yalwa (1992) suggests these velar consonants are labialized and palatalized before back rounded vowels /o, u/ and low vowel /a/, as in ƙyau 'beauty', gyadā 'peanuts', ƙyūyā 'indolence' (p. 111). This is evident in the examples captured in Table (9) below which shows a wordlist of featured complex segments in Hausa.

Table 9: Complex segments (consonants) of Hausa with word examples

	Segments	Word	Transcription	Gloss
101.	**/ƙw/**	ƙwai	/ kʷai/	'egg'
102.	**/ky/**	kyau	/kʲau/	'beauty'
103.	/**gy**/	gyada	/gʲada:/	'nuts'
104.	**/ts/**	tsani	/tsa:ni/	'know'
105.	**/gw/**	gwaji	/gʷa:ji:/	'test'

As suggested earlier by Sagey (1982), simple segments are not doubly articulated. In agreement, Kadenge (2012, p. 61) affirms that simple segments are articulated with a single constriction at one point of the oral cavity. A wordlist of Hausa simple segments is captured in table (10) below.

Table 10: Simple segments (consonants) of Hausa with word examples

Segments		Word	Transcription	Gloss	Segments		Word	Transcription	Gloss
106.	**/m/**	mace	/mac'e/	'woman'	117.	**/h/**	hula	/hu:la/	'cap'
107.	**/n/**	nema	/nema:/	'find'	118.	**/w/**	wari	/wa:ri:/	'smell'
108.	**/b/**	baki	/ba:ki:/	'guests'	119.	**/ƙ/**	ƙitse	/ƙi:ts'ai/	'fat'
109.	**/d/**	daka	/daka:/	'beat'	120.	**/ɓ/**	ɓace	/ɓa:ʒe/	'lost'
110.	**/t/**	tuki	/tu:ki/	'drive'	121.	**/ɗ/**	ɗaki	/ɗa:ki/	'room'
111.	**/f/**	fādā	/fa:da:/	'fight'	122.	**/z/**	zaki	/za:ki:/	'lion'
112.	**/s/**	safi	/sa:fi:/	'sorcery'	123.	**/y/**	yaro	/ya:ro:/	'boy'
113.	**/l/**	laifi	/laifi:/	'fault'	124.	**/g/**	gida	/gi:da:/	'house'
114.	**/r/**	riba	/ri:ba:/	'gain'	125.	**/j/**	jefi	/jefi:/	'throw'
115.	**/ɽ/**	ashar	/a:ʃar/	'wrong'	126.	**/k/**	kama	/ka:ma/	'catch'
116.	**/c/**	caaji	/ca:ji/	'charge'					

With the aid of the adopted FG model (Clements & Hume, 1995) a graphic representation for simple segments can be shown. The representation in Figure (2) below, buttresses the notion of simplicity which shows a segment, for instance, [g], articulated at one point of constriction [dorsal] and directly linked to the consonantal node (Clements & Hume, 1995; Kadenge & Mudzingwa, 2011). Indigenous word examples (106) through (126) shown above are sourced from Newman (2000) and Yalwa (1992).

27

[g]

|

C - Place

|

[dorsal]
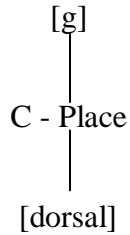
Figure 2: Representation of a [g]

2.2.2. HAUSA SYLLABLE STRUCTURE

Regarding syllable structures, Hausa has three structure types found in its grammar – CV, CVV, CVC (Clements, 2000; Caron, 2013; Musa & Altakhaineh, 2015). Following Lindau-Webb (1985, p. 162), the Hausa syllable structure is fairly simple and thus prefers a pattern typical of a CV shape. Due to the fact that Hausa does have long vowels and diphthongs, it exemplifies a heavy syllable shape of CVV, essentially a simple onset with a complex nucleus. The CVC structure as Caron (2013) suggests is mostly found in ideophones and loanwords (p. 7). Examples of syllable shapes which occur in Hausa are shown in Table 11 below:

Table 11: Hausa syllable structure shapes

127.	CV	shi /ʃi/	'him'
128.	CVV	yau /'jau/	'today'
129.	CVC	can /ʒaŋ/	'there'

Although Hausa preferably operates a fairly moderate CV pattern, Abubakre (2008, p. 81) suggests that consonant clusters (CC) can be found in Hausa. Abubakre however, states that clusters occur only in restricted environments, at interior positions and in most cases are made up of liquids /l, r/ which can fuse together with any other consonants (ibid). Han (2009, p. 269) on sonority constraint in Hausa, suggests syllable constraints in Hausa which disallows consonant clusters occurring within the same syllable, hence a phonotactic constraint: *COMPLEX. In the same vein, Clements (2000, p. 145) states that consonant clusters which occur in Hausa can be analyzed as combination of a coda belonging to a preceding syllable followed by the onset of the

subsequent syllable, essentially a coda + onset sequence. Clements (2000) confirms the presence of syllable codas in Hausa. This statement is crucial as we know languages that operate strict CV syllable patterns in most cases lack syllable codas, hence reflect an onset + nucleus sequence. Shona phonology for example, disallows syllable codas (Kadenge & Mudzingwa, 2011, p. 148). Examples are shown below, and further description shown using a CV phonology diagram.

130. ta.kal.mi 'shoe' CV – CVC – CV

131. kar.fi 'strength' CVC – CV
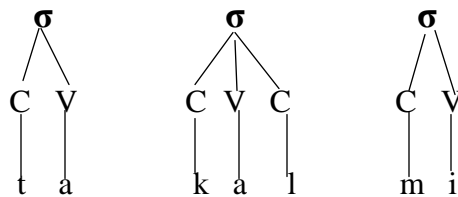
Figure 3: coda+onset of takalmi "shoe" CC
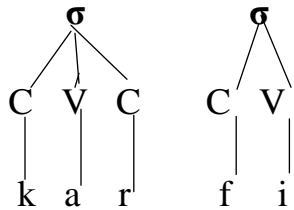
Figure 4: coda + onset of karfi "strong" CC

Quite apparent from the illustrations captured in Figures (2) and (3) is that Hausa seemingly disallows clustering of consonant segments within the same syllable, hence the presence of a syllable boundary or edge which conditions coda-onset combinations (Clements, 2000; Han, 2009). One language on which extensive studies have been conducted and found to also disallow consonant clustering within same syllable is Yawelmani (Noske, 1985).

The sole motivation for this study is the inevitable need to adapt loanwords so they suit the pre-existing phonology of Hausa. Distinctions in segment inventories and syllable structures of the languages under study corroborate the objective and/or rationale for this study.

2.3. LITERATURE REVIEW

A research of this magnitude must relate to existing studies, making reference to literatures and works of notable scholars with similar interests within the same area of study. Research on linguistic borrowing and loanword phonology has continually enjoyed much attention from linguists all over the world. It is quite inevitable that with much attraction drawn by a particular inquiry or research field, divergent views and opinions are bound to arise. This has been the case for loanword phonology as it has been consistently characterized by extensive debates (Rose, 1999; Rose & Demuth, 2006; Gussenhoven & Jacobs, 1998; Uffmann, 2004, 2006; Fleischhacker, 2001; Kenstowicz, 2006; Kadenge, 2012). Growing debates emerged with regards to 'discourse' and/or manner of approach. Some scholars prefer to cast loanword adaptation within the realms of phonological discourse, while others accord phonetic/perceptual alignments to the subject (Kadenge, 2012, p. 57).

On the one hand, a phonological approach discusses repair strategies like vowel epenthesis, feature spreading, segment deletions, segmental preservations or substitutions, amongst other phonological processes to arrive at adaptations of loanwords (Sahayi, 2005, p. 255). On the other, perceptual and phonetic factors argue that loanword adaptation is made possible with emphasis on phonetic/speech perception of the native speakers (Davis & Cho, 2006, p. 1009). Silverman (1992, pp. 289-291) acknowledges with evidence that a complete and comprehensive analysis of loanword adaptation will require both approaches – phonological and phonetic/perceptual factors. Similarly, Davis and Cho (2006, p. 1008) suggest that loanword realizations are influenced by a variety of factors, both phonetic and phonological.

The claims of Silverman (1992) and Davis and Cho (2006) seem to be rooted in Sagey's argument (1982, p. 17) that, "greater understanding of phonology and a more explanatory phonological theory result from investigating phonology hand in hand with phonetics". In the same vein, Josiah and Udoudom (2012, p. 72) state that, "linguists generally acknowledge that there exists an inevitable inter-relationship between different levels of linguistic analysis; phonetics, phonology, morphology, syntax and semantics". Although it is important to draw ideas from both approaches – phonetic and phonological – this particular study is phonologically motivated and/or based (Kadenge, 2012).

Since every language is a possible borrower (Abubakre, 2008), it therefore means that the task of remodelling loanwords to suit language grammar specifics becomes inevitable. Sahayi (2005) suggests that English has also adapted words, stating Spanish as the donor (p. 253). A possible example would be a borrowed word from French into English:

132. /krēm/ crème → /kriːm/ cream 'sweeteners, sweet milk'.

In example (132) above, since English tolerates syllable structures ranging from simple or complex onsets as mentioned earlier, it decides to retain the complex onset [kr] after adoption. Since English also tolerates open syllables as well as closed syllables (generally analyzed as syllable codas (Uffmann, 2006; Kadenge, 2012), it retains the consonant segment [m] word-finally. It is necessary to stress that rephonologization is motivated by the apparent need to satisfy syllable structure requirements of the receptor language. Therefore in cases where borrowing and donor languages share similar syllable structure patterns, remodelling need not apply since the borrowed word form shapes consistently, and is well-formed to that of the receptor language. This claim is evident in example (132) above, as the word forms of French and English share resemblances. English and French as mentioned earlier, exhibit identical syllable patterns and are sister languages of the same language family (Campbell, 2004).

Katamba (1994) highlights instances where English had to nativize borrowed words from donor languages. Katamba (1994) states that French treated phonemes /v/ and /z/ as allophones of respective /f/ and /s/, and not as independent phonemes. Therefore words which were borrowed into English with these phonemes subsequently resulted in a phonemic split. This split shows adaptation by English as a repair strategy, since its grammar treated both phonemes distinctly, rather than allophones of the same phoneme.

Table 12: English remodelling of French segments /v/ and /f/

	French	**English**
133.	/**v**/ [vain]	(a). /**v**/ [vain] (b). /**f**/ [fain]
134.	/**z**/ [zeal]	(a). /**z**/ [zeal] (b). /**s**/ [seal]

Katamba's (1994) examples (133) and (134) above show that 'vain' borrowed from French into English became vain and fain with segments [f] and [v] becoming independent, and French 'zeal' borrowed into English became 'zeal' and 'seal' with segments [z] and [s] also independent. Therefore as a result of the split, segments [v, f, z, s] in English all enjoy phonemic status, hence resulting into different words with distinct meanings (ibid, p. 146).

Speaking of a particular approach to a study of this nature, whether it is phonetically or phonologically based, or even both, Kang's (2010) research on English loanwords in Korean relives such arguments as it exemplifies a study drawn from both approaches. Kang explored the emergence of phonological adaptation from phonetic adaptation of English loanwords in Korean. This particular study, quite complex in nature as the author suggests, argues that the realization of surface forms, a result of phonological adaptation, is achievable through the regularization of underlying forms, which reflects phonetic adaptations (p. 225). Kang states that English's posterior coronal obstruents /ʃ tʃ dʒ/ are variably adapted in Korean with a glide /j/ or /w/. The distribution of glides as Kang maintains, is dependent and/or conditioned by the phonetic and phonological characteristics of the English input, as well as the phonotactic constraints of Korean native speakers (ibid, p. 225). The syllable structure of Korean, as Kang notes, reflects a CGVC shape. However, the author stresses that glide and vowel combinations exemplify variant outcomes as there are certain constraints to the sequence of glide + vowel occurrences. Notably, /j/ does not occur with the high, /i/ and high central /ɨ/ vowels, hence *ji. In the same vein, /w/ does not occur with the back vowels /u/ and /o/, *wu, *wo. Kang further states that consonant + glide co-occurrences also have restrictions as labial consonants and coronal obstruents do not

precede glides, hence *pw, *mw, *ts, *tsʰw, etc. (p. 228-229). The phoneme /ʃ/ is adapted as [s] before vowel /i/, and phonemes /tʃ, dʒ/ adapted as [tsʰ] and [ts] respectively in Korean. Cited examples from Kang (2010), of adapted English words into Korean can be found from (pp. 245-249). Although Korean exemplifies writing with special characters and would require one who has knowledge to supply examples showing vivid phonological processes which have taken place, a few examples transcribed in English are presented in Davis and Cho (2006) and are shown below. Other languages found to adopt special notations in writing include Chinese, Japanese, and Arabic amongst many others. A similar study on Korean adaptation from English was supplied by Davis and Cho (2006). Korean seemed to epenthesize vowels after loanwords with a final /s/ (p. 1008). Hence words like gas, bus, mass etc., had the central vowel [ɨ] inserted at the word end eventually adopting a construction of this sort (Davis & Cho, 2006, p. 1018) and examples (135) through (137) exemplify these reconstructions:

135. /gas/ → [kasˈɨ] 'gas'

136. /bəs/ → [pəsˈɨ] 'bus'

137. /mas/ → [mæsˈɨ] 'mass'

Overall, Kang's (2010) study suggests vowel epenthesis and glide formation and/or insertions as major adaptation strategies active in Korean aimed at remodelling English loanwords, a typical construct of Hausa phonology as observed already. Although Kang's study identifies key adaptation strategies which enhance syllable structure adjustments, it does not employ or incorporate theoretical tools of FG and OT for analytical purposes, like this present research does.

On the African front, it is interesting to note that cross-linguistically, languages apparently share similar properties. A good number of African languages operate simple syllable onsets and codas, and often end in open syllables typical of Shona, isiZulu, Swahili, Akan amongst many others (Uffmann, 2004; 2006; Kadenge & Mudzingwa, 2011; Khumalo, 1984; Baldi, 1988; Batibo, 1994; Adomako, 2008), thus exhibiting as syllable structure typical of a CV pattern.

Uffmann (2006) discusses vowel epenthesis in four languages: Shona, Sranan, Samoan and Kinyarwanda. On Shona, a Southern Bantu language mostly spoken in Zimbabwe, he concludes

that it disallows consonant clusters and avoids syllable codas thus reflecting a strict CV syllable shape (p. 1083). His study reveals that the epenthetic vowel chosen results from three possible strategies which include default insertion, consonantal assimilation and vowel harmony (p. 1081). Building up statistical data from a corpus of loanwords borrowed into Shona from English, Uffmann acknowledges that vowel [i] accounts for almost 70% of epenthetic cases, while vowels [u] and [o] share a combined 21.4%, with [u] the highest at 12.4, while [o] insertions represent the remainder of the total mark, and other vowels marginal. His overall analysis and findings however, show that the choice of the epenthetic vowel occurred as a result of similarities shared between epenthetic materials and neighbouring segments. The overall result from Uffmann (2006, p. 1083) as he notes,

> .., shows that /u/ is the preferred epenthetic vowel after labial consonants (61%) and that /i/ is preferred after coronals (almost 92%). After a dorsal consonant, the picture resembles the overall picture, with /i/ being most frequent. After liquids, a whole range of vowels may occur.

In light of the extract above, Uffmann's observation correlates with this present study. However, this research goes beyond articulatory functions by delving into the phonological function of the epenthetic vowels.

Kadenge and Mudzingwa (2012) compared chiShona (Southern Bantu, Niger Congo) loanwords of monolingual and bilingual speakers, with huge chunks of lexicons sourced from English. Their study adopts analytical tools of FG and OT in their analysis, the same mode of investigation underscored in this research. Findings from their study showed that chiShona exhibited open syllable structures for word endings, disallowed complex onsets and syllable nuclei (long vowels and diphthongs) as opposed to English which favored complex syllable structures. ChiShona therefore relies on vowel epenthesis and feature spreading to effectively repair loans incorporated into its vocabulary. Their analysis demonstrates repair strategies that chiShona uses to remove complex syllable nuclei, complex onsets and codas in its phonology. For Kadenge and Mudzingwa, (2012) feature spreading, essentially an insertion refers to all or some of the features of an epenthetic segment being supplied by one or all of the input segments (pp. 149-150). A featured example is shown below (138),

138. /goʊt/ → [gáwùtì] 'gout'.

Since chiShona disallowed complex syllable nuclei, a semi-vowel (glide) [w] was inserted in between vowels [a] and [u] to repair the sequence of vowels. In order to fix the closed syllable construction which ends with a consonant [t] in 'gout' vowel /i/ was epenthesized word-finally to open up the syllable realizing an optimal candidate [gáwùtì]. More interestingly, since this study was a comparison of monolingual and bilingual chiShona speakers, distinctions in the adaptation strategies of both speakers was observed. Monolingual speakers never retain complex onsets of English forms thus relying on vowel epenthesis to fix such 'illegality', while bilingual speakers tolerated complex onsets and therefore retained them. Proof from the authors (Kadenge & Mudzingwa, 2012) is evident in their word examples (139) through (141) as shown below,

English form	Monolingual chiShona form	Bilingual chiShona form	Gloss
139. /prəʊtiːn/	[pùróténi]	[próténi]	'protein'
140. /drʌm/	[dìrámù]	[drámù]	'drum'
141. /fluːt/	[fùrétí]	[flùtí]	'flute'

Despite differences identified in the forms of both speakers in dealing with complex onsets, handling of closed syllables seemed uniform. Overall, this situation has implications for constraint rankings as Kadenge and Mudzingwa (2012, p. 147) suggest both speakers assign hierarchies differently to complex onsets. Their study concurs with this research, concluding that repair strategies operate across a board of constraint rankings per language.

Similarly, Khumalo (1984) examines adaptations of isiZulu loanwords from English and Africans. isiZulu (Southern Bantu, Niger Congo) also employs insertions which Khumalo couches within the notion of substitution and involves two kinds; suprasegmental adjustments and syllable structure adjustments (p. 205). Khumalo's scope of study however, dwelled on syllable structure adjustments. It examined vowels and consonants maximally replaced by closest registered counterparts in the isiZulu phonetic inventory. Phonemes (vowels) like /ɜ/, /ʌ/, /ɔ/, realized in English and Afrikaans were replaced with their nearest counterparts, /e/, /a/, /o/ since the former phonemes did not exist in isiZulu. Apenteng and Amfo (2014) also note the same pattern of vowel replacements in Akan (Niger Congo, Kwa), as English vowels /ʌ/, /ə/, and /ɒ/

are substituted with Akan vowels /ɔ/ and /a/ context dependently. Examples sourced from Khumalo (1984, p. 210) include:

142. /nɜs/ → [un**e**si] 'nurse'

143. /brʌʃ/ → [ibhul**a**shi] 'brush'

144. /pɔt/ → [ebh**o**dwe] 'port'

isiZulu also replaces consonants, a similar pattern in Hausa, with the nearest or identical phonemes. Liquids /l/ and /r/ were both realized as [l] in isiZulu, as /r/ is not registered in the inventory. Therefore isiZulu maximally replaced every instance of /r/ with an identical counterpart /l/, since both segments are liquids. Consider these few examples sourced from Khumalo (1984) shown below:

145. /rəbər/ → [i**l**abha] 'rubber'

146. /ro͞olər/ → [i**l**ula] 'ruler'

Khumalo (1984) however, stresses that this historical construction is no longer the case because isiZulu currently realizes the segment: [r], a case of 'importation' (p. 211). Importation as defined by Khumalo (1984, p. 211) refers to when foreign segments and/or sounds are borrowed and fully integrated into the segment inventory of a language. Batibo's (1994) study on foreign sounds in Kiswahili corroborates Khumalo's claim, suggesting that until recently, many Bantu languages realized phoneme [r] as an allophone of [l]. However, due to the influx of loanwords, foreign sounds such as the lateral sound /r/ have now become fully nativized or integrated into Bantu vocabularies (Batibo, 1994, p. 185).

One of the first of many studies concerning Hausa loanword phonology was conducted by Baldi (1988) as he examined borrowed words into Hausa and Swahili, from Arabic. Like Yalwa (1992), Baldi suggests that Arabic has been very influential to many African languages in the area of loanwords (p. 2). Through trade and religion (Islam) most importantly, language contact with Arabian merchants ensured the exchange and borrowings of lexicons. He however maintained that a systematic study at the time of conducting his study had yet to be conducted on such African languages and their incorporated loanwords. Baldi's work therefore set out to only

identify loanwords on the basis of similarity of borrowed forms to that of nativized and/or adapted forms in Hausa and Swahili. Although Baldi's study unlike this research did not identify phonological adaptation processes like vowel epenthesis, segment substitutions, consonant deletions and so on, an examination of his word examples still shows at large, inherited forms quite different to those of adapted forms in the receptor languages. This phenomenon by implication suggests that borrowed words had to undergo some sort of remodelling, so that native speakers could apply them in their day to day language use, and by so doing satisfy native language requirements. Arabic which exhibited consonant clustering at variant word positions was eventually simplified to suit the phonologies of Hausa and Swahili. This notion and/or occurrence speaks volumes on the imminent need for modifications and remodelling, which dovetails with Baldi's views as he suggests at quite an early period, that these loanwords were partly modified to suit the needs of Hausa and Swahili (p. 2). Words borrowed from Arabic and adapted into Hausa and Swahili are shown in examples (147) through (151) below:

Arabic (AR)	Hausa (HA)	Swahili (SW)	Gloss
147. [janā'iz]	[jànaa'izaa]	[jeneza]	'funeral' in SW as 'bier'
148. [talj]	[talji]	[theluji]	'snow'
149. [miqass]	['àlmakàsii]	[mkasi]	'scissors'
150. [hadd]	[hadii]	[hadi]	'boundary, limit, up to'
151. [hadra]	[halaraa]	[hadhara]	'presence, in presence of'

Baldi's word examples (147) through (151) above, suggest Swahili and Hausa operate a modest CV syllable shape, as underlined in this research, particularly Hausa. Example (149) shows Swahili and Hausa to rely on segment substitutions to replace foreign sounds as we see [k] of both languages (Swahili and Hausa) replacing the foreign [q] which does not exist in the receptor languages but registered in the Arabic inventory. So far observed, Baldi's (1988) work like this present study identifies key strategies applicable to Hausa's adoption and adaptation process, which include vowel epenthesis and segmental substitutions.

An identical study to Baldi's (1988) was that of Yalwa (1992) who also examined Arabic loanwords in Hausa. Hausa loanword research has consistently favoured Arabic as the understudied donor language due to the enormous influence it has had on its vocabulary over time. Yalwa suggests that this pattern of borrowing was culturally and/or religiously motivated, since the two languages in contact were never neighbours or variants (dialects) of the same language (p. 101). Citing religion (Islam) as the major influence, Yalwa suggests that within areas of literature and grammar, law and administration, the Islamic school system and modern writings, Hausa was greatly influenced with new sets of vocabulary. Yalwa mentions segmental replacements of phoneme /q/ with phonemes /k, ƙ, g/ in all environments (p. 118). Consider Yalwa's examples (152) through (154) as shown below:

152. [al-qabar] → [**k**àbàrī] 'grave',

153. [al-qaaidah] → [**ƙ**ā'ìdā] 'principle, rule',

154. [al-qahwah] → [**g**ahawā] 'coffee'.

Baldi (1988) and Yalwa (1992) both confirm segmental substitutions as a major phonological process in Hausa, aimed at restructuring loanwords. Vowel insertions also feature as a key adjustment strategy to ensure a CV syllable structure is retained. Example (152) above clearly shows vowel epenthesis to be active, as vowel [i] is inserted word-finally to avoid consonants ending words in Hausa, while examples (153) and (154) above depict consonant deletions as [h] is elided word-finally.

More recently, Abubakre's (2008) article on the domestication of Arabic loanwords in Hausa, also acknowledges the vast incorporation and influence Arabic has had on the Hausa vocabulary. This particular study identifies the phonological processes active in Hausa, concerning the rephonologization of loanwords. Abubakre suggests vowel epenthesis and segmental deletions which are both underscored in this study, as adaptation processes employed to repair non permitted or 'illegal' loanword forms incorporated into Hausa from Arabic to suit Hausa's pre-existing grammar (p. 88). Cited examples by Abubakre (2008, p. 84) as shown below include:

155. /muna:fiq/ → [munafik**ì**] 'hypocrite'

156. /ba:ʔaŋ/ → [ba'yan**i**] 'explanation'

157. /ema:ŋ/ → [imanì] 'faith'

In examples (155) through (157) above, the Arabic forms captured in phonetic slashes all end with closed syllables, an allowed syllable pattern in Arabic (Alqahtani & Musa, 2014). For Hausa to open up the closed syllables, vowel [i] was epenthesized to preserve its preferred CV pattern native to the grammar. Like Yalwa (1992), Abubakre (2008) notes that Hausa which lacks the uvular plosive [q], but a registered segment in the Arabic inventory, subsequently replaces the segment with [k] considered the closest found in its inventory as seen in example (155) above. In similar trend, the glottal plosive [ʔ] which does not exist in Hausa but in Arabic, is replaced with an identical segment realized in Hausa ['] a glottal ejective, as captured in example (156) above. Abubakre (2008) also mentions segment deletions as a repair strategy in Hausa. Deletions occur in the word examples shown just below (Abubakre, 2008, p. 84):

158. [salah] → [salla] 'prayer'

159. [zakah] → [zakka] 'alms'

160. [niyah] → [niyya] 'intention'

Examples (158) through (160) above, all have the final segment [h] deleted to avoid word-final consonants in Hausa. It is worth noting that during deletions, compensatory lengthening is gained in this case consonantal lengthening. Medial consonants [l], [k] and [y] were lengthened in the process. Compensatory lengthening is widely known to occur in cases of segmental deletions (Campbell, 2004). When segments are lost, retained segments are compensated with length. This does not presume Hausa has long consonants each enjoying phonemic status, because cases of deletions only conditioned consonantal lengthening. Although consonant deletions is not a major adaptation process in Hausa as only a few cases can be cited, it still remains a repair strategy in Hausa loanword phonology. Like Hausa, Akan, a major Ghanaian language in West Africa, also relies on consonant deletions to ensure syllable structure adjustments (Adomako, 2008). Although Abubakre's (2008) study and this research show resemblances as they both identify the key adaptation strategies applicable to Hausa loanword phonology, this work differs from Abubakre's as it employs combined analytical tools of FG and OT as its core theoretical framework. Incorporated theoretical tools help to show more clearly

how these phonological processes manifest in terms of features shared between neighbouring segments, thus implying predictability (Kadenge, 2012, p. 58).

A more detailed and elaborate description of segmental replacement of consonants, one way Hausa employs in rephonologizing loanwords, was examined by Newman (2000). Phonemes alien to the Hausa inventory were replaced with the most identical ones found in its inventory. Newman's (2000) example of 'theatre' buttresses this notion,

161. /θiətəɹ/ → [**ti**'yata] 'theatre'

Example (161) above shows that voiceless dental fricative [th] which exists in English but is not realized in Hausa, is subsequently replaced with [t], a close segment available in Hausa (p. 316). As highlighted earlier, phonemes /v/ and /p/ are prohibited in Hausa hence replaced with phonemes /b/ and [f], for example:

162. /vəzə/ → [**b**isa] 'visa'

163. /vetrənerē/ → [**b**itanari] 'veterinary'

164. /prəfesər/ → [furofesa] 'professor'

Quite noticeably, one may argue the replacement of /v/ with /b/, which ought to have been the case of replacing /v/ with /f/, since the latter group reflects phonemes which are all labiodental fricatives. However, Hausa tends to substitute segments by parameters of manner of articulation. For the fact that /v/ is a voiced consonant and involves the use of the lips, it can be replaced with the existent phoneme /b/ which is also a voiced consonant and well involves the use of the lips. This is the same case with the voiceless bilabial /p/ replaced with /f/ rather than the counterpart voiced bilabial /b/. For the fact phoneme /p/ is voiceless just as /f/ is, Hausa finds it convenient to substitute the former phoneme with the latter phoneme /p/ → /f/. For this particular example though, it is necessary to stress that phoneme /p/ is not registered in the Hausa phonetic inventory but is realized in speech and pronunciation (Smirnova, 1982; Caron, 2013). It is noteworthy to state that since phoneme /f/ is realized as [h] before rounded vowels, Hausa \adapted words with [p] followed by rounded vowels with the glottal [h], so as to ensure loanwords conform to its pre-existing phonology. Example (165) below of 'powder' sourced from Newman (2000, p. 313) captures this adaptation pattern,

165. /poudər/ → [hōdā] *foda 'powder'.

In example (165) just above, since we expect every instance of [p] adapted as an [f], it is temporarily adapted with an [f], but because [f] is realized as [h] when it occurs before back rounded vowels in Hausa, its eventual reconstruction is adapted with a [h], [**h**oda] and not *foda. This reconstruction pattern of [f] → [h] is clearly captured in early examples (86) through (89) above. Again we see compensatory lengthening, an active process in Hausa occurring, as vowel [o] is lengthened to become [ō], after [u] was elided, since diphthong [ou] is not realized in Hausa but in English. Vowels with slash bars on top connote long vowels /o:/ (Newman, 2000).

Example (166) below confirms the substitution pattern of Hausa as regards [p] → [f],

166. /pencəl/ → [fensir] 'pencil'.

In the example above (166) 'pencil', since [p] precedes [e] considered a front vowel, it is adapted with the conventional [f] as in [**f**ensir] and not [h], as in *hensir.

An interesting study on Hausa's phonological adaptation patterns was that of Leben (1996). Leben argues for tonal adjustments, one way Hausa employs as repair strategy towards adaptation of loanwords from English (p. 140). Goldsmith (1976) argues in favour of supra-segmental features – tone, accent, stress, pitch, etc. as autonomous segments within language grammar. In similar vein Clements (2000, p. 152) states that, "[p]erhaps the most outstanding characteristic of tones in African languages is their independence with respect to their segmental support. Tones behave very much as though they exist in a separate 'dimension' from consonant and vowel segments".

Most African languages are tone marked (Leben, 1971; Clements, 2000; Kenstowicz, 2006). Accordingly, Leben (1996) states that Hausa maximally replaces English's stress with tones, as he writes, "the main factor governing tone in Hausa borrowings from English is the position of the main stress in the English source word" (p. 139). Hausa seemed to replace main stress with high tones, secondary stress with either low or falling tones. Hausa has three tones namely high, low and falling. The high tone is not marked in orthography, as segments are left unmarked; the low tone carries a falling diacritic as seen, /ì/ and the falling tone is essentially a combination of the high and low tones as seen, /ô/. Leben suggests that Hausa replaces main stress with high

tones, and in the process lengthens the vowels since vowels are known to be tone bearing segments. Leben's wordlist examples were also drawn from Roxana Ma Newman's (1990) English – Hausa dictionary. Cited examples include,

167. SOLdier → [soojà] 'soldier'

168. PARking → [faakìn] 'parking'.

Examples (167) and (168) reckon that where main stress occurred (first syllable), high tones were assigned as replacements and the vowels lengthened. Also in cases where secondary stress occurred, low or falling tones (short vowels) were assigned as replacements. Therefore Hausa's interpretation of tones as regards tonal adaptations seemed very much operational on bijective terms, a sort of one-to-one correspondence, where high tones replace main stress and either low or falling tones replace secondary stress. Kenstowicz (2006) also wrote on tonal adaptations in Yoruba (Niger-Congo) loanwords from English, affirming tonal adaptation as a phonological process employed in rephonologizing loanwords. Kenstowicz (2006) however, warns that there are a few exceptions in Hausa grammar where tones were marked differently from the presumed sequence (p. 144). As I mentioned earlier, Hausa does not mark high tones, hence vowels bearing high tones are usually left unmarked. Also for purposes of differentiating main stress from secondary stress, I temporarily represented main stress with capital letters (CAPS) and secondary stress with small letters. This research however, focuses only on segmental phonology, and so does not delve into suprasegmental phonology and its prosodic features.

Adomako's (2008) study on Akan (Niger-Congo), a major language in Ghana, West Africa, identifies vowel epenthesis and consonant deletions as major repair strategies of loanwords borrowed into the African language (p. 1). Like this present study, Adomako (2008) employs recent analytical tools of FG (Clements & Hume, 1995; Rice & Avery, 2004) and OT (Uffmann, 2004, 2006; Rose & Demuth, 2006) in accounting for vowel epenthesis and consonant deletions. According to Adomako, Akan exemplifies a typical CV syllable pattern or at its best can tolerate a CrV syllable structure, hence the inevitable need for phonological adaptation of loanwords so as to satisfy Akan's phonotactic demands. Therefore borrowed words which exhibited complex onsets and syllable codas (closed syllables) were all modified to preserve the preferred syllable

structures typical of a CV shape. A few examples mentioned by Adomako (2008, pp. 26-27) include:

169. /smōk/ → [s**u**mok**u**] 'smoke'

170. /stæmp/ → [s**i**tamp**u**] 'to stamp'

171. /streCH/ → [s**u**tretʃ**i**] 'stretch'

From the examples above (169) through (171), vowel epenthesis is employed to simplify complex onsets word-initially, as vowels [u] and [i], were inserted in between clustered consonants. Vowels are also inserted at word-final positions in Akan, to open up closed syllables and avoid codas. Adomako maintains that Akan seemed to insert rounded vowels /u/ when the second clustered consonant (C2) was labial /m/, and a high front vowel when the C2 was coronal /t/. Akan's behavioural pattern lends support to studies of Uffmann (2004; 2006) and Kadenge (2012) in Shona as it exemplifies consonantal assimilation. The only difference observed so far, is that consonantal assimilation in Akan seems to occur in a regressive manner as the epenthetic vowel is determined by the following consonant to its right, while in Shona, the epenthetic vowel is influenced by the preceding consonant to the left in a progressive manner. Interestingly, in example (171) of 'stretch', rounded vowel /u/ was inserted in an environment where both C1 and C2 are coronal sounds. Adomako (2008) relates this scenario to language exceptions, suggesting cases of such constructions in Akan were very rare (p. 27). In other cases, Adomako (ibid, p. 29) suggests Akan inserts high front vowel [i] when the first consonant in the cluster C1 is a lateral [l]. This behaviour connotes spreading, elaborately captured in Kadenge's (2012) study on the rephonologization of Shona loanwords from English. Example (172) below supplied by Adomako (2008) is a typical reconstruction in Akan which exemplifies feature spreading,

172. /fɪlm/ → [fil**i**m] *fil**u**m 'film'.

Kadenge's (2012) study provides evidence of segment spreading, a major repair strategy in Shona (Southern Bantu) geared towards adapting loanwords. Shona relies on spreading to repair complex nuclei, a sequence of vowels (long vowels and/or diphthongs), which is a disallowed syllable pattern in Shona phonology. Spreading essentially an insertion, refers to when all features are supplied by the input segment (Kadenge, 2012). In example (172) above, the lateral

segment [l] supplies its features [coronal] thereby determining the epenthetic segment [i] also [coronal]. The advantage of spreading over default insertion as Kadenge (2012) notes is that, the input segment affords to sponsor features attributed to the epenthetic segment, rather than a case of fresh supply of features which come along with the epenthetic material (p. 76). Kadenge (2012, p. 74) citing Katamba (1989) states that such assimilation or construction results in a smoother, more effortless, economic transition from one sound to another thereby facilitating the task of speaking, a sort of homorganic glide.

Also in example (172) above, it is important to note that since Akan permits a sequence of a consonant followed by a liquid and then a vowel CrV, it retains segment [r] clustered to the preceding [t], as such construction is accommodated in Akan's syllable structures. With reference to consonant deletions, another phonological process Akan employs as a repair strategy, consonant clusters at word final positions had either former or latter segments (C1 or C2) deleted depending on Akan's phonotactic constraints applicable to specific environments. Therefore cases which had a combination of a velar + fricative or stop, had the former segment deleted (C1 deletion) as in,

173. /kɒntækt/ → [konta:ti] 'contact'.

Other constraints showed Akan deleted the latter segments when clusters were made up of fricatives + stops (C2 deletion) as in,

174. /pəʊst/ → [posu] 'post'.

Above examples (173) and (174) are sourced from (Adomoku, 2008, pp. 32-33).

The same way compensatory lengthening occurred in Hausa's segmental deletions as highlighted in Abubakre's (2008) study above, similar behaviour is observed in Akan. Adomako (2008) states that when input segments are deleted in Akan, preceding vowels are lengthened /a/ → /a:/ (p. 32). In example (173) when [k] belonging to the word final cluster was deleted in 'contact', the preceding vowel /a:/ was lengthened, the only difference being that Akan lengthens vowels, while Hausa lengthens consonants since already, long vowels exist in Hausa. Notably in example (174) above, Akan replaces the English diphthong [əʊ] with [o], auditorily and acoustically closest to it since Akan lacks diphthongs in its vowel segment inventory (Adomako, 2008, p. 9).

Alqahtani and Musa (2014) more recently also investigated vowel epenthesis in Hausa loanwords from Arabic. Apart from Arabic as donor language, they also explore Hausa loanwords from English. They conclude that word-initial clusters and syllable codas which are simplified in Hausa can be generated from English examples, while Arabic word forms mostly show simplification of syllable codas in Hausa (p. 71). Just as obtains in this study, the authors employ recent theoretical model of Optimality Theory in their analysis. They conclude that word-initial clusters in Hausa are disallowed, and thus simplified through insertion of vowels to break up consonant sequences (Alqahtani & Musa, 2014, p. 71). Unlike this study, the authors do not account for the vowel quality or type inserted which Feature Geometry helps to explain. So far, Alqahtani and Musa, (2014) speak of default epenthetic vowels with [i] and [u] by far, the most used segments during the epenthetic process. Unlike Alqahtani and Musa's (2014) article, this study goes beyond their analysis, to account for the vowel type, as it tries to explain why certain vowels are necessary within specific environments. Alqahtani and Musa also note that although words in Hausa end word-finally with consonants, the most preferred syllable shape is the CV pattern and so Hausa inserts vowels to avoid word-final consonants. This phenomenon is also underscored in this research hence constraints on closed syllables are considered low ranking in Hausa, the converse was observed with isiZulu, Shona, Yoruba and many other African languages (Khumalo, 1984; Kadenge, 2012; Kenstowicz, 2006). Consider these examples (175) through (179) supplied by Alqahtani and Musa (2014, p. 70), as shown below:

175. /breik/ → [b**u**rk**i**] 'break'

176. /iŋglɪʃ/ → [ʔing**i**li**ʃi**] 'English'

177. /wɒrənt/ → [warant**i**] 'warrant'

178. /bentʃ/ → [bentʃ**i**] 'bench'

179. /pʌmp/ → [famfo] 'pump'.

Example (175) above shows simplification of the word-initial cluster [br] as vowel [u] is inserted to break up the consonant sequence, while examples (175) through (179) show coda simplifications as vowels [i] and [o] are inserted word-finally to open up syllables. Alqahtani and

Musa (2014) also supply reconstructions of Hausa loanwords from Arabic aimed at simplifying syllable codas. Consider examples (180) through (184) as shown below:

180. /kafir/ → [kafir**i**] 'misbeliever'

181. /hakim/ → [hakim**i**] 'district head'

182. /wadʒib/ → [wadʒib**i**] 'obligatory'

184. /χaradʒ/ → [haradʒ**i**] 'poll tax'.

From the examples (180) through (184) above, vowel [i] is used throughout to indicate its role as a default vowel inserted at the end of Arabic word forms to avoid closed syllables in Hausa. Alqahtani and Musa (2014) also note consonant deletions as a repair strategy in Hausa. Although they note that consonant deletions are not as pronounced in Hausa as an adaptation process, marginal cases occur. The same observation is also noted in this study.

Drawing from the various studies sampled so far in this section, vowel epenthesis seems the most commonly employed repair strategy, or at least, one of the most frequent processes relied upon for adoption and adaptation of loanwords. Segmental replacements and substitutions also feature in the reviewed studies as a widely recognized pattern for loanword rephonologization. In any case, irrespective of the repair strategies identified in these various studies, reconstructions and/or remodelling of loanwords seem to operate across a regularized pattern or construct, and not in an arbitrary fashion. This assertion can only be supported through the immense contributions of analytical tools of FG and OT as theoretical models in unpacking a scholarship of this sort. Therefore the next chapter which adopts and explains models of FG and OT will insightfully account and provide plausible explanations behind these structured and predictable constructions.

2.4 SUMMARY OF CHAPTER

To sum up, this chapter has presented segment inventories of the languages understudy – English and Hausa. It outlines the syllable structure patterns available or permitted per language. Native English syllable structures are rather complex and compounding as compared to Hausa which operates a modest syllable pattern, and as such can only pose phonotactic conflicts for Hausa

when borrowing lexicons. The chapter also reviews relevant literatures related to loanword phonology. So far, studies of Katamba (1994) and Sahayi (2005) reveal English to have borrowed words from French and Spanish, with phonemic split and diphthongization as identified phonological processes employed in adapting loanwords.

Studies of Kang (2010) and Davis and Cho (2006) note Korean remodellings of English loanwords borrowed into the language. The authors identify vowel and glide epenthesis as key repair strategies adopted in the language in remodelling loanwords. Kang (2010) and Davis and Cho (2006) combine phonological and phonetic/perceptual approaches within their study. For Uffmann (2006), Kadenge and Mudzingwa (2012) and Kadenge (2012), Shona, a Southern Bantu language, relies on vowel epenthesis, feature spreading and glide epenthesis to remodell borrowed words from English. All three articles employ theoretical models of FG and OT to account for Shona's rephonologization pattern within phonological discourse.

Khumalo (1984) notes that isiZulu, also a Southern Bantu language, relies on segmental substitutions as a key repair strategy employed to remodell loanwords from English and Afrikaans. isiZulu replaces alien segments (vowels and consonants) from English and Afrikaans with the closest found in its inventory. Adomako (2008) on Akan, a major language spoken in Ghana, identifies vowel epenthesis and consonant deletions as loanword remodelling strategies active in the African language. Adomako also employs recent analytical tools of FG and OT to account for Akan's phonological adaptation.

Studies of Baldi (1988), Yalwa (1992), Newman (2000) and Abubakre (2008) reveal Hausa to rely on vowel epenthesis, segment deletions (consonants) and segmental replacements as repair strategies in remodelling loanwords from Arabic and English. Still on Hausa, within autosegmental phonology, Leben (1996) and Kenstowicz (2006) identify tonal adaptations as a repair strategy of Hausa loanwords from English. Both authors note that Hausa replaces stress with tones to achieve syllable structure adjustments. Alqhatani and Musa (2014) within the framework of OT also note vowel epenthesis to occur more frequently regarding Hausa loanword phonology. Vowels are inserted in Hausa loanwords of Arabic and English word forms to simplify complex onsets and codas to conform to native demands.

Quite a number of reviewed studies above are couched within OT and FG frameworks, recent theoretical models which have accounted for phonological processes that occur within loanword

phonology more elaborately and descriptively. Both models are adopted in this present study so as to clearly illustrate the adoption and adaptation processes in Hausa's rephonologization of loanwords. The next chapter (3) introduces theoretical models of Feature Geometry (Clements & Hume, 1995) and Optimality Theory (Prince & Smolensky, 2004) adopted in this research.

CHAPTER 3

3.1 METHODS OF DATA COLLECTION AND VERIFICATION

Data for this research are garnered mostly from three Hausa reference books. As Ritchie and Lewis (2003, p. 61) suggest, if literature is available and relevant, researchers should consider using such data, if can be accessed. Paul Newman's (2000) *The Hausa Language: An Encyclopaedic Reference Grammar*, Roxanna Ma Newman's (1990) *Dictionary of Hausa – English*, and Neil Skinner's (1965) English – Hausa illustrated dictionary: *Kamus na Turanci da Hausa*, are used to generate lexical examples of borrowings. The two dictionaries and encyclopedia put together supply this research with a robust list of words, native and loanwords in the Hausa grammar. Other notable scholarly works on Hausa loanword phonology that will be used in this study include Leben (1971; 1996), Baldi, (1988), Yalwa (1992), Newman & Newman (2001), and Abubakre (2008) amongst many others. Small portions of data will be generated by me, a native speaker who has been exposed to the widely acknowledged variety of Hausa, spoken in Kano, Northern Nigeria.

Concerns, controversy and doubts that arise from relying on one person's information to represent an entire speaking population are hereby ameliorated by referencing extant literatures and works of notable scholars: Neil Skinner's (1965) *English – Hausa Illustrated Dictionary*, Roxanna Ma Newman's (1990) *Dictionary of Hausa – English*, Paul Newman's (2000) *The Hausa Language: An Encyclopaedic Reference Grammar*. These dictionaries will help confirm the veracity of inputs furnished in this research. Over 75% of data of this research will be drawn from existing literature. The remainder under 25% of data will be supplied by the researcher who is a competent speaker of Hausa, as earlier mentioned.

3.2 THEORETICAL FRAMEWORK

This section discusses the analytical tools employed in this research. Combined efforts of theoretical models of Feature Geometry (FG) (Clements & Hume, 1995), and Optimality Theory (OT) (Prince & Smolensky, 2004) are both adopted as core frameworks for this research. FG is

very relevant for descriptive details and eventual analysis of place features for vowels and consonants, and by so doing, accounts for the predictability of epenthetic materials and segmental replacements or substitutions. OT specifically outlines violable and permissible constraints per language, which are ranked within the same set of universal restrictions (Kadenge, 2012).

3.2.1 FEATURE GEOMETRY

For McCarthy, (1988, p. 85) FG basically groups speech sounds according to place features via place of articulation. McCarthy further explains that representations postulated by FG at once, provide a plausible interface between phonology and articulation, and affords a simple but comprehensive description of common phonological phenomena with a minimal set of operations. Sagey (1982, p. 9) suggests that through an analysis of segments considering their distinctive features, it becomes possible to represent any phonological process or form that can occur within a human language. If this be the case, then some sort of accuracy in phonology can be arrived at, devoid of arbitrary constructions and/or assumptions. One may argue against representations of particular segments as impossible, inexpressible and in fact repugnant. However, Goldsmith (1976), drawing from Leben's (1971) study, suggests that such representations are indeed very achievable through a notation of distinctive features (p. 2). Goldsmith's (1976) study went on to adequately account not only for a representation of segments (phonemes), but also extended to suprasegmental and prosodic elements (tones, stress, intonation, accent, etc.). Goldsmith (1976) regarded them as 'autosegments' in phonology, independent in their own right.

In the same vein, Clements and Hume (1995, p. 245) acknowledge that,

> In recent years, it has become widely accepted that the basic units of phonological representations are not segments but the features, the members of a small set of elementary categories which combine in various ways to form the speech sounds of human languages.

Kadenge (2012, p. 66) reiterates the contributions of FG as it does not merely depict default insertions or repairs, but also shows the predictability of consonant and vowel interactions. In respect to this thesis, FG attempts to account for why particular vowels are epenthesized or

inserted within clustered environments, and also shed light on the segmental replacement/substitution of consonants in Hausa, one way Hausa employs as a repair strategy in the rephonologization of loanwords. A widely acknowledged graphic model of FG is that of Clements and Hume (1995) which makes it possible to inter-relate consonants and vowels to place of articulation.

3.2.1.1. Distinctive Features chart of Consonants

The feature structure for consonants from inception starts with the root node, (mother node) which essentially constitutes [sonorant], [approximant], [voccoids]. The root node dominates the laryngeal, nasal and oral cavity nodes. The laryngeal node dominates [spread glottis], [constricted glottis], [voice], while the oral cavity node dominates the C-place and the continuant nodes. The nasal node which branches directly from the root node is a terminal feature, in other words, does not dominate any other feature but ends as [nasal]. The C-place dominates the labial, coronal and dorsal nodes. It should be noted that in other feature models (Sagey, 1982; Newman, 1997; Halle et al., 2000) the labial and dorsal nodes are not terminal nodes, but dominate terminal features, [round] (labial), and [high], [low], [back], (dorsal). Clements and Hume (1995) however present labial and dorsal nodes as terminal features replacing [round] and [high], [low], [back] respectively. Their motivation for this innovation and/or construction is rooted in the fact that features [labial] and [coronal] are well sufficient and adequate, by themselves, to distinguish place of articulation of vowels, hence replacing traditional features [round] and [back] (ibid, p. 276). The coronal node dominates [anterior], [distributed]. As Kadenge (2012, p. 65) suggests, there are diverse models of FG which have been proposed over time. Choice of a particular model does not pose a problem in the analysis of any given data. The adopted graphic feature chart of consonants as illustrated by Clements and Hume is shown below:

root [±sonorant] [±approximant] [-vocoid]

[laryngeal] [nasal] [oral cavity]

[spread] [constricted] [voice]   [continuant]

C-Place

[labial] [coronal] [dorsal]

[anterior]   [distributed]
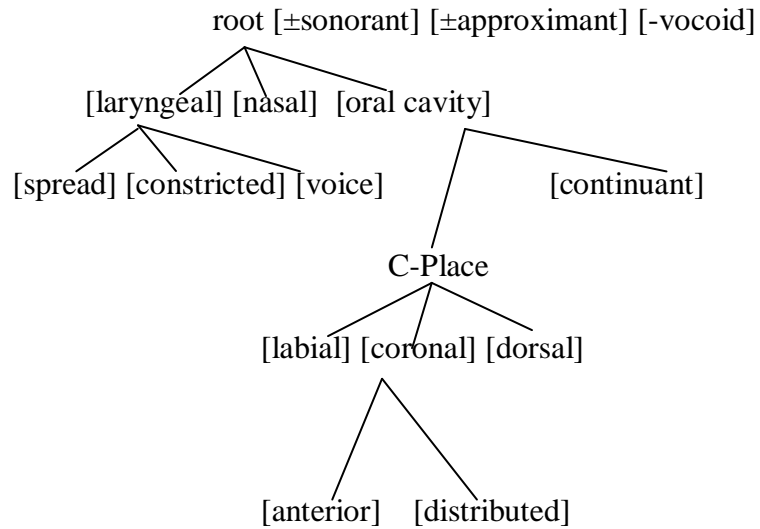
Figure 5: Clements and Hume (1995, p. 292) FG model of Consonants

Using the graphic model above (Figure 5), a feature structure for various consonants can be drawn, appropriately showing their place features. As an illustration, phonemes /b/ and /d/ will have their structures represented in this manner:

[b]

C – Place

Labial
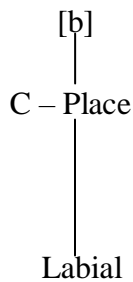
Figure 6: Representation of /b/, baki 'mouth'

[d]

C-place

coronal

[+anterior] [-distributed]
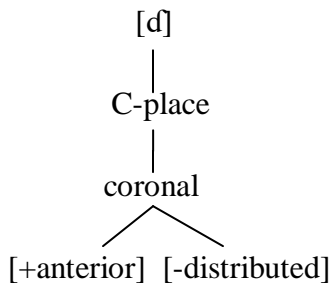
Figure 7: Representation of /ɗ/, ɗaki 'room'

Hausa does have complex segments as mentioned already. As an illustration, complex segments /gʷ/ and /kʸ/ have their structures represented in this manner:

```
                [gʷ]
                 |
              C-place
              /      \
        [dorsal]    V-place
                       |
                    [labial]
```
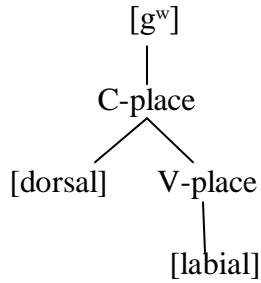
Figure 8: Representation of /gʷ/, [gwada]

```
                [kʸ]
                 |
              C – Place
              /      \
        [dorsal]   V – Place
                       |
                    coronal
                    /      \
          [-anterior]  [+distributed]
```
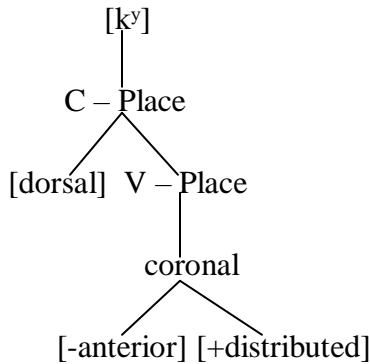
Figure 9: Representation of /kʸ/ kyada 'nuts'

3.2.1.2. Distinctive Features charts of Vowels

The feature structure for vowels is quite similar to that of the consonants, except for the definitive features which are specific to vowels. The root node also constitutes [sonorant], [approximant], [voccoids], and is particularly different from that of consonants as it 'checks' vocoids (+) while the consonantal root node 'un-checks' vocoids (-). In similar vein the root node dominates the laryngeal, nasal and oral cavity nodes. The laryngeal node dominates the [spread], [constricted glottis], [voice] features, while the oral cavity node dominates the C-place and continuant nodes. The nasal node is also a terminal feature. From the C-place, the vocalic node is generated which links the V-place to the C-place. Aperture is also dominated separately by the vocalic node. The V-place dominates the labial, coronal and dorsal nodes. The aperture dominates a terminal feature [open]. In similar construction to that of consonants, the labial and dorsal nodes are terminal, while the coronal node dominates terminal features [anterior] and [distributed]. A graphic representation of this summary is shown below:

root [+sonorant] [+approximant] [+vocoid]

[laryngeal]　　[nasal]　[oral cavity]

[spread] [constricted] [voice]　　　　[continuant]

C-Place

Vocalic

V-Place　　　aperture

[labial] [coronal]　[dorsal]　[+open]

[-anterior] [distributed]
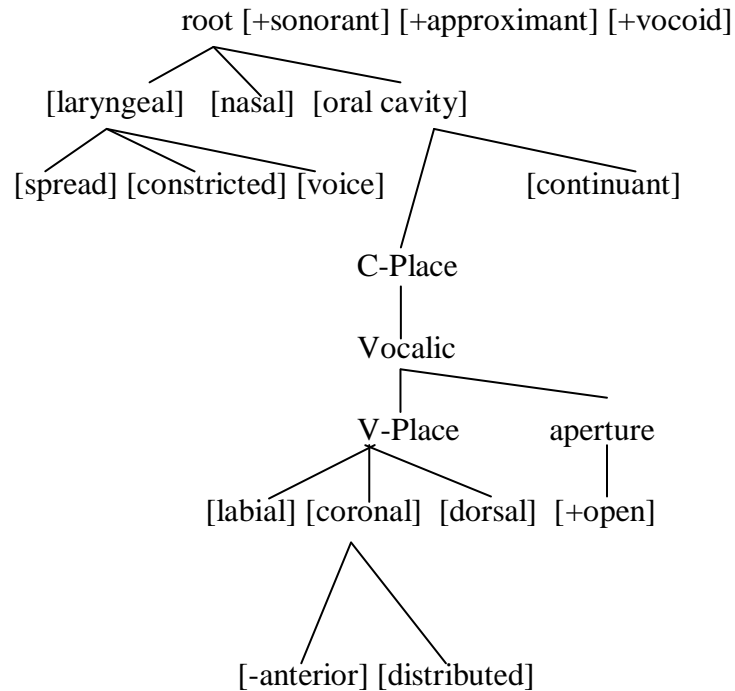
Figure 10: Clements and Hume (1995, p. 292) FG model of Vowels

Drawing from Clements and Hume (1995) and Kadenge (2012), a feature structure for Hausa vowels can thus be represented as shown in Table (13) below:

Table 13: Features of Hausa vowels (Clements & Hume, 1995)

	/i/, /ii/	/e/, /ee/	/u/, /uu/	/o/, /oo/	/a/, /aa/
Coronal	*	*			
Labial			*	*	
Pharyngeal					*
Dorsal	*	*	*	*	*
Open		*		*	*

Adopting this particular model of FG, Clements and Hume (1995) demonstrate place features for Hausa vowels: front vowels [i] and [e] are coronal, back rounded vowels [u] and [o] are labial,

and the low vowel [a] is pharyngeal, (Kadenge, 2012, p. 61). This model also extends the same implications for Hausa long vowels. Vowel epenthesis does not apply in the case of diphthongs. This is because Hausa rarely inserts diphthongs into borrowed words for adaptation purposes, and more so, because it tolerates a sequence of long vowels and/or diphthongs.

Vowels /i/ and /o:/ have their feature structure in this manner, as shown below in Figures (11) and (12):

```
        [i]                              [o:]
         |                                |
      C-place                          C-place
         |                                |
      vocalic                          vocalic
         |                               / \
      V-place                     V-place   aperture
         |                           |         |
      [coronal]                   [labial]   [open]
```
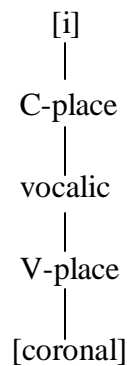
Figure 11: Representation of /i/   **Figure 12:** Representation of /o/
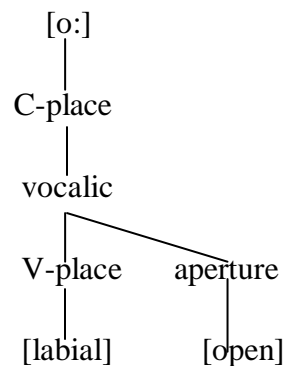
In sum, the adopted model of Clements and Hume (1995) is apt for this research as it presents a unified account of place in consonants and vowels as shown above (Kadenge, 2012). The model predicts that consonants and vowels which share identical place features form a natural class Clements and Hume (1995).

3.2.2. OPTIMALITY THEORY (OT)

The overall analysis of this research is couched in OT. This theory has as its central idea, the fact that surface forms or eventual realizations of language reflect resolutions of conflicts between competing demands and constraints (Kadenge, 2012, p. 67). Kager's (2004, p. 3) comment in that respect, is pertinent: "Violation of a constraint is not a direct cause of ungrammaticality, nor is absolute satisfaction of all constraints essential to the grammar's output. Instead what determines the best output is the least costly violation of the constraints". The innovation for a linguistic theory such as Optimality Theory is based on the known fact that languages of the world differ one from another in structure. Structure is very vital to the definition and description of every language, hence its grammar. For Chomsky and Halle (1968) there is a set of rules,

Universal Grammar (hereafter UG), 'linguistic universals' which apply to all natural languages (p. 4). Chomsky and Halle's (1968) claim states that every grammar is embedded with essential properties, which makes it possible to function as a natural human language. They also state that there is a universal category – 'organization of rules", commonly shared across all languages. The advent of OT has not come to antagonize this claim; instead, it states that within this same set of UG lie language specific rankings which are violable or conformable to. In other words, due to language variation, every language ranks and marks its rules differently, which is achieved through a sort of hierarchy or schemata so as to obtain and/or maintain an almost perfect grammar output. If this be the case, then studies of Prince and Smolensky (2004), Kager (2004), and McCarthy (2007; 2008) hold estimable value as they suggest that grammatical output of any language is only at its best when it is least violated.

OT argues that all languages have a particular set of rankings and violable constraints that determine its language structures (Prince & Smolensky, 2004; Archangeli & Langendoen, 1997; McCarthy, 2008). The OT model has three basic principles:

1. GEN (Generator) for a given input. The GEN generates a list of possible outputs, or candidates.

2. CON (Constraints). There are universal sets of constraints. All languages have strictly ordered violable constraints. The "language particular ranking of constraints" is used to decide on the candidates.

3. EVAL (Evaluation) chooses the optimal candidate (output), with the use of the language constraint hierarchy from a set of candidates that are produced by GEN.

Constraints are hierarchically ranked and violable and they interact with each other to produce an optimal candidate (surface representation) from the candidates that GEN creates from the input (underlying representation). The candidate that violates the lowest ranked constraint in the language is considered the optimal candidate. Kadenge and Mudzingwa (2012, p. 145) state that "according to these principles, the role of grammar is to select the optimal form from among many candidates".

This research shows the ranking of Hausa constraints relevant in the rephonologization of loanwords in its grammar. There are two types of constraints: Markedness and Faithfulness, and

they are explained and shown below. On the one hand, Markedness constraints govern the form of the output: they ensure that a candidate adheres to the requirement regarding well-formedness of output forms.

185. *[σCC

Onsets are simple (Kager, 1999, p. 97).

186. *P

The segment [p] does not exist in Hausa (Newman, 2000, p. 393).

187. *V

The segment [v] does not exist in Hausa (Newman, 2000, p. 316).

188. *ə

The segment [ə] is prohibited (Caron, 2013, p. 70).

189. *æ

The segment [æ] is prohibited (Caron, 2013, p. 70).

190. *ʌ

The segment [ʌ] is prohibited (Caron, 2013, p. 70).

191. *COMPLEX

Consonant cluster within the same syllable is prohibited (Han, 2009, p. 269).

On the other hand, Faithfulness constraints require a correspondence between input and output forms so as to preserve basic word properties (Kager, 1999; Kadenge & Mudzingwa, 2012).

192. *C]σ

Syllables are open (Kager, 1999, p. 94).

193. IDENT F

Feature values of the input segment must correspond to values of the output segment Kager (1999, p. 205). Kadenge and Mudzingwa (2011, p. 152), drawing from Kager (1999) state: Let α be a segment in S_1, and β be a correspondent of α in S_2. If α is [γF], then β is [γF].

194. *MAX-IO

Input segments must have output correspondents (no deletion) (Kager, 1999, p. 102).

195. *DEP-IO

Output segments must have input correspondents (no epenthesis) (Kager, 1999, p. 100).

It is interesting to note that unlike Shona, isiZulu, Yoruba and many Niger-Congo and Bantu languages, *C]σ (which stipulates all syllables are open) is low ranking in Hausa. The aforementioned languages have a strict syllable structure which militates against closed syllables and this implies that the native constraint on closed syllables in these languages is high ranking. This is the reverse in Hausa as the constraint *C]σ is low ranking (Alqhatani & Musa, 2014), due to the fact that syllable codas do occur in the language. A detailed segment substitution pattern for Hausa's vowels and consonants captured in Caron's (2013) study is presented in sub-section (4.5) of Chapter 4 which handles segmental substitutions and replacements in Hausa.

Sahayi (2005, p. 253) opines that OT is apt for a scholarship of this sort, because it recognizes the difference between phonologies of languages. In the same vein, Kadenge and Mudzingwa (2011, p. 147) state that "the mapping from underlying to surface forms is a matter of negotiating the demands of the language specific constraint hierarchy".

For procedural analyses purposes, a template for syllable ranking order in Hausa can be illustrated to explain how violations and faithfulness are accounted for. Drawing from Fery and van de Vijer (2003), permitted syllable structures found in Hausa can be illustrated as shown below:

Tableau 1: The optimal CV structure

*ONSET, *COMPLEX, NOCODA >> FAITH

/CV/	*ONSET	*COMPLEX	NOCODA	FAITH
a. [VC]	*!		*	
b. [CVCC]		*!	*	
c. ☞ [CV]				*

In Tableau 1 above, candidate (a) clearly violates high ranking constraint *ONSET which demands that all syllables begin with a consonant, and also violates NOCODA constraints which disallow word final consonants, therefore ruled out. Candidate (b) does well to repair the illegal structure by adhering to *ONSET, but fatally violates *COMPLEX which prohibits consonant clusters occurring within the same syllable. It also violates NOCODA as it requires that syllables remain open, therefore ruled out as a suitable candidate. Candidate (c) is appraised the clear winner as it scores FAITH, not contravening high ranking *ONSET and *COMPLEX constraints, and *NOCODA.

Tableau 2: The optimal CVV structure

*ONSET, *COMPLEX, NOCODA >> FAITH

/CVV/	*ONSET	*COMPLEX	NOCODA	FAITH
a. [VCC]	*!	*	*	
b. [CVC]			*!	
c. ☞ [CVV]				*

In Tableau 2 above, candidate (a) violates the undominated constraint *ONSET, which stipulates that syllables must begin with consonants and not vowels. It also violates high ranking

*COMPLEX which disallows consonant clustering within same syllables. It also contravenes NOCODA which demands that all syllables remain open, therefore ruled out as a suitable candidate. Candidate (b) does well to re-syllabify the ONSET as it incorporates a consonant into the word initial position, but fails as an optimal candidate as it violates NOCODA, hence also ruled out. Candidate (c) wins as it adheres to high ranking constraints *ONSET and NOCODA, and accommodates a heavy peak (VV), a sequence of vowels permitted in Hausa.

Tableau 3: The optimal CVC structure

*ONSET, *COMPLEX >> NOCODA, FAITH

/CVC/	*ONSET	*COMPLEX	FAITH	NOCODA
a. [VCC]	*!	*	*	*
b. [VC]	*!		*	*
c.☞ [CVC]				*

In Tableau 3 above, candidate (a) fatally contravenes *ONSET and *COMPLEX, both high ranking constraints within Hausa grammar, therefore not considered an optimal outcome. It also violates low ranking constraints FAITH and NOCODA, which require that syllables remain open. Candidate (b) fatally violates *ONSET as it does not replace the vowel with a consonant, violates *FAITH as well as NOCODA, as it elides C, hence ruled out. Although candidate (c) violates NOCODA, it still wins as it violates a least ranked constraint hence considered faithful to native requirements.

In a nutshell, OT is a comprehensive linguistic model which clearly demonstrates how languages are bound and/or influenced by constraints on the input and output of its grammar (McCarthy, 2007, p. 1). From above structures, several steps involved towards syllabification can be conceptualized through contributions of OT. OT does not only relate to the syllable as shown above, but is also able to explain as many other linguistic theories and processes couched within phonology, and many other fields of interests within linguistics such as syntax, phonetics, morphology and so on.

3.3 SUMMARY OF CHAPTER

To sum up, this chapter outlines the methods adopted for this research, for purposes of data gathering and analysis. Data (word examples) for this work is garnered mainly from Paul Newman's (2000) *The Hausa Language: An Encyclopaedic Reference Grammar*, Roxanna Ma Newman's (1990) *Dictionary of Hausa – English*, and Neil Skinner's (1965) English – Hausa illustrated dictionary: *Kamus na Turanci da Hausa*. The researcher who is a native speaker of Hausa also provides some fraction of data for this work. Unlike other Hausa works, this research adopts recent linguistic theoretical models of FG and OT as its core framework for analytical purposes. FG clearly demonstrates segment interactions with vivid illustrations and representations within segmental phonology discourse (Uffmann, 2006). Detailed feature charts for consonants and vowels are presented in Figures (5) and (10) respectively. OT, the overall analytical model in which this research is couched, exposes the phonotactic constraints which exist in Hausa grammar as well as their rankings.

The ranking scheme: *ONSET, *COMPLEX >> NOCODA, FAITH just below Tableaux headings, shows direction in respect of hierarchical rankings of the constraints, with markedness constraints listed first and faithfulness constraints subsequent, from left to right. This pattern is adopted throughout this thesis.

CHAPTER 4

DATA ANALYSIS

4.1. GENERAL REPAIR STRATEGIES IN HAUSA LOANWORDS

Having introduced the subject matter – loanword phonology – and given a brief but insightful account of the most common and sought after repair strategies or remodelling routes employed by languages of the world in adaptation of loanwords, Hausa's major repair strategies are: vowel epenthesis and segmental substitutions and/or replacements (Abubakre, 2008; Newman, 2000). This chapter provides evidence to the Hausa loanword adaptation patterning. The aim of furnishing evidence is to provide scaffolding for discussion and to also make generalizations which adequately account for the main strategies employed in modifying loanwords in Hausa. This section discusses vowel epenthesis, segmental substitutions and/or replacements, and re-syllabification. Much of the discussion is devoted to vowel epenthesis and segmental replacements of phonemes /p, v/, as these processes constitute the two major strategies observed in Hausa's adaptation process.

This chapter is organized as follows: Section 4.1 introduces the general repair strategies adopted by Hausa in remodelling loanwords. A brief note identifies adaptation processes which include: vowel epenthesis, segmental substitutions and replacements, as major repair strategies, and re-syllabification and consonant deletions which are marginal. Section 4.2 discusses vowel epenthesis found in two word positions of the input form, i.e. word medial positions, and the word final position. Sub-section 4.2.1 focuses on vowels epenthesized into word medially to break up word-initial clusters, while subsection 4.2.2 explores vowels inserted into word-medial clusters to avoid *COMPLEX. Consonant clusters are disallowed from occurring within the same syllable in Hausa hence medial clusters are simplified through vowel epenthesis. Sub-section 4.2.3 discusses vowel epenthesis into word final positions to avoid word-final consonants to ensure syllables remain open. Section 4.3 examines consonant deletions, a less frequent repair strategy employed in simplifying codas, thus opening up closed syllables. Section 4.4 examines segmental substitutions. Segments (vowels and consonants) faithful to Hausa's inventory replace

foreign segments alien to its inventory. Charts are presented to show Hausa vowels and consonants substitution patterns. Subsection 4.5.1 explores replacements of phoneme /p/ with [f] realizations, while subsection 4.5.2 discusses replacement of phoneme /v/ with [b] realizations.

4.2 VOWEL EPENTHESIS

For Uffmann (2006), vowel epenthesis is a significant adaptation strategy in loanword remodelling aimed at satisfying grammar constraints of languages with restrictive syllable structures (p. 1080). It is one of the commonest repair strategies employed by many languages of the world in their quest for loanword adoption and adaptation (Silverman, 1992). Epenthesis, a broad phonological process, generally inserts sounds into word initial, medial and final positions (Campbell, 2004, p. 35). Epenthesis or insertions include a range of materials: vowels, consonants, glides etc. Contributions of loanword phonology offer explanations to account for why epenthesis is necessary to ensure a language's pre-existing structure is retained and/or preserved. A language bound by its own phonotactics has no option but to seek ways to resolve new set of inputs which do not conform to its grammar requirements and demands. Through loanword research, language specific adaptation processes are identified. Also, the need for such phonological processes inherent in the system of languages, upon which the task of adaptation is dependent, can be conceptualized. Word positions are crucial as some languages do not permit insertions into every position – initial, medial or final positions – while some languages outline epenthetic conditions for inserting materials into particular sites (Kang, 2002). For instance, Adomako (2008, p. 26) suggests that Akan permits insertions of vowels only into obstruent clusters (essentially a fricative + stop). The case for Hausa is one which allows insertions of vowels into word medial and final positions, without definite implications for the nature of consonants clustered in specific environments. The sole aim for Hausa's epenthesis is to retain its preferred syllable shape typical of the CV nature, and therefore inserts vowels to break up consonant clusters, and to also open closed syllables.

4.2.1 VOWEL EPENTHESIS INTO WORD-INITIAL CLUSTERS

In repairing consonant clusters that occur word-initially, vowels are usually inserted in between the clustered consonants of the borrowed word to simplify complex onsets in Hausa. Hausa has a strict syllable restriction on complex onsets as it does not tolerate them (Alqhatani & Musa,

2014; Caron, 2013; Newman, 2000). The language therefore inserts vowels to simplify such complex onsets. This is one of the major differences between Hausa and English phonologies. While occurrences of complex onsets are tolerated in English, Hausa phonology presents a phonotactic restriction which totally bans them. Loanwords from English with complex onsets therefore receive a vowel in Hausa to break up disallowed clusters. Word examples showing word-initial clusters in English and their treatment in Hausa are presented in Table 14 below. Examples (196) through (204) as shown below are sourced from Newman (2000, pp, 317-318).

Table 14: Vowel epenthesis to simplify complex onsets

	English form	Hausa form	Gloss
196.	/**br**ed/	[būròdí]	'bread'
197.	/**dr**aivəʳ/	[dírébà]	'driver'
198.	/**pr**əfesəʳ/	[fūrōfèsá]	'professor'
199.	/**st**ɔ:r/	[sítō]	'store'
200.	/**st**iər/	[sìtārí]	'steering'
201.	/**sl**ɪpərs/	[sìlìfā]	'slippers'
202.	/**sp**i:kəʳ/	[sìfíká]	'speaker'
203.	/**fl**aʊəʳ/	[fulāwā]	'flour'
204.	/**bl**ɒk/	[bùlo]	'block'

Examples (196) through (204) above, show that complex onsets such as /br/, /dr/, /pr/, /st/, /sl/, /sp/, /fl/ and /bl/ in the input forms (English) are simplified through insertions of vowels in Hausa. The clustered sequences all recieve vowels as a result of the undominanted markedness syllable constraint *[σCC (Kager, 1999; Kadenge, 2012), which prohibits a sequence of consonants occuring at the onset position in Hausa.

With the aid of OT, a formalization of this process is illustrated in Tableau 4 below:

Tableau 4: Realization of the word 'driver' in Hausa

*[σCC >> *v >> *ə >> *C]σ >> DEP-IO

/drai.vəʳ/	*[σCC	*v	*ə	*C]σ	DEP-IO
a. [drai.vəʳ]	*!	*	*	*	
b. [di.ra.vəʳ]		*!	*	*	*
c. [dir.bəʳ]			*!	*	*
☞ d. [di.re.ba]					*

The relevant constraints that apply to the word realization 'driver' presented in Tableau 4 above include:

205. *[σCC,

    Onsets are simple (Kager, 1999, p. 97).

206. *v,

The segment [v] is prohibited (Newman, 2000, p. 316).

207. *ə,

    The segment [ə] is prohibited (Caron, 2013, p. 70).

208. *C]σ,

    Syllables are open (Kager, 1999, p. 94).

209. DEP-IO,

    Output segments must have input correspondents (no epenthesis) (Kager, 1999, p. 100).

The syllable constraint *C]σ in Hausa is low ranking as mentioned earlier. Hausa has three syllable structures which include CV, CVV and CVC. The existence of syllable codas in Hausa thus implies that the constraint which bans closed syllables in Hausa is lowly ranked. This ranking is the opposite in languages such as Shona, isiZulu, Yoruba and many other African

languages, that operate a strict CV syllable shape, hence totally ban the occurrence of syllable codas, therefore the constraint *C]σ considered high ranking.

In Tableau 4 above, candidate (a) fatally contravenes *[σCC, as it retains the word-initial complex onset [dr], hence disqualified for violating the high ranking constraint which militates against consonant clusters occurring at onset positions. Apart from the occurrence of consonant complex segments, Hausa permits only a maximum of a single consonant in the onset position. Candidate (a) also violates high ranking *v which bans the occurrence of the consonant segment [v] which does not exist in the Hausa inventory, hence ruled out as an optimal candidate. Candidate (a) also violates the undominated constraint *ə. The segments, [ə] and [v] do not exist in Hausa's vowel inventory suggesting segmental restrictions: *ə, *v in place on input forms adopted with the non-existent segments. Candidate (a) also violates *C]σ as Hausa phonology is widely known to avoid word-final consonants (closed syllables). On those bases, candidate (a) is ruled out. Candidate (b) does well to epenthesize vowel [i] into the word-initial cluster [dr] but violates the undominated constraints *v and *ə, as it retains the non-existent segments [v] and [ə] hence ruled out. It also violates *C]σ which stipulates that syllables remain open. It violates low ranking constraint DEP-IO which requires output segments to have input correspondents, essentially disallowing epenthesis, hence also ruled out. Candidate (c) resolves high ranking constraints: *[σCC and *v, but violates *ə as it retains the segment [ə] a vowel that does not exist in Hausa, therefore ruled out on that account. Candidate (c) also violates low ranking DEP-IO which bans insertions of segments, therefore ruled out. Candidate (d) wins as it resolves constraints; *[σCC thereby ensuring the repair of consonant cluster [dr] through vowel epenthesis, *v replacing segment [v] with [b] appropriately, *ə replacing English vowel [ə] with Hausa's closest counterpart [a], and in the process resolves *C]σ. The sequence [əʳ] is always adapted acoustically with vowel [a] in Hausa which is evident in examples (197), (198), (202) and (203) above. Although it violates DEP-IO which militates against insertions, it is however appraised the optimal candidate because it only violates the least ranked constraint and conforms to strict restrictions considered high ranking.

As a reminder, the central idea behind OT is to ensure input forms (loanwords) contravene the least ranked constraints applicable to the receptor language, but conform to high ranking restrictions so as to ensure well-formedness of inputs (Kager, 1999, 2004). A closer look at

examples (196) through (204) above, reveals some sort of patterning and/or consistency in the choice of vowels inserted as observed. This is as a result of shared place features identified with neighbouring segments and the epenthetic materials. In FG terms, adjacent segments that share identical features pair conveniently (Clements & Hume, 1995; Uffmann, 20006; Kadenge, 2012). According to Uffmann (2006), how vowels are inserted exactly, within a particular language, a given context and indeed cross-linguistically exemplify diverse accounts (p. 1080). Some languages demand vowels share similar features (vowel harmony), some others require consonants to extend features (consonantal assimilation), while others have a default epenthetic segment (Uffmann, 2006). The above phenomena reveal segment interactions that usually occur at underlying levels to produce peripheral forms. Segments that sort of 'agree' share similar features to connote assimilation which requires neighbouring material be identical. Assimilation occurs when correspondence is achieved either vowels or consonants resembling and/or sharing all or some features with epenthetic segments. In the case where vowels assimilate, vowel harmony is attained while for consonants, consonantal assimilation is achieved. Dissimilation, the converse, suggests features are not shared between neighbouring segments which brings to the fore the case for default segmentism (Uffmann, 2004, 2006; Adomako, 2008; Kadenge, 2012). While it is tenable that some languages usually have default epenthetic vowels, as the case is observed in Japanese with [u], and [i] in Yoruba, Fijian, Tongan, etc., explanations drawn from recent FG models provide evidence to suggest that default insertions alone cannot account for all the patterns of vowel epenthesis (Uffmann, 2006, p. 1081). This then means that epenthesis is not always achieved arbitrarily (by default), but includes vowel harmony and/or consonantal assimilations. As Uffmann (2004; 2006) observes with Shona, Adomako (2008) with Akan, adjacent segments determine the vowel quality and/or type inserted. Kadenge (2012, p. 57), drawing from Clements and Hume (1995) writes that, "Labial consonants and rounded or labial vowels form a natural class; coronal consonants and front vowels form a natural class; and the low vowels and pharyngeal consonants form a natural class". Based on this observation, segments likely to be inserted within clustered environments either to break up consonant clusters or to open up closed syllables in languages can be predicted, in this case Hausa, on which this study is based. General strategies therefore that pattern vowel epenthesis include default insertions, consonantal assimilations, vowel harmony, amongst many others (Uffmann,

2006, Adomako, 2008, Kadenge, 2012). According to Uffmann (2006, p. 1080), due to language variation some or all of the epenthetic patterns may apply.

Default insertions, consonantal assimilations and vowel harmony exhibit diverse epenthetic strategies and are thus represented differently within FG terms as shown in Figure (13) below:

```
    (a)  F              (b)  F              (c)  F
         |                   | \                 |  \
         |                   |   \               |    \
         |                   |     \             |      \
    V C V              V C V              V C V
```
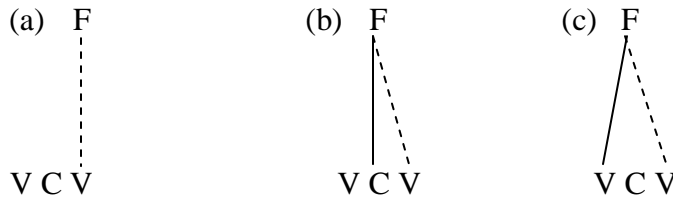
Figure 13: Representation of default insertions, consonantal assimilations and vowel harmony (Uffmann, 2006)

Figure 13 above shows that (a) which connotes default insertion, introduces a segment with unique features not sharing any properties with adjacent segments, while (b) exemplifies associations shared between neighbouring segments as preceding segments (consonants) influence the epenthetic material and in the process determine the vowel type inserted. Diagram (c) of Figure 13 demonstrates that a preceding vowel not immediately next to the epenthetic segment still spreads or supplies its features unto the epenthetic vowel to ensure consonance or coherence between the two vowels. In this case, neighbouring vowels determine the epenthetic vowel type. For Uffmann (2006), all three strategies have advantages as well as disadvantages. He notes that default insertions do not need disrupt feature-to-segment associations thereby maintaining unique (bijective) associations, while consonantal assimilations and vowel harmony share some or all features hence ensuring some coherence between neighbouring materials (p. 1095). Most importantly, what Uffmann notes of vowel harmony is that it dislodges the notion of locality, as segments skip intervening materials to spread features to freshly introduced segments distant from them in the epenthetic process.

Findings so far reveal on the one hand, consonantal assimilations to mostly occur in cases of word-medial epenthesis in Hausa, and on the other hand, default insertions occur in cases of word final epenthesis and also in Hausa's re-syllabification process as captured in sub-section (4.2.2) and section (4.4) respectively, of this present study. Cases of vowel harmony are

marginal. A formal representation adopting the FG model (Clements & Hume, 1995) is therefore presented in Figure (14) below of the loanword 'bread' in Hausa.

```
        /b/                                    /u/
         |                                      |
         |                                      |
        root                                   root
         |                                      |
         |                                      |
         |                                      |
      C–place                               C-place
         |                                      |
         |                                   Vocalic
         |                                      |
      labial --------------------------------  V-place
```
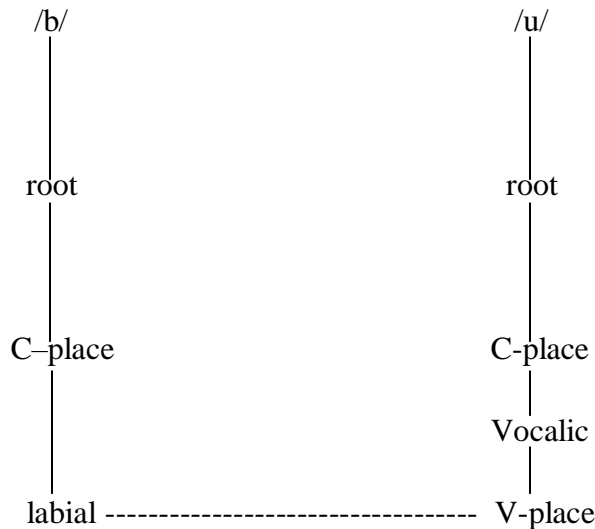
Figure 14: Representation of [b**u**rodi] 'bread'

Figure 14 above demonstrates that the place of articulation of the preceding consonant influences the choice of the epenthetic vowel. Following established claims of consonants and vowels which share identical place features eventually forming a natural class (Clements and Hume, 1995; Kadenge, 2012), segment [u] [+back, +round] is inserted after [b] since they both share identical place features [labial], hence form a natural class. The case seen above of Figure 13 is a typical of consonantal assimilation occurring in a progressive manner, as the preceding consonant [b] spreads its features onto the epenthetic segment [u], from left to right. Unlike Hausa, assimilation in Akan occurs in a regressive pattern where following segments (consonants and vowels) spread their features onto preceding epenthetic segments from right to left (Adomako, 2008).

4.2.2 VOWEL EPENTHESIS INTO WORD-MEDIAL CLUSTERS

It is widely acknowledged that Hausa does have syllable codas in its grammar. Available syllable structures include the CVC pattern, which at its best tolerates a maximum of a single consonant occurring at the syllable edge (Clements 2000; Han, 2009; Musa & Altakhaineh, 2015). Hausa therefore does not permit consonant clusters occurring within the same syllable (Musa and Altakhaineh, 2015). Put differently, consonants can cluster word-medially but are not permitted

to occur in the same syllable (Abubakre, 2008; Han, 2009; Musa & Altakhaineh, 2015). In the same vein, Kager (1999, pp. 96-98) notes that languages of the world exhibit variant dimensions within the notion of complexity as it relates to the syllable margin. Kager observes that although some languages tolerate syllable codas, they disallow complex syllable codas. Hence, Hausa's syllable requirements, quite similar to those of Yawelmani (Valley Yokuts language family) (Noske, 1985), stipulate that syllables at most have one consonant at an edge (Clements, 2000). Therefore Hausa permits only one consonant at the coda position. According to Clements (2000), this sequence connotes a coda + onset combination as the permitted syllable arrangement in Hausa. This syllable requirement suggests the existence of grammar constraints within Hausa known as *COMPLEX, which bans consonant clusters occurring within the same syllable. Hausa therefore relies on vowel epenthesis, as it inserts vowels in the form of a syllable nucleus into clustered consonants for re-syllabification purposes to satisfy grammar demands ensuring syllable well-formedness. Consider the loanword examples shown in Table 15 below, borrowed from English into Hausa with consonant clusters occurring within the same syllable, but eventually re-syllabified to suit Hausa's pre-existing phonology.

Table 15: Vowel epenthesis to simplify complex syllable codas

	English form	Hausa form	Gloss
210.	/dɪ**gri**:/	[dig**i**ri]	'degree'
211.	/siŋ.**gl**ət/	[siŋ.g**i**.le.ti]	'under cloth'
212.	/maɪ.**kr**ə.fəʊn/	[māk**ù**rōfõ]	'microphone'
213.	/ə.**dr**es/	[ā.d**i**.re.ʃì]	'ad.dress'
214.	/laɪ.**br**ər.i/	[la.b**u**.ra.re]	'li.bra.ry'

In Table 15 above, word-medial clusters such as [gr], [gl], [kr], [dr] and [br] all receive vowels [i] and [u] to ensure re-syllabification is achieved in Hausa. Examples (210) through (214) above are sourced from Newman (2000). With the help of CV phonology, an illustration is drawn to show how input forms in English are re-syllabified in Hausa as shown in Figure 15 below:

σ   σ   σ   σ   σ   σ

C V C C V C → C V C C V C V C V

s i n g l e t   s i n g i l e t i
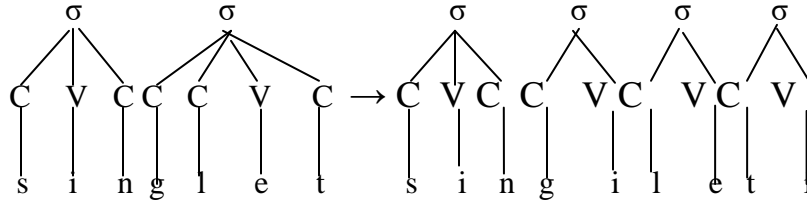
Figure 15: Resyllabification of the word /siŋ.glət/ → [siŋ.g**i.**le.ti] in Hausa

Figure 15 illustrates the ultimate need for re-syllabification in Hausa which is motivated by the apparent need to abide by the syllable constraint which prohibits consonant clusters occurring within the same syllable. The cluster [gl] is remodelled by introducing syllable nucleus [i] in between the cluster to ensure each syllable has no more than one consonant at the edge. When consonant clusters occur in Hausa but belong to different syllables, there is no need to insert segments (vowels) so as to achieve syllable adjustments. This is evident in the loanword examples shown below:

215. /äk.to.bər/ → [ok.to.bā] 'October'

216. /dIs.pɛn.səri/ → [dīs.fàn.sārè] 'dispensary'

Above examples (215) and (216) have the input forms of English in phonetic slashes //, while adapted forms of Hausa realizations are captured in phonemic brackets [], and the word meaning presented with inverted commas. This note is underscored all through examples not captured in tables presented in this research. Loanword examples (215) and (216) are sourced from (Smirnova, 1982, pp. 25-27).

In example (215) 'October', since adjacent segments [k, t] belong to different syllables, there is no apparent need to re-syllabify the medial cluster [kt] by inserting a vowel to break up the sequence. The same explanation extends to word example (216) above, 'dispensary' as medial clustered segments [s, p] belong to the first and penultimate syllables respectively, hence no apparent need for re-syllabification.

In OT terms, a formalization of the re-syllabification process in Hausa is presented below in Tableau 5:

Tableau 5: Realization of the word 'library' in Hausa

*COMPLEX, *ə >> MAX-IO, DEP-IO

/laɪ.brər.i/	*COMPLEX	*ə	MAX-IO	DEP-IO
a. [laɪ.brər.i]	*!	*		
b. [la.bə.ri]		*!	*	
☞ c. [la.bu.ra.re]				*

Necessary constraints that apply to the word realization 'library' presented in Tableau 5 include:

217. *COMPLEX,

> Consonant cluster within the same syllable is prohibited (Han, 2009, p. 269).

218. *ə,

The segment [ə] is prohibited (Caron, 2013, p. 70).

219. MAX-IO,

> Input segments must have output correspondents (no deletion) (Kager, 1999, p. 102).

220. DEP-IO

> Output segments must have input correspondents (no epenthesis) (Kager, 1999, p. 100).

Presented in Tableau 5 above, candidate (a) clearly violates high ranking constraints: *COMPLEX and *ə. *COMPLEX bans the clustering of two or more consonants within the same syllable. Hausa allows at most one consonant at a syllable edge, therefore (a) is ruled out. It also contravenes the undominated constraint *ə as the vowel [ə] is not a registered segment in Hausa's inventory, and on that account also ruled out. Candidate (b) does well to re-syllabify the word-medial cluster [br] but in the process deletes segment [r] and by so doing violates MAX-IO which disfavours deletions, as it is always better to insert segments rather than to delete (Kadenge, 2012), therefore ruled out. It also violates high ranking constraint *ə, as it retains the

alien vowel, hence disqualified. Candidate (c) is declared the winner as it inserts vowel [u] in between clustered [br] thus re-syllabifying the input form and adhering to syllable structure demands. Although it violates DEP-IO which militates against insertions, it is still appraised as winner because it only violates the least ranked constraint.

Also in FG terms, Hausa syllable coda simplification reveals consonantal assimilation to be very active as a result of spreading of place features shared by neighbouring segments. In example (213) above of [adireʃi], consonant [d] spreads its place features [coronal] onto the epenthetic segment [i] also [coronal] thus influencing the vowel quality and/or type inserted. As a reminder, coronal consonants and front vowels form a natural class (Clements & Hume, 1995).

An illustration to show spreading of place features from [d] unto [i] is presented in Figure 16 below.

```
        /d/                              /i/
         |                                |
         |                                |
        root                             root
         |                                |
         |                                |
       C–place                         C-place
         |                                |
         |                             Vocalic
         |                                |
     coronal ---------------------------- V-place
```
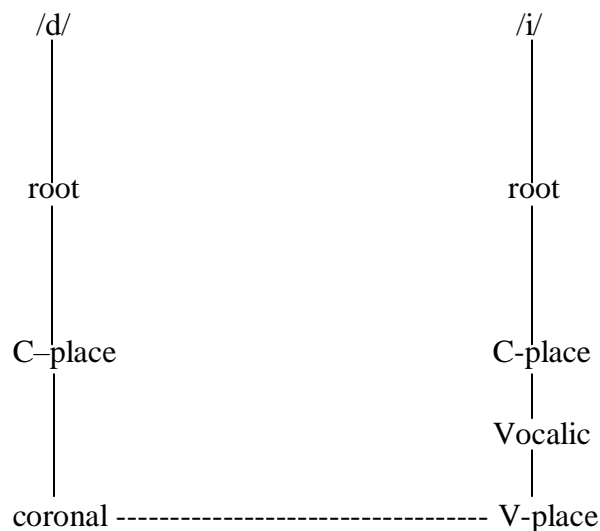
Figure 16: Representation of [ad**i**reʃi] 'address'

Figure 16 above demonstrates that consonant [d] [coronal] spreads its features unto the epenthetic vowel [i] thereby determining the vowel type, in a progressive manner.

It is worth noting that in examples (207) through (209) above, vowels [i] and [u] are inserted into sites where dorsal consonants occur. Notably vowel [i] is inserted after preceding [g], while vowel [u] is inserted after [k]. This scenario posits the existence of default vowels in Hausa, by far vowels [i] and [u] wherever dorsal segments appear as preceding consonants, with reference to re-syllabification. Commenting on Akan, Adomako (2008, p. 40) underscores a similar pattern

with dorsal segment spreading. He draws conclusions from Sagey (1982) and Halle's (1992) explanations on the inactiveness of dorsal segments to spread place features. Although Clements and Hume (1995) and Kadenge (2012) establish that dorsal segments and low vowels form a natural class, Sagey (1982), Halle (1992), and Adomako (2008) all conclude that due to the inactive nature of dorsal segments, they lack the ability to contribute place features to the epenthetic vowels. Kadenge (2012, p. 74) also notes similar behaviour in Shona and states that, "after dorsal consonants, no such assimilation, conceivable as a spreading process of consonantal place is found". According to Sagey's (1982) non-linear phonological representation, Dorsal is the mother node for backness and height of vowels [high, low] (p. 2). In this light, Dorsality plausibly accounts for why Hausa adopts default vowels during epenthesis aimed at re-syllabifying illicit complex syllable structures, as the reverse is the case with labial and coronal segments. Examples (210) and (211) above, confirm that labials and coronals spread place features unto epenthetic vowels in sites which they occur or appear.

According to Clements (2000, p. 141), heavy (complex) syllable patterns which are permitted in Hausa, hence tolerate segment clustering within the same syllable are: long vowels and diphthongs. This notion holds crucial implications for the discussion of syllable weight in Hausa (Newman, 1973; Leben, 1971). Indigenous word examples which exemplify heavy syllables in Hausa are shown below and sourced from Clements (2000, p. 142):

221. [raagoo] 'ram'

222. [tausai] 'pity'

223. [jirgii] 'plane, train'

Further representations depicting syllable weight of long vowels and diphthongs are illustrated with the aid of the CV phonology model as shown in Figures 17 and 18 below

σ
onset rime
nucleus coda
r a a

σ
onset rime
nucleus coda
g o o
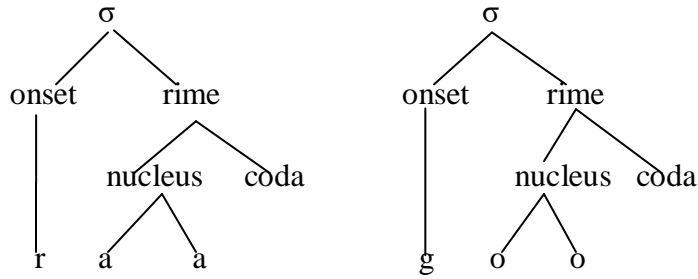
Figure 17: Permitted syllable weight CVV [ragoo] 'ram' for long vowels in Hausa

σ
onset rime
nucleus coda
t a u

σ
onset rime
nucleus coda
s a i
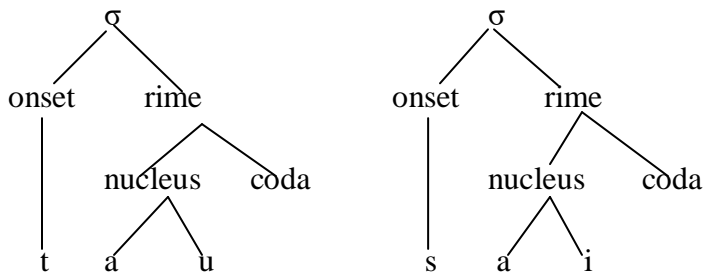
Figure 18: Permitted syllable weight CVV [tausai] 'pity' for diphthongs in Hausa

In Figures 17 and 18, the root node (represented as σ) heads the syllable tree, and dominates the onset and the rime. The rime dominates the nucleus [+vocalic], and the coda. The onset and coda positions are always [+consonantal] (Newman, 2000; Clements, 2000).

4.2.3 VOWEL EPENTHESIS INTO WORD FINAL POSITIONS

In Hausa, vowels are also inserted into word-final positions to open up closed syllables. The language preferably operates a fairly simple syllable structure typical of the CV shape (Lindau-Webb, 1985). As mentioned in the early stages of this research, Hausa does have words that end with consonants typical of a CVC syllable shape. However, in most cases, Hausa prefers to retain its CV syllable pattern and thus inserts vowels word-finally to simplify syllable codas (Caron, 2013; Alqahtani & Musa, 2014).

According to Newman (2000, p. 317), only minor exceptions show Hausa words to end finally with consonants. The majority of indigenous words all end with vowels, hence English words present a phonotactic conflict as they are known to end with consonants. Therefore loanwords sourced from English receive a syllable nucleus in the form of an epenthetic vowel in Hausa to avoid word-final consonants in its grammar thereby opening up closed syllables. Shown in Table

16 below, are examples of loanwords borrowed into Hausa from English but remodelled to achieve syllable structure adjustments.

Table 16: vowel epenthesis to open up closed syllables

	English form	Hausa form	Gloss
224.	/bʌkit/	[bōkìtí]	'bucket'
225.	/gɑːrd/	[gādí]	'guard'
226.	/wɒrənt/	[wārāntí]	'warrant'
227.	/riŋ/	[riŋgi]	'ring'
228.	/sɪrɪndʒ/	[sìriŋjì]	'syringe'
229.	/peg/	[fẽgì]	'peg'
230.	/ʃed/	[shēdī]	'shed'
231.	/stæmp/	[sìtamfì]	'stamp'

The examples above (224) through (231), show that loanwords are adapted with vowel [i] inserted into word-final positions to simplify syllable codas.

A formalization of this process is presented within OT terms as shown in Tableau 6 below:

Tableau 6: Realization of the word 'bucket' in Hausa

*ʌ >> *C]σ >> DEPIO >> IDENT [F]

/bʌkit/	*ʌ	*C]σ	DEP-IO	IDENT [F]
a. [bʌk.it]	*!	*		
b. [bʌ.ki.ti]	*!		*	
☞c. [bō.kì.tí]			*	*

The relevant constraints that apply in the word realization 'bucket' shown in Tableau 6 above include:

232. *ʌ,

      The segment [ʌ] is prohibited (Caron, 2013, p. 70).

233. *C]σ,

      Syllables are open (Kager, 1999, p. 94).

234. DEPIO,

      Output segments must have input correspondents (no epenthesis) (Kager, 1999, p. 100).

235. IDENT [F],

      Feature values of the input segment must correspond to values of the output segment Kager (1999, p. 205). Following Kadenge and Mudzingwa (2011, p. 152) while drawing from Kager (1999) state: Let α be a segment in S_1, and β be a correspondent of α in S_2. If α is [γF], then β is [γF].

In Tableau 6 above, candidate (a) clearly violates the undominated constraint *ʌ which is high ranking. Like Shona and many other African languages that operate a modest five vowel system (Kadenge & Mudzingwa, 2012, p. 146), the English vowel [ʌ] is not part of the Hausa speaker's vowel inventory (Caron, 2013), hence ruled out. Consonants and vowels which are not registered in Hausa's segment inventory are substituted with their closest counterparts registered in the grammar. The substitution pattern of segments in Hausa is captured in the next section (4.3) of this chapter which deals with segmental substitutions and replacements. Candidate (a) also violates *C]σ which disallows the occurrence of closed syllables in Hausa as it retains word final consonant [t], hence ruled out. Candidate (b) does well to epenthesize a vowel [i] at the word final position but in the process violates high ranked *ʌ, as it retains [ʌ] an unregistered segment in Hausa and therefore ruled out. Also due to the epenthetic process, it violates DEP-IO which disallows epenthesis, although considered a least ranked constraint (faithfulness). Candidate (c) is appraised the winner as it inserts vowel [i] to open up the closed syllable resolving *C]σ, and also replaces [ʌ] with a close counterpart [o] resolving the undominated segmental constraint *ʌ.

Although it violates DEP-IO and IDENT [F] constraints in the adjustment process, it still wins because both constraints are considered low ranking, hence an outcome which violates the least constraints but conforms to high ranking requirements therefore considered more faithful to native requirements. As regards constraint IDENT [F], it is crucial to state that the foreign segment [ʌ] is usually substituted with its closest variety [a] in Hausa as captured in Caron's (2013) vowels substitution pattern. In this light, the replacement of [ʌ] with [o] as against the usual [a] violates the IDENTITY constraint which stipulates that feature values in the input segment are preserved in the output segment (Kager, 1999, 2004; Kadenge & Mudzingwa, 2011). IDENT [F] is however, a low ranking constraint in Hausa due to available cases where such reconstructions occur to facilitate the task of speaking and to preserve assimilation. Caron's (2013) vowel substitution pattern is presented and discussed in detail in sub-section (4.4) about segmental replacements in the latter stages of this work.

It is needful to point out that in the instance of [bōkìtí] example (224) above it is adapted with vowel [o] due to consonantal assimilation, a direct consequence of shared place features. Since [b] is labial, Hausa drops the conventional vowel [a] and maximally replaces it with [o] [+back, +round] since back rounded vowels pair conveniently with labial consonants as expatiated through the FG model (Clements & Hume, 1995) adopted in this research.

Unlike epenthesis into word-initial clusters, word-final epenthesis in Hausa seems to suggest the existence of a default epenthetic vowel which Uffmann (2006) discusses. Observed so far, the epenthetic segment employed context independently is vowel [i]. Examples 224 through 231 above provide evidence to this insertion (default) pattern. In agreement, Newman (2000) states that indigenous words with final /ʃ/, /j/, /c/, /g/ and /d/, and early loanwords with final /t/ and /k/, were invariably added and incorporated with a post-prosthetic vowel, usually the segment [i] (p. 317). Statistics from word examples listed in Newman (2000, pp. 317-318) exemplify that [i] is by far the most frequently chosen epenthetic vowel in Hausa used to avoid word final consonants.

Drawing from Kadenge (2012), and Clements and Hume (1995), it is expected that dorsal segments form a natural class with low vowels, but as observed in example 230 above [fegi], vowel [i] [coronal] was inserted after [g] [dorsal] to avoid closed syllables. However, studies of Sagey (1982), Halle (1992) and Adomako (2008) reveal the inability of dorsal segments to

influence or contribute place features to the epenthetic vowels due to their features [+back, -high]. Sagey's (1982) hierarchical feature representation shows the mother node [Dorsal] dominates place features [high, low, back] (p. 2). While the claim in the inability of dorsal segments to contribute features to epenthetic segments remain valid, the notion for a default vowel employed in resolving syllable codas in Hausa is further buttressed with example (231) above of [sitamfi]. This reconstruction shows that vowel [i] [coronal] is inserted after [f] [labial] to avoid word final consonants.

These reconstructions observed in examples 224 through 231 above, posit the existence of a default epenthetic segment in Hausa with vowel [i], by far the most commonly used in environments where coronal, labial and dorsal segments occur. Therefore, word-final consonants like /t/, /d/, /ŋ/, /g/, /dʒ/, /p/ in the data set captured in Table 16 above, all receive vowel [i] in the form of a default epenthetic segment to open up closed syllables.

With the aid of the adopted FG model (Clements & Hume, 1995) the epenthetic strategy default insertion which applies in Hausa is represented as shown in Figure 19 below.

The word example 'stamp' [sitamfi] to illustrate default insertion is represented as shown:
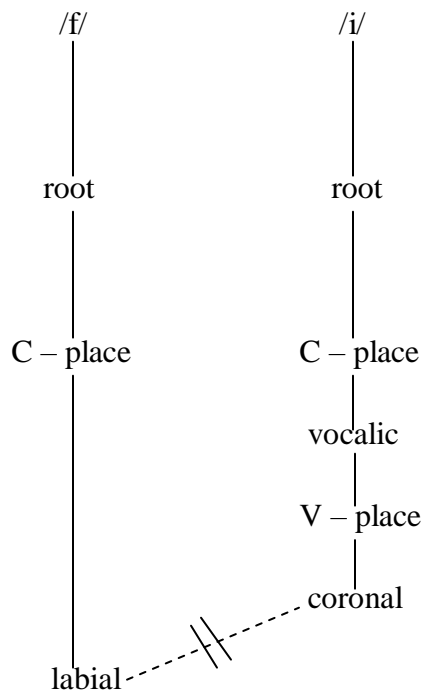

Figure 19: representation of the word [sitamf**i**] 'stamp'

Figure 15 above, demonstrates that vowel [i] is epenthesized context independently without any links or associations to the neighbouring segment (preceding [f] in this case) to indicate default insertion. The link from the preceding consonant [f] to the epenthetic vowel [i] is shown to be cut off with double slashes across the dotted connecting line.

4.3. CONSONANT DELETIONS

Following Abubakre (2008), deletion of segments is also a phonological process Hausa employs, to open up closed syllables to retain the preferred CV syllable pattern. Akan (Niger-Congo) amongst many other languages relies on consonant deletion to repair illicit word forms borrowed into the language. Hausa deletes word final segments (consonants) to achieve rephonologization, since its preferred syllable structure is typical of the CV shape. Word final consonants are elided to ensure syllables remain open. Although segment deletions may not be a major phonological process in Hausa, a number of loanword examples listed in Abubakre (2008) and Newman (2000) provide evidence to suggest consonantal deletions as a process cannot be ignored. Most of the examples provided by Abubakre (2008) are loanwords sourced from Arabic not English, as shown in earlier examples (118) through (120) above. The data set of loanwords presented in Table 17 below is therefore drawn from Newman (2000) as this research focuses on English loanwords as the donor language.

Table 17: Word deletions in Hausa to preserve CV syllable shape

	English form	Hausa form	Gloss
236.	/əkaʊntənt/	[àkantā]	'accountant'
237.	/pəjaməz/	[fànjāmā]	'pajamas'
238.	/pedəl/	[fẽda]	'pedal'
239.	/signəl/	[siginā]	'signal'
240.	/sɛkrɪtɛriət/	[sakatēriyā]	'secretariat'

Examples 236 through 240 above show that word final consonants like, [nt], [z], [l] and [t] are deleted to ensure words end in open syllables. Notably in example 240, [r] is deleted in the clustered sequence [kr] to simplify the word-medial consonant cluster, which rarely occurs as Hausa prefers to usually add segments (epenthesis) rather than delete segments. As observed, consonant deletions are known to occur in Hausa, but the adaptation process is less relied on for remodelling as just a few cases can be provided (Alqahtani & Musa, 2014).

Generally speaking, the CV syllable is universal to all languages as it exemplifies a near perfect syllable shape (Kager, 1999, p. 95). In this light, Hausa phonology is no exception as it also presents the universal CV syllable pattern. However, repair strategies highlighted so far: vowel epenthesis and consonant deletions, confirm and affirm Hausa's preference of the CV shape over any other syllabic shape, which is not just a mere case of cross-linguistic characteristics but demonstrate deliberate efforts made by the language (Hausa) to re-syllabify foreign word forms considered not well-formed to native phonology. This is one of the merits of loanword phonology as it reveals true syllable structures specific to language(s).

A formalization of this process is presented within OT terms as shown in Tableau 7 below:

Tableau 7 : The realization of the word 'pedal' in Hausa

*COMPLEX, *ə >> *C]σ, *DEP-IO, *MAX-IO

/pedəl/	*p	*ə	*C]σ	*DEP-IO	*MAX-IO
a. [pe.dəl]	*!	*	*		
b. [fe.də.li]		*!	*	*	
☞ c. [fe.da]					*

The relevant constraints that apply in the word realization of 'pedal' shown in Tableau 7 above include:

241. *p

   The segment [p] is prohibited (Newman, 2000, p. 393).

242. *ə

The segment [ə] is prohibited (Caron, 2013, p. 70).

243. *C]σ

Syllables are open (Kager, 1999, p. 94).

244. *MAX-IO

Input segments must have output correspondents (no deletion) (Kager, 1999, p. 102).

245. *DEP-IO

Output segments must have input correspondents (no epenthesis) (Kager, 1999, p. 100).

Presented in Tableau 7 above, candidate (a) fatally violates *p which is high ranking as the segment [p] is non-realized in Hausa (Newman, 2000) hence outcome (a) is non-optimal. It also violates the high ranking constraint *ə, as the segment [ə] is also non-realized in Hausa's inventory (Caron, 2013), therefore ruled out. Candidate (a) also violates the low ranking constraint *C]σ. Hausa preferably operates open syllables, an on that basis ruled out. Candidate (b) does well to resolve the undominated constraint *p as it replaces it with the suitable segment [f], but fails to win as the alien segment [ə] is retained. Candidate (b) also violates low ranking DEP-IO which militates against epenthesis, as vowel [i] is inserted to avoid word-final consonant. Concerning consonant deletions, Hausa preferably elides segments that insert them, and on that basis candidate (b) is ruled out. Candidate (c) wins as it resolves high ranking constraints: *p and *ə, replacing them with realized segments [f] and [a] respectively. It also resolves *C]σ through deletions rather than insertions. Although it violates lowly ranked MAX-IO which bans deletions, it still wins because the constraint MAX-IO is least ranked.

4.4 SUBSTITUTIONS OF ENGLISH SEGMENTS WITH HAUSA SEGMENTS

One way Hausa employs as a repair strategy for loanword adaptation is segmental substitution and replacements (Newman, 2000). This phonological process is inevitable due to language variation which results in distinct segment inventories exhibited by different languages (Katamba, 1989). In other words, phonemes and/or segments found in language A may differ

from those found in language B. Although certain sounds occur cross-linguistically, such segments usually referred to as regular sounds, Katamba (1989, p. 79) stresses that, "No two languages have exactly the same inventory of phonemes which are realized by the same set of allophones; no two languages have exactly the same phonological rules regulating the deployment of their sounds".

While it is true that languages reflect similar segment inventories universally, Hausa along with many African languages buttress Katamba's claim above. A phoneme considered quite regular, the bilabial stop /p/ which registered in many languages like English, Shona, French, amongst many others does not exist in Hausa. Such outstanding contrasts trigger segment replacements in a receptor language. Therefore segments that exist in receptor languages considered closest to borrowed sounds are replaced as substitutes. Phonological or phonetic and/or perceptual reasons usually motivate for segmental substitutions (Davis and Cho, 2006; Kang, 2010; Kadenge, 2012). Caron (2013, p. 7) presents a vowel substitution pattern of segments in Hausa as shown in Table 18 below:

Table 18: Vowel substitutions of English segments with Hausa segments (Caron, 2013)

English vowels	Hausa realization	Hausa form	English form	Gloss
/ə/	[a]	[ōganeza]	/ôrgənizər/	'organizer'
/ɒ/, /ɑ/	[a]	/gɪtɑː/	[gītā]	'guitar'
/ʌ/	[a]	/mʌɪlɪdʒ/	[mālējì]	'mileage'
/æ/	[a]	/væsəliːn/	[bāsili]	'vaseline'
/ɛ/	[e], [ē]	[sekatēriyāa]	/ sɛkrɪtɛːriət/	'secretariat'
/ɨ/, /ɪ/	[i]	[sìmìntí]	/sɪment/	'cement'
/ɔ/	[o]	[rákodā]	/rɪkɔdəʳ/	'recorder'
/ʊ/	[u]	[sugārí]	/ʃʊgəʳ/	'sugar'

Caron's (2013, p. 7) vowel substitution pattern of Hausa as shown above resembles Shona's monophthongal substitutions captured in Kadenge's (2012) study. Shona like Hausa replaces foreign (English) vowel segments with native ones (vowels) which are articulatorily, acoustically and auditorily closest to them (p. 70). Apenteng and Amfo (2014, p. 219) also note the same occurrence in Akan, as it substitutes English vowels with more familiar ones in the language. English vowels are therefore also replaced with their closest counterparts found in the Hausa inventory as shown in Table 18 above. Like Shona, there are more vowel substitutions in Hausa than consonantal ones (Kadenge, 2012). Newman (2000) also outlines English consonant segments that are substituted with close counterparts in Hausa. Unlike Newman's outline, this research presents the consonantal substitution pattern in a tabular form as shown in Table 19 below.

Table 19: Consonant substitutions of English segments with Hausa segments (Newman, 2000)

English consonants	Hausa realization	Hausa form	English form	Gloss
/p/	[f]	[**f**úlōtí]	/**p**lɒt/	'plot'
/v/	[b]	[**b**ārándà]	/**v**ərændə/	'veranda'
/θ/	[t]	[**t**īyatā]	/**θ**ɪətə^r/	'theater'

Table 19 above, shows substitutions of English forms /p/, /v/ and /θ/ replaced with close segments [f], [b] and [t] respectively, in Hausa. Newman (2000, p. 316) also mentions the uvular /q/ which is realized in Hausa as either; [k], [ɓ], or [g]. Yalwa (1992, p. 118) notes the same substitution pattern for /q/ and provides examples from Arabic. He suggests that context independently either of the segments; [k], [ɓ], or [g] can be used as replacements for /q/ without any particular reference to environment conditions. In terms of English inputs, loanword examples are quite difficult to find. Consider Yalwa's (1992, p. 118) examples as shown in Table 20 below:

Table 20: Substitution of Arabic /q/ with Hausa forms of [k], [ƙ], and [g]

	Arabic segments	Hausa realization	Arabic form	Hausa form	Gloss
246.	/q/	[k]	[al-**q**abar]	[**k**abarī]	'grave'
247.	/q/	[ƙ]	[al-**q**aaidah]	[**ƙ**ā'idā]	'rule'
248.	/q/	[g]	[al-**q**ahwah]	[**g**ahawā]	'coffee'

Table 20 above, shows that /q/ is replaced with either [k], [ƙ], or [g] forms, irrespective of the word positions at which they occur.

This research however, focuses on segments [f] and [b] as replacements for /p/ and /v/, which are the major segmental substitutions that occur in Hausa. Below is a detailed description and analysis of the aforementioned segments with employed theoretical tools of OT and FG models adopted to demonstrate the replacement(s) strategies.

Quite interestingly, as observed so far, Hausa seems to substitute segments by parameters on manner of articulation, with particular emphasis on voicing of segments. This behaviour is quite common with many languages, as Newman (1997, p. 12) states:

> [+/- voiced]: [+voiced] sounds are produced with the vocal cords vibrating; in the case of [-voiced] sounds, there is no such vibration. [+voiced] refers to the voiced sounds such as, [b, d, ɟ, g, v, ð, z, ʒ, ɣ, dʒ, m, n, ɲ, ŋ, l, r, i, e, o, u, a]; [-voiced] refers to the voiceless sounds, such as [p, t, c, k, f, θ, s, ʃ, x, ʧ].

Drawing from Newman's observation above, phoneme /p/ can well be adapted with [f], and the same explanation extends to /v/ adapted with [b] with emphasis on [+/- Voice]. Very notably is the absence of phonemes /p/ and /v/ in the Hausa phonetic inventory hence the existence of phonotactic constraints thus marked; *p and *v both undominated and highly ranked constraints in Hausa grammar (Newman, 2000).

4.4.1 SEGMENTAL REPLACEMENTS OF [p] WITH [f]

Every instance of phoneme /p/ in loanwords adopted into Hausa is adapted with an [f] to satisfy its grammar requirements. In speech however, segments [p] and [v] alternate and do not cause any change in meaning. This phenomenon is realized throughout the dialects of Hausa, Western Hausa (WH), Northern Hausa (NH), Southern Hausa (SH) and many more. One may wonder why phoneme /p/ is not adapted with [b] since they are both bilabials and share same articulatory (phonation) features. This notion however, seems to be waived in Hausa as it places emphasis on voicing of segments, just as Newman (1997) suggests in the classification of segment examples in the quote above. Therefore segments (consonants) with identical voice features form a class hence can be substituted one for another on that basis. This substitution pattern of /p/ with [f] with loanwords examples from English into Hausa cited in Newman (2000) is shown in Table 21 below:

Table 21: Segmental replacements of [p] with [f]

	English form	Hausa form	Gloss
247.	/**p**e**p**əʳ/	[**f**aifai]	'pepper'
248.	/**p**edəl/	[**f**eda]	'pedal'
249.	/**p**a:kiŋ/	[**f**akin]	'parking'
250.	/dıs**p**ensəri/	[dīs**f**ànsārè]	'dispensary'
251.	/**p**eınt/	[**f**ēntì]	'paint'
252.	/**p**aʊəʳ/	[**f**āwā]	'power'
253.	/klı**p**/	[kili**f**]	'clip'
254.	/kæm**p**eın/	[kam**f**e]	'campaign'

Examples 247 through 254 presented in Table 21 above, show that segment [f] replaces every occurrence of [p] in loanwords borrowed from English into Hausa.

In OT terms, the segmental markedness constraint which is high ranking is marked *[p], because the segment [p] does not exist in the Hausa inventory. A formalized presentation is shown in Tableau 8 below:

Tableau 8: Realization of the word [**f**ɪrāmārē] 'primary'

*p, *[σCC, *ə >> DEP-IO

/praɪ.mə.ri/	*p	*[σCC	*ə	DEP-IO
a. [praɪ.mə.ri]	*!	*	*	
b. [fraɪ.mə.ri]		*!	*	
☞c. [fi.ra.ma.re]				*

The relevant constraints that apply to the word realization 'primary' presented in Tableau 8 above include:

255. *p

      The segment [p] is prohibited (Newman, 2000, p. 393).

256. *[σCC

      Onsets are simple (Kager, 1999, p. 97).

257. *ə

      The segment [ə] is prohibited (Caron, 2013, p. 70).

258. *DEP-IO

      Output segments must have input correspondents (no epenthesis) (Kager, 1999, p. 100).

In Tableau 8 above, candidate (a) violates high ranking *p, which bans the occurrence of [p] an unregistered segment in Hausa, therefore ruled out. It also violates constraint *[σCC which disallows the word initial cluster [pr] at the beginning of the word 'primary' hence ruled out.

Candidate (a) also violates *ə, an unregistered vowel segment in Hausa, as presented earlier in Table 18 above, and as a result ruled out as an optimal candidate. Candidate (b) does well to substitute /p/ with [f] but in the process violates *[σCC as it retains the word initial cluster [fr], which is high ranking, therefore also ruled out. It also violates *ə as it does not substitute it with the appropriate segment [a], and so ruled out in that regard. Candidate (c) however, replaces /p/ with [f], substitutes *ə appropriately with [a] and inserts a vowel [i] in between clustered [fr] thereby resolving constraints *p, *ə, and *[σCC respectively, and is so declared the winner. Although in the adjustment process it contravenes DEP-IO which prohibits epenthesis, it is still appraised the optimal candidate as such constraint within Hausa is least ranked.

In FG terms, an illustration is drawn in Figure 20 below to show substitutions based on voicing of segments [p] and [f] using the adopted FG model for this research (Clements & Hume, 1995).
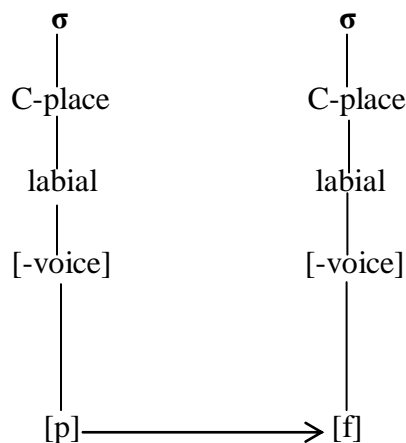
Figure 20: FG representations of segments [p] and [f] sharing voice features

Figure 20 above illustrates that segments [p] and [f] on the same tier share identical phonation features [labial, -voice]. The tiers for [+voice] and [-voice] exemplify diverse locations or positions on the feature chart. Therefore, since phoneme /f/ is located with /p/ on the same location both share same voice feature, Hausa deems it fit to adapt /p/ as [f], once again drawing from Newman's (1997) categorization of [+/-voiced] segments.

4.4.2 SEGMENTAL REPLACEMENTS OF [v] WITH [b]

The same rationale extends to the replacement of segment [v] [labial, +voice] with [b] [labial, +voice]. Based on Newman's (1997) categorization of [+/-voice] segments, [b] can be

maximally substituted for [v] since they share identical phonation features [labial, +voice]. Therefore since [v] does not exist in the Hausa phonetic inventory, Hausa substitutes it with the nearest counterpart arriving at such conclusion based on voice features. Segment [b] having fulfilled all the requirements; which is labial and [+voiced] herewith becomes the most suitable replacement. Loanword examples sourced from Newman (2000) are listed and shown in Table 22 below:

Table 22: Segmental replacements of /v/ with /b/

	English form	Hausa form	Gloss
259.	/**v**espə/	[**b**asfã]	'vespa' (a type of motorcycle)
260.	/**v**æsəli:n/	[**b**āsili]	'vaseline'
261.	/**v**etərɪnəri/	[**b**ītìnārì]	'veterinary'
262.	/**v**i:zə/	[**b**īsà]	'visa'
263.	/əd**v**aɪs/	[ādi**b**ās]	'advice'

Table 22 above with listed examples 259 through 263 shows that phoneme /v/ is adapted with [b] wherever it appears in loanwords borrowed from English into Hausa.

In OT terms, possible outcomes and the eventual choice of the optimal output form for the word /**v**æsəli:n/ 'vaseline' is shown in Tableau 9 below:

Tableau 9: Realization of the word [**b**āsili] 'vaseline'

*v, *ə, *æ >> *C]σ, MAX-IO

/væsəli:n/	*v	*ə	*æ	*C]σ	MAX-IO
a. [**v**æsəli:n]	*!	*	*	*	
b. [**v**asəli:]	*!	*			*
c. [basəli:n]		*!		*	
☞ d. [basili]					*

The necessary constraints that apply to the word realization 'vaseline' presented in Tableau 9 above include:

264. *v

The segment [v] does not exist in Hausa (Newman, 2000, p. 316).

265. *ə

The segment [ə] is prohibited (Caron, 2013, p. 70).

266. *æ

The segment [æ] is prohibited (Caron, 2013, p. 70).

267. *C]σ

Syllables are open (Kager, 1999, p. 94).

268. *MAX-IO

Input segments must have output correspondents (no deletion) (Kager, 1999, p. 102).

In Tableau 9 above, candidate (a) fatally violates *v which prohibits the occurrence of [v], an unregistered segment in Hausa, and also violates high ranking *ə and *æ as both vowels [ə], [æ], do not exist in Hausa's segment inventory, hence ruled out as a suitable outcome. It also violates

*C]σ which stipulates that syllables remain open in Hausa. Although candidate (b) does well to resolve *æ and *C]σ, adapting [æ] with [a] and deleting word final [n] hence opening up the syllable, it however violates undominated constraints *v and *ə as it retains the segments [v], [ə] which are disallowed in Hausa, therefore also ruled out. Candidate (c) further substitutes [v] with [b], adapts [æ] with [a] respectively, however contravenes high ranking *ə by retaining an unregistered segment [ə] in Hausa, hence disfavoured as an optimal candidate. Candidate (d) which incurs least ranked constraint MAX-IO (C) which prefers addition of segments rather than deletions, nonetheless wins as it resolves high ranking constraints *v, *æ, *ə and *C]σ, by replacing unregistered segments [v], [æ] and [ə] with their nearest counterparts viz, [b], [a], and [a] appropriately, and opens up the closed syllable by deleting word final [n] to obtain a CV syllable shape. As a reminder, the central idea behind OT is to obtain an outcome amongst many possibilities which incurs the least ranked rule.

Like replacements of /p/ with [f] using the FG theoretic approach (Clements & Hume, 1995), a representation is shown below in Figure 21 depicting relations of /v/ and [b] based on same phonation features shared.
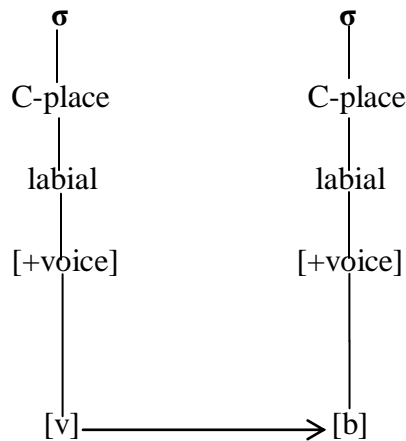
Figure 21: Representation of phonemes /v/ and /b/ related through voice features

Figure 21 above demonstrates that segments [v] and [b] share the same phonation (articulatory) features [labial, +voice] and thus either one can be substituted for the other, in this case [b] for [v], as Hausa does.

It is interesting to note that some native speakers tend to alternate [b] with [v] in speech. This notion may be drawn from the intuition that segment [v] is replaced with [b] which is evident as

loanword phonology insightfully explains. Native speakers therefore extend the same alternate pattern of segments [f] and [p] to [v] and [b] although confined to Hausa speech only. Since native speakers have the idea that interplay of [f] and [p] is permitted in Hausa speech, they tend to extend similar behaviour to segments [b] and [v].

Indigenous word examples are shown below:

269. /barci:/ → [**v**arci] 'sleep'

270. /bargo:/ → [**v**argo] 'blanket'

Examples 269 and 270 above show that native Hausa speakers tend to pronounce [b] as [v] on the peripheral level. As a native speaker, I am yet to come across conflicting thoughts attributed to this interplay as ungrammatical during utterances.

Apart from vowel epenthesis, segmental substitutions and consonant deletions, like Shona (Kadenge, 2012; Kadenge & Mudzingwa, 2012), Hausa also inserts glides into loanwords to satisfy grammar requirements. This suggests that as a phonological process, some sort of glide epenthesis or formation occurs in Hausa concerning the adaptation of loanwords. Due to Hausa's labialization pattern, Caron (2013, p. 8) suggest segments [k] and [g] often become labialized when followed by back rounded vowels /o, o:, u, u:,a, a:/. This opinion is also shared by Alqhatani and Musa (2014, p. 69) as these authors note that velar consonants become labialized when they are preceded by rounded vowels. Caron (2013) does well to also extend the notion of labialization in Hausa to implosives as they often tend to become labialized when followed by back rounded vowels as well. According to Caron, while in actual text indigenous words can be represented in this manner as captured with examples 271 through 273 below:

271. [buhu] 'bag'

272. [boko] 'school'

273. [gudu] 'run',

During speech, the consonants are pronounced with rounded lips such that [bʷuhu], [bʷoko], [gʷudu] of the aforementioned examples 271 through 273 above, is actually heard (Caron, 2013, p. 8). The back rounded vowels [u] and [o] which immediately follow the velar consonants [k]

and [g] actually condition this behavior (labialization). This assertion now makes credible sense as can be observed in Hausa loanword phonology. Since Hausa's grammar pattern labializes velar segments when preceded by back rounded vowels, then cases of English borrowings where segments [k] and [g] precede rounded vowels [o], [u] and [a] cannot escape being adapted with a glide [w] [+labial] to ensure the labialization process in Hausa is maintained, and by so doing eventually kick-in secondary articulation (Rose, 1994; Hansson, 2007). A closer look at several loanwords which have been adapted into Hausa will suffice as evidence or proof to show glide epenthesis exist so as to ensure labializations are triggered, in the process satisfying Hausa grammar restrictions. Examples are shown below:

274. /gʌvənə/ → [gʷamna] 'governor'

275. /kɑlɪdʒ/ → [kʷaledzi] 'college'

276. /kɑlərə/ → [kʷalara] 'cholera'

277. /kʌlvət/ → [kʷalbati] 'culvert'

278. /kəma:ndə/ → [kʷamanda] 'commander'

Above examples 274 through 278 are sourced from Leben (1996, pp. 144-145). These examples exemplify that glides [w] are inserted into loanwords incorporated into Hausa from English when velar sounds are followed by back rounded vowels.

4.5 SUMMARY OF CHAPTER

In summary, repair strategies that apply in Hausa's loanword adoption and adaptation include, vowel epenthesis, segmental substitutions and consonant deletions. Vowel epenthesis as observed, apply into word-initial clusters to simplify onsets, word-medial clusters to simplify codas to satisfy *COMPLEX where medial consonant clusters which occur within the same syllable are simplified, and into word final positions to avoid word-final consonants to achieve re-syllabification purposes. Epenthetic patterns or strategies in Hausa include consonantal assimilation in a progressive manner, and default vowel insertion. Vowel harmony so far observed, is not known to apply to Hausa during vowel epenthesis. During consonantal assimilation, place features are spread from the preceding consonant onto the epenthetic vowel,

thereby determining the vowel type epenthesized. Consonantal assimilation as observed, applies during vowel insertions to break up word-initial clusters, and word-medial where labial and coronal segments are found. Default vowel insertions apply during word-final epenthesis to simplify codas, and also into word-medial clusters where dorsal segments occur, so as to break up consonant clusters which occur within a syllable. When dorsal segments (consonants) appear, Hausa employs vowels [i] and [u] by default due to the inability of dorsal consonants to contribute place features onto the epenthetic segments. A similar case of this epenthetic pattern has been observed in Akan (Adomako, 2008). Consonant deletions apply less frequently in Hausa's loanword adaptation, mostly to avoid word-final consonants. Consonants that end words are therefore deleted to retain a CV syllable shape in Hausa. Segments which are considered alien to Hausa's segment inventory are replaced with closest or nearest counterparts found in Hausa's inventory so as to satisfy grammar demands. Most notably, consonantal substitutions or replacements apply with emphasis on voicing of segments. Consonant segments are therefore substituted based on voice properties, thus acoustic features. Segments [p] and [v] are therefore replaced with [f] and [b] respectively, the former group [p, f] [-voice], and the latter group [v, b] [+voice]. Interestingly, glide insertions also occur in Hausa through labialization. Indigenous words show a systemic pattern in which velar sounds undergo labialization when they precede back rounded vowels. Thus, loanwords also go through the same process, as glides [w] are inserted to preserve native labialization patterns apparently active in Hausa. Within OT terms, it is evident that a number of possible outcomes apply during loanword adaptation. However, the eventual candidate which qualifies is one that violates the least constraint hence considered faithful to Hausa's native phonology, and well-formed.

CHAPTER 5

GENERAL FINDINGS AND CONCLUSIONS

This chapter presents general findings and conclusions regarding all aspects discussed throughout this thesis. The thesis has so far discussed loanword adaptation and/or rephonologization processes in Hausa. It set out to achieve chiefly two objectives. First, to identify and describe repair strategies which occur or apply in Hausa loanword phonology. In that regard, I have shown that in Hausa loanword adoption and adaptation, major phonological processes such as vowel epenthesis and segmental substitutions apply in repairing illicit syllable structures in foreign words borrowed from English into Hausa. Consonant deletions also apply in Hausa as a repair strategy, but marginally. It has been observed that vowels are inserted to simplify complex onsets, syllable codas and to also simplify complex syllables, essentially a sequence of consonants belonging to the same syllable, all aimed to achieve re-syllabification.

The driving force for loanword adaptation is Hausa's native phonology which exhibits a modest CV syllable pattern or at most tolerates a CVC structure, hence English word forms have to undergo reconstruction since they reflect complex syllable shapes. Segmental substitutions also occur as foreign segments not realized in the Hausa segment inventory are subsequently replaced with native counterparts considered auditorily, acoustically or articulatory closest to them. These replacements are necessary to ensure borrowed forms are well-formed to native phonotactic requirements. For instance, it has been observed that regular sounds [p] and [v] that do occur frequently in many languages of the world do not exist in Hausa. These variations motivate for the need to adapt foreign sounds with local/native ones to ensure conformity with native phonology demands. Segmental replacements occur in all positions wherever foreign segments appear. In the case of deletions, segments are mostly eliminated word-finally, as consonants are elided to open up closed syllables. Second, this thesis aimed to show native phonotactic constraints; markedness and faithfulness requirements applicable to Hausa loanword phonology. In this regard, I have shown within the OT framework that repairs of illicit structures is triggered by the same set of markedness constraints which require input (borrowed) forms conform to native demands. However, markedness constraints as concerns Hausa phonotactics mark

differently from other languages, which is admissible within Universal Grammar (Kager, 1999; Prince & Smolensky, 2004; Uffmann, 2006; Kadenge, 2012).

As regards the quality and/or type of the epenthetic vowel in Hausa loanword phonology, I have shown that mostly, two epenthetic strategies apply generally in Hausa: consonantal assimilation and default vowel insertions. On the one hand, consonantal assimilation which requires neighbouring material to be identical sees the preceding consonant spread its features onto the epenthetic vowel. As observed, consonantal assimilations occur mostly to simplify complex onsets (word-initial clusters) and to simplify complex syllables (word-medial clusters). During assimilation in Hausa, the consonant to the left spreads its place features onto the inserted segment on the right hence influencing the vowel epenthesized as a result of similar properties shared between the neighbouring segments. Consonant assimilation in Hausa unlike Akan, occurs in a progressive manner. Therefore, the quality or type of the epenthetic vowel has been observed to depend on two main factors – the shape of the adjacent consonant, and the directionality of feature spreading. All insertions of vowels as regards direction is observed to spread in one way, left to right, into word-initial and word-medial clusters, and also into word final sites. This is opposite to the case of Akan as the language spreads from right to left (regressive manner) during simplification of word-initial and word-medial clusters, while it spreads from left to right (progressive manner) during epenthesis into word-final positions (Adomako, 2008, p. 108).

With regards to the default epenthetic vowel, it is observed that in Hausa during vowel epenthesis into word final sites and for complex syllable simplification, it relies on vowels [i] and [u], relatively loud segments (Han, 2009) as default epenthetic segments. Most notably, during avoidance of word-final consonants (closed syllables) only vowel [i] so far observed applies during rephonologization of loanwords. Furthermore, vowels [i] and [u] are inserted into consonant clusters that occur word-medially belonging to the same syllable. Hausa therefore re-syllabifies such borrowed forms considered illicit, in the same way that Yawelmani does (Noske, 1985), through maximal insertions of vowels [i] and [u] in a default manner. An overall analysis therefore shows that more of coronal spreading occurs in Hausa, though labial spreading proves to be very active as well in the native phonological process, especially during simplification of complex onsets.

In conclusion, it has been realized that not much work within Hausa's loanword adaptation process has been done adequately incorporating recent theoretical models of Optimality Theory and Feature Geometry, so as to account for a total and conclusive phonological process in Hausa. I therefore recommend a broader research be conducted in this field in future in order to obtain a more complete approach to Hausa's loanword adoption and adaptation strategies. It is evident that the major repair strategies that exist in Hausa loanword remodelling include vowel epenthesis and segmental replacements. However, other strategies apply for example, consonant deletions. For purposes of further investigation, it will be imperative to explore consonant deletions broadly, and other repair strategies which seem to exist in Hausa. For instance, glide epenthesis which results into labialization and palatalization can be expatiated with extensive studies. Also, tonal adaptations which Leben (1996) and Kenstowicz (2006) suggest as an active loanword adaptation process in Hausa can be investigated, so as to obtain a holistic analysis on Hausa loanword phonology.

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A wordlist of English loanwords in Hausa (Dataset)

	English form	Hausa form	Gloss
1.	/bred/	[būrodì]	'staple food'
2.	/spanər/	[sūfanà]	'spanner'
3.	/blak/	[bāki]	'black'
4.	/tʃəːtʃ/	[cōci]	'church'
5.	/prəfɛsə/	[fũrofesà]	'professor'
6.	/prʌiməri/	[fīrāmàrē]	'primary'
7.	/viːzə/	[bīzà]	'visa'
8.	/vɛtərinəri/	[bītinari]	'veterinary'
9.	/poudər/	[hōdā]	'powder'
10.	/dɪspensəri/	[dīsfãnsàrē]	'dispensary'
11.	/lɒtəri/	[lōtàrē]	'lottery'
12.	/ɔːgənʌizə/	[ōganēzà]	'organizer'
13	/reɪlweɪ/	[rēlùwē]	'railway'
14.	/drʌivə/	[dirēbā]	'driver'
15.	/paʊəʳ/	[fãwā]	'power'
16.	/pepəʳ/	[faifai]	'pepper'
17.	/məʊtə/	[mōtā]	'motor'
18.	gləʊb/	[gūlò]	'globe'

	English form	**Hausa form**	**Gloss**
19.	/pakɪt/	[fākìtì]	'packet'
20.	/tʃɒkələt/	[cākulate]	'chocolate'
21.	/tɔːtʃlʌɪt/	[c'ōcilā]	'torchlight'
22.	/prɪzənə/	[fūrsùnā]	'prisoner'
23.	/sɪgnəl/	[sìgīnā]	'signal'
24.	/tɛlɪgram/	[tālgìrām]	'telegram'
25.	/sɪmɛnt/	[sīmīntì]	'cement'
25.	/reɪdɪəʊ/	[rēdìyō]	'radio'
26.	/äktobər/	[oktobā]	'October'
27.	/mɪnɪstə/	[mīnìstā]	'minister'
28.	/wɒrənt/	[wārāntì]	'warrant'
29.	/sɛkrɪtɛriət/	[sekātērìyā]	'secretariat'
30.	/mʌɪlɪdʒ/	[mālējì]	'mileage'
31.	/lʌɪsəns/	[lāsīsì]	'license'
32.	/kabɪdʒ/	[kābējì]	'cabbage'
33.	/katəpɪlə/	[kâtàfīlā]	'caterpillar'
34.	/maɪ.krə.fəʊn/	[mākùrōfō]	'microphone'
35.	/kɑːbjʊrɛtə/	[kāfɪrētō]	'carburetor'
36.	/skruːdrʌɪbə/	[sūkudirēbà]	'screw-driver'

	English form	**Hausa form**	**Gloss**
37.	/səʊldʒə/	[sōjà]	'soldier'
38.	/ɒfɪs/	[ōfis]	'office'
39.	/spiːkəʳ/	[sīfìkā]	'speaker'
40.	/rɪkɔːdə/	[rākōdā]	'recorder'
41.	/kəmaːndə/	[kʷāmāndà]	'commander'
42.	/gʌvənə/	[gʷamna]	'governor'
43.	/kʌlvət/	[kʷalbati]	'culvert'
44.	/kɑlɪdʒ/	[kʷaledzi]	'college'
45.	/kɑlərə/	[kʷalara]	'cholera'
46.	/rɛfəriː/	[rāfàlī]	'referee'
47.	/paːkiŋ/	[fãkin]	'parking'
48.	/stɔːr/	[sītō]	'store'
49.	/peɪnt/	[fẽntì]	'paint'
50.	/kriːm/	[kīrìm]	'cream'
51.	/gɪtɑː/	[gītā]	'guitar'
52.	/lɔːjə/	[lauyā]	'lawyer'
53.	/pedəl/	[fẽdā]	'pedal'
54.	/liːtə/	[lītā]	'litre'
55.	/bʌɪrəʊ/	[bīrō]	'biro'

	English form	**Hausa form**	**Gloss**
56.	/teɪlə/	[tēlā]	'tailor'
57.	/baləns/	[bālās]	'balance'
58.	/swɛtə/	[sūwaità]	'sweater'
59.	/gɑ:rd/	[gādì]	'guard'
60.	/taksi/	[tāksi]	'taxi'
61.	/əpi:l/	[āfil]	'appeal'
62.	/vespə/	[basfā]	'vespa' (a type of motorcycle)
63.	/væsəli:n/	[bāsili]	'vaseline'
64.	/ədvaɪs/	[ādibās]	'advice'
65.	/klɪp/	[kilif]	'clip'
66.	/kæmpeɪn/	[kamfe]	'campaign'
67.	/dɪgri:/	[digiri]	'degree'
68.	/sɪŋglət/	[siŋgileti]	'under cloth'
69.	/ədres/	[ādireshi]	'ad.dress'
70.	/laɪbrəri/	[laburare]	'li.bra.ry'
71.	/bʌkit/	[bōkìtí]	'bucket'
72.	/rɪŋ/	[riŋgi]	'ring'
73.	/sɪrɪndʒ/	[sìriŋjì]	'syringe'
74.	/peg/	[fēgì]	'peg'

	English form	**Hausa form**	**Gloss**
75.	/ʃed/	[shēdī]	'shed'
76.	/stæmp/	[sìtampì]	'stamp'
77.	/stiər/	[sìtārí]	'steering'
78.	/slɪpərs/	[sìlìfā]	'slippers'
79.	/flaʊəʳ/	[fulāwā]	'flour'
80.	/blɒk/	[bùlo]	'block'
81.	/pencəl/	[fensir]	'pencil'
82.	/pʌmp/	[famfo]	'pump'
83.	/breɪk/	[burki]	'break'
84.	/drɑ:ft/	[diraf]	'draft'
85.	/gʌvənmənt/	[gwàmnátì]	'government'
86.	/rɪpɔ:t/	[rāhōtò]	'report'
87.	/mesɪndʒəʳ/	[māsinjà]	'messenger'
89.	/belt/	[bel]	'belt'
90.	/bærəks/	[bārīkí]	'barracks'
91.	/taɪəʳ/	[tāyā]	'tyre'
92.	/tæŋki/	[tankí]	'tank'
93.	/klʌtʃ/	[kulocī]	'clutch'
94.	/gɪəʳ/	[gíyà]	'gear'

	English form	Hausa form	Gloss
95.	/gærɑːʒ/	[gārējí]	'garage'
96.	/kæbɪdʒ/	[kābējí]	'cabbage'
97.	/ʃʊgəʳ/	[sugārí]	'sugar'
98.	/lemən/	[lēmū]	'lemon'
99.	/dʒʌmpəʳ/	[jamfã/	'jumper'
100.	/fiːld/	[fili]	'field'
101.	/stæmp/	[sitamfí]	'stamp'
102	/breɪk/	[burki]	'break'