THE PHONOLOGY OF AKAN LOANWORDS IN GA AND DANGME

BY

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DECLARATION

I do declare that this thesis is the result of my own original research, and has not been presented either in whole or in part for award of any degree elsewhere. References to other sources of information used in this work have been duly acknowledged. All errors and mistakes found are solely mine.

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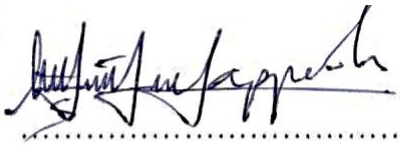

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DEDICATION

I dedicate this work to my entire family, especially my wife, Grace and my sons Amos and Gabriel, for the support, patience, and prayers throughout the years I have spent on my education all up-and-coming researchers in Ghanaian languages.

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ABSTRACT

This thesis studies the loanword phonologies of Ga and Dangme (Kwa, Ga-Dangme group) languages. It focuses on investigating how Akan (Kwa, Tano Central group) source words have been phonologically adapted into Ga and Dangme. It has been observed that both Ga and Dangme have borrowed comparatively more Akan words into their vocabularies than Akan has borrowed from Ga and Dangme. However, not much studies have been carried out to establish the nature and extent of borrowings between Akan, on the one hand, and Ga and Dangme, on the other hand. The thesis, therefore, seeks to investigate how the two target languages have adapted some Akan segments, especially non-native segments (both vowels and consonants) into their vocabularies. It also explores how Akan source prosodic features such as syllabic nasals and tone have been realised in the two target languages. The data for this study were collected from the entries in both Ga-English and Dangme-English dictionaries. The study concludes that the phonological adaptations in general are motivated by a combination of phonological and perceptual factors. Phonologically, the adaptations of non-native vocalic and consonantal segments can be accounted for within OT due to the crucial ranking of some markedness constraints. In terms of tone, it has been concluded that the source tone melody is generally preserved in both languages. However, additionally, the same source melodies can be adapted into other melodies present in the targel languages.

LIST OF ABBREVIATIONS & SYMBOLS

Acute accent	High (´) tone
C	Consonant
DF	Distinctive Feature theory
F1	First Formant
F2	Second Formant
Grave accent	Low (`) tone
Macron	Mid(¯)tone
N	Syllabic nasal
OT	Optimality Theory
S	Syllabic consonant
UNSD	United Nations Statistical Division
V	Vowel
ꜜH	Downstepped High
*	Constraint violation mark
*!	Fatal constraint violation mark
σ	Syllable

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CHAPTER ONE

GENERAL INTRODUCTION

1.1. Introduction

This study focuses on investigating how Akan source words have been phonologically adapted into Ga and Dangme. Speakers of Akan, Ga and Dangme have had contacts through trade, intermarriages, and education (Dakubu 1987, Dakubu 2009a). These three languages have had influence on each other. This influence has mainly resulted in borrowing some aspects of their cultural practices as well as some words into the vocabulary of the respective languages.

According to Dakubu (1999, 2009a, 2013) and Owusu-Adjei (2007), Ga and Dangme have borrowed more Akan words into their vocabularies than Akan has borrowed from Ga and Dangme.

Though one can identify Akan source words in Ga and Dangme, not much study has been carried out on the segmental and prosodic structure of Akan words that have been loaned into Ga and Dangme. This study, therefore, seeks to investigate how Akan source words have been segmentally and prosodically adapted to the phonological structure of both Ga and Dangme. The study also investigates the tonal structure of Akan loanwords in Ga and Dangme. From the data gathered for the present study, which is confirmed by some data from Dakubu's (1999, 2009b, 2013) dictionaries, the majority of the borrowed words from Akan in both Ga and Dangme, as has been indicated in the dictionaries, come from the Akuapem dialect of Akan. Therefore, unless otherwise stated, the Akan data discussed in this study would come from the Akuapem dialect.

There are three schools of thought that have emerged concerning the approach or model to explain the loanword phenomenon. These are production-based model (cf. Paradis & LaCharité 1997, Silverman, 1992, Boersma 2007, Boersma & Hamann 2009, among others), perception-based model (cf. Peperkamp & Dupoux 2003, Vendelin & Peperkamp 2006), and a third view that posits a combination of factors based on production and perception, and sometimes on non-grammatical factors, which I have termed it 'hybrid' in this thesis (cf. Kenstowicz 2001, Uffmann 2013). These approaches are discussed in chapter two of this thesis. This study, therefore, focuses on providing explanations for the adaptations of Akan source segments, that is, vocalic adaptation which focuses on the phonological patterns for adapting source non-native vowels by both Ga and Dangme speakers in chapter three. The segmental adaptations also look at how speakers of the two target languages adapt some source consonants, including non-native consonants in chapter four. Another important discussion that will engage our attention in the present thesis will be that of the adaptations of prosodic features of the Akan source words by both Ga and Dangme speakers. These prosodic features include the syllable structure in chapter five, and tone in chapter six.

In the rest of this chapter, I provide the relevant background information on the phonology of Akan, Ga and Dangme.

1.1.1. Language Information

1.1.1.1. Overview of Akan language

Akan is a member of the Kwa (Tano Central) sub-family of the Niger-Congo language family. Akan is spoken mainly in Ghana and some parts of the eastern part of Côte d`Ivoire both in West Africa. The language is the most widely used language presently in Ghana. It is spoken as first language (L1) in six out of the present ten administrative regions in Ghana. These regions are Ashanti, Brong Ahafo, Central, Eastern, Western and small part of Volta. In terms of its speaker population, it is estimated that currently, Akan has over 9 million speakers, which is divided into over 8 million L1 speakers and approximately 1 million L2 (second language) speakers in Ghana alone (cf. Simons & Fennig 2017).

The number of its dialects usually varies between ten and twelve in existing literature. While some authors, including Agyekum (2006) list as many as twelve dialects, namely Asante, Akuapem, Akwamu, Fante, Akyem, Agona, Assin, Denkyira, Twifo, Wassaw, Kwawu, and Bron, a very recent report by Simons & Fennig (2017) puts the figure at ten distinctive dialects. They include Agona, Akuapem, Akyem, Asante, Asen, Dankyira, Fante (Anomabo, Abura), Kwawu (Kwahu), Gomua, and Ahafo. Out of these dialects, three have received literary status in Ghana, namely Akuapem, Asante, and Fante. The first two major dialects together form the Twi group.

1.1.1.2. Akan vowel system

In terms of its vocalic phonology, Akan phonologists are still debating the actual numbers that constitute the vocalic inventory of Akan (cf. Dolphyne 1967, 1988;

Stewart 1967; Abakah 2002, 2005a, 2013; Boadi 2009). Generally, it is accepted that Akan has nine (9) phonemic vowels, namely /i, ɪ, e, ɛ, u, ʊ, o, ɔ, a/. However, the status of the tenth vowel [æ] is still being debated by Akan scholars as to whether it is phonetic or phonemic. While majority of authors including Dolphyne (1988/2006), Adu Manyah (2003), and Boadi (2009) posit that Akan has nine (9) oral phonemic vowels, others, including Dolphyne (1967), Stewart (1967)[1], Abakah (2002, 2004,2005a, 2013) argue that the number of vocalic phonemes is ten (10), which includes /æ/. The explanation has been that while the Twi dialects operate the ten-vowel system, many varieties of the Fante dialect, on the other hand, have nine phonemic vowels in their system. However, Abakah (2002) provides evidence to support his claim that the vowel is contrastive in some sub-dialects (especially Boka) of the Fante dialect. As to whether this vowel is still contrastive in Akan, Boadi (2009: 6-11), asserts that the advanced low vowel seems to be losing its contrast with its unadvanced counterpart, /a/ synchronically in Akan. It can be deduced from above that the number of phonemic vowels in Akan is dialectal; while it could be ten in Fante, as posited by Abakah (op cit), it is nine in both Akuapem and Asante. The tenth vowel, which is [æ], is realised at the phonetic level of representation in both Akuapem and Asante. In the present study, my reference to the 'Akan vowels' includes [æ], which is phonetic in the two Twi dialects. Since the discussions on vocalic adaptations will focus on height, I group all the ten vowels according to their height in example (1) below.

[1]Stewart (1967: 185) represents his advanced low vowel /æ/ as /ɜ/ in his paper.

(1). Classification of Akan vowels by tongue height

High: i, ɪ, u, ʊ

Mid: e, ɛ, o, ɔ

Low: æ, a

According to Dolphyne (1988), in addition to the ten oral vowels, there are six nasal vowels in Akan, which are /ũ, ʊ̃, ĩ, ɪ̃, ã, æ̃/. Out of these six nasal vowels, five are present in the Twi dialects and six one, that is, /æ̃/ can be phonemic in Fante.

The two main types of harmonies that apply in Akan are Advanced Tongue Root (ATR) and rounding harmonies. The former has received much attention in extant literature (cf. Stewart 1967, 1983; Clements 1981; Dolphyne 1967, 1988/2006; Ballard 2010; Abakah 2012; Kügler 2015; among others). The ATR harmony is a phonological process that requires that vowels that occur within a stem or morpheme or a phonological word, phrase or even a sentence belong to one set of vowels, either advanced or unadvanced. Based on this rule, all the ten vowels in Akan are grouped into two sets in terms of their ATR values as shown in (2a).

(2). The Akan ATR sets

a. ATR pairing

[+ATR]: i, e, u, o, æ

[-ATR]: ɪ, ɛ, ʊ, ɔ, a

The other type of harmony associated with Akan vowels is the rounding harmony. In Akan rounding harmony, the Akan vowels are divided into two sets based on their values for the feature [round]. This rounding pairing is exemplified in (2b).

(2). The Akan round sets

b. Rounding set

[+round]: u, ʊ, o, ɔ

[-round]: i, ɪ, e, ɛ, æ, a

For details discussions and examples of Akan words that exhibit both ATR and rounding harmonies within stems and across morpheme boundaries, see Dolphyne (1988).

1.1.1.3. Akan consonant system

Just like the vocalic inventory of Akan, its consonantal inventory is also not without a debate. This assertion finds expression in a statement made by Abakah (2006) that:

> "…modern linguistic study of the various dialects of Akan started by the close of the nineteenth century and to date there seems to be controversy over the number of systematic phonemes contained in the consonantal inventory of the language" (Abakah 2006: 22).

This was in direct response to a claim made in the preliminary report on Akan phonology by Schachter & Fromkin (1968), in which they reported that Akan has only eight 'true' consonants (1968:35). Abakah (2006) has challenged this claim and rather opined instead that there are fourteen (14) phonemic consonants in Akan which he listed as follows: p, b, t, d, k, g, m, n, r, f, s, h, j, w. Aside from these phonemic consonants, Abakah presented a chart of sixty-four (64) phonetic variants of the fourteen consonantal phonemes and posited that the additional fifty (50) phonetic consonants (i.e. the 14 phonemes aside) could be derived through the application of some phonological rules. This same statement had been made previously by Christaller (1933), Dolphyne (1988), among others. The statuses of some consonants, including the following: /tɕ, dʑ, tɕɥ, dʑɥ, ɕɥ, ɲ/ still remain unclear. With the exception of /dʑ/, Abakah (2006) listed all these consonants before front vowels, implying that they have undergone palatalisation. However, there is enough evidence from Akan to prove that these consonants can occur before non-front vowels, namely central and back vowels as we can see in (3) below.

(3). Some examples of alveo-palatals in Akan

i.	atɕatɕa	a hunch-back
ii.	ntɕo/ntɕɥo	defeat
iii.	dʑata	lion
iv.	dʑʊnsɔ/dʑɥʊnsɔ	urine

v.	ɛtɕɥʊ	hernia
vi.	etɕɥã	scar
vii.	edʑɥa	market
viii.	dʑɥoŋku	hip
ix.	ɲɲɥʊm	songs
x.	ɲɥunu	cold

It is worth pointing out that the long-standing debate over whether these consonants are phonemic (palatal) or phonetic (palatalised) does not seem to have been resolved yet (cf. Mensah 1977, Boadi 1988). Those who posit a diachronic change from plain back consonants; k, g, n into tɕ, dʑ, ɲ respectively before front vowels might not consider such consonants phonemic. The question now is, once they can occur before non-front vowels, have they synchronically assumed a phonemic status in Akan segmental phonology? Though there seems to be a lack of a clear-cut answer to this question, I include these alveo-palatals and 'labialised' alveo-palatals in the list of consonantal phonemes in Akan. I posit that these consonants might be going through a phonemicisation process in Akan. The Table 1 below displays the consonantal inventory of Akan.

Table 1: Akan consonantal inventory

	Bilabial	Labio dental	Alveolar	Alveo-palatal	Palatal	Labialised alveo-palatal	Velar	Labial-velar	Glottal
Stop	p, b		t, d				k, g		
Affricates				tɕ, dʑ		tɕꭧ, dʑꭧ			
Fricatives		f	s			ɕꭧ			h
Nasals	m		n		ɲ	ɲꭧ	ŋ		
Approximants	(w)		ɹ		j			w	

1.1.1.4. The syllable in Akan

Akan operates simple CV and V as its basic syllable structure (cf. Dolphyne 1988/2006). There are also syllabic consonants, which is represented as 'S' due to their sonority status, such as word-final and preconsonantal nasals, liquids, and the labio-velar glide (cf. Abakah 2005a). These word-final syllabic consonants, according to Abakah (2004), are derived through the elision of the underlying [+high] final vowels. So the three basic syllable types in Akan are CV, V, and S. It is worth noting at this point the crucial role tone plays in the syllabification process in Akan. In Akan, every syllable is a tone-bearing unit. According to Dolphyne (1988), all the vowels and all the syllabic consonants usually occupy the nucleus of the syllable, and on their own can constitute syllables.

1.1.1.5. Tone in Akan

As it is characteristic of tone languages, tones are phonemically contrastive, i.e. a morpheme with the same syllables can have two or more different meanings depending on the kind of tones the syllables may bear. Akan has two basic contrastive tones; High (H) and Low (L). Out of these two levels, there can be compound tones, i.e. falling (HL), as well as rising (LH) tone. For example, from the native Akan words in (7) below, it is the tone that contrasts the meanings. This is the lexical function of tone in Akan (cf. Dolphyne 1988; Abakah 2004, 2005a, 2005b; Kügler & Genzel 2011a, b; Genzel 2013; Kügler 2016; among others).

(4).

Akan	Gloss
i. pápá	good
ii. pàpá	father
iii. pàpà	fan

The interaction of the level tones may lead to the application of tone rules such as downstep where the pitch level of a H is perceived relatively lower than preceding H when it is immediately preceded by a L. This tone rule is schematised in (5).

(5). H- L– H→ H - L -$^{!}$H

In chapter six of this thesis, I discuss how the level tonal melodies of Akan source nouns are realised in both Ga and Dangme. In the same chapter, I also consider the interpretations of the downstep rule in the adaptations of Akan source nouns in the two target languages.

1.1.1.6. Overview of Ga language

Ga is a member of the Niger-Congo (Kwa) family of languages. It is one of the only two languages that belong to the Ga-Dangme group. The language is spoken mainly in the Greater Accra Region; the national capital of Ghana. Though the language does not have dialects, according to Dakubu (2002) citing Kotei's (1969) thesis and (Mante 1971), there are variations in pronunciations of some Ga words among speakers in some areas as follows:

Table 2: The Ga sociolects (Adopted from Dakubu 2002:2)

	Accra	La	Teshie	Nungua	Kpone	Gloss
i.	ònúfú	ònùúfú	ònú'fú	ònùúfú	ònùúfú	snake
ii.	gbèsàŋè	gbòsàŋè	gbòsàŋè	gbòsàŋè	gbòsàŋè	leathery turtle
iii.	òdáàklɔ̀	òdáàklɔ̀	òdáá'klɔ́	òdáàklɔ̀	òdáàklɔ́	lizard
iv.	àklɔ̀ntɪ́à	àkɔ̀ntɪ́á	àklɔ̀tɪ́à	àklɔ̀tɪ́à	àklɔ̀tɪ́à	pin

In terms of speaker population, Ga has a population of 745,000 L1 speakers according to Simons & Fennig's (2017) estimates based on the 2013 UNSD report.

1.1.1.7. Ga vowel system

The language has seven oral vowels /i, u, o, ɔ, e, ɛ, a/ and five nasal vowels /ũ, ĩ, õ, ɛ̃, ã/ in their vocalic inventory (cf. Dakubu 1987, 2002; Wentum 1997; Campbell 2017; among others). According to Dakubu (2002), though Ga vowels can be distinguished based on ATR, thus dividing the seven oral vowels into [+ATR] i, u, o, e; and [-ATR] ɛ, ɔ, a, "…there is no vowel harmony based on this [ATR] feature, as there is in Akan."(2002: 52). Similarly, these vowels can be grouped according to the feature [round] as seen below in (6).

(6). The Ga round sets

Rounding set

[+round]: u, o, ɔ

[-round]: i, e, ɛ, a

Table 3: Akan vs. Ga vowels mapping

Akan	i	ɪ	u	ʊ	e	ɛ	o	ɔ	æ	a
Ga	i		u		e	ɛ	o	ɔ		a

As a brief comparison, it can be seen from the Ga vocalic inventory (also in Table 3) that three Akan vowels, namely /ɪ, ʊ, æ/ are not present in the Ga vowel system.

The question that I will seek to address in chapter three of this thesis is, how do the Ga speakers adapt these three non-native vowels in Akan loaned words?

1.1.1.8. Ga consonant system

In terms of consonantal inventory, Ga has 32 consonantal phonemes (Dakubu 2002, Campbell 2017, among others). Dakubu (2002) lists these consonants as follows in Table 4.

Table 4: Ga consonantal phonemes (Adopted from Dakubu 2002: 61)

	Bilabial	Labio-dental	Alveolar	Pre-palatal	Labialised pre-palatal	Velar	Labialised velar	Labial-velar
Stop	p, b		t, d			k, g	k^w, g^w	k͡p, g͡b
Affricates				ʧ, ʤ	ʧ^w, ʤ^w			
Fricatives		f, v	s, z	ʃ	ʃ^w	h	h^w	
Nasals	m		n	ɲ		ŋ	ŋ^w	ŋ͡m
Approximants				j	(w)			w
Laterals			l					
Retroflex			r					

From the Table 4 above, it can be observed that though Ga has more consonantal phonemes than Akan has, there are few consonants present in Akan which are not seen in the Ga system. These consonants include: /tɕɥ, dʑɥ, ɲɥ ɕɥ/. This observation is tabulated as follows in Table 5. The question I will investigate is, are the Akan source labialised alveo-palatals adapted with labialised pre-palatals in Ga?

Table 5: Akan vs. Ga consonant mapping

Akan	tɕɥ	dʑɥ	ɲɥ	ɕɥ	ɥ
Ga	ʧʷ	ʤʷ	ŋʷ	ʃʷ	hʷ/w

In chapter four of the present thesis, I investigate, among other things, how these Akan source consonants are adapted in Ga.

1.1.1.9. The syllable in Ga

Ga, just like Akan, also operates the open syllable system. The most basic syllable structures in Ga are CV, V, and syllabic nasal consonants, which Dakubu (2002) represents as N. For the syllabic nasal consonants - N, they can belong to any place of articulation in onset position of a word, but it is only the velar nasal that can occur in word-final position of words in Ga (cf. Dakubu 2002: 48). So from this, it is obvious that unlike Akan, consonants such as m, n, w, r, are not permitted word-finally and therefore they are not syllabic in Ga. However, according to Dakubu (op cit), the lateral *l* and the retroflex *r* can bear tones in $C_1C_2V_2$ syllable, which is derived from an underlying $C_1V_1C_2V_2$ through the elision of V_1 similar to what happens in Akan in such a context. It is worth mentioning that just as it obtains in Akan, the syllable in Ga is a tone-bearing unit.

1.1.1.10. The tone in Ga

Ga, just like Akan, is a tone language that operates two contrastive lexical tones, namely H and L as its basic tones (cf. Dakubu 2002). According to Dakubu (2002:

6), this two-level tone property is, "…one of the major structural differences between Ga and its only close relative, Dangme, which has three phonemic tones…" Again, the pitch contrast can provide a contrast at the lexical as well as the grammatical level (Dakubu 2002). In the following examples, I present Ga monosyllabic words which exhibit the H and L contrast.

(7).		Ga	Gloss
a.	i.	lá	sing, blood
	ii.	là	fire, dream
b.	i.	bú	hole
	ii.	bù	guard
c.	i.	k͡pɛ́	carve
	ii.	k͡pɛ̀	sew
d.	i.	ká	knock
	ii.	kà	stuck

Aside from these basic tones, Dakubu (2002) posits that there can be compound tones in Ga, namely HL, and LH tones which are not contrastive, as obtains in other contour tone languages like Japanese, Mandarin Chinese, Mongolian, etc. Tone rules such as downstep and downdrift also apply in Ga.

1.1.1.11. Overview of Dangme language

Dangme is a member of the Kwa (Niger-Congo) family of languages. Dangme, together with Ga forms the only members of the Ga-Dangme group (cf. Dakubu 2002, Simons & Fennig 2017, among others). Speakers of Dangme can be found in the Eastern, Greater Accra, and some parts of the Volta regions of Ghana (cf. Simons & Fennig 2017). The language has six dialects, namely Ada, Gbugbla, Klo, Ningo, Osu (Osuwem), and Sɛ (cf. Apronti & Dakubu 1972). It is worth pointing out that the Ada, Ningo, and Gbugbla dialects have been described in the existing literature as the Coastal dialects, while the Klo, Osu and Sɛ form the so-called Inland dialects. The remaining two dialects are described as the Western dialect (cf. Dakubu 1987). According to recent estimates by Simons & Fennig (2017), which are based on the 2013 UNSD report, the language is spoken by approximately 1.02 million speakers in the above-mentioned regions in Ghana.

1.1.1.12. The Dangme vowel system

In its vocalic inventory, Dangme has seven oral vowels and five nasal vowels, the same number as Ga, its sister language (cf. Apronti 1967, 1990; Dakubu 1987; Caesar & Adi 2014; Owulah 2014; Larweh 2017; among others). All put together, there are 12 phonemic vowels in Dangme which are listed as follows: /i, u, o, ɔ, e, ɛ, a, ũ, ĩ, ɔ̃, ɛ̃, ã/. In (8) below, I group the Dangme oral vowels in terms of two feature round.

(8). The Dangme round sets

Rounding set

[+round]: u, o, ɔ

[-round]: i, e, ɛ, a

Table 6: Akan vs. Dangme vowel mapping

Akan	i	ɪ	u	ʊ	e	ɛ	o	ɔ	æ	a
Dangme	i		u		e	ɛ	o	ɔ		a

Again, as a brief comparison, we can see that the Dangme vocalic inventory does not contain the vowels /ɪ, ʊ, æ/.

1.1.1.13. The Dangme consonant system

Dangme, a sister language to Ga, has about 23 consonantal phonemes (cf. Dakubu 1987, Caesar & Adi 2014, Owulah 2014, and Larweh 2017), which I present in Table 7.

Table 7: Dangme consonantal phonemes (Adapted from Dakubu 1987:13)

	Bilabial	Labio-dental	Alveolar	Pre-palatal	Labialised pre-palatal	Velar	Labial-velar
Stop	p, b		t, d			k, g	k͡p, g͡b
Affricates				ʧ, ʤ			
Fricatives		f, v	s, z			h	
Nasals	m		n	ɲ		ŋ	ŋ͡m
Approximants				j	(w)		w
Laterals			l				

Unlike Ga, Dangme shares fewer consonants with Akan. And just like Ga, some Akan source alveo-palatal consonants are missing from the Dangme inventory. In Table 8, I show how the Akan source alveo-palatals and the palatal consonants completely lack correspondents in the Dangme consonant system.

Table 8: Akan vs. Dangme consonant mapping

Akan	tɕɥ	dʑɥ	ɲɥ	ɥ	ɕ
Dangme					

From Table 8 above, it is observable that the Akan source alveo-palatals, palatal fricative, labial-palatals, and by extension, labial-palatalised consonants are not present in Dangme phonological system at all. In chapter four, I investigate how these non-native source consonants (both phonemic and phonetic) are adapted in Dangme.

1.1.1.14. The syllable in Dangme

Dangme, just like Ga, has an open syllable (cf. Dakubu 1987: 8, Apronti 1990: 10). Therefore, the basic syllable structures in Dangme are CV, V, and syllabic nasal. The syllabic nasal in Dangme is limited to /m/, which according to Dakubu (op cit), occurs in loanwords usually from Twi, and even that, an attempt is usually made to avoid it. When these syllabic nasals occur in word-final positions in native Dangme words, they are usually derived when, just as in Akan and Ga, the final vowel in the underlying representation is dropped in rapid speech.

Apart from these syllabic nasals, there are also syllabic laterals which occur in C_1C_2V syllable structures where the C_2 is either of the two variants; *r* or *l*. However, Dakubu continues (citing Apronti's (1967) Ph.D. thesis in support) that phonetically, it seems sometimes when the C_1 is voiceless, the C_2, which has assumed nuclear status as a result of the dropping of preceding V in underlying $C_1V_1C_2V_2$ structures, then loses its tone and subsequently forms 'cluster' with C_1 in this context (see also Apronti 1990).

1.1.1.15. The tone in Dangme

Dangme has a three-level contrastive tone system comprising H, M(id) and L tones (cf. Dakubu 1987, 2002). Again, just like Akan and Ga, the syllable in Dangme, according to Dakubu (op cit), is the tone-bearing unit. In the example in (9), we show how tone in Dangme contrasts in monosyllablic words based on data from Dakubu (1987:19).

(9). Tone levels in Dangme

Monosyllabic words	Gloss
i. sá	snatch
ii. sā	rot
iii. sà	sieve

This study investigates how Akan's two-level tone system is interpreted in Dangme's three-level tone system. It again investigates how some active tone rules in Akan such as downstep (cf. Abakah 2000, Genzel & Kügler 2011b, Genzel 2013, among others, for Akan), are interpreted in the two target (i.e. recipient) languages.

1.2. Problem statement

Although the phonological study of loanword phenomenon across languages has attracted much scholarly attention over the years, not much study has been carried out on Ghanaian languages, particularly on Akan words loaned into other Ghanaian languages. The closest attempts in this endeavour can be found in Owusu-Agyei (2007), which focused on both the phonology and semantics of some nativised Akan words in Ga. For the phonological nativisation in particular, she provides a description of how some Akan source segments are adapted in Ga, though she does not provide an account of what condition the nativisation process. Therefore, due to its limitation in scope, no adequate phonological generalisation

could be made based on this particular study. Again, it considered only the segmental adaptation and did not touch on the suprasegmentals of nativisation at all.

With regard to Dangme, there is not yet any such attempt made on this subject, as far as I know. Among the closest of such study are Dakubu's (1973) general survey of some loaned words in Dangme, which preceded her draft dictionary in 2013 and Nartey's (1976) article on English loaned words in Dangme.

This study, therefore, seeks to fill this gap by providing a comprehensive account of the adaptation patterns employed by Ga and Dangme speakers in adapting Akan source words into their vocabularies. It also provides formal account of those phonological patterns within the Optimality Theory framework.

1.3. Objectives

The main objectives of this project are:

- To provides a comprehensive account of which segmental phonological conditions and processes are exploited by Ga and Dangme in the(ir) nativization of Akan words.
- To investigates how prosodic units and structures (particularly, the syllable, tone and nasalization) of Akan source words have been adjusted in the borrowing processes to fit the permissible prosodic types and structures of Ga and Dangme.

In the course of working towards achieving the above objectives, this study will also attempt to establish the nature of the symmetry and asymmetry, if any, between how Ga and Dangme adapt Akan source words into their vocabularies.

1.4. Research Questions/Hypotheses

The following questions are to be addressed within this study:

- How are Akan source words segmentally adapted in the Ga and Dangme vocabularies?
- What is the interpretation of the prosodic structures of Akan source loanwords in Ga and Dangme?

1.5. Methodology

1.5.1. Description of research methods

For the study project, I conducted fieldwork to elicit data for the investigation of how Akan source words are segmentally and prosodically adapted into Ga and Dangme. This fieldwork complemented the collection of such Akan loaned words in both the Ga and Dangme dictionaries. The following methodology was employed to guide the present study.

1.5.2. The Data source

The main source of data for this study has been a secondary source.

a. Two editions of the ***Ga-English dictionary with English-Ga index*** by Dakubu (1999, 2009b) for the Ga data, and

b. The draft version the ***Dangme-English dictionary with English-Dangme glossary*** by Dakubu (2013). Also, I consulted J. Abedi-Boafo's (1971/80) *Dangme Nyaii (Classical and Idiomatic Dangme)* 2nd edition, and E. O. Apronti's (1990). *Dangme Ngmami bɔ (The writing of Dangme)* revised edition. These two books were consulted also by Dakubu in her preparation of the draft version of the Dangme dictionary.

This secondary source was complemented by a primary source of data comprising recordings of one Ga Asafo war song on 31stMay, 2017 and one Dangme Asafo war song by Asafotsengua (Kudzragbe Division) of Ada Traditional Council on 5th August, 2017. I was assisted by one native speaker linguist each for each of the two target languages to identify the possible Akan loaned words in them.

1.5.3. Data

The size and the nature of the data used for this study were as varied: for Ga, I collected approximately 959 entries in Dakubu's (2009b) dictionary that are of Akan origin (see Appendix 4 for the list). These targeted entries have already been transcribed in the dictionary, and I had to use my Akan native speaker's intuition together with the help of Christaller's (1933) dictionary of Akan to do the transcription of the Akan source words. The total number of Ga entries of possible Akan source constitutes about one-tenth (i.e. 10%) of the entire entries in the dictionary, which is significant in that for every ten 'Ga' words, one is possibly of Akan origin. This number of entries was complemented by the few words I elicited

from the Ga Asafo war songs. I purposively selected and used sixty English words out of the number of entries collected that have syllabic nasals and also of certain tone patterns in when translated into Akan, which will be the focus of my discussions in chapters 5 and 6. I then asked each of the Ga respondents to provide their equivalent words in Ga in isolative style to trangulate the transcriptions and the tone markings on the loaned word entries.

For the Dangme data, I collected a total of 333 entries of possible Akan source, also from Dakubu's (2013) draft dictionary (see Appendix 5 for the list). This number of entries collected constitutes about seven percent (7%) of the total entries in the draft dictionary. Just as in the Ga dictionary, the targeted entries had already been transcribed, but here I had to use my knowledge in Akan sounds to transcribe some of the selected entries since they were still in their orthographic forms, which is expected of a draft work. Here too I used my native speaker's intuition together with the help of Christaller's (1933) dictionary to transcribe the Akan source entries. Moreover, I observed that there are far more cases where the Akan source words are not provided at all for many entries though the author alludes to the fact that those entries are of Akan origin. For Dangme too, I purposively selected and used sixty English words out of the number of entries collected. The selection was informed by English words which when translated into Akan have syllabic nasals and certain tone patterns. The Dangme respondents were then asked to provide the equivalent words for the six sampled entries in Dangme. It is worth pointing out that some of the adapted forms in both Ga and Dangme have become obsolescent, while others have undergone semantic shift. I have indicated all these against the entries in the lists in Appendices 4 & 5.

Now judging from the fact Akan, Ga, and Dangme belong to the same language family, namely Kwa, the obvious question then is whether these loaned words of Akan source are cognate words or not? I have derived my conviction that those words, as shall be discussed from the chapter three onwards of this thesis, are indeed loaned or 'natvised' words of Akan origin for the following four reasons:

First, it is worth pointing out that from the dictionaries, virtually all these loaned words of Akan source have their indigenous equivalents already in the dictionaries. It is, therefore, probably for the purpose of prestige that words of Akan source have also been nativized in the vocabularies of both Ga and Dangme as a result of the several contact situations mentioned in the introduction. It must be emphasised that both Ga and Dangme speakers do not lack vocabularies for all the Akan source loaned words that they nativise. Some of the concepts borrowed from Akan into Ga and Dangme co-exist with their native counterparts in the languages. For examples, an Akan loaned word in Dangme; *òpléú* 'squirrel' from the Akan word *òpúró* co-occurs with *gb͡lɛ́ntsū*, the native word for the same animal.

Second, the entries in the dictionaries have been subjected to scrutiny and validations by both the author and some native speakers who are language experts over several decades (cf. Dakubu 2013, Introduction). Therefore, it is assumed that those entries, without doubts, have been validated as borrowed or loaned words of Akan origin.

Third, the revision that resulted in the 2009 edition of the Ga dictionary, in particular, benefitted from the inputs of native speaker Ga language experts who formed the participants for the two workshops held for that purpose (see Dakubu 2009b: 5, for the list of the participants of the two workshops). The Dangme dictionary has not gone through such a revision yet as the author has explicitly stated in that dictionary. However, there is a committee of Dangme language experts in place that is working currently for that purpose.

Fourth, the morphology of some of the words identified in the dictionary easily makes them identifiable as of Akan origin. For example, the use of the suffix morpheme *–fo* [fʊ] 'person marker' which exists only in Akan morphology in such Akan words as [ɔ̀hĩ̋ã́ˈfú] 'poor person, pauper'. This word is adapted in both Ga and Dangme as [ɔ̀hĩ̋ã́ˈfó] and [ɔ̀hĩ̋ã́fõ] respectively with the same meaning.

1.5.4. Data collection instruments and techniques

The recordings involved the elicitation of words and simple sentences, as well as of spontaneous social events such as oral texts (e.g. war songs, see Appendix 3 for the instrument used) by some asafo group members in both Ga and Dangme speaking communities for the Ga and the Dangme songs respectively. I used a headset, which had a microphone attached to it, and a laptop for all the recordings of the elicited words and sentences in the *Praat* software. I complemented these devices with a voice recorder (Olympus digital voice recorder VN-3100PC) in the recording exercise.

To test how speakers of the two borrowing languages adapt the segmental and tonal properties of the Akan source words into their lexicons, I provided first the lists of English words which I purposively sampled from the two dictionaries with the respondents of the two target languages. The selection of the stimuli/tokens for the elicitation was guided by one of my objectives for this study; to account for how non-native Akan source segments are adapted in the two target languages. I then asked the respondents to translate them first into their respective languages on the sheets I gave them which contained the list of English words. When I crosschecked the translations they did with the selected entries from the dictionaries, I realised that for some few words, specifically seven and five entries representing approximately 12% and 8% of Ga and Dangme entries respectively, the native Ga and Dangme words were preferred and were written down as the translated words instead of the anticipated nativised words of Akan origin. I then provided the indigenised variants which I had already taken from the dictionaries and asked for their acceptability judgments. Those indigenised words were generally accepted by the respondents as variants. This exercise preceded the actual recording session.

During the recording sessions, I used the recording menu in the *Praat* software to record directly the translated words onto my laptop. I placed a headset with an attached projected microphone over the head of each of the respondents at a time. After adjusting the microphone and testing it, I then asked the respondent to repeat each word (the translated Ga/Dangme word lists) three times while I recorded the repeated words. I did this for the elicitation of Ga and Dangme words of possible Akan origin. The two Ga respondents were given the same wordlist for

the recording. Similarly, the Dangme respondents were given the same wordlist for the elicitation exercise (see Appendix 1 & 2 for the samples). The same recording procedure, as has been described above, was followed in the recordings of the Ga and Dangme simple sentences that were constructed using the same elicited words by the respondents. Before the recordings began, I made the respondents relax by taking some deep breaths to ensure they were in their right mood in order not to have a negative effect on the recordings. The elicitation of the Ga wordlist of Akan source lasted an average of 05:19 minutes (311.4 seconds), while the Ga sentences lasted for 06:16 minutes (369.6 seconds) average for the two respondents. For Dangme, on the other hand, the elicitation of the wordlist lasted an average of 05:38 minutes (323.33 seconds), while that of the sentence lasted for 07:10 minutes (approximately 426 seconds). The duration of the recordings of both the wordlists and the sentences by each respondent is presented in the following table.

Table 9: Duration of recordings of Ga/Dangme words & simple sentences

Ga			Dangme		
Respondent	Wordlist (Duration)	Simple sentence (Duration)	Respondent	Wordlist (Duration)	Simple sentence (Duration)
1. MO	353 sec.	441 sec.	1. RA	413 sec	437 sec.
2. NA	285 sec.	311 sec.	2. FO	277 sec.	390 sec.
			3. MC	471 sec.	580 sec.

Though the transcriptions have been done in the dictionaries, as I have already indicated, I did the recordings, to triangulate the earlier works and also to be able to provide acoustic evidence to support my analyses in this study. My acoustic analyses corroborate the transcriptions done in the two dictionaries.

The various recordings of the events mentioned above have been subjected to *Praat* analyses with the objective of establishing segmental qualities and tonal patterns on the adapted forms, which constitute the basis of my study.

In addition to verifying the entries collected from the two dictionaries, I set up a Multiple Forced Choice (MFC) listening experiments to test how both Ga and Dangme speakers perceive all the 10 vowels of Akan with particular focus on the 3 non-native vowels. In the experiment, the listeners were tasked to choose from the vowels that appeared on the experiment screen that was most similar to what they heard. The stimuli were vowel sounds. The number of the stimuli was 10 vowels representing the 10 oral vowels of Akan, namely [a, æ, e, ɛ, i, ɪ, o, ɔ, u, ʊ]. The listeners were to judge what they listened to against 7 responses vowels in CV words that appeared on the screen. For the Ga listeners, the responses were: ti, bu, gbe [g͡be], ho, lɛ, nyɔ [ɲɔ], fa, while the Dangme listeners had the following as their responses: fi, pu, te, mo, wɛ, tɔ, kpa [k͡pa]. All these responses are real words in each of the target languages. The number of replications per each stimulus was 4, making 40 stimuli for each listener. There was break after every 10 stimuli. These stimuli were randomised after every break. Each listener had the opportunity to repeat any stimulus they did not perceive well up to a maximum of 5 replays.

For the Dangme listeners, there were 15 females and 5 males. The Ga listeners, on the other hand, comprised 8 females and 2 males. My choice of number of respondents for each language was informed by the fact Dangme has

six dialects as against one dialect by Ga. Similarly, Dangme has comparative more speakers.

The results and the analyses thereof of the listening experiment are presented in chapter 3 of the thesis during the data presentations on the adaptations of Akan source vowels in Ga and Dangme.

1.5.5. Sample/metadata

I engaged five respondents for the word elicitation exercises, two males and three females. These respondents are divided between the two languages as follows. For the Ga recordings, a male and a female respondent who were aged between twenty-five and thirty years were engaged. Both respondents were born and bred in the communities where Ga is predominantly spoken as L1 (first language), and have been speaking the language regularly. Their highest level of education is first degree in Ga Education. For the MFC experiment, on the other hand, ten Ga listeners were involved in the listening test.

For the Dangme recordings, three respondents aged between twenty-five and forty-five were engaged. Of the respondents, one was a male and two were females.

Because of the dialectal variations in Dangme, I selected one respondent from the Klo (Odumase Krobo), one from Ada, and the other one from Gbugbla (Miotso) dialects.

All the respondents lived in the communities where the Dangme language is predominantly spoken as L1. Again, all the three respondents have been speaking the language as their L1 themselves. Their highest level of education is a

first degree in Dangme Education. One of the respondents was doing his national service in the Department of Ga-Dangme at the University of Education, Winneba. Another respondent, who was in her final year of the degree programme, is a professional teacher. The remaining two of the respondents were also in the final year.

For the war song, I had one recording for Ga by a group of different singers, and one recording for Dangme. Both songs were sung by Asafo groups and have been transcribed in appendices 6 and 7 respectively. I have summarised these pieces of information about the respondents in the Table 10 below.

For the MFC experiment in Dangme, twenty respondents were engaged in the listening test. These comprised fifteen females, and five males. Just as I did for the elicitation exercise, all the respondents were students from the same department.

Table 10: Summary of information about the respondents for the triangulation exercise

Respondent	Sex	Age range	Hometown	Place of abode	L1	L2	Level of proficiency in L2	Language of parents	Profession	Comment
1. MO	M	18-25	Teshie	Teshie	Ga	EN TW	Good Average	Ga	Student	s/he has lived his
2. NA	F	18-25	La	La	Ga	EN TW	Good Good	Ga	Student	She's lived her entire life in
3. FO	F	36-45	Krobo Odumase	Krobo Odumase	Dangme	Ga TW FR EN	V. good Good Good Good	Dangme	Student/ Professional teacher	She's lived her entire life at KO
1. MC	F	26-35	Dawhenya	Dawhenya	Dangme	Ga TW EN	V. good V. good Good	Dangme	Student	She's lived her entire life in Dawhenya
2. RA	M	26-35			Dangme	EN TW	Good Good	Dangme	National Service person	

In order to ensure the validity of the data used for the present study, whenever I was in doubt about any issue concerning the data for verification, I consulted some identified language experts who are native speakers of the two target languages, especially those who teach the languages at the College of Languages Education, University of Education, Winneba at Ajumako.

1.5.6. Selection of respondents

In selecting my respondents, I employed purposive sampling technique based on social factors such as age, sex, educational background and professional background since these demographic factors could also affect acoustically how Akan source words are adapted into the borrowing languages. I chose the younger respondents due to the fact that the respondents for the two dictionary projects seem to be the older generation. The objective was to verify if age could significantly affect tone adaptation. From the data analysis in this study, I realised that tone markings on the adapted words generally do not change with age. For my choice of a male and a female pairing for each of the two target languages, the objective was to establish whether gender could affect the pitch levels of the source words in the adaptation process.

1.6. Ethical considerations

1.6.1. Consent procedures

I stated explicitly to the respondents that the purpose/objectives of the research study are as follows; to gather data of possible Akan source words in Ga and in Dangme in order to provide a comprehensive account of the general adaptation patterns employed by Ga and Dangme speakers in terms of the segment structure of the Akan source words, and also to investigate how Ga/Dangme speakers syllabify those possible Akan source words and also mark tone on those words.

I explained to the respondents that the data collection exercise was expected to last for about 3 working days. And each recording session lasted for about 2 hours. For the Asafo war songs recordings, the respondents (the Asafo groups) sung two Asafo war songs, and those songs were audio-recorded. For the elicitation of some Ga/Dangme words, I provided a wordlist of some purposively selected English words and asked the respondents to say the Ga/Dangme equivalents. Their responses were audio-recorded by me. After the elicitation of the wordlist, each of the elicited words was used to form a simple sentence by the respondents.

1.6.2. Confidentiality

Although the data collected so far do not border on confidentiality of the records of the respondents, I assured the respondents that based on their wishes; I will protect their identity in the data they give out. The research records of the respondents, which include their names, may be accessible to interested linguists, particularly phonologists and sociolinguists, historical linguists, and typologists.

1.6.3. Privacy

The data collection exercise had nothing to do with the respondents' privacy. However, I intend to respect and accord all of the respondents their privacy in this research study.

1.6.4. Risks and benefits

I did not anticipate any identifiable risks associated with this study in terms of physical, social or psychological risks. Similarly, I did not anticipate any direct benefits accruing to the respondents. There were no hazards to respondents.

1.6.5. Compensation

Respondents were given prior information that each of them would receive a specified amount of money agreed upon between the respondents and myself as compensation package for their participation in this study. They were made aware that they would receive this package only at the end of the study.

1.6.6. Withdrawal from Study

Respondents were made aware that their participation in the study was voluntary; therefore, they could withdraw from participating in the study at any point in time without penalty. Similarly, they were informed that they would not be adversely affected if they declined to participate or later stop participating in the study. Again, they were made aware that their legal representative would be informed in a timely manner if information became available that may be relevant to their willingness to continue participation or withdraw. They were informed their participation might be terminated if they showed lack of commitment to the study.

1.7. Thesis Overview

In chapter one, I present the general introduction to the thesis. I also present the information about the languages under consideration in this study. In the same

chapter, I provide the problem statement that informed and served as the basis for this research study and also lay out the research questions this study seeks to answer.

In chapter two, I review some relevant literature on the subject matter of the present thesis, and also literature on the Optimality Theory, the theoretical framework that this thesis adopts. I discuss relevant literature on the debate over the formal approach or model for loanword adaptation in this chapter.

The chapter three looks at the vocalic adaptations of Akan source words in Ga and Dangme. The vocalic adaptations focus on how the three non-native vowels of the Akan source words are adapted in Ga and Dangme. I formalise the discussions within the OT framework in this chapter.

In chapter four, I investigate the adaptations of Akan source non-native consonants in Dangme. I focus, specifically, on how source non-native alveo-palatals, palatals and labial-palatalised consonants are adapted in Dangme. Additionally, I discuss how Ga and Dangme speakers realise the labial-velar consonant in a non-permissible word-final position when adapting it from Akan in this chapter.

In chapter five, I look at how some Akan source prosodic structures such as the syllable and the nasal feature are adapted in Ga and Dangme. The focus of the chapter is on discussing how Akan source syllable and nasality is realised in Ga and Dangme. For nasalisation, it considers how the source nasalisation rule manifests itself in the borrowing language.

The sixth chapter, on the other hand, discusses the adaptations of tone, as prosodic feature from Akan to Ga and Dangme in the adaptation process. In

addition to discussing how the Akan source regular tonal melodies of nouns are interpreted in Ga and Dangme, the chapter looks at how Akan's downstepped H syllable is incorporated into, for example, the three-level tone system of Dangme.

In chapter seven, I summarise and conclude all the discussions and analyses done in the present thesis. In the chapter, I present the recommendations to be made in this thesis.

1.8. Summary of the chapter

This chapter has provided a general introduction to the whole thesis. It has given overviews of the background information about Akan, Ga, and Dangme in terms of their sound systems (vowels and consonants), syllable structure, and tone. The problem statement, research objectives, and research questions have been presented in this chapter. The research methodology, which includes the data, data source, data collection instruments and techniques, the sample/metadata, and the techniques for the sampling have also been discussed. Another issue that has been talked about in this chapter is the ethical considerations that underpin this study. Finally, issues bordering on the ethical considerations for this study have also been discussed in the chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

In this chapter, I review some relevant existing literature on the subject matter of the thesis. I do a similar review on the theoretical framework to be employed for my analysis, which is Optimality Theory. Before I begin reviewing relevant literature on my theoretical framework, I do a quick overview of how the generative phonology evolved.

Phonology, as an aspect of the study of grammar, has evolved over the years. Pāṇini's 5th century (BC) study of the phonology of Sanskrit is credited as the known maiden attempt towards what is described in present-day terms as generative phonology (McCarthy 2003b, Goldsmith & Laks 2010). In his work, according to McCarthy, Pāṇini posited "explicit rules that relate an abstract representation of words to their actual pronunciation" (McCarthy 2003b: 328). This, according to McCarthy, is what greatly influenced structuralism, pioneered by Leonard Bloomfield, Edward Sapir, Roman Jakobson and Nikolai Trubetskoy in the 1930s, which became the foundation of modern linguistics. In structuralism, the phoneme was recognised as the fundamental unit of the organisation of sound systems. He continues that:

> "…this unit is a contrastive element by which two words can be distinguished. The phoneme abstracts away from detailed rules of pronunciation to provide a representation of language from which

> the fully predictable aspects of phonological structure are absent" (McCarthy 2003b: 328).

However, it was not until 1968 that contemporary phonology began with the groundbreaking work towards formalising linguistic/phonological phenomena by Chomsky & Halle's (1968) *The Sound Pattern of English* (SPE). They also took inspirations from the previous ideas in Pāṇini's Sanskrit and in structuralism, particularly ones by Sapir. The four main tenets of the SPE, as it was developed, according to McCarthy (2003b), Goldsmith & Laks (2010), among others, are as follows:

(i) The theory is generative in the sense that it requires explicit formulation of the rules that relate the underlying representations of the lexicon to the surface representations of actual pronunciation.

(ii) The theory must be capable of describing all and only the sound systems and rules that actually occur in languages. Thus, a generative phonology is a model of the mental representation by adult native speakers of the sound structure of a language.

(iii) The theory of phonological processes in *SPE* is a universal theory of how to express rules in terms of a metalanguage.

(iv) The idea that phonological rules and representations are characterised in phonetic terms. That is, every speech sound is composed of a set of two-valued *distinctive features*. (McCarthy 2003b: 328-329, Goldsmith & Laks 2010: 7-8).

Some of these principles of the SPE were not without controversies when the programme was first introduced. The most important ones, according to McCarthy were those about abstractness of underlying representations, conspiracies among rules, and rule naturalness.

In their attempt to separately address each of these controversies, subsequent phonologists came up with several ideas that gave birth to a number of post-*SPE* generative phonological theories. These phonological theories are Paul Kiparsky's *Lexical Phonology*, which sought to address the abstractness controversy found within the SPE model. One of the main strengths of the Lexical Phonology, according to Goldsmith & Laks (2010: 14), was that it was to offer, "… an effort to synthesise elegantly solutions to a large number of problems, many of which had not hitherto been viewed as directly related". Later on, two theories, namely Conspiracy by Charles Kisseberth and Natural Phonology by David Stampe also emerged. All these successive phonological theories continued with the tradition of linear representations of phonological phenomena.

The quest for non-linear representation of such phonological phenomena as stress and tone later on led to the development of such phonological theories as the Metrical Phonology. This theory was to specifically account for stress phenomena, and the Autosegmental Phonology, which was initially meant to handle specifically tonal phenomena, also emerged. These two theories depart from the predecessor *SPE*'s linear representation approach. Again, another practice that these two theories broke with their predecessors was that they employed constraints in place of the rules that were used on the representations in the SPE (McCarthy 2003b: 330). Since the feature will be used in the discussions in this

present thesis, it is expedient I discuss briefly the Distinctive Feature (henceforth DF) theory in this section.

Finally, the Optimality Theory (henceforth OT), also a non-linear and constraint-based theory, emerged to address virtually all the lingering challenges its predecessors had, which each of the post-*SPE* theories had sought to address separately with varying degree of success. OT espouses the view that all of phonology can be reduced to the interaction of constraints (cf. McCarthy 2003b). In this chapter, I focus my discussions on the last two theories, namely DF and OT in section 2.4. In subsection 2.4.1, I discuss the DF and in 2.4.2, I focus the discussion on the OT.

2.2. What is loanword adaptation?

Loanword adaptation refers to the "transformations of foreign words into forms that better conform to the phonotactics of the borrowing language" (Peperkamp & Dupoux 2001: 1, Peperkamp 2004: 341). To throw more light on this, Uffmann (2013) postulates that borrowed words are, "… adapted to the phonological system of the borrowing language, both segmentally, identifying native phoneme categories to express the sounds of the original form, and suprasegmentally, making the borrowings conform to native phonotactics and syllable structure constraints, and adapting them to the native stress or tone system." (Uffmann 2013: 1).

The borrowing phenomenon has been grouped into two main types in phonology. These are what is termed (1) *adaptation* by Paradis (1996) or *on-line adaptations* by Kenstowicz & Sohn (2001), among others and (2) *loanword* (cf.

Paradis 1996, Kenstowicz 2003a, Peperkamp 2004) or *historical loanword* (cf. Peperkamp & Dupoux 2001). Peperkamp (2004), on the other hand, refers to the second type as *integrated loanwords*, and she defines those words as words that have entered the lexicon of the borrowing language, that have been studied most often. And because of how closely-knitted these forms have been integrated into the lexicon of the L1, she continues, the monolingual speakers who use these loanwords never hear their source forms. There is thus no reason to postulate an underlying form that differs from the surface form in their grammar (Peperkamp 2004: 342). This type of borrowing is what is often termed *nativisation* or *indigenisation*, among others.

Regarding on-line adaptation, on the other hand, Peperkamp (2004) posits, "…*on-line adaptations* are foreign words that are borrowed 'here-and-now" (Op cit 2004: 342). On-line adaptations refer to the borrowed words in their early stages being integrated into the target language.

In this study, I classify the phenomenon of Akan source words borrowed into Ga and Dangme as the historical or integrated loanwords, though there is every reason to assume that there are also on-line adaptations as long as the languages involved keep their contacts. This decision is informed by Dakubu's (2002) opinion that these borrowed words from Akan have been "indigenised" in the borrowing languages.

2.3. Overview of literature on loanword among some Ghanaian languages

The mentioning of the loanword phenomenon or linguistic borrowing often induces the idea of incorporating 'foreign' words into a target language. In the

Ghanaian context, consideration attention is often paid to investigating the borrowing of some European words, particularly English, into one Ghanaian language or another (for Kwa languages, see Nartey (1976) (Adanme; Dangme); Sey (1990), Addo (2002), Abakah & Tenteh (2005), Adomako (2008, 2013), Apenteng (2013), Apenteng & Amfo (2014), among others in Akan; Dzameshie (1996), Agbedor (2006), among others in Ewe; for Gur languages, see Hudu (2002) in Dagbani, Awedoba (1980) in Kasem, among others. This might explain why relatively less attention has been paid to discussing the loanword phenomenon among the two major language sub-families in Ghana, namely Kwa and Gur. Even in those studies, discussion of loanwords from one Ghanaian language into another, often such discussions are not detailed in content. For examples, Dorvlo (2008) briefly talks about the form of some loanwords from Akan (Twi) and Ewe in Logba (Ikpana) when describing the grammar of Logba.

There are few exceptional cases, however, where a considerable amount of time has been devoted to discussing the loanword phenomenon among languages from the same genetically-related languages in Ghana. Of such exceptions are studies by Heine (1968) who looked at the influence of Akan and Ewe among some Togo Remnant languages. Koffi (1998) has carried out a similar study though he focused on Akan and Ewe loanwords in Akebu, also a Togo Remnant language. It is not only among the Togo Remnant languages that such studies have been done. Owusu-Adjei (2007) too has looked at some Akan loanwords in Ga. This thesis seeks to contribute to existing literature on borrowings between one Kwa (Tano Central) language, Akan, on the one hand, and Ga and Dangme, also Kwa (Ga-Dangme) languages, on the other hand.

2.4. Theoretical Framework

There are various phonological theories within the generative phonology that could be employed for the analysis in this study. I, however, have opted for the OT for the simple reason being that it is an attested phonological theory in formalising segmentals as well as suprasegmentals especially prosodic structures such as the syllable, tone, and nasality, which are the focus of this thesis. Since the discussions of Akan source segmental (both vocalic and consonantal) adaptations, and those of the syllable and nasalisation form the core of the chapters three, four and five of the thesis, it will be appropriate to employ this analytical tool in this thesis. I briefly outline some basic tenets of both DF and OT in the following subsections.

2.4.1. Distinctive Feature (DF) theory

The feature theory, acording to Hayes (2009), is "…part of a general approach in cognitive science which hypothesizes formal representations of mental phenomena" (Hayes 2009: 70). Hayes (2009) continues that in representing features in phonology, phonological rules of segments are organised according to the phonetic properties of the segments (see also Ladefoged 1993). Therefore, each segment is represented as a bundle of features that collectively defines it (cf. Hayes 2009:71). It is worth noting that the proposal for the feature set has its roots in system of features developed by Roman Jakobson and co. in the 1950s and was later on further developed by Chomsky & Halle's (1968) SPE. By employing this feature system, we are able to characterise natural classes, i.e. groupings of sounds

that appear in phonological rules (Hayes 2009: 74). The features are based mainly on the acoustic and articulatory properties of segments.

There are categories of features, namely major class features, place features, manner features, and laryngeal features. The major class features are used to categorise all sounds- vowels and consonant. It is generally assumed that features are binarily valued. That is, either a segment has a particular feature, which is indicated by "+" sign, or it does not have it, which is marked by "-" (cf. Hayes 2009).

Since the core of the analyses of this study is about the adaptations of one Akan source feature or another, I will employ the distinctive feature theory. Following Hayes (2009), I employ the major place features labial, coronal and dorsal for consonantal segments in this thesis. For example, for all consonant segments in whose articulation the lips are involved, including labial-palatals, labial-palatalised consonants, labialised consonants are specified for [labial].

2.4.2. Optimality Theory (OT)

OT is a general framework for modelling human linguistic competence that attributes linguistic generalisations to the interplay among ranked and violable constraints (cf. McCarthy 2003a, 2003b, 2007). The theory was originally developed by Prince & Smolensky (1993) and later on McCarthy & Prince (1993a, b). Its primary objective was to address the main challenges in the *SPE* programme, which had given rise to the emergence of separate phonological theories each of which was meant to address each of these problems, namely conspiracy of rules, naturalness in phonology, among others.

It is a linguistic theory that has been applied successfully to aspects or components of linguistics, namely morphology, acquisition, semantics, variation, sociolinguistics, etc. in addition to the primary domains of phonology and syntax (cf. McCarthy 2003a). Again, OT differs from other generative linguistic theories in that it is comparative; that is, it has ranked, violable constraints; and also it is inherently typological, asserting that all variations in languages can be attributed to differences in rankings of sets of constraints (cf. Kager 1999, McCarthy 2003a).

Representations in OT, unlike in other non-linear theories, are non-derivational. As has been mentioned earlier, the OT framework employs violable constraints in its approach and according to Kager (1999: xi), "the central idea of OT is that, "… surface forms of language reflect resolutions of conflicts between competing demands or constraints". The well-formedness of a linguistic expression is determined comparatively in the sense that an expression is well-formed because it is the best among a set of competing candidates (McCarthy 2003a: 211). Furthermore, such a well-formed expression or candidate is 'optimal' in the sense that it incurs the least serious violations of a set of violable constraints, ranked in a language-specific hierarchy" (Kager: xi). In talking about 'hierarchy', McCarthy observes that, "candidates are compared by a hierarchy of ranked, violable constraints. When two constraints disagree in their assessment of competing candidates, the constraint that is ranked higher is the one that takes precedence." (op cit 2003a: 211). So, though the optimal candidate or the most harmonic candidate can violate constraint(s), it must, as a matter of necessity, avoid violating higher-ranked constraints, which violation is fatal. Constraints in OT, as Kager (1999: xi) posits, "… directly encode markedness statements and

principles enforcing the preservation of contrasts". This statement clearly indicates the two major types of constraints, namely markedness and faithfulness constraints, which I shall elaborate at the end of this subsection.

Some basic assumptions or principles that underlie the OT frameworks are summarised as follows.

a. Universality
b. Violability
c. Domination
d. Optimality.

OT has a standard architecture that defines the stages it operates in, generating surface forms, which I present below in Figure 1.

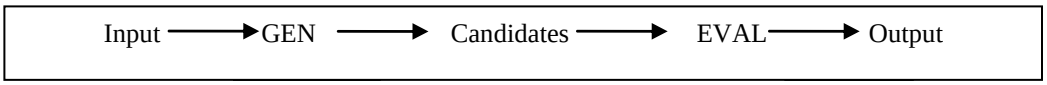

Figure 1: The Standard OT Architecture (Adapted from McCarthy 2003a: 211)

From Figure 1 above, McCarthy (2003a) explains that the Input component consists of an underlying representation (from phonology perspective) or something from another aspect of the grammar. The GEN(erator) receives the Input and then generates a set of candidates or possibilities with recourse to the Input. These candidates are then supplied to the EVAL(uator) function to select the optimal candidate among the lot generated, which becomes the output forms. In the selection of the optimal candidate, the language-specific constraint hierarchy is

applied. In addition to these, we have already mentioned that the constraints; CON in OT, are also universal. It is therefore assumed in the architecture of OT that the Input, the GEN and the CON are all universal, while the Output is language-specific. This assumption is an affirmation of how typological OT is (McCarthy 2003a: 211). In this regard, a language-specific ranking hierarchy when re-ranked can produce the ranking hierarchies of other grammars. This phenomenon is what has been termed in existing literature on OT as *factorial typology*.

McCarthy (2003a) continues that it is assumed in OT that the CON function contains two types of constraints, namely *markedness* constraints, and *faithfulness* constraints. Markedness constraints are constraints that ensure structural well-formedness, and, as McCarthy (2003a: 212) posits, they "…assign zero violation-marks to a candidate based on aspects of its output structure, with reference to the input from which it is derived." That is, in the evaluation of candidates, the EVAL is blind to the Input for the markedness constraints. The faithfulness constraints, on the other hand, try to preserve contrasts in the input in the output forms, and by so doing, according to McCarthy (op cit), "…assign zero violation-marks to the candidate that is identical to the input, they penalise candidates that differ from the input in various respects." In other words, faithfulness constraints ensure that, as much as possible, the candidates preserve maximal identity with the input. These two types of constraints are always in conflict to derive the output forms.

It is my hope that the OT framework would be efficient enough to provide a formal account for the descriptive generalisations that will be made about the

adaptation strategies employed by both Ga and Dangme in nativising Akan source words in their lexicons.

2.5. Models/Approaches to loanword adaptation

The study of loanword phonology cross-linguistically has led to the development of phonological theories. Though there is a consensus among specialists regarding the assertion that the loanword domain has contributed significantly to linguistic theorisations, yet there seems not to be a consensus as to which theoretical approach or model best accounts for the patterns observed cross-linguistically. Currently, there are two main schools of thought that have emerged in this regard, namely perception-based model, and production-based model and a third model, which is a mixture of these two main approaches, which I have termed the 'hybrid' model. In this section, I briefly take an overview of the central ideas of these schools of thought in the theoretical modelling of loanword adaptation phenomenon. I first discuss the production-based model, followed by the perception-based view, and then conclude with the tenets of the *hybrid* approach.

2.5.1. The production-based model

The production-based theorists generally assumed in generative grammar that, "… the input to loanword adaptations is constituted by the surface form of the source language, and that the adaptations are computed by the phonological grammar of the borrowing language" (Peperkamp & Dupoux 2003: 367; Peperkamp 2004: 341). In other words, an output of the donor language (L2) becomes the input to the borrowing language which has to go through some phonological well-

formedness adjustments, before it is incorporated into the lexicon of the target languages (L1). Proponents of this view include Silverman (1992), Yip (1993), Paradis (1995), Paradis & LaCharité (1997, 2005); Broselow (2000), Jacobs & Gussenhoven (2000), and Uffmann (2001, 2006, 2007)[2].

The central idea of this approach, according to Uffmann (2013), is that it is not perceptual similarity that counts in the adaptations process, but phonological equivalence. By phonological equivalence, the phonemes of the target language are identified by the speakers, and these phonemes, which are matched with those of the donor language, are analysed as equivalent. With regard to the relevant role that perception might play in phonological adaptations, Uffmann posits that "in many cases, the perceptual approximation account and the phonological equivalence account converge since phonologically equivalent structures should also be phonetically similar…" (Uffmann 2013: 656). It is not always the case that perception (phonetics) may play any significant role in the adaptation process and, as has been pointed out by the phonological approach, in many cases the adaptations do not go for the closest phonetic match, but rather seem to map sounds that are instead phonologically equivalent (cf. Paradis & LaCharité 1997; LaCharité & Paradis 2002, 2005; Paradis & Tremblay 2009; Uffmann 2013).

However, the opponents of the production-based model cite, among other cases, the instances where monolingual speakers of the borrowing languages who use the loanword never hear their source forms, hence positing an underlying form (i.e. the 'source' form) that differs from the output form misses psychological

[2]It is worth pointing out that Uffmann does not explicitly contribute to this theoretical modelling debate per se, however, his studies from cross-linguistic perspective are mostly given purely phonological explanations, hence his inclusion in the proponents of the production-based approach.

reality (cf. Peperkamp & Dupoux 2001: 1). The question at this point then is, should monolingual speakers always directly perceive from the source, even when they do not understand the source? Could it also not be possible that bilingual speakers can introduce the borrowed words into the borrowing language, and from there monolingual speakers pick them as their 'source'? We shall see how this question will be addressed as we proceed further with the reviews.

Some of the canonical cases that the proponents of the phonological approach cite to discount perceptual role, are Paradis & LaCharité's (2002) study of vowel adaptation. They observed that the English lax vowels [ɪ, ʊ], which are phonetically closer to /e, o/ than to /i, u/ in languages that do not have a tense-lax contrast, are rather consistently adapted as /i, u/. This adaptation reflects their phonological status as [+high] vowels, instead of what would have been expected; /e, o/ if perception were to be main factor in the adaptations (see also Uffmann 2013). However, as we shall see in chapters three and four of the present thesis, for example, empirical evidence from the adaptations of non-native vowels in Akan loans in both Ga and Dangme point to the fact that it is possible that both perceptual and phonological accounts might equally be needed to comprehensively account for the model for loanword adaptation. The adapters in both L1 languages seem to go for both the perceptual closeness and the phonological height match, and even in addition to these two strategies, consider the ATR match.

As Uffmann (2013) explains about the production-based approach, "a necessary condition for adaptations to reflect the phonological rather than the phonetic status of a segment is that borrowers are aware of the phonological status

of the borrowed segment" (Uffmann 2013: 657). This raises the question of who introduces loanword into the L1. To this, it has been argued, especially by Paradis & LaCharité (2002) that loanwords are first introduced by competent bilinguals who have profound knowledge of both phonological systems (i.e. of their L1 and the L2). This view is contrary to the one held by the perceptionists, particularly by Peperkamp & Dupoux (2003) that loanword adaptations require "a relatively low level of competence in the L2 in order for perceptual deafness to play a role" (cf. Uffmann 2013: 657), though a perceptual study by Flege (2003) on fluent L1 and L2 Italian bilinguals shows that their role might be marginal as the perception-based approach claims. Based on this, it is concluded that though the bilingual speakers may borrow words into a speaking community, it is rather the monolingual speakers who adapted those words in the L1 (cf. Uffmann 2013).

Having said these, the question that Uffmann (2013: 657-658) then asks, which I paraphrase here, is, if loanword adaptations actually involve the mapping of phonologically corresponding segments, how do speakers, even bilingual speakers, establish this correspondence? Especially if phonologists themselves cannot agree even on a universal set of segment specifications, how can linguistically naive speakers set up correspondence relations between the segments of two languages, if not phonetically?

2.5.2. The perception-based model

The perceptionist's view on loanword adaptation and the role perception plays has been summed up by Peperkamp (2004: 346) that, "concerning the role of perception, it has long been known that the way in which we perceive speech

depends upon phonological properties of our native language .... Accordingly, it has been argued that certain loanword adaptations take place during perception, due to the difficulties that listeners have in perceiving non-native sound patterns" (see also Silverman 1992; Yip 1993; Rose 1999; Kenstowicz 2001; etc.).

In effect, the perception-based approach (and its offshoot psycholinguistic approach) holds the view that the source words are not the actual inputs to the borrowing languages to which native phonological rules have to apply for their transformation. Transformation of the source words in the adaptation process rather takes place at the exact time perception is taking place (cf. Peperkamp & Dupoux 2001, 2003; Peperkamp 2004; among others).

In an attempt to defend the perception-based view of the loanword adaptation, Peperkamp (2004), Peperkamp & Dupoux (2003) argue against the idea that loanword adaptations are computed in the phonology of the borrowing language's grammar, and rather proposes that, "… a principled solution lies with the hypothesis that **all** (emphasis theirs) loanword adaptations are phonetically minimal transformations that apply during speech perception" (Peperkamp & Dupoux 2003: 368, Peperkamp 2004: 341-342). In furtherance of her case against postulation of phonological module for loanword adaptations, Peperkamp (2004) posits that:

> "Indeed, loanword adaptations do not involve synchronic alternations, but rather consist of transformations that are applied only during the introduction of the loanword. Once they have made their way into the borrowing language, there is no reason to keep

> the corresponding forms in the source language as the underlying forms in the lexicon of the borrowing language. It therefore makes no sense to postulate rules or constraints that apply to loanwords only". (Peperkamp 2004: 345)

According to Uffmann (2013), there seems to be two types of proposals for modelling perceptual adaptation in the phonological grammar, both of which employ OT. One is Steriade's (2001) P-map proposal. In this proposal, speakers have so-called perceptual maps at their disposal, which encode the perceptual similarity between sounds. Uffmann (2013) continues that speakers then draw upon this knowledge when the grammar requires an unfaithful parse of the input and choose a candidate form that deviates perceptually the least from the input form. The other one by Boersma & Hamann (2009), on the other hand, analyses loanword adaptation within their bidirectional model of phonology. This bidirectional model by Boersma & Hamann then unifies both the production and the perception grammars in one constraint ranking. There are, however, different constraints for perception and those for production, and that loanword adaptation occurs in the perception component of the grammar. This approach, according to Uffmann (op cit), can thus explain mismatches between loanword adaptations and native processes.

In pointing out the weakness of both phonological approach and mainstream perception approach, Peperkamp (2004) posits that, "… it appears that arguments in favour of perceptual transformations are sought for adaptations …, which cannot be accommodated within the native (production) grammar. The

distinction between perception and production in loanword adaptations is, therefore, *ad hoc*". (2004:346). In other words, transformations in loanword adaptations have been considered perceptual because the phonologies of the native grammars could not explain or account for them without empirical evidence from the perception point of view to that effect. She, therefore, provides an alternative explanation in psycholinguistic account in perceptual assimilation. In explaining the role of psycholinguistics and the point at which psycholinguistics comes into adaptation, Peperkamp & Dupoux (2003) postulate that at the point of perceiving those structures:

> "… all aspects of non-native phonological structure, including segments, suprasegments, and syllable phonotactics, are systematically distorted during speech perception. That is, non-native sound structures are assimilated to ones that are well-formed in the native language, both by monolinguals and by bilinguals" (Peperkamp & Dupoux 2003: 346).

Basing the argument on the empirical evidence from results of experiments on how native speakers perceive non-native words to draw parallelism between 'phonological deafness' and loanword adaptations, Peperkamp & Dupoux (2003) posit that, "… loanword adaptations are not due to the phonological grammar, but rather, to perceptual processes involved in the decoding of nonnative sounds."(2003: 367). The argument is then concluded after pointing out the weakness of production-based accounts by Peperkamp (2004) that:

> "… there is a third phenomenon that is driven by the requirement to respect native phonological structure: during speech perception, the process of phonetic decoding maps nonnative forms onto forms that are in accordance with the native phonology. This process is thus influenced by but not identical to the phonology of the listener's native language. The perceptual assimilations that result from it are completely automatic and apply beyond the listener's awareness. Moreover, they are based upon phonetic rather than phonological distance, and in the cases studied so far they correspond to the transformations that take place in loanword adaptations" (Peperkamp 2004: 349, see also Peperkamp & Dupoux 2001).

Peperkamp & Dupoux (2001) further point out the problems associated with the phonological view of the model of loanword adaptations. These problems include the learnability of non-native segments and ill-formed syllable structures. That is, the fact that some adaptations are rather phonetically driven, and finally the fact the perception of source words is not faithful as phonological view of the adaptation would assumes that the input to loans is the phonetic representation of the source word. They posit that though perception in adaptation is not faithful, it stands to reason that it is influenced by the speaker's knowledge of the phonology of the borrowing language. In the subsequent chapters of the present thesis, empirical data from Akan source borrowed words in both Ga and Dangme will be used to test against this claim.

2.5.3. The 'hybrid' model

There is a third intermediate view, which I term 'hybrid' in the present thesis. It refers to proposals that draw on explanations from more than one of the main grammar components. The explanations for loanword adaptations posited by the proponents of the view have been attributed to combined factors or facts of either phonetic and phonology, phonetic, phonology and sociolinguistic, etc. This position has been proposed by scholars such as Kenstowicz (2003b, 2005), Heffernan (2005), Rose & Demuth (2006), Yip (2006), Kenstowicz & Suchato (2006), Dohlus (2010), Uffmann (2013), among others. It argues that both phonology and perception (phonetics) play equally important roles in explaining loanword adaptation. Among the proponents of this hybrid view, one school of thought holds the position that all explanations for loans adaptations might not be grounded solely in either of the two main views above, but it could also be from non-grammatical factors. For example, Uffmann (2013) posits additional sociolinguistic factors to play significant role in the adaptation process of loanwords. This is in spite of the fact that the entire loanword adaptation phenomenon fundamentally results from sociolinguistic experiences such as contact situations.

The third view, which advocates a combination of factors whereby each of those factors to some extent plays equally important roles in the adaptation process, is becoming the most appealing opinion among loanword researchers. A critical look at the claims by both opposing sides clearly point to the fact neither of the two opposing sides can completely discount the role(s) either side play.

However, the main issue of contention seems to be the relative role played by the other model. There are some extremists, however, among each of the sides that will discount completely any significant role by the other side.

There have been several instances in loanword adaptations for which comprehensive explanations have required both phonological and perceptual, and sometimes other factors. One of such cases is a recent study by Dohlus (2010) of how the same source target front rounded vowels /ø, œ/ found in both German and French loans are adapted differently by Japanese adapters. According to Dohlus (2010), vowels are adapted as /e/ in loans of German source, while they are adapted as /u/ in those of French source. Though perceptually these vowels are closer to /u/ in native Japanese phonology, there are extralinguistic explanations for the variations in the adaptations of same source segments which has to do with social class, period of entry of the loans, and the domain of use of the loans, among others.

Uffmann (2013), on his part, also recommends additional factors such as sociolinguistic (conventionalisation) facts when explaining some loanword adaptation phenomena. After reviewing several instances of loanword adaptations where either phonological approach or perceptual approach or even a combination of both have failed to comprehensively explain them, Uffmann (op cit) concludes with a proposal following Paradis & LaCharité (1997), that the loanword adaptation process or computation "… requires competent bilinguals as agents of change, speakers who are able to assess phonological equivalence between segments as a measure of both phonetic similarity and similar systemic properties, including systems of oppositions and natural class behaviour." (Uffmann 2013:

661). This does not mean the role of perceptual deafness has been relegated to the background, as Uffmann cites empirical evidence from perception experiments to justify itsimportant.

From the data on Akan source loans in both Ga and Dangme, I conclude that some of the explanations might transcend the two main approaches and would require additional non-grammatical accounts as some aspects of the hybrid approach seem to suggest. In this study, I test each of these approaches against how loanword corpora of Akan source are borrowed into Ga and Dangme in order to provide evidence for one or the other of these models.

2.6. Summary of the chapter

This chapter has reviewed some literature relevant to the present study. In the review, I have briefly talked about phonology in relation to its history and the emergence of its major theories. The chapter has also discussed the positions researchers in the loanword phenomenon have taken regard the best model or approach to account for the phenomenon where I have concluded that for the adaptations of the Akan source loanword in two sister languages, Ga and Dangme, a comprehensive account would require both perceptual and phonological accounts as well as even non-grammatical explanations. I have also briefly given an overview on literature on loanwords among Kwa and Gur languages in Ghana in this chapter.

CHAPTER THREE

AKAN VOCALIC ADAPTATIONS IN GA AND DANGME

3.1. Introduction

In this chapter, I discuss how some Akan source vocalic segments are adapted in Ga and Dangme. This chapter specifically looks at how Akan source non-native vowels are realised in Akan borrowed words in Ga and Dangme. These discussions to be made in the chapter will be formalised within the OT framework. I show that for the adaptations of the Akan source non-native vowels in Ga and Dangme, the speakers of the two target languages consider perceptual closeness, as well as height and ATR equivalences. The implication of this is that both perceptual and phonological factors come into play in the adaptations of those vowels. On the comparison of the patterns of adaptation by both Ga and Dangme, I show that the two languages share a lot in common in their adaptation patterns than they differ in.

The rest of the chapter is organised as follows: Section 3.2 discusses the vocalic adaptations from Akan in Ga. In this section, I consider the adaptations of Akan source non-native vocalic segments in Ga. In section 3.3, I discuss vocalic adaptations from Akan in Dangme. In this section, the discussions concentrate on the strategies Dangme speakers employ in adapting Akan source non-native vowels. Finally, I conclude the chapter with a summary of all discussions in section 3.4.

3.2. Adaptations of Akan source non-native vowels in Ga

It will be recalled that in chapter one, we indicated that there are three vowels present in Akan which cannot be found in the vocalic inventory of Ga. These vowels are [ʊ], [ɪ], and [æ]. Out of these three vowels, two, namely [ʊ] and [ɪ] do not occur in word-initial position. The discussions in this section focus on the context of adaptation, frequency of occurrence of the target vowel, and the model that might have informed the adaptation process. In this subsection, we look at how these non-native vowels are realised in loaned words in Ga that are of Akan source.

But before I discuss and analyse the data in this subsection, I show the results of the listening experiment and subsequently discuss how Ga speakers perceive Akan source vowels with focus on the three non-native vowels. This discussion will serve as the basis for the main discussions in this section.

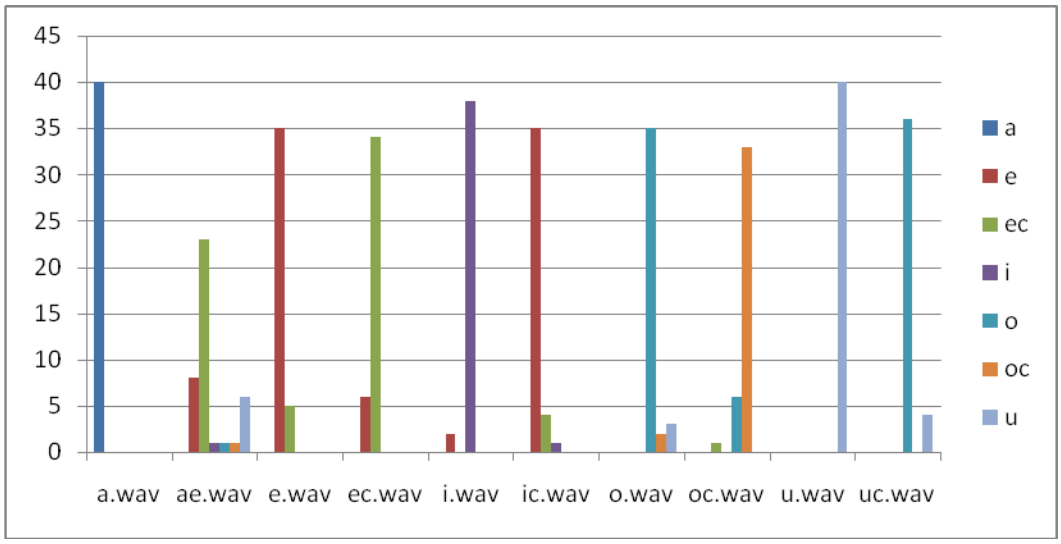

Figure 2: Results of Ga speakers listening experiment[3]

From Figure 2 above, we observe the results of a listening experiment carried out to test how Ga listeners perceive all the ten vowel sounds of Akan each of which was articulated in isolation. On the horizontal (i.e. x) axis are the ten Akan vowels, and the figures on the vertical (i.e. y) axis represent the number of times (frequency) a particular source vowel is perceived as a vowel in the target language. With our focus exclusively on the three Akan source non-native vowels, it can be observed that for an Akan source stimulus [æ], 23 out of the 40 times the Ga listeners perceived [æ] as [ɛ]. This represents approximately 58% of the responses for the perception of [æ]. The other figures are as follows: 8 out of 40 times, representing 20% that the stimulus [æ] was perceived as [e] by the Ga speakers. The remaining figures show that 15% of time (i.e. 6 times), the stimulus

[3] In the present study, the following letters of the alphabet represent the following phonetic sounds in the charts: ae = [æ], ec = [ɛ], ic = [ɪ], oc = [ɔ], uc = [ʊ].

was perceived as [u]. The implications of these results are that given any Akan source input word that contains [æ], it is very likely that this vowel will be perceived and hence, realised as [ɛ] by Ga speakers.

For the front high stimulus, [ɪ], it is observable from the Figure that 35 out of 40 times, which represents approximately 88% of the responses, the Ga speakers perceived it as [i]. Based on this result, we would expect the vowel [ɪ] in an Akan source word to be realised as [i] most of the times. However, as we shall see later in this chapter, the Ga speakers rather adapt an input [ɪ] as [e] in most cases in the adaptation process. 10% of the respondents perceived the front high vowel stimulus as a back mid [o]. This is unexpected, and as will be shown later in this chapter, such cross frontness adaptation does not actually occur when adapting a loanword of Akan in Ga.

The last stimulus perception to be discussed is the high back non-native [ʊ]. From the perception results, 36 out of the 40 responses, the Ga speakers perceived the stimulus vowel as [o]. This represents an overwhelming 90% of the responses to the stimulus. For the remaining 10%, the stimulus was perceived as [u]. From this outcome, it is expected that for an input [ʊ] in an Akan loanword, it is very likely it will be realised as [o] in Ga.

With this foreknowledge, it is hypothesised that the adaptations of the three non-native vowels of Akan source in Ga will be based on the following.

(10). Assumptions based on Ga speakers' vowel perception

	Akan		Ga
a).	[ʊ]	→	[o]
b).	[ɪ]	→	[i]
c).	[æ]	→	[ɛ]

The assumptions in (10) are based on how the Ga speakers perceive the three source non-native vowels in Ga. Based on the results of the perception experiment, I assume that the Akan source non-native [ʊ], [ɪ], and [æ] will in most cases be realised as [o], [e], and [ɛ] by the Ga speakers when adapting words from Akan. In the rest of this subsection, I test the above assumptions against natural data on how the Ga speakers adapt some words from Akan to their vocabulary.

3.2.1. The adaptations of source [ʊ]

It has been observed cross-linguistically that speakers of languages that do not have the tense-lax contrast in their vocalic systems tend to perceive the vocalic segment [ʊ] as [o] when adapting it (cf. LaCharité & Paradis 2002, Flege 2003, Flege & McKay 2004, among others). With Ga identified among such languages that lack this contrast as was seen in chapter one, I examine, in this subsection, to know whether Ga speakers also follow this perception cue when adapting loaned words of Akan source that have this vocalic segment or they do something different. As a convention throughout this thesis, all the segments targeted for the

discussions (both vocalic and consonantal) have been underlined in both the source and the target words.

3.2.1.1. Adaptation of source [ʊ] as [o]

In the following examples, we see that the Akan source [ʊ] is adapted as [o] by the Ga speakers. This adaptation strategy, it will be explained, is influenced by the speakers' perception of the source non-native vowel as showed in the results of the perception experiment discussed earlier in this chapter.

(11).	Akan	Ga	Gloss
i.	ɔbʊ̀nsʊ́m	àbò̩nsám, àbò̩nsáŋ	devil
ii.	àdʊ̀bɛ́	àdò̩bɛ́	raffia palm
iii.	fʊ́fʊ́rɔ̀	àfò̩fò̩rò, àfò̩flò	flower, blossom, bud
iv.	àhʊ́rá	àhó̩rà	a very serious insult, taunt
v.	àsàfʊ̀	àsàfò̩	military company; group
vi.	pʊ́	k͡pòô, k͡pò̩ó	reject, refuse to accept; disown
vii.	ɔ̀pàpʊ́	k͡pàk͡pó̩	male goat, he-goat

From the examples in (11) above, it is observable that Ga speakers' adaptation of the non-native [ʊ], which is specified for [+high, +round, -ATR] in Akan source words follows the cross-linguistic perceptual pattern. Since Ga lacks the tongue

root contrast for the source vowel, the speakers go for the phonetically closest vowel, which is [o], in place of [ʊ]. The only phonological similarity between the source [ʊ] and the target [o] is that both share the same value for the feature round, i.e. both are [+round]. Apart from this, the target vowel is a mid vowel and also produced with the tongue root in an advanced position compared to a high and an unadvanced tongue root property of the source vowel. With regard to the context of occurrence, it can be observed that [ʊ] can be adapted as [o] in word-medial position as in (11i) – (11iv), and in word-final position as in (11v) – (11vii). From the data collected, there are 144 instances of the adaptations of Akan source [ʊ]. Out of these instances, on 108 occasions, the source non-native vowel is adapted as [o], constituting 75% of frequency of adaptation. This high frequency of occurrence is in consonance with the outcome of the listening perception test in Figure 2 above, where in most cases the Ga listeners perceived the non-native [ʊ] as [o]. From the discussion above, it can be claimed that wherever a source [ʊ] occurs, it is very likely it will be adapted as [o] in Ga.

However, as we shall soon see, this is not the only strategy employed by Ga speakers in the adaptation of this source non-native vowel. In addition to [ʊ] being perceptually adapted as [o], Ga speakers can also adapt the same source vowel with two other vowels as follows.

3.2.1.2. Adaptation of source [ʊ] as [u]

In the example (12) below, I discuss one of the other vowels with which [ʊ] can be adapted in Ga. That is, the realisation of source [ʊ] as [u] in Ga. We will observe that the source [ʊ] is replaced with a phonologically equivalent high back vowel [u] in Ga. In terms of context, this adaptation strategy occurs only in word-medial position with the exception of only one example of its occurrence word-finally as shall be seen in (12). This exceptional example has even been labelled 'obsolescent' in the Ga dictionary.

(12).	Akan	Ga	Gloss
i.	àhʊ̀mkấ	àhʊ̀ŋká	joy, satisfaction
ii.	àkʊ̀ntá	àkʊ̀ntá	brother-in-law
iii.	àwʊ́sú	àwʊ̀sú,	birth waters
iv.	kʊ̀rá	kʊ̀rá, kʊ̀lá	preserve, look after
v.	kʊ̀ràfấ	kʊ̀ràfấ	brother/sister-in-law
vi.	ɔbʊ́sʊ́mákítíẃ	àbʊ́sʊ́mấkútŕé	chameleon
vii.	sʊ̀rʊ̀ŋkʊ́	sɽòŋkʊ́	extraordinary (obsolesce.)

From the frequency count of the data collected for the present study, the source non-native [ʊ] is adapted as [u] on only 17 out of the 144 occasions, representing

approximately 12% frequency rate. It can be observed that phonologically the target differs from the source vowel only in its value for the feature [ATR] i.e. it is [+ATR] as against the source [-ATR]. It is worth pointing out that there were very few exceptions in the data in which a source [ʊ] was adapted as [a] as in *àjʊ̲wá* 'copper, brass; a metal container' realised as *àja̲wá* in Ga. Hence, positing perceptual factors in this particular adaptation strategy will lack support as empirical evidence from vowel perception experiments across languages with such lack of contrast (cf. LaCharité & Paradis 2002, among others) predicts otherwise. The most logical explanation, therefore, is to postulate phonological factors. As has been mentioned already, the source vocalism is specified for [+high], Ga speakers, therefore, replace this vowel, which is not present in their vowel system with the only back high vowel present in their phonological system; [u].

From acoustic perspective, it can be concluded that the Ga speakers maintain the First Formant (F1), i.e. the height value of the source vocalism in addition to preserving redundantly the Second Formant (F2), i.e. the frontness, of the same in the target vowel.

I formalise the phonological adaptation based on height equivalence within the OT framework. As has been discussed above, the back high vowel specified for [-ATR] is absent in Ga, hence whenever the vowel occurs in any word of Akan source, it has to be repaired in Ga in the adaptation process. The constraint that bans this source vowel from occurring in the output is *[+high, -ATR]. As it shall be seen later in this chapter, the non-specification of the frontness property or the value for the feature [round] in the constraint will serve to account for all

unadvanced high vowels that are banned in Ga. This markedness constraint is defined as follows:

(13). *[+high, -ATR]: A vowel segment specified for [+high, -ATR] is prohibited

This constraint when ranked highly will penalise any output form that faithfully preserves the feature values of the non-native input vowel. It has also been observed that the Ga speakers faithfully preserve the value for the feature [round] of the input vowel. Thus, a [+round] source vowel is adapted as [+round] in the output. I define this specialised constraint from the faithfulness constraint family IDENT as follows:

(14). IDENT-IO(Rd): Correspondents in input and output have identical value for the feature [round]

This constraint, just like *[+high, -ATR], has to be undominated since as we have seen in the two examples discussed so far (and also in the examples to follow), the F2 of the source vowel is most often maintained in the target vowel. Hence, by ranking this constraint higher, it becomes fatal for any output that violates it. Again, as has been seen already and will be discussed further later in this section, preserving the frontness property of the source vowel is to be respected more than preserving either the height or the ATR value.

Another specialised constraint from the Identity family to be used in this analysis is IDENT-IO(high). This constraint ensures that the height of the source vocalic segment is maintained in the adapted form. This reflects the phonological match in terms of height between the source and the target vowels. It is defined as follows:

(15). IDENT-IO(high): Correspondents in input and output have identical value for the feature [high]

The structural well-formedness constraint *[+high, -ATR] dominates IDENT-IO(high) since it is more costly to maintain the prohibited segment specified for [+high, -ATR] than to alter the height of the source vowel in the output forms. However, IDENT-IO(high) outranks MAX-IO(F), a constraint that bans deletion of the non-native segment. MAX-IO(F) is defined as follows:

(16). MAX-IO(F): Every segment of the input has a correspondent in the output in terms of a feature (F)

From the discussions of the example (12), it has been observed that Ga speakers adapt the source [ʊ] by altering its [ATR] feature value in the output. Therefore, MAX-IO(F) has to rank low so that its violation will have minimal consequence for the optimal candidate, which has to necessarily violate it.

Tableau 1: The adaptation of the Akan source [ʊ] as [u] in Ga

/ kʊ̀rá / 'preserve'	*[+ high, -ATR]	IDENT-IO (Rd)	IDENT-IO (high)	MAX-IO(F)
a.[kʊ̀rá]	*!			
b. ☞[kùrá]				*
c. [kòrá]			*!	*
d. [kɔ̀rá]			*!	*
e. [kàrá]		*!	*	*

Constraint ranking: *[+ high, -ATR], IDENT-IO (Rd) » IDENT-IO (high) » MAX-IO(F)

From Tableau 1, candidate (a), though the most faithful output form to the input becomes the least harmonic candidate for fatally violating the highly-ranked *[+high, -ATR]. Candidate (e) is the next candidate that is not preferred in this Tableau for violating another highly-ranked constraint, IDENT-IO (Rd) for adapting the input rounded vowel as a non-rounded vowel. Also by altering the input high vowel to a low vowel, it additionally violates IDENT-IO (high). This crucially-ranked constraint is also fatally violated by candidates (c) and (d) for adapting the source high vowel as low vowel [o] and [ɔ] respectively in addition to both violating MAX-IO(F). The optimal candidate, candidate (b) is also penalised minimally for adapting the input [-ATR] value as [+ATR] in violation of the lowly-ranked MAX-IO(F).

3.2.1.3. Adaptation of source [ʊ] as [ɔ]

The discussions so far have focused on an example of what seems to be perceptual adaptation and another example of a phonological adaptation of height. There is yet a third strategy by which the Ga speakers can adapt Akan source non-native [ʊ]. This strategy also seems more phonological than perceptual. I present an illustration of this below in (17).

(17).	Akan	Ga	Gloss
i.	àhʊ́rɔ́	àhɔ́lé	sputum, phlegm
ii.	àkʊ́kɔ́bɛ́sã́	àkɔ́kɔ́bɛ́sã́	a thorny shrub
iii.	ànʊ̀kʷádí	ànɔ̀kʷálé	truth
iv.	ɛ̀mʊ̃	òmɔ̃́	rice; small waist beads for babies
v.	ɛ̀sʊ̃́	sɔ̃́	blame; responsibility
vi.	mã́ń'sʊ̃́	mã́ńsɔ̃	quarrel, strife, ill-feeling; litigation

From the examples in (17) above, we observe that the source non-native [ʊ] is adapted as [ɔ] in Ga. The adaptation is observed in word-medial position as can be seen in (17i) - (17iii), and in word-final position as in (17iv) – (17vi). In terms of the frequency of occurrence, from the data collected, Akan source [ʊ] is adapted as [ɔ] by the Ga speakers on 19 out of the 144 of such adaptations, representing

approximately 13%. Again, from the perception perspective, though in the vowel space of Ga [ɔ] is closest to [o], the vowel with which we would have expected to be adapted on perceptual grounds, the former differs from the latter in terms of the activities of the tongue root. While the former is produced with an unadvanced tongue root, the latter is articulated with the tongue root in an advanced position.

In terms of the feature theory, [ɔ] is specified for [-ATR], the same as the source vowel [ʊ]. Could this, i.e. ATR, have been the main factor that influenced the Ga speakers in the adaptation process? If yes, then the explanation is that there is a mapping of the phonological feature ATR between the source vowel and the target vowel. Incidentally [ɔ] is the only back vowel in Ga that is specified for [-ATR], so it is the only back vowel that matches with the source vocalism in terms of its [ATR] value. In addition to the ATR, both the source vowel and the target vowel share the same F2 property of being back vowels. Based on the explanations above, it can be concluded that the adaptation strategy employed in this pattern is based on phonological (ATR) equivalence.

In formalising this adaptation strategy, we employ the entire set of constraints used in 3.2.1.2, save one, that is IDENT-IO(high), which needs to be slightly modified. The obvious reason for the slight modification of this faithfulness constraint stems from the fact that vowel height is irrelevant to the present adaptation strategy. What is relevant is the ATR value. Therefore, we simply change the feature [high] in the constraint to the feature [ATR], and subsequently modify the definition of the constraint in (18) as follows:

(18). IDENT-IO(ATR): Correspondents in input and output have identical value for the feature [ATR]

In terms of the ranking of constraint in (18), just as we saw in Tableau 1, IDENT-IO(ATR) has to be dominated by both *[+high, -ATR] and IDENT-IO(Rd), but it, in turn, has to outrank MAX-IO(F). This ranking is necessitated by the fact that it is not expected of the optimal output form to be faithful to the input form in preserving all of its features; we observed that the height of the source vowel mismatches that of the target vowel. By its low ranking, the optimal candidate will not be severely penalised when it eventually violates it.

Tableau 2: The adaptation of an Akan source [ʊ] as [ɔ] in Ga

/ mɑ̃ń'sʊ̃ / 'litigation'	IDENT-IO (Rd)	*[+ high, -ATR]	IDENT-IO (ATR)	MAX-IO(F)
a.[mɑ̃ńsʊ̃]		*!		
b. [mɑ̃ńsó]			*!	*
c. [mɑ̃ńsʊ̃]			*!	
d. ☞ [mɑ̃ńsɔ̃]				*
e. [mɑ̃ńsɑ̃]	*!			*

Constraint ranking: *[+ high, -ATR], IDENT-IO (Rd) » IDENT-IO (ATR) » MAX-IO(F)

From Tableau 2, candidate (e), which alters the roundness property of the input vowel, hence fatally violating the highly-ranked IDENT-IO(Rd), is the least

candidate preferred as the output form. It incurs additional violation mark for the lowly-ranked MAX-IO(F) for changing [high] to [low]. Candidate (a), the most faithful output form is also ruled out of the competition for violating fatally the highly-ranked well-formedness constraint against [ʊ], albeit that is the only constraint it violates. Both candidates (b) and (c) follow similar trajectory in losing out on the competition for fatally violating the crucially-ranked IDENT-IO(ATR). Both candidates have altered the input [-ATR] value into [+ATR] in [o] and [u] respectively. Their main competitor, candidate (d), which satisfies this constraint at the expense of minimally violating MAX-IO(F) emerges as the optimal candidate.

From the above examples, it could be observed that the Akan source [ʊ] can be adapted as any vocalism specified for the feature [+round]. The adaptations, as we have just seen, could be influenced by either perceptual or phonological factors.

3.2.2. The adaptations of source [ɪ]

In this subsection, we discuss how the Akan source non-native [ɪ] is adapted in Ga. Just like [ʊ], Ga does not have the high front unadvanced vowel [ɪ] in its vowel system, and as such this vocalic segment has to be adapted.

3.2.2.1. Adaptation of source [ɪ] as [e]

From the results of the listening experiment above, it would be predicted that Ga speakers will mostly adapt this non-native vowel as [e], which also follows a cross-linguistic prediction based on perception. In the following examples in (19), this prediction is confirmed in how Akan source words with the non-native [ɪ] are adapted in Ga.

(19).	Akan	Ga	Gloss
i.	dàdɪ̀sɛ́ŋ́	dàdɛ̀sɛ́ŋ́	iron pot
ii.	kòŋ̀kòhɪ́nɪ́	kòŋ̀kòhɛ́né	chief fish-monger
iii.	àɥɪ̀rɛ̀hʊ́ẃ	àwɛ̀rɛ̀hó	grief, sadness
iv.	àtààdɪ́	àtàdɛ́, àtàlɛ́	dress, garment
v.	kùmɑ́ɑ́sɪ́	kʊ̃̀mɑ́ɑ́sɛ́	the city of Kumasi
vi.	kʷá'ɪ́	kʷáe	thick forest

From the examples above, it is observable that Ga speakers adapt the source non-native [ɪ] as [e] when it occurs in word-medial position, as evident in (19i) – (19iii), and in word-final position as found in (19iv) – (19vi). In 90, representing 53% of the occurrences, 171 occurrences of the source non-native vowels in the entries collected for this study, [ɪ] was adapted as [e]. This finding contradicts the

results of the perception test carried in which most Ga listeners perceived the stimulus [ɪ] rather as [i]. This is also supported by the findings from the perception test carried out in which an overwhelming 88% of Ga listeners perceived [ɪ] as [e].

This adaptation pattern by Ga speakers would be predicted on perceptual grounds, following what has been found out among languages that do not have this vocalic segment in existing literature. Again, as can be predicted, the adapted vowel shares F2 (i.e. frontness) with the source vowel. That is, both the source and the target vowels are front. Phonologically, the two vowels contrast in terms of height (F1) and ATR, thus while the former is a high vowel, the latter is a mid vowel. Similarly, while the former is specified for [-ATR], the latter has a positive value for the feature. This clearly strengthens the claim that the adaptation strategy employed here seems more perceptual than phonological.

In addition to the above adaptation strategy, there are two vowels which the non-native source vocalic segment can be adapted as. I discuss the two adaptation strategies as follows.

3.2.2.2. Adaptation of source [ɪ] as [i]

The Akan source non-native [ɪ] can be also adapted by the Ga speakers in some loaned words of Akan source as [i]. I exemplify this strategy as follows.

(20).	Akan	Ga	Gloss
i.	àbètɪ́ŋ̀, àbètɪ́nɪ́	àbètɪ́ŋ̀, àbɛ̀ŋtɪ́ŋ̀	a very old, tall palm tree
ii.	àɕɥɪ̀ɕɥɛ́	àʃʷɪ̀ʃʷɛ́	mirror
iii.	àhɪ̃̀ŋ̀kʷàá	àhɪ̃̀ŋ̀kʷɪ̀rá	King's servant, attendant
iv.	ɔkʷàsɪ̀á	kʷàʃɪ̀á	stupid person
v.	àfɪ̃́	áfɪ̃́	year
vi.	ɔbàŋ̀tɕɪ̀	bɑ̃̀ntʃɪ́	cassava

From the examples in (20) above, it can be observed that [ɪ] is adapted is as [i] in Ga in the context of word-medial position, as in (20i) – (20iv), and in word-final position, as in (20v) – (20vi). Again, from the frequency count, in 54 (i.e. 31%) occasions of out of the 171 instances of the adaptations of [ɪ], it is realised as [i] in Ga. The 31% frequency rate is a marked improvement on the very low rate of 3% frequency Ga listeners perceived the stimulus [ɪ] as [i] in the listening experiment.

From the discussions above, one can posit that the explanation for the adaptation strategy employed by Ga speakers will be to phonological factors rather than perceptual ones. That is, the fact that both the source and the target vowels are high, and in feature theory, both share the feature [high]. From acoustic perspective, Ga speakers preserve the F1 of the source vowel in the target vowel, in addition to preserving redundantly the F2 of the same source vowel. The

preservation of the height of the source vocalism can be captured and explained within OT as follows.

With regard to the set of constraints to be employed in the present analysis, we recall the same set of constraints and the constraint ranking used in accounting for a similar height adaptation used in 3.2.1.2. The only difference between the adaptation process analysed in Tableau 1 and Tableau 3 below is that while the input vocalic segment in Tableau 1 was [+round], the one for Tableau 3 is [-round]. And, despite the contrastive values for the feature round, the constraint IDENT-IO(Rd) can account adequately for the formalisation of the two input vowels in the two Tableaux.

Tableau 3: The adaptation of an Akan source [ɪ] as [i] in Ga

/ àfɪ́ / 'year'	*[+ high, -ATR]	IDENT-IO (Rd)	IDENT-IO (high)	MAX-IO(F)
a. [àfɪ́]	*!			
b.☞ [àfí]				*
c. [àfé]			*!	*
d. [àfá]			*!	
e. [àfú]		*!		*

Constraint ranking: *[+ high, -ATR], IDENT-IO(Rd) » IDENT-IO(high) » MAX-IO(F)

From Tableau 3 above, candidate (a) and candidate (e) both become suboptimal candidates for their fatal violations of the highly-ranked constraints *[+high, -ATR] and IDENT-IO(Rd) respectively. Candidate (a) violates the constraint because it

preserves the prohibited input vowel segment [ɪ], while candidate (e) also incurs violation mark for altering the frontness property of the input from front to back, which also violates MAX-IO(F). Candidate (c) and candidate (d) equally fatally violate the crucially-ranked constraint that demands the input vocalic segment and the output vocalic segment to share the feature [high]. While candidate (c) adapts the input high vowel as a mid vowel, candidate (d) adapts the same input as a low vowel. The former candidate incurs additional violation mark for MAX-IO(F) for deleting the input [-ATR] feature and replacing it with [+ATR], a constraint also minimally violated by candidate (b), the optimal candidate.

3.2.2.3. Adaptation of source [ɪ] as [ɛ]

There is a third strategy by which this source non-native vowel [ɪ] can be adapted by Ga speakers. This is through adapting it as [ɛ], though it is the vowel least expected to adapt [ɪ] as. This assertion is supported by the loan corpus gathered for this study, in which most of the time the source vowel is adapted as [e], followed by [i] ahead of [ɛ] in frequency of occurrence order (S. Rose, personal communication, 28th September, 2017). In the following examples in (21), I exemplify this adaptation strategy.

(21).	Akan	Ga	Gloss
i.	ɔtɪ̀mpɔ̃ŋ̀	tɛ́mpɔ̃ŋ́	path, way
ii.	tɕuɪ̀m	ʧʷɛ̀m	all together
iii.	ɔgùàntɪ́ŋ́	gʷɑ̃̀ntɛ̃́ŋ́	sheep; fool
iv.	àpísɔ́ẃ	àk͡pɛ́sɛ́ó, àpɛ́sɛ́ó	a small animal, the potto
v.	àtɕuɛ̀rí	àʧʷɛ̀rɛ́, àʧʷɛ̀lɛ́	fist, blow with the fist
vi.	ɔ̀tɕɪ̀ɑ̃́mɪ́	ɔ̀ʧàámɛ́	linguist, spokesman for a chief

In the examples above, the non-native source [ɪ] is adapted as [ɛ] in word-medial position in words, as seen in (21i) – (21iv), and as in word –final position in (21v) – (21vi). In 27 out of the 171 occurrences of [ɪ] in loaned words of Akan source, it was adapted as [ɛ]. This represents approximately 16% of the occurrences of the vowel. This figure is not too different from the 10% that perceived this source vowel as [ɛ] in the listening test. To explain the adaptation strategy in (21), we observe that the source vowel [ɪ] is closer to [i] in terms of F1 in the acoustic space, however, it is perceptually closer to [e] than it is to [ɛ] on both phonological (height) and perceptual grounds respectively.

Therefore, adapting the source high [-ATR] vowel as [ɛ], which is some phonetic distance away from the input, could be motivated by ATR factors, and obviously not by either height or proximity as is possibly with the other two vowels discussed already, namely [e] and [i]. That is, both the source and the target vocalic segments, in this example, have one phonological feature in common, that is, they are both [-ATR], apart from the obvious fact that both are also [+front].

Additionally, a cursory look at the data collected points to the fact that the target vowel [ɛ] very often (i.e. in 21 out of the 27 instances), occurs in the environment of [+nasal] segments. Could this possibly have effect on the adaptation strategy, as it is generally accepted in acoustics that nasals have a suppressing effect on vowels so that nasal or nasalised vowels fall below their oral counterparts in the acoustic space? Hence, could an intended perceptual adaptation of the source [ɪ] by Ga speakers with [e] have been suppressed further down to [ɛ] due to the effect of the neighbouring nasal segments? If yes, then how do we account for the context in which there are no nasal segments in the neighbourhood? Or is it the case of the speakers matching the source front [-ATR] vowel with the only front [-ATR] vowel in Ga in the adaptation process, just as was explained for the adaptation of source [ʊ] as [ɔ] in Ga? In either of the two, the effect of phonology is clearly significant to assume that the adaptation strategy employed here is phonological. This pattern of adaptation can be formalised in the OT as follows.

For the analysis in this sub-subsection, we employ the same set of constraints and the same constraint ranking in 3.2.1.3 to account for the phonological adaptation that is driven by ATR equivalence. This decision has been necessitated by fact of the argument made for the immediately preceding analysis. The Tableau analysis is thus presented as follows.

Tableau 4: The adaptation of source [ɪ] as [ɛ]

/ adʑʯíŋ / 'mud-fish'	IDENT-IO (Rd)	*[+ high, -ATR]	IDENT-IO (ATR)	MAX-IO(F)
a. [adʑʯíŋ]		*!		
b.☞ [adʑʯéŋ]				*
c. [adʑʯíŋ]			*!	
d. [adʑʯéŋ]			*!	*
e. [adʑʯɔ́ŋ]	*!			*

Constraint ranking: *[+high,-ATR], IDENT-IO(Rd) » IDENT-IO(ATR) » MAX-IO(F)

From Tableau 4, both candidate (a), the most faithful candidate, and candidate (e) become the least harmonic output forms due to their fatal violations of the two highly-ranked constraints IDENT-IO(Rd) and *[+high,-ATR] respectively. While candidate (a) fatally preserves the prohibited [ɪ], thereby violating *[+high,-ATR], candidate (e) adapts the front vowel as a back vowel in violation of IDENT-IO(Rd). By so doing, the latter also violates MAX-IO(F) in addition. Both candidate (c) and candidate (d) satisfy the two highly-ranked constraints by preserving the front value and also changing the prohibited input vowel, yet they

fatally violate the crucially-ranked constraint that ensures correspondence in ATR value between the input and the output forms. Candidate (d) incurs extra violation mark for adapting the input high vowel as a mid vowel in violation of MAX-IO(F). Candidate (b), the optimal candidate also violates MAX-IO(F), albeit minimally, also for adapting the input high vowel as a mid vowel. This analysis seems to be a matter of phonology rather than perception. If it were perceptual, one would have expected the candidate with [e], like candidate (d), to emerge, because as it has been established cross-linguistically, [e] sounds perceptually closest to [ɪ] among the three possible candidates, namely [e], [i], and [ɛ]. The speakers of Ga go for ATR equivalence, and among the three front vowels in Ga, it is only [ɛ] that shares similar ATR value i.e. [-ATR] with the source segment.

3.2.3. The adaptations of source [æ]

So far we have discussed the adaptations of two of the three non-native vowels of Akan source by Ga speakers. The third non-native vowel of Akan source whose adaptation we will discuss in this sub-subsection is the low vowel [æ]. This vowel is adapted systematically as [a] in Ga irrespective of the context within which it occurs.

3.2.3.1. Adaptation of source [æ] as [a]

In the following examples in (22), I show how this vowel is realised in Akan source words borrowed into Ga.

(22).	Akan	Ga	Gloss
i.	àkæ̃ńsí	àkã̄ŋ̃ʃ̃ĩ̃	competition
ii.	m̀pæ̃ǹtú	àk͡pã̄ǹtú	a kind of plantain, for fufu.
iii.	kæ̃ˈɗɸá	kãɗʒà	the root of a plant growing on ant-hills
iv.	pǣtú	pà̄tú	a bird, the owl; the unexpected, sudden
v.	dǣæ̀bí	dà̄à̀bí	no
vi.	dǣbídà	dà̄bídà	no, emphatic denial
vii.	kʷǣdú	àkʷà̄dú	banana

As noted above, the source non-native vowel [æ] is invariably adapted as [a], the closest vowel in the vowel space in terms of height and frontness. The only exception in the data is the adaptation of the word *bǽgʷúá* 'any meeting of elders', which is adapted as *bɛ̀gʷà *bàgʷà.* Unlike what obtained in example (22), interestingly only 2% of Ga listeners perceived this source vowel as [a] in the listening test. Majority of them (i.e. 58%), rather perceived it as [e], though it is adapted only as [a] by Ga speakers in the adaptation process. It is interesting to note that this source vocalism is sometimes perceived confusingly as [ɛ] even among some native speakers of Akan (especially students study the Akan

language) to the extent that they can even represent it orthographically as such. Thus, it would not have been out of place to expect Ga speakers to confuse [æ] as [ɛ] (see Flege & McKay's (2004) similar report on how Italian speakers confuse English vowel /æ/ and /ɛ/) if their adaptation of this source vowel is perceptually motivated.

Indeed, from the listening experiment conducted, few Ga listeners perceived the source [æ] as [ɛ]. However, as seen in the examples in (26) above, this source vowel is systematically realised as [a] in Akan loaned words in Ga. The most plausible explanation for this adaptation strategy seems to reside in the phonology. Phonologically, both the source and the target vowel are equivalent in sharing the feature [+low]. The only feature value that separates the two is the [ATR]; Ga has only the [-ATR] counterpart in its phonological system. This adaptation strategy can be straightforwardly accounted for within the OT theory as shown in the next sub-subsection.

We established from the discussion of the examples in (22) above that the illicit source vowel [æ] is invariably realised as [a] in loaned words of Akan source at word-medial position. Since this vowel is not realised at word-final position in the Twi dialect of Akan, no such examples were found in the data. The most plausible explanation for this adaptation strategy seems to reside in the phonology. Phonologically, both the source and the target vowels are equivalent in sharing the feature [+low]. The only feature that separates the two is the [ATR] feature; Ga has only the [-ATR] counterpart in its phonological system. In other words, the

source low [+ATR] vowel is adapted as the [-ATR] counterpart available in the Ga phonological system.

From the brief discussion above, it seems therefore, that speakers' adaptation is phonological rather than perceptual. They maintain height equivalence to the source segment. This adaptation strategy can be straightforwardly accounted for within OT framework as shown below.

To account for the prohibition of the vocalic segment [æ] in the output, the well-formedness constraint *[+low, +ATR] is introduced which is defined as follows:

(23). *[+low, +ATR]: A vocalic segment specified for [+low, +ATR] is prohibited

By ranking *[+low, +ATR] constraint highly, it will severely penalise any candidate that preserves this prohibited segment. As we observed from the data in (22), the source [æ] is invariably adapted as [a], both of which differ only in [ATR] value. Therefore, *[+low, +ATR] has to outrank the constraint that demands correspondents between input and outputs in terms of ATR i.e. IDENT-IO(ATR). The lower ranking of IDENT-IO(ATR) will ensure that the imminent violation of it by the optimal candidate will have minimal effect on it.

Again, just as has been done in the previous Tableaux analyses, two more constraints are adopted for the present analysis, namely IDENT-IO(Rd) and IDENT-IO(ATR). The former constraint is modified as IDENT-IO(low) to reflect

the that height, and not frontness, is the key factor in the adaptation process. This modified constraint is defined as follows:

(24). IDENT-IO(low): Correspondents in input and output have identical value for the feature [low]

Before we formalise how Ga speakers adapt Akan source non-native [æ], it will be expedient to establish the fact that this vowel in itself is not the input in Akan, but derived in the context of the environment of [+ATR] vowel. In the input in Akan, it is specified for [-ATR] but due to the higher ranking of the constraint AGREE(ATR) over IDENT-IO(ATR) and *[+low,+ATR], candidate with [æ] emerges as the optimal candidate. The AGREE constraint is defined as follows:

(25). AGREE(ATR): Segments agree in terms of the laryngeal feature [ATR]

AGREE(ATR) dominates IDENT-IO(ATR) and *[+low,+ATR] so that candidates that fail to apply ATR harmony rule where the context is ripe fatally the highly-ranked constraint. This is exemplified in Tableau 5 below.

Tableau 5: The realisation of [æ] in Akan

/ daabi / 'no'	AGREE(ATR)	IDENT-IO (ATR)	*[+low, +ATR]
a. [daabi]	*!		
b. ☞ [dææbi]		*	*

Constraint ranking: AGREE(ATR) » IDENT-IO(ATR), *[+low, +ATR]

Having discussed the realisation of the [+low,+ATR] vowel in Akan, we move to discussing the formalisation of the same vowel in Akan words borrowed into Ga in Tableau 6 below.

Tableau 6: The adaptation of the source [æ] as [a] in Ga

/ dææbi / 'no'	IDENT-IO (low)	*[+low, +ATR]	IDENT-IO (ATR)
a. [dææbi]		*!	
b.☞ [daabi]			*
c. [dɛɛbi]	*!		*
d. [deebi]	*!		

Constraint ranking: IDENT-IO(low), *[+low, +ATR] » IDENT-IO(ATR)

Tableau 6 shows the adaptation of an illicit source [æ]. As has been discussed in (22) above, the only option in repairing this source illicitness is through faithfully adapting the source height and only altering its ATR value. Therefore, the attempt by candidates (c) to adapt the source vocalism with the nearest vowel on the Ga

vowel space, which is [ɛ], fatally violates the highly-ranked IDENT-IO(low). The same candidate violates IDENT-IO(ATR) for changing the source [+ATR] to [-ATR]. The other candidate applies similar strategy of adapting the illicit source [æ] to the nearest vocalic segment is candidate (d). It also fatally violates IDENT-IO(low) just like candidate (c), however, it is better than candidate (c) for remaining faithful to the input by preserving its ATR value. Thus it satisfies the low-ranked IDENT-IO(ATR), though this does not improve its chance for optimality in any way. This strategy, however, results in the candidate fatally violating the highly-ranked constraint that demands that the output shares correspondence in height with the input, that is, IDENT-IO(low). This constraint is also fatally violated by a similar output, candidate (c) that additionally changes the ATR value of the input vowel in violation of IDENT-IO(ATR). Though candidate (b) also violates the latter constraint, its violation is insignificant in deterring it from emerging as the optimal candidate.

3.2.3.2. Summary of discussions

From the discussions made thus far, the following interim conclusions are made based on the adaptation strategies employed by the Ga speaker.

(26). Source Ga

a). [ʊ] → [o], but + [u] and [ɔ]

b). [ɪ] → [e], but + [i] and [ɛ]

c). [æ] → [a], but never [ɛ]

From the discussions, it is clear that neither phonological factors alone nor perceptual factors alone can comprehensively account for the strategies that Ga speakers adopt in the adaptation of non-native vowels of Akan source. For each of [ɪ] and [ʊ] perceptual as well as phonological motivations have been observed to inform how the speakers adapt these vowels to the phonological system of their language.

Acoustically, the F2 of the source vowel (i.e. frontness property) is anticipated and perceived by Ga speakers, hence the feature value [+round] is systematically preserved in all the three vocalic options that the source non-native segment is adapted as. A symmetrical interpretation also holds for the adaptation of source non-native vowel [ɪ] as [e], [i] or [ɛ] (S. Rose, personal communication, 28th September, 2017). The perceptual adaptations, as we have discussed, has been from the psycholinguistic point of view, which is espoused by Peperkamp (2004), following Best (1994), stating that "... non-native segments are assimilated to the closest available phonetic category by a phonetic decoding module that is part of the speech perception system" (Peperkamp 2004: 347, see also Peperkamp & Dupoux 2003). Peperkamp & Dupoux (2003: 368) explain further what the 'closest' implies by positing that, "… 'closest' is defined in terms of either acoustic proximity or proximity in the sense of fine-grained articulatory gestures…". They continue to discount the relevance of phonological factors by

observing that, "… thus, phonological proximity as reflected in the featural structure of segments is irrelevant."(Peperkamp & Dupoux 2003: 368).

The first part of the argument for the perceptual motivations in the adaptation process has been attested in the present thesis with the discussion of how Akan source non-native high vowels; front and back, are adapted as [e] and [o] respectively in Ga. Cross-linguistic studies on perception of non-native vocalic segments have also lend credence to this perception. However, evidence from the adaptation of Akan source non-native vocalic segments in Ga does not seem to support the second part of the argument that seeks to claim that all perception does in the model for the adaptation is by relegating the role phonology can play in the process.

As has been discussed already, a source non-native vowel [ɪ] is adapted as three different vowels, namely [e], [i], and [ɛ]. Putting [e] aside, it makes complete phonological sense to postulate that adapting the source [ɪ] as [i] is a straightforward process; it is a matter of faithfully adapting the entire feature matrix of the source save the value for the feature [ATR]. The only contrast (phonological difference) between the source vowel and the target vowel is that, while the former is [-ATR], the latter is [+ATR]. Again, how does perception ('closest available category') explain why, say, a source [ɪ] is adapted as [ɛ]. Could [ɛ], a mid vowel, be the closest available category to the source non-native high vowel in Ga? The answer is obviously no! In the vowel space, [ɪ] occurs between [i] and [e] in the source Akan, and it has been claim already in this section that the

source being adapted as the latter could well be perceptually defined. However, there seems to be no perceptual motivation for it to be adapted as a vowel further away from it in the vowel space as the perceptionists, especially Peperkamp & Dupoux (2003), Peperkamp (2004), seek to claim. In feature theory, both [ɪ] and [ɛ] differ in the feature [high], as has been explained already.

3.3. Adaptations of Akan source non-native vowels in Dangme

In this section, we look at how Dangme speakers also adapt the three non-native Akan source vowels. The section specifically looks at the strategies Dangme speakers employ in adapting non-native vowels. The discussions on Dangme also focus on the context of adaptation, frequency of occurrence, and the model that might have informed the adaptations. In a similar fashion, we will formalise the discussions within the OT.

In the discussion of the segmental inventories of the targeted languages, it would be recalled that we realised there are three vowels present in Akan which are not found in the vocalic inventory of Dangme. These non-native vowels, we listed as [ʊ], [ɪ], and [æ]. In this subsection, we discuss in detail how these non-native vowels are realised in some Akan loaned words in Dangme. Just as we did in the previous section, we precede the main discussions with results of the listening experiment conducted and their implications for the analyses. Following the universal perception of the three non-native vowels of Akan source, we would expect them to be adapted in Dangme as follows:

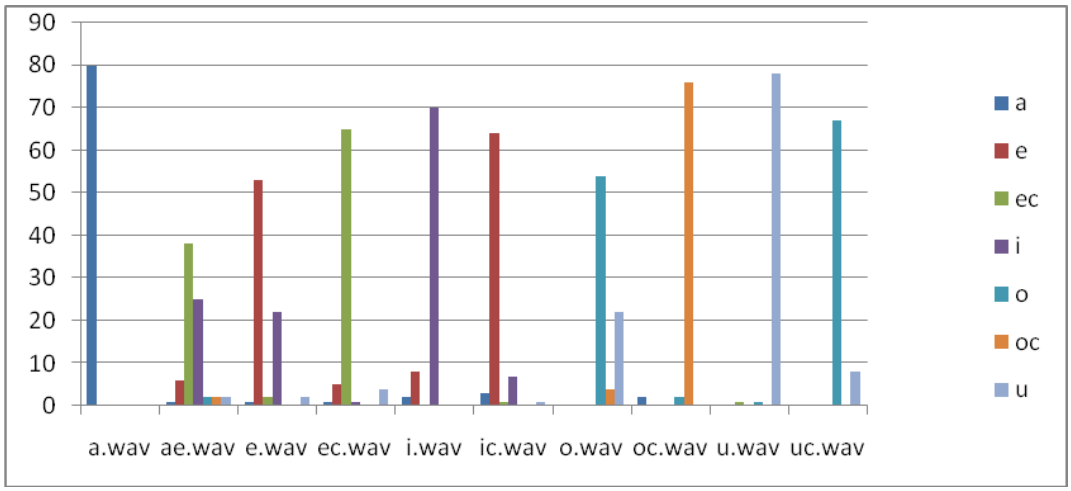

Figure 3: Results of Dangme speakers listening experiment

From Figure 3 above, just as was done for Figure 2, we observe the results of a listening experiment that was carried out to test Ga listeners' perception of all the ten vowels of Akan. Here too, in Figure 3, the ten Akan vowels are represented on the horizontal axis, while the number of times an Akan stimulus vowel is perceived as one of the seven oral vowels present in Dangme is on the vertical axis. Again, our focus is on Dangme listeners' perception of the three Akan source vowels, [ɪ], [ʊ] and [æ].

I begin the analysis with [æ]. It came out from the results that on 38 out of 76 occasions, [æ] was perceived as [ɛ]. This represents 50% of the responses for the perception of [æ]. Surprisingly, on only once, which represents an underwhelming 1.3%, was [æ] perceive as [a]. It came out rather surprisingly that 25 out of the 76 responses was the stimulus perceived as [i]. This figure represents an unexpected 33% frequency rate. As we shall see later in this section, an Akan

source [æ] is never adapted as [i] in the adaptation process. I could not immediately explain why such an unusual perception. Perhaps further experimentation has to be carried to ascertain whether or not this pattern will be repeated.

With regard to the stimulus [ɪ], it was perceived as [e] on 64 out of 76 occasions. This represents 84% frequency rate. On 7 occasions, which represents 9.2%, [ɪ] was perceived as [i]. The same stimulus was perceived as [ɛ] only once (i.e. 1.3% frequency rate).

The stimulus [ʊ] was perceived as [o] on 67 out of 75 times. This represents 89% frequency rate. On the remaining 8 occasions, representing 11%, [ʊ] was perceived as [u] by Dangme listeners. The pattern of the perception of the stimuli by Dangme speakers is similar to that by Ga speakers in the earlier analysis of the perception test. One major difference is that unlike by Ga listeners, 33% of the time, the stimulus [æ] was unexpectedly perceived as [i] by Dangme listeners. The same stimulus [æ], on the other hand, was perceived as [a] rather only once by the same speakers.

Following this pattern of perception, the following assumptions are made regarding how Dangme speakers would adapt the stimuli in the process of adapting Akan source words in Dangme.

(27). Assumptions based on Dangme speakers' vowel perception

	Akan		Dangme
a).	[ʊ]	→	[o]
b).	[ɪ]	→	[e]
c).	[æ]	→	[ɛ]

In the rest of the subsection, the assumptions above are tested with some empirical data from Akan loanwords in Dangme as follows.

3.3.1. The adaptations of source [ʊ]

Just as we did in the preceding section with the hypothesis about the adaptations of non-native vocalic segments based on cross-linguistic patterns (cf. LaCharité & Paradis 2002, Flege 2003, Flege & McKay 2004, among others), we test these hypotheses against the strategies Dangme speakers employ in adapting some words of Akan source to their vocabulary.

3.3.1.1. Adaptation of source [ʊ] as [o]

In the following examples, I show that the source [ʊ] can be realised as [o] in Dangme in consonance with the results of the perception experiment among Dangme listeners.

(28).	Akan	Dangme	Gloss
i.	àdʊ̀wá	àdʊ̀wá	royal antelope
ii.	ànʊ̀kʷárí	ànʊ̀kʷálé	fact, truth
iii.	ɔbʊ̀̃ǹsā́ḿ	abʊ̀sī́ā́ḿ	devil
iv.	ɔ̀pàpʊ̃́	àk͡pàk͡pʊ́, k͡pàk͡pʊ́	male goat, he-goat
v.	àsàfʊ̀	àsàfʊ̀	group, company, congregation
vi.	àqìrɛ̀hʊ́	àjùrɛ̀hʊ́, àwìlɛ̀hʊ̀,	grief, sorrow, sadness
vii.	bàbàsʊ̀	bàbàsʊ̀, bàbàsʊ̀	venereal disease, gonorrhoea

From the examples in (28), it can be observed Dangme speakers, just like we saw with Ga speakers, adapt the non-native [ʊ] as [o] in Akan loaned words. The contexts of this adaptation strategy are in word-medial position, as seen in (28i) – (28iii), and in word-final position, as in (28iv) – (28vii). With regard to the frequency of occurrence, out of the 46 occurrences, in 30, which represents approximately 65% of the time, [ʊ] is adapted as [o]. This is similar to the 67 out of 75 occurrences realised in the listening test. The adaptation strategy here follows the cross-linguistic perceptual pattern claimed for similar adaptation in Ga in the preceding section. The explanation, here and there as well, is that since Dangme speakers do not have the source [ʊ] in their sound system, the go for the perceptually closest vocalic segment in their vowel space, [o], in place of [ʊ].

Aside from [ʊ] being adapted as [o], there are two more strategies thorugh which Dangme speakers can adapt this non-native Akan source vowel.

3.3.1.2. Adaptation of source [ʊ] as [u]

In the following examples, we discuss how the adaptations are done. I begin the discussions with the example in (29) below.

(29). Akan	Dangme	Gloss
i. ɔbʊ̄̀nsā́ḿ	àbʊ̀sáḿ, àbʊ̀sī́ā́ḿ	devil
ii. æ̀ʤ̀ìnā̀mʊ̄̀á	àʤ̀làmʊ̄̀á	domestic cat
iii. bʊ̀á	bʊ́á	help
iv. sìàdìbʊ́á	sìàlèbʊ́á	hedgehog
v. ɔ̀kʊ́ḿbɔ̀m̀mɔ̀fʊ́ɔ́	ɔ̀kʊ́ḿ-mɔ̀mɔ̀fʊ̄ɔ	poisonous twig/vine snake
vi. fʊ̀tʊ́	fʊ́tŕʊ́	treasure

In (29) above, we observe that the non-native source [ʊ], which is specified for [+high, -ATR] is replaced with an equivalent high back vowel [u], which is present in Dangme. Unlike in the previous examples, from the data collected, this adaptation strategy occurs in non-final position only. And for the frequency of occurrence, it occurs in 12 out of 46 instances, which represents 26% frequency

rate. This is an improvement over the 11% occurrence that Dangme listeners perceived [ʊ] as [u] in the listening experiment.

A closer look at the source and the target vowels points to the fact both differ only in their values for the feature ATR; while the former is [-ATR], the latter is [+ATR]. Therefore, positing phonological factors for the adaptation strategy as has been done already that the speakers adapt [ʊ] as the phonological equivalent vowel [u] becomes more straightforward than perceptual factors.

In the following Tableau analysis, we formalise this adaptation strategy within the OT. From the discussion above, one can observe striking semblance to the analysis that was made in 3.2.1.2. I, therefore, employ the set of constraints and the ranking that was used for the Ga examples in Tableau 7 below.

Tableau 7: The adaptation of the Akan source [ʊ] as [u] in Dangme

/ bʊ̀á / 'help'	*[+ high, -ATR]	IDENT-IO (Rd)	IDENT-IO (high)	MAX-IO(F)
a. [bʊ̀á]	*!			
b. ☞[búá]				*
c. [bóá]			*!	*
d. [bɔ́á]			*!	
e. [báá]		*!	*	

Constraint ranking: *[+ high, -ATR], IDENT-IO (Rd) » IDENT-IO (high) » MAX-IO(F)

For preserving the prohibited input vocalic segment [ʊ], candidate (a) incurs fatal violation of the highly-ranked well-formedness constraint *[+high, -ATR], a constraint that bans this segment in the output forms. All the other candidates avoid violating this constraint by altering some feature of the input vowel in some way. However, for adapting this rounded vowel as an unrounded vowel, candidate (e) also incurs fatal violation mark for IDENT-IO(Rd), another highly-ranked constraint in Tableau 6. Also adapting a high vowel as a low vowel, candidate (e) gets extra punishment for violating IDENT-IO(high). The IDENT-IO(high) is also violated by candidate (c) and candidate (d) due to their replacement of the input non-native high vowel with mid vowels [o] and [ɔ] respectively. Their violation of this constraint is fatal due to its high ranking. The former receives extra violation mark for violating the lowly-ranked MAX-IO(F), for adapting a [-ATR] vowel as a [+ATR] vowel. This lowly-ranked constraint is also violated by the eventual winner of the competition, candidate (b), also for the same reason. This constraint being the only constraint candidate (b) violates, its violation does not significantly affect its optimality in the Tableau.

3.3.1.3. Adaptation of source [ʊ] as [ɔ]

In the following discussion, I look at the last strategy that Dangme speakers employ in adapting the non-native [ʊ] aside from the two previous strategies. In (30) below, I provide examples of this strategy.

(30). Akan	Dangme	Gloss
i. àkʊ́kɔ́ʤɑ́ń	àkɔ́kɔ́ʤáí	a kind of domestic fowl
ii. àkʊ́kɔ́bɛ́sɑ́	àkɔ́kɔ́bɛ́sɑ́	sweet smelling shrub
iii. ànʊ̀kʷárí	ànɔ̀kʷálé	truth, fact

From (30) above, we observe that Dangme speakers can adapt the source non-native [ʊ] as [ɔ] in some loaned words of Akan source. Surprisingly, however, in the listening experiment carried out, none of the 20 Dangme listeners perceived the non-native [ʊ] as [ɔ] as can be seen in Figure 2. In terms of frequency count, this adaptation strategy occurs only 4 times, representing 9% of the total occurrence in data collected. The target [ɔ] differs from the source [ʊ] only in terms of height. In other words, aside from their roundness property, the two vocalic segment share value for the ATR feature. It is therefore concluded that the speakers map the non-native source [-ATR] vowel to the only [-ATR] back vowel in Dangme during the adaptation process. Hence, the model for this adaptation is phonological, i.e. to attain equivalence in the value for the phonological feature [ATR]. This conclusion is in line with a similar pattern observed with the Ga case considered in the preceding subsection.

Just as was done for the analysis of the preceding Tableau 7, we use the same set of constraints and the same ranking we employed in the analysis of a symmetrical strategy in Ga in 3.2.1.3 in the formalisation of the pattern discussed above.

Tableau 8: The adaptation of the Akan source [ʊ] as [ɔ] in Dangme

/ ànʊ̀kʷárí / 'truth, faith'	IDENT-IO (Rd)	*[+ high, -ATR]	IDENT-IO (ATR)	MAX-IO(F)
a. [ànʊ̀kʷálé]		*!		
b. [ànòkʷálé]			*!	*
c. [ànʊ̀kʷálé]			*!	
d. ☞ [ànɔ̀kʷálé]				*
e. [ànɐ̀kʷálé]	*!			*

Constraint ranking: IDENT-IO(Rd), *[+high, -ATR] » IDENT-IO(ATR) » MAX-IO(F)

So far from the data discussed in both Ga, in the previous subsection, and in Dangme, presently, it has been generally observed that the non-native source [ʊ] is not adapted as [a]. This observation is supported by the outcome of the listening experiment conducted among the Dangme listeners where none of them perceived [ʊ] as [a]. Therefore, for candidate (e) to adapt this non-native input vowel as [a] results in fatal violation of the highly-ranked constraint that demands that an input [+round] vowel has a correspondent [+round] in the output.

Similarly, preserving the banned [ʊ] in the output as is done in candidate (a) also results in the fatal violation of the equally highly-ranked*[+high,-ATR], a constraint which prohibits the non-native vowel. For adapting the source [-ATR] vowel as [+ATR] vowels, both candidate (b) and candidate (c) also incur fatal violation marks for crucially-ranked IDENT-IO(ATR). And adapting the input

[+high] vowel as a [-high] vowel, candidate (b) is penalised additionally for this offence for violating MAX-IO(F). The MAX-IO(F), which is the lowest-ranked constraint in the present Tableau is also violated by candidate (d), albeit minimally, for also adapting the input [ʊ] as [ɔ]. Due to the low ranking of MAX-IO(F), candidate (d) emerges as the optimal candidate for this Tableau.

3.3.2. The adaptations of source [ɪ] in Dangme

In the following subsection, I discuss the strategies Dangme speakers employ in the adaptations of the non-native Akan source [ɪ]. Just as was observed with Ga speakers in the preceding section, Dangme speakers employ different strategies in the process of adapting the Akan source non-native vowel [ɪ].

3.3.2.1. Adaptation of source [ɪ] as [e]

In the following discussions I talk about each of these strategies in the adaptation process. The discussions on Dangme also focus on the context of adaptation, frequency of occurrence, and the model that informed the adaptations.

(31).	Akan	Dangme	Gloss
i.	àdí̱ˈbɔ́	àdé̱bɔ́	creation, nature
ii.	àpḯ́m	àpé̱m	a kind of plantain, with thin fingers
iii.	tɕí̱nā́m	ké̱nā́mḯ́	fried fish

iv.	àdí̲	àdé̲	creation, the created world
v.	ŋ̀ká'tí̲	ákátḛ́	groundnut
vi.	wɔ̀fà̰sí̲	āfà̰sḛ́	sister's child; matrilateral cousin
vii.	àmà̰nḭ́	àmà̰nḛ́	death, trouble, calamity
viii.	àpḭ́m̀	àk͡pḛ́	thousand

In (31) above, it is observable that the non-native source [ɪ] is adapted as [e] in word-medial position, as in (31i) - (31iii), and in word-final position, as seen in (31iv) – (31viii). In all, a total of 68 occurrences of such adaptations are identified in the data for this study. Out of the number, on 42 instances the non-native source is adapted as [e]. This represents approximately 62% frequency rate. From the examples above, it can be that [ɪ], being adapted as [e] by Dangme speakers, can be predicted on perceptual grounds as the experiment results have shown. In the listening experiment, an overwhelming 84% of the Dangme listeners perceived this non-native vowel as [e]. In terms of phonology, the only property that the source and the target vowel share is F2 (i.e. frontness). Aside from this property, they have nothing phonological in common. That is, the two vowels contrast in two phonological ways; while the source vowel is high, the target vowel is mid. Similarly, while the source is specified for [-ATR], the target is specified for [+ATR]. Based on these, it stands to reason that the model for this adaptation strategy is perception than it is phonology.

3.3.2.2. Adaptation of source [ɪ] as [i]

There are other strategies that Dangme speakers employ in adapting the non-native source [ʊ] to their phonological system. In the following examples, I illustrate one of these strategies.

(32). Akan	Dangme	Gloss
i. ŋkáˈtíɛ́	káˈtíɛ	groundnut
ii. àɕqìɕqɛ́	àhìhʷíɛ́, àjìhúɛ́	mirror
iii. àqìrèhó	àwīlèhó	grief, sorrow, sadness
iv. àmǎnǐɛ̋	àmǎníɛ́	story, case, event, matter, news
v. kàí	káì	remind, remember, recollect
vi. ámpǎnɪ̋	ápāní	edible species of bat, esp. rosette bat
vii. m̀mɔ̀dɪ́ń	mɔ́dí	effort, esp. successful effort

From the examples in (32) above, we observe that the non-native source [ɪ] is adapted as [i] in both word medial and word-final positions, as can be seen in (32i) - (32iv) and (32v) – (32vii) respectively. From the data, out of the 68 occurrences of the adaptation of this non-native source vocalism, 22 of them, representing 32%, are instances of replacing it with [i]. This figure is an improvement on the

only 9% of Dangme speakers who perceived the non-native vowel as [i] in the listening experiment reported above.

Just as was done with the Ga adaptation, it can be explained that this adaptation strategy is motivated by phonological factors rather than perceptual ones. The source and the target vowels are both high and front. In acoustic terms, the two vowels share both the F1 and the F2 properties. They differ only in terms of their values for the [ATR] feature. In the following OT analysis, we account for the phonological adaptation of the non-native source vocalism.

In formalising the vocalic height adaptation in Dangme, we employ the same set of constraints and the constraint ranking that were used for similar height adaptation strategy in the preceding section for Ga in 3.2.2.2 for the avoidance of repetitions.

Tableau 9: The adaptation of Akan source [ɪ] as [i] in Dangme

/kàɪ́ / 'remember, remind'	IDENT-IO (Rd)	*[+high, -ATR]	IDENT-IO (high)	MAX-IO(F)
a. [káì]		*!		
b.☞ [káì]				*
c. [káè]			*!	*
d. [káà]	*!		*	
e. [káù]	*!			*

Constraint ranking: IDENT-IO(Rd), *[+high, -ATR] » IDENT-IO(high) » MAX-IO(F)

From Tableau 9, candidate (d) and candidate (e) are suboptimal candidates due to their fatal violation of the highly-ranked IDENT-IO(Rd). This violation results

from their altering of the input front vowel to central and back vowels respectively. In addition to this, the two candidates are penalised for adapting input high vowel as a low and changing input [-ATR] to [+ATR] respectively. Another candidate that fatally violates another highly-ranked constraint *[+high, -ATR]. The competition is then left between candidate (b) and candidate (c). The latter falls out of the competition due to its fatal violation of the deciding constraint; IDENT-IO(high) for adapting [+high] as [+low]. Candidate (b), the eventual winner avoids violating this crucially-ranked constraint by adapting the input high vowel as a high vowel. However, by altering the input [-ATR] as [+ATR]. Due to the low ranking of the MAX-IO(F), the optimality of candidate (b) is not affected.

3.3.2.3. Adaptation of source [ɪ] as [ɛ]

It is not only the two strategies discussed above that Dangme speakers employ in to adapt the Akan source non-native [ɪ]. There is a third way by which the vowel [ɪ] can be adapted in Dangme. In the following examples, I illustrate this adaptation strategy.

(33). Akan	Dangme	Gloss
i. àjɪ̱f(ʊ)ɾɔ́	àjɛ̱fĺó, àjɛ̱fĺóò	bride, newly married woman
ii. àqìrɛ̀hʊ́	àwɛ̀rɛ̀hó	grief, sorrow, sadness
iii. ʤɸqɪ̱̋ŋ̍	ʤʒʷuɛ̱	reason, think

iv. ɔtɕɪ̃ɑ̃ˈmɪ̃́ ɔtʃʃɪ̃ɑ̃ˈmɛ̃́ spokesperson, linguist

From the examples in (33) above, it is observable that [ɪ] can be adapted as [ɛ] in word-medial position, as seen in (33i) – (33ii), and in word-final position, as in (33iii) – (33iv). This adaptation strategy has a limited occurrence in the data (i.e. 5 out of 68), representing 6%. Just as was explained for a similar strategy by Ga speakers, the source [ɪ] would have been adapted as [i] if vowel height was the main motivation for the adaptation. Similarly, [ɪ] would have been adapted as [e] on perceptual grounds since [ɪ] should be perceptually closer to [e] than any other vowel in Dangme. Therefore, positing either height or perceptual adaptation to explain the strategy might not be as plausible as ATR adaptation would. In either of the two, the effect of phonology is significant enough to assume that the adaptation strategy employed here is phonological. This adaptation pattern can be formalised within OT as shown below.

Just as has become a practice in this section, we fall on the constraints that were used for the analysis of a similar adaptation strategy in Ga in the preceding section in 3.2.2.3. In Tableau 9 below, I formalise this in OT.

Tableau 10: The adaptation of source [ɪ] as [ɛ]

/ɔtɕɪ̀ɪ́ˈmɪ̱́/ ‘spokesperson’	IDENT-IO (Rd)	*[+ high, -ATR]	IDENT-IO (ATR)	MAX-IO(F)
a. [ɔtʃɪ̀ɪ́ˈmɪ́]		*!		
b.☞[ɔtʃɪāˈmɛ́]				*
c. [ɔtʃɪāˈmí]			*!	
d. [ɔtʃɪāˈmé]			*!	*
e. [ɔtʃɪāˈmɔ́]	*!			*

Constraint ranking: IDENT-IO(Rd), *[+high, -ATR] » IDENT-IO(ATR) » MAX-IO(F)

From Tableau 10 above, we observe that both candidate (a) and candidate (e) fatally violate the two highly-ranked constraints in the Tableau for preserving a prohibited vowel and adapting a front vowel as a back vowel respectively. And by so doing, candidate (e) incurs violation mark for the lowly-ranked MAX-IO(F). Both candidate (c) and candidate (d) follow the two candidates in becoming suboptimal candidates for also fatally violating the deciding constraint; IDENT-IO(ATR). The violation is due to the fact that they have adapted the input [-ATR] vowel as a vowel with a [+ATR] feature value. For also adapting an input high vowel as a mid vowel, candidate (d) violates MAX-IO(F), a constraint also violated by candidate (b), the optimal candidate, albeit the only violation mark it incurs in the Tableau.

3.3.3. The adaptations of source [æ] in Dangme

In the following subsection, we look at how the source non-native [æ] is adapted in Dangme. Unlike what was observed in Ga, where this source vowel is systematically adapted as [a] in Dangme, it can be adapted as two different vowels which we discuss below.

3.3.3.1. Adaptation of source [æ]as [a]

In the examples in this sub-subsection, I discuss one of the vowels with which the Akan source non-native [æ] can be adapted in Dangme. I show that this adaptation is motivated by phonological equivalence.

(34).	Akan	Dangme	Gloss
i.	àsímæ̰̀sí	àsímà̰sí	so-and-so, what's-his-name
ii.	dæ̰æ̀bí	dà̰à̀bí	no, negative response
iii.	dæ̰bídà	dà̰bídà	no, emphatic denial
iv.	m̀pæ̰̀ntú	k͡pà̰tú	big-fingered *Musa paradisiaca*
v.	pæ̰tú	pà̰tú	a bird, an owl
vi.	sæ̰̀ŋkú	sà̰ŋkṹ	hand-piano/organ

From the examples above, the source non-native [æ] is adapted as [a] in word-medial position. In terms of frequency of this adaptation, out of the 40 such adaptation, 30 are done as [a], which represents 75% of the occurrences. This figure is in sharp contrast to the only 1 out of the 76 times that Dangme listeners perceived the Akan stimulus [æ] as [a]. The phonological explanation for this adaptation strategy could be that both the source and the target vowel are equivalent in sharing the feature [+low], they differ only in the value for the feature [ATR]. The source vowel is specified for [+ATR], while the target vowel has [-ATR] specification.

In formalising the adaptation of [æ] as [a], I adopt the same set of constraint and the ranking employed in 3.2.3.1 for a similar segment in the present analysis.

Tableau 11: The adaptation of the Akan source [æ] as [a] in Dangme

/ sæ̀ŋkú / 'hand-piano'	IDENT-IO (low)	*[+low, +ATR]	IDENT-IO(ATR)
a. [sæ̀ŋkú]		*!	
b.☞ [sà̀ŋkű]			*
c. [sèŋkű]	*!		*
d. [sèŋkű]	*!		

Constraint ranking: IDENT-IO(low), *[+low, +ATR] » IDENT-IO(ATR)

From Tableau 11, we observe that the four different candidates employ different strategies in adapting the prohibited input vocalism each of which follow the

phonotactics of the language. However, due to the relatively high ranking of IDENT-IO(low), candidate (c) and candidate (d) which adapt input low vowel as mid vowels become suboptimal. Also, for candidate (c) adapting an input [+ATR] as [-ATR], it violates IDENT-IO(ATR) in addition. Candidate (a), which is the most faithful output form is also ruled out for the race of optimality due to its fatal violation of another highly-ranked constraint, for retaining the illicit input vowel [æ], though this is the only constraint it violates. Candidate (b) then emerges as the optimal candidate for minimally violating the lowly-ranked IDENT-IO(ATR) for adapting the input [+ATR] low vowel as [-ATR] low vowel.

As it was with Ga, it has also been observed in Dangme that the speakers correctly anticipate the frontness property of the source non-native vowels; hence they almost invariably adapt a non-native front vowel as a front vowel.

3.3.3.2. Adaptation of source [æ] as [ɛ]

Aside from the source non-native [æ] being adapted as [a], the same vowel can be realised as [ɛ] in some Akan loaned words in Dangme. I illustrate this in the following examples.

(35).	Akan	Dangme	Gloss
i.	dæ̱æ̀bí	dɛ̱̀bí	no, negative response
ii.	dæ̱bídà	dɛ̱̀bídà	no, emphatic denial

iii.	kɔ̀kɔ̀sæ̱tɕì	kɔ̀kɔ̀sɛ̱̀tʃî	a title for the vulture
iv.	pàtæ̱kú	pétɛ́kú	hyena
v.	àkæ̱ǽtíá	àklɛ̱́tīa	chimpansee, baboon

From the examples in (35), it is can be seen that at the word-medial position, the source [æ] can also be adapted as[ɛ], in addition to [a], in Dangme. Though this adaptation strategy is found in 5 out of the 40 occurrences, representing approximately 13%, it is significant to report that unlike in Ga, the source non-native vowel can be realised as the front mid vowel in Dangme.

This adaptation can be explained acoustically that Dangme speakers perceive the low vowel more front than central in non-initial position. It is interesting to note from figure 2 that out of the 76 occasions Dangme speakers listened to the source vowel, exactly half of them perceived it as [ɛ] in the listening experiment conducted. Again, in the vowel space of Akan, [æ] is closer to [ɛ] than it is to [a] in both F1 and F2 values, and this even makes it harder for non-native speakers of Akan and other languages that do not have this vowel to perceive it differently from [ɛ]. It is so even with non-linguist native speakers.

A more puzzling case is where the source non-native low vowel is realised as [e] in an exceptional example where *akæætia* 'chimpanzee, baboon' has another variant [àkeetɛ̀̂ia] in Dangme. As has already been pointed out, Dangme has five dialects which are divided into two major dialects groups, namely the coastal and

the non-coastal dialects. Though it is yet to be confirmed, the source word (the input) could be the Fante dialect variant; *akeeɪsia*, instead of the Twi variant. In that case, it is hypothesised here that the word could have entered Dangme through the coastal Dangme with the Fante variant (i.e. with [e]) as the entry word in those dialects, while the Twi variant (i.e. with [æ]) could have entered through the non-coastal dialects perhaps both happening at the same time. This might explain why the two variations exist in Dangme.

In the following subsection, I provide an interim summary for the adaptations of the Akan source non-native vowels in Dangme.

3.3.4. Summary of discussions

From all the discussions thus far, the following interim conclusions can be made based on the adaptation of phonological patterns employed by Dangme speakers when adapting segments of Akan source into Dangme. In the following examples, we observe that an Akan source non-native vowel which is rounded is adapted as any of the rounded vowels in Dangme. Similarly, a source non-native front vowel is realised as any of the three front vowels in Dangme.

(36). Source		Dangme
a). [ʊ]	→	[o], but + [u] and [ɔ]
b). [ɪ]	→	[e], but + [i] and [ɛ]
c). [æ]	→	[a]/[ɛ]

From the discussions above, just as was made about similar patterns observed in Ga, it is obvious that phonology or perception alone cannot comprehensively account for the strategies Dangme speakers employ when adapting non-native vowels of Akan source into Dangme. But rather a combination of both perceptual and phonological factors account for such adaptations.

However, due to the high ranking of the well-formedness constraints that ban these non-native vowels, the speakers' adaptations may be motivated by either perception or phonology. And in the latter, factors such as the height and the ATR value of the source vowel may inform the strategy the speakers employ in the adaptation process. And for the perceptual adaptations, I repeat, for emphasis, the explanation provided earlier in the preceding section from the psycholinguistic point of view following Peperkamp & Dupoux (2003), Peperkamp (2004), among others here that "... non-native segments are assimilated to the closest available phonetic category by a phonetic decoding module that is part of the speech perception system" (Peperkamp 2004: 347 following Best 1994; see also Peperkamp & Dupoux 2003).

3.4. Summary of the chapter

This chapter has discussed the adaptation strategies employed in borrowing some Akan source vocalic segments by both Ga and Dangme speakers. The discussions have centred on the adaptations of the Akan source non-native vocalic segments in the two target languages.

With regard to the model that influences the adaptations by speakers of the two target languages, it was concluded that both perceptual and phonological factors interplay in driving the adaptations. For the perceptual explanation, it was concluded that both Ga and Dangme speakers go for the perceptually closest vocalic segment available in their vocalic inventories in place of the Akan source non-native ones. The other adaptation patterns were also attributed to phonological factors, where the speakers considered the height or the ATR value of the source vowels in their adaptation process. In terms of OT accounts for the adaptations of the source non-native vowels, the conclusion is that it is the crucially high-ranking of the faithfulness constraint IDENT-IO(Rd) over MAX-IO(F), in addition to satisfying the markedness constraints *[+low,+ATR] and *[+high,-ATR], that ensures that the optimal candidate always maintains the source roundness though the height of the input vowel may be altered in the output.

It was finally concluded, based on the discussions, that either phonology alone or perception alone cannot comprehensively account for the phonological adaptation patterns both Ga and Dangme speakers employ in incorporating some Akan source segments in their respective languages. As a comparison, it was also observed that there is much resemblance in the patterns that speakers of the two target languages employ in the adaptation processes than they differ in.

I briefly compare and contrast the adaptation strategies for the Akan source non-native [ɪ], [ʊ], and [æ] in the following table.

Table 11: Adaptations of Akan source non-native vowels in Ga and Dangme

Akan source vowel	Ga			Dangme		
i. [ɪ]	e	i	ɛ	e	i	ɛ
ii. [ʊ]	o	u	ɔ	o	u	ɔ
iii. [æ]	a			a	ɛ	

CHAPTER FOUR

AKAN CONSONANTAL ADAPTATIONS IN GA AND DANGME

4.1. Introduction

In this chapter, I discuss the adaptations of some Akan source consonants in Ga and Dangme. The chapter specifically looks at how the Akan source labial-palatals and labial-palatalised consonants, which are non-native in both Ga and Dangme, are realised in some Akan borrowed words in Ga and Dangme. The chapter also considers how some Akan source consonants, though present in both Ga and Dangme, yet are adapted due to the restrictions on the distributions in the target languages. The discussions that will be made in this chapter are formalised within the OT framework.

In section 4.2, I discuss the adaptations of the labial-palatals and labial-palatalised consonants of Akan source in Ga and Dangme. I look at how and why the Akan source palatal fricative, though present in Ga, yet is still adapted in the same section. In section 4.3, on the other hand, I discuss how these source labial-palatals and labial-palatalised consonants are realised in Dangme. Section 4.4 discusses the adaptations of the illicit source word-final labial-velar fricative [w] in Ga. And in section 4.5, I discuss the how this labial-velar fricative is realised in Dangme at word-final position. It is shown that either delete or vocalic the word-final [w] when repairing this positionally ill-formed segment. Finally, I summarise the discussions of the chapter in section 4.6.

4.2. Adaptations of Akan source non-native consonants in Ga

In this section, we look at how some Akan source consonants that are not present in the consonantal system of Ga are adapted in Ga. These consonants, as we saw in chapter one, are the labial-palatals in Akan as well as the labial-palatalised consonants, which are realised at the phonetic level of representation. But before we discuss the examples of Akan loaned words with labial-palatal and labial-palatalised consonants, it will be appropriate we discuss first the labial-palatalisation process in Akan to serve as a background to the main discussion to follow.

The process and the context of the labial-palatalisation in Akan have been discussed by Abakah (2012), following Ladefoged (1993), as follows:

> To begin with, when a sequence of [LABIAL] and [CORONAL] vowels follow a set of consonants in Akan, both vowels superimpose their C-Place [LABIAL] and [CORONAL] articulator features on the preceding consonant[,] provided the requisite conditions are met. For instance, when an anterior coronal or the C-placeless h, is followed by a V_1V_2 of a Ue/Ua sequence, the consonant, if it is t, is labial-palatalised in all the dialects of Akan. (Abakah 2012: 78).

Abakah (2012) further proceeds to discuss the dialectal variations in the applications of this rule on some consonants in Akan. With regard to these variations, Abakah (2012) opines that the Asante labial-palatalises all plosives,

nasals, and glottal fricative /h/ only when the U in the CUa/e strings is specified for [+ATR], otherwise, it does not labial-palatalises at all. For both the Akuapem and the Fante dialects, however, the process fails to apply only if the C in the string is a bilabial plosive. Unlike the Asante, the [-ATR] feature value of the U does not serve as an exception to the application of the rule. The following examples are taken from Abakah (2012: 78-79) for illustration.

(37).	UR	Fante	Akuapem	Asante	Gloss
i.	/due/	[dɥie]	[dᶣie]	[dᶣie]	expression of condolence
ii.	/tue/	[tɥei]	[tᶣie]	[tᶣie]	to puncture
iii.	/bue/	[bʷei]	[bʷue]	[bᶣie]	to open
iv.	/pue/	[pʷei]	[pʷue]	[pᶣie]	to go out
v.	/nuã/	[nᶣiã]	[nᶣiã]	[nᶣiã]	sibling
vi.	/dua/	[dᶣia]	[dᶣia]	[dᶣia]	tree
vii.	/tua/	[tᶣia]	[tᶣia]	[tᶣia]	to apply suppository
viii.	/nʊ̃ã/	[nɥĩã]	[nᶣĩã]	[nʷʊ̃ã]	to cook
ix.	/dʊa/	[dɥɪa]	[dᶣɪa]	[dʷʊa]	to arrest
x.	/tʊa/	[tɥɪa]	[tᶣɪa]	[tʷʊa]	to join
xi.	/sʊa/	[sɥɪa]	[sᶣɪa]	[sʷʊa]	to carry

From the examples above, we observe that the labial-palatalisation process is an active process in all the three major dialects of Akan. This process can be superimposed on the primary articulation of a consonant, as seen in the examples above, or it can assume a consonantal status as was briefly mentioned in chapter one of this thesis, where we observed from the Ga consonantal inventory that it does not have these "compressed" labialisation process i.e. [ɥ] or [ᶣ], but rather it operates the "protrusion" labialisation process, which is represented by [ʷ]. The subsequent subsections look at how these compressed labials or labialised consonants in some Akan source words are realised in Ga.

4.2.1. Adaptations of source non-native consonants in Ga

This subsection discusses the strategies Ga speakers adopt in adapting the Akan source compressed labialisation process, which is lacking in their system, when adapting words of Akan source into their vocabulary.

4.2.1.1. Adaptation of source [ʨɥ] as [ʧʷ]

The Akan source labial-palatal consonant [ʨɥ] is realised as [ʧʷ] in Akan forms that are adapted in Ga. This is shown in the data below.

(38)	Akan	Ga	Gloss
i.	àtɕɥìrí	àʧʷèré	ladder, staircase
ii.	òtɕɥáǹsā́	òʧʷàǹsā́	drunkard
iii.	ǹtɕɥʊ̀mā́	ǹʧʷʊ̀mā́	red clay

iv.	dʑɥàrí	dʒ^{w}álé	rinse, wash without soap
v.	dʑɥa	dʒ^{w}ɾà, dʒ^{w}l̀à	break into pieces; sabotage
vi.	dʑɥòŋ̀kú	dʒ^{w}òŋ̀kú	hip joint, thigh bone, loins

From the examples above, it is clear that the Akan source voiceless labial-palatal affricate [tɕɥ] is systematically adapted as an equivalent labialised voiceless pre-palatal affricate [tʃ^{w}], as in as seen in (38i) – (38iii). Similarly, in (38iv) – (38vi), the source non-native voiced labial-palatal affricate [dʑɥ] is adapted as a corresponding voiced labialised pre-palatal sound which is present in Ga. It is worth noting that the labialisation rule in the adapted forms in Ga is not triggered by the lip posture of the following vowel. The following vowel can either be rounded, as seen in (38iii) and (38vi) or unrounded, seen in (38i) – (38ii) and (38iv) – (38v). In effect, the source compressed labialisation is straightforwardly realised as a simple protrusion in Ga. Ga speakers match the source labial-palatal segment with phonetically equidistant labialised segment present in their inventory. This segmental matching seems phonological, rather than perceptual.

To account for this, we will need a constraint that will ban the labial-palatal [ɥ] in the output forms in Ga. This compressed consonantal segment is specified for [+cor, -ant, +cont]. A constraint to ban this segment in the output will, therefore, be formulated as *[+cor, -ant,+lab]. I define this structural well-formedness constraint as follows.

(39). *[+cor,-ant,+lab]: A segment specified for [+cor,-ant,+lab] is prohibited

Since the labial-palatal or labial-palatalised consonant is prohibited in Ga, it has to be adapted to some permissible consonant in the process of the adaptation. Therefore, *[+cor,-ant,+lab], the constraint that bans this consonant has to rank high so that any output form that preserves it is severely penalised. The primary articulatory gesture of the source consonant i.e. affrication is preserved in the adapted form. To account for this, there is the need for a constraint that ensures that the source labiality property is preserved in the output form. This faithfulness constraint is IDENT-IO (lab).

(40). IDENT-IO(lab): Correspondents in input and output have identical value for the feature [labial]

This constraint has to dominate a constraint that will block the deletion of some feature, say MAX-IO(F). So, any candidate that alters a labial-palatal or labial-palatalised consonant to a simple labial consonant violates this consonant for the simple reason that a change in some feature has to be effected to achieve this intended alteration. Once MAX-IO(F) was defined in the previous chapter, we will not define it here again to avoid repetition.

Tableau 12: The adaptation of source [ʤɻɥoŋku] as [ʤʒʷ] in Ga

/ʤɻɥoŋku/ 'hip joint'	IDENT–IO (lab)	*[+cor,-ant,+lab]	MAX-IO(F)
a. [ʤɻɥoŋku]		*!	
b.☞ [ʤʒʷoŋku]			*
c. [ʤʒeŋku]	*!		*

Constraint ranking: IDENT-IO(lab), *[+cor,-ant,+lab] » MAX-IO(F)

In Tableau 11 above, we observe that each of the three candidates adapts the input non-native consonant differently. As a strategy to license the deletion of the illicit labial-palatal feature, candidate (c) alters the vowel quality of the input, i.e. the feature value changes from [+round] in the input [o] to [-round] in [e]. Again, it is a change from back vowel to front vowel through a phonological process commonly termed *fronting*. This change will license the deletion of the labial feature on the consonant. Other than that, dropping the labial diacritic on the consonant when it is preceding a rounded vowel will be unnatural despite the fact that labialised pre-palatals are phonemic in Ga. Though [ʤʒʷeŋku] is possible in Ga, yet it is not as predictable as [ʤʒʷoŋku] in terms of labialisation, as it is easier to attribute the rounded vowel [o] in [ʤʒʷoŋku] as the trigger of the labialisation process than to attribute it to [e] in [ʤʒʷeŋku]. By employing this strategy, candidate (c) fatally violates the highly-ranked IDENT-IO(lab) for missing the correspondent input feature [lab] in the output. By this same action the same candidate additionally violates the lowly-ranked constraint by deleting the feature

[cor]. Candidate (b), on the other hand, faithfully preserves the input features. This preservation is in fatal violation of the equally highly-ranked constraint against the segment *[+cor,-ant,+lab]. The competition is then left with candidate (b). Though candidate (b) violates only one constraint, just as its competitors do, due to the low ranking of the violated constraint, it emerges the optimal candidate for this Tableau.

4.2.1.2. Adaptation of source [ɕɥ] as [ʃʷ]

Another Akan source labial-palatal that is adapted in Ga is the voiceless labial-palatal fricative [ɕɥ]. As has already been discussed in the preceding subsection, Ga speakers adapt this source non-native labial-palatal as labialised counterparts. In the following examples I look at how this consonant is adapted in Ga.

(41).	Akan	Ga	Gloss
i.	ɕɥédí	ʃʷédé	binoculars
ii.	ɕɥéɕɥé	ʃʷéʃʷé	a fresh water fish
iii.	ɕɥìé	ʃʷìê, ʃʷìé	spill, pour something; fall, pour; to start
iv.	ɕɥím	ʃʷím	fast, in a flash
v.	àɕɥìɕɥé	àʃʷìʃʷé	mirror
vi.	ɕɥĭ̋ăɕɥĭ̋ăă	hʷĭ̋ăhʷĭ̋ă, hʷiɛhʷiɛ	thin, slender, slim

In the examples in (41), it is seen, just as in the previous section, that source labial-palatal fricative is adapted as Ga labialised pre-palatal fricative; the closest consonant in the acoustic space available. This adaptation strategy is straightforwardly predictable based on Ga phonology. The only exception to this generalisation made so far is the exceptional example in (41vi) where contrary to the expected adapted form *ʃʷíáʃʷíá or ʃʷiɛʃʷiɛ, we observe that the source fricative is realised as glottal in the adapted forms though the [labial] feature is preserved. As was observed in chapter one of the present thesis and obviously in the examples above, Ga has the palatal fricative [ʃ]. It will be explained in the following discussion that this seemingly exceptional cases might be better explained by reference to the diachronic facts of Akan consonant system; the palatal fricative developed from the glottal fricative [h]. I offer a detailed explanation for this later in this section.

To formalise the discussions in sub-subsection 4.2.1.3, observe the following Tableau for how this adaptation is accounted for.

Tableau 13: The adaptation of source [ɐq] as [ʃʷ] in Ga

/àɕqìɕqé/ 'mirror'	IDENT –IO (LAB)	*[+COR,-ANT,+LAB]	MAX-IO(F)
a. [àɕqìɕqé]		*!	
b.☞ [àʃʷìʃʷé]			*
c. [àʃìʃé]	*!*		**

Constraint ranking: IDENT-IO(lab), *[+cor,-ant,+lab] » MAX-IO(F)

From the Tableau 12, just as was seen in the preceding analysis, candidate (c), which completely deletes the input non-native labial-palatal feature incurs double fatal violation marks for the high ranking IDENT-IO(lab) for missing the corresponding labial feature. The candidate violates, in addition, the constraint against the deletion of the [cor] feature among the set of the three features that define the input [ɥ], though it satisfies the markedness constraint against this sound. Candidate (a), on the other hand, satisfies the high ranking IDENT-IO(lab) by preserving the input labial-palatal segment. However, it fatally violates equally highly-ranked *[+cor,-ant,+lab] by that action. Though this is the only constraint it violates, yet it loses in the competition for the optimal output form; candidate (b), minimally violates the lowly-ranked MAX-IO(F), for deleting the feature [cor] in the input and preserving the feature [lab].

4.2.1.3. Adaptation of source [ɥ] as [w]

So far we have looked at the adaptations of the labial-palatals [tɕɥ], [dʑɥ], and [ɕɥ]. In the existing literature on Akan, these consonants are assumed to have been derived from the underlying /k/, /g/, and /h/ respectively in Akan through labial-palatalisation. This labial-palatalisation affects yet another consonant in Akan which is the labial-velar glide /w/. This rule changes an underlying /w/, which is a labial-velar approximant, to the labial-palatal approximant [ɥ], whenever the former occurs before a front vocalic segment at the phonetic level of representation. Focusing on their places of articulation, it can be observed that the

underlying segment which is articulated at the velum (and also with the lips at the same time) /w/ is fronted to the palatal region, becoming palatal [ɥ], while preserving its labiality property at the phonetic level of representation. In feature theory, this can be expressed as a change in the value of the feature [coronal]. That is, the underlying segment with the feature specification [-coronal] changes to [+coronal] at the phonetic level.

In the following examples, we observe that the source labial-palatal consonant is de-palatalised while maintaining the labial feature in the adapted forms.

(42).	Akan	Ga	Gloss
i.	àɥ̀ìrɛ̀fí	àẁɛ̀rɛ̀fí, ẁɛ̀rɛ̀fí	forgetfulness
ii.	àɥ̀ìrɛ̀hú́ẃ	àẁɛ̀rɛ̀hó	grief, sadness
iii.	æɥ́ísía̋a̋	àẃísa̋, àẁúsa̋	orphan
iv.	ɔɥ́íré	ɔ̀ẁélɛ̀	revenge, vengeance
v.	àɥ̀ìrɛ̀tɔ́	ɔ̀ẁélɛ̀tɔ̀ɔ̀	avenging

In the examples above, we observe that the source labial-palatal fricative, which is not present in Ga is systematically adapted as the labial-velar consonant [w]. By this adaptation strategy, one account for the adaptation of the source labial–palatal as labial-velar could be that Ga speakers might have adapted the source words in their original forms, that is, when an underlying /w/ have not undergone

palatalisation before front vowels in Akan at the time of borrowing them. That is, these words might have entered the Ga vocabulary at the time when, for example, the word for 'forgetfulness' was still *àwìrɛ̀fĩ* in Akan. Therefore, Ga speaker might not have altered any source consonant in the adaptation process.

An alternative explanation could also be that these words might have been borrowed into Ga in their present form. Ga speakers, therefore, had to repair the non-native labial-palatal fricative. In the process of repairing the fricative, they go for the closest consonant in their consonantal inventory taking into an account the place and the manner of articulations of the source segment. The labialised pre-palatal approximant [w] is selected in place of the source [ɥ]. This adaptation pattern is expected as we have already discussed that the source non-native labial-palatal segments are adapted simply as labial segments. In a similar way to how Ga speakers adapt the source labial-palatal affricates

In providing a formal account of how Ga speakers adapt the source non-native [ɥ], I employ the same set of constraints and the corresponding ranking as used in the analysis of the source [ʧɥ] for the present one. I formalise the adaptation pattern in the following Tableau.

Tableau 14: The adaptation of source [ɥ] as [w] in Ga

/ àɥìrèfí / 'forgetfulness'	IDENT-IO(LAB)	*[+cor, -ant, +lab]	MAX-IO(F)
a. [àɥèrèfí]		*!	
b.☞ [àwèrèfí]			*
c. [àhèrèfí]	*!		*

Constraint ranking: IDENT-IO(lab), *[+cor,-ant,+lab] » MAX-IO(F)

Following a similar pattern as the preceding analyses, we observe from Tableau 13 that candidate (a) faithfully preserves the prohibited labial-palatal segment in fatal violation of highly-ranked *[+cor,-ant,+lab]. In candidate (c), the illicit [ɥ], which is a fricative segment, is repaired through adapting it as [h], another fricative. However, since the target consonant is a non-labial consonant, candidate (c) incurs a fatal mark for violating the highly-ranked constraint that demands correspondent in the output in terms of the [labial] feature, IDENT-IO(lab). Also, for deleting the coronal feature of the input non-native consonant, candidate (c) additionally violates MAX-IO(F). Though candidate (b) also violates MAX-IO(F), it still emerges the optimal candidate due to the low ranking of this constraint, the only one it violates.

4.2.1.4. Adaptation of source derived [Cᶣ] as [Cʷ]

The labial-palatalisation process can be superimposed on the primary articulations of consonants, particularly stops and some fricatives in Akan. These consonants, as could be predicted by now, are adapted as an additional [labial] feature

superimposed on their primary places of articulation. In the following examples, I show how Akan source words with these labial-palatalised segments are adapted in Ga.

(43).	Akan	Ga	Gloss
i.	bòdᶣíá	bòdʷúá	horse-tail fly whisk
ii.	ædᶣìàwá	àdʷùàwá	fruit
iii.	okᶣíá	òkʷàá	farming, agriculture
iv.	òkᶣìàfʊ́	òkʷààfóŋò	farmer
v.	tᶣìé	tʷúè	gush out
vi.	æbùsᶣìá	àbùsʷǔā́	family; the nuclear family

From the examples in (43), it is observable that the Akan source non-native labial-palatalised consonants are adapted as their labialised counterpart present in Ga. This adaptation strategy can be explained that Ga speakers correctly perceive the primary articulations of the Akan source consonants [t, d, k, s], however the additional labial-palatal is rather simply realised as labial (-velar) by the speakers.

This pattern is phonological in the sense that the labial-palatalised consonants do not in word neither can they be realised in speech by Ga speakers. Therefore, the speakers go in for the phonologically closest consonants in place of the Akan source non-native ones. In other words, the labial-palatalisation rule, which is active in Akan is absent in the phonology of Ga, and in its place,

labialisation applies. For example, all the consonants that can undergo labial-palatalisation such as in /t, d, k, s/ in [tᶣ, dᶣ, kᶣ, sᶣ] respectively in Akan are rather systematically adapted as labialised consonants [tʷ, dʷ, kʷ, sʷ] respectively in Ga. This means these sounds are perceived more back than they are in Akan.

Though here we are talking about the adaptations of the labial-palatalised consonants in Akan vis-à-vis those of the labial-palatals, both follow the same process. Therefore, following from what have been discussed in the preceding subsections in this chapter, I employed the constraint and the rankings used for Tableaux for the OT analyses.

Tableau 15: The adaptation of source [Cᶣ] as [Cʷ] in Ga

/ ædᶣìàwá / ''fruit'	IDENT-IO(LAB)	*[+cor,-ant, +lab]	MAX-IO (F)
a. [àdᶣìàwá]		*!	
b. [àdìàwá]	*!		*
c. ☞ [àdʷùàwá]			*

Constraint ranking: IDENT-IO(lab), *[+cor, -ant,+lab] » MAX-IO(F)

From Tableau 14, for employing deletion of the non-native labial-palatal feature in the phonological adaptation process, thus missing a correspondent labial feature in the input, candidate (b) commits fatal violation of the highly-ranked IDENT-IO(lab). The same candidate incurs extra violation mark for MAX-IO(F) for the same offence. Though candidate (a), on the other hand, has the correspondent labial-palatal feature, thus satisfying IDENT-IO(lab), yet it commits fatal violation

of *[+cor,-ant,+lab] for preserving the prohibited labial-palatal feature. Though this is the only constraint it violates, it loses out on the race for optimality to candidate (c) that violates minimally the low ranking MAX-IO(F), for dropping the coronal feature in the feature matrix that defines the prohibited input labial-palatal feature.

4.2.1.5. Adaptation of source [ɕ] as [h]

Thus far the discussions have focused on how Akan source labial-palatals are adapted in Ga. In the following discussion, we are going to look at how source palatal fricative is sometimes adapted in some Akan loaned words in Ga. As mentioned earlier, source palatal fricative is usually adapted as an equivalent voiceless palatal fricative in Ga with few exceptions which I discuss as follows.

(44).	Akan	Ga	Gloss
i.	ɔdíɕí	òdéhè	noble, free born person
ii.	èɕí-dᵘìà	òhé	gum copal; gum copal tree; a bead
iii.	ɕɛ̃ɛ̃ŋ̀ŋ̀	hɛ́ɛ́ŋ́ŋ́	flame, colour, bright

From the examples above, it can be observed that source palatal fricative [ɕ] is adapted as the glottal fricative [h] though Ga has the palatal fricative [ʃ] in its consonantal system. This adaptation occurs at both the word-medial position, as in (44i) – (44ii) and word-final position, as seen in (44iii). The question then is, could

this adaptation be motivated by perceptual factors as it were for the adaptations of some non-native vowels as discussed in chapter three? The answer to this question is that probably may not be. The explanation seems to lie in the diachronic account of the source language. As it has been noted in some existing literature on Akan consonantal phonology (cf. Schachter & Fromkin 1968, Dolphyne 1988/2006, Boadi 1988, Abakah 2012, among others), this palatal fricative is an allophone of an underlying consonant /h/. Before front vowels, this glottal consonant is drawn forward to the palatal region in the oral cavity, which results in the phonological process of palatalisation. For instance, Dolphyne (1988/2006) in particular reports of Stewart's (1966) data that contains list of words that Koelle collected in some Akan communities in the 19th century that contained the non-palatalised consonants in present-day palatalising environment (cf. Dolphyne 2006: 21). For example, it contained Akan words like *gia*, present-day *gya* [ʤa] 'leave behind'.

From the foregone discussion, the above Akan source words are as follows in the underlying representation: *ɔ̀díhí́*, *ɛ̀hí́*(*-dᶣìà*), and *hɛŋ̀ŋ́*, which map onto Ga speakers' òdéhè, òhé, and hɛ̃́ŋ̀ŋ́ respectively. Another question, therefore, is at what point in time did the adaptation of the glottal fricative take place in Ga? Did these Akan words with the glottal fricative, rather than its palatal allophonic variant find its way into the Ga lexicon? Was it at the time that this consonant had not yet undergone the palatalisation rule? Perhaps, future study may aid in finding answers to the above questions.

4.2.1.6. Adaptations of source word-final [w]

The last consonantal adaptation that will be discussed in this section is of source word-final [w]. Again, as was observed in sub-subsection 4.2.1.5, the source segment is present in the Ga phonology; however, it is not permitted in word-final position. To repair this ill-formedness, the main strategies employed include vocalisation, elision, and compensatory lengthening.

(45).	Akan	Ga	Gloss
i.	háẃ	hàò	worry, bother, annoy
ii.	gùàẁ	gʷàò	whip, beat, lash, flog
iii.	kàẃ	káó	cake, biscuit
iv.	tɛ̀ẁ	tɛ̀ò	transplant, plant trees
v.	ænílháẃ	ànílháó	laziness
vi.	ɜ̀ǹtéẃ	ɜ́ńltéó	ambush, waylay

From the examples in (45) above, it can be observed that the word-final labial-velar glide, which is specified for [+lab] is vocalised into [o], also specified for [+lab], thus maintaining the [lab] feature of the source segment. This adaptation is necessitated by the fact that Ga does not permit the labial-velar glide word-finally. Though Ga speakers correctly anticipated the roundness property of the source word-final [w], due to its positional restriction, it is replaced with a rounded

vowel. However, what is not clear is the question of why the speakers did not go for the acoustically closest rounded vowel, which is [u] instead of the [o] that it is adapted as?[4] Is this adaptation perceptually-motivated as was concluded for the perceptual adaptations of the non-native rounded vowel [ʊ] in Akan source words?

In formalising the vocalisation of Akan source word-final [w] in Ga within OT, we will need a constraint that will ban such structurally ill-formed segment in the output form. The constraint to ban the labial-velar glide from occurring at the final position of an adapted word is formulated as *w]$_{\sigma}$, and it is defined as follows:

(46). *w]$_{\sigma}$: Segment [w] is prohibited as the word-final syllable

By the relatively high ranking of this constraint, any candidate that faithfully preserves the input word-final [w] incurs fatal violation of it. This structural well-formedness constraint has to outrank a faithfulness constraint that will demand that the output shares correspondence with the input by blocking the consonantal feature [cons] of [w] from being neutralised in the output. The faithfulness constraint to ensure correspondents in both the input and the output for the feature [cons] is IDENT-IO(cons), which I define below.

(47). IDENT-IO(Cons): Correspondents in input and output have identical

[4] The only exception is in the adaptation of the *tiw* 'to follow, pursue, catch up with somebody' which is adapted as *tiu/tuu*, *sìw* 'suppress; replace, displace;' *ʃìù*, asitíw 'making an error due to intentionally carelessness' àʃìtíú.

value for the feature [consonantal]

This constraint will be violated by any candidate that alters the source [w] to [o] though the same candidate will satisfy the other Identity constraint, IDENT-IO(lab) by preserving the labial feature in the target segment. IDENT-IO(cons) has to rank low so that the optimal candidate that has to necessarily violate it will do so minimally.

In the following Tableau, I present the formalisation of the adaptation of the illicit input word-final [w] through vocalisation.

Tableau 16: The adaptation of source word-final [w] as [o] in Ga

/ hàẁ / ‘worry, bother’	IDENT-IO (lab)	*w]$_{\sigma}$	MAX-IO	IDENT-IO (Cons)
a. [hàẁ]		*!		
b.☞ [hàò]				*
c. [hà]			*!	

Constraint ranking: IDENT-IO(lab), *w]$_{...\sigma}$ » MAX-IO » IDENT-IO(Cons)

From Tableau 15, the most faithful output form; candidate (a), becomes the least harmonic candidate in the present analysis due to its fatal violation of the highly-ranked constraint against word-final labial-velar approximant *w]$_{\sigma}$. Candidate (c), on the other hand, avoids violating this position-sensitive constraint through the deletion of the prohibited input word-final [w]. However, by employing deletion as the repair mechanism, it in turn fatally violates the general constraint against

deletion, MAX-IO. This violation becomes fatal due to the crucial ranking of the faithfulness constraint. Though candidate (b) is the only output form that violates the constraint against neutralising the consonantal feature of the final [w] through vocalisation, yet it emerges as the optimal candidate due to the lower ranking of the violated constraint. So in effect, Ga speakers will employ the vocalisation of the illicit source word-final [w] into [o] in this Tableau analysis as an adaptation strategy.

Aside from vocalising the ill-formed source word-final [w], the same ill-formedness can be repaired by eliding the source segment. The elision seems to take place only and only if the remainder of the syllable of the adapted words is minimally disyllabic. In the following examples, I illustrate how the elision of the source word-final [w] takes place in the adapted forms.

(48).	Akan	Ga	Gloss
i.	èkúẁ	àkú	heap
ii.	àsɛ̀m̀sùróẃ	àsɛ̀m̀sɪ̀ò	fear of trouble
iii.	àsɪ̀áàfúkúẃ	àsɪ̀áàfóàkú	regiment
iv.	hùrúẃ	hɪ̀ú, hl̀ú	jump, jump about
v.	wòsóẃ	hósò	shake, quake
vi.	àqìrɛ̀hóẃ	àwèrɛ̀hó	grief, sadness

From (48), it is observable that source word-final [w] is dropped in the adapted forms, unlike in the previous examples in (45) where it was vocalised into [o]. It is worth noting that as was earlier pointed out, the condition for the elision is that the rest of the word (i.e. the adapted form) should have at least two syllables.

There is an exception to this generalisation in the Akan source word *ɛpɔ́w* 'lump, bump; knot, knot in a mesh', which is adapted as *k͡pɔ́*, and not **k͡pɔ́ɔ́*, **k͡pɔ́o*; *ʤàw* 'worship, revere', which is realised as *ʤá*, and not **ʤáa* or **ʤáo*. The phonological implication of this is that in the constraint-based analysis, the constraint that bans final [w] is more important than the one that demands disyllabic minimality. Therefore, in constraint ranking, the constraint on the former should outrank that of the latter.

To account for the deletion of the illicit word-final [w], we will employ the same set of constraints as used for the analyses in sub-subsetion 4.2.1.1. However, since the strategy is deletion, the anti-deletion constraint, MAX-IO has to be demoted so that the eventual winner of the analysis will violate it minimally. Therefore, the last two constraints of the preceding constraint ranking in Tableau 15 is re-ranked in Tableau 16 as follows.

Tableau 17: The adaptation of source word-final [w] as [ø] in Ga

/ àụìrèhóẃ / ‘grief, sadness’	IDENT-IO (lab)	*w]$_{\sigma}$	IDENT-IO (Cons)	MAX-IO
a. [àwèrèhóẃ]		*!		
b.☞ [àwèrèhó]				*
c. [àwèrèhóó]			*!	

Constraint ranking: IDENT-IO(lab), *w]$_{...\sigma}$ » IDENT-IO(Cons) » MAX-IO

Tableau 16 shows that each of the three candidates employs different repair strategies for the illicit input word-final [w]. Candidate (a) preserves the illicit source word-final segment, which action incurs fatal violation mark for the highly-ranked position-sensitive *w]$_{\sigma}$. Candidate (c), on the other hand, employs vocalisation of the illicit labial-velar glide at the final position. Therefore, it surfaces as [o] in the output. It is worth noting that as we shall see in the following discussion; this strategy could also be explained as resulting from compensatory lengthening. By so doing, candidate (c) also violates fatally IDENT-IO(cons) for adapting an input word-final [+cons] as a [-cons] in the output. For completely deleting the illicit input word-final glide, candidate (b) violates MAX-IO, though it still emerges the preferred output form due to the low ranking of MAX-IO in the present Tableau. Though there is no correspondence between the input final [w] and the output, candidate (b) is not penalised for this lack of correspondence.

The final major adaptation strategy employed for the source word-final [w] is a two-step process, namely elision, and subsequent compensatory lengthening

which is driven by the disyllabic minimality requirement discussed in the preceding examples. I exemplify this in the following examples.

(49).	Akan	Ga	Gloss
i.	dòẃ	dòò	be browned by roasting
ii.	ɔ̀dáẁ	dáà	mouth, mouth cavity
iii.	sɔ̀ẁ	sɔ̀ɔ̀	catch from below; catch, with a flourish
iv.	kúẃ	kúú	group, council, society
v.	gʷùàẁ	gʷàà	whip, beat, lash, flog
vi.	bìrɛ̀ẁ	bl̀ɛ̀ɔ̀ɔ̀	slow, soft, slight

From the above examples, it can be observed that the primary strategy employed in repairing the ill-formed source word-final [w] is deletion or elision. However, due to the disyllabicity minimality requirement imposed on such words, the source vocalism seems to be lengthened to satisfy this requirement or constraint to avoid such ill-formed outputs as **dò* < *dòẃ*, **dá* < *ɔ̀dáẁ*, and **kú* < *kúẃ*.

Below we consider how the elision and its subsequent compensatory lengthening are accounted for within the OT. In accounting for the minimum loaned form to be disyllabic after the deletion of the illicit source word-final [w], which triggers compensatory lengthening, we will need a constraint that will

ensure that a disyllabic input form will map onto a disyllabic output form. This faithfulness constraint is IDENT-IO[σ], which is defined as follows.

(50) IDENT-IO[σ] - There must be identity between I and O in terms of syllable structure

This constraint has to dominate the anti-deletion constraint, MAX-IO so that deletion of the illicit source word-final will attract lesser punishment, however, for not applying the compensatory lengthening, the candidate will violate this crucially-ranked constraint. In the Tableau below, I present the formalisation of this adaptation strategy.

Tableau 18: The adaptation of source word-final [w] through compensatory lengthening in Ga

/ kúẃ / 'group, council'	IDENT-IO (lab)	*w]$_{σ}$	IDENT-IO [σ]	MAX-IO	IDENT-IO (Cons)
a. [kúẃ]		*!			
b.☞ [kúú]					*
c. [kú]			*!	*	

Constraint ranking: IDENT-IO(lab), *w]$_{...σ}$ » IDENT-IO[σ]» MAX-IO» IDENT-IO (Cons)

From Tableau 17, candidate (a) preserves the input word-final [w], which is in fatal violation of the position-sensitive constraint *w]$_{σ}$. Candidate (c), on the other hand, though employs the deletion of the illicit input word-final, yet it fatally

violates the crucially-ranked IDENT-IO[σ] for missing a correspondent input syllable. This same candidate is again penalised for deleting the final [w] in violation of the anti-deletion MAX-IO. For altering the input word-final [w], candidate (b) incurs a violation mark for IDENT-IO(cons), a constraint that ensures input and output forms correspond in terms of value for the feature [consonantal].

In this section, I have discussed the adaptations of the Akan source non-native labial-palatals and labial-palatalised consonants in Ga. I have also discussed the strategies Ga speakers employ in adapting the labial-velar glide in word-final position in words that are borrowed from Akan. It has come out that there is a high-ranking constraint that prohibits the labial-velar glide [w] from occurring at word-final position in Ga. To repair Akan source word-final labial-velar glide in the adaptation process, word-final [w] is either deleted or it is vocalised into [o]. There can also be compensatory lengthening, which results usually to ensure that rest of the word after the deletion of the final [w] is minimally disyllabic, though there are few exceptions to this generalisation that were found in the data.

4.3. Adaptations of Akan source non-native consonants in Dangme

In this section, I present the strategies that Dangme speakers also adopt when adapting non-native consonants from Akan. The section also discusses the adaptation of Akan source word-final [w] in Dangme. The discussions are formalised within the OT.

4.3.1. Adaptations of Akan source labial-palatals in Dangme

In the following sub-subsections, we take a look at the adaptations of the Akan source labial-palatals as well as the labial-palatalised consonants, which segments are not present in Dangme, as was shown in chapter one. With our foreknowledge of the labialisation process from the preceding section, I discuss how these labial-palatal and labial-palatalised consonants are adapted in Dangme.

4.3.1.1. Adaptation of source [ʤɥ] as [ʤʷ]

In adapting the Akan source non-native [ʤɥ], I show that just as was observed in Ga, Dangme speakers preserve the source [+labial] feature in the adapted forms though the primary source consonant is not labialised.

(51).	Akan	Dangme	Gloss
i.	ʤɥòŋ̀kú	g͡bʷòŋ̀gú	thigh bone, hip joint
ii.	æ̀ʤɥúmā́	à̀ʤʷū́mā́	work, labour
iii.	æ̀ʤɥúmā́ʤɥãń	à̀ʤʷū́mā́ʤā́ŋ́	unprofitable labour, a wild goose chase
iv.	ʤɥɥíń	ʤʷɥ̃ɛ̃̀	reason, think
v.	æ̀ʤɥàmā́ń	à̀ʤʷùà̃mā́	prostitute; fornication

From the example (51), it can be observed that the Akan source non-native voiced labial-palatal affricate is adapted as phonetically close equivalent sounds in Dangme, namely the voiced pre-palatal affricate [ʤ] as in (51ii) – (51v), and as a voiced labial-velar stop [g͡b] as in (51i). As we saw in chapter one on the consonantal inventory of Dangme, unlike in Ga, Dangme does not have labialised consonants. However, once the speakers anticipate lip protrusion, they create the protrusion labialisation by ensuring that both the target pre-palatal and the labial-velar are immediately followed by rounded vowels, though that may not be the case as can be seen in (51iv) – (51v). In these two examples, the labial-palatals in the Akan source are followed by front and central vowels respectively vis-à-vis the back (rounded) vowel [u] in Dangme.

In section 4.2, we observed that Ga speakers adopt the strategy in adapting the source non-native voiced labial-palatal affricate which is very similar to how Dangme speakers adapt this same source consonant. Therefore, we employ the same constraint set and the ranking used for the similar analysis as previously (in 4.2.1.1) in the present analysis.

Tableau 19: The adaptation of the source non-native [ʤ͡ʷu] as [ʤʷ] in Dangme

/ ædʒ͡ʷuúmá̋ / 'work, labour'	IDENT-IO(lab)	*[+cor, -ant,+lab]	MAX-IO(F)
a. [àdʒ͡ʷuúmá̋]		*!	
b.☞ [àdʒʷűmá̋]			*
c. [àdʒímá̋]	*!		*

Constraint ranking: IDENT-IO(lab), *[+cor,-ant,+lab] » MAX-IO(F)

In Tableau 18, each of the three candidates repair the source non-native labial-palatal differently. Candidate (c) employs deletion of the non-native segment as the repair strategy in fatal violation of the highly-ranked IDENT-IO(lab), for adapting the source [+lab] as a [-lab] consonant. By deleting the labial feature, the same candidate violates the lowly-ranked MAX-IO(F) in addition. Candidate (a), on the other hand, preserves the [lab] feature by preserving the input prohibited consonant which leads to its fatal violation of the crucially-ranked constraint against the input labial-palatal, *[+cor,-ant,+lab], though this is the only constraint it violates. Candidate (c) preserves the [lab] feature, but rather drops the [cor] feature in the input, thereby satisfying the two highly-ranked IDENT-IO(lab) and *[+cor, -ant,+lab] respectively. However, for deleting the [cor] feature, it incurs violation mark for the anti-deletion constraint, MAX-IO(F). Despite this violation, candidate (c) emerges the harmonic output form in this Tableau due to the low ranking of MAX-IO(F).

4.3.1.2. Adaptation of source [ʧɥ]

Aside from the adaptation of the Akan source non-native voiced labial-palatal affricate, the voiced labial-palatal affricate can also be adapted in Dangme, just as is done in Ga. In the following very limited examples, I show the adaptation of this source non-native consonant.

(52).	Akan	Dangme	Gloss
i.	àtɕɥìrí	àʧ́ré	ladle
ii.	tɕɥĩ̀ǹ̀sḯń	tʷõ̀sín	a kind of drum and its music, used for chiefs

From the examples above, it can be observed that the Akan source non-native voiceless labial-palatal affricate is adapted as two different consonants, namely a voiceless pre-palatal affricate as seen in (52i) or with an alveolar stop as in (52ii). Again, whereas the source [lab] is preserved in the latter, it is dropped in the former. These adaptation strategies differ from what we observed in Ga where the source was systematically adapted as the labialised pre-palatal affricate present in the language. Since the examples for these two adaptation strategies are very limited, I will not formalise them as have been done in the previous discussion thus far.

4.3.1.3. Adaptation of source [ɕɥ]

It is not only the Akan source non-native labial-palatal affricatives that are adapted in Dangme, but the speakers adapt also the source voiceless labial-palatal fricative [ɕɥ]. Just as was indicated in the preceding subsection, very few instances of this adaptation were observed in the data which I discuss in the following subsection.

(53). Akan	Dangme	Gloss
i. àɕɥìɕɥɛ́	àhihʷíé, àhʷùhʷúé,	mirror
ii. àɕɥíríẃ	àhĺéú	sugarcane

From (53), it is observable that the source non-native labial-palatal fricative [ɕɥ] is adapted rather as the glottal fricative [h] instead of the phonetically closer labialised pre-palatal fricative [ʃʷ], as was observed with the Ga. The explanation for this adaptation strategy is that unlike Ga, Dangme does not have the pre-palatal fricative in its inventory. Therefore, Dangme speakers seem to go for acoustically closest consonant available, which in this case is [h] as its replacement. The accompanying labialisation rule seems to apply selectively before both rounded and unrounded vowels as seen in (53i), and it fails before unrounded vowel and when preceding [l] as seen in (53i) and (53ii).

It would be recalled that in the preceding section, it was explained that for the source labial-palatal fricative to be adapted as labialised glottal fricative, then one needs to investigate some diachronic facts about Akan, which was postulated that the source labial-palatal is assumed to have developed from an underlying glottal fricative /h/. Could it be the case that since this sound is not present in the Dangme inventory, in the adaptation therefore, there was a phonetic minimality mapping to [h], which could be closer? Or is it the case that this source sound was adapted at the time when it was still /h/ in the source language just as was explained for the adaptation of the source [ɥ] in Ga?

A parallelism for the second question could be drawn from Peperkamp & Dupoux's (2003) assumptions based on empirical evidence from Japanese that, "… older loans might have entered the language during a stage in which certain sounds in either the source or the borrowing language had different phonetic characteristics." (Peperkamp & Dupoux 2003: 369). Just as was explained for the limited examples of the adaptation process, formalisation of this adaptation strategy will not be done for the obvious reason of the paucity of the examples.

4.3.1.4. Adaptation of source non-native [ɥ] as [w]

(54). Akan	Dangme	Gloss
i. àdàɥ̀ìrìkɔ̀sɔ̀	ādàw̱rìkɔ̀sɔ̀	iron bell
ii. àɥ̃ĩ̀ǹdàdì	àw̱èǹdàdè	a plant
iii. àɥ̀ìrɛ̀hó	àw̱ɛ̀rɛ̀hó, àw̱ī̀lɛ̀hó,	grief, sorrow, sadness
iv. àkàtàɥ̀ìá	àkàtàw̱ìá	umbrella

From the examples above, it is observable that the Akan source non-native labial-palatal fricative is realised with the labial-velar glide [w] in many of the examples in Dangme just as was the case with Ga with very few exceptions as in the adaptation of the source word *æ̀ɥ́ísɪ́ɑ̃́ɑ̃́* as *àẖʷũ̀sɑ̃́* 'orphan, orphanage', *àɥ̀ìrɛ̀hó* as *àj̱ʷùrɛ̀hó* 'sorrow' in which [ɥ] is realised as [hʷ] and [jʷ] respectively or even [ʤʷ] as in *àʤ̱ʷùrɛ̀hó*. With a similar diachronic explanation to the adaptation of

the source [ɕɥ], the Akan source [ɥ] is an allophonic variant of /w/ whenever it occurs before front vowels in Akan. Therefore, it is phonologically predictable when the non-native source is usually adapted as [w] in Dangme. I formalise this adaptation in Dangme within the OT as below.

In formalising within OT this adaptation strategy, which was termed de-labial-palatalisation in the previous section, I employ the set of constraint and the subsequent constraint ranking which were used for the analysis in 4.3.1.1 as shown below.

Tableau 20: The adaptation of the source non-native [ɥ] as [w] in Dangme

/ àkàtàɥìá/ 'umbrella'	IDENT–IO (lab)	*[+cor, -ant,+lab]	MAX-IO(F)
b. [àkàtàɥìá]		*!	
b.☞ [àkàtàwìá]			*
c. [àkàtàɟìá]	*!		*

Constraint ranking: IDENT-IO(lab), *[+cor, -ant,+lab]» MAX-IO(F)

In Tableau 19, the input is realised in three ways as reflected in the three candidates. Candidate (c) repairs the input illicit labial-palatal fricative through adapting it as a palatal glide/ approximant thus, fatally violating the highly-ranked constraint that demands correspondents between inputs and outputs in terms of the feature [lab]. For deleting the features of the input, the same candidate is also penalised by the low-ranking MAX-IO(F). In an attempt to satisfy these two constraints, candidate (a) faithfully preserves the input segment, which results in

the violation of the crucially-ranked well-formedness constraint against [ɥ], *[+cor,-ant,+lab]. Though this is the only constraint candidate (a) violates, it is outcompeted by its co-competitor candidate (b), which also incurs a single violation mark for MAX-IO(F) for dropping the [cor] feature in the input, due to the relatively lower ranking of MAX-IO(F).

4.3.1.5. Adaptations of source non-native [Cᶣ] as [Cʷ]

So far the discussions have focused on the adaptations of the Akan source labial-palatals in Dangme. In this subsection, we shift our focus to the discussion of how Akan source labial-palatalised consonants are adapted in Dangme.

(55). Akan	Dangme	Gloss
i. æt̠ᶣi̠ã́	àt̠ʷũ̠ã́	rebellion, defiance
ii. bɛ̀rɛ̀d̠ᶣi̠á	bɛ̀lɛ̀d̠ʷù̠á	a tall straggling shrub
iii. àbɛ̀d̠ᶣi̠á	bɛ̀ʤ̠ʷù̠á	a palm tree, when slightly taller than tamlaa and still untrimmed

From the data in (55), we observe that the source labial-palatalised alveolar stops [tᶣ] and [dᶣ] are adapted as the labialised alveolar [tʷ] and [dʷ] respectively. This can be straightforwardly accounted for as change in a feature value of the feature matrix that defines the superimposed [ᶣ] while the primary consonant is

maintained, as has been explained up to this point. However, as it can be seen, in (55iii) the source primary alveolar stop is adapted as a pre-palatal affricate, this time preserving the palatality property of the source at the expense of modifying the manner and place of articulation. Additionally, the labiality of the source is also preserved through the superimposition of the labialised diacritic on the target affricate. Just as was done before, examples of these adaptation strategies are few in the data collected for the present study. Therefore, making a generalisation in the form of formalisation based on these limited cases will not be appropriate.

4.3.2. Adaptations of source word-final consonants in Dangme

So far we have discussed the adaptations of the Akan source non-native labial-palatal and the labial-palatalised consonants in Dangme. In the final discussions of this chapter, we look at the adaptations of the Akan source word-final [w] in Dangme, discussing the strategies, which Dangme speakers employ in the adaptation of words of Akan source that end in the labial-velar glide. In the discussions to follow, we will observe that the adaptations follow similar patterns as were observed for Ga in the preceding chapter. The three main repair strategies include vocalisation, elision, and compensatory lengthening.

4.3.2.1. Adaptations of source word-final [w] as [o]

This sub-subsection looks at the process of vocalisation that is employed as a strategy for repairing an illicit Akan source word-final [w] in Dangme.

(56). Akan	Dangme	Gloss
i. bìrɛ̀w̏	blɛ̀ò	slowly, carefully, gently
ii. ænĭhá ẃ	ànĭhá ó	laziness
iii. gúá ẃ	g^{w}á ò	whip, beat
iv. fɛ́ ẃ	fɛ́ ó	beauty

From the examples in (56), it is clear that the Akan source word-final [w] is vocalised into [o] in Dangme with the feature [+round] been preserved in the adaptation process. This adaptation has been necessitated by the fact that Dangme bans the labial-velar glide at word-final position.

Dangme speakers' choice of the mid vowel [o], instead of the acoustically closer vocalic segment high vowel [u], is what requires explanation, however. Does the word-final [w] perceptually sound like [ʊ] in the ears of the speakers, hence informing its adaptation as [o], which was observed to be one of the target vowels when adapting the source non-native [ʊ] on perceptual grounds? This adaptation strategy falls in line with what was observed about Ga in section.

I formalise this adaptation of the Akan source word-final [w] through vocalisation in Dangme, and to do this, I employ the set of constraints and the constraint ranking that were used for a similar analysis in Ga in 4.2.1.6 (Tableau 15).

Tableau 21: The adaptation of the source word-final [w] as [o] in Dangme

/ fɛ́ẃ / 'beauty'	IDENT-IO (lab)	*w]$_{\sigma}$	MAX-IO	IDENT-IO (Cons)
a. [fɛ́ẃ]		*!		
b.☞ [fɛ́ó]				*
c. [fɛ́]			*!	

Constraint ranking: IDENT-IO(lab), *w]$_{...\sigma}$ » MAX-IO » IDENT-IO (Cons)

From Tableau 20, we observe three different strategies, which each of the three candidates employs in repairing the illicit input word-final [w]. Candidate (a) is the output form that has perfect segmental match to the input through preserving faithfully all the input segments. By being faithful to the input, it fatally violates the highly-ranked position-sensitive constraint *w]$_{\sigma}$ that ban [w] from occurring at word-final position. Candidate (c), on the other hand, satisfies *w]$_{\sigma}$ by completely deleting the prohibited [w] at the final position. However, by so doing it incurs fatal violation mark for the crucially-ranked anti-deletion constraint, MAX-IO. For adapting a vocalic segment as a non-vocalic segment, candidate (b) violates IDENT-IO(cons), which demands both the input and the output segments correspond in terms of the feature [cons]. Candidate (c) still emerges the optimal candidate despite this violation due to the low ranking of IDENT-IO(cons).

There is another strategy by which Dangme speakers repair the Akan source word-final [w]. This strategy is also through vocalisation. However, unlike in the immediately preceding discussion, the illicit source word-final [w] is vocalised into [u]. The following examples illustrate this adaptation strategy.

(57). Akan	Dangme	Gloss
i. àɕqíríẃ	àhĺéú	sugarcane
ii. àséẃ	àséú	misfortune
iii. féẃ	féú	beauty

From the examples above, it can be observed that the illicit word-final [w] is adapted as [u]. This adaptation seems to answer the question raised in the previous discussion as to why the target vowel is [o] instead of the expected [u], if the adaptation takes into an account the closest vocalic segment in the vowel space. Just as was explained for such similar strategy in Ga, Dangme speakers seem to adapt the positionally ill-formed [w] as the closest vocalic segment in Dangme, which is [u]. However, from (57iii), it is evident that Dangme speakers make a choice between [o] and [u] as the replacing vowel for the illicit source word-final [w]. In (56iv), the same source word *fɛ́ẃ*, which final [w] was adapted as [o] as in *fɛ́ó* is realised as *fɛ́ú* in which [w] changes to [u] in (60iii). It is therefore explained that in the adaptation of the Akan illicit source word-final [w] through vocalisation, Dangme speakers have two options, namely adapting as [o] as in (56), or altering [w] into [u] as seen in (57). It is not yet clear to me whether this variation is dialectal or not.

In formalising this form of vocalisation, it seems to suffice to employ the Tableau 20 since it could be predicted that any of the examples in (57) as an input is likely to surface with either [u] or [o] in word-final position.

Another repair strategy for the illicit source word-final [w] aside from the vocalisation is deletion. Just as in Ga, Dangme speakers can also employ deletion when adapting word-final [w]. This adaptation strategy cannot be discussed in detail since only one instance of such adaptation has been identified in the data for the present study. In this example, the Akan source word *títíríẃ* 'mainly, chiefly, especially' is adapted as *títlī, títrī* in Dangme. It can be seen that the source word-final [w] is completely dropped in the adapted forms in Dangme.

4.4. Summary of the chapter

This chapter has discussed the adaptations of consonants in Akan source words in both Ga and Dangme. In the discussions of the consonantal adaptations, the main issued were focused on the adaptations of Akan source non-native consonants and the adaptations of Akan source illicit word-final labial-velar glide [w]. For the discussions of the non-native consonants, we looked specifically at the adaptations of the labial-palatals and the labial-palatalised consonants, all of which are articulated with compressed labialisation.

With regard to the adaptations of the non-native consonants, it was concluded that speakers of both target languages usually adapt these source consonants to the perceptually closest ones that are present in their language. The non-native labial-palatal feature is achieved by the speakers through imposing the labialisation feature on the acoustically closest consonant. And where this acoustic closeness strategy cannot work, as was the case of the adaptation of the Akan source palatal fricative, speakers seem to incidentally replace such consonants with

their underlying counterparts in Akan. This led us to pose the question as to whether the adaptation of such instances might have taken place prior to the source consonants undergoing the palatalisation process or it is due to other phonetic factors. The phonological adaptation pattern has been accounted for in OT by positing a higher-ranked IDENT-IO(lab) and also markedness constraint *[+cor,-cont,+lab] over MAX-IO(F). This ranking ensures that in avoiding violating the prohibited source non-native consonant, Ga and Dangme speakers preserve the labiality of the same source consonant where equivalent labialised sounds are available in the consonantal inventories of the two target languages.

The other consonantal adaptations that engaged our attention was that of the adaptations of Akan source word-final [w], in which it came out that two main strategies apply, namely vocalisation and deletion. In the former strategy, the illicit word-final [w] vocalises into the rounded [o] in both Ga and Dangme, and additionally into [u] in Dangme alone. For the latter strategy, we found out that the application of the deletion strategy could lead to compensatory lengthening in Ga, for instance, usually when the rest of the source word is minimally smaller than disyllable after the final [w] is deleted. This compensatory lengthening was observed to apply exclusively in Ga.

I tabulate the major points of the discussions in the following showing the similarities and the differences between the adaptation patterns of Akan source consonants by both Ga and Dangme speakers.

Table 12: Adaptations of some Akan source consonants in Ga and Dangme

Akan source consonants	Ga	Dangme
Non-native consonant:		
tɕɥ	tʃʷ	tʃ/tʷ
dʑɥ	dʒʷ	dʒʷ
ɕɥ	ʃʷ	hʷ (has no ʃ)
Cᶣ	Cʷ	Cʷ
ɥ	w	w
ɕ	ʃ, h	h
Word-final w:	i. o	i. o, u
	ii. deletion	ii. N/A
	iii. compensatory lengthening after the deletion	iii. N/A

CHAPTER FIVE

AKAN PROSODIC ADAPTATIONS IN GA AND DANGME

5.1. Introduction

In this chapter, I discuss the phonological patterns of the adaptations of some Akan source prosodic features by both Ga and Dangme speakers. The prosodic properties to focus our discussions on include vocalic nasality and the syllable. The discussions focus on how the [+nasal] feature of some Akan source vowels, particularly how the non-native vowels are realised in both Ga and Dangme in the adaptation process. Regarding the syllable, I discuss the adaptations of the Akan source syllabic nasal, in the two target languages. I look at the main strategies the speakers of both target languages employ in adapting this syllabic nasal and attempt to answer the questions of the how and the where this adaptation occurs in the adapted forms of Akan source words in the adaptation process. In the discussions of the syllable structure, I briefly look at the adaptations of CV monosyllables as well as CVN and VV disyllables in both Ga and Dangme. Finally, the outcomes of the discussions are also be formalised within the OT framework as have been done in the two previous chapters.

The rest of the chapter is organised as follows: section 5.2 considers the strategies that Ga speakers employ in adapting the nasal feature on some of the Akan source words in the adaptation process. The section specifically looks at the realisations of the nasal feature on some non-native vowels in Ga. It also discusses

how some Akan source nasalised vowels are denasalised in Ga as well as sometimes how some source non-nasalised vowels are adapted as nasalised vowels. Section 5.3 also discusses the adaptations of nasality on some Akan source non-native vowels in Dangme. It specifically considers how Akan source nasalised and non-nasalised vocalic segments are realised in Dangme during the adaptation process. The section attempts to draw parallels between the strategies both languages adopt in adapting this prosodic feature in Akan source loaned words. In section 5.4, we take a look at how the Akan source syllabic nasal, at different positions, is realised in Ga. These positions in the word, as discussed below, will include word-initial, word-medial, and word-final positions. The same subject matter of the adaptations of source syllabic nasal, but this time in Dangme is addressed in 5.5. The chapter is summarised in section 5.6.

5.2. Adaptations of Akan source vocalic nasality in Ga

This section discusses the strategies Ga speakers employ in adapting the nasal feature on some of the Akan source vowels, both native and non-native vowels. We first consider the adaptations of the nasal feature on the Akan source non-native vowels in Ga. In chapter three, it was observed that the upper peripheral non-native vowels of Akan source, namely [ɪ] and [ʊ] are adapted as [e, i, ɛ] and [o, u, ɔ] respectively in Ga. The two source non-native vowels are adapted to six vowels in Ga, and out of the six, four are mid vowels. Two of the four mid vowels, namely [o] and [e] are not nasalised in Ga. Therefore, except when replacing a non-native vowel as a vowel from the periphery stock, the prosodic property of

nasality of the target vowel is dropped in the adapted forms. In the following subsections, I present the adaptations of the nasal feature of each of these Akan source non-native vowels in Ga. The discussions are also extended to the cases where the Akan source non-native is nasalised but the target vowel is denasalised not because the target vowel cannot be nasalised. We also discuss instances where the source vowels are oral, but they are nasalised in the target Ga language. Some of the discussions are formalised within the OT framework.

5.2.1. Adaptations of Akan source nasalised [ĩ]

With our knowledge of the target vowels with which the non-native [ɪ] is adapted, our focus here is to answer the question of whether or not the environment can play any significant role in deciding the preservation or otherwise of a source nasal feature on the target vowel.

(58).	Akan	Ga	Gloss
i.	àhĩ̀ŋ̀kʷàá	àhĩ̀ŋ̀kʷɪ̀rá	King's servant, attendant
ii.	ɕɥĩ́ã́ɕɥĩ́ã́ã́	hʷĩ́ã́hʷĩ́ã́	thin, slender, slim
iii.	m̀pĩ́m̀mã́	ã̀m̀pɛ̀mã́	a type of plantain
iv.	àpĩ́ḿ	àk͡pé	thousand, one thousand
v.	àmã̀nĩ́	àmã̀né	trouble, adversity
vi.	tɕɥĩ̀m̀	ʧʷɛ̀m̀	all together

vii.	àɗɾuɻ̃ŋ́	àʤʷɛ́ŋ́	a bird, any wagtail, mud-fish
viii.	ɔtʃ̀ɪ́ámɪ̃́	ɔtʃàámɛ́	linguist, spokesperson for a chief

From the examples in (58i) – (58ii), it is observable that whenever the source non-native nasalised [ɪ] is adapted as [i], the target vowels is systematically nasalised into [ĩ] even without a nasal consonant in the neighbourhood in (58ii). However, whenever the same source vowel is adapted as [e] as seen in (58iii) – (58v) or [ɛ] as in (58vi) – (58viii), the nasal feature is invariably dropped on the target vowels despite the presence of a nasal consonant in the context. This pattern of adaptation can be explained with recourse to Ga phonology. That is, in Ga, /e/ is one of the front vowels that cannot be nasalised (cf. Dakubu 2002, Campbell 2017). However, what is not clear is why oral [ɛ], which can also be nasalised in native Ga phonology, is adapted without the source nasal feature.

Therefore, it seems Ga speakers apply a rule on vocalic nasalisation when adapting Akan source vowels into their vocabulary. The rule can be stated as: in adapting the Akan source [ĩ] as a non-high front vowel, the [+nas] feature is systematically dropped in the target segment, though the nasalisation context is provided. There are few exceptions to this general rule such as *àtɛ́ŋ́* 'judgment', which is adapted as the source nasal feature intact as *àtɛ́ŋ́* and not the expected **àtɛ́ŋ́*. It is worth pointing out that [ɛ] can be nasalised in Ga in native words such

as *atsrɛlɛ* [àtʃr̃ɛ̀lɛ́] ‘money-doubling’, just as it is nasalised in Akan. However, Ga speakers may adapt it without the nasal feature though the nasalising environment may be provided, as seen in (58). From the data, it has been observed that in the adaptation process, when [ɛ̃] is nasalised in source words, the nasal feature is most likely to be maintained in the adapted form in Ga. However, whenever a source [ĩ] is adapted as [ɛ], the nasal feature is usually dropped in the adapted form in Ga.

I now attempt to formalise the dropping of the nasal feature on the Akan source vowels by Ga speakers in the adaptation process. In formalising the adaptations of the nasalised front vowel [ɪ], I introduce a constraint that penalises a candidate with a non-high nasalised vowel. This constraint has to rank above a constraint, which is against deletion; MAX-IO. I define this well-formedness constraint as (59):

(59). *[-high,+ATR,+nas]: A vocalic segment specified for [-high, +ATR] must not be nasal

The constraint is formulated after Kager’s (1999: 28) context-free *V_{NASAL}, which completely prohibits all vowels becoming nasal in a language. However, as has been observed about Ga phonology so far, nasalising vocalic segments is allowed in both the native and the loanword phonologies. There are few vowels in Ga that cannot be nasalised. These vowels, as have been shown, include [e]. The advanced

mid vowels are systematically not nasalised in all words borrowed from Akan, which is in consonance with the nasalisation rules in the native Ga phonology.

One faithfulness constraint that is in conflict with this *[-high,+ATR, +Nas] is IDENT-IO(nas). This constraint; IDENT-IO(nas), which follows Kager (1999: 29) is defined as (60):

(60). IDENT-IO(nas): Correspondent segments in input and output have identical value for [nasal]

The IDENT-IO(nas), constraint when dominated, will license the optimal candidate to drop the input nasal feature when adapting the source nasalised non-native vocalism. In other words, its violation will not have maximum effect on the offending candidate due to its significantly low ranking.

In addition to these two constraints, I employ two constraints that were used in the previous chapters, namely *[+high,-ATR], which bans unadvanced high vowels for candidate that faithfully preserves the non-native segment, and MAX-IO, a constraint against deletion, for the present analysis. The discussion of the data in (58) is formalised as follows in Tableau 21.

Tableau 22: The adaptation of the source nasality in [ĩ] in Ga

/àmɜ̀nɪ́/ 'trouble, adversity'	*[+high, -ATR]	*[-high,+ATR, +nas]	MAX-IO	IDENT-IO (nas)
a. [àmɜ̀nɪ́]	*!			
b.☞ [àmɜ̀né]			*	*
c. [àmɜ̀nɛ́]		*!		
d. [àmɜ̀n]			**!	

Constraint ranking: *[+high, -ATR], *[-high,+ATR,+nas] » MAX-IO » IDENT-IO (nas)

From Tableau 21, it can be observed that candidate (a) becomes suboptimal due to its fatal violation of the high-ranking *[+high, -ATR] for preserving the prohibited input vocalism. This constraint makes no reference to the nasal feature, otherwise the candidate would have satisfied it had it adapted the input segment as the closest high vowel, [i]. Candidate (c) also suffers the same fate for fatally violating the constraint against nasalising advanced mid vowels in Ga. The race for optimality is then decided by the crucially-ranked MAX-IO. Candidate (d), which employs deletion of the prohibited input segment as a repair strategy, incurs fatal violation marks for violating MAX-IO twice, namely for deleting the input segment, and for deleting the input nasality. Candidate (b), on the other hand, is penalised for deleting the input nasality, thus incurring only one violation mark. Though candidate (b) additionally violates IDENT-IO(nas), it emerges the optimal candidate due to its better violations portfolio of the crucial ranking of MAX-IO than candidate (d).

5.2.2. Adaptations of Akan source nasalised [ʊ̃]

In the following discussions, we consider how the Akan source nasalised non-native back vowel is realised in Ga. In a sequel to the discussion in subsection 5.2.1, [ʊ̃] can be adapted as either a back vowel that can be nasalised or one that cannot be nasalised in Ga. I provide examples of how these adaptations can be done in Ga as (61).

(61).	Akan	Ga	Gloss
i.	àhʊ̃̀mkʊ́	àhʊ̃̀ŋ̀kʊ́	joy, satisfaction
ii.	àkʊ̃̀ntá	àkʊ̃̀ntá	brother-in-law
iii.	mʊ́ńˈsʊ̃́	mʊ́ńsʊ̃́	quarrel, strife, ill-feeling; litigation
iv.	ànʊ̃̀kʷá	ànʊ̃̀kʷá	truth; indeed, truly, really, honestly
v.	ɔbʊ̃̀nsʊ́ḿ	àbʊ̀nsʊ́ŋ̀	devil
vi.	dʊ̃́ḿ	dʊ́mʊ̃̀	trust, accept, believe in
vii.	ʊ́ŋ̀kʊ̃́nʊ́ḿ	ʊ́ŋ̀kʊ̀nʊ́ḿ	loner, unsociable person

From the examples in (61), and following the discussion in chapter three, we can predict that whenever Akan source nasalised non-native [ʊ̃] is systematically adapted as the back high vowel [u], the source nasal feature is transferred onto the

target vowel as can be seen in (61i) – (61ii). Similarly, unlike in the preceding discussions, whenever the same source vowel is adapted as the unadvanced back mid vowel [ɔ], the source nasality is transferred onto the target vowel to be realised as [ɔ̃], as in (61iii) – (61iv). However, whenever the source is adapted as the advanced back mid vowel [o], the nasal feature is completely dropped as in (61v) – (61vii). This adaptation strategy can be explained by the fact that as far as Ga phonology is concerned, aside from the high and the low vowels, it is only the unadvanced mid vowels [ɛ] and [ɔ] that can be nasalised in Ga. Therefore, Ga speakers will predictably drop the nasal feature whenever adapting the source vocalism with [o]. In Tableau 22, I present a formal account of this adaptation strategy.

To formalise the adaptation of the nasality of the input nasalised non-native [ʊ̃], I employ the set of constraints and the ranking used for the analysis in subsection 5.2.1 for the present analysis.

Tableau 23: The adaptation of the source nasality in [ʊ̃] in Ga

/ɔbʊ̃̀nsɑ́ḿ/ ‘devil’	*[+high, -ATR]	*[-high,+ATR, +nas]	MAX-IO	IDENT-IO (nas)
a. [àbʊ̃̀nsɑ́ḿ]	*!			
b.☞ [àbɔ̀nsáŋ́]			*	*
c. [àbɔ̃̀nsáŋ́]		*!		

Constraint ranking: *[+high, -ATR], *[-high,+ATR,+nas] » MAX-IO » IDENT-IO (nas)

In Tableau 22, candidate (a) faithfully adapts the non-native nasalised vowel. This adaptation strategy fatally violates the highly-ranked *[+high, -ATR], the constraint that bans [ʊ] in the output in Ga. Candidate (c), on the other hand, avoids violating *[+high, -ATR] by adapting the source vowel as [o]. However, it also fatally violates the highly-ranked *[-high,+ATR,+Nas], a constraint that is ranked highly in the general phonology of Ga for nasalising the advanced back mid vowel, as in [õ]. Though each of these two candidates violates only one constraint, due to the high ranking of the violated constraints, candidate (b) emerges the optimal candidate for Tableau 22 for violating relatively lower ranked constraints, albeit one more than its competitors.

5.2.3. Adaptation of Akan source non-nasalised vowels as nasalised vowels

In this subsection, the discussion focuses on two contexts of the adaptation, namely where Akan source oral vowels are nasalised in Ga, and where Akan source nasalised vowels are denasalised in Ga. Unlike in the preceding discussions, the source vocalic segments are not altered in the following discussions since they are all present in Ga.

(62).	Akan	Ga	Gloss
i.	àkɛ́ńsɪ́	àkɛ́ŋ̀ʃɪ̀	competition
ii.	kʊ̀mɑ́ɑ́sí	kʊ̀mɑ́ɑ́sé	the city of Kumasi

iii.	àsɛ̀m̀sùróẃ	àsɛ̃̀m̀sɽ̀ò	fear of trouble
iv.	m̀mɔ́dɪ́ŋ́	mɔ̃́déŋ́	effort, esp. successful or laudable effort
v.	pàtá	k͡pã́tã̀	make peace, settle a dispute

In (62), it can be observed that the underlined Akan source oral vowels are realised as nasalised vowels in Ga. That is, in feature terms, a source [-nas] is realised with [+nas] in the target language. The nasalisation in the target language occurs in the neighbourhood of a [+nas] consonants in all the examples above with the exception of (62v). The questions then are, (1) does this nasalisation occur out of overapplication of the nasalisation rule? If yes, then (2) how do we explain such cases as (62v), where there is no nasal feature in the neighbourhood to serve as the bases of the (over)application of the nasalisation? (3) Could the application of the nasalisation rule also result from perception? By the end of this chapter, I will attempt to provide some answers to some of these questions. Comprehensive explanations to these questions, however, might require further investigation of the observed pattern.

5.2.4. Adaptation of Akan source nasalised vowels as non-nasalised vowels

There are instances where the nasal feature of some Akan source segments is dropped in Ga in the adaptation process though the target vowels can be nasalised in Ga. I illustrate this adaptation strategy in the following examples in (63).

(63).	Akan	Ga	Gloss
i.	dàdìsɛ́ɛ̱́ŋ	dàdèsɛ́ɛ̱́ŋ	iron pot
ii.	ɔ̀tɕɪ̀ɪ̱́mɪ́	òtʃàa̱mɛ́	linguist, spokesman for a chief
iii.	ædʑìnà̱mʊ̀ʊ̱́	àdʒɪ̀a̱mòá,	an appellation for the domestic cat
iv.	ædɪ̀ɪ̱́ŋkɪ̀rá	àdɪ̀ɪ̱́ŋkɪ̀rá	cloth on which traditional symbols have been printed

It is observable from the data in (63) that the Akan source nasality can be denasalised in Ga during the adaptation process. All the underlined Akan source vowels would have been expected to be nasalised in their nasalising environments, yet they fail to nasalise in the adaptation process in Ga.

5.3. Adaptations of Akan source nasality in Dangme

In this section, I discuss how the Akan source nasality is realised in Dangme. The discussions focus on the realisations of nasality on source non-native vowels. The section also discusses the nasalisation of source non-nasalised vowels as well as the denasalisation of source nasalised vowels in the adaptation process in Ga. The strategies Dangme speakers employ when adapting the Akan source nasal feature on both native and non-native vowels will engage our attention in this section. Just as was done in section 5.2, the discussions first focus on how the speakers adapt the nasal feature on Akan source non-native vowels in Dangme. In chapter three, we realised that Akan source non-native vowels [ɪ] and [ʊ] are adapted in Dangme

as [e, i, ɛ] and [o, u, ɔ] respectively. Some of these target vowels can be nasalised in the regular phonology of Dangme, while others cannot.

The rest of this section discusses how the source nasality and non-nasality are realised in Dangme. But before we proceed with the discussions, we briefly discuss the nasalisation of vowels in Dangme. Aside from the peripheral vowels, namely [i, u, a], two out of the four mid-vowels can be nasalised in Dangme just as obtains in the sister language, Ga. These two mid-vowels are [ɛ̃] and [ɔ̃]. We, therefore, begin the discussions with the assumptions that the Akan source nasalised non-native [õ] will be most likely adapted without the nasal feature as [o]. Similarly, we will expect the Akan source nasalised non-native [ĩ] to be adapted without the nasal feature when adapted as [e]. Aside from these two vowels, the rest of the target vowels will preserve the nasal feature in the source.

5.3.1. Adaptations of Akan source nasalised [ĩ]

In the following examples, I show that Dangme speakers can faithfully maintain the source nasality on even source non-native vowels when adapting words from Akan.

(64).	Akan	Dangme	Gloss
i.	dànĩ́	dɑ̃̂ĩ̀	change, turn into, metamorphose
ii.	m̀mɔdĩ́ń	mɔ́dí	effort, esp. successful effort

iii.	àmɜ̀nɪ̀ɛ́	àmɜ̀nɪ́ɛ	story, case, event, matter
iv.	ʤuɪ́ń	ʤʊ̀ɛ̀	reason, think
v.	ɔ̀tɕɪ̀ɑ́ˈmɪ́	ɔ̀tʃɪɑ!mɛ́	spokesperson, linguist
vi.	àpɪ́ḿ	àk͡pɛ́	thousand
vii.	bɪ́ḿ	bɛ́ḿ	innocence

From (64), it is can be observed that just as was seen about Ga in section 5.2, when a nasalised source [ĩ] is adapted as [i], the nasal feature tends to be maintained on the target vowel, as seen in (64i). However, this nasalisation rule fails to apply in (64ii) – (64iii), though the nasalising environment is there. In (64ii), for instance, we would have expected the source nasality to pass onto the target vowel prior to the deletion of the word-final nasal consonant as the trigger consonant does in (64i). Another case is (64iii) where, though the trigger nasal consonant is preserved in the target language, yet the source vocalism is denasalised. A comparison can be drawn for the adaptations of source [ĩ] as either [ĩ] or [i] between (64i) and (64iii), and as [ɛ̃] or [ɛ] between (64iv) and (64v) respectively. In (64vi) and (64vii), the lack of the nasality on the target vowel can be explained from the point of view of phonological markedness in Dangme, which does not permit [e] to be nasalised.

To provide a formal account of how Dangme speakers adapt the nasal feature on Akan source vocalic segment, I employ the constraints that were used

for the analysis in subsection 5.2.2 since it exhibits similar pattern to the Dangme adaptation strategy.

Tableau 24: The adaptation of the source [ĩ] in Dangme

/ bí̱ḿ / 'innocence'	*[+high, -ATR]	*[-high,+ATR, +nas]	MAX-IO	IDENT-IO (nas)
a. [bí̱ḿ]	*!			
b.☞ [bé̱ḿ]			*	*
c. [bɛ̃́ḿ]		*!		

Constraint ranking: *[+high, -ATR], *[-high,+ATR,+nas] » MAX-IO » IDENT-IO (nas)

In Tableau 23, the illicit input [ĩ] is realised in three different ways in the three candidates. In candidate (a) the illicit input has a perfect correspondent. The input segment is preserved with its nasal feature in fatal violation of the highly-ranked constraint that bans the input vowel, *[+high, -ATR]. Candidate (c), on the other hand, avoids violating this high-ranking constraint by replacing the illicit vowel with a permissible one [e]. However, by preserving the source nasality on [e], it also incurs fatal violation mark for the highly-ranked *[-high,+ATR,+nas] for nasalising an advanced mid vowel. Candidate (b), just as its main competitor, candidate (b), also adapts the input vowel as [e]. It, however, adapts the input illicit vocalism differently as it drops the input nasality while candidate (c) preserves it. By employing the deletion of the input nasality as a repair strategy, candidate (b) violates both MAX-IO and IDENT-IO(nas). Though it is the only

candidate that violates the higher number of constraints, it still emerges the optimal candidate due to the low ranking of the offending constraints.

5.3.2. Adaptations of Akan source nasalised [ũ]

In this subsection, I discuss how the Akan source [ũ] is realised in Dangme in the adaptation process. Consider the examples in (65) for illustration.

(65).	Akan	Dangme	Gloss
i.	ɔbṵ̃ɲsã́ḿ	àbṵsã́ḿ,àbṵsĩ́ã́ḿ	devil
ii.	æd̻ìnàmṵ̃á	àʤ̀àmṵ̀á	domestic cat
iii.	ànṵ̃kʷárí	ànɔ̃́kúalé	true, correct; truly, indeed
iv.	ɔbṵ̃ɲsã́ḿ	abɔ̀sĩ́ã́ḿ	devil
v.	ɔpàpṵ̃	à͡kpà͡kpó, ͡kpà͡kpṵ́	male goat, billy goat, sex maniac
vi.	ànṵ̃kʷárí	ànɔ̀kwádé	fact, truth

From the examples in (65), it is observable that the illicit source vocalism [ũ] is adapted differently. In (65i) – (65ii), the source is adapted as [u], however, against our expectation, the source nasality is dropped from [u]. That is, an expected [ũ] adaptation is realised rather as [u]. In (65i) the trigger nasal consonant is dropped, while in (65ii) it is present. It is worth re-emphasising here that Dangme has the

nasalised [ũ] in its vocalic system. In (65iii), however, as would be expected, the source nasality is preserved when [ʊ] is adapted as [ɔ]. Again, following the phonology of Dangme, the Akan source nasality is dropped whenever [ʊ̃] is adapted as [o] as can be seen in (65v) – (65vi).

Just as was done for Tableau 23, I formalise this pattern of adaptation in the following subsection. Since the adaptation pattern to be analysed is similar to the one in subsection 5.2.4, I employ the set of constraints and the subsequent ranking in the present analysis.

Tableau 25: The adaptation of the source nasality in [ĩ] in Dangme

/ànʊ̃kʷárí/ 'fact, truth'	*[+high, -ATR]	*[-high,+ATR, +nas]	MAX-IO	IDENT-IO (nas)
a. [ànʊ̃kʷádé]	*!			
b.☞ [ànòkwádé]			*	*
c. [ànõkwádé]		*!		

Constraint ranking: *[+high, -ATR], *[-high,+ATR,+nas] » MAX-IO » IDENT-IO (nas)

From Tableau 24, candidate (a) fatally violates the high-ranking constraint against the unadvanced high vowel [ʊ], for preserving the input segment in the output. The two other competing candidates avoid this violation by adapting the banned input vowel as [o]. However, the input nasality is realised differently by the two candidates. While candidate (c) preserves the input nasal feature in fatal violation

of another highly-ranked constraint against such nasality, candidate (b) drops the source nasality, thus violating both MAX-IO and IDENT-IO(nas). Though candidate (b) is the only output form that violates two constraints vis-à-vis one each by the other two competitors, it emerges the optimal candidate due to the relatively low ranking of the two constraints it violates.

5.3.3. Adaptation of Akan source non-nasalised vowels as nasalised vowels

Aside from the adaptation patterns so far observed in Dangme in this section, there are instances where the Akan source vocalic segments that bear no nasal feature are adapted as a [+nasal] feature on them in Dangme. In the following examples I present a few of these cases.

(66).	Akan	Dangme	Gloss
i.	æd̪ʱqàmɑ̃ń	àʤùɑ̃mɑ̃	prostitute; fornication
ii.	æd̪ʱqúmɑ̃	àʤṹmɑ̃	work, labour
iii.	kʷædú	àkɔ̀dṹ, kɔ̀dṹ	banana
iv.	ètú	tṹ	gun, shooting
v.	ækùtú	àkṳ̀tú, àkṳ̀tṹ	sweet orange

From the examples in (66), the Akan source [-nasal] vowels are realised as [+nasal] in Dangme in the adaptation process. From (66i) – (66ii), it can be tentatively explained that the nasal feature might have spread leftwards from the

[+nasal] segments to the target vowels. There are exceptions to this explanation such as the adaptation of the Akan source words like *æ̀tù̱pā́ń* 'bottle' which is adapted as *àtũ̱k͡pá* with no [+nasal] feature in the adapted form. The explanation for this might be that the target vowel [u] got its nasality from an initially nasalised [ã] as the trigger, as in *àtũ̱k͡pā́*, then the trigger vowel lost its nasality afterwards to realise the surface form *àtũ̱k͡pá*? However, the same explanation cannot be advanced for the examples in (66iii) – (66v), where we find no nasal segment in the neighbourhood of the source words to have triggered the nasalisation process in the adapted forms. It is hard to posit any phonological motivation for this nasal adaptation other than to assume that perhaps the speakers might have missed perceived the nasal properties of the target vowels in the adaptation process. This assumption would require perception test to confirm its validity or otherwise.

5.3.4. Adaptation of Akan source nasalised vowels as non-nasalised vowels

There are cases, as in (67), where the Akan source [+nasal] vocalic segments do not have correspondent [+nasal] vowels in the target words in Dangme, though those vowels can be nasalised in Dangme. I illustrate this below.

(67).	Akan	Dangme	Gloss
i.	dɔ̱̃ŋ̱kɔ́	dɔ̱ŋ̱kɔ́, ɔ̀dɔ̱kɔ́	slave
ii.	kɔ̱̃ŋ̱kɔ̱̃ⁿsā́	kɔ̱̀kɔ̱sá	slander; damaging report
iii.	ɔ̀bʊ̱̃ⁿsā́ḿ	àbù̱sáḿ, àbù̱sɪ́ā́ḿ	devil

iv.	m̀mɔ̀dḯń	mɔ́dí	effort, esp. successful effort
v.	àmɛ̃̀nɛ̃̀ɛ̃́	àmɛ̃́níɛ́	story, case, event, matter
vi.	àkʊ́kɔ́ʤɑ̃́ń	àkɔ́kɔ́ʤáí	a kind of domestic fowl

From (67), it can be seen that the nasal feature in the source segments are usually dropped in the adapted forms in Dangme. Could the lack of the nasal feature on the target vowels be due to the misperception of the prosodic feature on the part of Dangme speakers?

A closer look at the examples above points to the fact that with the exception of *ɖɔ̀ŋ̀kɔ́*, Dangme speakers drop the contiguous nasal consonant, as seen in (67i) – (67iv), to license the denasalisation process. The dropped nasal consonant deletes with its nasal feature so that it has no effect on the potential target vowels. There are, however, few counterexamples where though the trigger nasal consonant is preserved, yet its effect is dropped on potential target vowels as seen in (67v). The example in (67vi) is very similar to the phonetic variant of the Asante [àkʊ́kɔ́ʤɑ̃́ĩ] with the main variation being that while Asante has the nasal feature on the target vowels; it is dropped in the Dangme form.

So far we have discussed the adaptations of Akan source nasality in the adaptation processes in Ga and Dangme. The discussions have focused on the adaptations of nasality on Akan source non-native vowels as well as the nasalisation and denasalisation of Akan source oral and nasalised vowels respectively in both Ga and Dangme. In the next sections, we look at how the

Akan source syllabic nasals are realised in both Ga and Dangme. The focus is on the adaptations of word-initial, word-medial and word-final syllabic nasals.

5.4. Adaptations of Akan source syllabic nasals in Ga

Akan has syllabic nasals either as part of stems or as affixes. These syllabic nasals can occur at every position of the word, namely initial, medial, and final positions. In this section, we consider how these nasals are realised in Ga in the adaptation process.

A fact of Ga phonology, according to Dakubu (2002: 33), is that a sequence of double nasals in word-initial position is not permitted in Ga, but it is permitted in word-final position. And even that, it is limited to only velar nasals with the bilabial nasal [m] occurring only in loaned words from Akan (Twi). Dakubu continues that this bilabial nasal is even sometimes realised phonetically as velar nasal. In the subsequent subsections we look at how Akan source syllabic nasals are adapted in Ga.

5.4.1. Adaptations of Akan source word-initial syllabic nasals

Akan allows a sequence of two nasal consonants in a word; either in the initial position or in the medial position, which Ga does not usually permit in its regular morphology. As a common phonological adaptation pattern for such illicit sequence, Ga speakers may either delete the offending nasal segment or insert a vowel to break up such sequence. In this subsection, we will observe that the former pattern is employed systematically in the adaptation process. I will use ‘N’ mostly to refer to syllabic nasal throughout the rest of this chapter.

5.4.1.1. Where the source word-initial syllabic N is deleted

In this sub-subsection, we discuss how Akan source word-initial N in the contexts of NC and N_1N_2, where N_1 is the syllabic nasal, is realised in Ga.

(68)	Akan	Ga	Gloss
i.	ŋ̀kr̀ǎńˈtí	kl̀áńtè	cutlass, machete
ii.	ŋ̀kɔ̃̀ŋkɔ̃̀ǹsǎ	kɔ̃̀ŋkɔ̃̀ŋsǎ	gossip, betrayal
iii.	ŋ̀kɔ̃́ŋ́kɔ̃́ŋ́	kɔ̃́ŋ̀kɔ̃́ŋ̀	a dry, chesty cough; whooping cough
iv.	m̀pépéẃ	k͡pék͡péó	remains of the harvest
v.	m̀pókᵘíá	k͡pòkùá	young breasts

From the examples in (68) above, it can be observed that the Akan source word-initial syllabic nasals have lost correspondents in the adapted forms in Ga. The deletion of this initial syllabic nasals in these examples cannot be attributed to phonotactic constraint since Ga permits the NC sequences in its regular phonological system, albeit most are loaned, in words such as *ŋ̀káŋ́lɛ́* '*Sciaena nigrita*, marine fish' (cf. Dakubu 2002, 2009b), and even in some loaned words of Akan origin such as *ŋ̀k͡pòkùá* 'young breasts', as variant of (68v), for the source *m̀pókᵘíá*, and *ŋ̀kòŋǎǎ́* 'magic, magical rite; a kind of charm' for *ŋ̀kùŋǎǎ́*.

It is not only in the NC contexts where the N is deleted. The N_1 is also deleted in N_1N_2 contexts at the word-initial position, as can be seen in the examples in (69).

(69).	Akan	Ga	Gloss
i.	m̀mɔ́dḯŋ́	mɔ̋déŋ́	effort, esp. successful/laudable effort
ii.	n̪nɑ̃ɑ̃nḯ	ɲɑ̃né	a type of bead
iii.	n̪nɔ̀m̀múḿ	nɔḿ	slave, servant
iv.	m̀mɔbɔ̀mmɔ́bɔ́	mɔ́bɔ̀mɔ́bɔ̀	very pitiful
v.	m̀múáwá	múáwá	germ, virus

In a similar pattern to the strategy adopted for (68), the word-initial syllabic nasals are systematically dropped in the adapted forms. Unlike in the examples in (69), there are no instances of the NN sequence at word-initial position in any native word in Ga. Therefore, there can be a rule in Ga that strictly bans a sequence of NN, but the rule may be relaxed in NC contexts as there are many exceptions to that in Ga.

In Figure 4, a spectrogram showing the adaptation of the Akan source word-initial NN by deletion to support the analysis of the examples in (69).

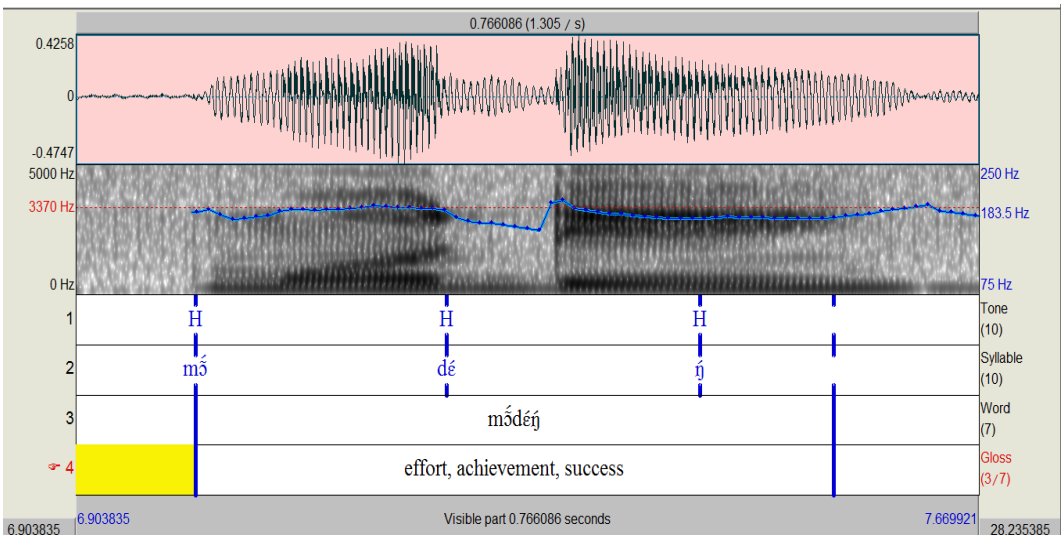

Figure 4: A spectrogram showing the syllable structure of the adapted Ga word *mɔ́déŋ́* 'laudable effort'

It can be seen from Figure 4 above that the four-syllable source word in reduced to a three-syllable word in the adapted form by Ga speakers. The syllable structure reduction is done through the deletion of the source word-initial syllabic nasal.

5.4.1.2. Where source word-initial syllabic N is adapted as V

We have so far discussed the application of deletion as a strategy to repair some word-initial syllabic nasal in NC and NN contexts. In this subsection, we look at the adaptations of source word-initial syllabic nasals through vocalic replacement. In the examples in (70), I show that Ga speaker can sometimes adapt Akan source word-initial syllabic nasals as a vowel, though Ga permits the syllabic nasals at the word-initial position in both the regular phonology and the loanword phonology.

(70).	Akan	Ga	Gloss
i.	ɲtɕètɕèrèé	àkèkèré, àkèkl̀é	headband, headgear, crown
ii.	ŋ̀kòŋǹǎǎ́	àkùŋǹǎǎ́	magic, magical rites; a kind of charm
iii.	m̀púní́m̀pú	àpúnǎ̀m̀pú	head-on, face-to-face, on the spot
iv.	ǹtɔ́m̀mɔ̀	àtómò	sweet potato
v.	m̀pǐ̀m̀mǎ́	ǎ̀m̀pèmǎ́	a type of plantain

From (70), we see that the source word-initial syllabic nasals are adapted as [a] in Ga. So far in all cases of such adaptation, the low vowel [a] is the only vowel Ga speakers employ as a replacement vowel. The example in (70v) rather shows the preservation of the word-initial nasal in addition to the prefix [a]. Following the adaptation pattern, we would have expected it to be realised as *ǎ̀pèmǎ́, where the syllabic nasal will be replaced with the low vowel. Is the source word-initial syllabic nasal maintained in addition to the prefixation of [a] meant to avoid a possible lexical clash in the Dangme? In other words, is it avoided by the speakers to ensure morpheme/word distinctiveness? From the Ga dictionaries, there does not seem to be like *pèmǎ́ and *ǎ̀pèmǎ́ do not seem to exist. Therefore, realising the source as either of the two would not have led to any lexical clash. Perhaps further investigations into this kind of adaptation might help explanation the phenomenon.

5.4.2. Adaptations of source word-medial syllabic nasals

It is not only at the initial position that a syllabic nasal is deleted, but also at the word-medial position as mentioned earlier. In this subsection, we will discuss the adaptations of word-medial syllabic nasals in NC and NN contexts.

(71).	Akan	Ga	Gloss
i.	bèŋ̀kṹm	àbèkú	left hand, left arm, left side
ii.	àbèŋ̀kũ̀mã́	àbèkúlɔ̀	left-handed person; awkward, clumsy person
iii.	pɛ̀sɛ̀mf́ŋ̀kʊ̃́mf́ŋ̀á	pèsèkúméɲá	selfishness

From the examples in (71), it can be observed that the word-medial NC is repaired by deleting the N, as exemplified above. However, there are many exceptions to this pattern in Ga phonology; both the native phonology and the loanword phonology do not ban such sequence at medial position. For example, *kontommire* 'leaf of the cocoyam' is adapted as *kontomle*/*kontomre* in Ga. The question that requires further investigation then is whether or not this adaptation is perceptually motivated.

(72).	Akan	Ga	Gloss
i.	kòǹtóḿmìré	kòǹtómlɛ̀́, kòǹtómɾɛ́	leaf of the cocoyam,
ii.	m̀mɔ̀bɔ̀mmɔ́bɔ́	mɔ́bɔ̀mɔ́bɔ̀	very pitiful

iii.	ǹnòm̀múḿ	nòḿ	slave, servant
iv.	ǹtũḿmúá	ǹtúmúá	a tiny biting fly, sun fly
v.	ŋ̀kấn̄nấrí	ŋ̀kấˈnấlé	rust
vi.	ɲ̀ɲĩnã̀m̀ɲĩnã̀m̀	ɲ̀rã̀m̀ɲ̀rã̀m̀	brightly, sparkling, sending out rays

From (72) above, we observe that just as at the word-initial position, an NN sequence is not permitted in adapted forms in Ga. The only exception in the data is in (72vi) in which a sequence of two nasal consonants is found in an adapted form from Akan. And even that, a closer look shows that the nasals have different places of articulation, which should make it salient enough for Ga speakers to distinctly perceive them, as opposed to the double nasals of the same places of articulation in the rest of the examples.

From the examples above, there seems to be a constraint that bans the sequence of nasals of the same place of articulation in Ga. However, this constraint can be relaxed to some extent on such sequence at the word-medial positions as the examples have clearly shown. Such OCP effect of avoiding nasal consonants in successive or adjacent syllables is evident and strong at word-medial positions as we have already seen.

5.4.3. Adaptations of Akan source word-final syllabic nasal

The position in a word where Akan source syllabic nasal are usually allowed in the adaptation process is the word-final position. Though it is not all the nasal

consonants that are permitted word-finally, we consider the realisations of these syllabic nasals of Akan source words.

In the following examples, I discuss cases where source word-final syllabic nasal is deleted in some adapted forms. I show that deletion is motivated by the phonology of Ga, which does not usually permit the bilabial nasals at word-final position.

(73).	Akan	Ga	Gloss
i.	bèŋ̀kũḿ	àbɛ̀kú	left hand, left arm, left side
ii.	àdéŋ́kũḿ	àdéŋ́kũ̀	a calabash rattle, a kind of music in which a rattle is used
iii.	àpḯḿ	àk͡pé	thousand, one thousand
iv.	pæ̀̃mpíḿ	pã̀mpí	trap, snare; obstruction to progress

From (73), it is clear that the Akan source word-final syllabic nasal is dropped in the adapted forms in Ga. By deleting this final nasal consonant, there is a mismatch in terms of syllable quantity between the source and the adapted forms.

There are exceptional cases to this pattern in which the source word-final nasal is clearly preserved in the adapted forms. For example, the source words, *ʧɥḭ̃m̀* 'all together' is adapted as *ʧʷɛ̀m̀* **ʧʷɛ̀*; while *ɔ̀bɔ̀nsá̃ḿ* 'evil' is adapted as *àbɔ̀nsáḿ*, *àbɔ̀nsáŋ́*, **àbɔ̀nsá*, and *æ̀hũḿ* 'wind, storm, gale, blast of wind' as *àhũḿ*,

*àhũ̀ŋ́ *àhṹ́*, etc. From these exceptional cases, it is clear that the decision to delete or not the source word-final syllabic nasal is without recourse to the environment, that is, the preceding vowel has no influence on the deletion.

In the following examples, the Akan source word-final syllabic nasals are realised as vocalic segment either through compensatory lengthening of the immediately preceding vowel or they are adapted as a high front vowel.

(74).	Akan	Ga	Gloss
i.	ɑ̃̀nsɑ̃̀ḿ	ɑ̃́ŋ́sɑ̃̀ɑ̃́	guinea fowl
ii.	àdɑ̃̀ḿ	àdɑ̃̀ɑ̃́	a type of music played by hunters' assoc.
iii.	kɪ̃̀ŋ̀kɑ̃̀ŋ̀ŋ̀	kɪ̃̀ŋ̀kɑ̃̀ɑ̃̀	fine, rich esp. of women's clothing
iv.	ædʑɑ̃́ń	àgɑ̃̀ɪ́	arrow
v.	dᵘ̀ìàdɑ̃́ń	dùáˈdɑ̃́ɪ́	a building of the wattle and daub type
vi.	àdɑ̃̀ḿ	àdɛ̃̀ɪ́	a type of music played by hunters' assoc.

From the examples in (74), it can be observed that the Akan source word-final syllabic nasal is either realised through deletion and subsequent compensatory lengthening, as seen in (74i) – (74iii), or with a high front vowel, as can be seen in (74iv) – (74vii). It is worth noting that the high tone of the source syllabic nasal is systematically preserved in the vowels with which they are adapted in Ga. Final alveolar nasal, being adapted as the front high vowel [i] as in (74iv) – (74v),

follows the pattern well noted of the Asante dialect of Akan in the realisation of the word-final alveolar nasal at the phonetic level of representation. There is a unique process in the Asante dialect whereby an underlying word-final alveolar nasal is realised as the back high unadvanced vowel [ɪ] at the phonetic level of representation (see Dolphyne 1988, Abakah 2005a, among others for detailed discussion). It is a fact of Ga phonology that an underlying word-final /n/ is usually realised as [ŋ] at the phonetic level of representation (cf. Dakubu 2002), so one would have expected this pattern to systematically reflect in the adaptation of Akan source word-final [n] in Ga. The question then is, could the source loan words be the Asante variants, that is, with the high vowel, rather than the nasal at the word-final position? It is a possibility that those words might have historically entered Ga as the Asante dialect variants. Alternatively, the present adapted forms might have possibly entered Ga as Akuapem variants (i.e. with the final syllabic nasals). However, these words might have synchronically undergone influence by the Asante variant since the Asante dialect is perhaps the most influential dialect in terms of contact with Ga speakers.

5.4.4. Truncation of Akan source syllable structure

In the final discussion of the adaptation of Akan source prosody in Ga, I look at some instances where the Akan source syllable structure is reduced in Ga in the adaptation process. Some of these reductions are instantiated by structural well-formedness requirements, while others are not. I exemplify this adaptation pattern in the examples in (75).

(75).	Akan	Ga	Gloss
i.	àpásá	pásá	tell lies; gossip
ii.	kũmáá̰	kũmá̰	junior
iii.	æ̀nḭ̀mũ̀ɔ̀ŋá̰m	ànũ̀ŋá̰m	glory
iv.	pɛ̀sɛ̀mḭ́ŋ̀kṹmḭ́ŋá̰	pɛ̀sɛ̀kúméŋ́ná	selfishness
v.	ǹnɔ̀m̀múḿ	nɔ̀ḿ	slave, servant

From the examples in (75), it can be seen that the syllable structure of the source words ais reduced or truncated in the adapted forms in Ga. This truncation here is not the result of the repairing of ill-formedness as we have observed so far in the discussions of the adaptations into Ga since the truncated syllables are not in any way ill-formed. For example, in (75i) and (75ii), the truncated monosyllable [a] is permitted at both word-initial and word-final positions in Ga. In examples (75iii) – (75v), on the other, two syllables in each word are truncated. Similarly, the truncation is not a strategy to repair ill-formedness in terms of structure. In examples (75iii) - (75v), two contiguous syllables of the source forms are truncated in the adapted forms. This truncation, as has been mentioned earlier, might not be phonologically-motivated, but perhaps just to facilitate faster speech, a phenomenon which is common across languages especially during first language acquisition by children. For example, a sequence of two vowels of the same

quality as in (75ii) exists in Ga (cf. Dakubu 2002), therefore, reducing the sequence in the adapted forms cannot be phonologically-motivated.

5.5. Adaptations of Akan source syllabic nasals in Dangme

In chapter one of this thesis, it was noted that the inventory of the syllabic nasals in Dangme is limited to the bilabial nasal [m], and even that Dangme speakers make efforts to completely avoid its occurring at the phonetic level of representation (cf. Dakubu 1987). In the following subsections we discuss the realisations of the Akan source syllabic nasals in Dangme. The subsection also discusses realisations of the syllable structures of some Akan words in Dangme.

5.5.1. Adaptations of source word-initial syllabic nasals

Just as was mentioned in the preceding section, Akan permits the syllabic nasal at all positions of the word. By word-initial position, I refer to NC or NN contexts. In the subsequent subsections, we consider the strategies Dangme speakers employ in adapting the Akan source syllabic nasals in the adaptation process.

In the following examples, the Akan source word-initial syllabic N is deleted in the context of NC in the adapted forms in Dangme.

(76).	Akan	Dangme	Gloss
i.	(tírí) ŋ̍kʷā́	(tlí) kū̄ā̄	expression of congratulations
ii.	n̩sékúró	sìékú, sékú	slander, gossip
iii.	ŋ̩kǔnḿm	kǔnḿm	victory, success

iv.	ŋ̀káˈtí	káˈtíɛ́	groundnut
v.	m̀̀fòní	fòní	picture, photo

From the examples in (76), it can be observed that the Akan word-initial syllabic nasals are systematically deleted in the adapted forms in Dangme. That is, unlike in Ga, Dangme speakers completely drop all syllabic nasals, including the velar nasal, which is permitted at the same position in Ga, as seen (76iii) – (76iv).

To account for the complete prohibition of the Akan source word-initial syllabic nasal in the adapted forms in Dangme, there needs to be a position-sensitive constraint which will ensure this ban. This position-sensitive constraint is *$\sigma1_{[+nas]}$, and it is formulated, following Kenstowicz (1996) and de Lacy (2001), as follows:

(77). *$\sigma1_{[+nas]}$: A syllable specified for [+nasal] are prohibited at the initial syllable of a word

The constraint, *$\sigma1_{[+nas]}$ prohibits, without any exception, any syllabic nasal at the word-initial position of Akan source words in Dangme. The constraint *$\sigma1_{[+nas]}$ has to dominate both the anti-deletion and the anti-insertion constraints; DEP-IO and MAX-IO to ensure that the output form that employs deletion of the prohibited initial syllabic nasal emerges the optimal candidate.

Tableau 26: The deletion of the Akan source word-initial syllabic nasal in Dangme

/m̀ɲfòní/ ‘picture, photo’	IDENT-IO(nas)	*σ1$_{[+nas]}$	DEP-IO	MAX-IO
a. [m̀ɲfòní]		*!		
b.☞ [fòní]				*
c. [àm̀ɲfòní]			*!	

Constraint ranking: IDENT-IO(nas), *σ1$_{[+nas]}$ » DEP-IO» MAX-IO

From Tableau 25, candidate (a) presents a perfect correspondence with the input word in terms of segmental match. By faithfully preserving the word-initial syllabic nasal, candidate (a) fatally violates the highly-ranked position-sensitive *σ1$_{[+nas]}$. Candidate (c), on the other hand, repairs this illicitness in the input word-initial syllabic nasal by inserting the vocalic segment [a] leftwards to realise it in an accepted form [àm̀ɲfòní], though this insertion is in fatal violation of the crucially-ranked DEP-IO. By employing deletion as the repair strategy for the illicit input word-initial syllabic nasal, candidate (b) violates MAX-IO. Though candidate (b) violates this anti-deletion constraint, yet it emerges the optimal output form due to the low ranking of MAX-IO.

The deletion of the Akan source word-initial syllabic N is not limited to only NC contexts in Dangme. In the following examples, we consider the deletion of the same source syllabic nasals in N_1N_2 context, where the N_1 is the syllabic nasal.

(78).	Akan	Dangme	Gloss
i.	m̀mɔ́dḯń	mɔ́dé	effort, esp. successful effort
ii.	m̀mùsú	mòsú, mùsú	abomination, taboo, ill luck
iii.	m̀mɔ́bɔ́	mɔ́bɔ̀, mɔ́mɔ̀	pity, sorrow
iv.	m̀mààwá	mɑ̃́wá	servant
v.	m̀màrá	mɭ̀á, mlàá	law

From the examples in (78), it is observable that the source word-initial syllabic nasals are systematically deleted in the adapted forms in Dangme. What we have observed so far is the prohibition of N_1 in an N_1N_2 sequence at the word-initial position in Dangme.

In Figure 5 below, I provide a spectrogram showing the deletion of the Akan source word-initial syllabic nasal in the adapted form in Dangme.

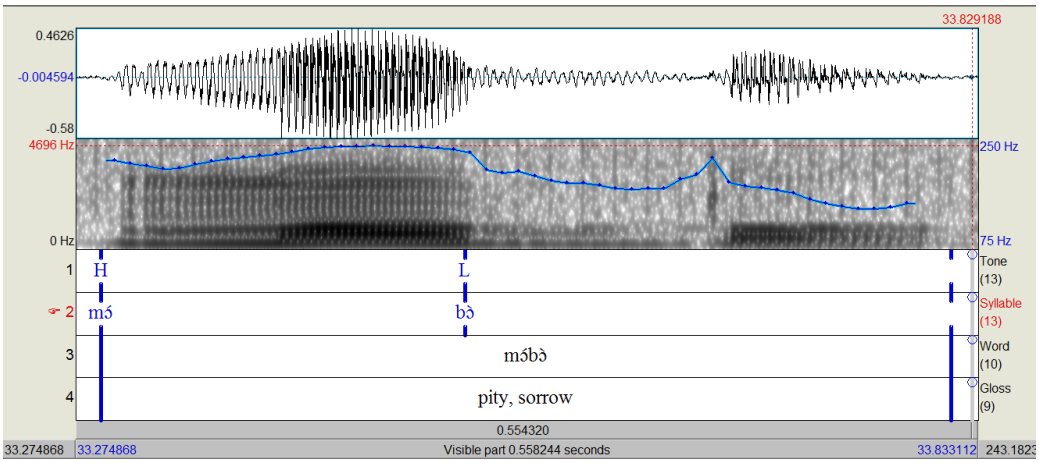

Figure 5: A spectrogram showing the syllable structure of the adapted Dangme word ‘pity, sorrow’ *mɔ́bɔ̀*.

From Figure 5, it can be seen that an Akan trisyllabic word is realised as disyllable in Dangme. The initial syllabic nasal has been deleted. This

5.5.1.1. Where word-initial N is realised as V

In this sub-subsection, I look at the vocalic replacement of the illicit Akan source word-initial syllabic nasal with vowels in Dangme as a phonological adaptation pattern.

(79).	Akan	Dangme	Gloss
i.	ŋ̀káˈtí	ákáté	groundnut
ii.	m̀màá	àmàá	clappers used for musical time keeping
iii.	m̀fòní	òfòní	picture, photo

In the examples in (79), rather than deleting the phonotactically restricted syllabic nasal at the word-initial position, Dangme speakers replace them with vowels in the adapted forms. In (79i) – (79ii), the source word-initial [ŋ] and [m] are realised as [a], while [ɱ] is realised as [o] in (83iii).

A closer look at the replacement process seems to point to a pattern of first stem-internal vowel copying to the place of the deleted word-initial syllabic nasal in the adapted forms. For example, the first stem-internal vowel [a] is copied in place of the deleted syllabic nasal in (79i) – (79ii), while the first stem-internal [o]

replaces the source word-initial syllabic nasal. I exercise caution here with this line of explanation because such examples are too few in the data gathered for the present study to be able to make a well-grounded generalisation. As it stands now, the explanation for this replacement process seems to reside in Dangme speakers' strategy to preserve the source syllable quantity in the adapted forms.

5.5.2. Adaptations of Akan source word-medial syllabic nasals

In this subsection, we will know if this prohibition is extended to word-medial and word-final positions in Dangme before we can generalise this prohibition. Aside from the word-initial position where the Akan source syllabic nasal is banned, such syllabic nasals are banned in the word-medial position. In this subsection, the adaptations of the Akan source word-medial syllabic nasals are discussed, where it will be shown that in both NC and NN contexts, the source syllabic nasal is usually deleted in the adapted forms in Dangme just as was observed with Ga. I begin the discussions with the adaptation of the syllabic nasals in the NC context.

The first context of the deletion of the source word-medial syllabic nasal is the NC context. In the following examples, we observe that the medial syllabic nasals are deleted in the adapted forms. We will soon find out that there are some few exceptions to this deletion pattern.

(80).	Akan	Dangme	Gloss
i.	à m̀pèsí	àpèsí	boiled green plantain
ii.	ætù m̀pǎ́ń	àtùpɛ̀ǎ́m, àtʊ̀pàmí,	a large talking drum

iii.	mɑ̃ḿpɑ̀ḿ	mɑ́pām̄	monitor lizard
iv.	bòn̄sù	bòsò	whale
v.	kòn̄tròm̄fì	kòtròfì	chimpanzee
vi.	ŋ̀kóń̄tóḿpó	kútúpɔ́	undermining, intrigue

From (80), it can be seen that Akan source word-medial syllabic nasal as the ante-penultimate syllable is dropped in the adapted forms as seen in (80i) – (80iii). Similarly, the target syllabic nasal in the penultimate position is also dropped as in (80iv) – (80vi). Again, in both (84v) and (80vi), both stem-internal syllabic nasals are dropped in the adapted forms. There are very few exceptions to this word-medial syllabic nasal deletion pattern in the adaptations of Akan source words such as *ŋ̀kóń̄tóḿpó* 'undermining, intrigue', which can also be adapted as *kútúḿpɔ́*. In this example, the penultimate syllable is preserved in Dangme. There is also the preservation of the medial syllabic nasal in adapting the Akan source word *ɖ̀ɣòŋ̀kú* 'thigh', which is realised as *g͡bòŋ̀gú*, and not **g͡bògú* in Dangme.

In the following discussions, we look at the adaptation of the same Akan source word-medial syllabic nasals, but in the NN context. In the examples it will be shown that just as obtains in Ga, the NN sequence is not permitted word-medially in Dangme words of Akan source.

(81).	Akan	Dangme	Gloss
i.	àkɔ́n̄nɔ́	àkɔ́nɔ́	lust, strong desire
ii.	m̀mɔbɔ̀m̀mɔ́bɔ́	mɔ́bɔ̀mɔ́bɔ̀	pitifully, sadly
iii.	dòn̄nó	òdònó	hour-glass drum
iv.	ɔ̀kúḿbɔ̀m̀mɔ̀fúɔ́	ɔ̀kúḿ-mɔ̀mɔ̀fūɔ	the poisonous twig or vine snake

The examples in (81) also show that the sequence of two nasal consonants is not permitted in Dangme. And as a repair strategy, the syllabic nasal, which is usually the first of the two nasals, is dropped. The example in (81iv) seems to be an exception to this pattern. However, the adapted form in Dangme seems to be a two-word compound than a singleton word. This might explain its exceptionality.

From the discussions in (78) and (81), it seems appropriate to say that Dangme speakers do not permit the NN sequence in the adaptation of the Akan source words. This ban can be expressed in the structural well-formedness constraint formulated and defined below:

(82). *NN A sequence of two nasal consonants is prohibited.

Though the constraint *NN does not make any particular reference to the syllabic nasal, it is assumed that since neither the Akan source nor the target Dangme permits consonant clusters, one of the Ns, consistently the N_1 is syllabic. Again,

the same constraint can account for the ban on such nasal sequence at word-initial position as well as word-final position, as I shall discuss later on in this chapter. This constraint has to dominate the constraint against deletion, MAX-IO since as we have seen so far that it is deletion, and not insertion, is employed as the repair strategy.

Tableau 27: The deletion of the Akan source syllabic nasal in NN context in Dangme

/àkɔ́ńnɔ́/ 'lust, strong desire'	IDENT-IO(nas)	*NN	DEP-IO	MAX-IO
a. [àkɔ́ńnɔ́]		*!		
b.☞ [àkɔ́nɔ́]				*
c. [àkɔ́ńdɔ́]	*!			

Constraint ranking: IDENT-IO(nas), *NN» DEP-IO» MAX-IO

In Tableau 26, candidate (c) avoids violating the highly-ranked *NN through the denasalisation of the N_2 to realise the word as *àkɔ́ńdɔ́*, a form equivalent to the Fante variant of the word. By so doing, it rather fatally violates IDENT-IO(nas), an equally highly-ranked constraint. Candidate (a), the most faithful output form to the input, is also ruled out of the competition due to its fatal violation of *NN for preserving the NN sequence in the input. By deleting the N_1 of the N_1N_2 sequence, candidate (b) avoids violating the high-ranking constraint against such sequence, *NN. However, this satisfaction is at the expense of violating the anti-deletion constraint, MAX-IO. Candidate (b) emerges the optimal candidate despite this violation because of the low ranking of MAX-IO in the present Tableau.

5.5.3. Adaptations of source word-final syllabic nasals

As noted above, Dangme does not generally permit the syllabic nasal at the word-final position with the exception of [m], which even occurs only in loaned words from Akan (cf. Dakubu 1987). As a result of this, several repair strategies are usually employed when adapting the Akan source word-final syllabic nasals. In this subsection, we discuss the adaptations of the Akan source word-final syllabic nasals by Dangme speakers. The discussions focus on two main strategies employed by the speakers in the adaptation process, namely deletion and vocalic replacement. It will be shown that usually the speakers either delete or replace the same word-final syllabic nasals when adapting words from Akan. It will also be shown that the speakers may avoid the syllabic nasals in word-final position through epenthesis. I begin the discussions with the use of deletion as a strategy for adapting Akan source word-final syllabic nasals.

It is not only at the non-final positions that Dangme speakers adapt Akan source syllabic nasals. In the examples in (83), I provide instances of the deletion of the target nasals at word-final position.

(83). Akan	Dangme	Gloss
i. æ̀tùpáń	àtɛ̃̀k͡pá	bottle, esp. beer bottle
ii. m̀mɔ́dḯń	mɔ́dé	effort, esp. successful effort
iii. æ̀dʑɥàmɑ̃́ń	àdʒùɑ̃̀mɑ̃́	prostitute; fornication

iv. àpím̀ àk͡pé thousand

As can be seen in (83), the source word-final syllabic nasals [n] and [m], as in (83i) – (83iii) and (83iv) respectively do not surface in Dangme. There are, however, few exceptions to this generalisation where the final nasal either surface with the same place of articulation as the source or with a change in the place of articulation as in the adaptation of Akan source *æ̀tùm̀páń* 'a large talking drum', with an alveolar nasal in the final position, as *àtùpæ̀ám*, where the final alveolar nasal [n] is realised as the bilabial nasal [m]. There are also examples of the complete preservation of the source word-final nasal as in *ɔ̀bɔ̃̀nsáḿ* 'devil' being adapted as *àbòsáḿ*, *àbùsáḿ*.

5.5.3.1. Where word-final syllabic N is adapted as V

The Akan source word-final syllabic nasals, aside from they being deleted in the adapted forms in Dangme, can also be adapted as a vocalic segment. In the following examples, unlike what obtained in our discussion of similar syllabic nasals adaptations at the word-initial position, the high front vowel is systematically the vowel with which these syllabic nasals are adapted.

(84).	Akan	Dangme	Gloss
i.	dḯńń	dîĩ̃	reserved, habitually quiet; quietly
ii.	ædɻáń	gáĩ̃	bow
iii.	sùbáń	súbáĩ̋	character
iv.	ædɻqúmádɻáń	àʤúmáʤáĩ̋	unprofitable labour
v.	táń	táĩ̋ĩ̋	unpleasant, ugly

It can be observed from the examples in (84) that the Akan source word-final alveolar nasal is adapted as [ĩ]. This particular realisation very closely resembles the Asante Twi phonetic realisation [dĩ̋ĩ̋] of the word. An exception to the high vowel as the replacement vowel can be found in the adaptation of the source *ɖɻɥḯ́ŋ́* 'reason, think', in which the final velar nasal [ŋ] is realised as [ɛ], but not [i] as in *ʤʷûɛ̀ɛ̀*. The word-final alveolar nasal being adapted as a high front vowel is very consistent with what obtains in the Asante dialect of Akan. In the Asante dialect, the word-final alveolar nasal in the underlying level of representation is systematically realised as [ĩ]. However, the explanation for the process in the Asante dialect is not that the word-final [n] changes to [ĩ], but that the nasal is systematically followed by the high front vowel in the underlying level of representation in a CVNV structure. Therefore, the intervocalic N rather deletes

passing its nasal feature to the final V, and not that it is replaced with the high vowel (cf. Dolphyne 1988; Abakah 2004, 2005a; among others).

Just as the process affects only the alveolar nasal in the Asante dialect; it is only the alveolar nasal that is adapted as the high front vowel in adaptation process in Dangme. It is not yet established in Dangme phonology that this intervocalic nasal elision applies; therefore, it can be assumed for the purpose of the present discussion that the source that Dangme speakers adapt might be specifically the Asante dialect (Asante variants) of Akan.

5.5.3.2. Where V is epenthesised to the word-final syllabic N

A third strategy by which Akan source word-final syllabic nasal can be adapted is epenthesisation. In this process, the source final nasal is preserved, however, a vocalic segment is epenthesised to its right to reduce its sonority. I exemplify this strategy in the examples in (85).

(85). Akan	Dangme	Gloss
i. æhũḿ	àhũmì	storm, gale
ii. tɕínā́ḿ	kénā́mḯ	fried fish
iii. ʤɥqáḿ	ʤūāmì	inside the market
iv. ætùmpā́ń	àtŭ̀pàní, àtŭ̀pàmí	a large talking drum
v. súńsˈúḿ	sūsūmá	spirit, image

In the examples in (85), the Akan source word-final syllabic nasals lose their syllabicity in the adaptation process; they assume the onset status after the epenthesisation of the vowels. This loss of the syllabicity is indicated by the shift of the tone bearing units from the source word-final nasals to the epenthetic vowels in the adapted forms. It is worth pointing out that, as would be expected, one Akan source word-final syllabic nasal can be adapted differently perhaps due to the dialectal differences among Dangme. For example, the Akan source word *ɔ̀bùnsā́m* 'devil' can be adapted as *àbòsám*, *àbùsám*, *abosī́ā́m*, *àbùsī́ā́m*, *àbùsī́ā́mī́*, according to Dakubu (2013).

5.5.4. Truncation of Akan source syllable structure

Just as was observed in the discussions of the adaptations of the Akan source syllable structures in Ga, there are instances also in Dangme where the syllable structure of the Akan source word can be truncated in the adaptation process, though limited. These syllable structures that are targeted for the truncation are the monosyllable CV, and the disyllable VV and CVN, where the N is the syllabic nasal. This truncation can occur either word-medially or word-finally in Dangme. I provide examples of this truncation process below in (86).

(86).	Akan	Dangme	Gloss
i.	àsàbrànní	àsàblá	appellation, title
ii.	æɥísī́ā́	àhũsā́	orphan, orphanage

iii. pɛ̀sɛ̀mĩ̀ŋ̀kʊ̃̀mĩ̀ŋ̀á pɛ̀sɛ̀kúmíŋ̀á egotism, self-centredness

In (86i), the source word-final CV is truncated in the adapted form, whereas disyllables VV and CVN are truncated in (86ii) and (86iii) respectively. Just as was explained for a similar process in Ga, the motivation for this process in not clear since the sizes of the source syllables do not seem to violate those of Dangme. Again, it is worth pointing out the interesting targets for the truncation process in (86ii). Following the regular pattern in such instances, we would have expected the final two syllables targeted, instead of the preceding [i], for the truncation process. This adaptation may be due to misperception on the part of Dangme speakers especially when the nasal front high [ĩ], which is specified for [cor], glides into the following nasal central low [ã]. Even though the distance between the two vowels are wide apart in the vowel space, [ĩ], being immediately preceded by [s], which also a coronal segment, can cause some difficulty in its perception. For similar studies on the cross-linguistic differences in perception of coronals in CV combinations by children, see van der Feest et al 2016).

5.6. Summary of the chapter

This chapter has discussed the strategies Ga and Dangme speakers employ in adapting Akan source nasality and source syllable structures. The adaptations of the nasal feature focused on the discussions of how the speakers adapt the [+nasal] feature on Akan source vowels, in particular, non-native vowels. It was concluded

that with the exception of instances where the vowels with which the source non-native vowels are adapted can be nasalised, the source nasality is dropped in the adapted forms, a pattern which is in consonance with what generally obtains in the general phonology of the two target languages (cf. Dakubu 1987, Dakubu 2002, among others).

It was also observed that there are instances where, though a source nasalised vowel, which is also nasaliseable in the target languages, is denasalised in both target languages in the adaptation process. To license the denasalisation process in Dangme, speakers were observed to drop the neighbouring nasal consonant. However, in Ga, it was observed that the denasalisation can take place without dropping the neighbouring nasal consonant. Similarly, a source oral vowel is sometimes nasalised in the adapted forms, even in non-nasalising environment, especially in Ga.

With regard to the adaptations of the Akan syllabic nasals in both Ga and Dangme, it was shown that at the word-initial position, the syllabic nasal may or may not be preserved in the adapted forms in Ga, whereas they are completely dropped in Dangme. These same initial syllabic nasals can also be realised as vowels, particularly the low vowel in both target languages. At the word-medial position, on the other hand, both languages do not usually permit such NN sequences, thereby reducing such sequence through deletion of the syllabic nasals in such contexts. For the adaptations of the Akan source word-final syllabic nasals, the two target languages differ to some extent. While some of the nasals, particularly [m], can sometimes be preserved in the adapted in both languages, the other nasals are either deleted or are realised as front high vowels. In Ga, there is

also an additional process of compensatory lengthening that sometimes accompanies the deletion of those word-final syllabic nasals. Dangme speakers also exclusively apply epenthesis of a vowel, usually a front high vowel, as a phonological pattern for the adaptation of word-final syllabic nasals. In OT, these adaptation patterns were systematically observed to have resulted from the highly-ranking of the markedness constraints *$\sigma 1_{[+nas]}$ for initial syllabic nasals, and *NN for a sequence of syllabic nasals elsewhere, over the faithfulness constraints DEP-IO and MAX-IO. By this ranking, either deletion alone or deletion and subsequently insertion (by replacing the deleted syllable) is resorted to as the adaptation pattern.

The chapter concluded with the discussions of the adaptations of the syllable structures of some of the adapted forms from Akan in Ga and Dangme. It was observed that between the two target languages, CV monosyllables and CVN or VV disyllables could be targeted for the truncation process. It was realised that the truncation might not be phonologically-motivated, but perhaps it is only meant to facilitate speech among the speakers of the two target languages.

In the table below, I present the similarities as well as the differences in how the prosodic features discussed in this chapter are realised in both Ga and Dangme.

Table 13: Adaptations of source prosodic features in Ga and Dangme

Akan prosodic features	Ga	Dangme
Nasalised vowel: [ĩ]	Oral when realised as [e] or [ɛ]	Oral when realised as [e], but nasal/oral when realised [i] or [ɛ]
[ũ]	Oral when realised as [o], but nasalised when realised as [ɔ]	Oral when realised as [o], but nasalised when realised as [u]
Can oral source be nasalised in non-nasalising context?	Yes	Yes
Can source nasalised be oral denasalised in nasalising context?	Yes	No
Denasalisation through deleting the trigger nasal consonant?	No	Yes
Syllabic nasals: Initial NC	N can delete	N always deletes
Initial NC	N can also become V	N can also be realised as V
Initial N_1N_2	N_1 always deletes	N_1 always deletes
Medial N_1N_2	N_1 always deletes	N_1 always deletes
Final N	N can delete	N always deletes when non-labial

CHAPTER SIX

AKAN TONES ADAPTATIONS IN GA AND DANGME

6.1. Introduction

This chapter is dedicated to the discussions of how the tonal melodies of some Akan source words are realised in both Ga and Dangme. The discussions are limited to the adaptations of some Akan source lexical tone on the noun/nominal class to the exclusion of the discussions of other lexical classes because the issues of tone are generally complex and broad to be comprehensively dealt with in a chapter. Even with the noun class, the discussions are narrowed down to only the noun/nominal stems in isolative construction, without mentioning nouns in possessive/associative construction. The simply reason for this is that in such constructions, even the three major dialects of Akan, which serve as the sources of adaptation for Ga and Dangme speakers, manifest them differently. In chapter one it was noted that though Akan, on the one hand, and Ga and Dangme, on the other hand, are tone languages, tone phenomena manifest differently among the three languages. It was mentioned that while both Akan and Ga, on the one hand, operate a two-level tone system, Dangme, on the other hand, operates a three-level tone system. This chapter, therefore, discusses how the lexical tonal melodies of the nominal stems that are adapted in both Ga and Dangme are realised. It also looks at the realisations of Akan source tone rules, including lexical downstep in some nominal stems in the two target languages. In this chapter, the tones are marked (˝) for High, (`) for Low, and (¯) for Mid. The use of H stands for High

tone, M for Mid tone, and L for Low tone will also be observed. The symbol ˡH represents downstepped High. I will use the symbol ˡH interchangeably with the expression, *downstepped H*.

Dolphyne (1988/2006) has identified two main types of Akan nominal stems, namely CV monosyllabic nominal stems and disyllabic nominal stems, which can be of any syllable size including CVV, CVCV, and CVN. According to Dolphyne (op cit), with the exception of a few cases, the CV monosyllabic nominal stems are realised with H tone. The disyllabic nominal stems, on the other hand, are subdivided into five distinctive types based on their tonal melodies. These disyllabic nominal stems are of the following types: HH, LH, HˡH, LL, and HL (cf. Dolphyne 2006: 76-78). The HL, according to Dolphyne (op cit) and Abakah (2005b), is mostly found in English loans in Akan (cf. Dolphyne 2006: 78). It is worth noting that though Dolphyne identified only two types of Akan nominal stems based on their tonal melodies, namely monosyllabic and disyllabic, there are nominal stems of trisyllables and even polysyllables also in Akan (cf. Appah 2003: 6-7) that are adapted in both Ga and Dangme. Again, the disyllabic nominal stems can also be of CVS structure, where the 'S' stands for any syllabic consonant (not only nasals) in Akan. By the use of the term *nominal stems*, I redundantly factor out the nominal affixes (both prefixes and suffixes) in the discussions since we know, from chapter three, that these affixes may not be adapted in the target languages.

It is worth pointing out that the nouns in Akan have also been classified by other criteria by different authors. For example, Bodomo & Marfo (2006) have

classified the nouns purely according to their morphological structure. Osam (2005), on the other hand, used their semantic properties to categorise nouns in Akan. Other authors too have discussed the classifications of nouns in Akan. However, my decision to follow Dolphyne's (1988/2006) classification stems from the fact that she, in her classification, considers both the syllable structure and tonal patterns of the nominal stems which is consistent with the discussions in this chapter. In this chapter, the discussions focus on the adaptations of tonal patterns of nominal stems of different syllable sizes, namely monosyllables, disyllables, and polysyllables as they occur in both Ga and Dangme. I also briefly discuss the adaptations of Akan source tones in compound stems in both Ga and Dangme in this chapter.

A tone rule that will engage our attention in this chapter is the downstep rule. The downstep rule in tone languages refers to the process of lowering the pitch range of H after a L-toned syllable so that a targeted H tone is lower in pitch than the H tones that precede it (cf. Yip 2002: 11). In Akan, the phenomenon has received a considerable attention (cf. Dolphyne 1988/2006, Abakah 2005b, Kügler & Genzel 2011b, Kügler 2016, among others). In the subsequent sections, I discuss the realisations of the downstep phenomenon in both Ga and Dangme in the adaptation process.

In this chapter, I provide spectrograms, where necessary, to show the pitch realisations of each syllable in Akan source words and as comparisons, I show how the source pitches are realised in both target languages. In the spectrograms, the horizontal direction represents time, which is also same as waveforms, and the

vertical direction represents frequency, which is measured in Hertz (Hz). The greyish area has broadband shaded areas which is called the formants. The darker the formant is, the higher the energy densities, and vice versa. The blue dotted line across the formant represents the pitch levels (cf. Boersma 2011). Each spectrogram has been divided into five tiers (both interval and point tiers), namely Segment, Syllable, Tone (point tier), Word (phonetic), and Gloss. The relative pitch of the syllable is indicated at the end of each syllable. In measuring the pitch level, I took the mean value for each syllable.

For the Dangme pitch spectrum, an average pitch range between the values of 85Hz and 100Hz is considered L. The average pitch for M is between 101Hz and 115Hz. The average pitch for H, on the other hand, ranges from 120Hz and above. Therefore, a pitch value that falls in between average values for M and H can be considered as a downstepped H in Dangme. For the Ga pitch spectrum, the average pitch for L is observed to range between 85Hz and 115Hz. The average pitch range for the H, on the other hand, is from 125Hz and above. Therefore, a pitch value which falls in between the values for the H and the L in context can be considered as that of a downstepped H in Ga. These pitch ranges used in this thesis are the averages of the pitches of three male speakers for each of the languages. The spectrograms analysed in this thesis are those of male Akan, Ga, and Dangme speakers.

The rest of the chapter is organised as follows: section 6.2 discusses the adaptations of Akan source lexical tone on nominal stems in both Ga and Dangme. The discussions focus on how some lexical tonal melodies in Akan source monosyllabic, disyllabic, and polysyllabic nominal stems are realised in Ga and in

Dangme. The discussions consider tonal adaptations in both monomorphemic and bimorphemic (compound) stems. The issue of how Akan source downstepped H is realised in both Ga, a language that also operates the lexical downstep rule, and in a language that is not noted for operating the lexical downstep phenomenon in its native tonology, is considered in section 6.3. The chapter focuses on how Akan source downstepped H can be realised as either H or L in Ga. I also look at how the source downstepped H, which is sometimes preserved in Dangme, can also be realised as H or M, and in some exceptional cases, as L in the same chapter. The discussions in this chapter are summarised in section 6.4.

6.2. Adaptations of Akan source lexical tone system in Ga and Dangme

In terms of tone system, though both Akan and Ga operate a two-level tone system, tone does not manifest in the same ways in the two languages. Again, while Akan has had the tone patterns of its noun class clearly defined (cf. Schachter & Fromkin 1968, Osam 2005, Dolphyne 1988/2006, Abakah 2000, 2005b, Bodomo & Marfo 2006, among others), not much has been done in Ga on Ga nouns with the exception of Wentum (1997), who studied the tones of Ga noun classes. She categorised Ga nouns based on their tone patterns.

The study of tone in Dangme, in general, has similarly received less attention, and even the most recent important study of the phenomenon in Dangme dates back to the 20th century by Apronti (1967) and Dakubu (1974, 1987). According to Dakubu (1987: 19-20), there are three tone levels in Dangme. They are H, M, and L and they can be combined to derive several tone patterns, but the

L and M tone levels never pattern together. There can be HH, LH, MH, MM, LL in two-syllable verbs, but not ML or LM.

It is worth pointing out that the main dialectal subgroups that exist in Dangme realise the tone patterns quite differently. While the Inland dialects including Klo and Sɛ have LL different from MM verbs, the Coastal dialects such as Ada and Ningo do not have LL pattern at all (cf. Dakubu 1987). Therefore, the LL pattern in the inland dialects is realised as MM in the coastal dialects. Again, in the coastal dialects, a non-H adjacent to H is realised as L. So in terms of constraints, the Coastal dialects have the constraint *LM and *LL, which means the sequences of LM and LL are prohibited. These constraints do not apply in the Inland dialects, therefore, they are demoted in those dialects of Dangme.

The foregoing, notwithstanding, Dakubu (1987:22) observes that within intonation phrases, only the Klo dialect that allows M to follow L in formal or semi-formal pronunciation. The other dialects do not permit this sequence at all in all contexts. However, a sequence of MML can be found in lexical items such as *pɔ̃pɔ̃lì* 'earthworm', though very limited cases (F. T. Owulah, personal communication, 18th July, 2018). Therefore, a potential LM sequence in the underlying level of representation can be repaired through raising the pitch of the L to M to derive MM in the Ada dialect, which can also occur in fast speech in the Klo dialect. Therefore, in effect, it is possible to realise a sequence of LMH in the Klo dialect in, for example, intonation phrases. The process of raising the pitch levels of a source L to M before M, has the objective of avoiding an ill-formed LM sequence in the Ada and the Klo dialects. Therefore, actual cases of the

realisations of the downstepped H syllables in lexical items in Dangme seem to be limited to loanwords, probably from Akan (Dakubu 1987:24).

This discussion seeks to shed light on noun classification in Ga and in Dangme based on their tone patterns. The discussions in this section focus on the adaptations of the tones of Akan source monosyllabic, disyllabic, and polysyllabic nominal stems in Ga and Dangme. It specifically looks at how the Akan source tonal melodies including LH (which is very common with noun classes, cf. Abakah 2005b), HH, LLH, and LHH are realised in Ga and Dangme.

6.2.1. Adaptations of tone of Akan source nominal stems

I begin the discussions in this subsection with the adaptations of the Akan source tones including H, HH, LH, and LHH in monomorphemic stems in Ga and Dangme. The subsection ends with discussions of the realisations of the Akan source tones in compound (bimorphemic) stems in Ga and Dangme. This subsection discusses level tone adaptation. The discussions of tone rule of downstep are deferred to the latter part of this chapter.

6.2.1.1. Adaptations of Akan source H

In the adaptation of the Akan source H-toned CV nominal stem, the pitch level of the source is almost always maintained in the adapted forms. I exemplify this in (87) and (88).

(87).	Akan	Ga	Gloss
i.	fɔ́	fɔ̋	guilt
ii.	kú	kó	wandering
iii.	èsʊ̋	sʊ̋	blame; responsibility
iv.	èbɛ́	àbɛ́	proverb, adage; indirect speech act
v.	bɛ́	àbɛ̀	pincers

From the examples in (87) above, it is observable that the Akan source H is systematically adapted as the same H in Ga, with the exception of (87v) which is the only exception throughout the data for the present study. The motivation for the change in tone in example (87v) by Ga speakers is not clear. We may suggest that perhaps it is to distinguish the adapted stem in (87v) from that in (87iv), since both have the same orthographic form. This postulation does not seem to hold for the adaptations of the Akan source word *bã́ŋ́* though, since the same form with the same tonal marking is realised as one same adapted form *bã́ŋ́* both for 'character, nature' and for 'boundary, limit, demarcation'.

In the adaptations of the Akan source H in CV syllables in Dangme, as was seen in (87), the source H is maintained in the adapted forms. I illustrate this with the examples in (88).

(88).	Akan	Dangme	Gloss
i.	fɔ́	fɔ́	guilt
ii.	èsú	sú	character, behaviour, nature
iii.	èbɛ́	àbɛ́	proverb
iv.	ɔfã́, àfã́	àfã́	half/soothsaying

It can be observed from the examples in (88) above that the Akan source CV nominal stem with H is adapted as H in Dangme. A symmetry pattern of realising a source H as H has been observed in Ga, which also almost invariably maintains the source tone in the CV stems in the adapted forms.

6.2.1.2. Adaptations of Akan source HH(H)

The adaptations of the Akan source HH, unlike in the preceding cases, are different in that the source is adapted to three different tonal melodies, namely HH, LH, and HL in CVCV, CVN, and CVV nominal stems. I provide examples for further illustrations in (89).

(89).	Akan	Ga	Gloss
i.	æpítí	àk͡pítí	a cake, made of corn
ii.	àpátɕí	àk͡pákí	a large calabash
iii.	ædʑáń	àgã̀ã́	arrow

iv.	æk̀ɾ́ó/èk̀ɾ́ó	àk̀ɾ̀ó/àk̀l̀ó	scar, sore; ulcer
v.	òkᵘíá	òkʷàá	farming, agriculture
vi.	àhɔ́rá	àhórà	a very serious insult, taunt
vii.	m̀mɔ́bɔ́	mɔ́bɔ̀	pity, sorrow

From (89), it can be observed that the source HH tone pattern is adapted as either LH as in (89iii) – (89v), where the pitch level of the stem-initial syllable is lowered or with HL, where the stem-final H syllable is realised as L as seen in (89vi) – (89vii) in Ga. In all these three cases of the realisations, the structure of the source stem can be the disyllabic C(V)CV, CVN, or CVV stems. From the existing literature (cf. Wentum 1997, Dakubu 2002, among others) the HH pattern in nominal stems is attested in Ga. Therefore, to realise a source HH as LH or HL could not be as a result of restrictions imposed by the native tonology. Again, source HH should be perceptually distinct enough for it to be misperceived as LH or as HL. It is worth pointing out the source words are nouns and not nominals (i.e. derived nouns). Therefore, their tonal alterations in Ga cannot be attributed to the result of any juncture, such as morpheme or word boundary, phenomenon. The same observation holds for the majority of the data examined in this chapter.

Dangme speakers adapt the Akan source HH tone pattern of CVCV, CVV, and CVN nominal stems in a very similar pattern as was observed in Ga. See the data in (90).

(90).	Akan	Dangme	Gloss
i.	ɔ̀wáwá	wáwá	a large tree
ii.	pápá	k͡pák͡pá	goodness, hospitality, correct thing
iii.	m̀mɔ́bɔ́	mɔ́bɔ̀, mɔ́mɔ̀	pity, sorrow
iv.	àtɪ́ã́	àtɪ̃ã̀, àtʃɪ̃ã̀	cashew nut tree; cashew nut
v.	æ̀hṹḿ	àhṹmì	storm, gale
vi.	æ̀ʤã́ń	gã̃ì	bow

From the examples in (90), we observe that Dangme speakers can adapt the Akan source HH as HH as seen in (90i) – (90ii), but in addition to maintaining the source HH pattern, the same source pattern can be adapted as the HL tone melody as seen in (90iii) – (90vi). That is, the pitch of the final syllable is lowered to that of L in the adapted forms just as was also observed in Ga, even though the two target sister languages permit the HH pattern in their tonology (cf. Wentum 1997). It is worth pointing out that (90v) is one of the variants of the realisations of the source word in Dangme.

I provide pictorial evidence to exemplify the discussion in (89) and (90) above in a form of spectrogram showing the pitches of the Akan source HH stem word in Figure 6. I show in Figures 7 & 8, spectrograms showing a different realisation of this source HH in Ga and in Dangme.

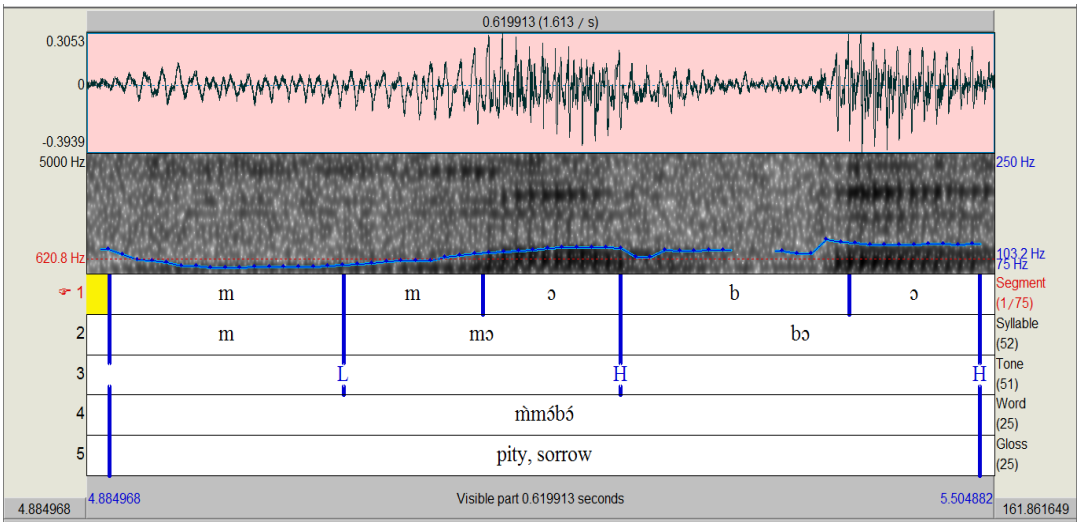

Figure 6: A spectrogram showing the pitch levels of *m̀mɔ́bɔ́* 'pity, sorrow' in Akan

From Figure 6, the first H is realised at the pitch level of 111.37Hz almost the same as the second H, which is said at 118.45Hz. The nominal prefix is said at relatively lower pitch level of 88.91Hz. I compare this spectrogram with one each by Ga speaker and Dangme speaker for the same word adapted in Ga and in Dangme in Figures 7 & 8 below.

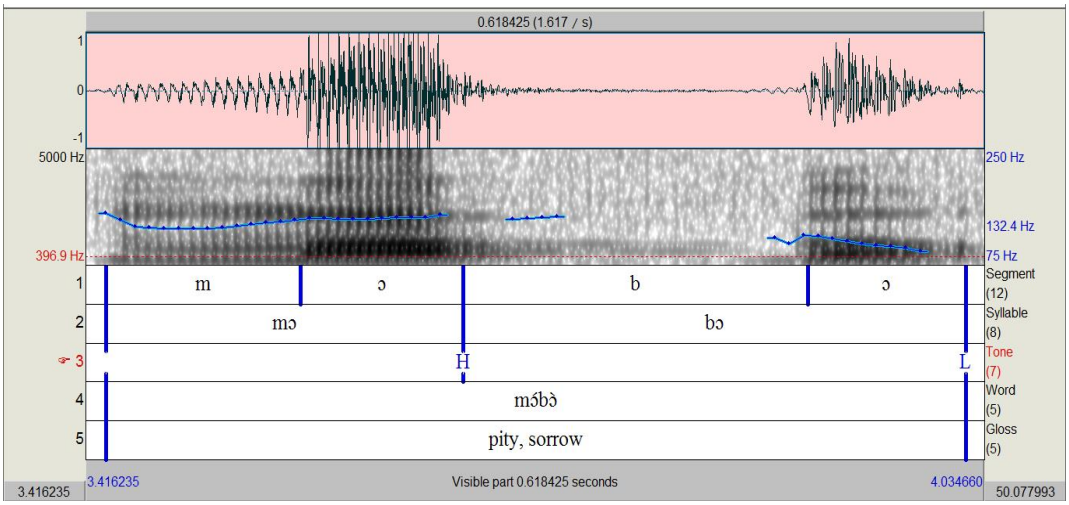

Figure 7: A spectrogram showing the pitch levels of *mɔ́bɔ̀* 'pity, sorrow' in Ga

From the spectrogram in Figure 7, the first syllable (i.e. H) is realised at the pitch level of 147.68Hz while the last syllable is relatively said at a significantly lower pitch level of 106.94Hz. It is evident that the Akan source HH pattern is realised as HL in the Ga pitch spectrum. In Figure 8, I present a spectral analysis of a similar realisation of the same source word in Dangme.

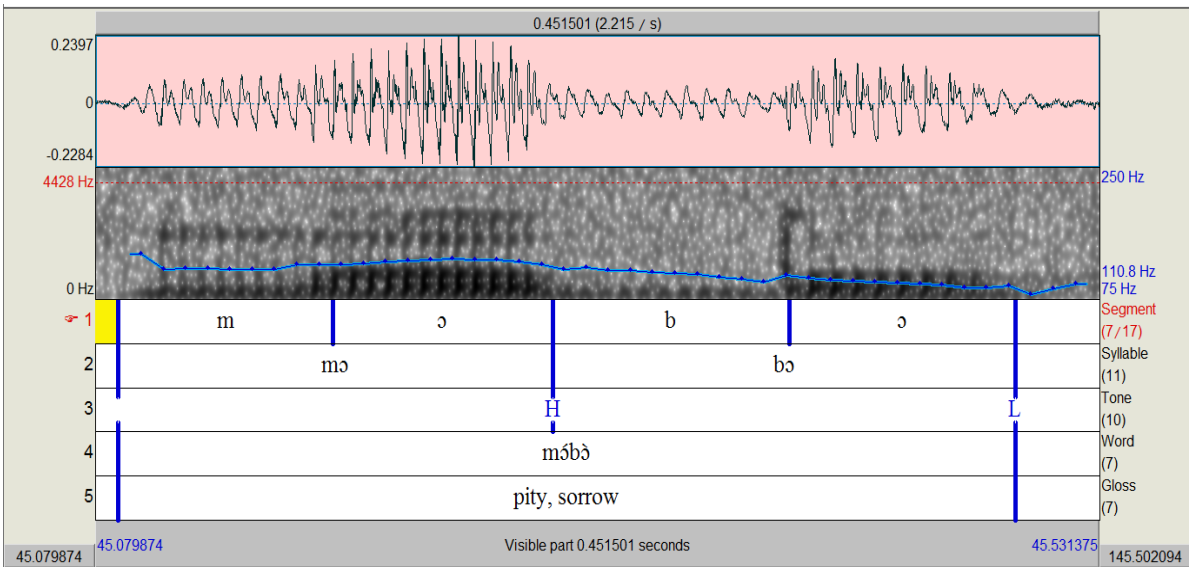

Figure 8: A spectrogram showing the pitch levels of *mɔ́bɔ̀* 'pity, sorrow' in Dangme

From Figure 8, in a very similar fashion to the spectrogram in Figure 7, contrast in pitch levels of the stem-initial and stem-final syllables is clearly observable in the spectrogram for the realisation of Akan source word for 'pity, sorrow' in Dangme. While the stem-initial syllable is said at the pitch of 125.49Hz, relatively higher than that of the stem-final syllable is at 96.84Hz. From the Dangme pitch

spectrum, the stem-initial syllable can be considered as a H toned-syllable and the stem-final syllable as L.

The same Akan source HH(H) can additionally be adapted as a LL tone melody in Ga, which is expatiated in the examples in (91).

(91).	Akan	Ga	Gloss
i.	ɔmā́ŋ́	mā̀ŋ̀	town, country, state
ii.	ɔkɔ́ˈrí	ɔ̀kɔ̀lɛ̀	eagle
iii.	ɔ̀kṹˈnā́	ɔ̀kṵ̀lā̀	widowhood
iv.	æ̀bíˈsá	àbìsà	fortune, destiny, lot, situation in life
v.	bǽˈgúá	bɛ̀gʷà	assembly, council of elders

The examples in (91) show the fourth melody with which an Akan source HH can be adapted. These adaptations occur in syllable structures such as CVN and CVCV in the adapted forms. The examples in (91) present a challenge for perception; a source HH being perceived as LL by Ga speakers is quite baffling when these source words have the same structure as those discussed earlier in this sub-subsection, which were realised differently. We, therefore, should have expected the source HH to be faithfully adapted as HH in Ga, and not as the contrastive LL melody. From the examples in this sub-subsection, it will be difficult, if not untenable, to attribute these instances of unfaithful adaptation of source tone melody to a requirement imposed by the tonology of the target language.

Similarly, an input HH is distinctive enough to be misperceived as LL in a target language especially when the source tone melody is present in the target language. I, therefore, recommend further investigation into the phenomenon to establish what might motivate the unfaithful adaptation of the tone melodies of those target words.

6.2.1.3. Adaptations of Akan source LH

Just as was observed in the adaptations of the source H or HH-toned stems, the Akan source LH melody can be adapted as HH melody aside from the LH levels. This is exemplified in (92) and (93) below.

(92).	Akan	Ga	Gloss
i.	àfɔ̀rí	àfɔ̀lé	sacrifice, offering
ii.	m̀̀fʊ̀á	m̀̀fóá	pimple
iii.	àjìrá	àjálá	the supernatural power to vanish
iv.	àpàkā̋ŋ̀	àk͡pàkā̋ī̋	palanquin, travelling basket

From the examples in (92ii) – (92iii), the source LH pattern of the nominal stem is realised as HH in the adapted forms in addition to the expected faithful preservation of LH in (92i). Our expectation of the source melody to be maintained in the adapted forms stems from the fact the the LH pattern of nouns is well attested in Ga just as it is in Akan. The syllable structures of the source stems,

that is, CVV and CVCV in (92iii) and (92iv) respectively, do not play any role in determining the pattern of tone in the adapted forms just as it has not so far in the adaptation process. Finally, the source LHH pattern in (92iv) does not follow the regular pattern of simply raising the pitch level of the stem-initial syllable as in (92) to realise HHH, but instead the pitch level of the first H rather drops to L as the stem is realised as LLH.

The Akan source LH can also be realised differently aside from this melody being maintained in the adapted forms by Dangme speakers. Among the different realisations of the source LH melody are HH, MH, and LL. I exemplify these different patterns of realisations in (93).

(93).	Akan	Dangme	Gloss
i.	pæ̀tú	pàtú	owl
ii.	òhĩ̋ã́	òhĩ̋ã́	poverty
iii.	ɔ̀pàpó	k͡pāk͡pó	male goat, billy goat
iv.	æ̀tᶣìá	tóá	attack
v.	æ̀bùdã́	àbùdã̀	foolish man; a hen-pecked man

It can be observed from the examples in (93) that, in addition to maintaining the source LH in Dangme, the pitch level of the source stem-initial L can rise to H to realise HH in the adapted forms, as seen in (93iii), or the pitch of the same source stem-initial L can rise to the M level to realise MH. Alternatively, the pitch level

of the stem-final H-toned syllable can rather drop to L to realise a LL melody in the adapted forms in Dangme, as can be seen in (93v). One would have been expected that, for the (93v), the pitch level of the stem-final H could drop to M from H. However, it should be noted that as noted earlier in this section, the output of that realisation, which is LM, is generally prohibited in Dangme. Therefore, it can be concluded that a source LH melody can be realised as LH, MH, HH, and LL, but not LM.

In the examples in (94), we consider the adaptations of an extension of the basic LH pattern in LLH(H). Again, we observe different adaptation strategies of the source tone melody including the raising of the pitch levels of the first, the second, and also the third or final syllables respectively of the nominal stems in the adapted forms.

(94).	Akan	Ga	Gloss
i.	æ̀dìbɑ̃̀ŋ̀	àdìbɑ̃̀ŋ̀	food, heavy or staple food
ii.	àkàsàá	àkásàá/àkáʃàá	cymbal
iii.	tɛ̀kɪ̀ɛ̀mɑ́	tɛ́kɪ̀ɛ̀má	tongue
iv.	àpàà̲wá	àpà̲á̲wá	a flat round wooden tray
v.	kɑ̃̀ŋ̀kɑ̃̀nɪ́	kàŋ̀ká̲ŋ̀	civet cat
vi.	æ̀dìæ̀tɕírí	àdíátʃírí	store-keeper, steward
vii.	ǹtʊ̃̀ŋ̀kʊ̃́m̀	tʊ̃̀ŋ̀gʊ̃́m̀/tʊ̃̀ŋ̀gʊ̃́ʊ̃́	new palm wine

In the examples in (94), it is seen that a source stem-initial L can be realised as H tone in the adapted forms as seen in (94ii) – (94iii). Similarly, a stem L in the penultimate position can be realised as H in the adapted forms as in (94iv) – (94v). The pitch level of an H-toned syllable of the stem, on the other hand, can be lowered at the penultimate position in the adapted forms, as seen in (94vii). It is worth noting that the same source LLHH can also be realised in two different ways in Ga, namely either as HHHH, as seen in (94vi) or as LLLH, as in (94vii).

So far no explanations have been offered on either phonological or perceptual grounds for the variations we observed in the adaptation of source tone melodies. Perhaps the explanation for this and other similar unfaithful adaptation might be that although speakers correctly perceive the source tone melodies, yet they adapt them to the variant melodies present in their language taken into an account the source syllable structure.

Aside from the basic LH melody, other extensions such as LHH can also be adapted by Dangme speakers. I provide some examples for this pattern in (95) below.

(95).	Akan	Dangme	Gloss
i.	ŋ̀kǔníḿ	kǔníḿ	victory, success
ii.	æ̀tùpǎ́ń	àtǔ̀k͡pá	bottle, esp. beer bottle
iii.	sùbǎ́ń	súbǎ́ǐ́	character

From the examples in (95), it can be observed that the source LHH can be realised with different patterns in Dangme. Though there are a limited number of such cases of tonal changes, yet the source LHH can be additionally realised as simple LH as in (95ii), which can as well be realised as LHH supposing the source stem-final were not deleted as a repair strategy. Alternatively, it can be realised through the raising of the pitch level of the stem-initial syllable from L to H in the realisation of HHH, as seen in (95iii). Other possible realisations such as MHH and LLL are not attested in the data examined.

Another extension of the Akan source LH melody with which Dangme speakers can adapt the source tonology is the LLH pattern. Here the adaptation patterns are similar to the source LH. I provide examples to illustrate this adaptation pattern in (96).

(96).	Akan	Dangme	Gloss
i.	àbìrìwá	àblèwá	old lady
ii.	kʷàsìá	kùàsìá	a fool, stupid person
iii.	pàtækú	pétɛ́kú	hyena
iv.	jààwá	àjáwá	a large metal pan, tray or box
v.	bʊ̀ɹɔ̀fʊ́	blɔ̃fónò	European, foreign

From the examples in (96), a major tone melody with which the Akan source LLH can be adapted is HHH as can be seen in (96iii) – (96iv), where the pitch level of

the LL is raised to that of HH to realise HH(H) in the adapted forms. Another strategy is to raise the pitch level of the second syllable from L to M to realise a melody of LMH as seen in (96v). Again, LLL and LLM, where the final H is lowered to L or M are not attested in the data examined for this kind of adaptation, although the source's first two syllables, LL can rise to HH in the adapted forms in Dangme as in (96iii).

6.2.1.4. Adaptations of Akan source (L/H)HLH

So far we have looked at cases of the realisations of either H or those of two distinct level tones in adjacency in the Akan source. This sub-subsection looks at the realisations of the Akan source stems that terminate in the HLH melody in Dangme. Just as have been consistently observed throughout this chapter, a source tone pattern, with the exception of the tones in some CV nominal stems, can be realised in different ways in the adapted forms. In this sub-subsection, we observe similar different realisations of same source melody, which I exemplify in (97).

(97).	Akan	Dangme	Gloss
i.	á᷅mpɛ̃̀n᷅	ápānī	edible species of bat, esp. rosette bat
ii.	mɑ̋᷅mpɛ̃̀m᷅	mɑ̋pām̄	monitor lizard
iii.	ædúòkú	àdùòkú	a nickname for the rat
iv.	ɔ̀sɪ̀ɑ̀fó	ásɪ̀ɑ̀fó	soldier

From the examples in (97) above, it is observable that the source terminating HLH melody, unlike in most of the discussions thus far, is never maintained in the adapted forms in Dangme; it is consistently realised differently. Similarly, the tone of the ante-penultimate syllable can be maintained as in (97i) – (97ii), or it can be lowered to L, as in (97iii) – (97iv). The intervening L can be raised to M, as in (97i) – (97ii), or even to H, as in (97iv). Again, the LH of both the penultimate and the final syllables can be realised as MM, as seen in (97ii). Similarly, the ante-penultimate H syllable can be lowered so that it is realised as L, as seen in (97iii) – (97iv). The final syllable H is usually maintained, though it can also be lowered to a M, as seen in (97ii). However, a drop in the pitch level to that of L will result in ML sequence in (97i) – (97ii), which we already know is not generally permitted in Dangme. In a similar manner, when the same syllable drops in pitch to the level of M, it will yield an LM sequence in (97iii), which is again not permitted in all dialects of Dangme.

6.2.1.5. Adaptations of Akan source HL

In the examples in (98), I show that the Akan source HL melody can be realised differently in Ga, namely as LH and LL in addition to maintaining the source pattern.

(98).	Akan	Ga	Gloss
i.	ɔ́dáẁ	dáà	mouth, mouth cavity
ii.	àdárì	àdídà, àdédà	billhook, pruning shears

iii.	òbóǹtó	bòǹtò	a type of fishing boat, trawler
iv.	bʊ́àpíà	bòápìà	a kind of monkey

From the examples in (98), it is observable that the source HL melody can also be realised as LL, thereby causing the lowering of the pitch level of the H (in the ante-penultimate syllable) in (98iii), and also lowering of the pitch level of the H (in the penultimate syllable) as in (98iv). In the case of first two syllable of example (98iv), on the other hand, the source HL is realised with a contrastive LH tone pattern in the adapted form in Ga. We have already seen the source HH being adapted as HL in (89), which means this pattern is attested in Ga. Therefore, adapting a source HL as other tonal melodies cannot again be as a result of restriction on the pattern by the native tonology.

6.2.1.6. Adaptations of tones in Akan source compound stems

In the following examples the adaptations of the Akan source nominal stems that are underlyingly compounds or bimorphemic are discussed. The second morpheme (i.e. morpheme$_2$) of the compound stem seems to be pre-specified for [+Low] tone whenever it occurs in CVV stems.

(99).	Akan	Stem$_1$+Stem$_2$	Ga	Gloss
i.	fáˈdáŋ́	(ɛ̀fá + dáŋ́)	àfáˈdáŋ́	swish building
ii.	sùbā̋ŋ́	(èsú + báŋ́)	súbā̋ŋ́	character

iii.	àkɛ́ńsí	(kɛ́ń + sí)	àkɑ́ŋ̀ʃ̀ĩ̀	competition
iv.	àdíˈbɔ́	(àdí + bɔ́)	àdébɔ̀ɔ̀	nature, creation
v.	gʷáˈbɔ́	(ègʷá + bɔ́)	gʷábɔ̀ɔ̀	assembly, conference
vi.	àqìrètɔ́	(ɔqírɛ̀ + tɔ́)	òwélètɔ̀ɔ̀	avenging
vii.	bɪ́ḿbú	(bɪ́ḿ + bú)	béḿbùù	acquittal, declared innocent

The adaptation of the compound stems exhibits an interesting pattern. That is, whenever the second stem of the source word is CV, the final V is lengthened and the derived CVV structure automatically receives an LL tone pattern as against the original H in the source. This pattern of tone realisation can be observed in (99iii) – (99vii). It could not be verified in this study whether or not Ga speakers are aware that these nominals which are targeted for this process are underlyingly compounds. From the discussion above, there emerges a pattern that lengthens the final V of morpheme$_2$, and thus alters the source H to LL. Again, perceiving a source stem-final H as LL as in (99iii) – (99vii) might not be due to any known tone rule in Ga. I illustrate the realisation of examples (99ii) in the spectrogram below in Figure 9 and 10. Figure 9 is the spectrogram of the Akan source word *sùbɑ́ŋ́* 'character' and its realisation in Ga is shown in Figure 10.

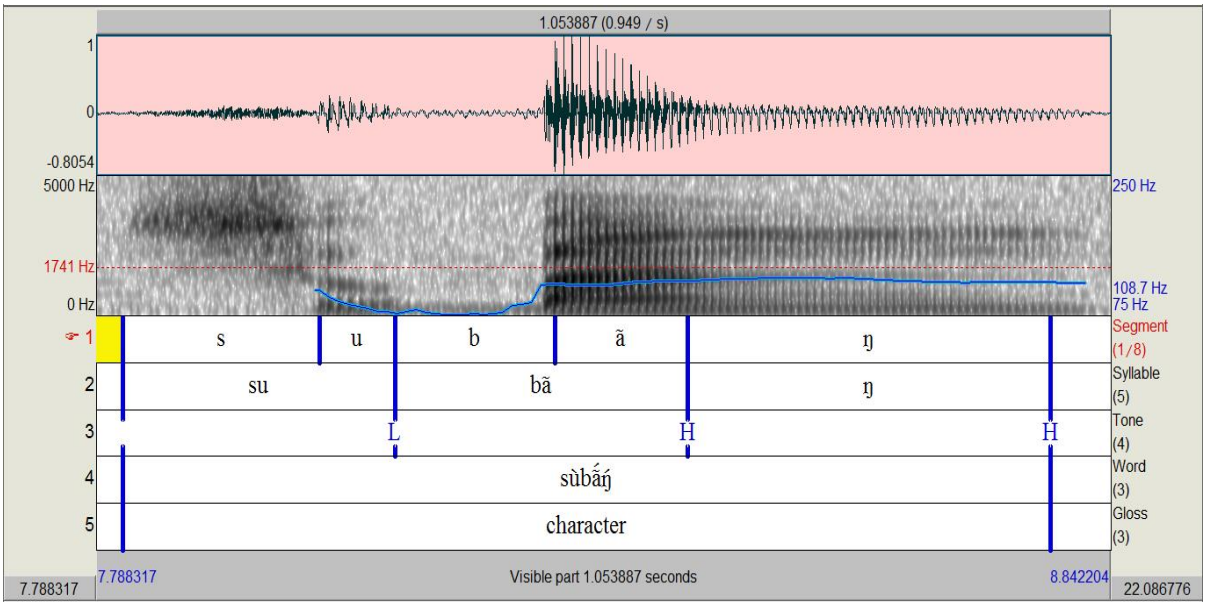

Figure 9: A spectrogram showing the pitch levels of *sùbáŋ* 'character' in Akan

In Figure 9 above, the initial syllable is realised at the pitch level of 88.72Hz, while the second and the last syllables are said at 116.12Hz and 119.95.71Hz respectively. The pitches of the initial syllable, on the one hand, and those of the last two syllables, on the other hand, fall within the averages for L and H respectively in the Akan pitch spectrum. In Figure 10, I present another spectrogram showing the realisation of the same Akan source word in Ga. It will be seen that the initial syllable in Ga is realised rather with H.

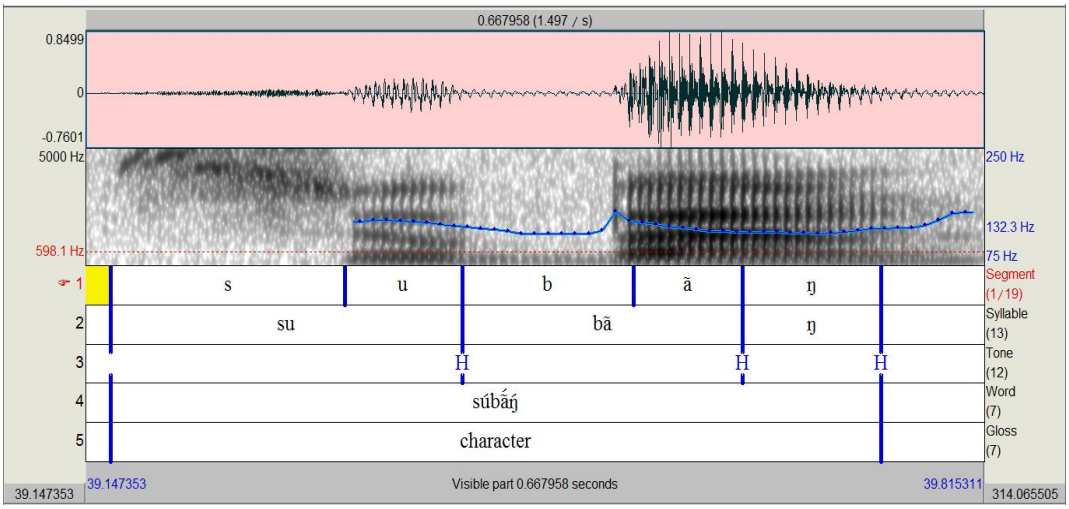

Figure 10: A spectrogram showing the pitch levels of *súbáŋ́* 'character' in Ga

From the spectrogram in Figure 10 above, it can be seen that the LHH melody of the Akan source word for 'character' is realised as HHH for all the three syllables in Ga. That is, the source stem-initial syllable, was realised as L in Akan, is said at the pitch level of 139.61Hz, which falls within the pitch range for H in Ga. This pitch is even slightly higher than the two subsequent syllables which are said at 131.41Hz and 125.48Hz respectively.

As has been done for Ga, I briefly look at the adaptations of the Akan source words which have compound stems at the underlying level of representation in Dangme. In Ga, it was observed that, for most of such stems, the stem-final vowel is lengthened and this tone changes from H in the source to L in the adapted forms. A similar pattern is also observed in Dangme. However, unlike in Ga, the lengthening of the final vowel does not apply in Dangme. Again, the source stem-final H can be realised as M in Dangme. I provide examples to illustrate this in (100).

(100).	Akan	$Stem_1$+$Stem_2$	Dangme	Gloss
i.	àmɜ̀nɪ̀hű	(àmɜ̀nɪ́ + hű)	àmɜ̀nèhlű, àmɜ̀nèhű	affliction, suffering
ii.	g^wúámɘ́	(g^wúá + mű)	g^wúámɘ̄	a gathering
iii.	àkúkɔ́bɛ́ˡsɜ́	(àkúkɔ́ + bɛ́sɜ́)	àkɔ́kɔ́bɛ́sɜ̀	a climbing/straggling thorny shrub
iv.	àqìrɛ̀hú	(ɔqɪrɛ̀ + hú)	àwɛ̀rɛ̀hò, àwìlɛ̀hò	grief, sorrow, sadness
v.	àmɜ̀nɪ̀bɔ́	(àmɜ̀nɪ́ + bɔ́)	āmɜ̄níɛ́bɔ̀	mission, report, news

From (100), it can be seen that although the final syllable of the compound nominal stem is H in the source language, it can also be systematically realised as non-high, i.e. either M, as in (100ii) or as L, as in (100iii) – (100v) in the adapted forms in Dangme. This adaptation follows a similar pattern to the one observed about Ga. In the following spectrograms, I show how Akan source compound stem-final H, as shown in Figure 11, is realised as L in Dangme, as seen in Figure 12.

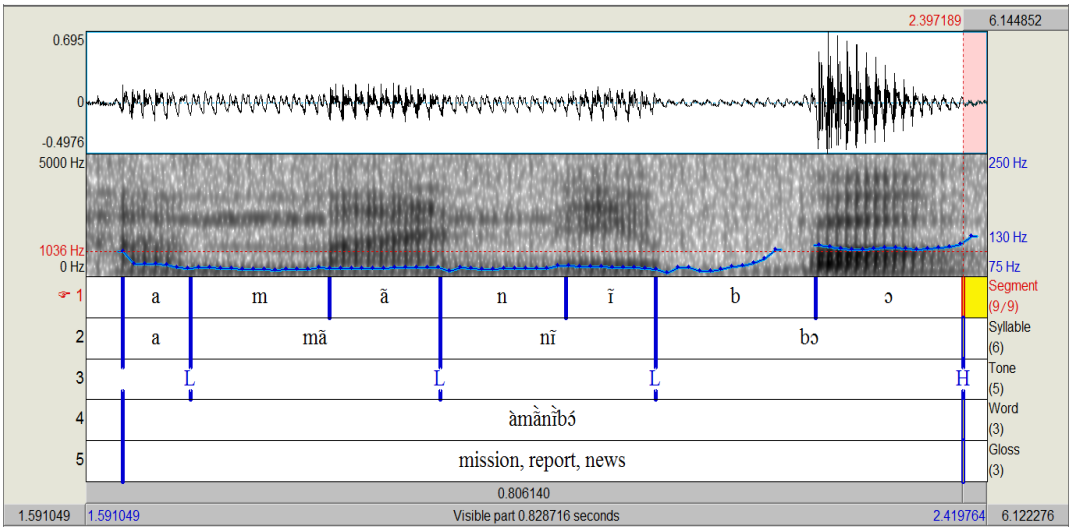

Figure 11: A spectrogram showing the pitches in *àmãnĩbɔ́* 'mission, report, news' in Akan

From the spectrogram in Figure 11, the pitch of the word-initial L syllable is 93.34Hz, while the second and the penultimate L syllables are realised at 87.30Hz and 88.72Hz respectively. The final syllable, on the other hand, is realised at a relatively higher pitch of 116Hz. The significant variation in pitch between non-final L syllables and the final H syllable is observable from the spectrogram, which results in LLH melody in the stem. In Figure 12, I show that this melody can change to LHL in adapted forms in Dangme.

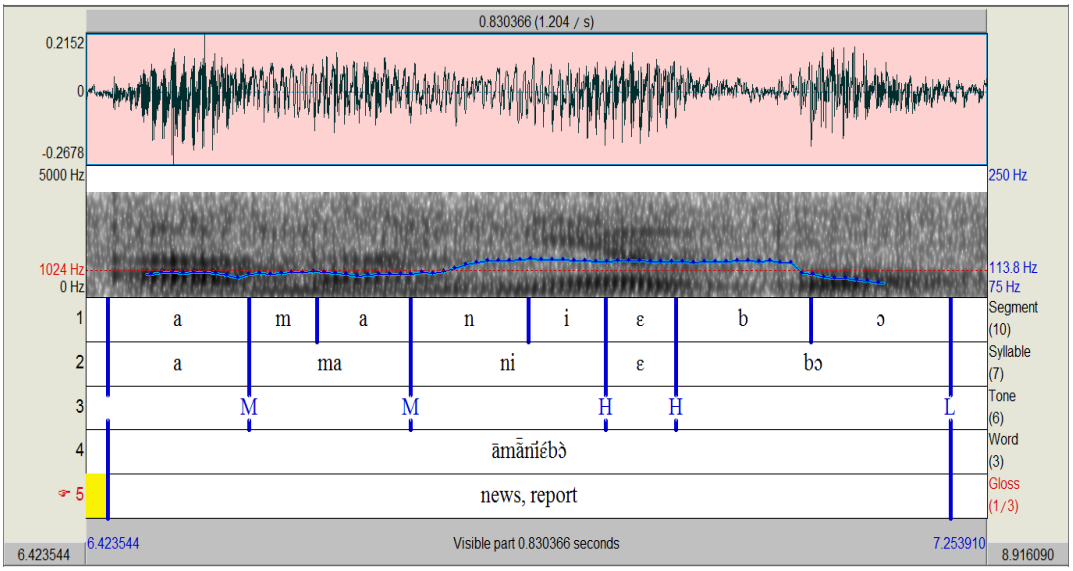

Figure 12: A spectrogram showing the pitches in *āmā̃ńíébɔ̀* 'mission, report, news' in Dangme

From the spectrogram in Figure 12, the first syllable, which is L according to Dangme pitch spectrum, is realised at the pitch of 107.05Hz virtually the same as the second syllable, which is at 106.27Hz. The ante-penultimate and the penultimate H syllable are both realised at the pitches of 124.61Hz and 123.08Hz respectively. The stem-final syllable, which is L, on the other hand, is realised at the pitch of 99.74Hz. With our focus on the penultimate and the stem-final syllables, it can be seen that the Akan source tonal pattern of -LH is realised as opposite melody of -HL in Dangme.

6.3. Adaptations of Akan source downstepped H in Ga and Dangme

Although the downstep rule is active in Ga, sometimes the downstepped H in some Akan source nominal stems are adapted as non-downstepped H tone. Similarly, the Akan source downstepped H can also be adapted as non-downstepped H in

Dangme, a language in which lexical downstep is rare (cf. Dakubu 1987). Unlike Ga, in Dangme, which is a three-level tone language, the downstep phenomenon is caused by either the L or the M tone, whereas it is only L tone that triggers the phenomenon in Akan, the source language. The target for the downstep rule is usually the H-toned syllable, though both the H and the M tones can be targeted in the downdrift process in Dangme (cf. Dakubu 1987: 21). In this subsection, I discuss how the Akan source downstepped H syllable is realised in both Ga and Dangme in the adaptation process. It will be observed in the following discussions that the downstepped H can sometimes be realised as L, M, or H. Again, it will be seen that some Akan source H-toned syllables can even be realised as a downstepped H in Ga.

6.3.1. Adaptation of Akan source ꜜH as ꜜH

In the following examples, I show that the downstep rule in Akan is also active in Ga even in its loanword phonology. It is, therefore, expected that an Akan source downstepped H syllable is maintained as such in Ga in the adaptation process.

(101).	Akan	Ga	Gloss
i.	ɔnùkʷáꜜfú	ànɔ̃kʷaꜜfó	a truthful person
ii.	àpásáꜜfú	àpásáꜜfó	liar, gossip, idle chatterer
iii.	ámꜜpé	ámꜜpé	a rhythmic jumping game
iv.	ŋkáꜜtíé	ŋkáꜜtíé, ŋkéꜜtíé	groundnut, peanut

In the examples in (101) above, the tonal melodies and the pitch levels of the Akan source syllables are faithfully maintained in the adapted forms in Ga, as seen in the spectrogram in Figure 14. This faithful adaptation is expected in that both the source and the target languages operate the downstep rule, which is the focus of the present discussion. This faithful adaptation is accounted for in terms of perception, that is, Ga speakers correctly perceive the pitch levels of each of the source syllables, hence they map them onto the syllables of the adapted forms. In Figure 13 below, I show a spectrogram of how the downstepped H is realised in the Akan source word for *ŋ̀kaˈtíɛ́*, and show how the downstep is maintained in the adapted form in Ga in Figure 14.

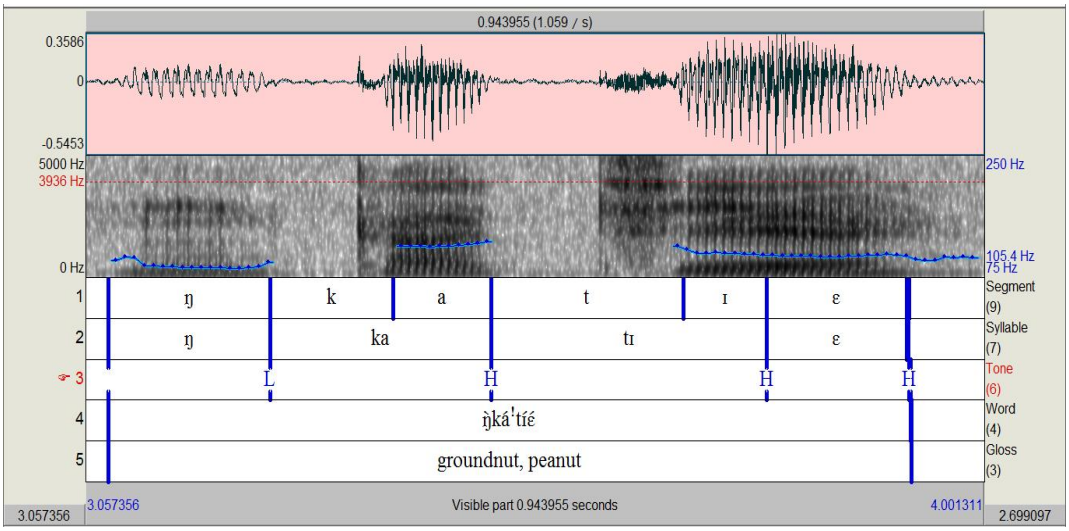

Figure 13: A spectrogram showing downstep in *ŋ̀kaˈtíɛ́* 'groundnut, peanut' in Akan

In the spectrogram in Figure 13, while the stem-initial H is realised at the pitch level of 121.56Hz, the ante-penultimate and the final downstepped H syllables are said at virtually the same pitch levels of 110.38Hz and 106.46Hz respectively. In the following spectrogram in Figure 14, I show how Ga speakers maintained the source downstep in adapted forms.

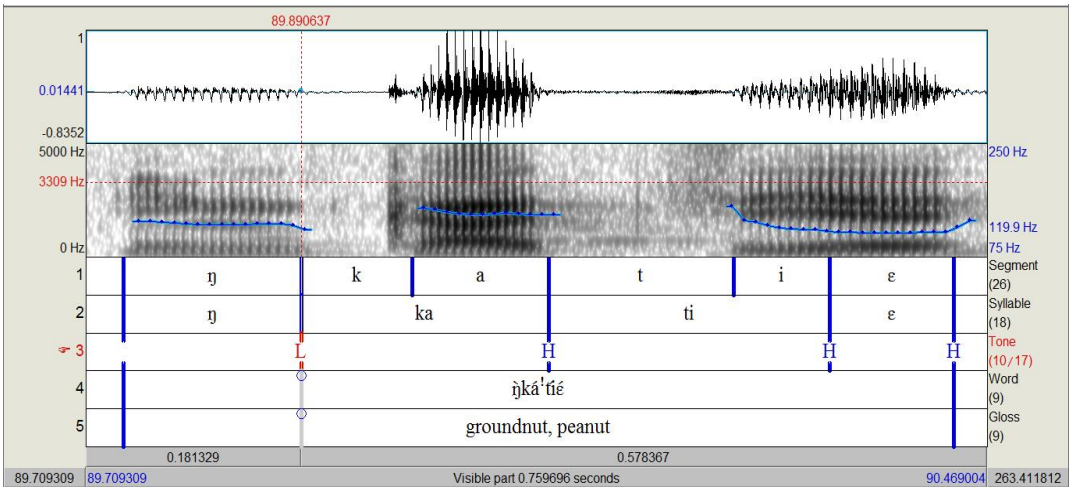

Figure 14: A spectrogram showing downstep in *ŋ̀kâˈtíé* 'groundnut, peanut' in Ga

From the spectrogram in Figure 14, the stem-initial H syllable is said at the pitch of 143.03Hz as compared to the following penultimate and final Hs, which are realised at 123.78Hz and 113.36Hz respectively. This pattern is similar to what we observed in Figure 13 where the stem-initial H syllable was significant higher in pitch than the subsequent H syllables.

Just as was observed in Ga, the Akan source downstepped H can be maintained in the adapted forms in Dangme. I provide illustrations of this adaptation in the examples in (102).

(102).	Akan	Dangme	Gloss
i.	ɔ̀kɔ́ˈtɔ́	ɔ̀kɔ́ˈtɔ́	a small greenish river crab
ii.	ɔ̀tɕ̰̃ɪ̃ã́ˈmɪ̃́	ɔ̀tʃ̃ɪ̃ãˈmɛ́	spokesperson, linguist
iii.	ŋ̀káˈtíɛ́	káˈtíɛ́	groundnut

From the examples in (102), it is seen that the pitch levels of the stem-final syllables in the source words are maintained in the adapted forms though the target language does not seem to operate the downstep rule. On the exceptional case above, it has been explained in the existing literature that occurrence of the downstepped H seems to be limited to loanwords (Dakubu 1987: 24). Is it because of the fact that it is a language with seven dialects? Though there is a native Dangme word for the 'blue plantain eater (*Corythaeola cristata*)' which is *ɔ̀tʃ̃ɪ̃rã́ˈkɔ́*, which has a downstepped H in it. The complete explanations for this exception might not reside in the phonology of Dangme, but perhaps in perception. As we will see in the next cases of this exception, the same source downstepped H can be adapted as H. So the question then is, how does the phonology again explain the adaptation of the same pitch differently in the same language?

6.3.2. Adaptation of Akan source ˈH as L

It is not always the case that the pitch levels of the source syllables are maintained in the adapted forms in Ga. Unlike the cases of the faithful adaptations in (103)

above, in the examples in (103), it can be seen that the Akan source downstepped H is rather realised as L.

(103).	Akan	Ga	Gloss
i.	ɔ̀kʊ̀bɔ́ˈfʊ́	kòbɔ́fʊ̀	vagrant
ii.	òbúbúáˈfʊ́	òbúbúáfʊ̀	cripple, paralysed person
iii.	mɑ̃́ɑ́ˈsʊ̃́	mɑ̃́ɑ́sʊ̃̀	quarrel, strife, litigation
iv.	ɔ̀dáˈsí	òdásè	testimony
v.	ɔ̀díˈɕí	òdéhè, òdéè	noble, free born person
vi.	ɔ̀dɛ́ɲˈtɕɛ́ḿ	òdɛ́ɲ́tʃɛ̀	a small type of crocodile

From the examples in (103) above, we see that the Akan source downstepped H syllable, being the last syllable, is realised as L in Ga. In other words, Ga speakers produce the source downstepped H with a relatively lower pitch, hence its realisation as L in the adapted forms. It is generally expected that the pitch level with which a downstepped H syllable is expected to fall between the levels of a H pitch and a L pitch for languages that contrast between these two levels. Therefore, for Ga, which falls within this category of tone languages, it can be expected that if Ga speakers do not correctly realise the level of pitch for a downstepped H syllable, they are likely to produce it as L-toned syllable. In Figure 15 below, I show the spectrogram of the word for ‘testimony’ in Akan and also show the downstepped H in the source word is realised in Ga in Figure 16.

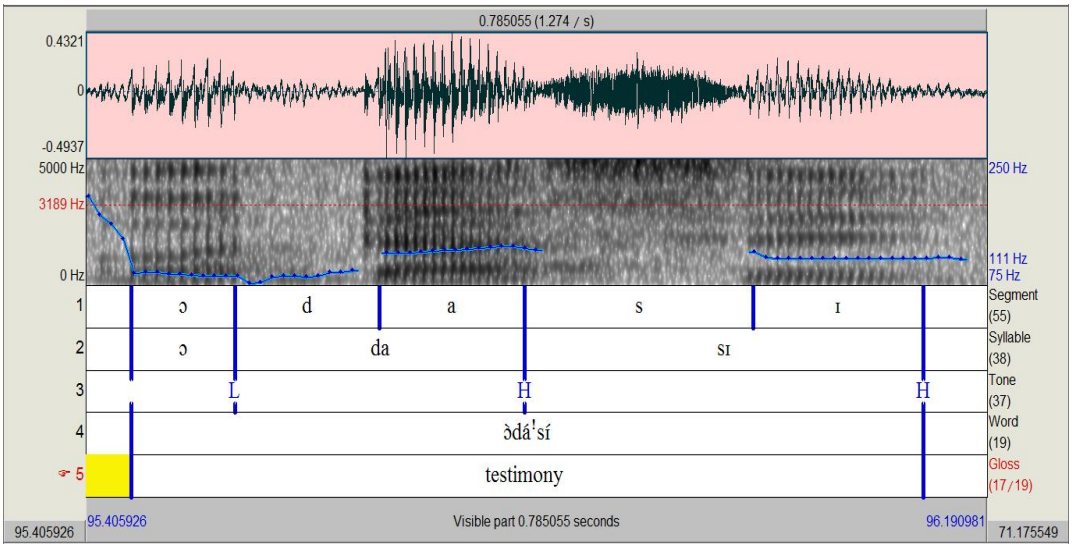

Figure 15: A spectrogram showing the pitch level of *ɔ̀dá'sí* 'testimony' in Akan

From Figure 15, the stem-initial H syllable is realised at the pitch of 124.46Hz as against the stem-final H syllable, which is said at a relatively lower pitch of 112.77Hz. The pitch of the stem-final syllable compares with the word-initial (nominal prefix) L syllable which is realised at 90.32Hz. This means the stem-final syllable is realised as downstepped H relative to the preceding H syllable. In Figure 16, we observe that the source stem-final H syllable is rather realised with a lower pitch in Ga.

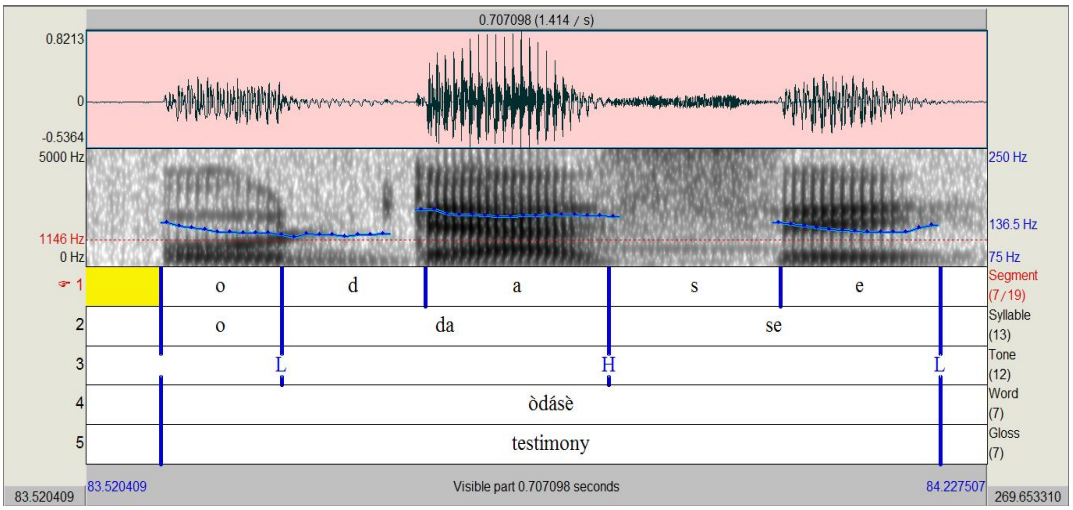

Figure 16: A spectrogram showing the pitch level of *òdásè* 'testimony' in Ga

In Figure 16, the stem-initial H syllable is realised at the pitch of 151.77Hz, while the stem-final syllable, also H, is realised at 130.92Hz almost the same as the word-initial L syllable with the pitch of 128.76Hz. This clearly shows that unlike in Akan, the stem-final syllable is rather realised as L.

It is not only in Ga that Akan source downstepped H can be realised as L, but also in Dangme as well. In the following examples I consider cases where the pitch of the source downstepped H is reduced to the level of L. Though there are fewer such examples in the data, I exemplify those cases in (104).

(104).	Akan	Dangme	Gloss
i.	àdíˈbɔ́	àdébɔ̀	creation, nature
ii.	æhŭ́mí	àhŭ́mì	storm, gale
iii.	àkúkɔ́bɛ́ˈsā́	àkɔ́kɔ́bɛ́sà̀	a climbing or straggling thorny shrub

In the examples in (104), it can be seen that the source stem-final, which was realised as downstepped H, is realised as L by Ga speakers. The adaptation is quite unexpected since the pitch level of the source downstepped H (at 126.22Hz, as seen in the spectrogram in Figure 17) should be high too to be realised as L, especially when the pitch range for L in Dangme falls below even 120Hz. I show in the following spectrograms how these pitches are realised in both Akan and Dangme.

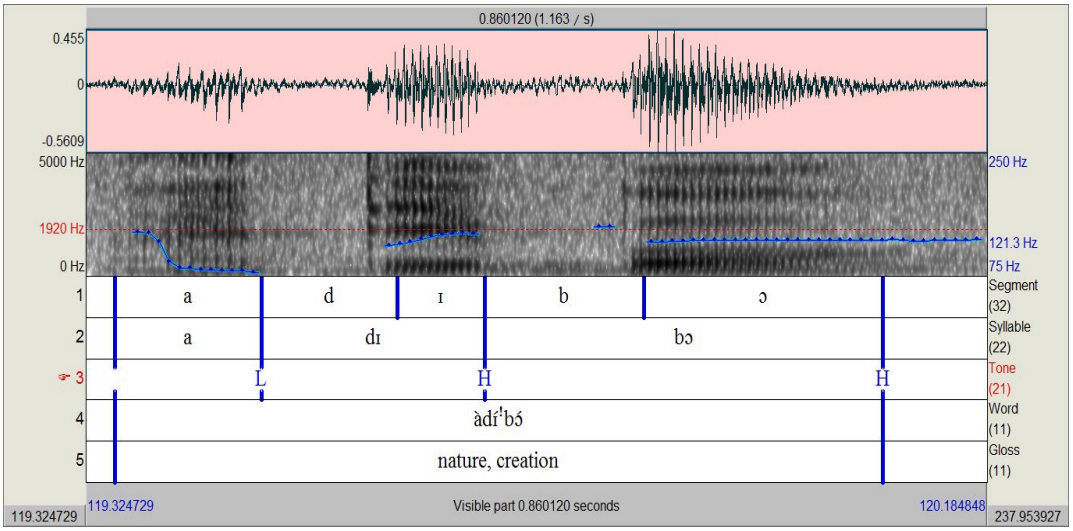

Figure 17: A spectrogram showing the pitch level of *àdɪ́ˈbɔ́* 'creation, nature' in Akan

In the spectrogram in 17, the stem-initial H syllable is realised at the pitch of 131.29Hz, while the following downstepped H syllable is said at a slightly lower pitch of 126.22Hz. The word-initial syllable, however, is realised at a significantly lower pitch of 97.22Hz making it a L-toned syllable. I compare this spectrogram

with another one showing how the source pitches are realised in the same word adapted in Dangme in Figure 18.

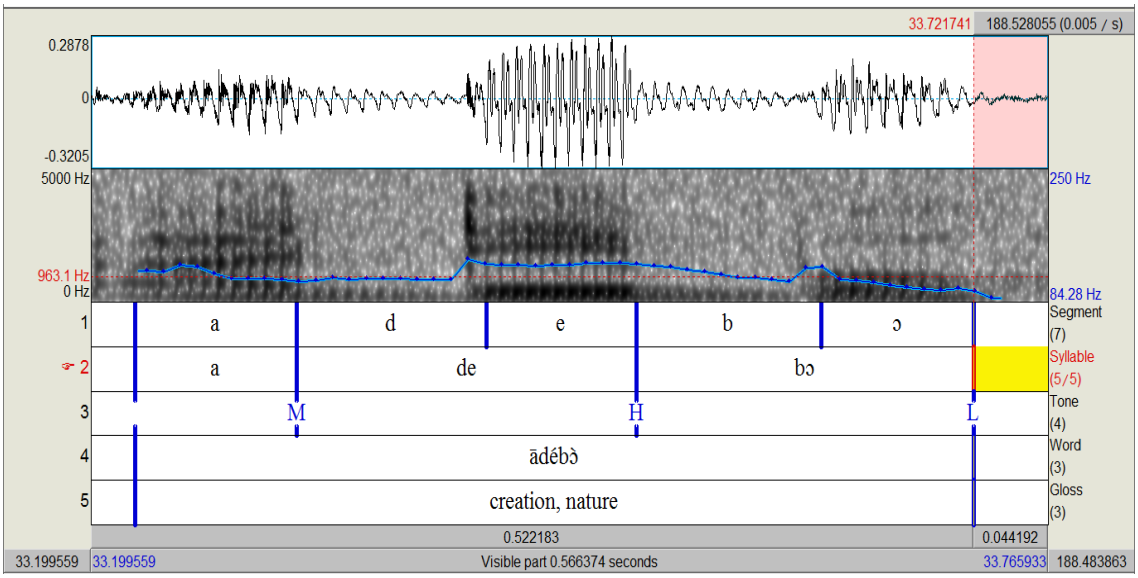

Figure 18: A spectrogram showing the pitch level of *ādébɔ̀* 'creation, nature' in Dangme

In the spectrogram in Figure 18, the stem-initial H is realised at the pitch of 124.67Hz while the stem-final syllable, which is L, is said at the pitch of 98.50Hz. The gap between the H and the L is wide enough for the stem-final syllable to be regarded as either downstepped H, as was the case in Akan, or even M, since it falls outside the average pitch range for non-L tones. It is interesting to note that the word-initial syllable, which is M, is even realised at the pitch of 112.00Hz.

6.3.3. Akan source ꜜH as M

This sub-subsection discusses how ꜜH is realised as M in some adapted forms. In the examples in (105), it will be seen that the same Akan source downstepped H is not always maintained, but can also be realised as M in adapted forms in Dangme.

(105).	Akan	Dangme	Gloss
i.	ɔdíꜜɕí	ōdéhē	noble, free born person
ii.	ɔ̀hɪ̀ɑ́ꜜfʊ́	ɔ̀hɪ̀ɑ́fʊ̄	poor person
iii.	ɔdáꜜsé	ōdásē	testimony, witness
iv.	áꜜkó	ákō	a bird, parrot
v.	ɔ̀tɕɪ̀ɑ́ꜜmɪ́	ɔ̀tʃɑ̀ɑ́mɪ̄	spokesperson, linguist

From (105), we observe that the Akan source downstepped H is adapted as M in Dangme. This adaptation pattern is expected in a three-level tone language. Again, from the examples in (105) the adjacent source H-toned syllable maintains its pitch level in the adapted forms. In these examples, Dangme speakers do not seem to be faithful to the source tonology, but instead they impose Dangme native tonal pattern on the adapted forms. The pitch level of the stem-final downstepped H is further reduced to M, a tone level which is present in Dangme instead of faithfully maintaining the highly marked ꜜH. It can, therefore, be explained that perhaps Dangme speakers might have perceived the downstepped H rather as more M,

which is close to a downstepped H in the adaptation process. It is worth pointing out that a downstepped H being perceived as M has also been observed in Bimoba, a Gur language spoken in Ghana by Snider (1999). In Figure 19, I provide a spectrogram to show that the source downstepped H in the word for 'testimony, witness', as shown in Figure 15 above, is realised as M in Dangme.

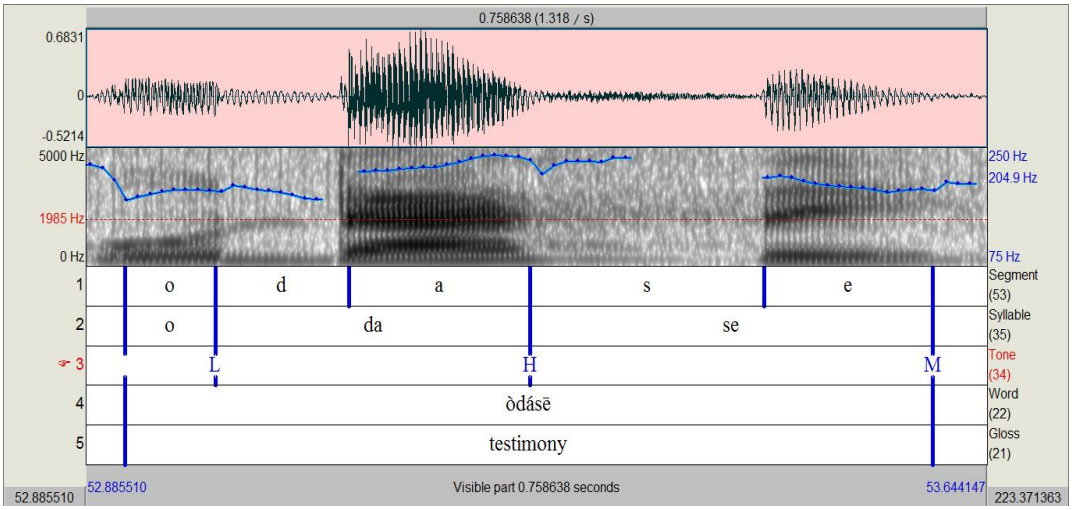

Figure 19: A spectrogram showing the pitch level of *ōdásē* 'testimony, witness' in Dangme

From the spectrogram in Figure 19, the stem-initial H syllable is said at the pitch of 126.39Hz while the following stem-final syllable, which is M, is realised at 103.07Hz. The pitch of the stem-final syllable is quite close to that of the word-initial L syllable, which is said at 112.07Hz. If the stem-final syllable were realised as a downstepped H as was shown in Figure 14 to be the case in Akan, we would have expected the pitch to be in the range of between 116Hz and 119Hz.

6.3.4. Adaptation of Akan source ꜜH as H

It is not in all cases that the pitch level of the Akan source downstepped H is reduced when adapted in Dangme. There are a few instances where source downstepped H is perceived with even a raised pitch level to H. I provide examples of these limited cases in the examples in (106).

(106).

	Akan	Dangme	Gloss
i.	ŋkáꜜtí	ākáté	groundnut
ii.	ɔpéꜜsé	ɔ̀pɛ̀sé	brush-tailed porcupine; hedgehog
iii.	kɔ̀tɔ́ꜜkɔ́	kɔ̀tɔ́kɔ́	crested porcupine

From the examples in (106), it is seen that the source downstepped H is realised rather as H with the pitch level of the adapted syllable higher than that of the source syllable. Unlike in the preceding cases in (105), adapting the source downstepped H as a H syllable is not unexpected since the two are phonetically close enough in terms of pitch. In Figure 20 below, I provide a spectrogram for the realisation of the adapted word *ākáté* 'groundnut' showing that the source stem-final downstepped H is realised as H in Dangme.

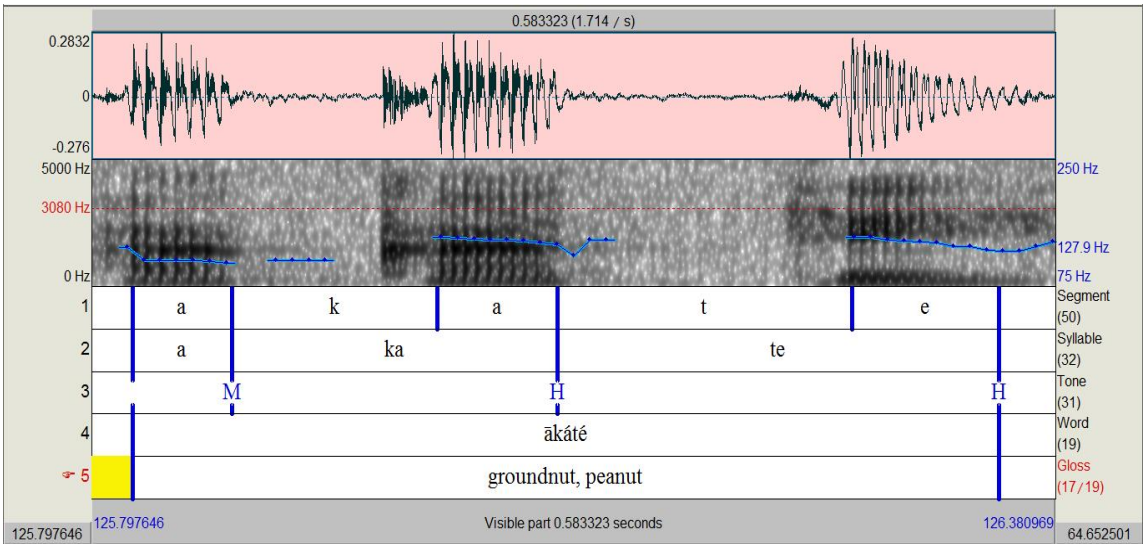

Figure 20: A spectrogram showing the pitch levels of *ākáté* 'groundnut, peanut' in Dangme

The stem-initial H in the spectrogram in Figure 20 is said at the pitch of 139.06Hz, almost at the same level as the following H, which is the stem-final, is realised at 135.41Hz, a value that obviously falls outside of the range for downstepped H. The word-initial M syllable, on the other hand, is realised at the pitch of 112.44Hz. These figures, compared with those we saw in Akan in Figure 13, lend credence to the claim that I have already made that the Akan source downstepped H syllable can also be realised as rather H in Dangme.

6.3.5. Adaptation of Akan source H as ꜜH

Sometimes the Akan source H-toned syllable can be adapted as a downstepped H syllable in Ga. To do this, Ga speakers employ strategies to create the context for the realisation of lexical downstep. In the examples in (103), I discuss how the

speakers create the downstep environment in order to realise the source H as downstepped H.

(107).	Akan	Ga	Gloss
i.	àpààfú	òpàáˈfó	day-labourer
ii.	ɔkúkúbàŋ	òkúkúˈbá	name of a small animal
iii.	àkɔtùá	àkóˈtówá	a small barrel, keg

From the examples in (107), it is clear that the source non-downstepped H is realised in Ga as downstepped H. The two main strategies Ga speakers employ in achieving this are as follows: first, is to raise the pitch of a penultimate L, which precedes a stem-final H to the level of H as seen in (107i). Second, is to raise the pitch level of the targeted syllable from L to ˈH when it is preceded by H as seen in (107ii). The last strategy, which involves two syllables, is to raise the pitch levels of both the target syllable and the preceding syllable from L to ˈH and H respectively as in (107iii).

6.4. Summary of the chapter

This chapter has discussed the adaptations of Akan source tone for the nominal class forms in both Ga and Dangme. The discussions have focused on the adaptations of some H, HH, LH, LLH, and LHH tonal melodies of Akan source words in the two target languages where it was concluded that both Ga and

Dangme speakers usually preserve the Akan source tonal melodies when adapting them. That is, the source melodies are adapted in the two language target languages. However, additionally, all the source melodies can be realised with different melodies in both target languages. This lack of consistency presents a challenge for the formalisation of the adaptation patterns within the OT, our working theoretical framework.

The adaptations of the Akan source compound stems were also discussed where it was concluded that both Ga and Dangme realise the Akan source compound stem-final H-toned CV syllable with a L tone. However, while Ga speakers lengthen the final vowel of the stem-final CV syllable, Dangme speakers do not lengthen this vowel.

The downstep phenomenon was also considered in the discussions where it was observed that while Ga either faithfully preserves the Akan source downstepped H or realises it as L, Dangme can adapt this same downstepped H as H, M, or L in addition to faithfully preserving the pitch level of the source syllable, though the downstep rule is not active in Dangme. Again, it was observed that Ga exclusively employs some strategies for realising even a source L-toned syllable as downstepped H through creating the necessary environment for the downstep rule to apply. So, for example, a source stem melody of LLH can be realised as H$^{!}$HH in Ga in the adaptation of *àkɔ̀tɔ̀wá* 'a small barrel, keg' as *àkó$^{!}$tówá*.

In Table 14 below, I summarise the commonalities and differences between Ga and Dangme in terms of how they realise Akan source tonal melodies.

Table 14: Adaptations of Akan source tonal melodies in Ga and Dangme

Akan source tonal melody	Ga	Dangme
Monosyllabic: H	H	H
Disyllabic: HH	HH,HL,LL,LH	HH,HL
LH	LH,HH	LH,HH,LL
HL	HL,LL	N/A
Trisyllabic: LHH	N/A	LHH,HHH
LLH	LLH,HLH,LHH, HHH	LHH,LHL,MH,HHH
Compound stem-final H	H, LL	H, M, L
Stem ending in HLH	N/A	HMH,HMM,LLH LHH
Downstepped H	ꜜH,L	ꜜH,H,M,L
Stem-final H	Can be ꜜH	N/A

CHAPTER SEVEN

SUMMARY, RECOMMENDATION, AND CONCLUSION

7.1. Introduction

This thesis has discussed the adaptations of Akan (Kwa, Tano Central language) source words in two sister languages, namely Ga and Dangme (both Kwa, Ga-Dangme languages). The study has specifically considered the various strategies that both Ga and Dangme speakers employ in adapting segmental (both vowels and consonants) and prosodic properties, which focused on nasality, syllable structure and tone, in the two target languages. In this chapter, I summarise and draw conclusions to all the discussions made in this thesis. I also show the significance of this study as well as make recommendations based on the findings in this thesis for future studies.

7.2. Summary of preceding chapters

In chapter one, I provided a general introduction to the entire thesis. In this chapter, I also provided some relevant information about the three languages that have been discussed in this thesis. In this same chapter, I mentioned the problem statement that informed and served as the basis for this research study as well asset out the main objectives for the study. Based on the objectives, I asked the research questions that have been addressed within the study. The chapter was concluded with the discussion of ethical considerations that guided this study.

In chapter two, I reviewed relevant literature on the subject matter of the present thesis where it was concluded that there has been considerably less attention paid to the study of the loanword phenomenon both within and across language families in Ghana. The ongoing debate over the theoretical approach or model to the phonological study of loanword adaptation was also discussed in this chapter. Finally, I briefly discussed two phonological theories, namely DF and OT. It was briefly explained why OT was chosen for the formalisations of the discussions in the thesis.

The phonological patterns both Ga and Dangme speakers employ in the adaptation of some vowels of Akan source, namely [ɪ], [ʊ], and [æ], have been discussed in chatper three. It was concluded that both [ɪ] and [ʊ] can be adapted to three vowels each that are present in Ga and Dangme. That is, the source [ɪ] can be adapted as [o], [i], or [ɛ]. For [æ], on the other hand, it is systematically adapted as [a] in Ga, while it can be additionally realised as [ɛ] in Dangme. These adaptation strategies, it was concluded, could be generally motivated by both perceptual and phonological factors. The pattern of adaptation where it was observed that in frequency count a source non-native vowel is most likely to be adapted as its perceptually closest counterpart in the target language supported the outcome of perception experiment carried out in this study. The other adaptation strategies were also attributed to phonological factors. Both Ga and Dangme speakers considered phonological factors such the height or the ATR value of the source vowels when adapting it. The conclusion, therefore, both phonological and

perceptual factors are important in explaining the adaptations of Akan source non-native vowels in both Ga and Dangme. The phonological adaptations were formalised within the OT. I did a brief comparison of both Ga and Dangme in terms of how each adapts Akan source non-native vocalic segments. It was concluded that there are more resemblances than differences between the two target languages.

In chapter four, I discussed the phonological patterns employed in the adaptations of some Akan source consonants, which are not present in both Ga and Dangme. The discussion mainly focused on the phonological patterns which speakers employed in realising the alveo-palatals, labial-palatals, and labial-palatalised consonants in Ga and Dangme. It was observed that both Ga and Dangme speakers correctly anticipate and perceive the Akan source non-native labial-palatality, hence, they systematically replace the feature with the labial feature, which is present in their phonology systems. Another issue that engaged our attention in this chapter was the adaptations of the Akan source illicit word-final labial-velar glide [w] in both Ga and Dangme. It was observed that two main strategies, namely vocalisation and deletion are employed in repairing such illicitness in the two target languages. With regard to the vocalisation, it was observed that source illicit word-final [w] consistently vocalises into [o] in both Ga and Dangme. In addition to the [o], the word-final [w] can also be realised as [u] in Dangme. It was also shown that when the deletion strategy is employed, it could result in compensatory lengthening in Ga, usually when the rest of the final word will beless than disyllable after the application of the deletion rule. OT was used to formalise the phonological accounts for the patterns of adaptations of the

Akan source non-native and positionally ill-formed consonants in both Ga and Dangme.

The chapter five has discussed the strategies Ga and Dangme speakers employ in adapting Akan source nasality and source syllable structures. The discussions of the adaptations of the nasal feature focused on how the speakers adapt the [+nasal] feature of Akan source vowels, in particular the three non-native vowels. It was concluded that with the exception of instances where the vowels which the source non-native vowels are adapted as can be nasalised, the source nasality is dropped in the adapted forms, which pattern is consistent with what generally obtains in the general phonology of the two target languages. It was also observed that there are instances where, although a source vowel can be nasalised in the target languages, it is not nasalised, yet the same becomes nasal in the adapted forms, and vice versa.

With regard to the adaptations of the Akan syllabic nasals in both Ga and Dangme, it was shown that at the word-initial position, the syllabic nasal may or may not be preserved in the adapted forms in Ga, whereas they are completely dropped in Dangme. The initial syllabic nasals can also be realised as vowels, particularly as the low vowel, in both target languages. At the word-medial position, on the other hand, both languages do not usually permit such NN sequence, thereby reducing such sequence through deletion of the syllabic nasals in such contexts. These restrictions in sequences were formalised within the OT.

For the adaptations of the Akan source word-final syllabic nasals, the two target languages differ to some extent. While some of the syllabic nasals, particularly [m] can sometimes be preserved in the adapted in both languages,

other nasals, including [n], and [ŋ], are either deleted or are realised as a front high vowel. In Ga, there is also an additional process of compensatory lengthening that sometimes accompanies the deletion of those word-final syllabic nasals. Dangme speakers also exclusively apply epenthesis of a vowel, usually a front high, as a repair strategy for the final nasals. The chapter concluded with the discussion of the adaptations of the syllable structures of some of the adapted forms from Akan in Ga and Dangme. It was observed that between the two target languages, CV monosyllables and CVN or VV disyllables could be targeted for the truncation process. It was realised that the truncation might not be phonologically-motivated, but seems to, perhaps, only facilitate speech among the speakers of the two target languages.

The chapter six has discussed the adaptations of Akan source tone for the nominal class forms in both Ga and Dangme. The discussion focused on the adaptations of some H, HH, LH, LLH, and LHH tonal melodies of Akan source words in the two target languages where it was concluded that, aside from the source H in CV stem which is virtually faithfully adapted I same pitch height, the tonal melodies of all the other nominal stems of different syllable sizes can be realised differently in both target languages.

The adaptations of the Akan source compound stems were also discussed where it was concluded that both Ga and Dangme realise the Akan source compound stem-final H-toned CV syllable with a L tone. However, while the Ga speakers lengthen the final vowel of the stem-final CV syllable, the Dangme speakers, on the other hand, do not lengthen this vowel. The downstep

phenomenon was also considered in the discussion. It was observed that while Ga either faithfully preserve the Akan source downstepped H or it is realised as L, Dangme, on the other hand, can adapt this same downstepped H as H, M, or L in addition to faithfully preserving the pitch level of the source syllable though the downstep rule is not active in Dangme. Again, it was observed that Ga exclusively employs some strategies for realising even a source L-toned syllable as downstepped H. This can be done by creating the necessary environment for the downstep rule to apply. So, for example, a source stem melody of LLH can be realised as H$^{!}$HH in Ga in the adaptation of *àkɔ̀tɔ̀wá* 'a small barrel, keg' as *àkó$^{!}$tówá*.

In chapter seven, I summarise all the discussions in each chapter. I also make some conclusions to the discussions made. The significance of the study and the recommendations made in this thesis are presented in this chapter.

7.3. Concluding remarks

The findings from the analysis of the various phonological patterns observed in the adaptations of words of Akan source by both Ga and Dangme speakers clearly lends credence to the postulation by Peperkamp & Dupoux (2003) that:

> "Loanword adaptations generally receive a phonological analysis, according to which they constitute phonologically minimal repairs that render illegal foreign forms in conformity with the native phonology. However, more than one such phonologically minimal

> repair is often available. … there can be more than one possibility to turn a non-native segment into a native one by a single feature change." (Peperkamp & Dupoux 2003: 368).

Indeed, from the analyses done in this thesis, it was concluded that often there is more than one possibility to nativise Akan source non-native vowels. It was observed that a non-native vowel can be systematically adapted to three native vowels in both Ga and Dangme by just a change in a feature or two in the source segment. This was accounted for in OT by the crucial ranking of the markedness constraints *[+low,+ATR] and *[+high,-ATR] in addition to the faithfulness constraint IDENT-IO(Rd) over MAX-IO(F). This ranking ensures that the optimal candidate systematically avoids fatally violating the highly-ranked *[+low,+ATR] and *[+high,-ATR] while at the same time preserving the source roundness at the expense of altering the height and the ATR values of the input vowel.

On the adaptations of Akan source non-native consonants, specifically the labial-palatals and the labial-palatalised consonants, their realisations as labialised consonants in both Ga and Dangme are clear examples of adaptations due to segmental 'deafness' (following Peperkamp & Dupoux 2002, arguing from psycholinguistic point of view). This is due to the fact that these types of consonants are not present in both target languages. Therefore, the speakers of both languages might not be able to accurately perceive these source consonants in the adaptation process, hence their replacement with the closest ones in the target languages. However, for Akan source palatal fricative [ɕ] to be sometimes adapted

asglottal fricative [h] in Ga, when it has [ʃ] in its sound system, cannot be attributed to misperception neither can it be due to the phonology of Ga. The explanation for this adaptation, as has already been offered, was due to historical facts. That is, perhaps at the time of the incorporation of those words from Akan, the underlying segment /h/ had not yet completely undergone palatalization in Akan, presumably as late as in the 19th Century (cf. Stewart 1966 following Koelle 1854, also Dolphyne 1988/2006, Abakah 2004). Within the OT, it was concluded that the phonological adaptations of the non-native consonants can be accounted for by positing a higher-ranked IDENT-IO(lab) and also markedness constraint *[+cor,-cont,+lab] over MAX-IO(F). Per this ranking, the preservation of the labiality of the Akan source non-native consonants together with the avoidance of fatally violating a constraint on the prohibited source consonants, *[+cor,-cont,+lab], is crucially by both Ga and Dangme speakers.

Dakubu (2002) had opined about the distribution of the syllabic nasal in Ga that "a series [sequence] of two syllabic nasal onset syllables does not occur" (Dakubu 2002: 33). In the present study, it has been found out that in the process of the adaptation of Akan source words in Ga, it is not only the sequence of two syllabic nasals that is prohibited at the word-initial position, but also all N_1N_2 sequences, where the N_2 is non-syllabic. Again, this sequence is not prohibited only at the word-initial position, but also virtually word-medially as well. While this prohibition may be repaired at the word-initial position through either deletion or vocalic replacement, it is only the former strategy that applies when adapting such sequence at the word-medial position in Ga.

With regard to the adaptations of the syllable types in both Ga and Dangme, it has already been established in the existing literature that "…nonnative … syllable types are mapped onto the closest native ones" (cf. Peperkamp & Dupoux 2002: 368-9) by the speakers of the target languages in the adaptation processes. It was, therefore, expected that both Ga and Dangme speakers would repair the illicit N_1N_2 sequences at word-medial and word-final positions to N_2. It is not only NN sequence; the NC sequence is even prohibited at word-initial position in Dangme, hence it is realised as C. This is what has been described in the existing literature as deafness due to phonotactic constraints (cf. Peperkamp & Dupoux 2002; see also Uffmann 2013: 650).

The adaptations of the Akan source tone patterns, however, did not seem to following the so-called suprasegmental 'deafness' postulations by Peperkamp & Dupoux (2002). This is because it was observed that all the source tone patterns are present in the two target languages (with the exceptions of the tone rule, downstep, which has already been explained is not active in Dangme). Therefore, there is no need for any sort of 'repair' of the source pattern in the adaptation process. For example, how could a source HH(H) melody be misperceived as LL(L), and which phonotactic constraint will motivate this adaptation when the source pattern is present in the target language? It has been observed in this study that virtually all the source patterns can be adapted faithfully and at the same time unfaithfully in the target languages. I have not been able to offer explanations for the instances of the unfaithful adaptations, and therefore would suggest further investigations to find answers to such questions. These unfaithful adaptations of

the source tone melodies, I have assumed, do not seem to be on either phonological or perceptual grounds.

My conclusion, therefore, is that both Ga and Dangme speakers usually preserve the Akan source tonal melodies when adapting them. That is, where available, the source melodies are adapted in the two language target languages as is. However, in addition to faithfully preserving the source melodies, all the source melodies can be realised with different melodies in both target languages. The explanation for this additional melody adaptations, I conclude, is not due to prosodic 'deafness', but rather that both Ga and Dangme speakers map a particular source melody to the variety of melodies available in the language that correspond with the structure of the source word. So, for example, a source HH can primarily map onto HH, and additionally HL, LL, and LH in Ga. This might also explain why a source HLM melody can be realised as HMH, HMM, LLH, and LHH in Dangme.

In comparing how Ga speakers on one hand, and Dangme speakers, on the other hand, adapt words of Akan source, it is concluded that the adaptation patterns of the two target languages have a lot in common than they differ in in terms of both segmental and prosodic adaptations. The differences in the patterns in the adaptation process have been observed to have resulted from the peculiarity that each of the two target languages possesses.

Finally, from the findings made in this thesis, I conclude that both perceptual and phonological factors are equally crucial in accounting for the strategies that speakers employ in the adaptations of Akan source segmental and prosodic features in both Ga and Dangme. Though not discussed in this thesis,

non-grammatical factors such as orthography, period of entry of the words, among others could also equally play significant roles in the adaptation process, which potentially supports Uffmann's (2013) call for the inclusion of such factors in determining the model of the loanword adaptation.

7.4. Significance of the study/contribution to knowledge

This study is significant in the following three ways:

As far as I know, there is no such study devoted to the loanword phenomenon between two or more Ghanaian languages with the exception of Owusu-Adjei (2007). Others, including Heine (1968), Koffi (1998) and Dorvlo (2008), have usually mentioned the phenomenon in passing in their studies. A few existing literature on loanword phonology in Ghanaian languages have mostly focused on English loans in one particular Ghanaian language or the other with some examples from the Kwa languages as English loanword in Adanme (Dangme) by Nartey (1976); English loanword in Akan by Sey (1990); Addo (2002); Abakah & Tenteh (2005); Adomako (2008, 2013); Apenteng (2013); Apenteng & Amfo (2014), among others; English loanword in Ewe Dzameshie (1996), Agbedor (2006), among others, just to mention a few. Although it is not uncommon to identify some words of Akan origin in some other Ghanaian languages and some words from the other Ghanaian languages, yet no detailed linguistic study has as yet been carried out in this phenomenon. It is, therefore, expedient to establish how the adaptations occur among the Ghanaian languages to facilitate better understanding of the phenomenon cross-linguistically and

subsequent phonological theorisations in terms of segmental and suprasegmental adaptations, hence the significance of the present study.

The study may also serve as a starting point for similar academic enterprises in case someone wants to replicate it for other Ghanaian languages, which may eventually contribute to our knowledge of the loanword phenomenon in general, and in the Ghanaian languages (specifically among the Kwa sub-family) and African languages in particular. This will go a long way to also contribute to complementing the existing literature on the loanword phenomenon.

From a theoretical point of view, although the loanword phenomenon is pervasive among the languages spoken in Ghana, yet not much has been contributed to the current phonological debate over the theoretical approach to loanword adaptation in particular, and in linguistic theory by any of the Ghanaian languages as far as I know. This study has attempted to fill this gap by providing OT analyses and also statements on the approaches to the adaptations of Akan source non-native vowels.

7.5. Recommendations for future studies

This thesis has focused only on the study of segmental (both vowels and consonants) as well as prosodic (nasality, syllable structure and tone) adaptations of Akan source words in Ga and in Dangme without discussing the roles that socio-cultural factors such as the generational differences, sex, level of education (literacy) among the speakers that can influence the loanword adaptation process. These factors were not considered at all in this study due to its focus, that is, purely on the phonology of the loanword phenomenon. It is, therefore,

recommended that these factors be investigated in future studies so that the account for the inter-languages adaptation between Akan, which belongs to the Tano Central group, on the one hand, and Ga and Dangme, belonging to the Ga-Dangme group, on the other hand, of the Kwa sub-family languages will be complete. Therefore, a comprehensive understanding of the phenomenon needs to also take into account such factors as well as the historical (diachronic) information concerning the adaptation process. There could also be other factors. I, therefore, recommend that these non-grammatical factors also be investigated in the future to complement the findings made in the present study.

Some questions concerning literacy and orthography that can be investigated in the future can include whether or not orthography could better explain the vocalic adaptations of the non-native vowels in both Ga and Dangme. For instance, the source non-native vocalic segments [ɪ] and [ʊ] being adapted as [e] and [o] respectively has been attributed to perceptual motivations in this thesis. It is worth noting that incidentally, the source vowels are orthographically represented as the adapted vowels in the following.

Source	orthography		Ga	Dangme
i). /ʊ/	<o>	→	[o]	[o]
ii). /ɪ/	<e>	→	[e]	[e]
iii). /æ/	<a>	→	[a]	[a], &[ɛ]

It will be interesting to ascertain whether or not orthography can influence the adaptations of Akan source segment in Ga and Dangme. For example, to know

whether the source non-native vowels which are adapted as perceptually closer vowels, which match the orthographic sounds, are as a result of sheer coincidence or the orthography rather than perception has motivated the adaptations.

Another question that may be of interest to investigate follows from the orthography issue is, how formally literate were Ga and Dangme speakers of the source orthography to have been influenced by it when the Akan source words were entering the two target languages? Though Ga and Dangme speech communities, just as can be argued about most of the speech communities in Ghana, have not been noted to have been formally literate communities earlier in history as compared to what have been established in other parts of the world, yet the fact that it does not necessarily have to take the involvement of the entire speech community to contemporaneously initiate the adaptation or borrowing process makes the orthography argument a possibility. The process usually begins with a few bilinguals in a particular speech community (cf. Uffmann 2013). Therefore, if there is the slightest possibility of orthography influencing the adaptations of such non-native vowels, then it calls for investigation in the future since as Peperkamp (2004) opines about the possible role orthography can play in loanword adaptations that "... in the case of integrated loanwords, the influence of orthography is not always easy to establish, in on-line adaptations that are gathered experimentally, orthography is a factor that can be controlled for" (Peperkamp 2004: 350). See also Vendelin & Peperkamp (2006) for further discussions on influence of orthography on loanword adaptation.

One question concerning the different realisations of some of the source consonants in the adaptation process is, at what point in time did the adaptation of

the glottal fricative [h] instead of the palatalised variant [ʃ] take place in Ga? When did the Akan source words that contain the glottal fricative, instead of its palatal allophonic variant, find their way into the Ga lexicon? Was it at the time this consonant had not yet undergone the palatalisation rule? Perhaps, future study may assist in finding answers to the above questions.

Finally, regarding the issue of tone, as has already been indicated in this thesis, for the analysis of tone adaptations of the verbs, which is complex. I would have needed to set up elaborate and complex experimentations to be able to determine the patterns of adaptation taking into account grammatical factors such as the tense, aspect and mood of the source verbs at the point of the adaptations. This could not have been done in this study looking at how broad the scope of verb tones is. I, therefore, recommend that the tone adaptations of the Akan source verbs be studied in the future to complement a comprehensive study of the loanword adaptation process.

APPENDICES

Appendix 1: Elicitation of words (for Ga)

INSTRUMENT #1.

To the respondent/participant:

1. Please I am going to give you some words in English and I would want you to provide me with their Ga equivalents. For each stimulus (word given), you are to repeat your response thrice (3 times). I will do both audio and manual recordings of all your responses.

	English words	**Ga equivalent**
1.	to insult	
2.	to carry a heavy load	
3.	to gush out	
4.	to feel well, well-built	
5.	sandals	
6.	main road	
7.	skinny	
8.	a medium-sized drum	
9.	bottle	
10.	character	
11.	to measure, calculate	
12.	spirit, soul	
13.	Tongue	
14.	wide, broad, flat	
15.	to gather, help	
16.	turn over, capsize	
17.	to change, turn into	
18.	box, trunk	
19.	Witness	
20.	Groundnut	
21.	proverb, adage	
22.	left hand, left arm	
23.	long-legged goat	
24.	devil	
25.	chameleon	
26.	matter, thing	
27.	food	
28.	dwarf	
29.	fruit	
30.	flower, blossom	

31. large canoe	
32. meeting, private consultation	
33. prostitution, fornication	
34. a young girl, woman	
35. scissors	
36. one thousand	
37. large calabash	
38. trouble, adversity	
39. event, news, report	
40. food containing boiled yam, plantain, cocoyam, etc.	
41. greed, covetousness	
42. truth	
43. somebody-or-other, so-and-so	
44. mirror	
45. scar	
46. rebellion, defiance	
47. fist, blow with fist	
48. glass (bottle) of liquor	
49. bride, newly married woman	
50. innocence	
51. think, thought	
52. remember, remind	
53. fried fish	
54. vagrant	
55. fan	
56. a clothe measurement, 12 yards	
57. liar	
58. quarrel, strife, litigation	
59. waterfall	
60. rainbow	
61. testimony	
62. pity, sorrow	
63. effort, esp. successful effort	
64. law	
65. taboo, abomination	
66. mushroom	
67. germ, virus	
68. congratulation	
69. misconduct	

Appendix 2: Elicitation of words (for Dangme)

INSTRUMENT #2.

To the respondent/participant:

1. Please I am going to give you some words in English and I would want you to provide me with their Dangme equivalents. For each stimulus (word given), you are to repeat your response thrice (3 times). I will do both audio and manual recordings of all your responses.

English words	Dangme equivalent
1. Good character	
2. Remind, remember	
3. Fried fish	
4. Foolish person	
5. Law	
6. Taboo, abomination	
7. Pity, sorrow	
8. Effort, successful effort	
9. Crippled person	
10. Bottle	
11. Testimony, witness	
12. Noble, royal	
13. Poor person	
14. Soothsayer, traditional priest	
15. Squirrel	
16. Turn over, capsize	
17. to change, turn into	
18. box, trunk	
19. cannons, heavy artillery, very big guns	
20. Groundnut	
21. proverb, adage	
22. Christian priest	
23. Spokesperson, linguist	
24. devil	
25. egotism, self-centredness	
26. hyena	
27. hand-piano	
28. spirit, image	
29. expression of congratulations	
30. a kind of drum & music for chief	

31. child of a man's sister	
32. servant/maid	
33. prostitution, fornication	
34. old lady	
35. creation	
36. royal antelope	
37. mirror	
38. affliction, suffering	
39. event, news	
40. boiled green plantain	
41. sugar cane	
42. domestic cat	
43. goat	
44. truth, fact	
45. cashew nut	
46. rebellion, defiance	
47. grief, sorrow, sadness	
48. bride, newly married woman	
49. large talking drum	
50. innocence	
51. think, reason	
52. palm tree	
53. whale	
54. messenger, angel, helper in need	
55. European, foreigner	
56. To gather, collect, assemble	
57. Exclamation no!	
58. Iron pot	
59. Buy, sell on credit	
60. Picture	
61. Bow (with arrow)	
62. Assembly	

Appendix 3: Recordings of social events

INSTRUMENT #3.

1. Please I would want you (the group) to perform for me two (2) Ga war songs to be audio-recorded. For Ga respondents.
2. Please I would want you (the group) to perform for me two (2) Dangme war songs to be audio-recorded. For Dangme respondents.

Appendix 4: List of Akan loanwords in Ga

(Approximately 959 suspected Akan source entries in Ga)

NO.	AKAN	GA	GLOSS
1.	àbààwá	àbààwá,àbl̀ààwá	Maidservant, female house help
2.	àbàkéré	àbàkĺé	A wristlet or bracelet worn by parents of twin. Also used to dress corpses.
3.	ɔbàsá	àbàsá	A bet, wager.
4.	àbàsáŋ́	àbàsáŋ̀	Fathom, length of double arm spread, including the width of the chest
5.	bɛ́	àbɛ̀	Pincers
6.	ɛ̀bɛ́	àbɛ́	Proverb, adage; indirect speech of any kind
7.	abɛ̀bre	àbɛ́ˈbɾ́é	A variety of palm fruit, very dark when unripe and deep red when ripe
8.	?abebuo	àbɛ̀bùá	Parable, illustration, proverb, proverbial expression
9.	abɛ̀bre	àbɛ́ˈdáŋ́	A variety of palm fruit, deep green when unripe.
10.	abɛde	àbɛ̀dé	Commission on a sale, esp. of fish
11.	benkum	àbɛ̀kú	Left hand, left arm, left side
12.	abenkuma	àbɛ̀kúlɔ	Left-handed person; awkward, clumsy person
13.	abɛ̀tinta	àbɛ́tíǹtá	A palm tree with a branching stem
14.	abɛ̀tiŋ, abɛ̀tını	àbɛ̀tíŋ́, àbɛ̀ǹtíŋ́	A very old, tall palm tree
15.	?æbísá	àbìsà	Fortune, destiny, lot, situation in life
16.	abŏraá	àbl̀àá	European woman (obsolesce.)
17.	aberetɕi	àbĺétʃí	Long-legged goat
18.	abʊrɔgua	àbl̀ògʷá, àbl̀òŋʷá	Deck chair, arm chair, straight chair.
19.	?abobonua	àbòbònùà	A kind of bird, woodpecker.
20.	abɔdıammɔ	àbòdìàmɔ́	Any round green glass bottle.
21.	àbòḿ	àbòḿ	Simple stew
22.	ɔbʊ̃ǹsā́ḿ	àbòǹsáḿ, àbòǹsáŋ́	Devil
23.	ɔbʊsʊm-akıtıw	àbósúmáŋ́kɛ́ˈtɛ́ó, àbósúmákɛ́ˈtéó, abusumakutre	Chameleon
24.	abodɟɛkutu, abɔdɟɥe-futu	àbɔdʒ̀ɛ̀kútú	Whiskers, sideburns
25.	abradı	àbɾ̀àdè, àbl̀àdè	Dignitary, high-born person, person of character, person of royal lineage

26.	aberekuri	ábŕékùlí, àbĺéˈkúí, ábĺékù	Moray eel, painted eel.
27.	æbusᵘia	àbùsù̃á̋	Family; the nuclear family.
28.	æbusᵘiafʊ	àbùsù̃ã̀fóì	Relatives
29.	ɔ̀dàbáŋ́	àdàbáŋ́	Door bar (iron bar)
30.	àdàfi̋ (to betray, disclose, forewarn)	àdàfĩ	News, information, announcement.
31.	àdáḿ	àdàŋ́, àdã̀ŋ́, àdã̀á̋, àdɛ̃̀i̋	A type of music played by hunters' association
32.	ɔ̀dáẃ (dàẃ-bɔ́ 'conversation)	dàwùʧò, àdàòʧò	Jawbone
33.	àdáwùrʊ̀mã̀	ádáróòmã̀	Grace, assistance, intervention
34.	àdí	àdé	Matter, phenomenon, thing, existence
35.	àdíbɔ́	àdébɔ̀ɔ̀	Nature, creation, the natural scheme of things
36.	àdéŋ́kũḿ	àdéŋ́kũ̀	A calabash rattle, a kind of music in which a rattle is used
37.	àdìsa̋	àdèsa̋	Story, tale
38.	ádìsà, ádàsà	ádèsà	Human being
39.	*àdìtɕi̋ã̀ní̋	àdèʧã̀ã́ní̋, àdìʧã̀ã́ní̋	Early morning tasks, the custom of visiting the grave a day after burial…
40.	ádɛ̀	àdɛ́	A bead
41.	èdi̋ŋ́ (difficulty)	àdéŋ́	Danger (semantic shift)
42.	ædì-ætɕírí (subordinate officer)	àdíátʃírí	Store-keeper, steward
43.	ædìbã̀ŋ́	àdìbã̀ŋ́	Food, heavy or staple food
44.	àdárì	àdídà, àdédà	Billhook, pruning shears
45.	ædìŋ̀kɾ̀á	àdìŋ̀kɾ̀á	Cloth on which traditional symbols have been printed
46.	àdʊ̀bɛ́	àdòbɛ́	Raffia palm
47.	ædᵘìàwá	àdùàwá	Fruit
48.	ædìfʊ̀dí	àdùfʊ̀dé	Greed, greediness, avarice
49.	ɔfa̋, àfa̋	àfa̋	Part, half, piece, portion
50.	àfã̀à̋fa̋	àfa̋àfa̋, àfa̋fa̋á̋fa̋	Sideways, one eighth
51.	fá-bã́ŋ́	àfábã̀ŋ́	Wall, fence, protection; both spiritual

			and physical
52.	fá-dáŋ́	àfáˈdáŋ́	Swish building
53.	àfànìwàá	àfànìwàá	Name of a variety of cassava
54.	àfàsíẃ (Ewe?)	àfàséó, àfàsó	Winged yam, water yam, violet, purple, purple blue
55.	àfí	afí (àfí = partridge, bush-fowl)	Year
56.	fúfúrɔ́ (new)	àfòfòrò,àfòfrò, àfòfl̀ò	Flower, blossom, bud (semantic shift)
57.	àfɔ̀rí	àfɔ̀lé	Sacrifice, offering
58.	æfṹ	àfṹ	Bulge, hump, hunch, bubble, lather, foam
59.	æfùá	àfùá	Mist, haze
60.	æfṹpɔ́ŋ́kɔ́	àfṹkpɔ́ŋɔ́, àfĺúˈkpɔ́ŋɔ́	Camel
61.	æfùŋ̃áŋ́	àfṳ̀ŋ̃áŋ́	A hairy worm
62.	ædʒ̬ã́ń	àgã̀ĭ́	Arrow
63.	dʒ̬áẁ	àgàwú	Gap, space between the teeth
64.	àgùàséḿ (no Ak. word)	àgʷàséìàŋ̀, àgʷàséàŋ̀	Respectable standing in society, as of an elder
65.	àgùà-àsí	àgʷàséŋ̀	Assembly of male elders representing the community
66.	ɔ̀hàǹtáŋ̀	àháńtà	A large tree
67.	àhɛ̀m̀bá (Fn)	àhm̀̃á	A large type of canoe (with its crew)
68.	ahɪnɛsɪ (no Ak. word)	àhĩ́ŋèsé	A large boat, lighter formerly used to unload ships berthed beyond the surf
69.	àhm̀̃ŋ̀kʷàá	àhm̀̃ŋ̀kʷr̀á	King's servant, attendant
70.	àhúrá	àhórà	A very serious insult, taunt
71.	ʔàhúrɔ́	àhɔ́lé	Sputum, phlegm
72.	hũ (see)	àhṹ	Chance discovery
73.	æhũḿ	àhũḿ, àhũń, àhṹˈmɛ́	Wind, storm, gale, blast of wind
74.	æwuŋadɪ	àhṹŋ̃ádé	Auction, sale by auction (semantic shift)
75.	àhṵ̃m̀kã́	àhṵ̃ŋ̀ká	Joy
76.	ahurutoa ahurutia	àhùrútíà	A poisonous striking snake, a viper
77.	ædʒ̬àm̀má	á'dʒ̬ámà	A kind of plant, a small tree or shrub
78.	ædʒ̬ina	àdʒ̬ìnã́	Meeting, private consultation, arbitration
79.	ædʒ̬inamʊa	àdʒ̬ràmòá, àdʒ̬àŋ̀mòá	An appellation for the domestic cat

80.	ædʑɥumadʑaŋ	àʤúmā́ʤā́ŋ́	In vain, for nothing, to no purpose
81.	ædʑɥumataŋ (no Ak. word)	àʤúmā́tā́ŋ́	One's working clothes, which are put into coffin when he dies.
82.	ægùàmáŋ́	àʤʷàmā́ŋ́ (Is it from Asante?)	Prostitution, fornication
83.	àdʑɥɥ́ŋ́	àʤʷéŋ́	A bird, any wagtail, mud-fish, freshwater catfish
84.	akadʑinam	àkàʤìnā̀ḿ [no transcription]	Surety
85.	àkā́ń	àkā́ŋ́	Competition, challenge, contest
86.	àkā́ńsí(é)	àkā́ŋ́ʃɨ̀ɨ̀	Competition
87.	àŋ̀káẃ	àkáò	The fresh-water tiger-fish
88.	àkàsàá	àkásàá, àkáʃàá	cymbal
89.	àkásé	àkásè	Blue, bluing, washing blue
90.	àkàtàmā́ńsʊ́	àkàtàmā́ńsò	Chief's umbrella
91.	àkàtàɥìá	àkàtàŋ̀wìá	Umbrella, parasol
92.	tɕétɕé	àkéké [no tone marking]	Spindle (obsolesce.)
93.	ɲtɕètɕèrèé	àkèkèré, àkèkɾ̀é, àkèkl̀é	Headband, headgear, crown
94.	àkʊ̀rʊ̀tfɨ̃ɛ̃ɑ̃	àkl̀ʊ̀tfɨ̃ɛ̃ɑ̃, àkl̀ʊ̀ntfɨ̃ɛ̃ɑ̃, akontia, akɔntia	Pin, straight pin, dressmaker's pin
95.	kófɨ́	áˈkófɨ́	Nursing bed for seedlings of e.g. yam
96.	àkʷætìá	àkòtìà	Dwarf, a drum used in music for particular deity
97.	akotrɔ̀ko	ákòtɾɔ́kò, àkóˈtɾɔ́kò	A long-stemmed, edible mushroom
98.	àkɔ̀tʊ̀á	àkóˈtówá	A small barrel, keg.
99.	akɔdi, ɛkɔm [no Ak. word]	àkɔ̀dì	Hunger
100.	àkʊ̀fànā́	àkɔ̀flā́	A horn, originally made from an elephant tusk
101.	akʊkɔbɛsa	àkɔ́kɔ́bɛ́sā́	A thorny shrub
102.	akʊkɔwa 'chicken'	àkɔ́kɔ̀wá	A young girl or woman [semantic shift]
103.	akɔnɪaba	àkɔ̀nìàbá, ŋ̀ʃɾàhʊ̃	Missing, failure to make contact
104.	ãkɔ́ńnɔ́	àkɔ́nɔ́	Quality of being delicious, appetizing, desirable; desirability, lust,

			infatuation
105.	àkóḿ, àkɔ́ḿ	àkɔ́ŋ̀	A type of music associated with traditional worship
106.	?àkɔ̀kṍnṍ	àkɔ́ŋ̀kɾ̀ɔ́	A kind of maggot found in rotten palm trees
107.	ɔ̀kɔ́tɔ́kúrɔ́	àkɔ̀tɔ̀kĺò	A hooked drumstick, a wooden fork used in thatching
108.	àpàkā́ŋ̀	àk͡pàkā̀ā́	Palanquin, travelling basket
109.	àpàtɕí	àk͡pàké	Crippled person
110.	àpátɕí	àk͡pákí	A large calabash
111.	pàdíɛ́, pàrí	àk͡pàlé	Rafter, ceiling support
112.	m̀pæ̀ntú, apænturɛŋ, àpæ̀ntú	àk͡pā̀ntú	A kind of plantain, used to prepare fufu.
113.	àpàsúɔ̀, àpàsɔ̀ɔ́	àk͡pàsó	Scissors; a kind of witch who cuts the victim's blood vessels
114.	apatɪram	àk͡pàtɾ̀àmɔ̃̀	Butter bean; lima bean
115.	àpḯḿ	àk͡pé	Thousand, one thousand
116.	àpísɔ́ẃ	àk͡pésɛ́ó, àpɛ́sɛ́ó	A small animal, the potto
117.	pétèpèré?	àk͡pètèk͡pl̀èbí	A small shrub-like savannah tree, and its fruit
118.	æ̀pítì,æ̀pítí	àk͡pítí	A cake, made of corn
119.	æ̀kɾ́ó, è̀kúró	àkɾ̀ó/àkl̀ó	Scar, growth over a sore
120.	àkùrɔ̀mā́	àkɾ̀òmā́, àkl̀òmā́	Hawk, lizard-buzzard; an animal impersonated by cult dancers
121.	akronnoi?	àkɾ̀ònòí, àkl̀ònòí, àkl̀ònùé	Rupture, hernia, of men
122.	æ̀kùròwá	àkɾ̀òwá, àkl̀òwá	Village, farm settlement
123.	akrubɛtɕɛ	àkɾúbɛ́tʃɛ́	Deformity of the arm due to injury or birth defect
124.	è̀kúẁ	àkú	Heap
125.	àkṵ̃ǹtá	àkṵ̃ǹtá	Brother-in-law
126.	ŋ̀kòŋ̀ā́ā́	àkùŋ̀ā́ā́, ŋkuŋaa, akuŋaa	Magic, magical rites; a kind of charm
127.	æ̀kùtú	àkùtú	Orange, grapefruit
128.	àkʷáàbà	àkʷáàbà	Welcome!
129.	kʷæ̀dú	àkʷàdú	Banana
130.	?ànā̃ǹtá	àlā̃ǹtá	Condition of being knock-kneed
131.	àmā̃, ?àmā́ń	àmā̃- obsolesce.	Gum, glue; tar, pitch

132.	amakwantɕya? No Ak. word	ámā́kʷā̀ntʃū́ā́	A small animal, the bush genet. [semantic shift from fem. name-not sure if personal]
133.	àmā̀nī́	àmā̀né	Trouble, adversity
134.	amanɪhunu	àmā̀nèhū́lū́	Affliction, suffering
135.	àmā̀nǐ̀é	àmànìɛ́	Events, news, report
136.	àmā̀m̀fū́	àmā̀ǹfó, àmā̀ǹfɔ́	Old town, original or home town; desolated, ruined place, ghost town
137.	amaŋkani	àmā̀ǹkā̀nī́	A root crop, cocoyam, taro
138.	am̀pàǹ ámpā̀ǹ	ámpā̀ǹ, ámpā̀ǹ	Fruit bat
139.	ámˈpé	ámˈpé	A rhythmic jumping game, mainly played by girls
140.	m̀pǐ̀m̀mā́	ā̀m̀pèmā́	A type of plantain
141.	àm̀pèsí	ā̃m̀pèʃí	Food consisting of plain boiled yam, cassava, plantain, or cocoyam
142.	æníbírí	àníbɾ́é, àníbĺé	Greed, covetousness
143.	?ænìdā́nī́	ànìdā́ì	Women's disease
144.	ænihaw	ànímháó	Laziness
145.	ànɔ̃mā̀ā́ + kʷàtɕí	ànòmákʷàtʃé	A kind of bird
146.	ànɔ̃kʷá	ànɔ̃̀kʷá	Truth; indeed, truly, really, honestly, actually, in fact, as a matter of fact
147.	ɔnɔ̃kʷáˈfú	ànɔ̃̀kʷaˈfó	A truthful person
148.	nʊkʷarɪ, anʊkʷadɪ	ànɔ̃̀kʷálé	Truth
149.	tɛw, antɛw (Fn), ntɛ	ā́ńˈtɛ́ó	Ambush, waylay
150.	?ænǐ̀mɔ̃̀ɔ̀ŋā́ḿ	ànɔ̃̀ŋā́ḿ	Glory
151.	áŋ́kɔ̄nā́ḿ	ā̃ŋ́kònā́ḿ	Loner, unsociable person; a kind of beads, worn esp. by widows
152.	ansam	ā́ŋ́sā̀ā́, ā́ńsā̀ŋ́, ā́ńsā̀ḿ	Guinea fowl
153.	ànt̀ɕɥèrí	àǹtʃʷèlé	Ladder, steps
154.	pàá	àpàá	Hire, job
155.	àpààwá	àpàáwá	A flat round wooden tray, carried on the head or placed on a table for displaying and carrying items
156.	àpā́ḿ	àpā́, àpā́ŋ́	Bonds, shackles, fetters, anything used to secure one who is to be beaten or executed…
157.	apásá	àpásá	Falsehood, lie
158.	àpásáˈfú	àpásáˈfó	Liar, gossip, idle chatterer
159.	apɛsɛ̀í	àpèsɛ̀é, opɛnsɛ	Brush-tailed porcupine

160.	àpísɔw	àpɛ̀sɛ̀ó, àk͡pɛ̀sɛ̀ó	A small animal, Bosman's potto
161.	aprapransa	àprà̀prà̀nsā́	A food, a corn and palm dish
162.	mpunimpu	àpúnā̀mpú	Head-on, face-to-face, on the spot
163.	àsá	àsá	Central room, hall, sitting room
164.	nsaasa(wa)	àsààsáˈá	Patchwork, made with cloths of many designs sewn together
165.	ɔsajɪrɪ	àsààjéré, àsɪ̀àjéré	A type of war music and dance, performed by women
166.	àsábìrá	àsábl̀á (obscele)	A children's disease
167.	àsàfʊ̀	àsàfò	Military company; group, congregation, assembly
168.	àsàfʊ̀kā́ń	àsàfòkā́ŋ́	Leader, head of an army, head of a vanguard
169.	sā̃mā̃ŋ̀	àsā̃mā̃núkpá	Small supernatural person, dwarf; an ape, the chimpanzee
170.	àsɪ̀àm̀	àsɪ̀à	Fever
171.	asɪ́à	àsɪ́à	Snuff; brown
172.	ɔsésé	àsésé, àséséù	Hut, temporary shelter; tabernacles
173.	àsèm̀sùróẃ	àsɛ̃̀m̀sɪ̀ò	Fear of trouble
174.	ǹsā̃m̀dú (Fn)	àsɛ̃̀ǹdó	Space between roof and ceiling; access hole in ceiling; ceiling
175.	àsìáńnàá	aʃana (No trans. Obsolesce.)	A food
176.	?æsiedu kɛtɛkɪrɛ	àʃíèdúkɛ̀tɛ̀kl̀ɛ̀	Initial words in a drummed appellation for Ga Mashie; an electoral district, Central Accra
177.	æsikre-sìā́m̀	àʃìkìnʃā́ŋ́, ʃìkìnʃā́ŋ́	Wheat flour
178.	æsìkò(tò)	àʃíkò	A game (Obsolesc)
179.	æ̀símæ̀sí	àʃímàʃí, òbɛ̀ǹtéŋ́	Somebody-or-other, so-and-so
180.	asitíw (deafness)	àʃìtíú	Making an error due to inattention, carelessness (Semantic shift)
181.	æsiwa	àʃìwá	A type of music
182.	aɕɥɪɕɥɛ	àʃʷìʃʷɛ́	Mirror
183.	asʊprɔpɔ	àsòk͡pl̀ò	White mangrove; button wood tree
184.	asrafʊkuw	àsɪ̀áàfóàkú	Regiment
185.	asraafʊ	àsɪ̀áàfóŋò	Soldier
186.	atadɪ	àtàdé, àtàlé	Dress, garment, shirt any price of dress esp. of European style; clothing, apparel
187.	àtɛ̃́ŋ́	àtɛ̃́ŋ́	Judgment

188.	ʔàtĩ̋ã̋	àtĩ̂ã̂	Cashew nut
189.	ætírìdìí	àtírìdìí, àtrìdìí	Fever, malaria
190.	àtʊ̀fʊ̀	àtòfò	A pillow worn by women at the back, as a bustle
191.	ǹtɔ́m̀mɔ̀	àtómò	Sweet potato
192.	àtɔ̀ròpó	àtr̀ò͡kpò, àtr̀ò͡kpó, àtr̀ó͡kpó	Aubergine, eggplant
193.	atrɔma	àtr̀òmã̋, àtɔ̀r̀ɔ̀mã̋, àtr̀ɔ̀mã̋	Morsel, bit of food, mouthful of food; confusion
194.	atɕɛ́	àtʃɛ́	A basket-work trap, used in river-fishing
195.	àtɕĩ̋ḿ	àtʃɛ́ḿ	The Akyem country
196.	atɕĩ̋ŋ̀tɕɛ̃ɛ̋ŋ̀	àtʃɛ̃ɛ̋ŋ̀tʃɛ̃ɛ̋ŋ̀, àtʃɛ́ŋ̀tʃɛ́ŋ̀, àtʃɛ̃ɛ́ntʃɛ́ɛ̃	Unripe palm nut
197.	ætɕĩ̋ã̋ḿpɔ̃ɔ̀ǹ (Also Ak. personal name)	àtʃĩ̂ã̀mpɔ̃ɔ̀ŋ̀	A herb, Acheampong, Busia, Krawuna or Siam weed.
198.	ètɕɥã̋	àtʃʷã̋	Scar, cicatrice, cuts made on the skin; quarrel, difference, misunderstanding
199.	ʔatɕɥɛrɪ	àtʃʷèré	Ladder, staircase
200.	àtɕɥèrí	àtʃʷèrɛ́, àtʃʷèlɛ́	Fist, blow with the fist
201.	ætᵘ̀ĩ̋ã̋	àtʊ̃ã̋	Rebellion, defiance
202.	ætᵘ̀ĩ̋ã̋	àtʊ̃ã̋tʃélɔ̀	Rebel
203.	ætʊ̀m̀pã̋ŋ̀	àtʊ̃m̀pã̋nĩ̋, àtʊ̃m̀pã̋ŋ̀, tʊ̃m̀pã̋nĩ̋	A large kind of drum; a type of court music associated with this drum
204.	tumpã̋ŋ	àtʊ̃ŋ̀kpã̋	Glass bottle of liquor, glass bottle
205.	túrúẃ ‘spatter’	àtúˈtrú	Chaff, fragments, remnant of shot expelled when a rifle is fired
206.	àwàrí	àwàlé	Spoon
207.	ɔ̀wàrì	àwàrè, àwàlè	A game played by two people at a time, using four counters per hole on a board of twelve holes, six for each contestant
208.	aɥɪrɛfiri	àwèrèfĩ́, wèrèfĩ́	Forgetfulness
209.	àɥìrèhúẃ	àwèrèhó	Grief, sadness
210.	æɥí (theft)	àwí	Wickedness (Semantic shift)
211.	awʊsu	àwòsó, àwùsú	Birth waters
212.	æwùràá	àwùlá, àwùrá	Lady, lady-like person; title for a young lady

213.	æwùlá-ækᵘíˈá	àwùláˈákúˈá	A kind of cassava
214.	æwule, ewure (Fn)	àwùlé	Surgeon-fish
215.	æɥísíɑ̋ɑ̋	àwúsɑ̋, àwísɑ̋	Orphan
216.	jìrá (lose, be lost)	àjálá	An absent person; the supernatural power enabling one to become invisible, vanish
217.	àjúwá	àjáwá	Copper, brass; a metal container; tray, salver, metal box, brass pan
218.	àjɛ̀fúrɔ́	àjɛ̀mfɾ̋ó, àjɛ̀mfɾ̋ó, àjɛ̀mfĺó	Bride, newly married girl
219.	ojibiribi (a tree)	àjíbl̀ìbì	A kind of beads, made of black seeds (Semantic shift)
220.	ajɛfarɪ	àjífálé, àjéfáré, àjífáré	A fine, claimed by husband from another man for adultery leading to divorce
221.	ʔbáhà	báhà	Fainting; extreme tiredness
222.	ɔbaɲtɕɪ	bɑ̃̀ntʃ́í	Cassava
223.	bɑ̋ŋ	bɑ̋ŋ	Boundary, limit, demarcation
224.	baŋ	bɑ̋ŋ	Character, nature
225.	bàtàfú	bàtàfó	Bush pig, wild pig
226.	bàjírɛ	bàjálé, bàjéré, bàjɛ́lé	A kind of yam
227.	ʔbaasʊnfʊ	beesonfo (no tone marking)	Chief fisherman's council
228.	èbɪ̋ḿ	bém̀, béŋ́	Innocence
229.	ʔbɪ̋ḿbú	bém̀bùù	Innocence, declared innocent
230.	bɛ̋ńtúá	béńˈtóá	A plant; a calabash made from the fruit of the plant; a calabash or other container used as a syringe for giving enemas
231.	béw	béó	Armadillo
232.	àbébéẃ	béˈbéó	A tiny river snail
233.	ɔ̀bɛ́dɛ́ẃ	bɛ́dɛ́ó	A makeshift basket, made of palm leaves, used on the farm
234.	bɛdiakɔ (come eat and go) No Ak. word	bɛ́díákɔ̀	A variety of cassava
235.	bægúá	bègʷà	Any meeting of elders
236.	ɖ̻ina (stay)	bèɖ̻ìná, òbèɖ̻ìná	An exclamation made while shaking hands after an outdooring

237.	bɛ̃ɛ̀ŋtɕé	bɛ́ŋ́kɛ̀	Approach, draw near, be close to something
238.	bétíbétí	bétébété, batabata	Loquacious, talkative
239.	bisibasaa	bísíbàsàà	Confused
240.	bitibiti	bítíbítí	Close, crowded
241.	bírɛ́ẃ	bĺéó	Palm branch, palm frond
242.	bìrɛ̀ẁ	bl̀èòò	Slow, soft, slight
243.	buroŋa	bĺóŋã̀, bĺòŋã̀	Christmas
244.	burosuo	bl̀òʃóó	Large and long, of pawpaw (obsolesce.)
245.	bróbrəbrɔ	bl̀ɔ̀bl̀ɔ̀ɔ̀bl̀ɔ̀, bĺɔ́bĺɔ́ɔ́bĺɔ́	Delicious
246.	bùrɔ̀fú	bl̀ɔ̀fó	Pertaining to or derived from European or white culture; anything perceived as foreign
247.	buroburo	bĺúbĺú	All
248.	búàpíà	bòápìà	A kind of monkey
249.	bòdᵘíá	bòdúá, ahuja	Horse-tail fly whisk
250.	ʔbòkā́ (Fn)	bòkā́	East
251.	bòn̄sù	bòn̄sò	Whale
252.	bóńsúẃá	bóńsúá	A type of small pot
253.	òbónt́ó	bòn̄tò	A type of fishing boat, trawler
254.	ɔ̀bósáẁ	bóˈsáó, bóˈsá	Plantain fibre, used as sponge or toilet paper
255.	bosrobo	bòsr̀òbò	An appellation for the sea
256.	ʔbɔ̀	bɔ̀	Create, set in motion-numerous expressions
257.	ɛbɔ	bɔ	A kind of flying ant
258.	ɔ̀bɔ́ˈfú	bɔ́fò	Messenger; ambassador, envoy, high commissioner; angel
259.	ɔ̀br̀á	br̀á, bl̀á	Menstruation
260.	ɔ̀br̀áˈfú	br̀áˈfó, bl̀áˈfó	Executioner; an appellation for the odum tree
261.	bírìsìí	bĺìʃìí, brîʃìí	A black-dyed cloth
262.	bùá	búà	Assemble, gather
263.	ʔbùá	bùá	Judge, arbitrate
264.	æbùàdá	búádá, bùádá	Fasting
265.	bùtú	bútù	Capsize, overturn be overset; overthrow, annihilate

266.	dà (asɪ)	dà	Thank
267.	da	dā̋	Stand, pose
268.	dáá; da (day)	dáá	Always, perceptually, every day, every time
269.	ɔ̀dáẁ	dáà	Mouth, mouth cavity
270.	ʔdæ̀æ̀bí, dæ̀bí	dààbí, dàbí	Excl. no
271.	ʔdæ̀bídà	dàbídà	Excl. no, emphatic denial
272.	dàdààdà	dàdààdà	Long time ago
273.	dàdí	dàdé	Iron, metal; equipment; cutlass; cash
274.	dàdìbā̋ŋ̀	dàdèbā̋ŋ̀	Iron bar, cross-bar
275.	dàdìsɛ̄̋ŋ̀	dàdèsɛ̄̋ŋ̀	Iron pot
276.	damfʊ̀ʤan	dā̀mfʊ̀ʤàì	A double-edged knife or dagger, with a sheath
277.	dā̀mpā̋ŋ̀	dā̀mpā̋ŋ̀, àsá	Hall, sitting room
278.	daŋkʷansɪrɪ	dàŋ̀kʷànsèré	An edible bat
279.	dédé	dédé	Make a noise
280.	ɔ̀dɛ́ẁ	dɛ́ɛ́ŋ̀	Nicely, attractively
281.	dɛɛtɕiriamʃfa	dɛ̀ɛ̀tʃ́ríàm̀ŋfā̀	Name of an 'abɛbua' emblem of the Otublohum division of Accra, a bird looking back
282.	deŋdeŋ	dɛ́ŋ̀dɛ́ŋ̀	Carelessly, roughly; very hard, assiduously
283.	dì (keep in mind)	dì	Be mindful of; follow; be habitual, a bad habit
284.	didimu	dìdìmú	Glutton
285.	dī̋ńŋ́	dī̋ńŋ́	Quiet
286.	dòḿ	dòḿ, dòŋ́	Travel, go abroad, emigrate, set off
287.	dʊ̋ḿ (favour)	dómɔ̃̀	Trust, accept, believe in (Semantic shift)
288.	dòẃ (Fn)	dòò	Be browned by roasting
289.	dɔ́ (love)	dɔ̀	Be helpful, kind, considerate; cherish (Semantic shift)
290.	dᵘia-adɪ (stick-yam)	dùàdé	Cassava, manioc
291.	dᵘiadan	dùá'dā̋ī̋	A building of the wattle and daub type
292.	dᵘìásòdᵘìá	dùásòdùá, dùásèdùá	Name of several semi-parasitic plants
293.	dᵘìé	dùé	Excl. an expression of sympathy, condolence
294.	èfī̋ń, òfī̋éń (Fn)	fɛ̄̋ī̋	A fish, marine spinehead or scorpaenid

295.	ʔfɛ́ẃ	fɛ́ó	Beauty; goodness, pleasantness
296.	ʔfɛw	fɛ́ó	Teasing
297.	fitaa	fítáá, fútáá	White, pure white, clean
298.	ʔfìrí	fl̀í	Buy or sell on credit
299.	fʊrɔ	fl̀ɔ́, fl̀ɔ́, fl̀ɔ́	Stew; meat or fish and vegetables cooked in oil
300.	ʔfɔ́	fɔ̀	Be wet; soak, wet, drench
301.	ʔfɔ́	fɔ́	Guilt
302.	fùfú	fùfùí	A food of pounded cassava, plantain, yam, etc.
303.	ʔfùtú	fútù	Mix, join
304.	fúˈtúró	fúˈtúrú	Gold dust
305.	ædʑãŋ̀ (Mande source)	gãĩ́, gãnĩ́, gɛ̃ĩ́	Bow; a spiny structure on the back of a catfish; porcupine quill
306.	gʷá	gʷá	Meeting, council
307.	gʷáˈbɔ́	gʷábɔ̀ɔ̀	Assembly, conference
308.	ògʷàntɛ̃ŋ́	gʷãntɛ̃ŋ́	Sheep; fool
309.	gùàẁ	gʷàò, gʷàà	Whip, beat, lash, flog
310.	hamahama	hm̀ãhm̀ã	Wavy, rough, of water
311.	haŋŋ	háŋ́ŋ́, heŋŋ	Bright, well lit.
312.	hàẁ	hàò	Worry, bother, annoy
313.	haw	hàòhàò	Worried, upset
314.	háráŋ́	háráŋ́ŋ́	Elegantly, beautifully, of dressing
315.	ɕɛ̃ŋ̀ŋ̀	hɛ̃ŋ́ŋ́	Flame, colour, bright
316.	hĩ̀ã́	hĩ̀ã́	Be necessary, be important
317.	àhḿmã́	hḿmã́	Very early
318.	wòsóẃ	hósò	Shake, quake
319.	hɔ́-nì-hɔ́	hɔ́nìhɔ́, hɔ́nɔ̀hɔ́ó, hɔ́hɔ́nɔ̀hɔ́ó	Half and half, in half measures, more or less, so-so
320.	hòrónóà	hŕõnɔ̃̀, hĺõnɔ̃̀	Blister; swelling around a wound
321.	hùrúw	hr̀ú, hl̀ú	Jump, jump about
322.	húẁ	hùù	Blow, blow on; fan; fight, wage war; beat; boasting
323.	hùàŋ̀	hʷãŋ̀	Dislocate, dislodge, a joint; limp, drag foot along the ground when walking; reduce, cut
324.	ɕɥ́ĩ́ãɕɥ́ĩ́ãã́	hʷ́ĩ́ãhʷ́ĩ́ã́, hʷiɛhʷiɛ	Thin, slender, slim

325.	ʤ̀àw	ʤ́á	Worship, revere
326.	ʤ̀áásí (royal household)	ʤ́áásé	Council, state council (Semantic shift)
327.	?ʤ̀àbádʤ̀àbá	ʤ́àbéʤ́àbé	Haphazardly
328.	ʤ̀ɥàrí, guàrí (bathe)	ʤ́álé	Rinse, wash without soap
329.	ʤ̀áŋ̀	ʤ́áŋ̀	Common, simple, ordinary , mere; empty
330.	ʤ̀ata (Mande ʤ̀ara)	ʤ́àtá	Lion. The emblem of the Gbese division of Accra
331.	òʤ̀átɛ́ŋ̀	ʤ́átɛ́ŋ̀	Torch, made of dried palm fronds
332.	? ʤ̀àwú	ʤ́àwú	A variety of yam
333.	ʤ̀ìʤ̀á	ʤ́íˈʤ́áá	Lose control, panic; get out of control
334.	ʤ̀ìʤ̀é	ʤ́ìʤ́é	Resound, echo; provoke, tease
335.	ʤ́ìmí	ʤ́ìmí	Go mad, be silly, be stupid
336.	?æʤ́ìnā́	ʤ́ìná	Consideration, thought, discussion
337.	ʤ̀ɥòŋ̀kú	ʤ́òŋ̀kú	Hip joint, thigh bone, loins
338.	ʤ̀ɥó	ʤ́ú	Monday, “female” day in Ga tradition
339.	ʤ̀ɥófɔ???	ʤ́úfɔ̀	Tuesday, “male” day in Ga tradition
340.	ʤ̀ɥá	ʤ́ʷìrà, ʤ́ʷìlà	Break into pieces; sabotage
341.	ʤ̀ɥetiri	ʤ́ʷétɾí	Treasure, money, capital for trading; silver
342.	ʤ̀ɥè	ʤ́ʷèɛ̀	Briefly and sharply
343.	ʤ̀ɥíŋ̀	ʤ́ʷèŋ̀	Think, thought
344.	ʤ̀ɥítɛ̀	ʤ́ʷìɛ́tɛ̀ɪ́, ʤ́ʷùétɛ̀ɛ́	Silver, ornaments
345.	æʤ̀ɥini, æʤ̀ɥine	ʤ́ʷíné, ʤ́ʷúné	A collection of trinkets
346.	ʤ̀ɥìrá	ʤ́ʷìlá	Bless, cleanse, purify
347.	?kā́	kā́	Turn fufu in a mortar
348.	? kā́	kā́	Swear; decide, determine; reprove, reprimand
349.	kàbìì	kàbìtìì	Thick darkness
350.	káɱ̀fṍ	káfò, kā́ɱ̀fò, káɱ̀fò	Praise
351.	kàí	káì	Remember, remind
352.	?kǽˈʤ̀á	káʤ́à	The root of kanya, used as a chewing stick
353.	kakaduro	kákáótʃ̀òfā̀, kákátʃ̀òfā̀	Ginger
354.	kɾ̀ā́	kl̀á (no nasal)	Guess, Divine, foretell

355.	kaŋfratoto (Fn)	kã̀ŋfl̃ã́tótó	The scales of the long-finned herring; a small silver coin
356.	kàntó (crooked legs)	kàntó	Shin, shin bone, tibia
357.	kã́ntɕĩmã́ (Fn)	kã́ntʃĩmã́	Catering, the practice of a woman cooking for an unmarried man; female caterer
358.	kæŋã́ŋ̀	kã́ŋà	Urge, encourage, prompt, stimulate, inspire
359.	kàŋã́ŋ̀kàŋã́ŋ̀	kã́ŋ́ãkã́ŋ́ã, kã́ŋ́ãã́	Thin, skinny
360.	kàŋ̀kànĩ́	kàŋ̀káŋ́	Civet cat
361.	kàẃ	káó	Cake, biscuit
362.	ʔkàsàtɕuí	kàsàŋ̀tʃʷì	Insinuation; indirect, allusive speech
363.	tɕínã́ḿ	kéˈnáŋ́	Fried fish
364.	kente	kèǹté	Kente cloth, hand-woven cloth; a length of this cloth
365.	kete	kètè	A type of music
366.	ʔkɛ̃̀ǹtɛ̃́ŋ́	kɛ̃̀ǹtɛ̃́ŋ́	Basket
367.	kiŋkaŋŋ	kìŋ̀kàŋ̀ŋ̀, kĩ̀ŋ̀kã̀ã̀	Fine, rich esp. of women's clothing, gorgeously aparrelled
368.	kítíkítí	kítíkítí	Small
369.	ŋ̀kɾ̀ánˈtí	kl̀ántè	Cutlass, machete
370.	krobów	klɔ̀bɔ́ó, klɔ̀bɔ́ɔ́, klɔ̀bɔ́	White clay, smeared on the body by the priests, priestesses, and by ordinary people during certain rites; a perfumed ointment, made with white clay
371.	kú	kó	Wandering
372.	ɔ̀kùbɔ́ˈfú	kòbɔ́fò	Vagrant
373.	kòòhã́ã̀	kòhá́á, kòháŋ́ (no nasals)	A large bird
374.	kodʑobesia	kòdʒ́óbɛ̀sía	An effeminate man
375.	kóˈkɾ́ó	kóˈkĺó	An old palm wine
376.	kokonte	kòkòǹté	Dried cassava flour; thick porridge made from cassava flour
377.	kónĩ̀ĩ́	kónĩ̀ŋ̀ŋ̀, kónĩ̀ĩ̀	Very quiet
378.	koŋkohĩ́mã́	koŋkohema (no transcription)	Chief fish-monger
379.	kòŋ̀kòhíní	koŋkohene	Chief fish-monger
380.	kontommere	kòǹtómm̀é, kòǹtómɾ̀é	Leaf of the cocoyam, a spinach-like

			vegetable
381.	kontromfi	kòntɾ̀òm̀ŋfì (no transcription)	A large monkey or ape, chimpanzee
382.	kóm̀m̀, kóḿḿ	kóŋ́ŋ́	Quiet
383.	akɔfra/akɔfla	kòòfɛ́ŋ́	A chief's horn
384.	kòó'kó	kòó'kóó	Haemorrhoids, piles
385.	kòó'kó	kòó'kóó	A type of cocoyam
386.	kòsɛ̀	kòsɛ̀	Excl. showing disgust, surprise, refusal to act as told
387.	kɔ̀kɔ̀	kɔ̀kɔ̀	Warning, admonition
388.	kɔ̀kɔ̀bú	kɔ̀kɔ̀bó	Dwarf mongoose
389.	kɔkɔtɛ (Fn)	kɔ̀kɔ̀tɛ̀	Sea catfish
390.	kɔntɔŋ	kɔ̀ntɔ́, kɔ̀ŋtɔ́	Curve, semi-circle
391.	ŋkɔ̃́ŋ́kɔ̃́ŋ́	kɔ̃́ŋkɔ̃́ŋ	A dry, chesty cough; whooping cough
392.	ŋkɔ̃̀ŋkɔ̃̀ǹsɔ̃́	kɔ̀ŋkɔ̀ŋsɔ̃́	Gossip, betrayal
393.	kɔ̀ɔ̀	kɔ̀ɔ̀	Bright red colour
394.	kɔ̀ɔ̀ʤ̀ɔ́ɔ́ń	kɔ̀ɔ̀ʤ́áń (no nasal)	Red mourning cloth
395.	?kɔnsɔŋkɔnsɔn	kɔ̀sɔ̀ŋkɔ́sɔ́	Chain, neck chain; necklace
396.	kɔ̀tí	kɔ̀tí	Penis
397.	?kɔtobonsam	kɔ̀tɔ̀bɔ̀ǹsàḿ	Unconsciousness
398.	kɔ̀tɔ́'kɔ́	kɔ̀tɔ́kɔ́	The crested porcupine
399.	ɛpaɪ	k͡pàí	A flexible rush basket
400.	pàpà	k͡pàk͡pà	Fan
401.	pápá	k͡pák͡pá	Good; genuine, right, correct; common, normal
402.	?pa (select)	k͡pá'k͡pĺá	Acquire, buy a large amount (Semantic shift)
403.	pɔ̃́ḿ	k͡pɔ̃̀ŋ̀, pɔ̃̀ŋ̀	Discuss, deliberate, plan, think about
404.	ɔ̀pàpú	k͡pàk͡pó	Male goat, he-goat
405.	pra	k͡pĺa	Herd, bring (sheep, cattle); clean off, clear off, be clean; be cleared from
406.	pràm (quick)	k͡pl̀àk͡pl̀à	Unexpectedly; urgent, immediate
407.	pàtá	k͡pɔ̃́tɔ̃̀	Make peace, settle a dispute, propitiate, pacify; destroy, annihilate; be destroyed
408.	apata	k͡pàtá	Shed, shelter
409.	pátaa	k͡pátáá	Open, flat, bare expanse
410.	?pæ̀tú	k͡pátù	Act deliberately

411.	péŋ	k͡péŋ́	Brittle, break easily
412.	pesú	k͡pèsú	A basket, for keeping fowls
413.	mpépɛw	k͡pék͡péó	Remains of the harvest
414.	pìní	k͡pl̀ɛ̃́	Admit, acknowledge, agree to, approve; get along, concede, cooperate, behave in a social, non-individualistic manner
415.	pɛ̀m̀	k͡péŋ́ŋ́	Hard, firmly
416.	èpɾ̀á	k͡pĺá	An animal, giant ground pangolin
417.	èpú	k͡pó	A cloth measure, 12 yards; volume, tome
418.	?poporoku	k͡pòk͡pl̀òkú	New corn
419.	pùpú	k͡pók͡pò	Shake; shiver
420.	?m̀pópò (a corn dish) + nsu	k͡pòk͡pònsù	Corn porridge, made from unstrained dough
421.	m̀pókᵘíá	k͡pòkùá, ŋk͡pòkùá	Young breasts
422.	?pòkúpòkú (egret)	k͡pòkúk͡pòkú	A large black and white bird
423.	pú	k͡pòô, k͡pòó	Reject, refuse to accept; disown
424.	ɛpɔ́w	k͡pɔ́	Lump, bump; knot, knot in a mesh; joint; misunderstanding, disagreement; unclear point, as in a discourse or discussion; locality; a plant
425.	?pɔ̀tɕí	k͡pɔ́kè	Break off a piece, take a piece of, snatch
426.	pɔtɔ́, pɔtɔ́w	k͡pɔ́tɔ	Rot, pollute; mash, knead, soften; mill flour
427.	pɔ̀tɔ̀ɔ̀	k͡pɔ́tɔ́k͡pɔ̀tɔ̀, k͡pɔ̀tɔ̀ɔ̀	Dirty, esp. of water, untidy, unclear, muddy
428.	mpɔtɔmpɔtɔ	k͡pɔ̀tɔ̀m̀k͡pɔ́tɔ́	Porridge of mashed cooked root vegetable, mixed with oil and condiments
429.	ɔkɾ́á	kɾ́a, kĺa	Soul, aspect of the human person that is believed to join God after death; page, young who carries the stool of a chief and sits in front of him at gatherings.
430.	kramo (Mande-karamɔgɔ)	kɾ̀àmò, kl̀àmò	Muslim
431.	kranaa	kɾ́ã́nã́ã́, kĺã́nã́ã́	Quiet, silent, without activity
432.	?ætɕiri (back,	kɾ̀ì	Dizziness, dizzy spells; details

	behind)		
433.	kronᵘia	kĺónùá	A kind of sandals with wooden sole and raffia toe strings (Obsolesc)
434.	ŋkùròfʊ́	kl̀óŋ́fó	townsmen
435.	kurotia (entrance to a town)	kl̀ótíá	Turn-off, turning point, junction
436.	?kf̋ʊ̋ŋ́kf̋ʊ̋ŋ́	kf̋ɔ̋ŋ́kf̋ɔ̋ŋ́, kĺɔ̋ŋ́kĺɔ̋ŋ́	Holy
437.	krɔŋŋ	kf̋ɔ́ŋ́ŋ́	Pure, unadulterated
438.	kukurudu	kùkr̀ùdù, kùkl̀ùdù	Earthquake, earth tremor
439.	?kuku	kúˈkwɛ́í	Pot, cooking pot
440.	kũmā́ā́	kũmā́	Junior
441.	kùmā́ā́sí	kùmā́ā́sé	The city of Kumasi; small coloured beads
442.	kurunku (Fn)	kũŋ́ˈkũḿ, kũŋ́ˈkũŋ́	A kind of music
443.	ŋkunim	kùníḿ	Success, victory
444.	?kuntann	kʊ̃ntɛ̃ŋ̀ŋ̀, kʊ̃ŋ̀kɛ̃ŋ̀ŋ̀, kɛ̃ɛ̀nʃɛ̃ŋ̀ŋ̀, kʊ̃ntʃɛ̃ŋ̀ŋ̀	Pompous, of dressing; unsuitably expensively dressed, overdressed
445.	kʊ̀rá	kùrá, kùlá	Preserve, look after, manage, control
446.	kʊ̀ràfā́	kùràfā́	Sister-in-law or brother-in-law
447.	kʷaɲtɕɪrɛ, ??ŋkwatɕɛrɪ	kʷààʃɛ́rí, kʷààʃɛ́lí	Happiness, long life
448.	?kusuu	kùsùù	Sombre, drab, dull; thick, overgrown
449.	kóńtóḿpóˈfʊ́	kútúḿpɔ́fo, làbl̀àbáfo	Liar
450.	kontompo	kútúḿpɔ́, làbl̀àbá	Lie, counterfeit
451.	?kúẃ	kúú	Group, council, society
452.	kʷáˈí	kʷáe	Thick forest
453.	?ɔ̀kʷækú	kʷàkúó	Mona monkey
454.	?kúráá	kʷláá, kʷráá, kúláá	Intens. All, at all, completely, entirely
455.	kʷàmā́ŋ́ (populace)	kʷàmàŋ̀	Crowd, community, the commonality
456.	?kʷaw	kʷàò, kʷàà	Smear clay on a surface e.g. a fireplace, to polish it
457.	ɔ̀kʷàsì́á	kʷàʃì́á	Stupid person
458.	kʷàtá	kʷàtá	Leprosy
459.	m̀màá	má	Bamboo clappers, for beating rhythm while singing

460.	abaawa	àbààwá, mààwá	Maid, female servant
461.	ɔmampam	mā́mˈpáŋ́	Land crocodile, monitor lizard
462.	mamprobi	mā̀mpɾ̀òbí, abɛntia	Royal cemetry
463.	maŋamaŋa	mā̀ŋā̀mā̀ŋā̀	Disorderly, mixed up, chaotic, confused
464.	ɔmā́ŋ́	mā̀ŋ̀	Town, country, state
465.	m̀mā̀ŋ́	mā̀ŋ̀	Herring, sardine
466.	mā́ńˈsɔ̃́	mā́ńsɔ̃	Quarrel, strife, ill-feeling; litigation
467.	mantɪasɪ	màŋ̀tìàsé	Central town, capital town
468.	m̀mìré	ml̀é, mɾ̀ɛ́	Mushroom
469.	m̀ŋfʊ̀á	m̀ŋfóá	Pimple
470.	?m̀ŋfɔ̀níní	m̀ŋfɔ̀nírí, m̀ŋfɔ̀níí	Picture, photograph
471.	mĭ̃ā́	mī̃ā̃	Squeeze, pinch
472.	m̀màrá	ml̀á	Rule, rules, law
473.	m̀mó	mó, omomoomo	Excl. congratulations!
474.	m̀mɔ̀ḿ	mɔ̀ŋ́	Rather
475.	m̀mɔ́bɔ́	mɔ́bɔ̀	Pity
476.	m̀mɔ̀bɔ̀mmɔ́bɔ́	mɔ́bɔ̀mɔ́bɔ̀	Very pitiful
477.	m̀mɔ́dī́ŋ́	mɔ̃́dɛ́ŋ́	Effort, esp. successful or laudable effort
478.	? m̀mɔ́dī́m̀mɔ́	mɔ̃́dɛ́ŋ́bɔ̀ɔ̀	Effort, achievement, success
479.	mpɪnabedi	m̀pɛ̀nā́bɛ́dí	Name of a variety of cassava
480.	mpɪnaba	m̀pl̀ā́bí, hemɔbi	Love child, offspring of a love affair
481.	m̀pʊ̀á	m̀pòá	Challenge (non-competitive, task)
482.	m̀pʊ̀àtɕɥá	m̀pòátʃʷàà	Challenging
483.	mmʷʊawa	múáwá	Germ, virus
484.	mʊ̃̀nā́	mʊ̃̀ná	Be moody
485.	m̀mʊ̀sú	mʊ̃̀sú	Ill luck, abomination, evil, sacrilege
486.	?m̀mʊ̀sʊ̀bɔ́	mʊ̃̀súbɔ̀ɔ̀	Sacrilege
487.	?bʊ̀sʊ̀ɛ́fʊ́	mʊ̀sʊ̀ɛ́fó	Accursed person, bringer of bad luck
488.	?mʊ́	mʊ̃̀ʊ̃̀	All, whole, full
489.	?nan	nā̃̀nè	Leg, including foot
490.	?nantu	nā̃̀ntú	Calf of the leg
491.	naŋkafʊ (No Ak. word)	nā̃̀ŋ̀káˈfó	Gossip, blasphemer

492.	ǹnòm̀múḿ	nòḿ	Slave, servant
493.	nsamawa (no Ak. word)	ǹsàmàwá	Bad body odour (obsolesce.)
494.	nsra	ǹsɾ̀á, ǹsl̀á	Camp; marching, parade; siege
495.	nsaɋqa (no Ak. word)	ǹsàʃùà	Fisherman's soup, fish and pepper boiled in sea water which is then discarded; casually prepared soup with fresh fish
496.	nsuframa (Fn)	ǹsùfɾàmá	Light, showery raindrops blown by the wind
497.	nsùkòókó	ǹsùkòó'kó	A plant, dumb cane
498.	asutɪŋ	ǹsùtɛ̃ŋ́	Waterfall
499.	ǹtá	ǹtá	Double
500.	ǹtã̀mã̀gó	ǹtàmàgó	A person's daily work clothes, put in his coffin when he dies
501.	tã̀nnã̀ã́	ǹtànàí	An area which has been partially burnt over to clear it; heap of dry farm trash, left from clearing
502.	ntajaa	ǹtájàá	Roofing tiles
503.	ntemefua	ǹtèmèfúà	Mashed plantain mixed with palm oil
504.	tìá	ǹtìá	Kick
505.	ntobro	ǹtòbĺó, ǹtòbɾ́ó	Measles
506.	ǹtɔ́m̀mɛ́	ǹtɔ́mɛ̀, ǹtɔ́bɛ̀	A kind of shrub, used to demarcate indicate a boundary
507.	etɋím	ǹtʃíŋ́	Blood soup
508.	ǹtɋʊ̃mã́	ǹtʃʊ̃mã́	Red clay
509.	ntumũrúm	ǹtúmlʊ̃́'mʊ̃́	An herb
510.	ǹtũm̀múá	ǹtúmúá	A tiny bitting fly, sunfly
511.	ònípá (human being)	'nʊ̃́k͡pá, 'ŋ́k͡pá	Senior, elder (Semantic shift)
512.	ɲã̀ã̀	ɲã̀ã̀	Slowly
513.	oɲã́ḿ	ɲã́ḿ	Praise, glory, enhancement, honour
514.	ɲ̀ɲã̀ã̀nɪ́	ɲã̀né	A type of bead
515.	ɲãŋ̀kʊ̃ǹtɔ̃́ŋ́	ɲãŋ̀kùǹtɔ̃́ŋ́	Rainbow; a deity, associated with the rainbow
516.	ɲ̀ɲɛ̀ɲɲɛ̀ɲtɋí	ɲɛ̃̀ɲɛ̃̀ŋ̀tʃʷí	Loose conduct, misconduct, profligacy, incl. sexual
517.	ɲ̀ɲĩ̀nã̀m̀ɲĩ̀nã̀m̀	ɲɾ̃ã̀m̀ɲɾ̃ã̀m̀	Brightly, sparkling, sending out rays
518.	ŋ̀kã́ḿfʊ́	ŋ̀kã́ḿfó	Name of a variety of cassava

519.	ŋkannarı	ŋ̀kā́ˈnaĺé	Rust
520.	ŋkã̀ní	ŋ̀kã̀ní	Name of a variety of yam
521.	ŋkan (Fn)	ńkàŋ̀, ńˈkáńˈtíá, ŋkaŋpu	Weakfish or croaker, cassava fish
522.	ŋkatıbɛ	ŋ̀kàtìbɛ́	Soup made with groundnut paste and palm-nut juice
523.	ŋ̀káˈtíɛ́	ŋ̀káˈtíɛ́, ŋ̀kɛ́ˈtíɛ́	Groundnut, peanut
524.	ŋ̀kàtìkòntó	ŋ̀kàtìkòntó	Soup made from groundnut paste and cocoyam leaves
525.	ŋ̀kŕákŕá	ŋ̀kĺákĺá	Light (unthickened) soup
526.	ŋkran	ŋ̀kĺˈán	Army ant
527.	ŋkɔ(fie)	ŋ̀kɔ́	Yam mould, mould in which yam is planted
528.	ŋ̀kɔ̀fìbɔ́	ŋ̀kɔ́bɔ̀ɔ̀	Making yam moulds
529.	ŋ̀kɔ̀mɔ́	ŋ̀kɔ̀mɔ́	Problem, worry, lament
530.	m̀páˈí	n͡m̀k͡pái	Libation
531.	mpokuwa	n͡m̀k͡pòkùá	Breast of a young girl; nipple
532.	ŋ̀kʊrɔm	ŋ̀krɔ́ŋ̀ʃímɔ̃̀	Snoring
533.	ŋ̀kú	ŋ̀kú	Shea butter
534.	kusukum (Fn)	ŋ̀kũ̀sũ̀kũ̀ḿ	A musical style, of Fante origin
535.	ǹsènía	ǹsènîì	Scales, balance
536.	ǹsékú	ǹʃékú, ǹʃékú, ɔ̀ʃékú	Back-bitting, slander
537.	?ǹsùpɔ́	ŋ̀ʃɔ̀k͡pɔ́	Island
538.	ɔ̀táŋ́	ŋ̀táŋ́, ǹtáŋ́	Carrying net, sack; fishing net; web, cobweb
539.	ǹtɔ́ŋ́	ŋ̀tɔ́ŋ́	A tree, screw pine
540.	wawadʑan (Fn)	ŋʷà̰ŋ̀ʷà̰dʑàŋ̀, hʷà̰hʷà̰dʑàŋ̀	Hair-tail or ribbon fish
541.	ɔ̀bɾ̀á	ɔ̀bl̀á	Life; a puberty custom for girls; fashion, fashionable swagger
542.	dʑìná	ɔ̀bèdʑìnā́	A customary rite performed at naming ceremonies; a greeting to a newborn baby
543.	mpintim	ɔ̀bī̀ǹtíḿ, ɔ̀bī̀ǹtī́ŋ́	A kind of drum; a style of drumming
544.	ɔ̀bɾ̀áˈfú	ɔ̀bl̀áfó	Executioner
545.	ɔbraŋ	ɔ̀bl̀àŋ́	Youthful, vigorous person; strongly built person
546.	obereku	ɔ̀bl̀èkú	A bird, Senegal coucal
547.	operenten	ɔ̀bl̀èǹtéŋ́	A drum, made in pairs called “male”

			and “female”
548.	ɔbiritɕi	òblìtʃí	A river fish
549.	ɔbʊsʊmasɪ	òbósɔ́ŋásé	A shrine house
550.	ɔbʊ́ˈsʊ̋ʊ́m	òbósúm	Fetish, spirit (obsolesce.)
551.	ɔbʊsʊmfʊ	òbòsùmfó	Title for the priest of certain deities incl. Tigali, Akɔŋ, Kpele
552.	ɔbɔadɪ	òbɔ́àdé	Creation of the world, origin; tradition
553.	ɔbɔŋkɔ́	òbɔ̃ŋkɔ́	River prawn
554.	òbɪ̀ròníbèdíàwùò	òblònípèdíàwùɔ̀, òbɪ̀ròníbèdíàwùɔ̀	Name of a variety of cassava
555.	òbúbúáˈfʊ́	òbúbúáfò	Cripple, paralysed person
556.	ɔdàbɔ́	odabɔ	A type of antelope, Bay duiker
557.	ɔdáˈsí	òdásè	Testimony
558.	ɔdasɪfʊ	òdàsèfóŋò	Witness
559.	ɔdíˈɕí	òdéhè, òdéè	Noble, free born person
560.	odi amrɔ	òdémɾ́ɔ́, òdémĺɔ́	Boiled fresh corn on the cob
561.	ɔdéɲˈtɕɛ́m	òdéńtʃè	A small type of crocodile
562.	adí-àmmã-wú-ba	odiamaraba, afaseo	Water-yam
563.	ɔdúdʊ̀bɛ̀ŋ	òdòdòbɛ̋ŋ́	Reed; tube, usu. Bamboo, used in tapping palm wine
564.	odoɛ, odoe (Fn)	ódóì, ódóè	A fish, barracuda when small
565.	òdòǹnó (Mande dunu)	òdònó	A small double-headed pressure drum, the heads joined by strings
566.	ɔdɔŋkɔ́	òdɔŋkɔ́	Slave; derogatory term for stranger, foreigner esp. originating from northern Ghana; facial scarifications
567.	odúku	òdúkù	Barrel
568.	odum	òdúm, òdúŋ	A tree; its timber
569.	ɛfʊ́	òfó	White-thighed Colobus monkey, a variety of “hɔi”
570.	ɔfɾɔtí	òflótè	A kind of antelope
571.	ɔhá	òhá	Hundred
572.	ɔhɪnɪbandi (no Ak. word)	òhénébàndí	A fish, the ten-pounder
573.	èɕí-dᵘɪ̀à	òhɛ́	Gum copal; gum copal tree; a bead, of gum copal; an incense, believed to ward off evil spirits when it is burnt
574.	òhɪ̃ɛ̃́	òhɪ̃ɛ̃́	Poverty, need

575.	òhɪ̃ã́ˈfʊ́	òhɪ̃ã́ˈfó	Poor person, pauper
576.	ɔhínɪba	òhíníbá	Traditional (Ashanti style) sandals
577.	odʑqirá	òdʒʷɾ̀rá, òdʒ̀ɪ̀lã́	A festival, celebrated by the Otublohum and Ngleshi Alata sections of Accra
578.	kɛ̀sí	òkɛ̀sé	Fashion, chic, prestigious manner
579.	ɔkɔ́rí	òkɔ̀lè, kɔɔle	eagle
580.	ɔkɔmfʊ́	òkɔ̀m̀fó	(traditional) priest
581.	ɔkɔmfʊwa	òkɔ̀ŋfówá	Traditional priest in training
582.	ɔkɔ́ˈtɔ́	òkɔ́tɔ̀	River crab, Potamon
583.	ɔprɛm	òk͡pl̀ɛ́m̀, òk͡pl̀ɛ́ŋ̀	Cannon, bomb, explosive
584.	ɔpʊ́ŋ̀	òk͡pl̀ɔ̃́	Table
585.	ɔpɔŋkɔ (Mande punu)	òk͡pɔ̃̀ŋɔ̃́	Horse
586.	ɔkʊ̃rʊpɔŋ	òkl̀òpɔ̀ŋ̀, òkɾ̀òpɔ̀ŋ̀	Eagle
587.	ɔkúkɔ́ḿ	òkùkóḿ	Name of a variety of cassava
588.	ɔkúkubàŋ́ (a squirrel)	òkúkúˈbá	Name of a small animal
589.	kʊ̃nã́	òkʊ̀lã̀	The state of being widowed; a funeral custom, performed by a bereaved spouse
590.	ɔkʊ̀nãfʊ́	òkʊ̀lãfó	Widow, widower
591.	ɔkumabɔmɔfʊ	òkúmàbòmòfó	A large variety of cassava
592.	ɔkumbɔmmɔfʊɔ	òkúḿbɔ̀bɔ̀fóɔ́	A very poisonous green snake, the green mamba
593.	òkúá, òkᵘíá	òkʷàá	Farming, agriculture
594.	òkᵘìàfʊ́	òkʷààfóŋ̀ò	Farmer
595.	ɔmã́ŋ́fʊ́	òmã̀nfó	Relative, countryman
596.	ɔmaŋdʑina	òmã́ńjĺã̀, òmɛ́ɪ́jĺã̀	A shrine, either made of cement, similar to otutu, or consisting of trees surrounded by a wall
597.	ɛ̀mʊ̋	òmɔ̃́	Rice; small blue and white waist beads, for babies
598.	àpààfʊ́	òpàáˈfó	Day-labourer
599.	opete	òpéˈté	Vulture; soldier fish, squirrel fish
600.	òpɛ̀hénádì	òpɛ̀hénádì	Morning star
601.	pòkúpòkú (Fn)	òpòkú, òk͡pòkú	A fish, frigate mackerel
602.	òpúrów	òpĺòŋ̀	Any red squirrel, also the red-headed forest squirrel

603.	ɔ̀sábɨ̃ŋ̀	ɔ̀sáábɛ́ŋ́, sábɛ́ŋ́	Lightening, discolouration of skin due to bleaching, burns, etc.
604.	ɔ̀sàí	ɔ̀sàí	Eunuch
605.	ɔ̀sáńsání	ɔ̀sáńsá	Apathy
606.	ɔ̀sáǹsá	ɔ̀sáŋ́sá, ɔ̀sáḿsá	A large bird, the black kite
607.	ɔ̀sésɛ́	ɔ̀sésɛ́, sɛsɛo	A large tree
608.	ɔ̀sé	ɔ̀ʃé	Acclamation
609.	osii	ɔ̀ʃìí	Limp
610.	?ɔ̀sídʑá	ɔ̀ʃídʑá	State of being unmarried; spinister, bachelor
611.	?ɔ̀sídʑáˈfú	ɔ̀ʃídʑáˈfó	An unmarried person of either sex
612.	sísìbírí	ɔ̀ʃíʃíbĺíǐʃì	An animal, the honey rattel; bear
613.	?ɔ̀sóɔ̀dé	ɔ̀sóɔ̀dé	Name of a type of music
614.	ɔ̀sɔ́ˈfú	ɔ̀sɔ́fɔ̀	Christian priest, minister; title for a reverend minister
615.	súpurupù	ɔ̀súpɾúˈpú	River turtle
616.	ɔ̀tɛ́ǹtɛ́	ɔ̀tɛ́ńtɛ́	A kind of drum
617.	ètí	ɔ̀tí	Main point, as in a speech, a book
618.	ɔ̀tɪ̃ˈfú	ɔ̀tìàfó	Person sitting side-by-side, abreast with another, esp. in a canoe
619.	tírídààsì	ótírídààsè	Response to greeting “tirinkwa”
620.	tíríŋˈkʷɑ̃́	ótíríŋˈkʷɑ̃́	A greeting, of congratulation on safe arrival, safe delivery, escape from accident, death, etc.
621.	ɔtoko(a)akatá	otokotaka (no transcript.)	A small spreading tree or large shrub
622.	ɔ̀tɔ́	ɔ̀tɔ́	A food, of mashed yam, plantain or cocoyam mixed with palm oil
623.	ɔ̀tɔ́ˈfú	ɔ̀tɔ́ˈfó	Ghost of one who dies unnaturally, ie. Violently, in an accident, unexpectedly, or young
624.	ɔ̀tɕɪ̃ɑ̃́mɪ̃́	ɔ̀tʃàámí, ɔ̀tʃàámɛ́	Linguist, spokesman for a chief
625.	ɔtɕɪrɪbɛ̃ŋ	ɔ̀tʃérébɛ́ŋ́, ɔ̀tʃíríbɛ́ŋ́	Any of the several kinds of green snake; fierce snake, green-lined snake, emerald snake, green mamba; also African Beauty snake, striped form
626.	ɔ̀tɕɥáǹsɑ̃́	ɔ̀tʃʷàǹsɑ̃́	Drunkard
627.	ɛtɕɥitɕɥɛkrɔbɔ (Fn)	ɔ̀tʃʷìtʃʷákɾɔ̀bɔ́ɔ́	A fish, blanquillo
628.	?ɔ̀ɥírɛ́	ɔ̀wélè	Revenge, vengeance

629.	ʔàɥìrètɔ́	òwélètɔ̀ɔ̀	Avenging
630.	oɥiakɔtɔ	òwìákɔ̀tɔ̀	Fish eagle, palm nut vulture
631.	ɔ̀ɥìrèŋ̀fó	òwìrèŋ̀fó, òwìŋ̀fó	Sinner, breaker of taboo
632.	òwúrà	ówúlà, ówúrà	Title for a gentleman, Mister, sir; gentleman, man of substance
633.	ɔ̀jɔ́	ójɔ́	One good turn deserves another (obsolesce.)
634.	paa sʊ	pàásó	Add, do in addition
635.	pàí	pàá, pàé, pàí	Call upon, call upon by an appellation or nick-name, mention
636.	páí	pàí	Be upset, be angry at sb.
637.	pædʑa	pàdʑá	Lift with both hands, lift with effort (obsolesce.)
638.	m̀pa̰m̀pa̰ḿ	pa̰m̀pa̰ḿ	Crown of the head
639.	pampamsuadɪ	pa̰m̀pa̰ŋ́súádé, paprasuade	A type of fishing net
640.	pæ̰m̀pímḿ	pa̰m̀pí	Trap, snare; obstruction to progress
641.	pàpà	pàpà, k͡pàk͡pà	Fan
642.	mpʊ̀pàhʊ̋	pa̰pa̰ŋ́, pa̰pa̰ú	Towel
643.	àpásá (falsehood, lie)	pásá	Tell lies; gossip
644.	batakærí	pàtàkàlí	Smock of hand-woven cotton, as made in northern Ghana; war smock
645.	pàtækú	pàtàkú	An animal, the spotted hyena, a variety of “klaŋ”
646.	pætú	pàtú	A bird, the owl; the unexpected, sudden
647.	ʔpefee (or Eng. 'perfect’)	péfée	Perfectly, plainly, exactly; perfect, plain
648.	pírí	pl̀é	Make for, struggle for; scramble, struggle, quarrel over
649.	pesú	pèsú	Chicken coop
650.	pé	pé'í	Chisel
651.	pèsèmĩ́ŋ́kʊ̃́mĩ́ŋ́á̰	pèsèkúméɲá	Selfishness
652.	pì	pì	Indeed
653.	pḭá	pḭá̰	Push from below
654.	pìá	pìá	Bedroom, bed chamber
655.	pii	pìì	Many
656.	pìrá	pìlá	Hurt, injure; get hurt

657.	pené (groan with pain)	pîĩ	Suffer; torture, cause to suffer, mentally or physically
658.	pɽ̀áádúrù	pl̀áádúrù	An erect herb
659.	pràm	pl̀ãmā́	Courtyard
660.	pó, ??m̀pó	pó	Very, even, at all, indeed
661.	pùé	púè	Appear, be out, manifest; appearance, appearing
662.	sà	sà	Syringe, purge, administer an enema
663.	sà	sà	Castrate
664.	sá	sá	A cylindrical implement used in making fishing nets, to regulate the size of the mesh
665.	ɔsá	sá	Access road or path, to a farm or hunting grounds
666.	(n)sãs̄ɛ̄ŋ́	sààsɛ̄	A pot for collecting palm wine
667.	ǹsãbɽ̀ãŋ́	sàbl̀ā́, sàbɽ̀ā́	Appellation, nickname; a formal appellation corresponding to one's lineage or asafo name
668.	sakasaka	sàkàsàkà	Disorder, roughness
669.	sãm (figures made by cutting in relief)	sàmā́	Designs, painted on canoes, clothing, etc.
670.	samanadzɪ (Fn) (hell)	sā́mà̃à̃dé, sā́ˈmā́ā́dé	The world of ghosts
671.	sæ̀míná (Arab. sabun)	sàmā́l̀ã, sã̀m̀l̀ã	Soap
672.	sætɕimadɪ (Fn)	sā́ŋ́kũmā́dé	A fish, small sea-perch
673.	àsáńtɾ́òfĩ́	sáńtɾ́ófĩ́	A bird, the long-tailed nightjar
674.	sáɲãã́	sáɲãã́	A metal; silver
675.	?sànĩ́	sā́ŋ̀è	Be relieved, feel better
676.	ɔsã̀ŋ̀kú	sã̀ŋ̀kū́	Any keyed or stringed musical instrument: thumb piano, organ, piano, accordion, guitar, violin, harp
677.	asapaaté	sàpàté, sàpàtí	Assistant to a traditional priest or priestess; leader of a religious group; member of a group, peer, righthand associate
678.	sra	sl̀á, sɽ̀á	Visit with a purpose; give the second round of drinks at a customary function
679.	sárísú bàɲ̀tɕì	sàrésò-bàǹtʃ́í	A wild, inedible kind of cassava

680.	ɔsátàdᵘíàà	sátáˈdúá, tátádùá	A shrub, with a tough flexible wood; name of a variety of cassava
681.	ɔsàɥèé	sàwìé	Sponge chewed and dried
682.	sétɕɛ	séké	anchor
683.	sɛ́ŋ̀	sɛ̀ŋ̀	Hang; kill by hanging or crucifixion
684.	ɔsɛ́ŋ́	sɛ́ŋ́	Pot
685.	sadé	ʃàdé	Blessing, luck, good fortune; destiny, fate
686.	sàdíbúá	ʃàdébóá	An animal, hedgehog or brush-tailed porcupine
687.	sɨ̀áw	ʃáó	Cluster, bunch e.g. of bananas
688.	ʔaɕɥɪrɪw	ʃɛ̃́	Sugar cane
689.	sika	ʃìká	Money; precious metal
690.	sikasika (Fn)	ʃìkáʃìká	Fish, golden-headed sea bream
691.	sìw	ʃìù	Suppress; replace, displace; be bogged down, get stuck; sink
692.	ɕɥédí	ʃʷédé	binoculars
693.	ɕɥɛɕɥɛ́	ʃʷéʃʷɛ́	A fresh water fish
694.	ɕɥie	ʃʷìê, ʃʷìé	Spill, pour something; fall, pour; to start, commence; set out for a destionation; put into a sequence, etc.
695.	ɕɥíḿ	ʃʷíḿ	Fast, in a flash
696.	èsɑ̃́	sísà	Ghost; shade of one who died a natural death, in sickness or old age
697.	sò	só	Hit the back of an opponent's hand in a boy's game
698.	sʊ̀pá	sópà	Insult
699.	sʊ̀nʊ̀	sòlò, sòrò, sòlè, sèlè	Differentiate; be different
700.	èsʊ̃́	sɔ̃́	Blame; responsibility
701.	sɔ̀rí	sɔ̀lè	Worship, pray to; baptize
702.	sʊ̃ḿ	sɔ̃́mɔ̃́, sʊ̃mɔ̃́	Work for someone as a live-in house servant; serve, work to repay someone's debt to the employer
703.	sɔ̀w	sɔ̀ɔ̀	Catch from below; catch, with a flourish; accept, receive, appreciate
704.	súsɔ́ẃ	sɔ́sɔ́ó	A digging stick, with a wooden handle and metal blade
705.	srawa	sɾˈáwá, sɾ̀âwá, slˈáwá	Lightening; electricity
706.	sʊrʊŋkʊ	sɾ̀ɔ̀ŋ̀kʊ̃́	Extraordinary (obsolesce.)
707.	èsú	sú	Nature, character, colour, appearance

708.	sùá	sùá	Carry a heavy load (obsolesce.)
709.	sùbáŋ́	súbáŋ́	Nature, character, habit
710.	àsùmànfú (owners of charms)	sùmã̀ŋ́fó	A sea fish (Semantic shift?)
711.	sumpi (Port. chumbo)	sũ̀mũ̀ĩ́	A metal, lead; lead weights for fishing nets
712.	sũm	sũné	Pillow
713.	sùsúẃ	súsù	Measure, calculate; think, imagine, assume
714.	sũńsũḿ	sùsùmã́	Spirit, soul, shade; subconscious mind, out-of-body experience
715.	nsú	sũ̀ũ̀	Drown, submerge (semantic shift)
716.	tàà	táábó	Gizzard
717.	káfɾàtɕɛ̀ (Haus. gafara)	tàfĺàtʃɛ̀	Excuse me, pardon me
718.	tã̀ŋ́	tã́ŋ́	Impurity, nastiness
719.	ǹtáḿpé	táàŋ͡kpèé	Sisal, a beach plant; a long heavy rope or chain
720.	tã̀ŋ́tã́ŋ́	tã́ŋ́tã́ŋ́	Impurities
721.	tààtáá	tàtáá, tàtɾá	With hesitant steps, as of children learning to walk
722.	ʔtápòrí	tàpòlí	A small wooden hourglass shaped implement for grinding vegetables, used with 'ka', grinding bowl
723.	ʔtìtìtìtì	tètèètè	Time immemorial
724.	tɛkrɛmã́ (tongue)	tɛ́kɾ̀ɛ̀má (no nasal)	Cantor in "otu" singing (semantic shift)
725.	ɔ̀tĩ̀m̀pɔ̃́ŋ́ (main road)	tɛ́ḿpɔ̃́ŋ́	Path, way (slight semantic shift)
726.	tɛ̀w	tɛ̀ò	Transplant, plant trees
727.	tètɾɛ́ɛ́	tɛ́tɾɛ́ɛ́	Flat, wide, broad
728.	tì (apɔ)	tì (apɔ)	Muscular, well-built (restricted usage)
729.	tĩ̀ã́	tĩ̂ã̂	Save
730.	tìàfĩ́	tìàfĩ (no nasal)	Toilet, latrine
731.	tĩ́ã́tĩ́ã́	tĩ́ã́tĩ́ã́, tĩ́ã́ã́	Skinny
732.	tìpɛ̃́ŋ́, tìpɛ̃̀ŋ́fú	tìpɛ́ŋ́, tùpɛ́ŋ́ (no nasal)	Peer, equal, mate

733.	tɪ̀tɪ́	tɪ̀tɪ́	Scratch
734.	titiriw (main, principal)	tí'tɾí	Important, special, particular
735.	tiw	tìù, tùù	Follow, pursue, catch up with; bother about take an interest in, take trouble over
736.	ntùkùtá (?Haus. takalmi)	tòkòtá	Sandals
737.	tòǹtó	tòtó, tɔ̃ǹtɔ́	Name of a variety of yam, that matures very slowly
738.	túródóó	tɾódóó	Plain, straightforward
739.	tɔ̃ŋ̀ŋ̀	tɔ̃ŋ̀ŋ̀, tɔ̃ɔ̃	Off, away
740.	ǹtʊ̃ńtʊ̃ḿ	tɔ́ŋ́tɔ́ŋ́, tɔ́ŋ́tɾɔ́	Mosquito
741.	ètɔ́ẃ (lump)	tɔ́ó, tɔ́	bunch
742.	tɾútɾú	tɾótɾó	Smooth and slippery
743.	tɕètɕèkú (Fn)	ʧètʃèkútʃèkú	A fish, triggerfish
744.	tɕɛ́	ʧɛ̀	Last, be long lasting; spend time, delay
745.	àtɕɪ̀ɪ́	ʧɪ̀ɪ́	Swagger
746.	tɕɪ́ńtɕɪ́ńɪ́a	ʧíntʃíníí (no nasal)	By all means, at all cost
747.	tɕítɕè-pè-àwàrí	ʧítʃépɛ́àwàlé, ʧítʃépɛ́àwàré	The planet Venus
748.	tɕʊ̀ɪ̃m	ʧʷɛ̀m	All together
749.	tɕʊ̀ɪ̃ǹɪ̃sɪ́ŋ́	ʧʷɛ̀ŋ̀ʃɪ́ŋ́, ʧɔ̀ìʃɪ́ŋ́	A type of medium-sized drum; the music played on it
750.	tʰɪ̀á	túà	Become strong; attack; rape; punish, esp. by inserting hot spice into the anus; drink
751.	tʰɪ̀é	túè	Gush out
752.	ǹtʊ̃ɪ̀ŋkʊ̃ḿ	tʊ̃ɪ̀ŋgʊ̃ḿ, tʊ̃ɪ̀ŋgʊ̃ʊ́	New palm wine, palm wine from a freshly felled tree
753.	tʊ̃ɪ̀mpɑ́ŋ́	tʊ̃ɪ̀ŋ͡kpɑ́	Bottle, liquor bottle
754.	tʊ̃ɪ̀mɪ̀m	tʊ̃ɪ̀ŋ̀ŋ̀	Dark, black
755.	tùtúẃ	tùtú	Ache
756.	?tʊ̃ɪ̀tʊ̃ɪ́m	tùùtùù, tùù	Darkness, dark of the evening
757.	ɔwæ̀dúrú	wàdúrú	Mortar, for pounding fufui
758.	qiriqiriwa (Fn)	wìí'wíá, wìíjú'wá, jùújú'wá	A fish, golden-headed sea-bream, when small
759.	wùsú	wósò, hósò	Shake

760.	wɔfâ (mother's brother)	wɔfâ	Uncle, father or mother's brother (semantic extension)
761.	wɔfâàsí	wɔfâàsé	Nephew, niece
762.	qírídúú	wúrúdúú, wúlúdúú	Cool; safe, secure; quiet; bland; fluent
763.	jìjí	jìjí	Reason, remonstrate
764.	jómã̀	jóómà	Camel

Appendix 5: List of Akan loanwords in Dangme

(Approximately 329 suspected Akan source entries in Dangme)

NO.	AKAN	Dangme	GLOSS
1.	àpàplɛ̃ànsɑ̃́	àbàblàsɑ̃́,àpàplàsɑ̃́, àbɛ̀blɛ̀sɑ̃́	A food made of milled roasted corn cooked in palm soup
2.	àbàsá	àbàsá	Yard, arm-spread; fathom
3.	àbààwá	àbàwá, àblàwá	Servant
4.	ɛbɛ́	àbɛ́	Proverb
5.	àbɛ́bú	àbɛ́bù	Proverbial, formal language
6.	abɛti	àbɛ̀tɪ̃́; àbɛ̀tí	A very tall mature palm tree
7.	abradɪ	àblàdè, òdéhē	A royal, noble; a respectable person
8.	abaawa	àblàwá, màwá	Maid servant, also slave or servant of either sex
9.	àbìrìwá	àblɛ̀wá	Old lady
10.	abɪrɪwabɛwʊ	àblèwábɛ́wó	A measure of drink, about a quarter of a pint. It refers to the bottle of Atwood's medicine
11.	ɔbùn̄sɑ̃́m	àbòsám̀, àbùsám̀, abosɪ́ɪ̃́m̀, àbùsɪ́ɪ̃́m̀, àbùsɪ́ɪ̃́mɪ́, àbosɪ́ɪ̃́mɪ́	Devil
12.	abɔntore (no transcript.)	àbɔntole	Vine rubber
13.	Ɛ̀bùdɑ̃́	àbùdɑ̃̀	Foolish man; a hen-pecked man, a man who does women's chores
14.	ɔdàbɔ́ (antelope)	àdàbɔ́, òdàbɔ́	Animal, kind of
15.	àdàqìrìkɔ̀sɔ̀	ādàwlikɔsɔ	Iron bell
16.	àdí	àdé	Creation, the created world
17.	àdíˡbɔ́	ādébɔ̀	Creation, nature
18.	àdéŋ̀ˡkũḿ	àdekum	A kind of music and dance, played in the coastal areas.
19.	àdùwá	àdòwá	A kind of music or dance form, played mainly by women in coastal areas.
20.	àdùwá	àdòwá	royal antelope

21.	??edufa (Fn)	àdúfá	A medicine, made by grinding herbs and formed into balls before drying
22.	ædìfùdí	àdùfùdé	Windfall, sth. received without working for it; greed, wanting things cheap
23.	ædúòkú	àdùòkú	A nickname for the rat
24.	ɔfā́, àfā́	àfā́	soothsaying
25.	wɔ̀fààsí (no nasal)	āfȁ̀sé	Matrilateral relative: sister's child of a man; matrilateral cousin
26.	àfàsíẃ (Ewe?)	àfàsé, àfàsó	water yam
27.	àɕɥìɕɥɛ́	àhìhʷíɛ́, àhùhúɛ́, àjìhúɛ́	Mirror
28.	æhṹḿ	àhũmì	Storm, gale
29.	??æwúŋā́dí	àhű̀ŋā́dé	Sale by auction
30.	æɥísɪ̄ā́ā́	àhũsā́; àhű̀sā́	Orphan, orphanage
31.	àjá	àjá	A man who is sponsoring a dipo candidate or has a fiancée among them; a masculine name
32.	àɕɥíríẃ	àhléú	Sugarcane
33.	ædʑìnā́	àdʑìnā́, àdʑȉlā́, àdʑȓā́, àdʑlȁ̄ā́	Meeting, private consultation, conference
34.	ædʑìnàmʊ̀á	àdʑlàmʊ̀á	Domestic cat
35.	ædʑɥàmā́ń	àdʑùȁ̃mā́	Prostitute; fornication
36.	ædʑɥúmā́	ādʑʊ́mā́; ɛdʑʊ́mā́	Work, labour
37.	ædʑɥúmā́dʑā́ń	àdʑúmā́dʑā́ī́, àdʑʊ́mā́dʑā́ŋ́	Unprofitable labour, a wild goose chase; in vain
38.	àkàsȁ̃wá	àkàsàwá	Cymbal
39.	àkàtàɥìá	àkàtàwiíá	Umbrella
40.	ŋ̀káˈtí	ākáté, káˈtíɛ́	Groundnut
41.	àkæ̀ǽˈtíá	àkèétiā, àkȉétīa	Chimpanzee, baboon
42.	??ækùròwá	àklòwá	village
43.	áˈkó	ákō	A bird, parrot
44.	kʷædú	àkɔ̀dʊ́, kɔ̀dʊ́	Banana
45.	àkúkɔ́dʑā́ń	àkɔ́kɔ́dʑā́ī́	A kind of domestic fowl that often has very few feathers
46.	àkúkɔ́bɛ́ˈsā́	àkɔ́kɔ́bɛ́sȁ̃	A climbing or straggling thorny

			shrub
47.	àkɔ́ńnɔ́	àkɔ́nɔ́	Lust, strong desire
48.	kɔ́tɔ́kɾ́ɔ́	àkɔ́tɔ́klɔ́	Hooked drumstick; a wooden fork used in thatching
49.	??èpá	à͡kpá,	Trap for catching animals
50.	àpàtɕí	à͡kpàké	Crutch; any disease that renders the victim lame
51.	ɔ̀pàpú	à͡kpà̰͡kpó, à͡kpā͡kpó	Male goat, billy goat, (fig.)sex maniac
52.	àpḭ́ḿ	à͡kpé	thousand
53.	æ̀kùtú	àkṵ̀tú, àkṵ̀tṹ; àkùtú	Sweet orange
54.	àmà̰ŋkà̰ńḭ́	àmà̰kà̰ńḭ́, àmà̰ŋkà̰ńḭ́, mà̰ǹkà̰ńḭ́, mà̰kà̰ńḭ́	Cocoyam, taro
55.	àmà̰ńḭ́	àmà̰né; àmà̰nè	Death, trouble, calamity
56.	àmà̰ǹ̄hṹ	àmà̰nèhlṹ, àmà̰nèhṹ	Affliction, suffering, unpleasant occurrence
57.	àmà̰ǹ̄ɛ̃́	àmà̰nìɛ́	Story, case, event, matter
58.	??àpæ̰̀ntú	ámútṹ	Twin plantain, plantain fingers joined down the side
59.	??ànà̰ǹsì	ànà̰sè,	Disease, shingles
60.	ænḭ́háẃ	ànḭ́háó	Laziness
61.	ànṵ̀kʷárí	ànòkʷádé	Fact, truth
62.	anʊkʷarɪ	ànɔ̀kuálé	Truth, fact
63.	ànṵ̀kʷárí	ànɔ̀̃kúalé	True, correct; truly, indeed
64.	æpítí	à͡kpítí; àbìtì	A plantain cake, steamed or baked.
65.	pàá	àpàá	Hire, labour, job; wages
66.	??ámṕpà̰ńḭ́	ápānḭ́	Edible species of bat, esp. rosette bat, Gambian fruit bat
67.	??àpààwá	àpàwá	Flat round wooden tray, carried on the head, for displaying wares
68.	àpḭ́ḿ	àpíḿ	A kind of plantain, with thin fingers
69.	àm̀pèsí	àpèsí	Boiled green plantain
70.	àbírétɕí	àplétʃí	Goat
71.	àsàbɾ̀àní	àsàbl̀á; sà̰blà̰í	Appellation, title
72.	àsàfʊ̀	àsàfò	Group, company, congregation
73.	àsàrì	àsàlè	Personal name
74.	asɛw (no	asɛu	Misfortune

	transcript)		
75.	asrɛ (no transcript.)	àsìlé, àsl̀é, àslɛ̀ɛ́	comb
76.	àsímæ̀sí	àsímã̀sí	So-and-so, what's-his-name, somebody
77.	??ɔ̀sr̀áàfʊ́	áslàáfó	soldier
78.	??ǹsr̀à-bã́ń	asra, sala	Camp, military camp
79.	??ǹtáfr̀ɛ́	àtéplɛ̀ɛ́	Cockroach
80.	??àtf̃ã́	àtf̃ã̀, àtsf̃ã̀	Cashew nut tree; cashew nut
81.	atrɔmbaa (no transc.)	àtlɔ̀mbàá, atlombi	A seed
82.	æ̀tírìdìí	àtr̃ìdìí, àtĺìdìí	fever
83.	æ̀tᵑm̃ã́	àtũ̀ã́	Rebellion, defiance
84.	??àtɕɥ̀ìrí	àtsré; àʧù̀lé	Ladle
85.	æ̀tùpã́ń	àtũ͡kpá	Bottle
86.	æ̀tùm̀pã́ń	àtũ̀pàní	A large talking drum
87.	awaa	awaaáwà	A kind of music and dance played in coastal areas
88.	aɥındadı	awendade	A plant
89.	àɥ̀ìrɛ̀hó	àwɛ̀rɛ̀hó, àwīlɛ̀hó, àjùrɛ̀hó	Grief, sorrow, sadness
90.	??jààwá	àjáwá	A large metal pan, tray or box
91.	àjìfʊ́rɔ́	àjɛ̀fló, àjɛ̀flóò, àjìfló, àjìflóò	Bride, newly married girl
92.	àjífr̀ɛ́	àjífálé	An adultery fine, paid by a wife's lover
93.	bàbàsʊ̀	bàbàsò, bàbàzò	Venereal disease, gonorrhea
94.	??bàsàà	bàsàà	Disorderly, haphazardly, confused, reckless
95.	bàsàbàsà	bàsàbàsà	Carelessness, lack of respect, lack of self-discipline and self-control; bad, disorderly, uncultured, chaotic
96.	bf̃ḿ	béḿ	Innocence
97.	àbèdᵑm̀á	bèʤùá	A palm tree, when slightly taller than tamlaa and still untrimmed
98.	bèrèdᵑm̀á (no transc)	bèlèdùá	A tall straggling shrub

99.	ʔbɛŋ	bɛŋ	bayonet
100.	bísíbàsàà	bísíbàsàà	Disorderly, in a disorderly manner
101.	bìrèẁ	blèò	Slowly, carefully, gently
102.	búróɲà	bĺôŋã̀; blóòŋã̀	Christmas, the Christmas season
103.	bòn̄sù	bòsò	Whale
104.	ɔbɔ́ˈfʊ́	bófō	Messenger; angel; helper at a critical time
105.	bùɹɔ̀fʊ́	bl̀ɔ̄fóɲò; blɛ̀fónò	European, foreign
106.	bɔ̀kɔ̀bɔ̀kɔ̀	bɔ̀kɔ̀bɔ̀kɔ̀	Gentle, slow, calm; gently, slowly
107.	bɔ̀kɔ̀ɔ̀	bɔ̀kɔ̀ɔ̀	Slow, calm
108.	??bú	bū	Listen, obey, be respectful
109.	bu	bù	proclaim
110.	??bú	bù	Count, work out a problem, check
111.	??bʊ̀á	búá	Gather, collect, assemble
112.	??bʊ̀á	búá	Help
113.	??bʊ̀á	bʊ̀á	Lie, pretend; do intentionally, decide to do; take lightly, joke about sth; judge, determine
114.	bʊ̀tʊ́	bútʊ̀	Capsize, be overset, overthrow, collapse
115.	??dáá	dáá	Every day; always, often; forever
116.	dæ̀æ̀bí	dààbí, dàbí, dɛ̀bí	Excl. no, negative response, signifying dissent, disagreement
117.	dæ̀bídà	dàbídà, dɛ̀bídà	No, emphatic negative response
118.	??dàdààdà	dàdà, dādā	Past times, ancient times
119.	dàdààdà	dàdààdà	Of old, long ago
120.	dàdí	dàdé	Iron, metal; catlass, sword; money (sem. extension)
121.	dàdìsɛ́ŋ	dàdèsɛ̋ɛ̃̋, dàìsɛ̋ɛ̃̋	Iron pot
122.	??dàní	dɑ̋ɑ̃̀	Change, turn into, metamorphose
123.	??àdáˈká (Port.?)	; dákà	Box, chest, trunk; square or rectangular shape; lie, liar
124.	ɔ̀dáˈsí	òdásē, dásē	Witness
125.	??dáńtá	dátá	Belt, girdle
126.	dɪ̋ńń	; dɪ̋ɪ̃̋	Reserved, reluctant to talk, habitually quiet; quietly, silently
127.	dɔ̃̀ŋ̀kɔ́	dɔ̀ŋ̀kɔ́, òdɔ̀kɔ́	slave

128.	ɔfa̋	fa̋	Half, piece
129.	fɛ́ẃ	fɛ́ó, fɛ́ú	Beauty
130.	fìrí	fl̀í	Buy or sell on credit
131.	m̀fɔ̀ní	fɔ̀ní, ɔ̀fɔ̀ní	Picture, photo
132.	fɔ́	fɔ́	Guilt
133.	fùfú	fùfùí	Food, fufu, obtained by pounding boiled yam, cassava, or plantain (or a mixture) in a mortar
134.	fusuo (no transc.)	fùsúo	A large antelope, waterbuck
135.	??fítáá	fútaa	Very white; dazzling white
136.	fùtú	fútŕú, fòtĺó	Treasure
137.	??fùtú	fútù	Mix; be misty, foggy
138.	??ædz̩a̋ń	gâî;gɛ̀ɛ̋; kɛ̀ɛ̋	bow
139.	dz̩ụòŋ̀kú	g͡bòŋ̀ú	Thigh
140.	??gúá	gua, gwa	assembly
141.	gua	gúa	Gather
142.	gʷúámɴ́	gʷúámɴ̄	A gathering
143.	gùàẁ	gwaò	Whip, beat
144.	háẃ	hàò	worry
145.	??wòsó	hósò	shake
146.	??hu	hú	Shout someone down; blow, of wind
147.	dz̩ụámɴ́ (no transcr.)	ʤūāmì	Inside the market
148.	dz̩ụfi̋ŋ̀	ʤù̇ɛ̀	Reason, think
149.	ka̋	ka̋	Swear, invoke
150.	ka̋	ka̋	Turn fufu as it is pounded
151.	kàí	káì,	Remind, remember, recollect
152.	kápŕé (Eng. copper)	kápl̀ɛ́	Any coin of very low value
153.	kato (no transcr.)	kà̋tó	Shin bone
154.	tɕínã́mɴ́	kénã́mi̋	Fried fish
155.	kese??	késé	Tell

156.	kó	klésìà	Wild date palm
157.	krɔɔ (no transc.)	klɔ̃ɔ̃, kʷlɔ̃, kùlɔ̃	table
158.	??kùtú	kótò	Bend over; roll around flat on the ground
159.	??kómḿ	kóóm	Alone, quietly
160.	??kòtòkú	kòtòkú	Sack, pocket
161.	kòntr̀òm̀fì	kòtròfì	Chimpanzee
162.	??kɔ̀kɔ̀bú	kɔ̀kɔ̀bó	Mongoose; fox
163.	kɔ̃ǹkɔ̃ǹsā́	kɔ̀kɔ̀sá	Slander; damaging report
164.	kɔ̀kɔ̀sæ̀tɕì	kɔ̀kɔ̀sètʃì	A title for the vulture
165.	kɔ̀kɔ̀tɛ̀ (Fn)	kɔ̀kɔ̀tɛ̀	Sea catfish
166.	kɔtɔ́ˈkɔ́	kɔ̀tɔ́kɔ́	Crested porcupine
167.	??pápá	k͡pák͡pá	Goodness, hospitality, correct thing; good; well, successfully, truly, indeed, really
168.	ɔ̀pàpú	àk͡pā̀k͡pó	Male goat
169.	??pàtá	k͡pā́tà̄	Pacify, mollify, settle a misunderstanding
170.	àpæ̃ǹtú	k͡pā̀tū́	big-fingered plantain. Often used for fufu
171.	pɛ̀pɛ̀ɛ́	k͡pɛ̀k͡pɛ̀ɛ́	stinginess
172.	ɛpra	k͡plaa	armadillo
173.	pòkúpòkú (Fn)	k͡pókú, k͡pók͡pókú, k͡pók͡pĺókú, k͡pōk͡plōkú, pópókú	A river fish, tuna
174.	kʷàsìá	kùàsìá	A foolish, stupid person, a common insult
175.	ŋ̀kṳ̃níḿ	kṳ̃ńḿ, kṳ̃ńḿḿ	Victory, success
176.	??kùsɛ̀	kùsìɛ̀	God forbid!
177.	??kusuu	kùsùù	Dull, of weather
178.	ŋ̀kóńtóḿpó	kútúḿpɔ́, kútúpɔ́	Undermining, intrigue (Semantic shift)
179.	mmàá	màá, àmàá	Clappers used for musical time keeping, made of slip bamboo; nickname for a goat
180.	mã̀ńḿ	mané, manê	Send sth. via a messenger; order sth.
181.	??mā́ḿpã́ḿ	mā́pām̄	Monitor lizard

182.	m̀mààwá	mã̀wá, àblàwá	Servant
183.	m̀màrá	ml̀á, mlàá	Law
184.	??ḿmó	mó	Of congratulations, well done!
185.	m̀mùsú	mùsú	Abomination, taboo, ill luck
186.	m̀mɔ́bɔ́	mɔ́bɔ̀, mɔ́mɔ̀	Pity, sorrow
187.	m̀mɔ̀bɔ̀m̀mɔ́bɔ́	mɔ́bɔ̀mɔ́bɔ̀	Pitifully, sadly
188.	m̀mɔ́dḯń	mɔ́dé, mádé, mɔ́dí	Effort, esp. successful effort
189.	??mṹ	mṹ; mlùkú	Whole
190.	??nan	nã̀nē, nã̀nè	Leg, foot; hind leg of an animal
191.	??ònḯ	nī̄	Person
192.	òbúbúáˈfṹ	óbúbúafṍ	Person crippled by an accident
193.	ɔ̀dáˈsí	òdásē	Testimony, witness
194.	ɔ̀díˈɕí	òdéhē, àblàdè	Person of royal lineage, noble
195.	ɔdodobɛŋ	odododbéŋ	A tall grass, reed
196.	ɔ̀dɔ̀ǹnó (Mande?)	òdònó	Hour-glass drum
197.	??ɔ̀hã́	òhã́	Flying squirrel
198.	òhĭ̀ã́	òhĭ̀ã́	poverty
199.	òhĭ̀ã́ˈfṹ	òhĭ̀ã́fṍ	Poor person
200.	òʤùmã́	òʤùmã́	Umbrella tree
201.	ɔkrɔɔ	òklɔ̃̀ɔ̃́; òkplɔ̃̀ɔ̃́	Table
202.	ɔ̀kɔ́ˈtɔ́	òkɔ́ˈtɔ́	A small greenish river crab
203.	ɔ̀kɔ̀m̀fṹ	òkùm̀fó	soothsayer
204.	ɔkumbɔmmɔfʊɔ	òkúḿ-mɔ̀mɔ̀fūɔ	The poisonous twig or vine snake
205.	ɔ̀pɛ́ˈsɛ́	òpèsé	Brush-tailed porcupine; hedgehog
206.	ɔ̀̀púró	òpléú	squirrel
207.	ɔ̀pr̀èmṹ	òplèmḯ	Cannons, heavy artillery, very big guns
208.	ɔprɛtɛ (no transcr)	òpl̀étɛ̄	A Klama drum, beaten with the hand
209.	?ɔsɛɛ	osɛɛ	God
210.	osisibisi	òsísíblísì, òsísíbìsí	Honey rattel, bear, wolf
211.	ɔ̀sɔ́ˈfṹ	òsɔ́fṍ	Priest (christian)
212.	??ɔ̀tɔ́	òtɔ́	A ritual food made of mashed yam or other tuber mixed with palm

			kernel or palm oil.
213.	ɔtɔˈfú	ɔ̀tɔ́fɔ̄	Accidental death; ghost of one who died an accidental death
214.	ɔtɕɛ̀ǎˈmɪ́	ɔ̀tʃɪ̀āˈmɛ́, ɔ̀tʃɛ̀ǎ́mɪ̄, ɔ̀tʃɛ̀ǎ́m̄, ɔ̀tʃɪ̀ǎ́mɪ̄	Spokesman, linguist
215.	??ɔtɕìrɛ̀mǎ	ɔ̀tʃɪ̀rɛ̀má	A short drum (Semantic shift)
216.	owuɲʷuka (no transcr.)	ɔ̀wùɲṹkā	An evergreen shrub
217.	pàpà	pàpà	Fan
218.	pàpàhṹ	pàpàmí	Towel
219.	pætú	pàtú	owl
220.	??pépɛ́ɛ́pɛ́	pépɛ́ɛ́pɛ́	Exactly, precisely, orderly
221.	pɛ̀sɛ̀mɪ́ŋ́kṹmɪ́ŋ́ǎ	pɛ̀sɛ̀kúmíŋ́ǎ	Egotism, self-centredness
222.	pàtækú	pétɛ́kú	Hyena
223.	ɔbɪ̀ráˈfú	plàáfɔ̄	State executioner
224.	powa	pòwá	A bead
225.	??sá	sá	Draw water
226.	sæ̀ɲ̀kú	sǎ̀ɲ̀kṹ	piano
227.	sìàdíbúá	síadébóa, sìalèbúa	hedgehog
228.	sìká	sìká	money
229.	ǹsékúró	sìékú, sékú	Slander, gossip
230.	sìsí	sīsí	Cheat
231.	??sra	sɪ̀rá, sl̀á, slàá	Visit; watch, be alert, vigilant
232.	èsú	sú	Character, habit, behaviour, nature
233.	sùbǎ́ń	súbǎ́ī́	Character
234.	??sùsú	súsù	Think about, measure, imagine
235.	súńsˈúḿ	sūsūmá	Spirit, image
236.	??ta	tá	Patch
237.	??àtàdí	tàdé	Clothing to cover the upper part of the body
238.	??tǎ́ń	tǎ́ī́, tǎ́ŋ́	Unpleasant, ugly
239.	tìnǎ̀ àsì	tí nàsè; tí dàsè	Response to ‘tlikua’
240.	tɪ́ǎ́ǎ́	tɪ́ǎ́ǎ́	Thin and long, slim, narrow
241.	tɪ̄ɪ̄	tɪ̄ɪ̄	Straight, directly
242.	??tìtì	tìtì	The past, ancient times

243.	títíríẃ	títlī, títrī	Mainly, chiefly, especially
244.	tírí ŋkʷā́	tlí kū̄ā̄	Expr. Of congratulations
245.	??ætᶣìá	tóá	Attack (Semantic shift?)
246.	tɕqì̀ǹ̀sī́ń	tōìsī́ń	A kind of drum and its music, used for chiefs
247.	tɔm	tɔ̃́m, tɔ̃́n	Screw pine
248.	?ètú	tū́	Gun, shooting
249.	wáwá	wáwá	A tree
250.	?wʊ̀sʊ́	wósò; hósò	Shake
251.	wɔ̀fà	wɔ̀fà	Maternal uncle
252.	wɔ̀fàsí	wɔ̀fàsé	Maternal uncle; niece or nephew, child of a man's sister

Appendix 6: Ga war song

This is an Asafo song sung when feud or dispute arises. It is sung to warn the opponents or enemies of the preparedness and might of the Asafo member coming into the 'war'.

	Song	Transcription
1.	Agya Yaw eeei, Yaw o ya! Father Yaw, Yaw! (Crying out Father Yaw's name!)	[adʑa jaw eeei jao o ja]
2.	Agya Yaw eeeei, Agya Yaw eeei! Father Yaw, Father Yaw! (Crying out Father Yaw's name)	[adʑa jaw eeei adʑa jao eeei]
3.	Obi a-kɔ-fa biribi a-ba, Yaw oo, Yaw ooo eya! Somebody PERF-go-bring something PERF-come, Yaw oo, Yaw ooo! Yaw, somebody has caused a problem!	[Obi akɔfa biribi aba jao oo, jao oo eja]
4.	Agya Yaw eeei, Agya Yaw a-kɔ-fa manso aba ooo! Father Yaw, Father Yaw PERF-go-bring litigation! Father Yaw has caused litigation!	[adʑa jao eeei adʑa akɔfa mãnso aba oo]
5.	Yaw eeei, Yaw eeei! Yaw, Yaw! (Crying out Yaw's name!)	[jao eeei jao eeei]
6.	Biribi Akyiampɔn twa gidi gandan! Something Acheampong crosses gallantly! We are gallantly marching pass our opponents/enemies to scare them!	[biribi atɕiampɔn tʧʷa gidi gandan]
7.	Biribi Akyiampɔn twa gidi gandan!	[biribi atɕiampɔn tʧʷa gidi gandan]

Something Acheampong crosses gallantly!

We are gallantly marching pass our opponents/enemies to scare them!

8. Agya Yaw eeei, Yaw eeei! [adʑa jao eeei jao eeei]

   Father Yaw, Yaw!

   (Crying out Father Yaw's name)

9. Yɔɔ miafo eeei, Yaw eeei! [jɔɔ miafo eeei jao eeei]

   Retreat, Yaw!

   Yaw, the person who retreats!

Appendix 7: Dangme war song

The War Cry of the Warriors of the Kudzragbe Division of the Ada Traditional Area
sing during the Ada Asafotufiami Festival and also mainly after the swearing of oath of allegiance to the Paramount Chief and the President of the Ada Traditional Area of the Greater Accra Region, Djetse Nene Abram Kabu Akuaku III.

	Song	Transcription
Call	Yɛn anim ogya ee, ogya ee (asase)!	[jɛn anim odʑa ee, odʑa ee (asase)]
	There is fire in our eyes, fire [landlord]!	
	We are seriously ready to attack (in the battle)!	
Response	Ee, ogya ee!	[ee, odʑa ee]
	Yes, fire!	
	Seriously ready for war.	
Repeat	Ee, ogya ee!	[ee odʑa ee]
	Yes, fire!	
	Seriously ready for war.	
	Ogyae (ne) su!	[odʑa ne su]
	The fire is set (lit)!	
	Ready.	
	Ogya oo!	[odʑa oo]
	Fire!	
	Serious.	
Call	Asase!	[asase]
	Land (The Landlord/Owner)!	
Response	Hee!	[hee]
	Here am I!	
Call	Asase!	[asase]
	Land (The Landlord/Owner)!	
Response	Hee!	[hee]
	Here am I!	
Question	Wobɛyɛ dɛn?	[wobɛjɛ dɛn]
	What will you do?	
Action	Wazo, wazo, wazo!	[wazo wazo wazo]
	(Stepping of feet on the ground to indicate readiness!)	
Call	Pediatɔ!	[pediatɔ]
	The name of the Chief Warrior/Warlord/Captain/Leader!	
Response	Hee!	[hee]
	Here am I!	

Call	Peditɔ!	[pediatɔ]
	The name of the Chief Warrior/Warlord/Captain/Leader!	
Response	Hee!	[hee]
	Here am I!	
Question	Wobɛyɛ dɛn?	[wobɛjɛ dɛn]
	What will you do?	
Action	Waya, waya, waya!	[waja waja waja]
	(Shaking the chest and weapons very vigorously (bravery)!)	
Action	Waya ee!	[waja ee]
	(Warriors raise their ammunitions/weapons singing!)	
	Yɛn nie oo!	[jɛn nie oo]
	Here we are!	
	Yɛn agya nie oo!	[jɛn adʑa nie oo]
	Here is our father (Leader/Captain/Warlord/Chief)!	
	Yɛkum a yɛnsuro!	[jɛkum a jɛnsuro]
	When we are killing (our adversaries) we are not afraid!	

Repetition

Call	Ee, Asase!	[ee asase]
	Land (The Landlord/Owner)!	
Response	Hee!	[hee]
	Here am I!	
Call	Asase!	[asase]
	Land (The Landlord/Owner)!	
Response	Hee!	[hee]
	Here am I!	
Question	Wobɛyɛ dɛn!	[wobɛjɛ dɛn]
	What will you do?	
Action	Wazo, wazo, wazo!	[wazo wazo wazo]
	(Stepping of feet on the ground to indicate readiness!)	
Call	Pediatɔ!	[pediatɔ]
	The name of the Chief Warrior/Warlord/Captain/Leader!	
Response	Hee!	[hee]
	Here am I!	
Call	Peditɔ!	[pediatɔ]
	The name of the Chief Warrior/Warlord/Captain/Leader!	
Response	Hee!	[hee]
	Here am I!	
Question	Wobɛyɛ dɛn?	[wobɛjɛ dɛn]
	What will you do?	
Action	Waya, waya, waya!	[waja waja waja]
	(Shaking the chest and weapons very vigorously (bravery)!)	
Action	Waya ee!	[waja ee]
	(Warriors raise their ammunitions/weapons singing!)	
	Yɛn nie oo!	[jɛn nie oo]
	Here we are!	

Yɛn agya nie oo! [jɛn adʑa nie oo]
Here is our father (Leader/Captain/Warlord/Chief)!
Yɛkum a yɛnsuro! [jɛkum a jɛnsuro]
When we are killing (our adversaries) we are not afraid!

Notes

1. **Asase.** The Kudzragbe Clan of the Ada Traditional Area are the custodians of the entire land of the traditional home (Hometown) for all Ada natives. They, therefore, use the *Asase* (land) as the major linguistic identity in their war cry.
2. **Pediator.** The Stool Name is Pediator [pediatɔ]. An Akan corrupted phrase '*wopɛ dea, to'* which means if you like, throw (it at me/us) … your weapon… and you will see the action that will follow. The caller calls on him as the leader of the team for action or direction.
3. **Ogya.** The metaphor for seriousness, war-ready, etc. Fire always means danger!

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