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Underapplication in Akan Loanword Adaptation

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Abstract

This paper examines the phenomenon of underapplication of palatalization rule observed in loanword adaptation in Akan, a Niger-Congo (Kwa) language. The phenomenon has been widely studied almost exclusively in the domain of reduplication where palatalization fails in some reduplicants in the context of back consonant + front vowel. Similar failure is observed when adapting some English words into Akan. For instance, a source word 'crack' is adapted as **krak**ɪ but not ***krat͡ɕ**ɪ as would be expected in the native grammar. The sequence of **k** + ɪ would be expected to result in palatalization of the **k** into **t͡ɕ**. This is accounted for within the Optimality Theory that while in reduplication palatalization fails due to a high-ranking of OCP(+cor) constraint, in loans adaptation it results from the adapters' bid to attain phonetic match between source words and adapted forms, hence a relatively high ranking of IDENT-IO(cor) constraint over well-formedness constraints.

Keywords: Underapplication, Akan, Optimality theory, Loanword, Reduplication, Phonology

1. Introduction

Underapplication, as a phonological phenomenon, has been observed and studied in the Akan phonology for some time now (cf. Christaller 1875[1933]; Welmers 1946; Schachter & Fromkin 1968; Wilbur 1973; Marantz 1982; McCarthy & Prince 1995; McCarthy & Prince 1999; Kager 1999; Raimy 2000; McCarthy et al 2012; etc.). In all these studies, the phenomenon has been observed in the domain of reduplication where in Akan, palatalization, which is usually expected to apply when a front vowel immediately follows a back (velar) consonant, fails in the reduplicant. However, it is not only in Akan reduplication that palatalization fails or underapplies. The current study discusses a similar failure or underapplication of this phonological process in Akan in the domain of loanword adaptation.

A sequence of velar consonant and glottal fricative *h* + front vowel invariably results in complete palatalization of the consonant in the surface representation in the general grammar of Akan. The examples of palatalization in (1) have been given diachronic explanations in the literature (cf. Stewart 1966; Dolphyne 2006). It is worthy to note that full palatalization in Akan affects only back consonants, unlike what pertains in other languages where coronal consonants could also undergo full palatalization (Chen 1973; Bhat 1978; Hall 2000; Bateman 2007; among others).

(1).

	UR	SR	Gloss
a.	**k** + ɪ	**tɕ**ɪ	catch
b.	**g**+ ɪ	**dʑ**ɪ	collect
c.	**h** + ɪ	**ɕ**ɪ	burn
d.	**k** + **i**	**tɕi**	dislike
e.	**g** + **e**	**dʑe**	collect (Akuapem)
f.	**k** + ɛ	**tɕ**ɛ	divide
g.	**h** + ɛ	**ɕ**ɛ	wear

Exceptions to this palatalization rule in the native grammar can be found in the examples in (2)[1]. These few marked lexical exceptions are as follows.

(2)

	Native words	Gloss	Ill-form
a.	**æhi~æɕi**	disgust	-
b.	**him**	wave	***ɕim**
c.	**hini**	open (e.g. of door)	***ɕini**
d.	**hɪnɪ**	chief	***ɔɕɪnɪ**
e.	**kete**	a classical Akan folk song	***tɕete**
f.	**kɛtɛ**	straw mat	***tɕɛtɛ**
g.	**kita**	hold	***tɕita**

[1]For more examples of these exceptions to the palatalization rule in the native grammar, please see Christaller (1933:233-237). Some his examples are from reduplication (the failure occurs in the reduplicants) as in **kekaw** 'to bite repeatedly'. This has been well discussed in succeeding literature on Akan reduplication (cf. Schachter & Fromkin 1968; Marantz 1982; McCarthy & Prince 1995; etc.).

h.	**kæhire~kæɕire**	head pad	-
i.	**kɪnam**[2]**~tɕɪnam**	fried fish	-
j.	**kɛkɛ**[3]	just like that	* tɕɛtɕɛ
k.	**gigim**	fabulous	*ɟiɟim

The forms to the extreme right are ill-formed basically because all the back consonants immediately preceding front vowels have undergone palatalization rule, which is expected in the native phonology. This happening has been explained to be phonological. The postulation in the literature attributes this failure of palatalization in these exceptional cases to OCP effects. The observation made by Christaller 1875 [1933]; Schachter & Fromkin 1968; Dolphyne 2006; Boadi 1988; McCarthy & Prince 1995 is that the underapplication of the palatalization rule as observed in (2) could be explained to arise from an OCP effect in the general phonology of Akan where according to McCarthy & Prince in particular, "…palatalization is blocked when the next syllable begins with a coronal obstruent" (McCarthy & Prince 1995:94).

Two kinds of illicitness in source words such as a word initial clusters involving a back consonant and a word final back consonant in source words being borrowed into Akan would have to undergo a repair mechanism through either deletion or often, through epenthesis with recourse to its position in the word or the syllable. It has been observed, particularly in Uffmann (2006), Adomako (2008), among others, that high vowel is employed as the epenthetic vowel in Akan loanword adaptation. The only harmony source vowels and the epenthetic vowel share for verbs is ATR, but additional rounding harmony in adaptation of nouns. The epenthesis of this high front vowel and it following a back consonant, therefore, is what results in this underapplication of the expected palatalization with recourse to the native phonology. This paper examines this failure of palatalization in Akan loanword phonology and accounts for it within the optimality theoretic framework.

The first objective of this paper is to show that the underapplication of palatalization phenomenon is also present in Akan loanword phonology which is a very productive against claims in the literature, particularly Kager, that underapplication is 'reduplication-specific'(Kager 1999:240). The current paper seeks to show that the phenomenon is active in both derived and non-derived contexts in Akan loaned words where while the former comes about through epenthesis, the latter is inherent in the source word. Again, this paper presents a systematic analysis of this phenomenon within the optimality theoretic framework. It would be shown that the systematic failure of application of palatalization can be accounted for to arise from speakers' bid to attain phonetic match between the source words and the adapted forms, hence, the undominated ranking of IDENT-IO(-cor). We would also attempt to compare and contrast it with the same failure in a familiar domain of Akan phonology; reduplication.

[2]This form is used by some speakers of a subdialect of Akan; Akyem. The major town of these speakers even has two variant forms; [**a□□m**] and [**ak□m**]. The speakers are also called by that name.
[3] Examples in (j) and (k) are both examples of ideophones in Akan.

1.1 The Background of Akan

Akan is a Niger-Congo language of the Kwa language family, which is spoken mainly in Ghana and some parts of Côte d`Ivoire both in West Africa. The three major dialects of the Akan language are Akuapem, Asante and Fante. The first two dialects together constitute the Twi group. Together with its non-L1 speakers, it is estimated that far more than half of Ghana's over 24 million population[4] either speak or understand the Akan language. This obviously makes the Akan language the most widely used language in Ghana today. Akan has ten phonemic vowels in its vocalic system. Below in (3), I present the vocalic system of Akan.

(3) Akan vocalic inventory

Table 1. Akan vowel table[5].

	Front	Central	Back
High	i/ɪ		u/ʊ
Mid	e/ɛ		o/ɔ
Low		æ/a	

The above table presents Akan vowel segments.

From Table 1, we observe that Akan does not have the following English vowels in its inventory; (i) mid central /ə/ (ii) low back unrounded /ɑ/ and (iii) the low-mid back unrounded /ʌ/. The low front vowel /æ/ is central in Akan, but front in English.

On the syllable structure, Akan operates an open syllable system with the following as its basic syllable structures; CV, V, CrV[6], etc. Each syllable is a tone-bearing unit. Akan verbs, in particular, have CV syllable structure (Dolphyne 2006:52). Also, it is only syllabic consonants such as m, n, ŋ, r, w, which are tone-bearing units that can occur word-finally in Akan aside from vowels (cf. Dolphyne 2006; Abakah 2004, 2005). This is exemplified in the following words in (4).

(4)	UR	SR	Gloss	Syllable structure	Ill-form
a.	**ka.nɪ**	**ka.n**	count	CV.N	*CVN
b.	**ta.mʊ**	**ta.m**	lift	CV.N	*CVN

At the surface representation (SR), all morpheme-final nonvowel sonorants in Akan are

[4] From the 2010 Population and Housing Census conducted, it is now estimated that Ghana's population is about 24.6 million.

[5] On the Akan vowel table, in each pair of vowels in each cell, the vocalic segment to the right is specified with [+ATR] value while the other to the right has the specification [-ATR].

[6] The r in CrV is always the liquid /r/ in native words such as pra 'sweep', fr□ 'call', tra 'exceed', etc. The lateral sound /l/, on the other hand, is usually found in loaned or nativised words such as l□:r□ 'lorry', b□:l□ 'ball', etc.

followed by [+high] vowels at the underlying representation (UR), which delete at the SR (cf. Abakah, 2004, 2005).

On vowels, Dolphyne (2006) postulates that each vowel in Akan constitutes a syllable on its own. Therefore, a sequence of the same vowel or vowels of different qualities should not belong to the same syllable. Therefore, the following words are represented in the following syllable structure in (5).

(5)	Syllable structure	Word	Gloss	Ill-form
	a. CV.V	**bu.a**	respond	*CVV
	b. CV.V	**kɔ.ɔ**	red	*CVV

Based on the Dolphyne's (idem) syllabification of Akan words, the following syllable structures are not permitted in Akana: *CVC, *VC, *CCV, *CVV, *CVVC, etc.

On what the underlying consonantal phonemes in Akan are, Akan phonologists are yet to agree on the exact number and the constituents of the consonantal phonemic inventory of Akan. With regard to palatals and alveo-palatals such as **ɕ, ʧ, ʤ,** the common postulation is that they were diachronically **h**, **k**, **g** respectively in the underlying representation (Christaller 1875[1933]; Welmers 1946; Stewart 1966; Schachter & Fromkin 1968; Dolphyne 2006; Abakah 2006; etc.). Evidence for this claim stems from the fact that even presently, some older speakers (henceforth, monolinguals) of Akan still use the plain voiceless velar **k** in place of its palatalized counterpart /ʧ/ in words such as **ɔkɪna** 'tomorrow', instead of the present form **ɔʧɪna**; **kɪnam** 'fried fish' instead of **ʧɪnam**, etc. This is even extended to their loanword adaptation where source alveo-palatal or palatal consonant is de-palatalized as in the following adapted forms by these monolinguals.

(6).	Adapted	Source	Gloss
a.	**hedi**	[ʃeɪd]	shade
b.	**hɛ:tɪ**	[ʃɜ:t]	shirt
c.	**site:hãn**	[steɪʃən]	station
d.	**ŋku:rãnsɪ**	[ɪnʃʊə:rans]	insurance
e.	**kɔlɛhãn**	[kəlɛkʃən]	collection (offertory)
f.	**mahin**	[məʃi:n]	machine
g.	**kosã**	[kwɛstʃən]	question

As Dolphyne (2006:33) postulates, "**k** is replaced by the alveo-palatal affricate **ky** [ʧ] before front vowels in stem words". On the voiced velar stop, she continues, "it does not occur before front vowels…before front vowels **g** is replaced by **gy** [ʤ] …". From the above discussion, we would expect **g, k, h** to turn into ʤ, ʧ, ɕ respectively before front vowels at the SR in Akan.

Before we move on to the next section, let us quickly look at the speaker groups we have as far as loans adaptation into Akan is concerned. There are two main kinds of adapters identified in Akan loanword grammar; monolinguals (without formal education) and bilinguals (with different levels of formal education). Each of these groups adapts source words by employing quite different strategies through targeting different positions in the source words for repairs. It is worthy to note that while the former group repairs every illicitness associated with the source words, the latter usually focuses only on repairing illicit codas. This paper focuses on the latter group which forms are pervasive in everyday discourse. It can be among the reasons that the two groups adapt the source words differently because they use different social registers. The donor language for our discussion is English[7], which is the official language of Ghana, and the recipient language is Akan (Asante Twi dialect). For further discussions on the speaker groups, see Adomako (2008).

The data for analysis in the current paper were collected from two main sources; from Akan (Asante Twi) students pursuing B.Ed and B.A. programmes in Twi Education in the Department of Akan-Nzema Education, University of Education, Winneba between 2010 and 2012. This constitutes the primary source of data. For the secondary source, I consulted literature on Ghanaian Pidgin English (GhaPE) by Huber (1995, 1999, 2008) and also some Akan loaned words corpus by Adomako (2008).

The rest of the paper is organized as follows; Section 2 discusses some working definitions employed in this paper. Section 3, on the other hand, presents the Akan loanword underapplication data and makes some generalizations thereof. In section 4, we see the formalization of the repair strategies employed by recipient language within the OT framework. Section 5 draws general conclusions to the study.

2. Underapplication in Reduplication

The phenomenon *underapplication* has engaged the attention of phonologists over the past few decades since the initial observation by Wilbur (1973), though the discussion of the phenomenon far pre-dates his. It has been variously defined in the literature, and according to McCarthy & Prince (1995):

… a phonological process will be said to underapply when there is

a *lack* of expected disparity between the input stem and the output.

Akan reduplication provides a typical example: palatalization fails

in the reduplicant when it is not phonologically motivated in

the base. (McCarthy & Prince 1995:2-3).

On his part, Kager defines Underapplication as "the non-application of a phonological process in the reduplicant even though this meets the structural condition". Citing Wilbur (1973), he continues to say that, 'That is, a rule fails to apply in the "right" environment'. (Kager 1999: 239).

[7] For detailed discussion of the features of the Ghanaian variety of English, see Huber 1995, 1999, 2008.

The segmental mapping, in this current paper, is between the segments in the source words and those in the adapted forms.

2.1 Underapplication in Akan Reduplication

The underapplication phenomenon has received much scholarship in Akan just like other phenomena such as tone, vowel harmony (ATR), etc. Researchers such as have already been mentioned in the introduction have all contributed substantially to our knowledge in this area of the Akan phonology. In all these studies, the phenomenon has been observed only in the domain of reduplication of Akan verb stem with the exception of McCarthy, et al (2012) who briefly mentioned that underapplication also fails Akan loans. They cited Adomako (2008) to buttress their argument. In the present paper, we will show that the phenomenon is well-attested in Akan loanword phonology.

The data in (7) are common examples found in the literature on underapplication in Akan reduplication (cf. Schachter & Fromkin 1968, McCarthy & Prince 1995, Kager 1999, etc.)

(7).

	Stem	Reduplication	Gloss	Ill-form
a.	**kaʔ**	**ki-kaʔ**	bite	***tɕi-kaʔ**
b.	**hawʔ**	**hi-hawʔ**	pester	***ɕi-hawʔ**
c.	**ham**	**hin-ham**	hold breath	***ɕin-ham**
d.	**gam**	**gɪŋ-gam**	hold tightly in arm	***ʤɪŋ-gam**

From the above discussions thus far, one can observe that the study of underapplication, particularly in Akan, has been restricted/confined exclusively to the domain of reduplication. There is another domain in Akan where this consistent failure of palatalization is observed which this current paper seeks to discuss; this domain is loanword adaptation. Unlike in reduplication whereby underapplication results due to attainment of 'resemblance' between the reduplicant and the base (McCarthy & Prince 1995) by satisfying some highly-ranked constraints OCP(+cor) and also observed in (7), in general terms, one can straightforwardly assume that this failure of application of palatalization rule occurs as a result of the speakers' attempt to achieve some phonetic similarity the source words and their adapted counterparts, but in this paper, it is argued from OT's perspective that this failure results from the reranking of some faithfulness (Identity) constraint which is ranked very lowly in the reduplication phonology of Akan. In the reduplicant, there is always vocalic height raising which should have resulted in application of palatalization rule of the initial back consonant before front vowels as in (7). Failure of such rule application leads to underapplication. For instance, a constraint which bans a velar consonant from immediately preceding a front (coronal) vowel will be relatively ranked higher in the native grammar, but lower in the loanword grammar to allow the optimal output candidate to minimally violate it.

3. Underapplication in Akan loanwords: Data Presentation and Generalizations

Akan generally restructures the syllable structures of source words mainly through some phonological processes such as epenthesis and deletion. The restructuring involved in loan adaptation necessitates some mapping of phonetic/phonological representations of the source

segments and phonetic/phonological representations of the adapted forms. So any time we realize a sequence of velar consonant and front vowels inherent in the source words, we would expect a complete palatalization as is usually the case in the native phonology in the adapted forms. However, in the same context during repair of source illicitness of such sequence, the same rule fails or underapplies. This is what the present paper discusses.

The general epenthetic pattern as has been observed in Akan loanword adaptation by Uffman (2006); Adomako (2008) and Yoruba, a sister language by Salami (1972); Pulleyblank (1988); Akinlabi (1993); Howe & Pulleyblank (2004); etc., is that the high vowels are employed as the epenthetic vowels in repairing illicitness in source words. In the subsequent subsections, we discuss one of the repair strategies; epenthesis, employed to repair illicitness in source-final consonants in Akan loanword adaptation and make generalizations thereof.

The data used for discussion in this paper are mainly verbal forms. In the subsequent data, we discuss some environments within which an expected palatalization fails in some positions in loanword adaptation in Akan.

3.1 Front Vowel + Velar Consonant in Final Position

In repairing an illicit velar coda in source words, there is usually an epenthesis of a high front vowel into the epenthetic site. So in the instance where the source word contains a front vowel, a high front vowel is epenthesized. This epenthetic vowel invariably harmonizes with the input vowels in terms of the latter's ATR value. In (8), we provide examples for illustration.

(8).

	Loaned	Source	Gloss	Ill-form
a.	**kiki**	[kɪk]	kick	***kitɕi**
b.	**kuki**	[kʊk]	cook	***kutɕi**
c.	**ke:ki**	[keɪk][8]	cake	***ke:tɕi**
d.	**siki**	[sik]	seek	***sitɕi**
e.	**lɪkɪ**	[lɪk]	lick	***lɪtɕɪ**
f.	**rɪgɪ**	[rɪg]	rig	***rɪʤɪ**
g.	**breki**	[breɪk]	break	***bretɕi**
h.	**teki**	[teɪk]	take	***tetɕi**

[8] It is worthy to note that as Huber (1995, 1999, 2008:81) notes about Ghanaian Pidgin English (GhaPE), diphthongs such as /ɛa/, /uɔ/ are reduced to [ɛ], [ɔ] respectively. A similar process is observed in Akan loanword phonology where source diphthongs /eɪ/, /oʊ/ are reduced to [e] and [o] respectively in the adapted forms. Again, the low back unrounded /ɒ/ and mid central /ə/ vowels are adapted with mid back vowel [ɔ]. The low back vowel being adapted as mid back vowel could be influenced by the orthography of the source word in addition to the fact that the former segment is absent in the native vocalic inventory.

i.	**ɕeki**	[ʃeɪk]	shake	***ɕetɕi**
j.	**reki**	[reɪk]	rake	***retɕi**
k.	**feki**	[feɪk]	fake	***fetɕi**
l.	**tɕɛkɪ**	[ʧɛk]	check	***tɕɛtɕɪ**
m.	**lɔ:kɪ**[9]	[lɒk]	lock	***lɔtɕɪ**
n.	**dɔ:gɪ**	[dɒg]	snub sb.	***dɔ:ʥɪ**
o.	**lɔgɪ**	[lɒg]	log…on	***lɔʥɪ**
p.	**ɕɔkɪ**	[ʃɒk]	shock	***ɕɔ:tɕɪ**
q.	**klɔkɪ**	[klɒk]	clock (in race)	***klɔtɕɪ**

(9). *When a coda velar consonant is preceded by a front or a back vowel in a source word: Insert a high vowel into the epenthetic site.*

From the examples in (8), we observe that irrespective of the quality of the source or input vowels in terms of frontness, i.e. either front or back, and height, i.e. high or mid, a high front vowel is epenthesized to repair the illicit coda in the source words. Judging from the generalization made earlier about the data in (2) concerning the only environment within which palatalization failures in the native disyllabic morpheme i.e. avoiding violation of constraint that bans a succession of coronal features in successive syllables which we will discuss in detail in section 4, we would rather expect the forms that are ill-formed (those to the extreme right).

3.2 Velar Consonant in Final Position

In repairing a source-final velar stop /**k**/, the vowel /ɪ/ is epenthesized into the epenthetic site. This context conditions application of palatalization, which fails in the adapted forms. We further illustrate this in (10) where will observe that the epenthetic vowel insertion is well defined within a context of source-final /**k**, **g**/ being preceded by /**a**/.

(10).	Adapted	Source	Gloss	Ill-form
a.	**lakɪ**	[lak]	lack	* **latɕɪ**
b.	**ba:gɪ**	[bag]	bag...up	* **ba:ʥɪ**
c.	**hangɪ**	[haŋ]	hang	* **hanʥɪ**
d.	**pakɪ**	[pak]	pack	* **patɕɪ**
e.	**sakɪ**	[sak]	sack	* **satɕɪ**

[9] From (8m)-(8q), the epenthetic vowel becomes rounded to harmonize with the source/input vowel when adapting source nouns. For example, *a lock* /lɒk/ is adapted as [**lɔ:kʊ**] *[**lɔ:kɪ**].

f.	**ata:kɪ**	[ətak]	attack	* **ata:ʧɪ**
g.	**ma:kɪ**	[mɑ:k]	mark	***ma:ʧɪ**
h.	**bakɪ**	[bak]	back	***baʧɪ**
i.	**ʍakɪ**	[wʌk]	whack	***ʍaʧɪ**
j.	**krakɪ**	[krak]	crack	***kraʧɪ**
k.	**krankɪ**	[kraŋk]	crank…up	***kranʧɪ**
l.	**tankɪ**	[θaŋk]	thank	***tanʧɪ**

(11). *When a coda velar stop is preceded by /**a**/ in a source-final position: Insert a high front vowel is inserted into the epenthetic site.*

We have observed again in (10) that irrespective of the quality of the input vowel, high front vowel is invariably epenthesized to repair an illicitness of source-final velar consonant when adapting verb forms.

Thus far we have looked at instances of failure of application of palatalization rule though the palatalizing environment is created (derived) as a result of repairing an illicit final velar consonants. In the subsequent subsections, we are going to discuss instances where the palatalizing environment is inherent (non-derived) in the source words at the initial and medial positions.

3.3 Velar Consonant/Glottal Fricative + Front Vowel at the Initial Position

The sequence of the back consonants and front vowels which is inherent in source words also does not result in palatalization of the former segment as would be expected in the native grammar. Though this palatalizing condition is inherent within the source word, based on the activeness of palatalization rule that applies in the general phonology of Akan, we would have expected the palatalization to apply to ensure complete nativisation of the source segments. Such failure of application of palatalization is considered underapplication as we see in the examples in (12), where palatalization fails.

(12).	Adapted	Source	Gloss	Ill-form
a.	**gɛtɪ**	[gɛt]	get	***ʤɛtɪ**
b.	**ge:ni**[10]	[geɪn]	gain	***ʤe:ni**
c.	**ge:mu**	[geɪm]	(play) game	***ʤe:mu**
d.	**ki:si**	[kɪs]	kiss	***ʔʧisi**[11]

[10] It is interesting to observe how the speakers would epenthesize a high front vowel after final nasals in (12b) and (12c) when the native grammar permits nasals in the surface representation since they are among the nonvowel sonorants allowed syllable or morpheme-finally in Akan in general (cf. Dolphyne 2006, Abakah 2005, etc.). Again, the palatalizing environment is there for the initial velar consonant to undergo palatalization. Failure of application of the rule could therefore be explained as more phonetic than phonological. That is, preservation of the salient position i.e. initial syllable, which is cross-linguistic is what is observed here.

e.	**kipi**	[kɪp]	keep	***tɕipi**
f.	**kɛ:sɪ**	[kɜ:s]	curse	***tɕɛsɪ**
g.	**hɪntɪ**	[hɪnt]	hint	***ɕɪntɪ**
h.	**hi:ti**	[hi:t]	heat	***ɕi:ti**
i.	**hɪtɪ**	[hɪt]	hit	* **ɕɪtɪ**
j.	**he:ti**	[heɪt]	hate	* **ɕeti**

(13). *When source-initial velar stop or glottal fricative is followed by a front vowel: Adapted it as it is.*

Having briefly looked at how source-initial velar stop + front vowel is adapted and also how velar coda is repaired, we now turn our attention again to the how source-medial velar stop + front vowel is adapted into Akan in (14).

3.4 Velar Consonant + Front Vowel in Medial Position

As was observed in §3.3, the same pattern is invariably observed of such sequencing of velar stop + front vowel in medial position. Again, palatalization fails or underapplies as observed in (14).

(14).	Adapted	Source	Gloss	Ill-form
a.	**tagɛtɪ**	[tɑ:gɪt]	target	***tadʑɛtɪ**
b.	**brakɛtɪ**	[brakɪt]	bracket	***bratɕɛtɪ**
c.	**makɛtɪ**	[mɑ:kɪt]	market	***matɕɛtɪ**
d.	**loketi**	[loʊkeɪt]	locate	***lotɕeti**
e.	**inʃɛsige:ti**	[ɪnvɛstɪgeɪt]	investigate	***inʃɛsidʑe:ti**
f.	**aloketi**	[aləkeɪt]	allocate	***alotɕeti**
g.	**sɛgrige:ti**	[sɛgrəgeɪt]	segregate	***sɛgridʑe:ti**
h.	**sɔfisike:ti**	[səfɪstɪkeɪt]	sophiscate	***sɔfisitɕe:ti**
i.	**fɔgɛtɪ**	[fəgɛt]	forget	***fɔdʑɛtɪ**
j.	**sofoketi**	[sʌfəkeɪt]	suffocate	***sofotɕe:ti**

(15). *When a velar consonant is followed by a front vowel in medial position in a source word: Adapted it as it is.*

Thus far, we have observed the failure or underapplication of an active phonological rule in

[11] This form is grammatical in the monolingual form. The palatalization rule applies here.

Akan; palatalization in the Akan loanword phonology. We have seen that though the palatalizing environment was set, palatalization failed in that context. The explanation for this failure, we have observed from the preceding data presented and discussions made, that it does not necessarily reside in prominence of the position of the sequencing of the palatalizing segment since we have seen it occur in initial as in § 3.3, in medial as in § 3.4 and in final position as in § 3.2 of the adapted forms. Again, we have observed from all the data presented that the epenthetic vowel has consistently been the high front vowel irrespective of the roundness of the source vowel in adapting verbs.

In the next subsection, we discuss how source-final palatals or alveo-palatals are adapted into Akan.

3.5 The Case of Palatals/Alveo-Palatals

In cases where the source-final coda is a palatal or alveo-palatal, this illicitness is repaired only by epenthesizing the epenthetic vowel. That is, there is no segmental change of the source-final consonant. As we observed in the velar consonant + front vowel adaptation, the same pattern is observed here without variation. In (15), we observe how these palatals or alveo-palatals are repaired.

(15)	Adapted	Source	Gloss	Ill-form
a.	**sɛʧɪ**	[sɜ:ʧ]	search	***sɛkɪ**
b.	**pɛ:ʧɪ**	[pɜ:ʧ]	perch	***pɛkɪ**
c.	**ge:ʤi**	[geɪʤ]	gauge	***ge:gɪ**
d.	**briʧi**	[bri:ʧ]	breach	***briki**
e.	**tiʧi**	[ti:ʧ]	teach	***tiki**
f.	**fɛʧɪ**	[fɛʧ]	fetch	***fɛkɪ**
g.	**tɔ:ʧɪ**	[tɔ:ʧ]	torch/touch	***tɔkɪ**
h.	**ko:ʧi**	[koʊʧ]	coach	***kokɪ**
i.	**wɔ:ʧɪ**	[wɒʧ]	watch	***wɔ:kɪ**
j.	**puɕi**	[pʊʃ]	push	***puhi**
k.	**wɔɕɪ**	[wɒʃ]	wash	***wɔhɪ**
l.	**dɔ:ʤɪ**	[dɒʤ]	dodge	***dɔ:gɪ**
m.	**brantɕɪ**	[brɑ:nʧ]	branch	***brankɪ**
n.	**ʧa:ʤɪ**	[ʧɑ:ʤ]	charge	***ʧa:gɪ**
o.	**braɕɪ**	[brʌʃ]	brush	***brahɪ**

p. **katɕɪ** [kaʧ] catch ***kakɪ**

(16). *When adapting a source-final palatals or alveo-palatals: Insert a high front vowel into the epenthetic site.*

Thus far, we have observed that irrespective of the height and roundness of the source vowel, source-final consonant is repaired by epenthesizing a high front vowel when adapting verbs. Again, we have seen that whether the palatalizing environment is inherent (non-derived) or created (derived), no palatalization applies contrary to what we would have expected in the general Akan grammar. We formalize these observations in OT in the next section.

4. Formalization of Underapplication in Akan Loanword Data

Having discussed the repair strategies and the general rules about repairing source words that have illicit structures, we now provide an OT analysis of adaptation patterns which invariably result in underapplication of palatalization in Akan loanword adaptation. As it was discussed in section 3, a source- final velar stop is repaired by epenthesizing a high front vowel without the consonant undergoing the palatalization rule as would have been expected in the general Akan phonology**.** Again, a sequence of velar stop/glottal fricative + front vowel in both initial and medial positions we observed to be adapted *in situ*. Salience could be postulated to explain the preservation of the contrast in the segments in the initial CV syllable as we saw in the adapted forms such as **kipi** 'keep', **he:ti** 'hate', etc. This is cross-linguistically attested, but how about preservation of similar sequencing in non-salient position such as medial as in **tagɛtɪ** 'target', **loketi** 'locate', etc.? In doing OT analysis in this subsection, we assume some constraints from McCarthy & Prince's (1995) Correspondence Theory, where we will employ constraints from both the markedness and faithfulness families of constraints. From the faithfulness family, we will particularly refer to the Identity constraints to evaluate correspondence between input (source) and output (adapted) forms.

Before we begin the discussion on OT analysis, let us assume the following unified place features for both consonants and vocoids that we will use in our discussion in this section. We follow Clement & Hume's (1995) Feature Geometry specification for place features for both vowels and consonants in Akan as follows;

All front vowels and alveolar (anterior) consonants are specified with the feature [coronal]; all velar consonants are specified with [dorsal], while the feature specification for palatals and alveo-palatals, which are complex segments, also as [coronal]. Correspondence is between segments in the inputs and those in the output forms.

4.1 Markedness Constraints

From the markedness constraints, we employ the structural well-formedness constraint; No-Coda, *+dor,+cor and an OCP constraint with feature specification OCP(+cor) and define them as follows;

(17). No-Coda: A consonant must not occur in coda position

(Syllables are open)

A relatively higher-ranked No-Coda constraint would ensure that input/source codas are repaired either by epenthesis of a vowel or deletion. However, from the data discussed thus far, it has become obvious that the grammar usually employs epenthesis as the preferred repair mechanism to deletion (which usually occurs to reduce consonant clusters). A high-ranking No-Coda extends to the general phonology of Akan where the language does not permit consonants in coda position of words.

(18). OCP(+cor): There should not be adjacent identical *elements specified* with [+coronal] in a successive syllable

The effect of this constraint is not local. That is, from the explanation we have already given about the underapplication of palatalization in native disyllabic forms, when can say that the effect of this constraint is across syllables i.e. adjacent syllables, but not within a syllable. Therefore, for example, when an input (source) $C_1V_1C_2$ is adapted as $C_1V_1C_2V$, the OCP(+cor) will not be violated if an output form has C_1 and V_1 both specified with [+coronal] but its C_2 is [-coronal]. This is because in this instance, the sequence of coronal feature is local, but not across successive syllables.

Another markedness constraint that demands palatalization is defined as follows;

(19) *+dor, +cor A sequence of segments specified for [+dorsal] and [+coronal]

is prohibited.

4.2 Faithfulness Constraints

Three faithfulness constraints would be used for our analysis of underapplication of palatalization in Akan loanword adaptation. These are from the Identity, DEP and MAX constraint families and are defined as follows;

(20). MAX-IO: Every segment of the input has a correspondent in the output. (No deletion of segments)

We have observed from the loanword adaptation pattern in this paper that the strategies for avoiding coda do not include deletion of illicitness. This is a general fact about repair strategies in many loanword phonologies cross-linguistically. The only time we usually observe deletion is during a repair of consonant clusters where the marked structure is systematic reduced through deletion. However, a relatively highly-ranked MAX will severely punish candidates that employ deletion, instead of epenthesis, as a repair strategy.

(21). DEP-IO: Every segment of the output has a correspondent in the input.

(No intrusion of segments)

This constraint must rank below MAX-IO and other constraints since as we have observed throughout the data discussed, repair of illicitness in source words is by epenthesis. Therefore, a highly-ranked DEP-IO will banish any candidate that epenthesizes a vowel to avoid coda. Hence, its lower-ranking will ensure that the optimal candidate violates it minimally.

(22). IDENT-IO(cor): Correspondent segments in input and output have identical values for [coronal].

A highly-ranked IDENT-IO(cor) will ensure that an input value for segments in terms of the coronality shares identity with that of the output. The unspecified value for coronal means if the input value is say [-coronal], we expect the output value to be also [-coronal]. This constraint militates against applying any phonological rule such as palatalization to output forms. When it dominates palatalization-demanding constraint *+dor,+cor, will result in underapplication of palatalization.

Now having defined our sets of constraints from both the markedness and faithfulness constraints, we begin our tableaux analyses by making these constraints interact in constraints rankings in the subsequent analyses.

4.3 Tableaux Analyses of Akan Loanword Adaptation Strategies

In section 3, we observed from the Akan data presented instances where we would have expected the phonological rule of palatalization, which is active in the native phonology, to have applied in the environment of velar consonant + front vowel sequence in the process of adapting foreign words into Akan. In this subsection, we will account for these instances of failure or underapplication of palatalization in loaned words by resorting to tableaux analyses. We begin our analysis by accounting for repair of final velar consonant in the source word when preceded by a front vowel in Table 2.

Before we do tableaux analyses of the underapplication patterns we have discussed loaned verbal adaptation in Akan, let us briefly consider what have been postulated for as the constraint ranking for the same phenomenon in Akan reduplication.

A simple ranking for palatalization in Akan requires Trigger constraint outranks IO-Faithfulness constraint. This ranking schemata is instantiated as follows in (23).

(23) *+dor, +cor >> IDENT-IO(cor)

This is the ranking proposed by McCarthy & Prince 1995:96[12] for the analysis of palatalization in Akan: IDENT-IO(+cor) >> OCP(+cor) >> *+dor, + cor >> IDENT-IO(cor).

We exemplify this ranking in the following tableau.

Table 2. General palatalization in Akan

/**k+ɛ**/ 'share'	*+dor, +cor	IDENT-IO(cor)
a. **kɛ**	*!	
b.☞ **ʧɛ**		*

Ranking for Table 2: *+dor,+cor>>IDENT-IO(cor)

[12] The PAL constraint used in McCarthy & Prince 1995 is replaced with a variant featural constraint *+dor,+cor, which militates against non-palatalizing CV i.e. g+i in the current paper.

A simple tableau analysis of underapplication in native Akan as we saw in (2) will be that an undominated *+dor, +cor ranked above IDENT-IO(cor) severely punishes a faithful copying of input velar consonant + front vowel as in candidate (a).

We will briefly look at ranking for underapplication in non-reduplicated forms in Akan in Table 3.

Table 3. Underapplication in non-reduplicated forms in Akan

/**kɛtɛ**/ ‘straw mat’	IDENT-IO (-cor)	OCP(+cor)	*+dor, +cor
a. ☞**kɛtɛ**			*
b. **ʧɛtɛ**	*!	*	

Ranking for Table 3: IDENT-IO(-cor), OCP(+cor)>>*+dor,+cor

I need not belabor the analysis of underapplication in Akan non-reduplicated form since it has been discussed extensively in the literature already (cf. Christaller 1875[1933]; Welmers 1946; Schachter & Fromkin 1968; Wilbur 1973; Marantz 1982; Boadi 1988; McCarthy & Prince 1994, 1995; Kager 1999; Raimy 2000; etc.). However, since I will draw parallelism between how the process patterns in Akan reduplication and loanword adaptation, I will briefly restate some facts about the phenomenon as has been evaluated and analyzed within the Optimality Theory in the existing literature for comparison sake.

The following ranking schema has been postulated for underapplication in Akan reduplication (McCarthy & Prince 1995; Kager 1999: 240);

Here, the relationship is not between only input and output forms, but also correspondence between Base and Reduplicant is crucial.

(24) BR-Identity, Blocker constraints >> Trigger-constraints >> IO-Faithfulness constraints.

From McCarthy & Prince (1995:97), the following is the instantiated ranking for underapplication in Akan reduplication:

(25) OCP(+cor), IDENT-BR(-cor) >> *+dor, +cor >> IDENT-IO(-cor).

We exemplify the ranking in (25) with the table 4 below.

Table 4. Underapplication in Akan reduplication.

/RED+ka/ 'bite'	OCP(+cor)	IDENT-BR (-cor)	*+dor, +cor	IDENT-IO (-cor)
a.☞ kɪ-ka		*	*	
b. tɕɪ-ka		*!*		
c. tɕɪ-tɕa	*!	*		*

Ranking for the above table: OCP(+cor), IDENT-BR(-cor) >> *+dor, +cor >> IDENT-IO(-cor)

From Table 4, OCP(+cor) rules out the overapplication form in (c). The same candidate also violates IDENT-IO(-cor) since the onset of the base in the candidate has undergone palatalization as a result, making it lose correspondence/identity with the input stem onset. Candidate (b) on the other hand, represents what we would expect in general Akan phonology i.e. normal application of palatalization. It is ruled out due to the high- ranking of the IDENT-BR(-cor) constraint above *+dor, +cor, which is violated by only candidate (a) which is the only candidate as well that fails to apply the palatalization rule. Though it also violates IDENT-BR(-cor), its violation in relatively minimal.

We begin our analysis with the analysis of repair of source-final velar consonant. The same analysis holds for the repair of velar coda irrespective of the quality (frontness) of the input vowel.

(26) IO-Identity, Structural well-formedness >>IO-Faithfulness A>>Blocker constraints >> Trigger-constraints >> IO-Faithfulness constraints B.

(27) No-Coda, IDENT-IO(-cor) >> MAX-IO >> OCP(+cor) >> *+dor, +cor >> DEP-IO.

Once the palatalization trigger constraint; *+dor, +cor is dominated by IDENT-IO(-cor) and/or OCP(+cor), the candidate with underapplied segment will emerge optimal as seen in Table 5.

Table 5. Front vowel + velar consonant in coda position.

/**tek**/ 'take'	No-Coda	IDENT-IO(-cor)	MAX-IO	OCP (+cor)	*+dor, +cor	DEP-IO
a. **tek**	*!					
b.☞ **te.ki**					*	*
c. **te.ʧi**		*!		*		*
d. **te**			*!			

Ranking for table 5: No-Coda, IDENT-IO(-cor), MAX-IO >> OCP(+cor) >>*+dor, +cor , DEP-IO.

From Table 5, the different candidates exhibit three different adaptation strategies. Candidate (a) adapts faithfully the source segments, but at the fatal cost of incurring a violation of a highest-ranked No-Coda constraint. To avoid violating No-Coda, the other three candidates adopt two repair strategies; insertion of vowel and deletion of consonant. Candidate (d) resorts to deleting the final consonant instead of epenthesizing, which strategy also falls afoul to the crucially ranked anti-deletion constraint; MAX-IO. Candidate (b) and candidate (c) both repair the illegality in the source-final velar by epenthesizing a vowel (high front). However, candidate (c) falls out of optimality on the highly-ranked IDENT-IO(-cor) for applying the palatalization rule to change source velar into affricate.

The failure or the so-called underapplication of palatalization in the above tableau has been somewhat explained by McCarthy & Prince that according to Laura Downing's troubled alternative suggestion for the behavior of the reduplicant vowels describing them as epenthetic vowels. That suggestion did not seem plausible to explain the process in Akan reduplication, however, it does in the current analysis where we have epenthetic vowel to repair illicitness in source words. The assumption is that epenthetic vowels do not trigger palatalization simply because they are inert (McCarthy & Prince 1995: 97fn 74). Their inertia means they are assumed to be empty nodes (Selkirk 1981; Lowenstamm & Kaye 1986; Itô 1986, 1989; McCarthy & Prince 1993; among others). The implication of this line of analysis is that any assumption of any OCP effect is faltered since in the process of repairing the illicitness, the high front vowel epenthesized to trigger palatalization is inert in itself. Therefore, under no circumstance should we expect the application of the process, though on the surface of it the environment seems created for its application. This seems plausible to explain the current pattern we observe of loanword phonology of Akan particularly in the

bilingual forms.

In the following analysis, we look at how a source word that exhibits morpheme-internal velar consonant + front vowel sequence is adapted into Akan loanword grammar.

For the data in table 6, if the observation made in the literature by Christaller 1875[1933], Schachter & Fromkin 1968, Dolphyne 1988, Boadi 1988, McCarthy & Prince 1995: 94 is to hold, then the underapplication of the palatalization rule could be explained to arise from an OCP effect in the general phonology of Akan where the "…palatalization is blocked when the next syllable begins with a coronal obstruent" (McCarthy & Prince 1995:94. In the following analysis, the palatalizing environment is non-derived or inherent in the source word. However, the failure or the underapplication environment is derived in the sense fact the blocker syllable was not present in the input or source, but it was derived after the application of the phonological rule of epenthesis. That is, going by earlier observation about the blocking environment for palatalization, there was no initial coronal obstruent, but rather a coda /t/ before the re-syllabification through epenthesis that made the coda assume onset position in the adapted form. So /gɛt/ → [gɛtɪ] 'get' as against the non-derived native form [kɛtɛ] 'straw mat'.

Table 6. Velar consonant + front vowel sequence in medial position

/**tagɛt**/ 'target'	No-Coda	IDENT-IO(-cor)	MAX-IO	OCP (+cor)	*+dor, +cor	DEP-IO
a. **ta.gɛt**	*!					
b.☞ **ta.gɛ.tɪ**					*	*
c. **ta.ʤɛ.tɪ**		*!		**		*
d. **ta.gɛ**			*			

The ranking is the same as for Table 5.

From Table 6, again candidate (a) copies faithfully the input form thereby fatally violating the high-ranking No-Coda constraint though it is the only constraint it violates. Candidate (c) becomes the least harmonic candidate as it fatally violates the highest-ranked constraint IDENT-IO(cor). It is the only candidate in this table that adapts an input /**g** +ɛ/ with palatalized segment ʤ in the output form. By this palatalization, it additionally violates OCP(+cor) that prohibits occurrence of a sequence of two coronal segments in successive syllables, which in this case are …ʤɛ+**t**ɪ. The race for the optimality then falls between

candidate (b) that also violates OCP(+cor) in addition to offending DEP-IO and candidate (d), which adapts the input by only deleting the coda. Candidate (b) outcompetes candidate (d) on grounds that though the former violates two constraints, one more that the latter, both constraints are ranked lower than the only one violated by the candidate (d).

In the next analysis, we account for the case of source-final palatals or alveo-palatals and how they are adapted into Akan. Since from the tableaux analyses done thus far the preferred output forms have been those that fail to apply palatalization even where there is a palatalizing environment set for it, it would be interesting to know how inputs that already have palatals are adapted in Table 7.

Table 7. Source-final palatal/alveo-palatal + front vowel sequence[13]

/**brantɕ**/ 'branch'	IDENT-IO(cor)	No-Coda	MAX-IO	OCP (+cor)	*+dor, +cor	DEP-IO
a. **bra.ntɕ**		*!		*		
b.☞ **bra.n.tɕɪ**				*		*
c. **bra.n.kɪ**	*!				*	*
d. **bra.n**			*!			

The same ranking Table 6 holds for this table.

As have been seen in the previous analyses in this subsection, candidate (c) decoronalizes the input alveo-palatal /tɕ/ into [**k**], which makes it least harmonic output form as it loses featural correspondence in the input, thereby fatally violating an undominated IDENT-IO(cor). This output form is expected to emerge in the monolingual loanword phonology where we would expect candidate with decoronalization to emerge as the optimal candidate. Candidate (a), on the other hand, though faithfully copies the input, falls out of the competition for fatally violating another high-ranking No-Coda constraint. Candidate (d) is also dispreferred on grounds that it employs an inappropriate repair strategy in this context. Epenthesis is preferred to deletion as a repair strategy in this case. It therefore fatally violates anti-deletion constraint MAX-IO. Candidate (b) emerges as the optimal candidate though it violates two constraints vis-à-vis one constraint each by candidates (a) and (d). It outcompetes both candidates because it minimally violates the two least-ranked constraints. Just like the previous three tableaux, we see faithful adaptation of the source segments in the output forms. That is, there virtually 'perfect' correspondence between input segments and those of the

[13] Candidate (d) does not violate the constraint No-Coda on pure phonological grounds that as stated about the Akan syllable structure, word-final nasals a syllabic in nature, therefore, they do not function as codas.

output forms.

5. Conclusion

The paper has discussed the phenomenon of underapplication or failure of palatalization in Akan loanword adaptation. We have observed that though the sequence of back consonants and front vowels is generally disallowed in the native phonology of Akan except when it would lead to violation of OCP(+cor) (cf. McCarthy & Prince 1995:94), it is permitted in loanword phonology even though its application would not result in such violation. We have explained that the underapplication of palatalization to arise out of the highly-ranked Identity constraint; IDENT-IO(cor) that aims at achieving featural identity between input and output forms above palatalization-triggering constraint *+dor,+cor, which penalizes failure of palatalization in palatalizing environment. This conflict between the faithfulness and the markedness constraints produces the underapplication of palatalization.

From the tableaux analyzed thus far, we can observe that palatalization fails to apply not because of an undominated ranking of OCP(+cor), but rather importantly because the constraint IDENT-IO(cor) that requires input forms to be identical to output forms in terms of the feature [coronal] is undominated throughout. In comparison, whereas palatalization underapplies in Akan reduplication primarily due to the undominated ranking of OCP(+cor), it is the highest-ranking of IDENT-IO(cor) that produces the optimal (underapplied) candidate in Akan loanword adaptation.

In more general terms, we have observed that the failure of palatalization in the adapted forms result from adapters' desire to maintain, in most part, a phonetic match between the source word and the adapted form.

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