VOWEL RAISING IN AKAN REDUPLICATION

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Abstract

This paper examines vowel raising in reduplication in Akan, a Niger-Congo (Kwa) language, focusing on the Asante-Twi dialect. It has been generally observed in Akan that in reduplicating CV stems, the stem [+low] vowels are pre-specified with [+high] the reduplicant (RED). However, it has been claimed that raising to the mid vowel in disyllabic REDs is idiosyncratic to the Fante dialect. I show that the phenomenon is attested in Asante and that stem CV_1V_2, where V_2 is [+low], raises to a corresponding [-high, -low] vowel in the RED, and not [+high]. I account for this within the Optimality Theory framework.

1. Introduction

Vowel raising has been a phenomenon that has received some scholarship in Akan phonology in general over the years and particularly in the domain of reduplication. Reduplication, in turn, has been one of the areas of research which have contributed immensely to our understanding of phonology and its theorization. Akan has been one of the languages that have contributed substantially over the past years in this regard. Among the notable authors who have made such contributions are Christaller (1875), Welmers (1946), Schachter & Fromkin (1968), Wilbur (1973), Marantz (1982), Lieber (1987), Dolphyne (1988), McCarthy & Prince (1993b, 1995), Raimy (2000, 2000b) and Abakah (2004, ms). However, these scholars seem to disagree on the height to which the stem low vowels raise in the reduplicant. Two major schools of thought have emerged as a result of this, the first one being spearheaded by Schachter and Fromkin's (1968) funded project on the study of Akan phonology. The preliminary report of this project has become a major source of reference for some succeeding works on Akan reduplication by researchers such as Marantz (1982),

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Lieber (1987) and Dolphyne (1988). Later on McCarthy and Prince (1994, 1995a), Kager (1999) and Raimy (2000) based their analysis of the phenomenon in Akan primarily on these succeeding works. The original claim by Schachter and Fromkin (idem) on vowel raising patterns in Akan reduplication has been that in all the three major dialects of Akan, in reduplicating CV verbal stems such as ka 'to bite', the low vowel raises to a high front vowel in the reduplicants, resulting in the reduplicated form kIka 'to bite repeatedly'. Based on this example, a general statement was later made about the CV verbal stem reduplication in Akan that a low vowel in a CV stem is always 'pre-specified' with the feature [+high] in the reduplicant (cf. McCarthy and Prince 1994, 1995, Kager 1999, Raimy 2000, among others)[i]. On the reduplication of disyllabic stems such as CV_1CV_2 or CV_1V_2, where in both cases the V_2 is a [+low] vowel, it raises to a front mid vowel [e] in the Fante dialect, but only assumes an advanced tongue root feature [+ATR] as in [æ] in the reduplicant in the Twi (Akuapem and Asante) dialects. So, for instance, the verbal stem munə 'to frown' reduplicates as munæ.munə in the Twi dialects.

The second school of thought, which strongly counters the previous one, revolves around Abakah's (ms) claim that the longstanding postulation of *a-raising* to [I] in Akan (referring to all the three major dialects) reduplication in general is nothing but, as he puts it, "...misleading to the core" and also "...counterintuitive" (Abakah, ms: 5), a claim which he suspects is merely influenced by orthography. He rather bases his argument on the observation of the raising pattern of /a/ in the general phonology of Akan and posits that the stem /a/ does not raise at all in both monosyllabic and disyllabic verbal roots/stems but instead, it is replaced with an epenthetic schwa [ə] in the reduplicant. He further explains that it is (only) the stem mid vowel that raises to a high vowel in the reduplicant. This is in sharp contrast to the earlier claim by the first school of thought. We reproduce some of the examples Abakah (idem: 4) cited to buttress his claim in (1) and (2) below.

1) **Monosyllabic Class I Verbs**

	Verb	Gloss	RED
a.	má	to give	mɛ̀má
b.	ká	to bite	kɛ̀ká
c.	pá	to skim	pɛ̀pá
d.	tá	to fart	tɛ̀tá

2) Disyllabic Class I Verbs

	Verb	Gloss	RED
a.	fám	to attach	fɛ̀m-fám
b.	pán	to prune	pɛ̀n-pán
c.	sáw	to collect	sɛ̀w-sáw
d.	tár	to paste	tɛ̀-tár

From the above, Abakah (idem) posits epenthesis (of /ə/) rather than raising as the phonological process that applies in reduplicating verbal stems in Akan. He explains that in both (1) and (2), there is no vowel raising in the reduplicant as is commonly claimed in the literature. However, the reduplicant instead copies only the consonantal melodies of the root/stem (at the initial stage), which results in consonant clusters (between the only consonant copied and the stem initial consonant), in the case of (2). He further explains that as a repair mechanism for such illegal clusters, the language then resorts to epenthesizing /ə/ to repair these clusters at the final stage (Abakah, idem: 4-5). In this paper, we provide an alternative analysis to these earlier claims by the two schools of thought regarding the copying of stem vowels in Akan reduplication.

The central aim of this paper is, therefore, to re-examine some claims in the literature regarding vowel raising in Akan reduplication, particularly

those by Schachter & Fromkin (1968) on the one hand, and Abakah (ms), on the other hand. We claim in this paper that the verbal root/stem [+low] vocalic melody in all syllable structures such as monosyllabic CV or disyllabic CVN, CVCV, etc. is susceptible to raising in the reduplicants depending on the tongue height configuration of the neighbouring vocalic segment in the stem. While we support the claim for the pre-specification of the CV and CVN verbal stems [+low] vowel with the feature value [+high] in the reduplicant (cf. Schachter & Fromkin 1968, Marantz 1982, McCarthy & Prince 1995, etc.), we hypothesise that the raising of the same vowel in the CV_1CV_2 verbal stem to the [-high, -low] vowel in the reduplicant results from the language's high-ranking of some well-formedness constraints such as OCP(+high). The high-ranking of the OCP(+high) will ban adjacent high vowels from co-occurring in successive syllables, hence, the stem low vowel truncating at the mid vowels in the reduplicant templates[ii]. This is particularly so when the stem V_1 has the feature specification [+high]. The same explanation holds for reduplicating a CV_1CV_2 verbal root/stem where the V_2 is a [-high, -low] vowel and the adjacent V_1 is specified with [+high]. To avoid violating the high-ranking OCP constraint, the exact segmental melodies are copied into the reduplicant template, resulting in *no-raising* of the stem-final mid vowel.

This paper is organized as follows: Section 1 is the general introduction to the paper where the focus of the paper is spelt out. The background of Akan is also briefly discussed in this section. Section 2 discusses some claims made about vowel raising in Akan reduplication, while in section 3, I present the Akan data and make generalisations about the data presented. Section 4 presents the analysis of the data within the Optimality Theory (OT) framework. Section 5 concludes all the discussions made in this paper.

1.1 Background

Akan is a Niger-Congo language of the Kwa language family, which is spoken mainly in Ghana and some parts of la 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 20 million population[iii] either speak or understand the Akan language (O'Keefe 2003). This obviously makes the Akan language the most widely used language in Ghana today. Akan, like many other languages, resorts to reduplication of items of different lexical classes to expand its vocabulary. Some of the categories that can be reduplicated in Akan include verbs (virtually all), adjectives and nouns. In this paper, we will discuss the reduplication of only verb stems of different syllable structures including CV, CVV, CVN and CVCV.

2. Claims about Vowel Raising in Akan

In the literature, particularly in Schachter & Fromkin (1968:156), it has been claimed that the [+low] vowel in a CV verb stem is always pre-specified in the reduplicant with the feature value [+high] and no other feature specification for all the three major dialects of Akan. This pre-specificational statement on CV reduplicants is overwhelmingly attested in all the three major dialects of Akan. However, their further claim that a disyllabic stem-final [+low] vowel in, say, CVa does not raise in the reduplicant in the Twi (i.e. Akuapem and Asante) dialects calls for some re-examination, and that is what this current paper attempts to do. Even though there have been works on Akan reduplication responding to this claim in diverse ways which have somehow implicitly disagreed with this claim, it is so far McCarthy & Prince's (1995a) work, citing earlier works by Marantz (1982) and Lieber (1987), which has explicitly 'questioned' this pre-specificational generalization. Even so, McCarthy & Prince merely ask why the low vowel does raise to mid vowels as well, without providing any counter evidence to challenge the claim (McCarthy & Prince, 1995a:83).

Though Dolphyne (1988) earlier on also provided data which counter Schachter & Fromkin's (1968) *no-raising* claim regarding CVV (disyllabic reduplicants) in Akuapem and Asante, a claim that was made without any phonological argument for the presence of such height raising, she made no direct reference to that claim in her book, which is understandably, largely descriptive in approach. In an ongoing project, Abakah et al have also made general comments on certain claims by Schachter & Fromkin

about raising in the Fante dialect. In this current paper, we provide an alternative analysis to this overgeneralized claim by providing data from the Twi (Asante) dialect to argue for the presence and productivity of the raising of both the low and the mid vowels within diverse phonological contexts. In these contexts, the stem/base-final low vowel /a/ in the CVa structure, more often than not, raises to the mid front vowels in the reduplicants in Twi reduplication as it does in the Fante dialect. This results in the feature specification for the CVV reduplicant-final as [-high, -low, -back][iv]. This process is contrary to earlier claims in the literature, particular by Schachter & Fromkin (1968:175-177) who assert that the process is predominant in the Fante dialect, but absent in the other two major dialects of Akuapem and Asante. They explain that in disyllabic reduplicants, a stem-final /ə/ is replaced with [æ] in the Akuapem and Asante dialects when followed by a [+Tense] vowel, but with [e] in the Fante dialect.

For the raising process in the Fante dialect, their assertion is that verbal root /A/ changes to [E] in the surface representation due to some vowel-gemination rule that applies, as in the examples below adapted from Schachter & Fromkin (1968:175).

3) Before vowel gemination Gloss After vowel gemination
Surface form

a. [pàípàì]   break   [pàápàì]   →   [pàápèì]

b. [dʑàídʑàì]   cease   [dʑèédʑàì]   →   [dʑèédʑèì]

We provide evidence in section 3 to show that low vowel raising to the mid vowels in disyllabic reduplicants is well attested in the Twi dialects as it is in the Fante dialect, as captured in earlier works by Dolphyne (1988), Obeng (1989), and recently Abakah (2004, ms), among others.

I propose a reanalysis of the pattern of Akan reduplication which will be done within the framework of the Optimality Theory (OT), focusing on vowel copying in the reduplicants. This has become necessary because of the limitation of similar earlier OT analyses of vowel raising in Akan

reduplication, particularly by McCarthy & Prince (1995a) and Kager (1999), to only CV RED forms. By this reanalysis, extension would be made to account for reduplicating disyllabic stems in which raising to two different vowel heights, that is, high and mid, is observed.

3. Akan vowel Raising: Data and Generalisations

The raising process usually occurs in both simple open monosyllabic CV structures, as has been analyzed in the literature (particularly Schachter & Fromkin 1968), and in closed disyllabic CVN structures. In both cases the V is a [+low] vowel which usually raises to a high vowel in the reduplicant. In this paper, I focus much attention on the height to which a stem-final [+Low] V raises in the reduplicant in open disyllabic CVV forms. Schachter & Fromkin (1968) provided a brief discussion of raising in this structure in which they concluded that vowel raising in disyllabic CVV is predominant in the Fante dialect, but absent in the Twi dialects. In this section, I provide data below from the Asante dialect of reduplicated verbs of CVV reduplicants showing a raising of the final V to a mid vowel to argue that the phenomenon is as productive in the other major dialects, particularly the Asante dialect, as it is in the Fante dialect. The vowel raising takes into cognizance two harmonies in Akan: Advanced Tongue Root (ATR) harmony and rounding harmony. Accordingly, the high vowel in the reduplicative prefix always agrees with the vowel in the stem in terms of the feature specifications: [αATR], [βback], and usually [nasal] according to Schachter & Fromkin (1968:156-157). Therefore, for instance, a mid front vowel in the stem will raise to a high front vowel in the reduplicant. Similarly, the low vowel /a/ in the stem/base will usually raise to a front high vowel /I/ in the reduplicant. In 3.1 are some examples of verb stems vowel raising processes observed in Akan. For the purpose of comparison between raising in closed syllable (i.e. syllable with nasal coda in the reduplicant) and nasal deletion in non-raising verb stems, I provide examples of the former structures in (4), (5), and (8). Again, I provide examples of verb stems with low vowel that raise to mid (not high) vowel in the reduplicant, to demonstrate the existence of such raising in Akan and Akuapem and and perhaps more importantly, to trigger further research into the earlier claims made about the process in Akan.

3.1 Vowel Raising in Reduplication

This subsection discusses the general vowel raising pattern observed in Akan reduplication. The discussions will be subdivided into reduplicating simple CV/CVN stems and other polysyllabic verb stems such as CVV/CVVN. It is worth noting here that all the verbs discussed in this paper are in their habitual state. As a practice in this paper, all the stem/base forms represent the underlying forms, while those under the reduplicated form represent the phonetic representation of the language.

3.1.1 Vowel Raising in CV/CVN Reduplicants

In both CV and CVN syllable reduplicants, similar height raising is observed since both stems contain the same number and quality of vowels that raise. Syllable weight does not make any difference here regarding the height a stem vowel raises to in the reduplicant, as seen in (4) and (6) below.

4) /a/ raises to [I]

	Base/Stem	Gloss	Reduplicated form
a.	dá?	sleep	dì.dá?
b.	mǎ̃ ?	give	mĩ̀ .mǎ̃ ?
c.	sá?	scoop	sì.sá?
d.	kán	read	kìŋ̀.kán
e.	táḿ	lift	tìǹ.táḿ
f.	báḿ	embrace	bìm̀.báḿ
g.	páḿ	sew	pìm̀.páḿ

From (4) above, the observation made about the pattern of raising can be expressed in a simple context-free phonological rule as in (5) below.

5) Context-free raising rule: /a/ raises to [ɪ]

[+low]→ [+high]

This rule states that root or stem /a/ raises to [ɪ] in the reduplicant. It is not only the low vowel that raises in the reduplicant in Akan reduplication. In (6) below, we see examples of the stem mid vowels raise to corresponding high vowels in terms of frontness. This raising takes into cognisance the roundness of the stem vowel.

6)   /ɔ/ raises to [ʊ]

	Stem/base	Gloss	Reduplicated form
a.	sɔ̃́	mend	sʊ̀.sɔ́ʔ
b.	dɔ́ʔ	weed	dʊ̀.dɔ́ʔ
c.	pɔ́ń	close	pʊ̀m̀.pɔ́ń
d.	tɔ́ʔ	buy	tʊ̀.tɔ́ʔ
e.	pɔ́ʔ	to bark	pʊ̀.pɔ́ʔ
f.	tɕɛ́ʔ	share	tɕì. tɕɛ́ʔ
g.	ɕɥɛ́ʔ	look at	ɕɥì. ɕɥɛ́ʔ

From (6) above, both mid back vowels (a-e) and mid front vowels (f-g) raise to the high back and high front vowels respectively in the reduplicant, thereby obeying the rounding harmony rule in the language. Like (4), example (6) can be expressed in another context-free rule in (7) below.

7) Context-free raising rule: /E/ raises to [I].

[-high, -low] → [+high].

The rule in (7) is also context-free, though the reduplicant vowel always harmonises with the stem vowel in terms of its roundness and ATR values. Our representation of the vowels in the rule in archiphonemes /E/ for front mid vowels and /I/ for front high vowels in this context stems from the fact that it is the ATR value of the stem mid vowel that determines the ATR value of the corresponding reduplicant high vowel.

McCarthy & Prince (1995a), in their analysis of the Akan reduplication data from Schachter & Fromkin (1968), question the pre-specification of the reduplicative prefix vowel with only the feature [+high] and not the mid-vowel. It is my suspicion that perhaps the inaccurate overgeneralization of the tongue height to which reduplicant vowels can raise was instigated by an earlier conclusion by previous authors on Akan reduplication that the reduplicant low vowels raise to mid vowels in data for reduplication in Akan. Particularly in Schachter & Fromkin (1968), the data on reduplication did not include those on raising to the mid vowels. All data were limited to those with raising to the high vowels in CV/CVN verb stems, that is, low vowel raising to high vowel and mid-vowel raising to high vowel. I provide below some examples of reduplicative prefixes in Akan where a low vowel also raises to the mid [not high] vowel, which is therefore specified for the feature [-high, -low], as in (6) below. Based on these examples, demonstrate that this phenomenon exists in the language, though it is perhaps not as productive as the simple CV structure raising to the high vowel as already discussed in the literature. In the following examples in (8), the low vowel in the stem can raise to the mid vowel in the reduplicant in the identified syllable structures.

3.1.2 Vowel Raising in CVV Reduplicants

Now turning our attention to stems with two vowels as in CV_1V_2 verb stems where the V_2 is a [+low], we observe that the V_2, which is [+low], raises to a mid [-low,-high] vowel in the reduplicant and not [+high] as was observed in (4) and (6) above. We provide examples in (8) below for illustration.

8) /a/ raises to [e]

Base/Root		Gloss	Reduplicated form
a.	sɥìá	imitate	sɥìé.sɥìà
b.	pjìá	push	pjìé.pjìà
c.	tjìá	step on	tjìé.tjìà
d.	tɥìá	block	tɥìé.tɥìà
e.	dɥìá	sow	dɥìé.dɥìà
f.	tɕjìá	make crooked	tɕjìé.tɕjìà
g.	bjìá	make marks	bjìé.bjìà
h.	tjĩ̀ã̀	shout at	tjĩ̀ɛ̃́ĩ.tjĩ̀ã̀
i.	pʷùá	force sth. on sb.	pʷùé.pʷùà
j.	ɕɥĩ̀ã̀	smell/sniff	ɕɥĩ̀ɛ̃́. ɕɥĩ̀ã̀
k.	mɟĩ̀ã̀	squeeze	mɟĩ̀ɛ̃́.mɟĩ̀ã̀
l.	ɕìá	meet	ɕìé.ɕìà
m.	dʑàí	stop	dʑèí. dʑàì~ dʑèé. dʑàì

In (8m), we see a deletion of the stem-final [+high] vowel in the reduplicant and a subsequent spreading of the [-high, -low] feature to fill the empty slot resulting from the deletion of the stem-final high vowel in the reduplicant.

In (9), (10) and (11) below, we see more examples of a-raising to mid vowels in the reduplicants of stems of different syllable structures. What this tells us is that /a/ raising to the mid vowel in reduplication in Twi (Asante) is as common as Abakah (ms) strongly asserts.

3.1.3   Vowel Raising in CVSV Reduplicants

9)   /a/ raises to [e] in CVSV

	Base/Root	Gloss	Reduplicated form
a.	ɕìrá	bless	ɕ̀ré.ɕ̀rà
b.	ʍùná	scare	ʍùné. ʍùnà
c.	dʑɥàrí	bathe	dʑɥèé.dʑɥàrì
d.	ɕɥàní	peel off	ɕɥèé.ɕɥànì
e.	sʲàní	descend	sʲèé.sʲànì
f.	dʑìná	stop	dʑìné.dʑìnà
g.	fʲìrá	drape	fʲr̀é.fʲr̀à
h.	tʲìná	sit	tʲìné.tʲìnà
i.	wùrá	enter	ɥr̀é. ɥr̀à
j.	kʷùrá	hold	kʷr̀é.kʷr̀à
k.	pʲìrá	hurt/injure	pʲìré.pʲìrà
l.	dʑɥàrí	bathe	dʑɥèé. dʑɥàrì

Unlike in the CV/CVN stems, a-raising in these examples is environmentally conditioned. In all the examples above, it is either preceded or followed by a [+high] vocalic segment in the stems.

3.1.4 Vowel Raising in CVVN Reduplicants

10)   /a/ raises to [e] in CVCV stem.

	Base/Root	Gloss	Reduplicated form
a.	ɕɥàní	'peel off'	ɕɥèé. ɕɥã̀ nĩ̌
b.	màní	'turn'	mɛ̃̀ɛ̃. mã̀ nĩ̌ ~ mɛ̃̀ɛ̃. mã̀ ĩ̌
c.	dʑɥàní	'run away'	dʑɥèé. dʑɥã̀ nĩ̌

3.1.5 Vowel Raising in CVSVN Reduplicant

11)   /a/ raises to [e] in CVSVN reduplicants.

	Base/Root	Gloss	Reduplicated form
a.	hìráḿ	'to yawn'	hʲr̀ɛ̃ɲ̃hʲr̀ǎ́ḿ
b.	tìráḿ	'be choked (by sth)'	tʲr̀ɛ́ɲ̃. tʲr̀áḿ

The examples show that a-raising is not restricted to a particular syllable structure of the stem, but can occur in any syllable at all. In all these a [+low] vowel co-occurring with a stem high vowel's raising can be stated in one rule as in (12) below.

12) Stem-final /a/ raising to [e] rule.

/a/ → [-high, -low, αATR] / [+high, +son, αATR] .

The phonological rule in (12) states that a stem or root /a/ raises to [e] when it co-occurs with a [+high] vowel. The position of /a/ in relation to the neighbouring vowels is not specified in the rule because it can either precede or follow the neighbouring vocalic segments. For instance, in (8m), (9e) and (10b), the stem low vowel precedes the neighbouring high vowels.

It is not only in reduplication that we observe this raising process in Akan. Boadi (ms, 2009) observes this raising pattern in some morphemes, particularly in the Fante dialect of Akan. He attributes this process within the lexical item to a neutralisation of height contrast within the Kwa languages' vowel harmony system. We briefly discuss this in 2.2 below.

3.2 *A-Raising* in the Verbal Root

With regard to the low vowel /a/ which is usually the vowel that is targeted for raising, Boadi (ms) explains that synchronically, the contrast between the [-ExP] /a/ and the [+ExP] /æ/ has been neutralized in root-final position in the Asante and Akuapem Twi dialects of Akan as well as other Niger-Congo (Kwa) languages, with the Fante dialect still maintaining the contrast. On the raising of the [+ExP] variant of the low vowel, Boadi (idem) continues that it usually raises to the nearest [+ExP] front vowel which in this case is /e/ in the Fante dialect but is maintained in the Twi dialect of Akan. The following are some of the examples adapted from Boadi (ms:3):

13)	Root	Twi	Fante	Gloss
a.	/ani/	[æni]	[enyi]	eye
b.	/asiedu/	[æsiedu]	[esiedu]	male name
c.	/boadu/	[bwædu]	[bwedu]	male name

This raising pattern has already been observed in the Twi dialects in reduplication as well where the final [+low] vowel of non-monosyllabic stem raises to a [-low,-high, +ATR] vowel in the reduplicant. A similar observation about raising to the mid vowel has also been made by Dolphyne (2006:130-131). This raises the question as to whether the neutralization of the two low vowels is resisted only in the Fante dialect as Boadi (ms) claims. If the claim is that the [+ExP] /æ/ does not raise only in root/stem words in the Twi dialect, then that is acceptable, but if this claim extends to the phonology of the language in general, then it raises questions as evidence from some reduplicated forms prove otherwise. Examples in

(14), largely a repetition of (8), are from Dolphyne (2006:130) and illustrate the low vowel to mid vowel raising in reduplication argument.

14)   Asante-Twi dialect[v]

	Base	form	Gloss	Reduplicated form.	Ill-forms
a.	sɥìá	imitate		sɥìé-sɥìà	?sɥìá-sɥìà
b.	pʲìá	push		pʲìé-pʲìà	?pʲìá.pʲìà
c.	ɥìá	steal		ɥìé-ɥìà	?ɥìá.ɥìà
d.	dzìná	stop		dzìné-dzìnã̀	?dzìnã̀.dzìnã̀
e.	kʷùsá	turn over		kʷùsé-kʷùsà	?kʷùsá.kʷùsã̀
f.	bʲìsá	ask		bʲìsé-bʲìsà	?bʲìsá.bʲìsà

Having discussed stem/base final low vowel raising in the reduplicant, I now turn my attention to discussing how the mid vowel is also copied to the reduplicant in CV1V2 template, where the V2 is a [-high, -low] vowel preceded by a [+high] vowel. The question is, what about stem/base final mid vowel /e/? Does it also raise in the reduplicant as the low vowel does, or does it maintain its height in the reduplicant? Judging from the behavioural pattern of both the mid and low vowels in monosyllabic reduplicants in Akan regarding raising, it could be predicted from hindsight that the reduplicant final mid vowel in disyllabic forms would raise to the high vowel as it does in monosyllabic reduplicants. We will soon see that a disyllabic stem-final mid vowel does not raise in the reduplicant as a low vowel does in a similar context.

The disyllabic stem-final /e/ undergoes complete copying into the reduplicant template. Therefore, reduplicants of CVV and CrV verbal stems maintain the vowel quality of all the stem vowels when copying. The following are some examples.

	15) Stem/base	Gloss	Reduplicated form.	Ill-forms
a.	tʲìé	listen	tʲìé-tʲìè	*tʲìí.tʲìèvi
b.	sʲìé	bury	sʲìé-sʲìè	*sʲìí.sʲìè
c.	pɥé	go out	pɥìé-pɥìè	*pɥìí.pɥìè
d.	ɥìé	finish	ɥìé-ɥìè	*ɥìí.ɥìè
e.	sɥìɛ́	to put down a load	sɥìɛ́-sɥìɛ̀	*sɥìí. sɥìɛ̀
f.	ɥìrɛ́	scratch surface	ɥrɛ́-ɥrɛ̀	*ɥrí.ɥrɛ̀
g.	fìrɛ́	call	fʲrɛ́-fʲrɛ̀	*fʲrí.fʲrɛ̀
h.	sìrɛ́	beg (for alms)	sʲrɛ́-sʲrɛ̀	*sʲrí.sʲrɛ̀
i.	pìrɛ́	touch	pʲrɛ́-pʲrɛ̀	*pʲrí.pʲrɛ̀

The *no-raising* of stem vowel pattern we observe of post-high mid vowels can be expressed in the rule formulation in (16) below. Let us note that the reduplicated forms from (15f-i) have a high vowel in the first syllable in the phonemic representation as shown in stem/base forms. They usually surface in emphatic or slow speeches.

16) Stem-final /e/ no-raising rule.

/e/ → [-high, -low, αATR] / [+high, +son, αATR] ___.

In the next section I formalise the raising processes observed within the framework of the Optimality Theory.

4. Analysis of Vowel Raising in Akan Reduplication

In my analysis of vowel raising in this paper, I adopt McCarthy & Prince's (1995) Correspondence Theory, which according to them, "extends the reduplicative copying relation of McCarthy & Prince (1993a) to the domain of input output faithfulness, and indeed to any domain where identity relations are imposed on pairs of related representations" (McCarthy & Prince 1995: 4). The full theory of reduplication involves correspondence between stem and base, between base and reduplicant, and between stem and reduplicant. It postulates that the relationship between participants in reduplication is the base and the reduplicant (BR identity) or input-output identity (IO identity) (McCarthy & Prince 1995:94).

In ranking vowel raising to mid-vowels there should be two important markedness constraints: OCP and *[-high]. For the former constraint, I refer to the height-specific OBLIGATORY CONTOUR PRINCIPLE constraint that militates against high vowels occurring together in two successive syllables (McCarthy & Prince 1995).

17) OCP(+high)

There should not be adjacent identical *elements* (+high vowels) in two successive syllables.

This constraint will ensure that a stem low vowel does not raise to high (the same height as an adjacent vowel in CVV) vowel in the reduplicant. The constraint should not be ranked above *[+Low]. It should be dominated by that constraint.

18) *[-high]

Vowels must not be non-high. There should not be vowels in forms (either stem or reduplicant) that are nonhigh.

 Faithfulness (B-R Identity) constraints:

19) IDENT-BR:

Base and Reduplicant should mirror each other closely

20) IDENT-IO(high):

Input and Output should share correspondence in terms of the Feature [±α high]

There is correspondence between segments in the input and those in the output in terms of vowel height. The feature value of the vocalic segment is not specified, implying that the value of the input vowel determines what that of the output should be for the conforming output forms.

In this paper, the target for constraints analysis is the reduplicant as a unit, but not the stem/root. Again, unlike in McCarthy & Prince's (1994) analysis, the focus of the discussion in this paper is the behaviour of vocalic melodies in reduplicants; therefore, less attention will be paid to the patterning of consonantal segments.

4.1 Analysis of CV Stem Reduplication

In this subsection, we will briefly analyse the reduplication of the CV reduplicative prefix. We will not elaborate further here since similar work has been done already in the literature, especially on why the reduplicant back consonant fails to palatalise when followed by a high front vowel as would have been expected in the general phonology of Akan. The marked difference between what I am doing here and what has already been done is that, I will focus on the behaviour of the reduplicant vowels in the process.

Tableau 1 presents an analysis of /a/ → [I] raising in CV/CVN reduplicants.

/RED-ka/	IDENT-IO(high)	*[-high]	IDENT-BR	OCP (+high)
a. ka-ka		**!		
b. tɕɪ-ka		*	**!	
c. ☞kɪ-ka		*	*	
d. kɪ-kɪ	*!			*

21) Ranking: IDENT-IO(high) >> *[-high] >> IDENT-BR, OCP (+high)

While the reduplicant of candidate (b) undergoes the phonological process of palatalisation, which is well observed in the general phonology of Akan, candidate (d), also a suboptimal output, undergoes what we can term *partial overapplication*. There is a raising of vowel height in the reduplicant as is expected, but this raising process back-effects the stem vowel which is immune from such a process in Akan CV reduplication, therefore making it the worst output which is indicated by its violation of the highest ranked constraint in this tableau. In the most harmonic candidate, (c), we observe an underapplication of palatalisation, though the requirement for high vowel raising in the reduplicant is satisfied. Though candidate (a) also violates only one constraint, as does candidate (c), it falls out of the competition due to its violation of the highest-ranked constraint, IDENT-IO (high).

It is important to note that as Abakah (2004) has noted about Akan reduplicated forms, the V_1 of a disyllabic reduplicant, where the V_2 is a low vowel, is almost always a [+high] vowel with an unspecified feature value for its backness property. This might account for or help explain why the language would always want to go for a nonhigh final vowel in the reduplicant. This also could be informed by the language's desire to avoid violating the OCP family of constraints that bars co-occurrence of two identical segments, be they vocalic or consonantal.

In tableau 2, we present an account of /ɔ/ → [ʊ] raising in CVN reduplicants.

/RED-pɔn/	IDENT-IO(high)	*[-high]	IDENT-BR	OCP (+high)
a. pʷɔn - pʷɔn		**!		
b. pʲɛm- pʷɔn		**!	*	
c.☞pʷʊm- pʷɔn		*	*	
d. pʷʊm - pʷʊn	*!			*

22) Ranking: IDENT-IO(high) >> *[-high] >> IDENT-BR, OCP (+high)

In tableau (2), candidate (d), which satisfactorily exhibits low vowel raising in the reduplicant, becomes the least harmonic candidate because it fatally fails to satisfy the highest-ranking constraint, IDENT-IO(high), though this is the only constraint it violates. The violation results from the candidate's 'overapplication' of the raising process. In that candidate, we observe that the reduplicant vowel, after it has been raised to high, spreads back to the stem vowel, so there is rightward spreading of vowel (height) quality after the raising process has applied—that is, from the reduplicant to the stem. Candidate (b) also becomes suboptimal because it fails to apply the raising rule in CV/CVN reduplicants where we would expect a [-high] vowel in the stem to raise to a [+high] vowel in the reduplicant. This failure results in the violation of the crucially ranked constraint, *[-high] that indiscriminately bans all nonhigh vowels from occurring in both the stem and the reduplicant. This constraint has to be dominated by IDENT-IO(high), other than that, a suboptimal candidate that over applies the raising rule such as candidate (d) will emerge as the surface form. The candidate violates the dominated IDENT-BR only once, i.e., through the change of the feature [+round] in the stem to the value [-round] in the reduplicant[vii]. Candidate (a) is similar to candidate (b) to a large extent. Though it commits violations of the least number of constraints and also has its reduplicant corresponding faithfully to the base, it becomes suboptimal for fatally violating the crucially-ranked *[-high] on two occasions. The mid vowel in both the reduplicant and

the base makes it violate that constraint twice. It is relatively better than candidate (b) on the grounds that it does not violate IDENT-BR, which candidate (b) does. Candidate (c) is the optimal output form, though it violates one extra constraint more than candidate (b) does. It wins the competition for optimality on the grounds of its incurrence of the *[-high] constraint once in addition to violating IDENT-BR once under the same circumstance as candidate (b). There is no ranking between IDENT-BR and OCP(+high), as their ranking would not participate in deciding the optimal candidate in the tableau analysis.

4.2 Analysis of Disyllabic CVV/CVCV Stem Reduplication

We observed in the data in 3.1.2 that in reduplicating CV_1V_2 where V_1 is a [+high] vowel and V_2, a [+low] vowel, V_2 raises to mid vowels, but not to high vowels as would be expected. Here, we will have to do some changes to our working constraints and subsequently our constraint ranking. In order to minimise the amount of violation we expect the output forms to incur, we will still need the markedness constraint on vowel height; this time not *[-high], but with a replacement that punishes candidates that surface with lows, *[+low]:

Markedness constraint on vowel height

23) *[+Low]

There should not be a low vowel.

This constraint is to ensure the low vowel does not remain *in situ* in the reduplicant in terms of height as in the stem, though a satisfaction of this constraint would result in a necessary and relatively less costly violation of a relatively lower-ranked BR Identity in order to satisfy the highly-ranking markedness constraint, *[+Low]. It is crucial for us to note that low vowel raising to mid vowel in the reduplicant will not violate this constraint. This will yield a suboptimal candidate for CV stem verb reduplication since we have already noticed that a stem-final low vowel is pre-specified for a high vowel in the reduplicant, but not a mid vowel.

Secondly, since in CVV reduplication the stem-final low vowel does not raise up to a high vowel when preceded by a high vowel, there is the need to rank the constraint that will punish any output form that raises the stem-final low to high within that context, hence, our higher ranking of OCP (+high) in relation to IDENT-BR. What this re-ranking implies is that avoiding the co-occurrence of an adjacent high vowel is more important than complete copying, whereby the reduplicant will map the base in terms of equality in number and quality of segments.

Tableau 3 is an analysis of /a/ → [e] raising in CVV reduplicants.

/RED-mia/	IDENT-IO (high)	OCP(+high)	*[+low]	IDENT-BR
a. mʲia-mʲia			**!	
b. mʲii-mʲia		*!	*	*
c.☞mʲie-mʲia			*	*
d. mʲie-mʲie	*!			

24) Ranking: IDENT-IO(high) >> OCP(+high), *[+low] >, IDENT-BR

The tableau in (3) accounts for post-high low vowel raising in disyllabic reduplicants. In the tableau, candidate (d), which 'over applies' the raising process, is the worst output form and for that matter, the first casualty due to its fatal violation of the high-ranking IDENT-IO (high) constraint. Though its reduplicant resembles the harmonic reduplicant output form in that it raises the stem-final [+low] to a [-high, -low] vowel in the reduplicant when it occurs after a high vowel, it extends this raising process to the stem form which makes the stem lose total correspondence with the input form. Though it fares better than the other candidates by satisfying the next highly-ranked constraint, *[+low], which all the others violate, being the sole violator of the highest-ranked constraint makes it the least harmonic. Candidate (a) on the other hand, copies faithfully every segment in the

stem into the reduplicant template. However, because of its violation of the relatively high ranking of the markedness constraint, *[+low] on two occasions, it also fatally falls out of the competition for optimality, though that is the only constraint it violates. Candidate (b) would have 'perfectly' satisfied what is popularly described in some literature on Akan reduplication as the stem low vowel's "prespecification" with the feature [+high] in the reduplicant (cf. Marantz 1982, McCarthy & Prince 1995, Kager 1999) as it raises a stem-final low vowel to a high vowel in the reduplicant, though it follows another high vowel in the adjacent syllable.

4.3 The Implications of Schachter & Fromkin's Raising in Twi Claim

The following are some of the implications of Schachter & Fromkin's (1968) Twi claim about Akan reduplication, especially the Twi dialects, to our analysis so far. The claim is that for Twi disyllabic stems, a final low vowel does not raise at all even when it is preceded by a high, an environment we have demonstrated conditions this raising to the mid vowels. So in the regular reduplication of an Akan (Twi) CV_1CV_2 stem, where V_1 is a [+high] while V_2 is a [-high] vowel, we would expect the stem final vowel to raise to a mid vowel as we saw in the data presented above. Using the constraint set we have been using for the analysis of the preceding tableaux

Tableau 4 analyses /a/ to [æ] raising in CV_1CV_2 reduplicant.

/RED-bisa/	IDENT-IO (high)	OCP(+high)	*[+low]	IDENT-BR
a. bʲisa-bʲisa	*!	*	* **!	
b. bʲisæ-bʲisa[viii]			**!	
c ☞bʲise-bʲisa			*	*
d. bʲise-bʲise	*!			
e. bʲisi-bʲisa		*!	*	*

25) Ranking IDENT-IO(high) >> *[+low] >>OCP (+high), IDENT-BR

For candidate (b), which is what Schachter & Fromkin's (1968) claim would predict to emerge as the actual surface form, we would have to re-rank the

constraints above and also introduce some additional constraint on vowel harmony (e.g., ATR). This will ensure that base-final /a/ does not raise, but changes its ATR value from [-ATR] to [+ATR] in the reduplicant. The constraint I shall employ is Bakovic's (2003) constraint on ATR, which is defined as follows:

26) *[+low, -ATR]:

Segments may not be simultaneously [+low] and [-ATR].

In tableau 5 is an analysis of /a/ to [æ] raising in CVCV reduplicant.

/RED-bisa/	IDENT-IO (high)	IDENT-BR	OCP(+high)	*[+low]	*[+low, -ATR]
a. bʲisa-bʲisa				**	**!
b. ☞bʲisæ-bʲisa				**	*
c. bʲise-bʲisa		*!		*	*
d. bʲise-bʲise	*!				
e. bʲisɛ-bʲisa		*!		*	*

27) Ranking: IDENT-IO (high) >>IDENT-BR(high) >>OCP (+high) >> *[+low, -ATR]

With this set of constraints ranking, all the output forms of CV_1V_2 or CV_1CV_2 structures in contexts where the V_2 is [+low] will never emerge as the most harmonic output in the reduplicant in the language. This would not be the true reflection of what the speakers actually produce when reduplicating stem verbs of those structures. By this ranking too, the targeted optimal candidate, that is, candidate (c) is even less harmonic than candidate (a) which faithfully reduplicates the stem in the reduplicant template. It incurs violation of the same constraints as candidate (e) with respect to the number of constraints and the frequency of violation, though it fares better than candidate (d), and is the least harmonic in this tableau.

The competition for optimality therefore falls to candidates (a) and (b). Both violate the same constraints; however, candidate (b) outranks (a) just on gradient violation marking grounds. While the former violates the last constraint once, the latter incurs the violation of the same constraint twice.

In the next subsection, I propose a common constraint set and a tableau to account for the raising processes observed in the different syllable structures so far discussed

4.4 Proposed Common Constraint Ranking for Vowel Raising in Akan Reduplication

In tableau 6 below, I propose a common tableau and a constraint ranking for the general low vowel raising pattern observed in different syllable structures discussed. We have been able to account for low vowel raising in CV stem verbs in which the [+low] vowel is pre-specified with [+high] in the reduplicant as well as in CV_1V_2 verbal stems where the post-high [+low] (i.e. V_2) raises to [-high, -low] in the reduplicant in tableau 6.

Tableau 6 presents an analysis of vowel raising in both monosyllabic and disyllabic reduplicants.

a. /RED-fa/	IDENT-IO (high)	*[+low]	OCP(+high)	IDENT-BR	*[-high]
i. fa-fa		**!			**
ii. fʲe-fa		*		*	**!
iii. ☞fʲɪ-fa		*		*	*
iv. fʲɪ-fʲɪ	*!		*		
b. /RED- pʷua/					
i. pʷua-pʷua		**!			**
ii. ☞pʷue-pʷua		*		*	**
iii. pʷui-pʷua		*	*!	*	*
iv. pʷue-pʷue	*!				**
v. pʷui-pʷui	*!		**		

28) Ranking: IDENT-IO (high) >>*[+low] >> OCP (+high) >> IDENT-BR >>*[-high]

The reduplicative pattern observed in tableau (6a) is very similar to what we saw in tableau (1) with the only difference being the change in the input CV form and a modification of the ranking of the constraints. Nevertheless, we still realise the expected output form in candidate (c) in the end. With the same set and the same ranking of constraints as used for reduplicating CV verbal stems in Akan, we are also able to account for reduplication of disyllabic verb stems of structures such as CVV and CVCV, as shown in the tableau (6b) above. A similar optimal output form that emerged in our analysis of reduplicating CV stems in tableau (3) surfaces as the winner candidate in tableau (6b) in candidate (6ii.b). We have introduced candidate (e) with regard to the fact that it is possible for the Gen(erator) function of the OT architecture to produce this kind of candidate. This candidate may only result from *overapplication* of low vowel raising, just like candidate (d).

3. Conclusion

This paper has discussed vowel (low) raising processes observed in the domain of Akan reduplication, particularly the Twi (Asante) dialect. We have seen that the stem vowel /a/ is almost always bound for raising in the reduplicant. We found out that a stem [+low] vowel raises to two main tongue heights in the reduplicant template depending on the configuration of the neighbouring vocalic melodies: (a) it raises to a high vowel (front) when it occurs in monosyllabic stems, (b) it raises to a mid vowel when it co-occurs with a [+high] vowel in disyllabic stems. It has also been shown in this paper that the earlier claims in the literature on Akan reduplication that a verbal stem final [+low] vowel does not raise in reduplicants in Asante and Akuapem Twi (as Abakah (ms) claims about CV stems and Schachter and Fromkin (1968) about CVV/CVCV stems) are not supported by the evidence that abounds in the language. I have shown, in this paper, that it is not only in CV structures that stem-final low vowel raises in the reduplicants, but also in disyllabic reduplicants, the same vowel raises to either [+high] or [-high, -low] depending on the height specification of the neighbouring vocalic segment. That is, when the surrounding vowel

is of the feature value [+high], the low vowel, most often than not, raises to [-high, -low] in the reduplicant. This variation in the height to which a reduplicant low vowel raises, I have explained, occurs as a result of the language's relatively high ranking of the OCP(+high) constraint that prohibits the co-occurrence of two high vowels in successive syllables. To satisfy this high-ranked constraint in particular, the optimal output form has to terminate its raised stem low vowel at the mid vowel whenever there is a surrounding high vowel in disyllabic verbal stem reduplication. This explains why reduplicated forms such as *bʲisi-bʲisa, *mʲii-mʲia, etc. are ill-formed in the Twi dialect of Akan. We have proposed a common constraints ranking and tableau to account for and also to show the parallelism that exists in all forms of raising in Akan (Asante Twi) verbal reduplication.

Endnotes

i   It is worth noting that the primary interest of analysis most of these works was the behavior of velar or back consonants before high front vowels in the reduplicant. This is where palatalisation fails to apply in a sequence of velar consonant + high front vowel in reduplication as would be expected in the general phonology of Akan. This phenomenon has been termed in the literature as "Underapplication" (after initial use by Marantz 1982).

ii   As we shall see in this paper, Anee and Iguae, two subdialects of Fante would rank this markedness constraint lower in order for outputs with adjacent high vowels to emerge in the surface representation.

iii   Recently conducted Population and Housing Census now estimates Ghana's population at 24 million. This implies that the number could shoot up significantly.

iv   The third place feature and value [-Back] is redundantly stated just to emphasize the point that raising to the mid-vowel in the reduplicant is most often to the front, though Schachter & Fromkin (1968) assert that sometimes the low vowel can surface as a [+high] back.

v   It is worthy to note that the original source of the data has been slightly modified in this paper by way of transcription.

vi   The forms under 'Ill-forms' are not completely ungrammatical in the entire language, but are in fact, well-formed in both Anee and Iguae, two subdialects of the Fante dialect of Akan according to Abakah (2004:193-199). This was later reiterated upon personal conversation I had with Prof. E.N. Abakah as well as Dr. Charles Owu-Ewie, both native speakers of the Fante dialect of Akan, later on after I presented this paper at the Faculty of Languages Education, University of Education, Winneba faculty seminar in 2010. My profound appreciations to them.

vii The change of the stem-final alveolar nasal to bilabial nasal in the reduplicant does not count as a violation of IDENT-BR because according to McCarthy & Prince (1994a:7fn), "Correspondence turns out to hold between elements that miss perfect identity for principled reasons". So we can argue that the reduplicant-final m corresponds to the stem-final n in that, the former has only assimilated place to the following labial consonant.

viii In tableau 4, our focus in assigning violation marks is on the vowel height specification and not ATR or tenseness specification. This is why candidate (b) does not violate IDENT-BR constraint.

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