

OPTIMIZING STRUCTURE: THE CASE OF THE ‘CrV’ SYLLABLE OF AKAN

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Abstract

This paper sets out to look into the ‘CCV’ syllable structure of Akan, specifically ‘CrV’, as to whether or not the seeming consonant cluster is phonological in the language. Following Dolphyne (1988), we attempt to discuss the issue with the claim that the ‘CrV’ structure of Akan is only a phonetic/surface realization through economy of expression (e.g. Bresnan 2001) motivation. In terms of Optimality Theoretic analysis (e.g. Prince and Smolensky 1993), an output-based approach to grammar, where the heart of the phonology consists of a hierarchy of ranked and violable universal constraints therefore, it is argued that where ‘CrV’ seems to have been realized, it is only so because of an application of an economy-motivated process of vowel elision that results in a syllable reduction and its subsequent fusion into a preceding one. The ensuing ‘CrV’ should thus be analyzed into ‘CV.CV’. Three factors; occurrence of /r/, attainment of vowel harmony and the specification of the feature high, are discussed as accounting for the realization of ‘CCV’.

Keywords: Akan, economy (of speech), syllable structure, vowel harmony, vowel height

1. Introduction

The only syllable in Akan (specifically, in Asante-Twi¹) with a consonant cluster(s) – i.e. ‘CCV’ – is the subject of discussion in this paper. We strive to explain in this paper that CCV is not a basic syllable structure in Akan and, for that matter, could not be phonologically attained in the language. We claim and endeavor to explain that CCV is realized only at the surface level (or in the phonetic representation) as the most economical form. The non-existence of CCV and, indeed, any other underlying consonant cluster in Akan is also illustratively noted by Dolphyne (1988: 52-54).

The non-existence of consonant clusters in Akan is immediately proved in the coda situation in the language. This is simply because the language has no closed syllable,

¹ Akan is a Niger-Congo language from the Kwa branch. It is a two-tone language (i.e., high and low; e.g., see (1)). Asante-Twi is one of the major varieties of Akan and it is the focus in this paper, although the name ‘Akan’ is used consistently in the paper as reference.

let alone one that exhibits a cluster.² Quoting Welmers (1973) and Pilote (1982), Kaye (1985), however, notes that the onset situation seems to defy our claim, as shown in (1).

(1)	<u>CrV</u>	
	bɾ'ɛ	'palm leaf'
	bɾɔ	'beatings'
	grá.á	'a kind of container'
	ɛ.sɾɛ	'type of weed'
	ɔ.brá	'life'
	ɲ.krù.má	'okro'

In appropriate sections, however, it will be contended that the seeming consonant cluster, as given in (1), has resulted from a phonological process that ends in a syllable reduction and a subsequent fusion of this reduced syllable into another. For exhaustive explanation of this, through the Optimality Theory framework (Prince and Smolensky 1993, Kager 1999 etc.), an output-based approach to generative grammar within which the phonology of a language is only sensitive to a hierarchy of language-specific ranked and violable universal constraints, it is argued in that the ensuing CCV structure should be phonologically analyzed into separate CV.CV syllables. Let us note in passing at this point that Akan has a number of syllable structures besides the CCV structure, which described as basic, with the common ones being V and CV, as in **abaa** 'a stick/cane', syllabified as **a.ba.a.** (i.e. V.CV.V).

The paper is organized as follows. In the following section **2**, we look into the CCV syllable structure of Akan with regards to its constitution. We proceed in section **3** to discuss how two factors (specifically, vowel harmony and the feature high) contribute to the realization of the CCV structure. In section **4**, comprehensive optimality theoretic accounts of phenomena that contribute to the realization of CC is observed. Under section **5**, we discuss other data of labial feature description to highlight the fact that CCV is only a surface representation of an underlying structure and that it is realized on attainment of the triggering factors discussed in section **3**. Section **6**, concludes the paper with the affirmation of the claim that the CCV syllable is only a surface level representation and, as such, it should be phonologically analyzed as such.

² A final consonant, which is often syllabic in nature, is discussed as constituting a separate syllable in Akan. See Dolphyne (1988: 53) for further explanation.

2. The 'CCV' Syllable Structure

As could be observed in the data given in (1) above (in section 1), the CCV syllable structure is only represented in the form of CrV³ in Akan. Indeed, the occurrence of CrV in Akan immediately presupposes that it is one of the underlying, basic or true syllable structures in the language. However, being the only realization of CCV in the language, it prompts interest as to whether it is indeed an underlying syllable structure or not. It based on this interest that it has become necessary to keenly observe and analyze CrV.

As noted earlier, it is contended here that CrV is only a surface realization of two CV syllable structures (specifically, CV.rV). We explain that, in its realization, there occurs an elision of the vowel in the preceding CV structure in an underlying string of two CV syllables. This elision results in a reduction in the preceding CV (to C-) and, in subsequence, it is incorporated into the succeeding CV structure, hence CrV. As Engstrand and Krull (2001) suggest, syllable reduction (as in the present case in Akan) is a characteristic of casual or normal speech. Thus, as delved into in section 3, observe that the CrV structure in Akan is only an economy-driven phonetic realization of a phonological form (i.e. CV.rV), which has become part of the phonology of the language.

To ascertain the realization of CrV, it is important to note however that a vowel in a preceding CV syllable is not elided to yield the surface structure of CrV in every instance or at speaker's will. As could be seen in (1), observe that it is only elided when the consonant in the succeeding 'CV' is the labio-dental approximant, [r], and this is in addition to other requirements on the vowel, as will be explained in section 3. It is also important to note that this case of syllable reduction and its subsequent incorporation into another (that results in a complex onset) is not unique to the Akan language. In Anyi, a language spoken in Cote d'Ivoire and closely related to Akan, Kaye (1985) and Gut et al. (2001: 3) observe that semi-vowels and liquids, occurring in the same environment as [r] (as in the case of Akan), also provoke emergence of CCV.

In a bid to establish that the CrV structure in Akan ensues from an underlying CV.CV structure, and for that matter only a surface structure, we look at more data in Akan and data from a related language called Nzema,⁴ which is also spoken in Ghana. In this direction, we identify and discuss two pieces of evidence noted as phonetic

³ Indeed, as will be looked at, CrV could still be discussed as two syllables based on tone bearing unit (TBU) analysis. That is, if tone is assigned to every individual syllable then Cr is a separate syllable from V.

⁴Nzema and Akan are closely related languages, both being members of the Tano family within Niger-Congo.

realization of CV.rV in other data of Akan and realization of CV.rV in Nzema, respectively explained in the following sections 2.1 and 2.2.

2.1 ‘CV.rV’ in Other Akan Data

In the data in (1), repeated in (2) for ease of reference, it is realized that the CrV syllable structure is phonologically represented (i.e. in the orthography) even though, as has already been explained, it is a surface structure; it has been reduced from a CV.rV string.

(2)	<u>CrV</u>	
	bɹ'ɛ	‘palm leaf’
	bɹɔ	‘beatings’
	grá.á	‘a kind of container’
	ɛ.sɹɛ	‘type of weed’
	ɔ̣.bɹá	‘life’
	ɲ.kɹù.má	‘okro’

Besides the case in (2), there are other words in Akan that also have the underlying CV.rV structure and this is maintained in the phonology. In other words, the phonetic form of CrV is not realized in the orthography; the vowel in the preceding syllable is not elided as in the data in (2). Examples are given in the first column of the data in (3).

(3)	CV.CV	→	[CrV]	*[CV.rV]	
	/ku.ro/		[kro]	*[kuro]	‘town’
	/kye.rɛ/		[tɛrɛ]	*[teɹɛ]	‘to show’
	/ <u>pi.re</u> .bu.o/		[<u>pre</u> .bu.o]	*[<u>pre</u> .bu.o]	‘nest’
	/be.rɛ/		[brɛ]	*[birɛ]	‘time’
	/ <u>n.so.ro</u> .ma/		[n. <u>sɹo</u> .ma]	*[n. <u>soro</u> .ma]	‘star’
	/ <u>a.go.rɔ</u> /		[a. <u>grɔ</u>]	*[a. <u>gorɔ</u>]	‘game/play’
	/ <u>a.tu.ru.te.ra</u> .sɛ.m/		[a. <u>tru</u> . <u>tra</u> .sɛ.m]	*[a. <u>turu</u> . <u>tura</u> .sɛ.m]	‘brutality’

From data collected, however, as could be seen in the second column of the data in (3), the phonetic form of CrV is what is realized as the optimal form in the normal or casual speech in terms of native-speaker intuition. As has been noted earlier, this explains that CrV generally obtains from two basic CV syllable structures, specifically CV.rV. In the same data, also observe that the phonetic realization of CV.rV is ill-formed and, for that matter, could not be optimized.

The realization of the CrV structure in (3) suggests that speech, and for that matter economy of expression (e.g., Bencivenga 1987; Bresnan 2001; Marfo 2009),

evidently supports its articulation even where the basic/underlying syllable structure (CV.rV) is represented in the phonology. Based on this fact, we claim that the CrV syllable structure is more of a phonetic form than a phonological one and has found its way in the phonology of the language through the motivation of economy of expression. Thus, it could be said that it is a phonological change; an occurrence that is not uncommon in active languages.

Indeed, in the syllabification of CrV in Akan, Cr and V constitute separate syllables. This is explained in terms of tone assignment. That is, tone is assigned to syllables (with the peak being the bearing unit) in Akan, as in many other tone languages. So, the fact that /r/ is assigned a tone explains that there has been a re-syllabification after the elision of the vowel in the preceding syllable, which has enabled a constitution of a separate involving /r/ and the consonant of the preceding syllable. In other words, it is assumed that /r/ became the bearer of the tone only because of the elision of the vowel that should have been before it in a preceding syllable; /r/ then absorbs the tone that is set afloat by the elision of a preceding vowel as the next most sonorous unit.

2.1 ‘CV.rV’ in Nzema

The other piece of evidence that explains the fact that the CrV structure in Akan results from an underlying CV.rV structure is one that pertains in Nzema. As noted earlier, Nzema is a language that is one way or the other related to Akan and, so, one could envisage some similarities. One of them that is pertinent to our analysis of the subject matter is the CV.rV structure. There are some word counterparts in Akan and Nzema that are same in terms of underlying syllable structure and in terms of meaning. However, they are set apart at the surface level; i.e. they are phonetically realized differently in the individual languages, as could be observed in the data in (4). Observe that while a vowel before a liquid (i.e., /l/ and /r/) is phonetically realized (or pronounced) in Nzema, it is elided in Akan.

(4)	Nzema		Akan			
	<u>CV.rV</u>	→	<u>[CV.rV]</u>	<u>CV.rV</u>	→	<u>[Cr.V]</u>
	tɛnlabeɛ		[tɛnlabeɛ]	tɛnábéré		[tɛnábɛ́]
	zolo		[zolo]	sóró		[sɔ́]
	sɛɛ		[sɛɛ]	sèrè		[sɛ̀]
	fili		[fili]	firi		[fɪ̀]
	buluwu		[buluwu]	bùrúù		[bɹú̀ù]
						‘abode’
						‘above’
						‘to beg’
						‘to credit’
						‘blue’

The data in (4) establish that, indeed, the Akan word counterparts are represented as CV.rV in the phonology, just like their counterparts in Nzema. Accordingly, they should be phonologically analyzed as such. As suggested earlier, however, the principle of economy of expression/speech demands the realization of CrV and

optimizes it. Thus, one could assume that while economy of expression applies in the CV.rV structure in Akan, it fails to do so in Nzema.

Within Optimality Theory (OT), two well-formedness constraints immediately conspire to evolve the desirable speech/phonetic form of the word in Akan. These are *Complex-by-Sonorance* and *No Complex Onset*, symbolized as ‘*V[σ r’ and ‘*[σ CC’ respectively and stated in (5).

- (5) a. *V[σ r: A vowel before a sonorant-initial (here, /r/-initial) syllable is not allowed.
 b. *[σ CC: A syllable must not have a complex onset.⁵

From discussions so far, it is obvious that Akan crucially ranks *V[σ r above *[σ CC in normal speech, as Tableaux I illuminate. With this ranking therefore, (phonetic) forms exhibiting the CrV structure (i.e. candidates (a)) emerge as optimal ones. In other words, any violation of *V[σ r is costly and takes a candidate out of contention, as candidates (b) and (c) are outdone; for having a vowel before /r/, these candidates fail optimization and, indeed, candidate (c) in Tableau I (c) fails *V[σ r twice for completely satisfying *[σ CC.

Tableaux I: *CV[σ r >> *[σ CC

a.	/a.gu.rɔ/	*V[σ r	*[σ CC
☞ a.	a.gr.ɔ		*
b.	a.gu.rɔ	*!	

b.	/a.tu.ru.ti.ra.se.m/	*V[σ r	*[σ CC
☞ a.	a.tru.tra.se.m		**
b.	a.tru.tu.ra.se.m	*!	*
c.	a.tu.ru.ti.ra.se.m	*!*	

3. Other Factors in Realizing ‘CrV’

It is indisputable that the occurrence of /r/ in a succeeding syllable is a major factor in the realization of the CrV structure. So, as can be witnessed in (6), where any other consonant is the onset of a succeeding syllable, CV.CV is rather maintained.

⁵ In the spirit of structural preservation, ‘*[σ CC’ is strengthened by the faithfulness constraint, MAX(seg) (e.g. McCarthy and Prince 1995). This constraint militates against deletion/elision, such that every segment in a given input has a correspondent in its output.

(6)	$CV.rV \rightarrow [CrV]$		$CV.CV \rightarrow *[CCV]$			
	<u>/ku.ro/</u>	[kro]	'town'	<u>/n.ku.to/</u>	*[n.kto]	'shea butter'
	/du.ro/	[dro]	'bunch'	/du.do/	*[ddo]	'concoction'
	/pi.ra/	[pra]	'to sweep'	/pi.pa/	*[ppa]	'to clean'
	/pɔ.rɔ/	[prɔ]	'to rot'	/pɔ.tɔ/	*[ptɔ]	'to blend'
	/ho.ro/	[hro]	'to wash'	ho.no	*[hno]	'to mash'

Two other pieces of phonetic information relating to vowels also come into play in the realization of CrV. One is attainment of advancement of the tongue root (ATR) harmony between the vowels in the syllables concerned (see (7)) and the other is the specification for the feature high (i.e., [+H]) by the vowel to elide (see (8)). Let us look into these issues of ATR harmony and vowel height and their motivation of constraints to evolving desired candidates in sections 3.1 and 3.2 respectively.

3.1. ATR Harmony and 'CrV'

Akan has ten phonetic vowels, which are classed into two distinct sets based on the tongue root position in articulation of each of the vowels (Berry 1957; Clements 1985; van der Hulst and van de Weijer 1995; Bodomo and Marfo 2006, etc.). With this description, a vowel is either produced with an advanced tongue root (noted as [+ATR]) or with a retracted tongue root (noted as [-ATR]). The [+ATR] vowels are [i, e, o, u, ɔ] and those of [-ATR] are [ɪ, ɛ, ɔ̄, ʊ, a]. In ATR harmony, it is required that all vowels occurring in a word must share a common ATR specification. It is important to note however that there are a few words in the language within which the harmony is violated (see (8) for example).

Evidenced in (7) is the point that the satisfaction of ATR harmony between the syllables concerned also contributes to the realization of CrV (specifically, [Cr.V] in terms of right syllabification) from the CV.rV in Akan. Following Marfo and Yankson (2008), we urge notice of the ATR feature description on the vowels in the syllables concerned and the satisfaction of ATR harmony between these syllables explains the realization of CrV; i.e. the vowel before /r/ deletes to realize CrV.

(7)	$[CV_{[+ATR]} \cdot CV_{[-ATR]}] \rightarrow [CrV]$		
	<u>[kɔ̄rɔ]</u>	[kɔ̄.ó]	'town'
	[teɪrɛ]	[teɪ.ɛ]	'to teach or show'
	[pɪ.rɛ.bu.o]	[pɪ.ɛ.bú.ó]	'nest'
	[bɪ.rɛ]	[bɪ.ɛ]	'time'
	[n.sɔ̄.rɔ̄.ma]	[n.sɔ̄.ó.ma]	'star'

[a.g <u>o</u> .rɔ]	[à.gr.ɔ́]	‘game or play’
[a.tu.r <u>u</u> .t <u>i</u> .ra.sɛ.m]	[à.tr.ù.tr.á.sé.m̃]	‘brutality’

The claim that ATR harmony satisfaction is involved in the realization of CrV in Akan is evident in the cases where the ATR harmony is violation. That is to say, there are some other words in the language where /r/ in a succeeding CV syllable obtains, i.e. CV.rV, yet CrV does not realize. As the data in (8) below illuminate, in these words, there is an apparent ATR disharmony between the vowels in the syllables concerned, since we have vowels from both sets of the ATR divide.⁶ The argument here therefore is that without a common ATR specification, CrV cannot be realized, as the ill-formed forms in column three explains.

(8)	Word	[CV _[∞ATR] .CV _[∞ATR]]	*[CrV]	
i.	pira	[pɪra]	*[pra]	‘to get hurt’
ii.	fira	[fɪra]	*[fra]	‘to wear or cover’
iii.	akurase	[a.ku.ra.sɪ]	*[a.kra.sɪ]	‘village’
iv.	abura	[a.bu.ra]	*[a.bra]	‘well’
v.	hura	[hu.ra]	*[hra]	‘to ferment’

3.2. The Property of Vowel Height

There is another case of words in Akan where we have the CV.rV and the satisfaction of the ATR harmony, but CrV is still not realized. The data in (9) illustrate some of these words.

(9)	Word	[CV _[∞ATR] .CV _[∞ATR]]	
i.	sore	[sɔ.ri]	‘to stand or to worship’
ii.	sohori	[so.hɔ.ri]	‘limpkin’ (a kind of long legged bird)
iii.	pori	[pɔ.ri]	‘to hit one’s foot on a stone’
iv.	yareɛ	[ya.ri.ɛ]	‘sicknesses’
v.	fereɛ	[fɛ.ri.ɛ]	‘shyness/embarrassment’

The situation in (9) presupposes that, aside from the occurrence of /r/ in the succeeding syllable and the satisfaction of ATR harmony between the syllables concerned, there is another factor that has a bearing on the analysis toward the realization of CrV. We observe that this factor has to do with vowel height. None of the vowels in the syllables preceding the one containing [r] in (9), which is supposed

⁶ As could be seen in (8), the disharmony in each case involves the [-ATR] central vowel [a]. It is argued in the literature (e.g., Clement 1985; Kager 1997) that the central vowels specify for a particular ATR feature underlyingly. Thus, each of them is described as opaque and blocks the spread of contrastive ATR specification from its left, as could be seen in (iii) and (iv) of (8). Details of this are however outside the scope of this paper.

to elide, specifies for the feature [+H]. This is unlike what pertains in the data in (1) – (8). Explaining in passing, let us note that Akan like many other languages has four high vowels; i.e., [i, ɪ, u, ʊ]. The highness of these vowels is confirmed by the height-based scale of sonority (e.g. Howe and Pulleyblank 2004; Kent and Read 2002), which is proven by both acoustic and aerodynamic evidence as cross-linguistically motivated (Parker 2002). With this height distinction between vowels, we explain that the vowel to elide must also specify for the feature [+H] as could be witnessed in (1) – (7) and has descriptively been exemplified in (10) for ease of reference. Otherwise, as could be witnessed in (11), a feature description of (9), the vowel stays put for the maintenance of the phonological CV.rV structure in the phonetic form as well. A phonetic form of CrV in this case is ill-formed as shown in column three of (11).

(10)	[CV _[+H] .rV]	→	[CrV]		
	<u>[ku_[+H].ro]</u>		<u>[kró]</u>	‘town’	
	[pi _[+H] .re.bu.o]		[prè.bú.ó]	‘nest’	
	[bi _[+H] .rɛ]		[bré]	‘time’	
	[n.sɔ _[+H] .rɔ.ma]		[n.sró.ma]	‘star’	
	[a.gɔ _[+H] .rɔ]		[à.gró]	‘game or play’	
(11)	[CV _[-H] .rV]	→	[CV.rV]	*[CrV]	
	<u>[sɔ_[-H].ri]</u>		<u>[sɔ.ri]</u>	*[sri]	‘to stand or to worship’
	[so.ho _[-H] .ri]		[so.ho.ri]	*[so.hri]	‘limpkin’
	[po _[-H] .ri]		[po.ri]	*[pri]	‘to hit one’s foot on a stone’
	[ya _[-H] .ri.ɛ]		[ya.ri.ɛ]	*[yri.ɛ]	‘sicknesses’
	[fɛ _[-H] .ri.ɛ]		[fɛ.ri.ɛ]	*[fri.ɛ]	‘shyness/embarrassment’

4. Further Constraining and Desired Candidates’ Optimization

With the additional pieces of information to the realization of CrV discussed in section 3, the present constraints and their ranking are not enough to account for the two phonetic forms of CrV and CV.rV. Thus, observe from Tableaux II (a) and (b) that the present constraints and their ranking evolve ill-formed candidates (a) as the optimal ones because the ATR (dis)harmony and vowel height specification of [+H] are not taken into account in Tableaux II (a) and (b) respectively.

Tableaux II: $*V[\sigma r] \gg *[\sigma CC]$

a.		/a.bu.ra/	$*V[\sigma r]$	$*[\sigma CC]$
	☀	a. a.bra		*
	☹	b. a.bu.ra	*!	
b.		/po.ri/	$*V[\sigma r]$	$*[\sigma CC]$
	☀	a. pri		*
	☹	b. po.ri	*!	

While the present constraints and their present ranking are not adequate to evolve the optimal candidates, it is obvious from Tableaux II that a mere switching of the constraints could optimize the desired candidates between the present candidates; i.e. the candidates with the form that maintain the CV.rV structure at the phonetic level. But, as could be observed in Tableaux III below, with just this constraint switch, there could be other candidates that would perform at par with the present winning candidates. Observe that the (added) candidates (c) satisfy $*[\sigma CC]$, just as candidates (b) do, and violate $*V[\sigma r]$ same as candidates (b). The issue then is, how do we set them apart with optimization of candidates (b)? This is where constraints that are motivated on the additional phonetic information/conditions of vowel harmony and vowel height cannot be ignored.

Tableaux III: $*[\sigma CC] \gg *V[\sigma r]$

a.		/a.bu.ra/	$*[\sigma CC]$	$*V[\sigma r]$
		a. a.bra	*!	
	☞	b. a.bu.ra		*
	☺	c. a.bo.ra		*
b.		/po.ri/	$*[\sigma CC]$	$*V[\sigma r]$
		a. pri	*!	
	☞	b. po.ri		*
	☺	c. pi.ri		*

As observed earlier in section 3, to realize CV.rV as the phonetic form against Cr.V, there must be ATR disharmony between the syllables concerned. In addition, we have also noted that, for CV.rV to remain as the phonetic form, the vowel in preceding syllable must not have the vowel height specification of [+H]. In terms of OT, these two pieces of information could be constrained as in (12), respectively symbolized as ‘IDENT-IO_[ATR]’ and ‘Parse $V_{[-H]\sigma}[r]$ ’.

- (12) a. IDENT-IO_[ATR]: ATR specifications of vowels in the output must be identical to those of the vowels in the input.
- b. Parse V_{[-H]σ[r]}: Pre-sonorant vowel should be parsed as [-H].

With the inclusion of the faithfulness constraint ‘IDENT-IO_[ATR]’ and the markedness one ‘Parse V_{[-H]σ[r]}’ in Tableaux III (a) and (b) respectively, even as the least ranked constraints, the candidates (b) in Tableaux II could now be satisfactorily evolved as the optimal ones, as could be observed on the following Tableaux IV.

Tableaux IV: *_σCC >> *V_{σr} >> IDENT-IO_[ATR]

a.

	/a.bu.ra/	* _σ CC	*V _{σr}	IDENT-IO _[ATR]
a.	a.br _a	*!		
☞ b.	a.bu.r _a		*	
c.	a.bu.r _a		*	*!

*_σCC >> *V_{σr} >> Parse V_{[-H]σ[r]}

b.

	/po.ri/	* _σ CC	*V _{σr}	Parse V _{[-H]σ[r]}
a.	pri	*!		
☞ b.	po _[-H] .ri		*	
c.	pi _[+H] .ri		*	*!

It could be observed from Tableau IV (a) that, while candidate (c) and the desired one, (b), perform equally with ‘*_σCC’ and ‘*CV_{σr}’, it is with respect to ‘IDENT-IO_[ATR]’ that candidate (c) is outdone. This is because of the fact that the vowels in the syllable in question harmonize; a case which should have resulted in the elision of the pre-sonorant vowel (e.g., as candidate (a) reflects). Also, in Tableau IV (b), candidate (c) loses to candidate (b) only on ‘Parse V_{[-H]σ[r]}’ because pre-sonorant vowel /i/ is a high one; a vowel height that the constraint forbid.

5. Labialization in ‘CrV’

So far, in the analysis of the CrV structure of Akan, we have argued for the underlying structure of CV.rV and the requirement of the two phonetic factors of vowel/ATR harmony and vowel height, without which CrV is not realized. In this

section, we bring in other data in Akan that seem to destabilize our analysis so far.⁷ It will become evident however at the end of discussions that these other data rather strengthen the arguments put forward that CrV obtains when the appropriate factors obtain in a CV.rV structure. Below in (12), observe some examples of the data in question. It is interesting to note that examples to this case are scanty and, for this reason, one could easily overlook them. However, their analysis with respect to the structures under discussion enables a better understanding of the realization of CrV.

(12)	CV.rV	→	[CV.rV]	
	kò.rá		[kò.ra]	‘calabash’
	kó.ʼrɔ́		[kò.rɔ́]	‘a skin disease’
	à.kó.ré		[à.kò.ra]	‘a branch’
	hù.rì		[hu.ri]	‘jump’

Based on the phonetic representation (or transcription) of the data collected, we contend that the CrV structure is actually realized in the data in (12) and this is explained as follows.

In (12), each of the vowels preceding the /r/-initial syllable is actually elided and this is evident in the phonetic form (see data in (14), a re-analysis of (12)). However, each seems to be intact because, before its elision, it had left and/or imparted its inherent feature of [+round] on the consonant with which it constitutes a syllable in the underlying structure. In other words, before its elision, the high and round vowel (in each case) causes the consonant with which it constitutes a syllable to be articulated secondarily with respect to its rounding in particular, thereby resulting in labialization of the consonant. This follows from a labialization rule in Akan and many other languages schematized in (13) below, which states that a consonant (C) is labialized (Lab) before a rounded vowel ([+R]); [u, ʊ, o, ɔ].

$$(13) \quad [C] \rightarrow [Lab] \quad \left/ \begin{array}{l} \text{---} \\ \text{V} \\ [+R] \end{array} \right.$$

As could be seen in (14) below therefore, CrV is realized in the phonetic form and that each pre-/r/ vowel is only somehow perceptible because it has induced labialization, ensuing the labialized consonants.⁸

⁷ In fact, examples constituting the data here are scanty. So, one could easily overlook them. However, their analysis with respect to the structures under discussion in this paper will enable a better understanding of the realization of CrV.

⁸ Observe that /r/ still absorbs the lexical tone of the elided vowel.

(14)		$[CV_{[+H].rV}] \rightarrow [C^w_rV]$	
	i. kò.rá	[kò.ra]	[k^wra] ‘calabash’
	ii. kó.[!]ró	[kò.rɔ]	[k^wrɔ] ‘a skin disease’
	iii. à.kó.ré	[a.kò.rɛ]	[à.k^wrɛ] ‘branch’
	iv. hù.rì	[hu.ri]	[h^wri] ‘to jump’

The trait left behind by the elided vowels gives room for the assumption that the vowels are maintained and, for that matter, CrV is not realized. But, as has been explained and could be seen in (14), the claim here is that CrV is indeed realized, specifically in the phonetic form. Observe in (i) **kora** for instance that the vowel [ɔ] is elided with the attainment of the ATR harmony (between it and the following vowel) and its specification for the feature [+H], as explained earlier. But, we also realize that the initial consonant /k/ is labialized as [k^w] via the vowel [ɔ] that is ultimately elided. Hence, we get the phonetic form, **[k^wra]**, not **[kò.ra]**. As we observed in section 3.1 and illustrated in the data in (7), if there had been a disharmony, as in word **kura** **[kɔrɔ]** meaning ‘to hold’ for instance, although we might still have the labialization taking place (i.e., **[k^wɔrɔ]**), the vowel preceding the /r/-initial syllable is intact.

5. Conclusion

It has been argued for the position that Akan does not have an underlying CrV syllable structure in this paper. We have explained that CrV, syllabified as [Cr.V] where necessary, is only a phonetic or surface representation which is realized from the CV.CV stringed syllable structure. We have looked into the structure of CV.CV and have observed that the consonant in the succeeding syllable must be the sonorant /r/ in order for CrV to be realized. Thus, the specific CV.CV structure of CV.rV has been established as the underlying structure.

Furthermore, in our bid to comprehensively establish how CrV is attained, we have also looked into other details (besides the occurrence of /r/ as the initial segment in a succeeding syllable) that are involved in its realization, particularly through optimality theoretic analysis which is to give a vivid picture of the realization of CrV or lack of it. In this direction, vowel harmony in Akan – i.e. the advancement of the tongue root (ATR) – and the feature specification of [+H] have been identified and discussed as the additional triggering factors, without which the realization of CrV will be ill-formed. We have explained that, for CrV to be desirably or optimally realized, ATR harmony should be attained between the vowels in the syllables concerned and also the vowel in the preceding syllable (of CV.rV) that is to elide should have the [+H] feature specification.

With a few other CV.rV data of labial orientation where there is a seeming distortion of the arguments, we have substantially shown that CrV is still realized in the phonetic form once ATR harmony between the syllables concerned and the [+H] specification is attained in the vowel of the preceding syllable. In the nutshell, we have arguably reasoned that, indeed, CrV is not an independent or a phonological syllable structure in Akan and that even where it is present at the surface level in the language (which has been suggested as due to the motivation of the economy of speech principle), it should be phonologically analyzed as CV.rV.

References

- Bencivenga, Ermanno, 1987. Economy of expression and the aesthetic pleasure. *Philosophy and Phenomenological Research*, Vol. XLVII, No. 4.
- Berry, Jack, 1957. Vowel harmony in Twi. *Bulletin of the School of Oriental and Africa Studies* 19.1: 124–30.
- Bodomo, Adams and Charles Marfo, 2006. The morphophonology of noun classes in Dagaare and Akan. *Studi Linguistici e Filologici Online* 4.2: 205-244.
- Bresnan, Joan, 2001. *Lexical-Functional Syntax*. Oxford: Blackwell.
- Clements, George N., 1985. Akan vowel harmony: A nonlinear analysis. In D. L. Goyvaerts (ed.) *African Linguistics: Essays in Honor of W. M. K. Semikenke*, pp. 55–98. Amsterdam: John Benjamins.
- Dolphyne, Florence A., 1988. *The Akan (Twi-Fante) Language: Its Sound System and Tonal Structure*. Accra: Ghana Universities Press.
- Engstrand, Olle and Diana Krull, 2001. Segment and syllable reduction: preliminary observations, *Working Papers in Linguistics* 49: 26–29. Lund University.
- Gut, Ulrike et al., 2001. Rhythm in West African tone languages: a study of Ibibio, Anyi and Ega. *Proceedings of the Typology of African Prosodic Systems Workshop* pp. 1-7. Bielefeld University, Germany.
- Howe, Darin and Douglas Pulleyblank, 2004. Harmonic scales as faithfulness. *Canadian Journal of Linguistics* 49:1-49.
- Kager, Rene, 1997. Rhythmic vowel deletion in optimality theory. In Iggy Roca (ed.) *Derivations and Constraints in Phonology*. Oxford: Clarendon Press.
- Kaye, Jonathan D., 1985. On the syllable structure of certain West African languages. In D. L. Goyvaerts (ed.) *African Linguistics: Essays in memory of M.W.K. Semikenke*, pp. 285-307. Philadelphia: John Benjamins.
- Kent, Ray D. and Charles Read, 2002. *The Acoustic Analysis of Speech*. 2nd Ed. Albany: Thomson Learning.

- McCarthy, John and Alan Prince, 1995. Faithfulness and reduplicative identity. *University of Massachusetts Occasional Papers* 18: 249-384.
- Marfo, Charles, 2009. *Aspects of Akan Grammar and the Phonology-Syntax Interface*. Saarbrücken: Lambert Academic Publishing.
- Marfo, Charles and Solace Yankson, 2008. The structure of the 'CCV' syllable of Akan. *Concentric: Studies in Linguistics* 34.2: 85-100.
- Pilote, Doris, 1982. Quelques processus tonals en agni. Ms. Montreal: UQAM.
- Prince, Alan and Paul Smolensky, 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. Technical Report RuCCS #2, Center for Cognitive Science, Rutgers University. Mass: MIT Press.
- Stewart, John M., 1982. Akan vowel harmony: The word structure conditions. *GLOT* 5.3: 321- 342.
- van der Hulst, Harry and Jeroen van de Weijer, 1995. Vowel harmonies. In John Goldsmith (ed.) *The Handbook of Phonological Theory*, pp. 495–534. Oxford: Blackwell.
- Welmers, William, 1973. *African Language Structures*. Berkeley, California: University of California Press.

