CVCV VERB TRUNCATION IN AKAN (TWI)[1]

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The theory of markedness is significant in what truncates and what is retained in CVCV verbs in Akan (Twi): a high vowel is truncated over a non-high vowel; a coronal consonant over a labial consonant; the segmental content(s) of a low-toned syllable over that/those of a high-toned syllable; and a high vowel cannot be truncated unless its values of ATR and rounding (coronality and labiality) are predictable from an abutting segment. CVCV verb truncation in Akan supports both the height-based scale of sonority: Low >> Mid >> High (Howe and Pulleyblank 2004), and the harmonic ranking of place: labial, dorsal >> coronal (Prince and Smolensky 1993). High vowels make worse nuclei than non-high vowels, and intervocalic sonorous consonants are dispreferred as onsets of an unmarked vowel. Truncation targets unmarked units and does so in a way that preserves lexical contrast and/or respects certain wellformedness conditions.

La théorie de l'accentuation est importante dans ce sens qu'elle jette de la lumière sur ce qu'on doit tronquer et ce qu'on doit garder tel quel dans la structure CVCV en langue Akan (Twi):une voyelle sonore doit être tronquée si elle est à proximité d'une voyelle muette; une consonne coronale est tronquée si elle se trouve en présence d'une consonne labiale; le contenu segmental d'une voyelle non-sonore est tronqué si celle-ci se trouve à proximité d'une syllabe sonore. Une voyelle sonore n'est pas tronquée à moins que les valeurs de l' ATR et ses environs (coronalité et labialité) soient prévisibles à partir du segment saillant. La troncature des verbes en Akan se fait aussi bien sur la base de l'échelle de la sonorité: bas>>moyen>>haut (Howe et Pulleyblank, 2004) qu'en fonction du classement harmonique: labial, dorsal>>coronal (Prince et Smolensky, 1993). Les voyelles sonores font les pires noyaux que les voyelles non-sonores, et les consonnes intervocaliques sonores sont considérées comme les indices d'une voyelle muette. La troncature vise des unités non-accentuées et le font d'une manière à préserver les contrastes lexicaux tout en respectant certaines conditions de la bonne forme.

0. INTRODUCTION

CVRV (disyllabic) verbs in Akan (Twi) have truncated alternations such as: #CV, CCV, CVC, CV_1V_1 and CVV.[2] Unfortunately, the works that have focused or touched on this area of Akan phonology (Schachter and Fromkin 1968; Dolphyne 1988; Abakah 2005) do not identify every truncated output listed above, and also do not discuss the motivations for CVRV-verb truncation and non-truncation in Akan (Twi). For example, **pɪ̀rá** 'to sweep' and **pìrá** 'to get hurt' both have an initial vowel which is high and a second vowel which is low;

[1] This paper was first presented at the Annual Conference on African Linguistics (ACAL 41) which was held in University of Toronto, Canada, in 2010. This paper benefited from travel support and summer salary support from the University of Wisconsin Graduate School. I am really thankful to the University of Wisconsin Graduate School for these offers; the travel support allowed me to present this paper at this important conference on African linguistics, while the summer award allowed me to develop the paper into its present form.

[2] The "R" in CVRV stands for sonorants, namely /**r**, **n**, **m**, **w**/. A sequence of identical vowels is subscripted as V_1V_1; a sequence of non-identical vowels is without subscript. #CV represents the initial consonant-vowel of a CVCV form.

while it is possible for **pɪ̀rá** 'to sweep' to truncate to CrV (i.e. **pràá** 'to sweep'), **pìrá** 'to get hurt' does not truncate to CrV (i.e. **pràá**). The primary goal of this paper is to establish the conditions and the motivation(s) for truncation and non-truncation of CVRV verbs in Akan focusing on three Twi dialects of Akan, namely Akuapem (Ak.), Akyem (Aky.) and Asante (As.). Akan, which is spoken mainly in Ghana, belongs to the New Kwa language family and, also the Niger-Congo phylum (Williamson and Blench 2002). The verb forms under consideration have the basic structure, CVwV, CVmV, CVrV, and CVnV. The second consonant of these verbs is a sonorant, namely: /**r, n, m, w**/. I have omitted verb forms with the structure, $CVC_{[-SON]}V$, (e.g. **hàtá** 'to dry', **bìsá** 'ask') – i.e. disyllabic verbs without the intervocalic sonorous consonant – because they do not truncate. The paper is organized into five sections. Section one provides the relevant background on Akan phonology. Section two outlines and describes the CVRV verb truncation data according to dialect. Section (3) has linear and non-linear/autosegmental (Goldsmith 1976, 1990) representations of the (dialect-specific) truncation data as described in section (2). Section four presents the CVRV verb truncation data within the theory of markedness (Trubetzkoy 1939, 1969; Jakobson 1941, 1968; Rice 2007). In this section, I show the importance of the theory of markedness to CVRV verb truncation. Specifically, I show how markedness and well-formedness conditions/principles interact to derive truncated outputs. Section five is the conclusion.

1. A PHONOLOGICAL BACKGROUND – AKAN (TWI)

Following is a brief discussion of vowels, consonants, syllables and tones of Akan based largely on Dolphyne (1988) and Ofori (2008). The Twi dialects of Akan under consideration, namely Akuapem, Akyem and Asante have nine oral vowel phonemes as displayed in the table in (1).

(1) Vowel Phonemes in Akan (Twi)

Phonemes	/**i**/	/**u**/	/**ɪ**/	/**ʊ**/	/**e**/	/**o**/	/ɛ/	/**ɔ**/	/**a**/
High	+	+	+	+	-	-	-	-	-
Low	-	-	-	-	-	-	-	-	+
Rd/Bk/Labial	-	+	-	+	-	+	-	+	-
ATR	+	+	-	-	+	+	-	-	-

Akan operates [+ATR] harmony in which a [+ATR] vowel (e.g. **/i, u, o, e/**) causes a [-ATR] vowel (**/ɛ, ɔ, a, ɪ, ʊ/**) in its neighborhood to become [+ATR] ([**e, o, æ, i, u**] respectively). In (2) is an exemplification of [+ATR] assimilation in Akan (Twi).

(2) [+ATR] harmony in Akan

Underlying		becomes	Surface	Processes
a	**yɛ-di** 'we-eat'	→	[**yedi**]	(/**ɛ**/ changes to [**e**])
b	(i) **ɔ-di** 's/he eats'	→	[**odi**]	(/**ɔ**/ changes to [**o**])
	(ii) **ɔ-se** 'shout of victory'	→	[**ose**]	(/**ɔ**/ changes to [**o**])
c	**ba-du** 'tenth born'	→	[**bædu**]	(/**a**/ changes to [**æ**])
d	**mɪ-si** 'I-wash'		[**misi**]	(/**ɪ**/ changes to [**i**])
e	**mʊ-su** 'you.plural cry'	→	[**musu**]	(/**ʊ**/ changes to [**u**])

The low central unadvanced vowel, /**a**/, is realized as [**æ**] ([+ATR]) before /**i**/ and /**u**/ (Boadi 1963, 1991; Dolphyne 1965, 1988; Stewart 1967, 1970; Schachter and Fromkin 1968; Andoh-Kumi 1977; Clements 1981, 1985, 2002; Obeng 1989; 1995; and Abakah 2002). This brings the total number of oral vowel phones in Akan (Twi) to ten, namely [**i, ɪ, u, ʊ, e, o, ɛ, ɔ, a, æ**].

Akan operates rounding harmony known to apply regressively in Fante verbal constructions. Fante is a dialect of Akan just like Twi; Akuapem, Akyem and Asante, in discussion here, are subdialects of Twi. [+Round] harmony applies progressively in the Akyem and Asante subdialects of Twi. For example, the underlying forms, **/ataadɪ/** and **/gããnãfʊ**/, in Akuapem Twi, are realized as [**ataadɪɛ**] and [**gããnãfʊɔ**] respectively in Akyem and Asante Twi. That is, the emphatic suffix {**-ɛ**} is realized as [**-ɛ**] (non-round) when the preceding vowel is non-round, and, as [**-ɔ**] when the preceding vowel is round (Ofori, 2006a:28, 2006b: 32).

There is also vowel nasalization in all three Twi dialects of Akan. A vowel is nasalized (˜) when it precedes or follows a nasal consonant. Dolphyne (1988) identifies five nasal vowel phonemes in Akan, namely: **/ĩ/, /ɪ̃/ /ã/, /ʊ̃/** and **/ũ/.** Nasal vowels contrast with their oral counterparts (**/i/, /ɪ/, /a/, /ʊ/** and /**u**/ respectively) after voiceless (non-nasal) consonants in Akan. For example, **kà** 'bite' contrasts with **kã̀** 'utter/say' because of the vowels, /**a**/ and /**ã**/. Mid vowels are inherently [-Nasal], (Dolphyne 1965, 1988; Cahill 1985; Abakah 2002, 2005), and, owe their nasality to an abutting consonant.

Dolphyne (1988: 18, 48) identifies 30 consonant phones, and eighteen consonant phonemes in Akan. This viewpoint is adequate for the current paper which focuses on processes involving just four sonorous consonants in Akan, namely **/m/**, **/n/**, **/r/**, and **/w/**. Following in (2) is a brief feature description of some consonants in Akan.

(2) Aspects of Akan (Twi) consonants

	r	**n**	**m**	**ŋ**	**w**	**f**	**s**	**ɕ**	**h**	**p**	**b**	**t**	**d**	**k**	**g**	**t ɕ**	**d ʑ**	**t ɕ ɥ**	**d ʑ ɥ**	**j**
SON	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CONT	+	-	-	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	+
ANT	+	+	+	-	-	+	+	-	-	+	+	+	+	-	-	-	-	-	-	-
LAB	-	-	+	-	+	+	-	-	-	+	+	-	-	-	-	-	-	+	+	-
COR	+	+	-	-	-	-	+	+	-	-	-	+	+	-	-	+	+	+	+	+
DOR	-	-	-	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
NAS	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

All Akan consonants can occur in word-initial position but only /**m**, **n**, **r**, **w**/ can occur in word-final position (Dolphyne 1988: 31). According to Abakah (2005), a word-final consonant, in Akan, is CV# at the underlying level; a word-final consonant is the direct result of the delinking of the lexical postsonorant word-final [+High] vowel. However, Abakah is unable to account for why the rule does not apply to delete the final high vowel of the words, **tṹmḯ** 'to be able to,' **hṹmḯ** 'to breathe,' **pḭ̃nḯ** 'to agree to,' for example, in the Twi dialects. His viewpoint that a word-final consonant in Akan is CV# at the underlying level is diachronically true, but, not synchronically so for **CVŋ** forms in Akuapem Twi, for example; this is discussed in section two. On the surface, [m] occurs in word-final position in all dialects of Akan. [**n**] and [**r**] occur in word-final position in Fante but not in the Twi dialects. Akuapem Twi has [ŋ] as word-final as opposed to [**n**] as word-final in Fante. The consonants [**n**] and [ŋ] are never word-final in Akyem and Asante – words that end in [n] in Fante, and, in [ŋ] in Akuapem, rather end in a nasal vowel in Akyem and Asante Twi. The nasal vowel is one of the following, **[ũ, ʊ̃, ĩ, ɪ̃],** depending on the [Round] and the [ATR] value of the vowel that precedes it. **/r/** is never word initial at the underlying level. **/w/** occurs in verb final position in Akuapem (Twi) and Fante, but not in Akyem and Asante Twi.

Akan has two contrastive tones, namely /◌̀/, a Low tone (L), and /◌́/, a High tone (H), as in **dà** 'never' vs. **dá** 'day,' respectively. Akan has a downstepped high tone, !H, as in the word **kó!kó** 'hill' (i.e. [H!H]). A downstepped high tone – represented as !H – has been analyzed as the fusion of a floating low tone and a following high tone – i.e. H^{L}H becomes H!H (Dolphyne 1988). The second of two high tones is downstepped – i.e. lowered in pitch – by an intervening-floating low tone (L). Most Akanists treat the downstepped high tone as an allotone of the high tone in the domain described above. Of relevance to the current analysis is the high vs. low tone contrast. The syllable is the tone bearing unit as argued by Dolphyne (1988), and this is accepted in the current paper. Akan does not allow more than one tone (i.e. a contour tone) on one syllable. As a syllable cannot carry two tones, simultaneously, if there are two different tones on adjacent syllables, this is grounds for avoiding truncation.

The basic syllable types in Akan are V, CV, and C (Dolphyne 1988: 52) as in **à.dʊ́** 'a name,' which is V.CV, and **kà.ŋ́** 'read' CV.C (in Akuapem); 'a dot' marks syllable boundary. A word final consonant (**w, m, n, ŋ, r**) is considered syllabic in the present paper by the fact that it carries its own tone. That is, the fact that a word final consonant (e.g. **w, m, n, ŋ, r**) carries its own tone is the rationale for analyzing CVC as disyllabic, and, consequently, for syllabifying a word like **àdʊ́ḿ** 'grace' as V.CV.C , three syllables, as opposed to V.CVC, two syllables.[3]

2. DESCRIPTION OF THE CVRV VERB TRUNCATION DATA

This section outlines the phonological processes involved in $CVC_{[+Son]}V$ verb truncation in the three dialects of Akan (Twi), namely Akuapem (Ak), Akyem (Aky) and Asante (As) Twi. The section is subdivided into: (2.1) truncation in cvrv-verbs – the cvrv-verb truncation occurs in all three dialects of Akan: Akuapem, Akyem and Asante Twi; (2.2) truncation in **cvmṽ**-verbs – the **cvmṽ**-verb truncation, also, occurs in all three dialects of Akan; (2.3) truncation in cvwv-verbs – truncation of cvwv-verbs occurs in Akuapem only; and (2.4) truncation in **cvnṽ**-verbs, which occurs only in Akyem and Asante.

2.1 TRUNCATION IN CVRV-VERBS IN ALL THREE DIALECTS OF AKAN – AKUAPEM, AKYEM AND ASANTE

From (4) to (8) are the cvrv data. The verbs in (4) are low-toned and the first and the second vowel are both [+high] and also agree in being either [–round] (coronal) or [+round] (labial). That is, these verbs have the structure: $\mathbf{cv}_{[+hi,\ \alpha ATR,\ \beta Round]}\mathbf{cv}_{[+hi,\ \alpha ATR,\ \beta Round]}$ and truncate to either **crv** (with an initial high vowel truncated) in (4-ii), or **cv** (with **/r/** and a final high vowel truncated) in (4-iii), but do not truncate to ***cvr.**

(4) $\mathbf{cv}_{[+high]}\mathbf{rv}_{[+High]}$ data

	Non-truncated form	Truncated form		English Gloss
	(i) **cvrv**	(ii) **crv**	(iii) $\mathbf{c_1v_1}$	
a.	**fi̩ri̩**	**fri̩**	**fi̩**	come from/out
b.	**pɪrɪ**	**prɪ**	**pɪ**	be impatient
c.	**kʊrʊ**	**krʊ**	**kʊ**	unite/ coalesce
d.	**hʊrʊ**	**hrʊ**	**hʊ**	boil, bubble

[3] A final consonant in Akan is never a part of the syllable before it. The final consonant in Akan can be pronounced separately with its tone, e.g. **a-dʊ-m.** There is also evidence from borrowed words – monosyllabic CVC words in English are realized as CVCV in Akan. For example, 'map' becomes **mapʊ́** in Akan; the word 'yam' is pronounced **jamʊ.** If the language treats a final consonant as part of the preceding syllable then there will be no need for these insertions.

The CVRV verbs in (5) have a low-high tone. The first vowel of these verbs is always a high vowel as in column (5-i) where we have the non-truncated forms. The first and the second vowel agree in their values of ATR or rounding. For example, vowels of verb forms from (5a) to (5c) are both [-ATR] and [-Round]; vowels of verbs from (5d) to (5f) are both [+ATR] and [-Round]; verbs from (5g) to (5-letter-i) are [+ATR] and [+Round]; whereas vowels in (2j) **pʊ̀rɔ́** 'rot' agree in being [-ATR] and [+Round]. The second vowel is either high or non-high. In summary, CVRV-verbs, in (5), with low-high tones and first vowel high, truncate to **cr̀v́**, but do not truncate to ***cv** (**i.e.** ***cv,** or ***cv̀́**), nor ***cv̀ŕ.**

(5) $\mathbf{cv}_{[+\mathbf{high}]}\mathbf{rv}_{[\pm\mathbf{High}]}$ data

	(i) Non-truncated form	(ii) Truncated form	English Gloss
a.	**pɪ̀rɪ́**	**pr̀ɪ́**	contend for
b.	**pɪ̀rá**	**pr̀á**	sweep
c.	**fɪ̀rɛ́**	**fr̀ɛ́**	call
d.	**fi̇̀rí**	**fr̀í**	sell on credit
e.	**pi̇̀ré**	**pr̀é**	blow away
f.	**hwi̇̀rí**	**hwr̀í**	to jump
g.	**kʊ̀rʊ́**	**kr̀ʊ́**	cover up
h.	**tʊ̀rʊ́**	**tr̀ʊ́**	carry at the back
i.	**hʊ̀rɔ́**	**hr̀ɔ́**	hoot
j.	**pʊ̀rɔ́**	**pr̀ɔ́**	rot

The CVRV verbs in (6) are similar to those in (5) in having a low-high tone and an initial high vowel. Though the initial vowel of verbs in (6) is high just like that of verbs in (5), forms in (6), unlike forms in (5), cannot be truncated to **cr̀v́.** Verbs in (6) are different from those in (5) in the sense that the initial and final/second vowels of verbs in (6) do not harmonize in their values of ATR and/or rounding.

(6) Aspect of $\mathbf{cv}_{[+\mathbf{high}]}\mathbf{rv}$ **data**

a.	**hʊ̀rí** to jump	d.	**kʊ̀rá** hold/handle
b.	**kʊ̀rí** cut leaves	e.	**kʊ̀rá** to save
c.	**pi̇̀rá** to get hurt		

In (7) cvrv forms have either a low-low tone (i.e. from (7a) to (7e)) or a high-high tone (from (7f) to (7p)). Verb forms here are similar in having an initial vowel which is non-high. The second/final vowel is always a high front/non-round vowel. The two vowels harmonize in their values of ATR. Forms in (7), just like those in (6), do not truncate.

(7) **cv$_{[-high]}$rv$_{[+High]}$ data**

a.	**fɛ̀rɪ̀** flourish	**i.**	**fɛ̀rɪ́** to respect, revere
b.	**sɔ̀rɪ̀** be careful	**j.**	**fɔ̀rɪ́** mix up
c.	**hɔ̀rɪ̀** heave	**k.**	**sɔ̀rɪ́** rise
d.	**bàrɪ̀** coil	**l.**	**hàrɪ́** to paddle
e.	**wɔ̀rɪ̀** take off the skin	**m.**	**kæ̀rí** to weigh
f.	**pòrí** to challenge by striking	**n.**	**sàrɪ́** to thwart, hinder, intercept
g.	**dʒʊɛ̀rɪ́** to crush, destroy, kill	**o.**	**dʒʊàrɪ́** bathe, swim
h.	**pɔ̀rɪ́** challenge by striking	**p.**	**wàrɪ́** marry

Aspects of **cv̀$_{[-high]}$rv̀$_{[+high]}$** verb forms in Akuapem Twi as in (8-i) are realized as cv̀$_{[-high]}$ (as in 8-ii) in Akyem and Asante Twi. The Akyem and Asante forms seem to have achieved lexicalization in the sense that Akyem and Asante do not use the cvrv forms in Akuapem any longer. In the same vein, speakers of the Akuapem dialect do not use the cv forms in Akyem and Asante Twi.

(8) **cv̀$_{[-high]}$rv̀$_{[+High]}$ data**

	(i) Akuapem	(ii) Asante and Akyem	English Gloss
a	**tɸɛ̀rɪ̀**	**tɸɛ̀**	endure
b	**tàrɪ̀**	**tà**	block a hole
c	**tɸʊàrɪ̀**	**tɸʊà**	intercept
d	**dɛ̀rɪ̀**	**dɛ̀**	glow
e	**dɔ̀rɪ̀**	**dɔ̀**	increase
f	**tɔ̀rɪ̀**	**tɔ̀**	to fall
g	**wàrɪ̀**	**wà**	be long

I do not focus on data (8) in the present study because the cvrv and the cv forms are not in alternation in any dialect – a dialect has either CVRV (in Akuapem) or CV (in Asante and Akyem), but not both. For the present study I

focus solely on truncated forms that have not achieved lexicalization but that are in alternation – or used interchangeably – with their full/non-truncated forms.[4]

2.2 TRUNCATION IN CVMV-VERBS IN ALL THREE DIALECTS OF AKAN

In (9) and (10) are cṽmṽ verbs for all three dialects of Akan. Forms in (9-i) truncate to (9-ii) cṽm, but forms in (10) do not undergo truncation. In (9) where cṽmṽ verbs truncate to cṽm, the final vowel that deletes is high and has to agree with the preceding consonant (i.e. **/m/**) in labiality. The deleting final-high vowel and the initial vowel always agree in their values of ATR, but not necessarily in rounding – for example, from (9e) to (9k), the initial vowel is [-round] and the final vowel [+round]/[Labial]. The tone of the affected syllable (i.e. the final-CV-syllable) can be either a low tone as in (9a) to (9j) or a high tone as in (9k); examples are **pà̰m̀** 'sew' in (9j) and **pà̰ḿ** 'drive away' in (9k) respectively.

(9) **cvmv**$_{[+\textbf{High/LAB}]}$ **data**

	(i) Non-truncated form	(ii) Truncated forms	Eng. gloss
a.	**dʊ̰̀mʊ̰̀**	**dʊ̰̀m̀**	favor
b.	**kʊ̀mʊ̀**	**kʊ̀m̀**	kill
c.	**dɔ̰̀mʊ̰̀**	**dɔ̰̀m̀**	join group
d.	**sɔ̰̀mʊ̰̀**	**sɔ̰̀m̀**	protrude
e.	**hɪ̰̀mʊ̰̀**	**hɪ̰̀m̀**	blow nose
f.	**tɪ̀mʊ̀**	**tɪ̀m̀**	be firm
g.	**fɛ̰̀mʊ̰̀**	**fɛ̰̀m̀**	borrow
h	**sà̰mʊ̰̀**	**sà̰m̀**	scattered
i	**tɕɥà̰mʊ̰̀**	**tɕɥà̰m̀**	pine
j	**pà̰mʊ̰̀**	**pà̰m̀**	sew
k	**pà̰mʊ́**	**pà̰ḿ**	drive away

That is, the fact that the second/final vowel is high and also harmonizes with the preceding consonant in labiality is the condition for the truncation to **cṽm** truncation and explains why forms in (10) do not have the **cṽm** alternation.

[4] The #cv forms in Akyem and Asante in (5) have the structure, either #c$_{[-\text{Cont}/+\text{Cor}]}$v̀$_{[-\text{High}]}$ or #c$_{[+\text{Cont}/-\text{Cor}]}$v̀$_{[+\text{Low}]}$ – the final /rV$_{[-\text{round}/+\text{high}]}$/ might have deleted after either the initial #c$_{[-\text{Cont}/+\text{Cor}]}$v̀$_{[-\text{High}]}$ or #c$_{[+\text{Cont}/-\text{Cor}]}$v̀$_{[+\text{Low}]}$ syllable.

(10) **cv̀mv́** data

a.	**gyì mí** to be stupid	f.	**kyì má** to turn, menstruate
b.	**kà mí** to withhold/keep from	g.	**bù má** take by force
c.	**dù mí** to curse	h.	**pù má** charge or load a gun
d.	**hù mí** to breathe, rest	i.	**sù má** send someone
e.	**tù mí** to able to	j.	**nyà má** to beckon

The second/final vowel of **cv̀mv̀** verbs from (10a) to (10e) is high but cannot be truncated because it does not agree with the preceding consonant, **/m/**, in labiality. The second/final vowel of forms from (10f) to (10j) does not truncate because it is neither high nor agrees with **/m/** in labiality. It is interesting to point out that **cvmv̀** verbs do not truncate to **cmv̀** (even with a high vowel as V_1) nor to **cv̀** (i.e. with a final high vowel and **/m/** deleted). Akan (Twi) allows word-final sonorant labial consonant (i.e. **m**#) but does not permit a word-final sonorant coronal consonant.

2.3 TRUNCATION IN CVWV-VERBS IN AKUAPEM

Data in (11) represent CVwV truncation in Akuapem. A careful study of Christaller's dictionary and also a cross-checking of data with other Akan native-speaker linguists revealed only three CVwV verbs that all three dialects share, namely: (11*l*/12*l*) **wù wá** 'to protect,' (11m/12m) **bàwì** 'be ugly,' and (11n/12n) **wìwɪ́** 'to have love talk.' With the exception of these three verbs which all three dialects have in common, CVwV verbs in Akuapem are realized as CV in Akyem (Aky.) and Asante (As.) Twi, as shown in (12a-k). That is, Akyem and Asante Twi lack the CVwV vs. CVw alternation in Akuapem. What this means is that the cv data/forms, in Akyem and Asante Twi (12a-k), have already achieved lexicalization and for that reason fall outside the scope of the current paper.[5]

[5] I am very grateful to an anonymous reviewer who advised that I distinguish between cases of diachronic and synchronic truncation. I focus on the latter strictly for this paper. The availability of the forms **wʊwa, bawɪ,** and **wɪwɪ́** suggests that the CV forms in Akyem and Asante were derived from CVwV forms diachronically. Since the final vowel of CVwV verbs in Akuapem is either /**ʊ**/ or /**u**/, it can be argued that the CV Akyem/Asante data in (9) underwent two interconnected processes, the first of which Akuapem is still not over with, namely: (i) final $V_{[+Hi/Lab]}$ deletion, followed by (ii) final-w deletion to avoid word-final dorsal consonant. Dorsal consonants do not occur at the verb-final position in Akyem and Asante. Since our focus is synchronic what matters to us is the CVwV and CVw alternation in Akuapem.

(11) Akuapem		(12) As. and Aky.		English gloss
a.	**(i) sì̀wù̀ ~ (ii) sì̀ẁ**	a.	**sì̀**	to wash
b.	**(i) pɪ̀wù̀ ~ (ii) pɪ̀ẁ**	b.	**pì̀**	spit
c.	**(i) tù̀wù̀ ~ (ii) tù̀ẁ**	c.	**tù̀**	boast
d.	**(i) tʊ̀wʊ̀ ~ (ii) tʊ̀ẁ**	d.	**tʊ̀**	throw
e.	**(i) tɛ̀wʊ̀ ~ (ii) tɛ̀ẁ**	e.	**tɛ̀**	hide
f.	**(i) dɛ̀wʊ̀ ~ (ii) dɛ̀ẁ**	f.	**dɛ̀**	burn
g.	**(i) sà̀wù̀ ~ (ii) sà̀ẁ**	g.	**sà̀**	fetch
h.	**(i) kà̀wù̀ ~ (ii) kà̀ẁ**	h.	**kà̀**	bite
i.	**(i) sɔ̀wù̀ ~ (ii) sɔ̀ẁ**	i.	**sɔ̀**	light up
j.	**(i) dɔ̀wù̀ ~ (ii) dɔ̀ẁ**	j.	**dɔ̀**	cultivate
k.	**(i) fɔ̀wù̀ ~ (ii) fɔ̀ẁ**	k.	**fɔ̀**	be wet
l.	**(i) wʊ̀wá ~ (ii) *wʊ̀ẃ**	l.	**wʊ̀wá**	to protect
m.	**(i) bà̀wɪ̀ ~ (ii) *bà̀ẁ**	m.	**bà̀wɪ̀**	be ugly
n.	**(i) wɪ̀wɪ́ ~ (ii) *wɪ̀ẃ**	n.	**wɪ̀wɪ́**	to have love talk

In Akuapem, the non-truncated cvwv verb forms are used in deliberate/slow speech or in past constructions; the truncated forms appear in fast speech, in commands, and in non-past constructions. What the resultant truncated output suggests is that Akuapem allows word-final dorsal consonant – either **/w/** or /ŋ/. The affected syllable (which is the second-CV-syllable) is low-toned and the deleting vowel is a high vowel that is [+round]/[Labial]. In other words, the deleting vowel must agree with the immediately preceding consonant, **/w/**, in labiality. The same conditions, which is that the deleting vowel be high and must agree with a preceding consonant in labiality, apply in both cṽmṽ and cvwv truncation. Truncation does not apply from (11*l*) to (11n) where the second/final vowel does not agree with **/w/** in labiality or where the final vowel is not high (e.g. 11*l*). Truncation of **cṽmṽ** and **cvwv** verbs is unlike **cvrv** truncation whereby harmony as a condition for deletion holds between the deleting and an abutting vowel.

2.4 TRUNCATION IN cvnṽ-VERBS IN AKYEM AND ASANTE

Data in (13) to (16) illustrate the truncation of **cṽnṽ** verbs in Akyem and Asante Twi. In (13) we have **cṽnṽ** and **crṽ** alternation in Akyem and Asante Twi. These verbs have a low-high tone, and the initial vowel of the non-truncated forms (or the basic verbs) as in (13-i), is a high vowel. Two processes take place to derive the **cr̀ṽ́** alternant, namely: **/n/** (i.e. C_2) denasalizes to [**r**]; and then the

initial high vowel (which agrees with the second/final vowel in ATR and rounding) deletes. Akuapem Twi lacks the truncated forms and only uses the basic/non-truncated forms in (13-i).

(13) Akuapem has the non-truncated/full form, not the truncated form

	(i) Non-truncated	(ii) Truncated	English Gloss
a.	**pɪ̀nɪ́**	**prɪ́**	to consent; groan
b.	**tɪ̀nɪ́**	**trɪ́**	to straighten something
c.	**hɪ̀nɪ́**	**hrɪ́**	to open
d.	**dzɪ̀nɪ́**	**dzɪ̀rɪ́**	to gaze
e.	**tɪ̀nɑ́**	**trɑ́**	to sit
f.	**fʊ̀nʊ́**	**frʊ́**	be tired of something
g.	**sʊ̀nʊ́**	**srʊ́**	be peculiar
h.	**mɪ̀nɑ́**	**mrɑ́**	send

The cṽnṽ verb forms from (14) to (16) fall into a separate category in the sense that their **/n/** (i.e. C_2) does not denasalize to [**r**] instead **/n/** deletes to derive cṽṽ truncated outputs as in (14-ii). Akuapem Twi lacks both the cṽnṽ and cṽṽ alternation in Akyem and Asante. Verbs from (14) to (16) have underlying cvŋ structure in Akuapem. For example, **pɪ̀nɪ̀** 'shift to give way,' **dɑ̀nɪ̀** 'depend,' and **dɑ̀nɪ́** 'turn' – representing data (14), (15) and (16) respectively – have the underlying structure, **pɪ̀ŋ́** 'shift to give way,' **dɑ̀ŋ̀** 'depend' and **dɑ̀ŋ́** 'turn,' respectively, in Akuapem.[6]

Verbs forms in (14) have a low-low tone, and the first and the second/final vowel of these verbs are high and identical (i.e. agree also in ATR and rounding).

(14) $\mathbf{cv̀}_{[+\mathbf{high}]}\mathbf{nv̀}_{[+\mathbf{High}]}$ data

	(i) Non-truncated	(ii) Truncated	English Gloss (EG)
a.	**pɪ̀nɪ̀**	**pɪ̀ɪ̀**	shift to give way
b.	**ɲɪ̀nɪ̀**	**ɲɪ̀ɪ̀**	to grow
c.	**bɪ̀nɪ̀**	**bɪ̀ɪ̀**	to finish cooking
d.	**fʊ̀nʊ̀**	**fʊ̀ʊ̀**	to dig (up)
e.	**fʊ̀nʊ̀**	**fʊ̀ʊ̀**	stir up, disturb

[6] The Akuapem forms might have derived from the cvnṽ through two phonological processes, namely the deletion of the second/final vowel which is high, and the dorsalization of word-final **/n/** to [**ŋ**] upon $V_{2[+high]}$ deletion. The dorsalization was necessary to forbid a word-final coronal consonant in a Twi dialect of Akan. Of relevance to the present paper are the Akyem/Asante forms which are synchronic.

In (14a) and (14b), V_1 and V_2 are both [+High], [+ATR] and [-Round]. In (14c) the two vowels are [+High], [-ATR] and [-Round]; in (14d) the vowels are both [+High], [+ATR] and [+Round]; in (14e) they are both [+High], [-ATR] and [+Round]. From our previous argument, **/n/** deletes, not V_1 or V_2, in (14).

The cṽnṽ verb forms in (15) have an initial non-high vowel and a final/second high unrounded vowel (i.e. /ɪ/), and a low-low tone structure. V_1 and V_2 agree in ATR but need not agree in rounding.

(15) **cv̀$_{[-high]}$nv̀$_{[+High]}$** data

	(i) Non-truncated form	(ii) Truncated form	(iii) Truncation form	English Gloss
a.	**dɛ̀nɪ̀**	**dɛ̀ɪ̀**	**dɛ̀ɛ̀**	depend
b.	**sɛ̀nɪ̀**	**sɛ̀ɪ̀**	**sɛ̀ɛ̀**	stop
c.	**tɛ̀nɪ̀**	**tɛ̀ɪ̀**	**tɛ̀ɛ̀**	tease
d.	**bɔ̀nɪ̀**	**bɔ̀ʊ̀**	**bɔ̀ɔ̀**	imbue
e.	**fɔ̀nɪ̀**	**fɔ̀ʊ̀**	**fɔ̀ɔ̀**	grow lean
f.	**tɕɛ̀nɪ̀**	**tɕɛ̀ɛ̀ɪ̀**	**tɕɛ̀ɛ̀ɛ̀**	surpass

There are two truncated forms in (15) alone, namely: the **cṽ$_{[-high]}$ɪ̀-**type, as in (15-ii), and the **cṽ $_{[-high]}$ṽ$_{[-high]}$**-type, as in (15-iii). In (15-ii), **/n/** is deleted and whereby $V_{2[+High]}$ is unrounded it comes to agree with V_1 in rounding, as in (15d) and (15e). In (15-iii), **/n/** and /ɪ/ are both deleted and $V_{1[-High]}$ provides content for the second syllable.

In (16) the verbs have a low-high tone, with an initial non-high vowel and a final high vowel (i.e. /ɪ/). The truncated form is never **cṽ$_{[-high]}$ɪ́,** it is always **cṽ$_{[-high]}$ṽ$_{[-high]}$** – that is, the second vowel of the truncated form is strictly a copy of the first vowel, as shown in (16-ii).

(16) **cv̀$_{[-high]}$nv́$_{[+High]}$** data

	(i) Non-truncated form	(ii) Truncated form	English Gloss
a.	**dɛ̀nɪ́**	**dɛ̀ɛ́**	turn
b.	**sɛ̀nɪ́**	**sɛ̀ɛ́**	infect
c.	**nɛ̀nɪ́**	**nɛ̀ɛ́**	melt
d.	**sɔ̀nɪ́**	**sɔ̀ɔ́**	filter
e.	**ɲɛ̀nɪ́**	**ɲɛ̀ɛ́**	wake
f.	**mɛ̀nɪ́**	**mɛ̀ɛ́**	send

3. LINEAR AND NON-LINEAR FORMALIZATION OF CVCV VERB TRUNCATION IN AKAN (TWI)

Following are linear and non-linear representations of truncation processes described in section (2). A general characteristic of CVRV verb truncation is that an initial consonant – i.e. word-initial consonant – is never truncated. A segment of the second syllable is either the trigger or the target of truncation. There are two truncation domains, namely: when an intervocalic sonorant consonant is coronal (i.e. **/r/** oral, for all three dialects, or **/n/** nasal, for Akyem and Asante) as in (3.1); or when an intervocalic sonorant consonant is labial (i.e. **/m/**, anterior, for all three dialects, or **/w/**, dorsal, for Akuapem) as in (3.2). In (3.3) is a brief summary of what truncates or is retained in CVCV verb truncation.

3.1 DOMAIN: $CVC_{[COR]}V$ COMPRISING OF: (3.1.1) CVRV AND (3.1.2) CVNV VERBS

3.1.1 $CVC_{[Cor]}V$ verbs: The case of CVrV verbs in all three Twi dialects

The CVrV forms in truncation have the structure: $cv̀_{[+hi\ \alpha ATR,\ \beta Rd]}.rv̀_{[\pm hi\ \alpha ATR,\ \beta Rd]}$, or $cv̀_{[+hi\ \alpha ATR,\ \beta Rd]}.rv́_{[\pm hi\ \alpha ATR,\ \beta Rd]}$. The first or the second high vowel deletes, and not both. The deleting high vowel must agree with an abutting vowel in ATR and in rounding as shown in (17a) and (17b), linearly; and in (18) and (19), non-linearly. For this reason (i.e. the fact that the two vowels must harmonize in their values of ATR and rounding), two high vowels cannot be deleted simultaneously for the fact that the application of one rule blocks the application of the other. In other words, $V_{1[+high]}$ deletion, as in (17a) or as in (18a-i) removes the context for the application of $V_{2[+High]}$ deletion represented by (17b) – linearly, or (19a-i) – non-linearly, and vice versa.

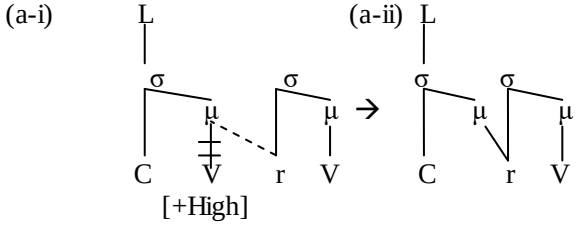
(17) List of vowel deletion rules: Linear representation of V_1 and V_2 deletion (see 18 and 19 respectively for their non-linear representations):

(a) V_1 deletion: $V_{[+Hi]} \rightarrow \varnothing$ / C __ rV or

(b) V_2 deletion: $V_{[+Hi]} \rightarrow \varnothing$ / $CV_{[+Hi]}$r _#

(18) Non-linear representations of (17a) in (18a), with an example in (18b):

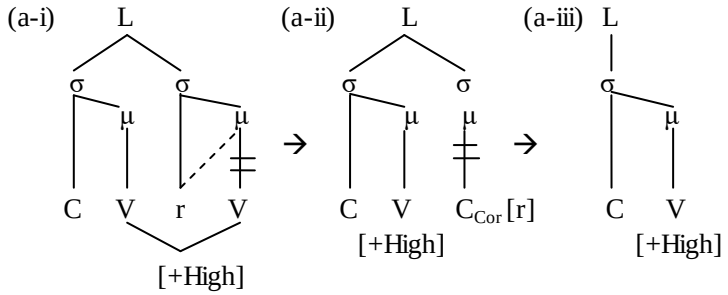
(18) a. V_1 deletion



(18) b. (b-i) **fìrì́ → frì́** 'to come from'; (b-ii) **fìrí́ → frí́** 'to go out'

(19) Non-linear representations of (17b) in (19a), with an example in (19b):

(19) a. V_2 deletion; followed by word-final coronal consonant deletion



(19) b. **fìrì** 'to come from' → ***fìr** (avoidance of coronal consonant final) → **fì**

Below in (20) is the list of wellformedness constraints that a truncated output must respect.

(20) List of wellformedness constraints:

(20) a. Avoidance of *$C_1C_{2[-LIQ]}$: to avoid this consonant sequence a $V_{1[+High]}$ only deletes when C_2 is **/r/** ([+LIQ])

(20) b. Avoidance of a word-final coronal consonant: $V_{2[+High]}$ deletion is blocked if it will result in a word-final coronal consonant and if the word-final consonant cannot be avoided after the $V_{2[+High]}$ deletion.[7]

(20) c. REALIZE F (where F is feature):[8] (i) Avoidance of contour tone – truncation is blocked to avoid a cv̀́ output; (ii) Underlying/contrastive nodes of tone, ATR, labiality/[+round] and coronality/[-round] must not be altered – truncation is blocked if it will remove lexically contrastive nodes of tone, ATR, labiality/[+round] and coronality/[-round].

In (20a) is a prosodic wellformedness requirement. Agreement with an abutting vowel in ATR or in rounding is not enough for $V_{1[+High]}$ deletion to apply in (17a) or (18a-i). There must be a segment in the immediate neighborhood that can preserve the affected nucleus – this suggests that the initial syllable is indeed not the domain of truncation. $V_{1[+High]}$ truncation is allowed in the first syllable because of **/r/** (+LIQ) – that is, for the fact that **/r/** is equally able to feed the nucleus of the preceding syllable. $V_{1[+High]}$ deletion does not apply when the following consonant is non-liquid. For example, **/r/** is a nucleus and an onset

[7] The only way to avoid a word-final coronal consonant is for the word-final coronal consonant to be deleted with or without compensatory lengthening. The vowel that lengthens is a non-high vowel, and never a high vowel.

[8] Again, I am very grateful to one of the anonymous reviewers who suggested the term "REALIZE F." I had used the term "prosodic wellformedness" which I latter realized was not a good cover term for the features/processes in (20c).

simultaneously whenever **fìrì** 'come from' goes to **frì**, or when **fìrí** 'to go out' becomes **frí**. Non-coronal C_2 verbs like CVmV and CVwV do not truncate to $CC_{[LAB]}V$ – that is, **dʊ̃mʊ̀** 'to favor' does not truncate to ***dmʊ̀ʊ̃,** and **sìwù** 'to wash' to **swù** because **/w/** and **/m/** are [-LIQ]. I have expressed the truncation of $V_{1[+High]}$ before **/r/** as the displacement/delinking of $V_{1[+High]}$ by **/r/** in (18a-i); and this is allowed when the round and ATR values of $V_{1[+High]}$ – the deleting vowel – are predictable from V_2. The fact that the deleting vowel is always [+High] – a default feature in Akan, and is never [-High], and also the fact that deleting vowel's round and ATR values must be predictable from V_2 suggest the role of principles of markedness in what delete.

(20b) states a phonotactic wellformedness requirement. **/r/** deletes upon $V_{2[+high]}$ deletion for the fact that all three dialects of Akan do not permit a word-final coronal consonant; (19a-ii) illustrates this truncation. For example, ***fìr** and ***fír** do not alternate with **fìrì** 'to come from' and **fìrí** 'go out' respectively for this reason. There are three processes or ways for avoiding a word-final coronal consonant, namely:

(i) a non-deletion of $V_{2[+High]}$ when the preceding consonant is coronal,
(ii) the deletion of the coronal consonant after $V_{2[+High]}$ deletion to create a CV truncated output, or
(iii) the deletion of $V_{2[+High]}$ to yield CVC_{cor}#, and a non-high V_1 lengthens to displace the final coronal consonant. Of the three rules, (20b-i) non-application of $V_{2[+High]}$ truncation (or simply, non-truncation), and (20b-ii) the truncation of $V_{2[+High]}$ and of C_{cor}# to derive the CV output,

are what apply in CVrV verbs. A truncated output must respect the well-formedness conditions in (20), for this reason, **firí** 'go out' cannot truncate to ***fí** because that will violate (20c); **fírí** cannot truncate to ***fír** because that violates (20b); and, finally, **fírí** cannot truncate to either ***fì** or to ***fí** because the low-high tone contrast will be affected (i.e. violation of 20c). The only way to avoid violations of these well-formedness conditions is for $V_{2[+High]}$ deletion to not apply in $cvrv_{[+High]}$ verbs (i.e. 20b-i), and explains why $cvrv_{[+High]}$ to cv truncation does not occur.

In (20c) are prosodic wellformedness requirements. There are two conditions under prosodic well-formedness, (i) avoidance of contour tone, and (ii) preservation of tone (and other) contrasts – a Low tone must remain so, a Low-High tone must remain so, etc. Contrastive units (i.e. tones) must not be altered. For example, **fìrí** 'go out' cannot become **fí** because that violates (20c-i), nor **fì** or **fí** because (20c-ii) will be violated.

3.1.2 $CVC_{[Cor]}V$ verbs: The case of CVnV verbs in Akyem and Asante

The CVnV verbs with the CrV truncated alternation have the basic structure, $\mathbf{cv\tilde{v}_{[+Hi]}n\acute{v}\tilde{v}}$. The linear and the non-linear rule in (21a) and (21b) respectively both illustrate **/n/** denasalization to [**r**]. The fact that **/n/** denasalizes to [**r**] creates the context for the $V_{1[+High]}$ deletion as in (17a), repeated as (21b-ii) that derives the CrV truncated output. The $V_{1[+High]}$ deletion rule, we have observed, can only apply when the following consonant is [+LIQ] and when

$V_{1[+High]}$ and the following vowel harmonize in ATR and in rounding. Rule (21a-i) and (21a-ii) are in a feeding relation – with **/n/**-denasalization (21a-i) feeding $V_{1[+High]}$-truncation (21a-ii).

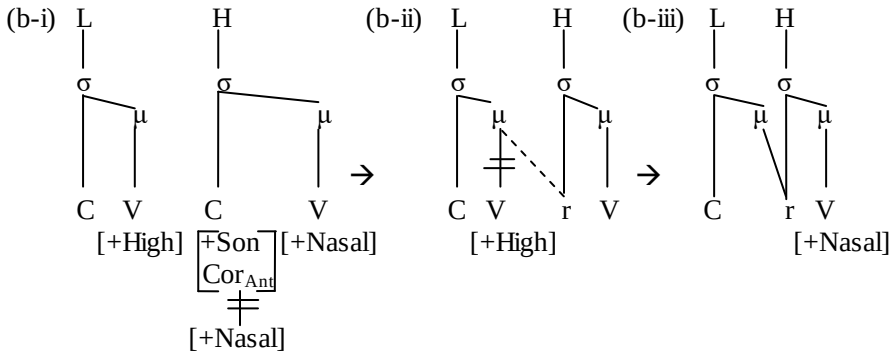
(21) a. Linear rules:

(i) **/n/** denasalizes between a low-toned high vowel and a high-toned vowel:

$$\textbf{/n/} \rightarrow [\textbf{r}] \; / \; \grave{\tilde{\textbf{v}}}_{[+\textbf{Hi}]} \_\_ \; \acute{\tilde{\textbf{v}}}$$

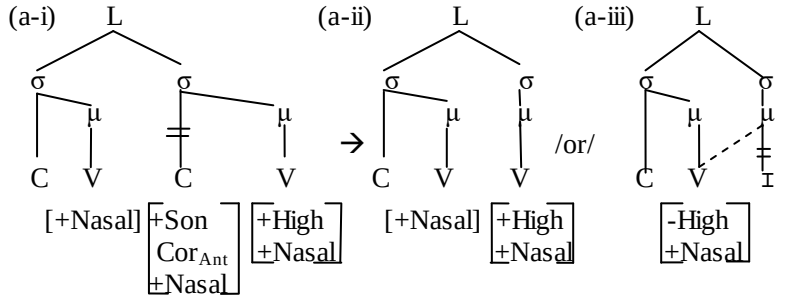
(ii) $V_{1[+High]}$ deletion: $\quad \textbf{V}_{[+\textbf{Hi, }\alpha\textbf{ATR, }\beta\textbf{Rd}]} \rightarrow \textbf{ø} \; / \; \textbf{C} \_\_ \; \textbf{rV}_{[\alpha\textbf{ATR, }\beta\textbf{Rd}]}$

(21) b. Non-linear representations of (21a-i) and (21a-ii) as (21b-i) and (21b-ii) respectively:



In Akyem and Asante, **/n/** deletes when the verbal tone is low. The deletion succeeds vowel nasalization. These verbs have the structure: $c\grave{\tilde{v}}n\grave{\tilde{v}}_{[+High]}$. This can best be expressed non-linearly as in (22a): **/n/** is truncated in (22a-i) to yield (22a-ii) as our final output. Final outputs undergo the alternation in (22a-iii) when V_1 is a non-high vowel. That is, a non-high V_1 delinks a following high vowel (i.e. /ɪ/) optionally as in (22b-ii), after **/n/** deletion in (22a-i).

(22) a.



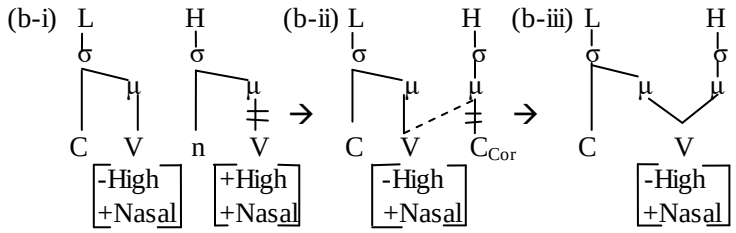
The $\textbf{c}\grave{\tilde{\textbf{v}}}_{[\textbf{-High}]}\textbf{n}\acute{\tilde{\textbf{v}}}_{[+\textbf{High}]}$ verbs forms lack the truncated output, $\textbf{c}\grave{\tilde{\textbf{v}}}_{[\textbf{-High}]}\acute{\tilde{\textbf{v}}}_{[+\textbf{High}]}$. These verbs in Akyem and Asante can only be truncated to $\textbf{c}\tilde{\textbf{v}}_{[\textbf{-High}]}\tilde{\textbf{v}}_{[\textbf{-High}]}$ –

whereby the second vowel is a copy of the first vowel realized through $V_{1[-High]}$-lengthening. The fact that the **cṽ$_{[-High]}$ṽ$_{[+High]}** alternative does not emerge suggests that $V_{1[-High]}$-lengthening is obligatory in this case.

(23) Linear and non-linear representations with an example in (23c)

(23) a. Linear representation of (23b-i) below: **V$_{[+High]}$ → ø / cṽ$_{[-High]}$ń_#**

(23) b. Non-linear representation of (23a) above:



(23) c. **dàǹfí** 'turn' → ***dàǹ́** (avoidance of final coronal) → **dàá́** (see 13-ii)

In (22) we observed an instance of $V_{1[-High]}$ lengthening to dislocate a following high vowel, optionally, not obligatorily. The fact that the application of $V_{1[-High]}$ lengthening here is obligatory, not optional, suggests that a different condition is involved in **cṽ$_{[-High]}$nv́$_{[+High]}** truncation and in the lengthening of $V_{1[-High]}$ in **cṽ$_{[-High]}$nv́$_{[+High]}** here to yield the **cv$_{1[-High]}$v$_{1[-High]}** truncated output. My argument is that $V_{2[+High]}$ deletes when the second syllable is high-toned, and when V_1 is a non-high vowel, as represented linearly in (23a), and non-linearly in (23a). The fact that $V_{2[+High]}$ deletes creates a word-final coronal consonant as in (23b-i/ii). Obligatory $V_{[-High]}$-lengthening in (23b-ii/iii), therefore, applies to prevent a word-final coronal consonant. So in espousal are two conditions for $V_{1[-High]}$ lengthening in Akan (Twi): a $V_{1[-High]}$-lengthening that delinks a following high vowel, optionally, for ease of articulation; and an obligatory $V_{1[-High]}$-lengthening that applies to achieve phonotactic wellformedness – i.e. to avoid a word-final coronal consonant and to preserve the disyllabicity of the verb.[9]

3.2 DOMAIN: $CVC_{[LAB]}V$

The structure, $CVC_{[LAB]}V$ is meant to describe CVmV (i.e. $CVC_{[+Son/LAB/ANT]}V$), and CVwV ($CVC_{[+Son/LAB/Dor]}V$) verb forms together. Vowels of these verbs generally agree in ATR, but need not agree in rounding (i.e. labiality or coronality). It is a $V_{2[+High]}$ that is truncated – the deleting $V_{2[+High]}$ has to agree with the preceding consonant in labiality. Truncation does not apply where $V_{2[+High]}$ does not agree with C_2 is labiality – i.e. where C_2 is labial, but $V_{2[+High]}$ is coronal/[-round] or non-labial.

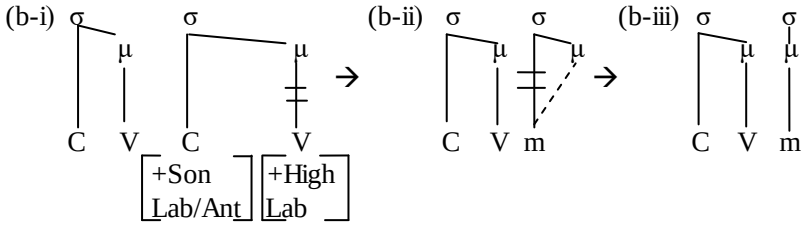
[9] For example, **tàf́** 'to do something often' is pronounced by the majority as **tàá.**

3.2.1 $CVC_{[LAB]}V$ – CVmV verbs in all three dialects of Twi

In (24a) and (24b-i), $V_{2[+High]}$ truncates and **/m/** becomes syllabic as illustrated in (24b-ii, and –iii). For example, **pàmʊ̀** 'to sew' truncates to **pàm̀**, and **pàmʊ́** 'to drive away' to **pàḿ.** The anterior labial sonorant (**/m/**) can occur word-finally in all three dialects of Akan. The tone of the affected second syllable can be either High or Low – that is, tone quality does not impede $V_{2[+High]}$ truncation, with a labial consonant as C_2.

(24) a, Linear rule: $V_{[+high/Lab]} \rightarrow \varnothing / C_{[Lab]} \_\_\#$

(24) b. Non-linear representation of (24a):



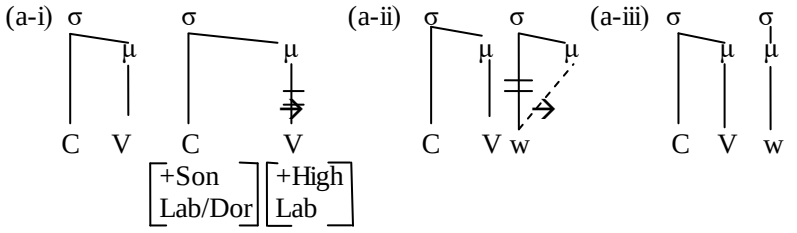
(24) c. (i) **pãmʊ̃̀** 'to sew' → **pãm̀**; (ii) **pãmʊ̃́** 'to drive away' → **pãḿ** (see data in (6)

3.2.2 $CVC_{[LAB]}V$ – CVwV verbs in Akuapem Twi

The rule in (24a) extends to CVwV verbs in Akuapem in (25). As shown in (25a), $V_{2[+High/Lab]}$ deletes to derive a CV.w truncated output in (25a-ii/iii). Akyem and Asante lack these underlying forms to obtain the CVw truncation.

(25) Non-linear representation of V_2 deletion in CVwV verbs with an example in (25b)

(25) a.



(25) b. **sìwù** 'to wash' → **sìẁ** (see data in 8)

3.3 SUMMARY

The truncated unit is either a high vowel, and/or a coronal consonant. The tone of the affected syllable is largely a low one. A word-initial syllable, a non-high vowel, a high-toned syllable, or a labial consonant is never truncated. Truncation targets the high vowel and/or a coronal consonant of the second/final syllable. Truncation of a high vowel in the first syllable, we have argued, is triggered by **/r/**; a deleting high vowel in the context of **/r/** always harmonizes with an abutting vowel in ATR and in rounding. That is, with the exception of the feature [+High], the deleting vowel's features (e.g. ATR, rounding, labiality) must be borne – i.e. sustained or preserved – by either an adjacent vowel or consonant; these features of the deleting vowel must be predictable from the neighborhood in order for the high vowel to delete. For the above reason, two high vowels cannot be deleted simultaneously in the context of **/r/** since one must remain for either initial high vowel or a second/final high vowel to delete. An initial high vowel cannot delete when C_2 is non-liquid. V_1 and V_2 are deemed adjacent in the domain CVrV by virtue of the fact that **/r/** (a liquid) is transparent/weak/unmarked.

It is the quality of V_1 that promotes V_2 deletion and vice versa, in the truncation of $CV_{[+High]}rV_{[\pm High]}$ verbs. This is not the case in CVnV, CVmV and CVwV (i.e. $CVC_{[-LIQ]}V$) verbs where the intervening consonant is not **/r/** (i.e. not transparent, or not weak). The quality of V_1 does not condition the $V_{2[+High]}$ deletion in $CVC_{[-LIQ]}V$) verbs because the intervening consonant, $C_{2[-LIQ]}$, is not transparent (i.e. not weak). The fact that $C_{[-LIQ]}$ is non-transparent means that the adjacent segment of $V_{2[+High]}$ in $CVC_{[-LIQ]}V$ verbs is /**m**, **n**, or, **w**/, and explains why $V_{2[+High]}$ deletion here is conditioned by harmony with $C_{2[-LIQ]}$ – i.e. the immediate (non-transparent/non-weak) segment – in labiality or in coronality. Here (i.e. in $CVC_{[-LIQ]}V$ verbs), the tone quality of the affected syllable does not matter, it can be high or low, and the affected (i.e. the final/second) syllable cannot be truncated completely – a vowel or a consonant may remain to preserve the affected syllable. In a situation whereby the segment that remains to preserve the affected syllable, or whereby the resultant output violates an important wellformedness condition, or whereby the final syllable's segments are deleted, the final syllable is preserved through progressive $V_{1[-High]}$-lengthening.

Overall, the need to sustain lexical contrast – i.e. both feature and prosodic (e.g. tone and syllabic) contrast, as well as, the need for an output to respect certain phonotactic and prosodic wellformedness constraints, are the main conditions that dictate truncation or non-truncation of a high vowel and/or a coronal consonant in Akan (Twi).

4. THE ROLE OF MARKEDNESS IN CVRV VERB TRUNCATION IN AKAN (TWI)

The theory of markedness (Trubetzkoy 1939, 1969; Jakobson 1941, 1968; De Lacy 2006; Rice 2007) has great relevance to CVCV verb truncation in Akan (Twi). Markedness captures the central observation that not all elements in a phonological system are of equal status (Rice 2007). In the CVCV verb truncation

data, marked (and lexically contrastive) units are insulated from truncation. An unmarked (a weak or a predictable) unit is what is always targeted for truncation, and where there are two or more unmarked units it is the most marked of the two that is truncated – for example, an unmarked segment with a low tone will be deleted over an unmarked segment with a high tone. The truncation of an unmarked feature/segment is only allowed when their loss will not: (i) remove contrast where they occur and/or (ii) violate very important prosodic and phonotactic wellformedness conditions in Akan (Twi). From the above, the markedness conditions in (26a) to (26d), and the hierarchies in (27) and (28) are crucial in what truncates and what does not truncate in CVRV verbs.

(26) Markedness conditions in Akan (Twi) with interpretation below:

Segment type		(i) Unmarked/weak	(ii) Marked/ strong
a.	Vowel (oral and nasal)	Oral vowel	Nasal vowel
b.	Place of articulation (PoA)	Coronal	Labial (anterior/dorsal)
c.	Height (Sonority condition applies)	High vowel	Non-high vowel
d.	Tone	Low tone	High tone

(a) Between oral vowels and nasal(ized) vowels, nasal vowels are marked, and, oral vowels, unmarked
(b) Between coronal consonants and labial consonants (anterior and dorsal), coronal consonants are unmarked and labials are marked
(c) Between a high vowel and a non-high vowel, a high vowel is unmarked, and a non-high vowel, marked
(d) Between the high and the low tone, the low tone is unmarked, and the high tone, marked

Unmarked vs. marked specifications in (26) are supported by the existing literature on the theory of markedness, namely: Kaczmarch (1953); Paradis and Prunet (1991); Grégoire (1993); Crosswhite (1999, 2000); Botma and Jan van der Torre (2000); Kent and Read (2002); Parker (2002); Howe and Pulleyblank (2004); Rice (2007); and Akinlabi (2008). Studies of language acquisition, by Kaczmarch (1953) on Polish children, and by Grégoire (1993) on French children, show late emergence of nasal vowels. Also, nasal vowels are considered more complex by virtue of their fused character: vowel + nasal. **/n/**, the coronal nasal, is argued to be the segmentally unmarked nasal, according to Botma and Jan van der Torre (2000). Coronals are considered unmarked by their susceptibility to place assimilation (Paradis and Prunet 1991). This is exactly what **/n/** is in Akan, it assimilates to labial and dorsal places of articulation of a following consonant. For example, **/ǹ-kɔ́/** 'don't go' and **/ǹ-pɪ̀rá/** 'don't sweep' – {n-} being the negative marker – are pronounced as [**ŋ̀kɔ́**] 'don't go' and [**m̀pɪ̀rá**] 'don't sweep,' in Akan. Also, unless morphologically significant,

/n/ deletes when preceded by a low vowel in Akuapem and is the main surface difference between numbers in Akuapem and their counterparts in Akyem and Asante (Ofori 2008).

Considering everything said, the harmonic ranking of place by Prince and Smolensky (1993), namely: labial, dorsal >> coronal, holds true for the Akan data. /**r**/ (in all three Twi dialects), and /**n**/ (in Akyem and Asante) can be truncated but /**m**/ (in all three dialects) and /**w**/ (in Akuapem) are always preserved. The argument then is that /**r**/ and /**n**/ are unmarked, with /**m**/ and /**w**/ as the marked of the four sounds (i.e. /**r**, **n**, **m**, **w**/) in these dialects of Akan.

On vowel truncation, the truncation of high vowels over non-high (i.e. low and mid) vowels – aside from being supported by the theory of markedness with high vowels as unmarked and non-high vowels as marked – is also sonority driven (Crosswhite 1999, 2000). The height-based scale of sonority, namely: Low >> Mid >> High (Parker 2002; Kent and Read 2002; Howe and Pulleyblank 2004), with Low and Mid vowels (i.e. non-high vowels) being sonorous over high vowels, is crucial in CVCV verb truncation in Akan (Twi). The least sonorous of the vowels in terms of height – which in the current paper is a high vowel – is what is truncated. Again, according to Akinlabi (2008), high vowels are known to be prosodically weaker than non-high vowels; they therefore make the worst nuclei, hence the move to truncate them over non-high vowels in these Twi dialects of Akan.

On tone, Fromkin (1972) identifies high (or Raised) and low (Lowered) as the two contrastive tones in Akan, with the low tone as unmarked and the high tone as marked. This is supported by the truncation data in the sense that it is a low-toned syllable that is often the domain of truncation, and also a final syllable that is low-toned can be deleted, but a final syllable that is high-toned cannot be deleted. For example, **fìrì** 'come from' can be reduced to **fì**, but **fìrí** 'to go out' cannot be reduced to ***fí**.

Below in (27) and in (28), we propose two markedness guided hierarchies from a non-deletable (i.e. more marked) to a deletable (i.e. less marked) segment. Tone information is significant to a segment's place on the hierarchy, for example: a segment 'X' with a high tone is more marked than the same segment 'X' with a low tone, etc. The hierarchy in (27) applies in all three dialects; (28) applies in Akyem (Aky.) and Asante dialects of Akan.

(27) Oral domains: (a) $\mathbf{V}_{[-hi]}$ >> (b) $\mathbf{V}_{[+hi]}$ [$\acute{\mathbf{v}}_{[+hi]}$ > $\grave{\mathbf{v}}_{[+hi]}$]

(28) Nasal domains (Aky. and As.): (a) $\tilde{\mathbf{v}}_{[-hi]}$ >> (b) $\tilde{\mathbf{v}}_{[+hi]}$, (c) **n**

In oral domains represented by (27), (27b) $\mathbf{v}_{[+hi]}$, a high vowel, is the least marked segment, and (27a) $\mathbf{v}_{[-hi]}$, a non-high vowel, the most marked segment. In $\mathbf{c\grave{v}}_{[+Hi]}\mathbf{r\grave{v}}_{[+Hi]}$ verb forms both vowels are unmarked by our hierarchies and so each of the two segments can be deleted hence the truncated variants, $\mathbf{cr\grave{v}}_{[+Hi]}$ and $\mathbf{c\grave{v}}_{[+Hi]}$ for these verbs. For example, **fìrì** 'to come from' truncates to either **fì** or **frì** because the two syllables are both low-toned so either of the two high vowels can be deleted. **/r/** drops to yield $C\grave{V}_{[+Hi]}$ (e.g. **fì** 'to come from') – to

avoid a word-final coronal consonant (i.e. ***fir**) – where $V_{2[+Hi]}$ truncation is the rule. In **cv̀**$_{[+Hi]}$**rv́**$_{[+Hi]}$ verbs, the first vowel is low-toned, and the second vowel, high-toned, making the latter high vowel more marked than the former. A consequence of this is that V_1, the unmarked of the two vowels is truncated, hence the output, **cr̀v́**$_{[+Hi]}$**.** This explains why **fìrí** 'to go out' truncates to **fr̀í** but does not truncate to ***fìr** or ***fì** ́ – i.e. /**i**/ of the low-toned syllable deletes, /**i**/ of the high-toned syllable is preserved or is insulated from truncation.

In **cṽ**$_1$**mṽ**$_{2[+Hi/Lab(+Round)]}$ and **cṽ**$_1$**mv̋**$_{2[+Hi/Lab(+Round)]}$ verb forms where **mṽ**$_{2[+Hi/+Lab]}$**#** is the domain of truncation, **ṽ**$_{2[+Hi/Lab(+Round)]}$, the unmarked of the two sounds, deletes, and the labial consonant (**/m/**), the marked of the two segments, is retained. For example, **pǎmʊ̌** 'to sewn' truncates to **pǎm̀.** The deletion is allowed because the labial and ATR values of the deleting /**ʊ**/ are predictable from existing segments (i.e. **/m/** and V_1 respectively). **cv̀wv̀**$_{[+Hi/+Lab]}$ verb forms truncate to cv̀ẁ in Akuapem – just like in cvmv truncation, the second syllable is the domain of activity, a high vowel being the unmarked deletes and labial-dorsal being the marked of the two is retained. For example, **pàwʊ̀** 'to select' truncates to **pàẁ**.

In nasal domains (in Akyem and Asante) represented by (28), (28b) **/n/**, the coronal (anterior) nasal, and $V_{[+High]}$ are the least marked, with (28a) **ṽ**$_{[-hi]}$**,** a non-high nasal vowel as the most marked unit. The hierarchy in (28) suggests that either **/n/** or $V_{[+High]}$ can be targeted for deletion (or even both). By virtue of being intervocalic, **/n/** is weaker (more unmarked) than $V_{2[+High]}$ and so **/n/** becomes the target for truncation – this is strictly the case when V_1 is [+high], i.e. unmarked, and/or when the syllable **/n/** belongs to has a low-tone (also, unmarked). **/n/** denasalization to [**r**] is the rule when V_1 is [+high]/unmarked but the affected syllable's tone is high/raised (i.e. marked). For example: **pɪ̌nɪ́** 'to accept' → ***pɪ̌rɪ́** → **pr̀ɪ́. /n/** deletion is the rule when the affected syllable's tone is low/unmarked (and V_1 is either [-high]/unmarked, or [-high]/marked). For example: **pi̍ni̍** 'to give way' becomes **pi̍i̍;** and **dǎ̀nɪ̀** 'to depend on' becomes **dǎ̀ɪ̀.** The fact that a non-high V_1 (i.e. a marked vowel, in terms of height) precedes **/n/**, may strengthen intervocalic **/n/** over $V_{2[+high]}$ such that $V_{2[+high]}$ truncates over **/n/** (irrespective of the affected syllable's tone). For example: **dǎ̀nɪ̀** 'to depend on,' by virtue of a non-high V_1, truncates, also, to **dǎ̀ǎ;** the verb **dǎ̀nɪ́** 'to turn' truncates to **dǎ̀ǎ́,** for the exact reason. The verb **dǎ̀nɪ́** 'to turn' does not truncate to ***dǎ̀ɪ́** (with **/n/** deletion) because the tone of the affected syllable is a high tone (i.e. marked), not low (i.e. unmarked), and V_1 is [-High] (marked), not [+High] (unmarked). The **dǎ̀nɪ̀** 'to depend on' to **dǎ̀ǎ̀** truncation and the **dǎ̀nɪ̀** 'to depend on' to **dǎ̀ǎ́** truncation – contrary to (22a-ii) – can together be expressed as $V_{2[+High]}$ deletion followed by $V_{1[-High]}$ lengthening to dislocate and avoid a word-final coronal consonant.

The markedness hierarchies are indeed important in what deletes and what is retained, but do not apply unconstrained. An unmarked element can be deleted so long as its deletion does not eliminate a contrastive feature or tone node. Contextually-contrastive units (features and tones) may insulate a high vowel or a coronal nasal from truncation.

5. CONCLUSION

From the above analysis, weak/unmarked non-initial units are targeted for truncation and marked units are insulated from truncation. We have defined which features or combination of features are unmarked and as a result are susceptible to truncation. Among these are high vowels (with non-high vowels as marked), and the coronal (anterior) nasal, **/n/**, (with nasal vowels as marked). The markedness constraints as defined in section four do not apply unconstrained. The truncation of the unmarked high vowel or the coronal (anterior) nasal may be blocked by:

(29) (a) The need to respect prosodic and phonotactic wellformedness conditions/ constraints;
(i) Avoidance of contour tone;
(ii) avoidance of word-final coronal consonant

(b) Also where an unmarked high vowel and a marked feature (e.g. the high tone) converge in the same syllable, the truncation of the unmarked high vowel is only allowed on condition that the marked unit (e.g. high tone) can be preserved and in a way that respects both prosodic and phonotactic wellformedness constraints (see 29a-i/ii).

(c) Again, truncation of the unmarked high vowel may be blocked to prevent the elimination of a lexically contrastive ATR, Labial or tone node. Adjacent identical ATR, Labial, or Tone have a single contrastive node of that feature in the CVCV verb domain. This means that abutting vowels, and tone bearing units are doubly-associated with the particular single contrastive node. It also means that the unmarked among the doubly-associated units can be truncated without deleting their shared lexically contrastive feature or tone node. In other words, the unmarked is truncated on condition that a neighboring unit is present to preserve their shared contrastive node. For example:

(i) /**i**/ ([+ATR]) and /**ɪ**/ ([-ATR]) are the main reason why the verbs **pìrá** 'to get hurt' and **pɪ̀rá** 'to sweep' are contrastive. The word **pɪ̀rá** 'to sweep' truncates to **pràˊ,** but **pìrá** 'to get hurt' does not truncate to ***pràˊ.** The **pɪ̀rá** 'to sweep' to **pràˊ** truncation is allowed because the [-ATR] feature of the deleting high vowel is predictable from /**a**/, the second vowel. Put differently, the /**ɪ**/ and /**a**/ vowels share a single contrastive ATR-node – i.e. [-ATR] is doubly-associated to the templatic units of /ɪ/ and /a/. In this situation, it takes the deletion of both vocalic segments to remove the [-ATR] contrast; the loss of /**ɪ**/ does not remove the [-ATR] lexical contrast instead the lexically contrastive [-ATR]-node is sustained/preserved by /**a**/. The word **pìrá** has two contrastive ATR-nodes, namely [+ATR] (for /**i**/) and [-ATR] (for /**a**/). The **pìrá** 'to get hurt' to

pɔ̀rá truncation is blocked by the fact that it removes a contrastive ATR-node. Another word, **pìré** 'to clear away' truncates to **prέ** because /**i**/ and /**e**/ are dominated by a single contrastive [+ATR]-node - /**e**/ remains to sustain the lexically contrastive [+ATR]-node with /i/ gone.

(ii) The word **kʊ̀rá** 'to save' does not truncate to ***krá** because that will amount to removing the lexically contrastive feature, Labial/[+Round]. The word, **kʊ̀rʊ́** 'to unify' truncates to **krʊ́** because the two vowels share a single lexically contrastive [+Round]/Labial-node; the second vowel preserves this contrast with the initial vowel deleted. The need to preserve a lexically contrastive feature is also the main reason why **dʊ̀mɪ́** 'to curse' cannot truncate to **dʊ̀ḿ. /m/** the most adjacent segment to /ɪ/ is labial, not coronal to sustain the coronality/[-roundness] of /ɪ/. On the other hand, the word **fɛ̃mɪ̃́** 'to embrace' truncates to **fɛ̃ḿ** because /**m**/, the most adjacent segment, exists to sustain the lexically contrastive Labial-node. **Fɛ̃mɪ̃́** does not truncate to ***fɛ̃ɪ̃** because /**m**/, a labial consonant, is more marked than /ʊ/, a high vowel.

(iii) The word **fìrì** 'to come from' has a single tone-node, which is a low-tone and as a result of this it can be truncated to **fì;** the loss of the second syllable does not eliminate tone contrast as **fìrì** 'to come from' has a single underlying/contrastive tone, which is low. In the word **fìrí** where there are two lexically contrastive tones, namely a low-tone followed by a high-tone, a truncation to **fì** will be blocked by the fact that a contrastive high-tone will be removed; truncation to **frí** is allowed because the lexically contrastive low-high tone of the verb is preserved.

(d) The conditions, in (a), (b) and (c), apply in all three Twi dialects. The truncation of /**n**/ (or its modification to [**r**]), we have observed, applies only in Akyem and Asante Twi because it is intervocalic and when it is preceded by a high (an unmarked) vowel, and/or when its syllable's tone is the unmarked (i.e. a low-tone). Intervocalic /**n**/ is strengthened over $V_{2[+high]}$ such that $V_{2[+high]}$ deletion is the truncation rule when /**n**/ is preceded by a non-high (i.e. a marked) vowel. Compensatory lengthening applies to avoid a word-final coronal consonant that results from the $V_{2[+High]}$ truncation, and can only be achieved through a marked (i.e. a non-high) vowel.

In summary, certain categories (e.g. features and prosodies) have lost their lexical contrast or have become predictable in the $CVC_{[Son]}V\#$ verbal domain.[10] Truncation is simply an attempt to purge these verbs of such unmarked categories thereby reducing these verbs to their minimally marked categories – or to their lexically contrastive features and prosodies – while respecting phonotactic and prosodic wellformedness requirements of the language, Akan (Twi). Should the speech community continue in this direction (especially in the context of its continuing contact with Indo-European languages), Akan may eventually develop a CVC-syllable (i.e. a closed single syllable) as against its current CV.C syllabification of its CVC truncated outputs.

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[10] As one of the anonymous reviewers had put it in affirmation of the above position, in autosegmental terms, the feature has a link to two segments, so one of the links can be lost without losing the feature.

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