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TONAL VARIATION IN THE PERFECT VERB STEM OF SOME AKAN DIALECTS

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Abstract

This paper offers a constraint-based account of surface tone variation in perfect (affirmative and negative) verb stems in the Akuapem, Asante, and Fante dialects of Akan. The paper argues that once we know the underlying tones of verb roots, surface tone difference in perfect verb stems in these dialects – i.e. surface tones of verb roots and their affixes – are all predictable from dialect-specific tone constraint hierarchy. This paper identifies dialect-specific ranking of the constraints: **Polar,** ***ȯ₁**, ***ȯ₂**, and **RT[Tone]** as responsible for variation in perfect verb stem surface tones in the three dialects. **Polar** and **RT[Tone]** are morpheme-based constraints, with ***ȯ₁** and ***ȯ₂** as syllable-based constraints. They reflect the need to respect both phonological and morphological well-formedness in perfect verb-stem surface-tone construction in the Akan language – which is the need to minimize the unmarked tone and to derive a high tone in a perfect verb stem simultaneously.

Keywords: Perfect, Stem, Tone, Constraints, Polarity

1. Introduction

This paper investigates dialectal tone variation in perfect (affirmative and negative) verb stems in three dialects of Akan, namely Akuapem, Asante and Fante. That is, a perfect verb stem (consisting of a verb and its affix(es)) takes different tones in these different dialects of Akan without any difference in perfect sentence-meaning. These differences in tone only reveal a speaker's socio-cultural identity as either Akuapem, Asante or Fante, putting the current work at the phonology/phonetic-sociolinguistic interface. The paper strictly accounts for tone differences in perfect verb stems, in these three dialects, independent of influences from abutting words in a sentence. The analysis of tone variation in perfect verb stems, in the three dialects, is couched within the optimality theoretic (OT) framework (Prince and Smolensky1993, McCarthy 1995). My goal, in using OT, is to establish the tone constraints, as well as, to develop the constraint ranking arguments that motivate variation in tone in perfect (affirmative and negative) verb stems in the Akuapem, Asante and Fante sub-grammars of Akan.

The rest of the paper is organized into five sections as follows. Section two provides some useful phonological and morphological background information on the data. Section three presents and explains data on tone variation in perfect verb stems in the three dialects. Section four outlines and discusses some key observations based on the data for the current study; briefly outlines some fundamental positions of OT of importance to data analysis; and outlines and defines the most salient tone constraints for the current data analysis. Section five develops constraint ranking arguments for the different dialects. Section six is the conclusion.

2. Background: A brief introduction to Akan phonology and Morphology

This section provides the relevant background information on Akan phonology and morphology for the current study.

Akan has fourteen vowel phonemes, namely nine oral vowel phonemes: **/i, ɪ, u, ʊ, e, ɛ, o, ɔ, a/** and five nasal vowel phonemes: **/ĩ, ɪ̃, ũ, ʊ̃, ã/**. There are eight high vowels: **/i, ɪ, u, ʊ, ĩ, ɪ̃, ũ, ʊ̃/**, and six non-high vowels: **/e, ɛ, o, ɔ, a, ã/**. There are two low vowels, **/a, ã/**. Akan operates advanced tongue root harmony. Advanced tongue root harmony in Akan constrains the distribution of vowels in particular morphophonological domains such that either only advanced tongue root ([+ATR]) vowels (i.e. **i, ĩ, u, ũ, e, o**), or

unadvanced tongue root ([-ATR]) vowels (i.e. **ɪ, ĩ, ʊ, ʊ̃, ɛ, ɔ, a, ã**) can occur together in those domains. In an instance of a violation of this requirement in a morphophonological domain, an unadvanced vowel (e.g. **/ɪ, ĩ, ʊ, ʊ̃, ɛ, ɔ, a/ã /**) changes to an advanced vowel (i.e. **[i, ĩ, u, ũ, e, o, æ/e]** respectively) to harmonize with an abutting vowel in the feature [+ATR]. The low vowel (**a/ã**) has the phonetic variants, [**æ/æ̃**] (in the Twi dialects of Akan), but [e] (in most Fante dialects of Akan) as a result of [+ATR] harmony. The perfect marker in the affirmative sentence is {**a-**}, a prefixing low vowel. The perfect prefix has simply been represented as **a-** in the data, as vowel harmony does not play any crucial role in the current study. This perfect prefix is always attached immediately before the verb root in the perfect affirmative sentence as [**a-**+Verb root].

The perfect marker is {**-ɪ**}, a suffix, in the perfect negative sentence. It is attached immediately after the negative verb stem (i.e. N-+Verb+**-ɪ**). The negative morpheme (N-) due to place harmony is pronounced: [**m-**] before a labial consonant; [**n-**] before an alveolar consonant; [**ɲ-**] before a palatal consonant; and [**ŋ-**] before a (labio)velar consonant. The negative morpheme has been represented in this paper simply as **n-** before the verb. The perfect suffix, {**-ɪ**}, has other phonetic variants in the language (see Ofori 2018 for other variants of the perfect suffix), but it remains [**-ɪ**] at sentence final when the verb root vowel immediately before it is [-ATR] (e.g. **ɪ, ʊ, ɛ, ɔ, a**). It is realized phonetically as [**-i**] when it is sentence-final and is preceded by an advanced tongue root vowel (e.g. **i, u, e, o**). In other words, there is [**ɪ**] and [**i**] alternation of the perfect suffix as a result of [+ATR] harmony. The form **-ɪ** is used as the basic perfect suffix in the current paper following Ofori (2018), Osam (1994, 2003) and Dolphyne (1988).

The syllable is the tone bearing unit in Akan (Dolphyne 1988, Ofori 2019). Akan syllables are open (i.e. codaless), and there are no onset clusters. Akan has light syllables only which means that contiguous vowels always belong to independent, adjacent syllables. The following syllable types have been identified in Akan, CV, V and C (i.e. a sonorant – a nasal, the labio-velar approximant (w) and the frictionless approximant (r). The word: **à.pá.ḿ** (V.CV.C) "a covenant" exemplifies the CV, V and C syllable-types in Akan with the dot demarcating constituent syllables.

There are two contrastive tones in Akan, a high and a low tone, as obtained in the words: **dá** "day" (with a high tone) and **dà** "never, ever before" (with a low tone). There is a non-contrastive (i.e. allotonic) use of the high and low tone in perfect sentences. The surface tone of the perfect prefix (**a-**) is either high or low under definable circumstances without any meaning difference. The same is the case for the negative prefix in the perfect sentence (N-, a homorganic nasal). The negative prefix carries a low tone in the Twi dialects (i.e. Akuapem and Asante), but a high tone in the Fante dialects, without any semantic difference between their sentences. Surface verb root tones also can vary depending on dialect or the morphophonological context, also without any semantic difference. The perfect suffix tone from the data is always low in the three dialects and in different morphophonological contexts. Below are examples of the perfect affirmative and negative sentences in Akan.

1. Perfect Affirmative
Amma a-frɛ me.
Amma PERF-call me.
Amma has called me.

2. Perfect Negative
Amma n-frɛ-ɪ me. (phonetically: [**mfrɛɛ]**)
Amma NEG-call-PERF me
Amma has no called me.

3. Dialectal Variation in Tone in the Akuapem, Asante and Fante dialects

The following data, adapted from Dolphyne (1988), are used to outline in detail tone variation in the perfect verb stem in the Asante, Akuapem and Fante dialects of Akan. Perfect affirmative sentences are from (3) to (5) with their negative versions from (6) to (8). The verbs in use in these sentences exhibit the following consonant-vowel shapes: CV (e.g. **dà** "sleep"), CV.C (e.g. **tɔ̀.ǹ** "sell") and CV.CV (e.g. **gyì.ná** "stand" in Twi, but **gyí.nà** in Fante.[1]).

Perfect affirmative sentences

3. CV verb (**dà** "sleep")

(a) Asante Twi:	**Kòfí à-dá.**	"Kofi has slept."
(b) Akuapem Twi:	**Kòfí á-dà.**	"Kofi has slept."
(c) Fante:	**Kòfí á-dà**	"Kofi has slept."

4. CVC verb (**tɔ̀.ǹ** "sell")

(a) Asante Twi:	**Kòfí à-tɔ́ń.**	"Kofi has sold (it)."
(b) Akuapem Twi:	**Kòfí á-tɔ̀ǹ.**	"Kofi has sold (it)."
(c) Fante:	**Kòfí á-tɔ̀ǹ.**	"Kofi has sold (it)."

5. CVCV verb (**gyìná ~ gyínà** "stand up")

(a) Asante Twi:	**Kòfí àgyíná hɔ́.**	"Kofi has stood up."
(b) Akuapem Twi:	**Kòfí àgyíná hɔ́.**	"Kofi has stood up."
(iii) Fante:	**Kòfí ágyínà hɔ́**	"Kofi has stood up."

Perfect negative sentences

6. CV verb

(a) Asante Twi:	**Kòfí ǹ-dá-ì**.	"Kofi has not slept."
(b) Akuapem Twi:	**Kòfí ǹ-dá-ì**.	"Kofi has not slept."
(c) Fante:	**Kòfí ń-dá-ì.**	"Kofi has not slept."

7. CVC verb

(a) Asante Twi:	**Kòfí ǹ-tɔ́ń-ì.**	"Kofi has not sold (it)."
(b) Akuapem Twi:	**Kòfí ǹ-tɔ́ń-ì**.	"Kofi has not sold (it)."
(c) Fante:	**Kòfí ń-tɔ̀ǹ-ì.**	"Kofi has not sold (it)."

8. CVCV verb

(a) Asante Twi:	**Kòfí ǹ-gyíná-í.**	"Kofi has not stood up."
(b) Akuapem Twi:	**Kòfí ǹ-gyíná-ì**	"Kofi has not stood up."
(c) Fante:	**Kòfí ń-gyíná-ì.**	"Kofi has not stood up."

[1] A change in verb stem tone as a result of the subject is not the focus of this paper and therefore will not be indicated just as it has not been my focus to specify predictable segmental differences. A reviewer suggested that in Asante Twi the high tone of **Kofi** spreads to dislocate the low tone of **a-** and **n-** which then becomes floating. While this may be true, it is not the focus of the current paper. However, a mention of it as I have done at the footnote suffices for the current focus. The reviewer's observation that the input tone is low and that a preceding high tone renders it floating does not in any way undermine positions taken and conclusions reached in the current paper. The fact of the matter is that the reviewer's observation falls outside the current scope of the paper.

Dolphyne (1988) gives the underlying tones of the verb roots as: **dà** (L tone), **tɔ̀ǹ** (LL tone) and **gyìná ~ gyínà** (LH in Twi, but HL in Fante).[2] I accept her position on their basic tones for the current study. As illustrated from data (3) to (8), these underlying verb tones are altered depending on the dialect and/or the morphophonological context. The following paragraphs focus on outlining variations in the verb stem surface tones in these three dialects of Akan. The table in (9) illustrates the tonal structure of perfect verb stems as obtained in data (3) to (8) in the three major dialects of Akan.

9. Tones of the perfect verb stem in the three dialects

Verb type and basic tone	Twi: Asante, Akyem and Akuapem				Fante	
	Asante		Akuapem		Fante	
	Affirm.	Neg.	Affirm.	Neg.	Affirm	Neg.
a. CV (**dà** 'sleep')	**àdá**	**ǹ-dá-ì**	**ádà**	**ǹ-dá-ì**	**ádà**	**ń-dá-ì**
b. CVC (**tɔ̀n** 'sell')	**àtɔ́ń**	**ǹ-tɔ́n-ì**	**átɔ̀ǹ**	**ǹ-tɔ́n-ì**	**átɔ̀ǹ**	**ń-tɔ́n-ì**
c. CVCV (Twi: **gyìná;** Fa: **gyínà** "stand"	**àgyíná**	**ǹ-gyíná-ì**	**àgyíná**	**ǹ-gyíná-ì**	**égyínà**	**ń-gyíná -ì**

In the Asante dialect of Akan, the verb root surface tone is always high (i.e. irrespective of a verb's basic tone) in both perfect affirmative and negative sentences. That is, **dà**, **tɔ̀ǹ** and **gyìná** are realized as **dá**, **tɔ́ń** and **gyíná** respectively in their perfect sentence usage in Asante.

In the Akuapem and Fante dialects, a verb root surface tone (i.e. irrespective of the verb's basic tone) is high in the negative sentence. In the affirmative of both dialects, the surface tone is the underlying (i.e. low tone) in CV and CVC verbs. The CVCV verb-root surface-tone, however, is different for the two dialects, in Fante, the surface tone is the underlying (i.e. HL) whereas, in Akuapem, the surface tone is high (HH).

The table in (10) is a more conclusive summary of the surface tone structure of perfect verb stems. A dash "-" indicates morpheme boundary. Identical tones, HH and LL, of a disyllabic morpheme (i.e. verb root) have been simplified to H and L respectively. Non-identical adjacent tones (e.g. HL or LH) of a disyllabic verb root are fully represented.

10. Tone structure of perfect verb stems in Asante, Akuapem and Fante

Verb type and basic tone	Column (1) Twi: Asante		Column (2) Twi: Akuapem		Column (3) Fante	
	Affirm.	Neg.	Affirm.	Neg.	Affirm.	Neg.
a. CV (**dà** 'sleep')	**L-H**	**L-H-L**	**H-L**	**L-H-L**	**H-L**	**H-H-L**
b. CVC (**tɔ̀n** 'sell')	**L-H**	**L-H-L**	**H-L**	**L-H-L**	**H-L**	**H-H-L**
c. CVCV (Twi: **gyìná;** Fa.: **gyínà** "stand"	**L-H**	**L-H-L**	**L-H**	**L-H-L**	**H-HL**	**H-H-L**

A high tone emerges in a perfect verb stem surface tone, that is, irrespective of a verb's basic tone. In (10-Column 1) in Asante, the high tone appears on the verb root, not

[2] There is nasalization of a voiced consonant after a nasal consonant in the Twi dialects of Akan. For this reason, **n-da** is pronounced/written as **nna/[nna]; n-gye** as **nnye/[ɲɲ-ɪ]**. This information has been excluded from the data in an attempt to keep verb roots uniform throughout this study.

on a prefect morpheme (i.e. **a-** or **-ɪ**) or the negative marker (**n-**). Verbal affixes (**a-**, **-ɪ** and **n-**) get a low tone. In the perfect affirmative in Akuapem (10-Colum 2), the high tone occurs on the verbal affix (i.e. **a-**, the perfect prefix) when the verb root is either CV or CVC. CV and CVC verb roots keep their basic tones which is low. In CVCV verb roots in the perfect affirmative, and in all verb roots in the perfect negative, however, the high tone surfaces on the verb root, not on verbal affixes. In the perfect affirmative in Fante as in (10-Column 3), the high tone always surfaces on the verbal affix (i.e. **a-**), and the verb root surface tone is the underlying. In the perfect negative, the high tone occurs on the negative prefix and also on the verb root, and the surface tone of the perfect suffix (**-ɪ**) is low.

4. Optimality theory, constraints and constraint definition

4.1 Optimality theory and some analytical positions

The central idea of Optimality theory (OT) is that surface forms of language reflect resolutions of conflicts between competing constraints (Prince and Smolensky 1993; Kager 1999). OT recognizes two fundamental classes of constraints, faithfulness constraints (i.e. for our purpose tone constraints) responsible for maintaining the faithful preservation of underlying units (i.e. underlying tones) in the output, and markedness constraints (i.e. tone constraints) that assess output tone configurations to ensure that certain tone requirements (i.e. markedness constraints) are satisfied (Prince and Smolensky 1993: 2; Kager 1999: 194). A resolution of conflict between markedness and faithfulness constraints through a language-specific constraint hierarchy and the evaluation of possible output forms against the ranked constraints is the basis in which the rightful (i.e. the optimal) output form is selected in OT.

The central arguments of the paper are as follows. (a) Tone constraints interact to minimize the unmarked tone (i.e. low tone) and to derive a high tone in the optimal perfect verb-stem in Akan. Tone constraints are therefore organized towards achieving this objective. (b) Differences in tone in output perfect verb stems in the three dialects therefore reveal differences in tone constraint ranking in their sub-grammars of the Akan language to meet this requirement. The goals of this section therefore are: (i) to spell out the constraints that are responsible for minimizing the unmarked tone and at the same time in deriving a high tone in perfect verb stems in Akan, and (ii) to develop the dialect-specific ranking of markedness and faithfulness constraints on tone that underlie the observed differences in tone in perfect verb stems in the three dialects. Tone variation across the three dialects, as already pointed out, only gives out a speaker's socio-cultural affiliation and is only significant in that regard.

4.2 Constraints and constraint definition

This subsection has two objectives: (a) it establishes the faithfulness and markedness constraints on tone in perfect constructions in Akan; and (b) it develops and illustrates the different ranking arguments for the three dialects of Akan to account for variation in dialectal tone. Below in the table is a repeat of surface perfect tones in the three dialects; verb root tones have been underlined.[3]

11. The perfect verb stem surface tone structure

Verb type and basic tone	Twi: Asante, Akyem and Akuapem		Fante
	Asante	Akuapem	Fante

[3] A dash (-) marks morpheme boundary.

	Affirm.	Neg.	Affirm.	Neg.	Affirm.	Neg.
a. CV (**dà** 'sleep')	**L-H**	**L-H-L**	**H-L**	**L-H-L**	**H-L**	**H-H-L**
b. CVC (**tɔ̀n** 'sell')	**L-H**	**L-H-L**	**H-L**	**L-H-L**	**H-L**	**H-H-L**
c. CVCV (Twi: **gyìná;** Fa.: **gyínà** "stand "	**L-H**	**L-H-L**	**L-H**	**L-H-L**	**H-HL**	**H-H-L**

Tone polarity is pervasive in optimal perfect verb-stems in all three dialects in consideration. Yip (2002) describes tone polarity basically as follows:

> "In some languages, certain affixes have tones that are fully predictable from the tone of the foot to which they attach, but instead of receiving their tone by spreading in the usual way they show a tone that is the opposite of the neighbouring tone. Words that end in L take H affixes, and words that end in H take L affixes. This is termed 'polarity"' (Yip, 2002:159).

Picanço (2002) says the same in few words. He defines the notion of tone polarity as "a phenomenon where a morpheme is assigned a tone opposite to an adjacent tone. Tone polarity in the perfect verb stem in Akan is slightly different; it does not hold between a tone and an abutting affix which would then make tone polarity a phonologically-conditioned allomorphy in Akan perfect verb stems. Tone polarity as it pertains in the perfect verb stem in Akan is a requirement on contiguous morphemes. Constituent morphemes of a perfect verb-stem must exhibit tone polarity. In other words, identical tones are dispreferred between adjacent morphemes. There is, however, a preference for identical tones on a disyllabic morpheme (since the constituent syllables are not morphemic) – this is a requirement for what is a perfect morpheme-based tone polarity. Morpheme-based tone polarity is said to have been violated where a disyllabic morpheme (e.g. the verb root) carries opposite tone values of the tone of an abutting affix. For example, (a) [$\mathbf{L_{Affix}\text{-}LH_{verb\text{-}root}}$]; [$\mathbf{L_{Affix}\text{-}HL_{verb\text{-}root}}$]; [$\mathbf{H_{Affix}\text{-}LH_{verb\text{-}root}}$]; [$\mathbf{H_{Affix}\text{-}HL_{verb\text{-}root}}$]; or (b) [$\mathbf{LH_{verb\text{-}root}\text{-}L_{Affix}}$]; [$\mathbf{HL_{verb\text{-}root}\text{-}L_{Affix}}$]; [$\mathbf{LH_{verb\text{-}root}\text{-}H_{Affix}}$]; [$\mathbf{HL_{verb\text{-}root}\text{-}H_{Affix}}$] are all forms with tone polarity violation. The verb root tone cannot be high-low or low-high; it must carry either a high or a low tone (and not both), and this single surface tone to be carried by the verb root must be the polar opposite of the surface tone of the abutting morpheme (affix).[4] In the context of OT, violation of (a) and (b) at the same time – because a (LH or HL) verb root is surrounded by affixes – amounts to double violation of tone polarity.

In the current study, tone polarity is not necessarily to be determined from the basic tone of an adjacent unit (i.e. syllable, morpheme or word). Tone polarity is one of four basic tone constraints that must interact in what is a dialect-specific tone constraint ranking to derive dialect-specific perfect verb stem surface tones. The remaining tone constraints would be discussed shortly. All that is important in determining perfect verb stem tone is the underlying verb root tone. With this underlying tone information, surface verb root tones and also the surface tones of verbal affixes are all predictable from the dialect-specific tone constraint ranking. Optimality theory is a scopal theory; underlying constraint ranking argument is the principle of scope – a highly-ranked constraint always has scope over a lower ranked constraint. Therefore, dialect-specific constraint ranking reveals the permissible dialect-specific scopal relations among these required surface tone conditions. Constraints are violable; therefore, there are instances of dispreference

[4] Tone polarity as described above results from the requirements of two Generalized OCP constraints – one prohibits a sequence of H-tones (*H…H), while the other prohibits a sequence of L-tones, (*L…L) in a given domain (i.e. between adjacent morphemes (Suzuki, 1998).

of tone polarity – i.e. a ranking argument that does not always favor tone polarity in certain domains in some dialects. In the end, tone polarity may either be enforced or violated in an optimal perfect verb stem in a dialect depending on its prescribed position on that dialect's unique tone constraint hierarchy.

Following are cases of tone polarity in the different dialects and also some exceptions. The tone of the verb-root is always high, and the tones of its affixes (**a-** in the affirmative; and **n-** and **-ɪ** in the negative) also are always low in the perfect (affirmative and negative) verb stem in Asante. This means that tone polarity has total application in the perfect verb stem in the Asante dialect. Tone polarity as described for the Asante dialect is also true of the perfect negative verb stem in Akuapem: the negative marker (**n-**) and the perfect suffix (**-ɪ**) take a low low tone, and the surface tone of the verb-root (which intervenes between these affixes) is always high.

Tone polarity also holds in the perfect affirmative verb stem in Akuapem, but not in the manner described for the perfect affirmative verb stem in Asante. In the perfect affirmative verb stem in Akuapem, **a-** (constituting the first syllable of the perfect verb stem) takes a high tone (**á-**) with CV and CVC verb-roots (e.g. **dà** and **tɔ̀ǹ**), but a low tone (i.e. **à-**) with CVCV verb roots (e.g. **gyìná**).

Tone polarity, however, holds minimally in Fante. There is the preference for the first syllable of a perfect verb stem (both affirmative and negative) to carry a high tone. This condition explains why **a-** (in the affirmative) and **n-** (in the negative) both carry a high tone in the perfect verb stem in Fante. In the perfect negative, the tone of the second syllable of the verb stem (i.e. the syllable that follows **n-**; i.e. the first syllable of the verb-root) is also always high. This means that tone polarity does not hold between **n-** (being the first syllable) and the verb-root (i.e. by virtue of its initial syllable being the second syllable) in the perfect negative verb stem in Fante. However, tone polarity holds at the right-periphery between the verb-root and the perfect suffix (**-ɪ**) in the perfect negative verb stem in Fante. The verb-root tone (irrespective of the syllable structure of the verb-root or the underlying verb tone) is always high and the **-ɪ** surface tone is always low. For tone polarity to be said to have applied, each morpheme (i.e. irrespective of its syllable structure) must carry a uniform tone: that is, either low or high. In the perfect affirmative verb stem in Fante, however, the verb-root tone is always the underlying. Tone polarity (to be referred to simply as **Polar**) can therefore be said to be a general constraint on surface perfect verb stems in Akan. Variations in tone polarity across dialects (as described above) are simply reflections of differences in the ranking of **Polar** – a markedness constraint – in the different dialects.

In analysing the contexts for and against tone polarity, certain syllable-based tone conditions were established. There were two of such, namely (i) the preference for an initial high-tone syllable of the perfect verb stem, and also (ii) the preference for a second high-tone syllable of the verb stem. These prosodic requirements can be formulated into the constraints, ***σ̀₁** and ***σ̀₂** respectively. Enforcing the ***σ̀₁** and ***σ̀₂** constraints in a perfect verb stem is simply an attempt at minimizing the low tone in such output in a dialect. The ***σ̀₁** constraint militates against a low-tone bearing initial/first syllable of the perfect verb stem (i.e. **a-** in the perfect affirmative, and **n-** in the perfect negative). The ***σ̀₂** constraint is a dispreference of a low tone on the verb root's initial syllable – the verb root's initial syllable is the second syllable (after **a-** or **n-**) of the perfect verb stem.

The two constraints – ***σ̀₁** and ***σ̀₂** – are highly respected in Fante, in the perfect negative verb stem (i.e. **σ₁.σ₂(σ).ɪ)**): both the negative marker (representing an initial syllable) and the first syllable of the verb-root (representing the second syllable of the verb stem) take a high tone in Fante (i.e. **σ́₁.σ́₂(σ).ɪ**). In the perfect affirmative verb stem (i.e. a-Verb) in Fante, however, it is ***σ̀₁** (**á-Ver**b) that is respected, as the verb-root surface tone is always the underlying.

In the Asante dialect, the tone of the second syllable of the perfect verb stem (both affirmative and negative) is always high; and tone polarity is highly respected in Asante. This means that a potential optimal candidate in Asante would have to respect the ***σ̀₂** constraint over the ***σ̀₁** constraint; and suggests the ranking of the ***σ̀₂** constraint over the ***σ̀₁** constraint in the Asante dialect.

In Akuapem, an initial syllable of a potential optimal candidate must be high in CV and CVC verbs in the affirmative – and this is the only context in which an initial high tone of a perfect verb stem in preferred in Akuapem, suggesting the ranking order: ***σ̀₁** >> ***σ̀₂**. In CVCV verbs in the affirmative, and in perfect negative verb stems, it is the second syllable that must carry a high tone to be represented as: ***σ̀₂** >> ***σ̀₁**. It will be determined later how the ***σ̀₁** >> ***σ̀₂** and ***σ̀₂** >> ***σ̀₁** rankings merge into a single constraint ranking argument for the perfect verb-stem in Akuapem.

There is also an attempt to stay faithful to underlying verb-root tones in some domains. This new constraint must always rank crucially with the ***σ̀₂** constraint in situations where there is also the need to preserve an underlying initial low tone of a verb root. In the perfect affirmative in Fante, the tone of the second syllable of the perfect verb stem is always low – i.e. the underlying – in CV and CVC verb-roots. Also, in Akuapem, the surface tone of the second syllable of the perfect verb stem (i.e. the initial syllable of the verb-root) is also the underlying just like in Fante. This means that the need to preserve an underlying low tone of CV and CVC verb-roots in the perfect affirmative is paramount in Fante and in Akuapem. Underlying tones of CVCV verbs are also preserved in the perfect affirmative in Fante. This suggests the existence of a faithfulness constraint, **IDENT-ROOT[Tone]** (**RT[Tone]** for short), that always interacts with ***σ₂** to either allow or prevent a high-tone on the second syllable of the perfect verb stem. The constraint **RT[Tone]** requires that the underlying tones of verb roots be preserved in an output. The fact that the effect of **RT[Tone]** is never realized in optimal outputs in Asante suggests that **RT[Tone]** is one of the lower ranked constraints in Asante. The ranking arguments to be developed in this paper is very basic and would only focus on how the four constraints identified so far interact in the three dialects to derive their perfect verb stem surface tones. Below is a summary of the constraints I have advanced so far to account for perfect verb stem surface tones in the Akuapem, Asante and Fante dialects of Akan.

12. **Constraints and their definitions**

i. **Polar (Tone polarity)**: Tones of adjacent morphemes must not be identical. There could be more than a single violation of this constraint in perfect verb stems consisting of three morphemes.
ii. ***σ̀₁**: The tone of the initial/first syllable of the verb-stem must not be low.
iii. ***σ̀₂**: The tone of the second syllable of the verb-stem must not be low.
iv. **RT[Tone]**: Basic tone(s) of verb-roots must be preserved in an output.

5. Variation in constraint ranking in perfect sentences in the three dialects

In this section, I develop tone ranking arguments for each of the three dialects of Akan. Subsection 5.1 focuses on Fante; subsection 5.2 is devoted to Akuapem, subsection 5.3 focuses on Asante and subsection 5.4 is a comparative analysis of constraint rankings in the three dialects.

5.1 Ranking argument for the perfect verb stem in Fante

In Fante perfect verb stems, the initial syllable always carries a high tone. This suggests a high-ranking (i.e. an undominated) ***σ̀₁** constraint. In the tableau in (13), candidate (13a) **à-dá** incurs fatal violation of the undominated ***σ̀₁** constraint. The optimal

candidate, (13b) **á-dà**, violates ***ȍ$_2$**, a lower ranking constraint; candidate (13c) **à-dà** violates the ***ȍ$_1$** and ***ȍ$_2$** constraints simultaneously.

13. Avoidance of an initial low tone of the verb stem: ***ȍ$_1$ >> *ȍ$_2$**

Input: /**a-dà**/	***ȍ$_1$**	***ȍ$_2$**
a. **à-dá**	*!	
b. **á-dà** (Fa.) *(optimal)*		*
c. **à-dà**	***!**	*
*d. **á-dá** *(non-optimal)*		

Candidate (13d) **á-dá,** a non-optimal candidate, respects both ***ȍ$_1$** and **ȍ$_2$**. Fante, however, disprefers (13d) **á-dá** as the optimal unit due to high-ranking **Polar** as captured in (14) below: here **Polar** outranks ***ȍ$_2$** and the candidate (13/14d) **á-dá** incurs a fatal violation of **Polar**. The candidate set in comparison in (14) suggests that there is no need to rank the ***ȍ$_1$** and **Polar** constraints crucially at this stage.

14. **Polar** domination of ***ȍ$_2$** in Fante

Input: /**a-dà**/	***ȍ$_1$**	**Polar**	***ȍ$_2$**
a. **à-dá**	*!		
☞ b. **á-dà** (Fa.)			*
c. **à-dà**	*	*	*
d. **á-dá**		*!	

The tableau in (15) presents **RT[Tone]** as an undominated constraint in the perfect affirmative verb stem in Fante.

15. **RT[Tone]** as an undominated constraint in Fante

Input: **/a-dà/**	**RT[Tone]**	***ȍ$_1$**	**Polar**	***ȍ$_2$**
a. **à-dá**	*!	*		
☞ b. **á-dà** (Fa.)				*
c. **à-dà**		*	*	*
d. **á-dá**	*		*	

An undominated **RT[Tone]** constraint in Fante (as obtained in (15) above) is justified at this stage of the analysis by the fact that the verb-root's basic tone (which as shown in (15) is underlyingly low)) is always retained in the optimal perfect affirmative verb-stem.

In the perfect negative sentence in Fante, however, the verb root's basic tone changes from low to high, and the resultant verb-stem, in that regard, always violates the **RT[Tone]** constraint. This means that the undominated **RT[Tone]** argument is not sustainable in Fante. The ***ȍ$_1$** constraint continues to be respected in the perfect-negative verb stem in that the tone of the initial-syllable of the perfect-negative verb-stem - i.e. just like that of the perfect-affirmative verb stem - is high. This suggests that a free-ranking ***ȍ$_1$** and **RT[Tone]**as obtained in (15) is not sustainable either. The **ȍ$_1$** and

RT[Tone]constraints must be crucially ranked with **ȍ$_1$** dominating **RT[Tone]**as represented in (16) below.

16. The need for ***ȍ$_1$** domination of **RT[Tone]**in Fante: ***ȍ$_1$ >> RT[Tone]**

Input: /**n-dà-ɪ**/	***ȍ$_1$**	**RT[Tone]**
a. **ǹ-dá-ì**	*!	*
☞ b. **ń-dá-ì** (Fa.)		*

The two competing candidates in (16) both incur a single violation of **RT[Tone],** making the assessment under **RT[Tone]**, therefore, not count in this case. Here, the selection of (16b) as the optimal form over (16a) is determined solely on the basis of the constraint ***ȍ$_1$**: candidate (16a) violates the ***ȍ$_1$** constraint fatally; the optimal candidate, (16b), does not.

Also, free-ranking ***ȍ$_1$** and **Polar** as modelled in (15) (for the perfect-affirmative verb-stem) is not sustainable for the fact that in the perfect-negative verb stem polarity is violated by the fact that tones of the first two syllables of the perfect-negative verb-stem are both high (i.e. irrespective of the verb-root's basic tone). That is, the negative marker which is a syllable and the initial syllable of the verb-root both carry a high tone in the perfect-negative verb stem. This suggests a ***ȍ$_1$** domination of **Polar** as illustrated in (17) below.

17. The need for ***ȍ$_1$** domination of **Polar** in Fante: ***ȍ$_1$ >> Polar**

Input: /**n-dà-ɪ**/	***ȍ$_1$**	**Polar**
a. **ǹ-dá-ì**	*!	
☞ b. **ń-dá-ì** (Fa.)		*

As illustrated in (16) and (17) above, the ***ȍ$_1$** relation with **Polar** and **RT[Tone]** is one of domination, not free-ranking: ***ȍ$_1$** dominates **RT[Tone]** and, again, dominates **Polar.** These revisions are necessary to accommodate (or account for) the tone structure of perfect-negative verb stems in Fante. The remainder of the analysis in this subsection focuses on representing how the **Polar**, ***ȍ$_2$** and **RT[Tone]** constraints interact to select the optimal perfect (affirmative or negative) verb stem in Fante.

Whereas in the perfect-affirmative verb stem, as in (15), **RT[Tone]** is argued to dominate ***ȍ$_2$**, the inverse of this relation is what is rather preferred in the perfect-negative verb-stem as illustrated in (18) below. Any attempt to extend the constraint relation as in (15) to candidate set in (18) therefore is bound to select the wrong candidate.

18. ***ȍ$_2$** domination of **RT[Tone]** in the perfect-negative: ***ȍ$_2$** >> **RT[Tone]**

Input: /**n-gyínà-ɪ**/	***ȍ$_1$**	***ȍ$_2$**	**RT[Tone]**
a. **ǹ-gyíná-ì**	*!		*
☞ b. **ń-gyíná-ì**			*
c. **ń-gyìná-ì**		*!	*
d. **ń-gyìnà-ì**		*!	*

The need to rank ***ȍ$_2$** over **RT[Tone]**when it comes to the perfect-negative as in (18) is necessitated by the fact that the verb root surface tone in the perfect-negative is always high, that is, irrespective of a verb's basic tone. The illustration in (19) is an attempt to extend the constraint relation in (18) to account for perfect-affirmative forms as in (15).

19. The problem of ***ȍ₂** domination of **RT[Tone]**in the perfect-affirmative

Input: **/a-dà/**	***ȍ₁**	***ȍ₂**	**RT[Tone]**
a. **à-dá**	*!		*
b. **á-dà** *(the expected/preferred candidate)*		*!	
c. **à-dà**	*	*	
d. **á-dá** *(the winning candidate)*			*

The fact of the matter is that the constraint relation as we have it in (18), and in (19), namely: ***ȍ₁**>>***ȍ₂**>>**RT[Tone],** selects the wrong candidate. The preferred optimal candidate is (19b) **á-dà**, but the ranking argument as in (19) favors (19d) **á-dá**, one of the dispreferred candidates for Fante. We can escape this conundrum by simply arguing that the perfect-affirmative and perfect-negative verb-stems in Fante require (and for that matter operate) different constraint rankings for the fact that the two constructions are different in their constituent structure. However, any such conclusion will be a quick one and also too easy for the fact that the argumentation that calls for it excludes **Polar**, a constraint that has a significant role, and is as equally important as the constraints ***ȍ₁**, ***ȍ₂** and **RT[Tone]**, in the selection of the optimal (perfect-affirmative/perfect-negative) unit in Fante (and in all these dialects). In the following paragraphs, I incorporate **Polar** to provide a unified tone constraint ranking argument for perfect (affirmative and negative) verb stems in Fante

A unified constraint ranking for perfect (affirmative and negative) verb stems in Fante lies with how the constraint **Polar** is distributed with respect to (i.e. interacts with) the ***ȍ₂** and **RT[Tone]** constraints. My analytical positions are: (i) that **Polar**, just like ***ȍ₂**, outranks **RT[Tone]**; and (ii) that ***ȍ₂**, and **Polar** are in free-ranking and dominated by ***ȍ₁**. OT illustrations from (20) to (23) capture these viewpoints.

20. Perfect-Affirmative verb-stem (with a monosyllabic verb root)

Input: /**a-dà**/	***ȍ₁**	***ȍ₂**	**Polar**	**RT[Tone]**
a. **à-dá**	*!			*
☞ b. **á-dà**		*		
c. **à-dà**	*	*	*	
d. **á-dá**			*	*!

In (20), the candidates (20a) and (20d) are rejected on the grounds of their fatal violations of the ***ȍ₁** and **RT[Tone]** constraints respectively. ***ȍ₂** and **Polar** are not in any crucial ranking; for this reason, candidate (20b)'s violation of ***ȍ₂** and (20d)'s violation of **Polar** can be ignored in the evaluation process. The selection of (20b) over (20d) is done solely on the basis of lower-ranked constraints, **RT[Tone],** which candidate (20d) violates fatally, but candidate (20b) respects. Candidate (20c) is the worst of the candidate set; it violates more of higher-ranked constraints.

In (21) is a further justification of the significant role the lower-ranked **RT[Tone]** constraint plays in selecting the optimal perfect verb-stem: candidate (21b) is selected over candidate (21d) and (21f) which incur fatal violations of the lower-ranked **RT[Tone]** constraint.

21. Perfect-Affirmative verb-stem (with a disyllabic verb root)

Input: /**a-gyínà**/	***ȍ₁**	***ȍ₂**	**Polar**	**RT[Tone]**
a. **à-gyíná**	*!			*
☞ b. **á-gyínà**			*	
c. **à-gyìnà**	*	*	*	*

d. **á-gyíná**			*	*!
e. **á-gyìná**		*	*	*
f. **á-gyìnà**		*		*!

Candidate (21a) is rejected on the grounds of its fatal violation of the undominated ***ȍ$_1$** constraint. (21c) and (21e) incur the most constraint violations -- especially (21c) which even violates the undominated ***ȍ$_1$** constraint.

In (22) and (23) where the focus is on perfect-negative verb-stems, however, the lower-ranked **RT[Tone]** constraint is not the main deciding factor in candidate selection. The fact that candidates violate higher-ranked ***ȍ$_1$** and ***ȍ$_2$** constraints (e.g. 22a, 22c, 23a and 23f), and also the fact that they incur several violations of salient constraints (e.g. 22d, 23d, 23e, 23c), are the main reasons for their rejection in candidate evaluation.

22. Perfect-Negative verb-stem (with a monosyllabic verb root)

Input: /**n-dà-ɪ**/	***ȍ$_1$**	***ȍ$_2$**	**Polar**	**RT[Tone]**
a. **ǹ-dá-ì**	*!			*
☞ **b. ń-dá-ì**			*	*
c. **ń-dà-ì**		*!	*	
d. **ǹ-dà-ì**	*	*	**	*

23. Perfect-Negative verb-stem (with a disyllabic verb root)

Input: /**n-gyínà-ɪ**/	***ȍ$_1$**	***ȍ$_2$**	**Polar**	**RT[Tone]**
a. **ǹ-gyíná-ì**	*!			*
☞ b. **ń-gyíná-ì**				*
c. **ń-gyínà-ì**			*!*	
d. **ǹ-gyìnà-ì**	*	*	**	*
e. **ń-gyìná-ì**		*	**	*
f. **ń-gyìnà-ɪ**		*!		*

The above representations - especially (20) and (21) - have attested to the need for a free-ranking ***ȍ$_2$** and **Polar** in Fante. That is, the fact that the ***ȍ$_2$** and **Polar** constraints are not in any crucial ranking in Fante is significant to the unified account of the perfect verb stem surface tone. Also, the distribution of the free-ranking ***ȍ$_2$** and **Polar** constraints with respect to ***ȍ$_1$** and **RT[Tone]** is equally vital in the determination of the most optimal perfect verb-stem in Fante. We have also seen the important role the lower-ranked **RT[Tone]** constraint plays in deciding the most optimal candidate -- this is the case, especially, in selecting the optimal perfect-affirmative verb stem. From our analysis, below in (24) is the most convenient tone constraint ranking argument for the perfect verb stem in Fante:

24. ***ȍ$_1$ >> *ȍ$_2$, Polar >> RT[Tone].**

5.2 Ranking argument for the perfect verb stem in Akuapem

This subsection focuses on establishing the constraint ranking for the perfect verb stem in Akuapem. The four tableaux (i.e. 25, 26, 27 and 28) below illustrate four different perfect verb stem forms in Akan. These are: (25) a monosyllabic-rooted perfect-affirmative verb stem; (26) a disyllabic-rooted perfect-affirmative verb stem; (27) a monosyllabic-rooted perfect-negative verb stem; and (28) a disyllabic-rooted perfect-

negative verb stem. I have already discussed how polarity is such an important tone condition in the perfect verb stem in Akuapem. An undominated **Polar** in this ranking is therefore in order. From (25) to (28), **Polar** is shown to outrank ***σ̀$_2$**, and non-optimal candidate forms incur either fatal or double violations of **Polar.**

25. A monosyllabic-rooted perfect-affirmative verb stem: **Polar >>*σ̀$_2$**

Input: /**a-dà**/	**Polar**	***σ̀$_2$**
👍 a. **á-dà** (Ak.)		*
b. **à-dà**	*!	*
c. **á-dá**	*!	

26. A disyllabic-rooted perfect-affirmative verb stem: **Polar >>*σ̀$_2$**

Input: /**a-gyìná**/	**Polar**	***σ̀$_1$**
👍 a. **à-gyíná** (Ak.)		*
b. **á-gyínà**	*!	
c. **à-gyìnà**	*!	*
d. **á-gyíná**	*!	
e. **á-gyìná**	*!	

27. A monosyllabic-rooted perfect-negative verb stem: **Polar >>*σ̀$_2$**

Input: /**n-dà-ɪ**/	**Polar**	***σ̀$_1$**
👍 a. **ǹ-dá-ì** (Ak.)		*
b. **ń-dá-ì**	*!	
c. **ń-dà-ì**	*!	
d. **ǹ-dà-ì**	**	*

28. A disyllabic-rooted perfect-negative verb stem: **Polar >>*σ̀$_2$**

Input: /**n-gyìná-ɪ**/	**Polar**	***σ̀$_1$**
👍 a. **ǹ-gyíná-ì** (Ak.)		*
b. **ń-gyíná-ì**	*!	
c. **ń-gyínà-ì**	**	*
d. **ǹ-gyìnà-ì**	**	
e. **ń-gyìná-ì**	**	

The optimal candidates (25a), (26a), (27a) and (28a), on the other hand, only violate ***σ̀$_1$**, a lower-ranked constraint, but respect **Polar**.

It is also a requirement in Akuapem that an optimal perfect verb stem respects polarity even at the expense of the preservation of a verb root's basic tone. This suggests **Polar** domination of the **RT[Tone]** constraint in Akuapem as represented from (29) to (32) below: **Polar** >>**RT[Tone]**

29. A monosyllabic-rooted perfect-affirmative verb stem: **Polar** >>**RT[Tone]**

Input: /**a-dà**/	**Polar**	**RT[Tone]**
👍 a. **á-dà** (Ak.)		
b. **à-dà**	*!	
c. **á-dá**	*!	*

30. A disyllabic-rooted perfect-affirmative verb stem: **Polar** >>**RT[Tone]**

Input: **/a-gyìná/**	**Polar**	**RT[Tone]**
☞ a. **à-gyíná** (Ak.)		*
b. **á-gyínà** (Fa.)	*!	*
c. **à-gyìnà**	*!	*
d. **á-gyíná**	*!	*
e. **á-gyìná**	*!	

31. A monosyllabic-rooted perfect-negative verb stem: **Polar** >>**RT[Tone]**

Input: **/n-dà-ɪ/**	**Polar**	**RT[Tone]**
☞ a. **ǹ-dá-ì** (Ak.)		*
b. **ń-dá-ì** (Fa.)	***!**	*
c. **ń-dà-ì**	***!**	
d. **ǹ-dà-ì**	***!***	

32. A disyllabic-rooted perfect-negative verb stem: **Polar** >>**RT[Tone]**

Input: **/n-gyìná-ɪ/**	**Polar**	**RT[Tone]**
☞ a. **ǹ-gyíná-ì** (Ak.)		*
b. **ń-gyíná-ì**	***!**	*
c. **ń-gyínà-ì**	***!***	*
d. **ǹ-gyìnà-ì**	***!***	*
e. **ń-gyìná-ì**	***!***	

Candidate forms are rejected, or considered non-optimal for the single reason of their **Polar** violation(s). Respect for **Polar** is thus an indispensable requirement for optimality.

Optimal perfect verb stems in (33), (34) and (35) support ***σ̀₂** domination of ***σ̀₁**. Non-optimal output forms from (33) to (35) violate the ***σ̀₂** constraint fatally while their optimal competitors always respect it.

33. A disyllabic-rooted perfect-affirmative verb stem: ***σ̀₂** >> ***σ̀₁**

Input: **/a-gyìná/**	***σ̀₂**	***σ̀₁**
☞ a. **à-gyíná** (Ak.)		*
b. **à-gyìnà**	*!	*
c. **á-gyìná**	*!	
d. **á-gyìnà**	*!	

34. A monosyllabic-rooted perfect-negative verb stem: ***σ̀₂** >> ***σ̀₁**

Input: **/n-dà-ɪ/**	***σ̀₂**	***σ̀₁**
☞ a. **ǹ-dá-ì** (Ak.)		*
b. **ń-dà-ì**	*!	
c. **ǹ-dà-ì**	*!	*

35. A disyllabic-rooted perfect-negative verb stem: ***σ̀₂** >> ***σ̀₁**

Input: /**n-gyìná-ɪ**/	***σ̀₂**	***σ̀₁**
👍 a. **ǹ-gyíná-ì** (Ak.)		*
b. **ń-gyínà-ì**	*!	*
c. **ń-gyìná-ì**	*!	
d. **ń-gyìnà-ì**	*!	*

The only problem with ***σ̀₂** domination of ***σ̀₁** as advanced from (33) to (35) is as in (36) below. In (36), the winning candidate, (36a) **à-dá**, is not the preferred optimal candidate. The preferred candidate (36b) **á-dà** violates the ***σ̀₂** constraint fatally and rather respects ***σ̀₁**.

36. A monosyllabic-rooted perfect-affirmative verb stem: ***[*σ̀₂** >> ***σ̀₁**]

Input: /**a-dà**/	***σ̀₂**	***σ̀₁**
a. **à-dá** *(the winning candidate)*		*
b. **á-dà** (Ak.) *(the preferred optimal candidate)*	*!	
c. **à-dà**	*!	*

The question is whether our claim of ***σ̀₂** domination of ***σ̀₁** is sustainable with forms in (36) demanding the reverse (or opposite) constraint relation. The claim of ***σ̀₂** domination of ***σ̀₁** is a fact about several perfect verb stems in the Akuapem dialect that cannot be disregarded in our representation; actually, it is only in the selection of this one optimal perfect verb stem in Akuapem (i.e. as in 36) that this ranking argument suddenly becomes a problem. We can sustain the ***σ̀₂** >> ***σ̀₁** ranking (which the majority of optimal perfect verb forms submit to) if we accept that, in Akuapem, **RT[Tone]** which candidate (36a) **à-dá** violates, and ***σ̀₂**, which the expected optimal candidate violate, are in free-ranking as illustrated in (37) below.

37. A monosyllabic-rooted perfect-affirmative verb stem:
RT[Tone], *σ̀₂ >> ***σ̀₁**

Input: /**a-dà**/	**RT[Tone]**	***σ̀₂**	***σ̀₁**
a. **à-dá**	*		*!
👍 b. **á-dà** (Ak.) *(winning candidate is optimal)*		*	
c. **à-dà**		*	*!

With the constraints, **RT[Tone]**and ***σ̀₂** in free-ranking, and each of the competing candidates violating one of the freely-ranked constraints, the optimal candidate's violation of ***σ̀₂** (as in 37b) becomes insignificant -- for reason of cancellation of violation marks. The focus then shifts from **RT[Tone]**and ***σ̀₂** to ***σ̀₁**, a lower-ranked constraint, in the selection of the optimal perfect verb stem in Akuapem. As obtained in (37), candidate (37b) emerges as the optimal perfect verb stem over candidate (37a) and (37c) on the grounds of their fatal violations of the lower-ranked ***σ̀₁** constraint.

At this juncture, we can reach a conclusion on constraint ranking in Akuapem. If **Polar** dominates ***σ̀₁** (as from 25 to 28) and also dominates **RT[Tone]** (as from 29 to 32), and **RT[Tone]** and ***σ̀₂** are in free-ranking and together dominate ***σ̀₁**, then the tone constraint ranking as represented in (38) below holds for Akuapem.

38. **Polar >> RT[Tone], *σ̀₂ >> *σ̀₁**

Below from (37) to (40) is a fuller evaluative representation of the ranking argument in Akuapem, as given in (38) above. In (39), candidate (39a) violates **RT[Tone]** while (39c) and (39d) violate undominated **Polar** fatally. The optimal candidate only violates ***σ̀₂**.

39. A monosyllabic-rooted perfect-affirmative verb stem

Input: /**a-dà**/	**Polar**	**RT[Tone]**	***σ̀₂**	***σ̀₁**
a. **à-dá**		*		*!
☞ b. **á-dà** (Ak.)			*	
c. **à-dà**	*!		*	*
d. **á-dá**	*!	*		

In (40), the undominated **Polar** constraint disqualifies four out of the six candidates in the competition – i.e. 40b, 40c, 40d, and 40e.

40. A disyllabic-rooted perfect-affirmative verb stem

Input: /**a-gyìná**/	**Polar**	**RT[Tone]**	***σ̀₂**	***σ̀₁**
☞ a. **à-gyíná** (Ak.)		*		*
b. **á-gyínà**	*!	*		
c. **à-gyìnà**	*!	*	*	*
d. **á-gyíná**	*!	*		
e. **á-gyìná**	*!		*	
f. **á-gyìnà**		*	*!	

Candidate (40a – the optimal output form) and candidate (40f) both violate **RT[Tone]**; their shared violation mark is cancelled out or ignored and a lower-ranked constraint (i.e. ***σ̀₂**) becomes the basis for optimal candidate selection. That is, the ***σ̀₂** constraint helps to select (40a) as optimal over (40f) in (40): candidate (40f) incurs a single but fatal violation of ***σ̀₂**, which the optimal candidate respects.

In (41), the undominated **Polar** constraint and **RT[Tone]** suffice in determining the optimal candidate form.

41. A monosyllabic-rooted perfect-negative verb stem

Input: /**n-dà-ɪ**/	**Polar**	**RT[Tone]**	***σ̀₂**	***σ̀₁**
☞ a. **ǹ-dá-ì** (Ak.)		*		*
b. **ń-dá-ì** (Fa.)	*!	*		
c. **ń-dà-ì**	*!		*	
d. **ǹ-dà-ì**	*!*		*	*

The optimal candidate (41a) violates a lower-ranked constraint (**RT[Tone]**) of **Polar**, and the remaining competitors each violates the **Polar** constraint fatally.

In (42), four out of the six competing candidates violate **Polar** either fatally or severally resulting to their disqualification. The optimal candidate (42a), and candidate (42f) – both violate **RT[Tone]**; cancellation of shared violation marks of **RT[Tone]** for the two candidates, therefore, leaves optimal candidate selection to be determined strictly by the ***σ̀₂** constraint.

42. A disyllabic-rooted perfect-negative verb stem

Input: /n-gyìná-ɪ/	**Polar**	**RT[Tone]**	***σ̀₂**	***σ̀₁**

☝ a. **ǹ-gyíná-ì** (Ak.)		*		*
b. **ń-gyíná-ì** (Fa.)	*!	*		
c. **ń-gyínà-ì**	**	*	*	*
d. **ǹ-gyìnà-ì**	**	*		
e. **ń-gyìná-ì**	**		*	
f. **ń-gyìnà-ɪ**		*	*!	*

5.3 Ranking argument for the perfect verb stem in Asante

Tone polarity is always upheld in Asante, and the second syllable of the perfect verb-stem is always high-toned (i.e. irrespective of the basic tone of the verb). The **Polar** and ***σ̀₂** constraints are therefore undominated in the Asante dialect. The situation, as described above, indicates the domination of the ***σ̀₁** and **RT[Tone]** constraints by the **Polar** and ***σ̀₂** constraints in the Asante dialect. As the tableaux in (43) to (46) indicate, in the Asante dialect of Akan, the undominated **Polar** and ***σ̀₂** constraints are not crucially ranked, and so are their subordinates in ranking, the ***σ̀₁** and **RT[Tone]** constraints.

43. A monosyllabic-rooted perfect-affirmative verb stem

Input: /**a-dà**/	**Polar**	***σ̀₂**	**RT[[Tone]**	***σ̀₁**
☝ a. **à-dá** (As.)			*	*
b. **á-dà**		*!		
c. **à-dà**	*	*		*
d. **á-dá**	*!		*	

44. A disyllabic-rooted perfect-affirmative verb stem

Input: /**a-gyìná**/	**Polar**	***σ̀₂**	**RT[Tone]**	***σ̀₁**
☝ a. **à-gyíná** (As.)			*	*
b. **á-gyínà**	*!		*	
c. **à-gyìnà**	*	*	*	
d. **á-gyíná**	*!		*	
e. **á-gyìná**	*	*		

45. A monosyllabic-rooted perfect-negative verb stem

Input: /**n-dà-ɪ**/	**Polar**	***σ̀₂**	**RT[Tone]**	***σ̀₁**
☝ a. **ǹ-dá-ì** (As.)			*	*
b. **ń-dá-ì**	*!		*	
c. **ń-dà-ì**	*	*		*
d. **ǹ-dà-ì**	**	*		*

46. A disyllabic-rooted perfect-negative verb stem

Input: /**n-gyìná-ɪ**/	**Polar**	***σ̀₂**	**RT[Tone]**	***σ̀₁**
☝ a. **ǹ-gyíná-ì** (As.)			*	*
b. **ń-gyíná-ì**	*!		*	
c. **ń-gyínà-ì**	*!*		*	
d. **ǹ-gyìnà-ì**	**	*	*	*
e. **ń-gyìná-ì**	**	*		
f. **ń-gyìnà-ɪ**		*!	*	*

The fact that both **Polar** and ***σ̀₂** are undominated explains why the first and second syllables of optimal perfect verb-stems in the Asante dialect never carry identical tones. The tone melody of the two syllables is strictly **L.H** because of the undominated **Polar** and ***σ̀₂** constraints. An optimal output cannot exhibit an initial **H.L** tone melody due to the undominated ***σ̀₂** constraint. Also, the initial identical tones, #**L.L** or #**H.H**, would be prevented by the undominated **Polar** constraint; and a #**L.L** tone melody would additionally violate the ***σ̀₂** constraint. Polarity requires that adjacent morphemes carry opposite tones: a **HL** or a **LH** tone on a disyllabic verb-root is a violation of tone polarity. The surface tone of the disyllabic verb must be either **LL** or **HH (**and the tone of an adjacent morpheme of the verb root dissimilar) in order for tone polarity to be respected. In Asante the surface verb-root tone is H (for monosyllabic verb-roots) and HH (for disyllabic verb-roots) because of the undominated ***σ̀₂** constraint and the need for identical/common tone on morphemes. The reason for the disqualification of most output forms in (42) and (44) is because of their violations of these requirements: there is a single violation of **Polar** by candidates in perfect affirmative verb-stems in (42); and in most cases double violations of **Polar** in perfect negative verb-stems in (44). A third and fourth uniformity in optimal perfect verb stems – i.e. in addition to the requirement that they respect the Polar and ***σ̀₂** constraints – is their shared violation of the **RT[Tone]** and ***σ̀₁** constraints. All the above argumentations about perfect verb stem surface tones in Asante sum up in the constraint hierarchy as presented in (47):

47. **Polar, *σ̀₂ >> RT[Tone], *σ̀₁**

5.4 A comparative analysis of constraint ranking arguments

The dialect-specific tone-constraint rankings identified are:

48.

(a) Fante: ***σ̀₁ >> *σ̀₂, Polar >> RT[Tone]**

(b) Akuapem: **Polar >> RT[Tone], *σ̀₂ >> *σ̀₁**

(c) Asante: **Polar, *σ̀₂ >> RT[Tone], *σ̀₁**

Common to the three dialects is the ranking of the constraint **Polar** over the constraint **RT[Tone]** and shows how for the most part the effect of tone polarity is very much felt on the verb-root in the three dialects. This is evident in the positioning of the ***σ̀₂** constraint in the dialect-specific ranking arguments. The ***σ̀₂** constraint always targets the initial syllable of the verb-root – that is, the need for the tone of this syllable to be high. In Fante and Asante, ***σ̀₂** outranks **RT[Tone]** denoting the strong need for a high-tone verb-root initial syllable than any attempt to preserve the verb-root's underlying tone in the two dialects. In Akuapem, however, **RT[Tone]** and ***σ̀₂** are in free-ranking where they outrank ***σ̀₁**.

With an undominated **Polar** (as in the Twi dialects - Akuapem and Asante), the implication is that the requirement for an initial high tone of a verb-root is stronger than the requirement for the preceding syllable (**σ₁**) to carry a high tone. Underlying verb-root tones may be preserved but there is a stronger need for tone polarity and, in meeting tone polarity, an initial high tone of the verb-root (**σ́₂**) is better than an initial high tone of the verb stem (i.e. **σ́₁**, a preceding high tone of the verb-root). In Fante, however, the need for an initial high tone of the verb stem is stronger than the requirement for a second-high tone of the verb stem, and this requirement (i.e. the need for an initial high tone of the verb stem) is often upheld at the expense of tone polarity. In the Twi dialects, however, tone polarity is an uncompromising requirement: it is strictly an undominated constraint.

In Akuapem, two constraints (i.e. a morpheme-based and a syllable-based constraints) are in free-ranking, dominated by a morpheme-based constraint and subordinated by a syllable-based constraint. In Asante and Fante, as a shared condition for the two dialects, ***σ̀₂** and **Polar** are not in crucial ranking. Asante is, however, different in promoting **RT[Tone]** and ***σ̀₁** free ranking also. The two dialects are also similar in ranking **RT[Tone]** lower, but, again, are different in their positioning of the ***σ̀₁** constraint, which is the lowest ranked constraint in Asante (with **RT[Tone]**), but undominated in Fante. With the exception of ***σ̀₁** which is undominated in Fante but lower-ranked in Asante, the ranking argument is the same for the two dialects.

A shared ranking argument for the three dialects is **Polar >> RT[Tone]**, both of which are morpheme-based tone constraints. The ***σ̀₂** constraint has a unique characteristic of free-ranking with some other constraint (notably, a morpheme-based constraint) in all three dialects.

In Fante, syllable-based tone constraints are prioritized over the morpheme-based tone constraints. In Akuapem, however, the morpheme-based tone constraints are rather prioritized over the syllable-based constraints. In Asante, the shared **Polar >> RT[Tone]** argument interspaces the two syllable-based tone constraints (***σ̀₂** and ***σ̀₁**), and contiguous syllable-based and morpheme-based tone constraints are not in any way crucially ranked.

6. Conclusion

This paper has focused on establishing prosodic (i.e. tone) requirements in the Akan perfect verb-stem. As we can see, there has been no attempt to propose underlying tones for bound morphemic constituents – i.e. verbal affixes – of the perfect verb-stem in Akan, namely: **a-** "the perfect marker in the affirmative", **-ɪ** "the perfect marker in the negative" and **n-** "the negative marker" (i.e. the homorganic nasal). The underlying tone(s) of a verb-root is all that is needed in determining the surface perfect verb stem tone in Akan. Phonetic differences in tone of verb stems (i.e. verb roots and their affixes) in the different dialects automatically emerge from their dialect-specific tone constraint ranking argument.

Prosodic (i.e. tone) requirements in the Akan perfect verb-stem are situated at two major levels of representation in Akan linguistics: the phonological level where the syllable is the unit of organization, and the morphological level where tone requirements are expressed in terms of constituent morphemes of perfect verb stems. The four constraints identified to be responsible for the perfect verb-stem surface tone – i.e. ***σ̀₁, *σ̀₂**, **RT[Tone],** and **Polar** – can therefore be grouped into two along these two levels. The constraints ***σ̀₁** and ***σ̀₂** – markedness constraints – are syllable-based and exist to minimize as much as possible the occurrence of low tones (i.e. the unmarked suprasegmental unit) in the optimal perfect verb stem in Akan. The constraints, **RT[Tone]** (a faith constraint) and **Polar** (a markedness constraint), are morpheme-based. **RT[Tone]** is the instruction to keep faith with the verb-root tone in the output. **Polar**, on the other hand, regulates inter-morphemic tones such that contiguous morphemes exhibit tone dissimilation phonetically. It is the interaction of these four tone constraints – two syllable-based/regulated tone constraints and two morpheme-based/regulated tone constraints – in what is a dialect-specific tone constraint ranking – that accounts for the differences in surface tones of perfect verb stems in the three dialects.

This study has shown the syllable and the morpheme as units of organization of tone in the perfect verb stem in Akan. Tones are organized to respect tone polarity in constituent morphemes of the perfect verb stem while at the same time striving to remain faithful to a verb's basic tone. Tone constraints interact to minimize the unmarked tone (which is low) and also to derive a high tone in perfect verb stems. The different rankings

of these tone requirements – tone requirements at the phonological and morphological levels of representation, with each ranking argument representing a dialect-specific prioritization of constraints, is what accounts for dialectal variation in perfect verb stem surface tones in the Akuapem, Asante and Fante dialects of Akan.

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