

# SOME ASSIMILATORY PROCESSES IN AKAN<sup>7</sup>

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Apart from Akan Vowel Harmony, which has received a great deal of discussion, all the other assimilatory processes in Akan have not received adequate attention, in the existing literature. This paper is therefore designed to fill a vacuum. We accordingly discuss assimilatory processes like *palatalization*, *coronalization*, *stridentization/sibilantization*, *labialization*, *dorsalization* and *labial palatalization* in Akan. We distinguish between palatalization and coronalization, which have hitherto been considered as one and the same phonological process placed under palatalization. We consequently assume in this paper that palatalization, coronalization and stridentization in Akan are related but different processes, which occur in the same phonetic environment. We have also established a distinction between labialization and dorsalization in Akan in this paper. Whereas labialization applies to consonants, dorsalization is tied in with vowels in Akan. Labialized consonants retain both their primary/major and secondary/minor articulations at the phonetic surface. A dorsalized vowel, on the other hand, changes absolutely from its lexical V-Place [CORONAL] articulation to an absolute V-Place [DORSAL]/[LABIAL] articulation.

A part l'harmonie vocalique de l'akan qui a été beaucoup discutée, les autres processus d'assimilation n'ont pas reçu d'attention adéquate dans la littérature existante. Ce travail a pour but donc de combler un vide. Nous traitons, en conséquence, des processus d'assimilation telles que la palatalisation, la coronalisation, la stridentisation/sibilantisation, la labialisation, la dorsalisation et la palatalisation labiale en akan. Nous faisons la distinction entre la palatalisation et la coronalisation qui ont été jusqu'ici considérées comme le même processus unique placé sous la palatalisation et la coronalisation. Notre hypothèse de base ici est que la palatalisation, la coronalisation et la stridentisation en akan sont des processus presque similaires tout en restant différents et qui se réalisent dans le même environnement phonétique. Nous avons aussi établi dans ce travail une distinction entre la labialisation et la dorsalisation en akan. Alors que la labialisation s'applique aux consonantiques, la dorsalisation est liée aux voyelles en akan. Les consonnes labialisées retiennent leurs articulations primaires/majeures ainsi que secondaires/mineures en phonétique de surface. Une voyelle dorsalisée, par contre, change complètement son articulation coronale dans sa position lexicale en une articulation [dorsale]/[labiale].

## 0. INTRODUCTION

Akan is a Kwa tongue spoken in the southern part of Ghana in the West African sub-region by about 44% of Ghana's 20 million people (2000 census) in six of Ghana's ten Regions (the Ashanti, Brong Ahafo, and Central Regions as well as parts of Eastern, Volta, and Western Regions) as their mother tongue (L<sub>1</sub>).

Akan has three main dialects namely, Fante, Akuapem and Asante. The other dialects of Akan include Akwamu, Akyem, Assin, Bono, Denkyira, Kwahu, Wassa, and others. This study primarily carries out a descriptive cum comparative analysis of the abovementioned three major dialects of Akan within the domain of assimilatory processes.

### 0.1. THEORETICAL FRAMEWORK.

The central portions of this paper are cast within the frameworks of (1) Autosegmental Phonology as propounded by Goldsmith (1976) and the well-known

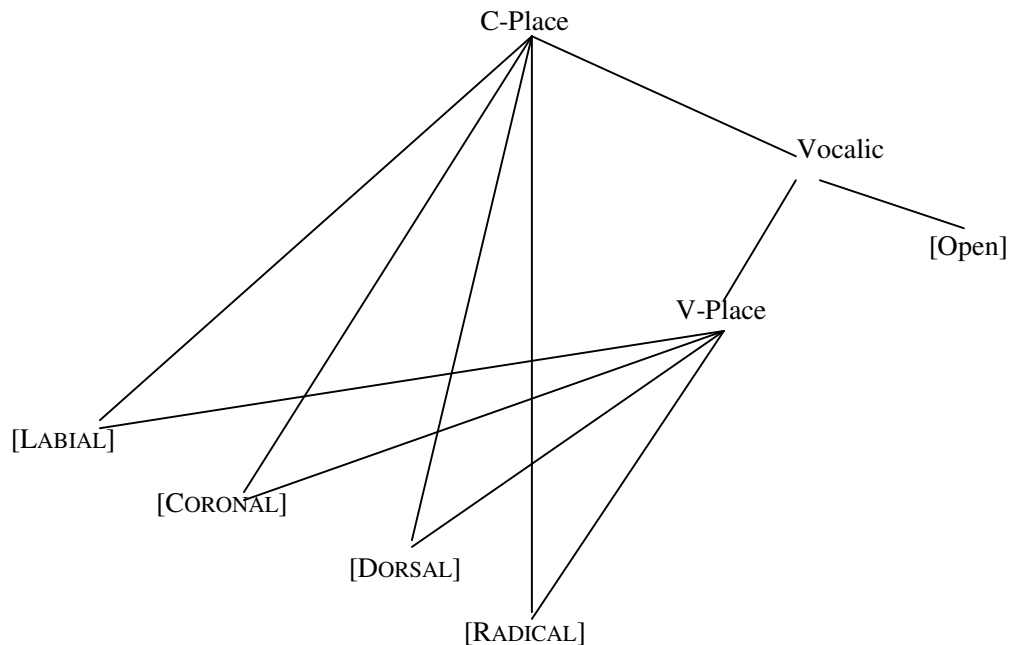
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<sup>7</sup> I wish to thank the two anonymous JWAL referees for their illuminating comments and suggestions that have inevitably helped revamp this paper to its present shape. Be that as it may, I, alone, am responsible for any deficiency associated with this paper.

literature that have cropped up from that work, and (2) Feature Geometry. We will not bother ourselves with the rudimentary tenets of the autosegmental phonology seeing that this theory has been in use for years and are therefore known to practitioners of phonology. However, we comment briefly on the Constriction-Based model of the Feature Geometry Theory, also referred to as the Unified Feature Theory (UFT) model of Feature Geometry, expounded by Clements & Hume (1995) and Hume (1996).

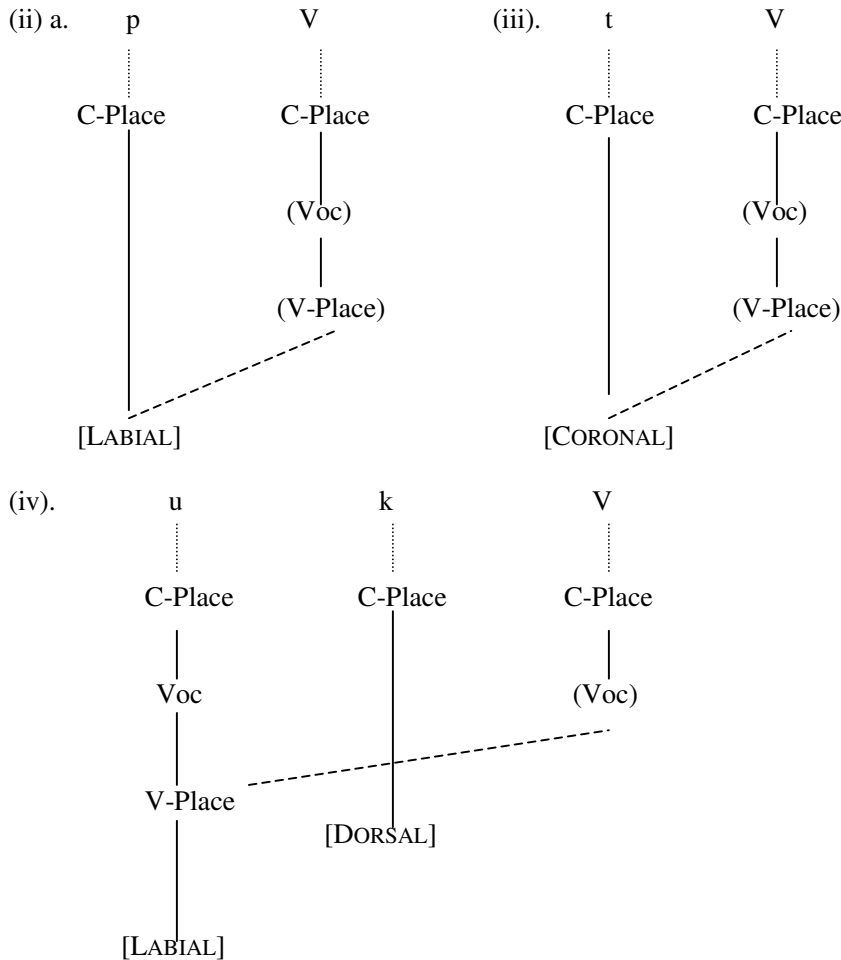
We will employ the UFT framework to account for the assimilatory processes in this paper. This model predicts that front vowels and coronal consonants can constitute one natural class; rounded or labialized vowels and labial consonants can also form a natural class; even as back vowels and dorsal consonants can also belong to one and the same natural class. Hence, in this theory, vowels and consonants utilize a unified set of features in such a way that the Place Features [LABIAL], [CORONAL], [DORSAL] and [RADICAL]/[PHARYNGEAL] are used to describe places of articulation for both vowels and consonants. The fundamental difference between the two is the fact that the C-Place node dominates consonantal place features, while the V-Place node dominates vocalic place features. We replicate the geometry of place features as motivated in Clements & Hume (1995) or Odden (1994) as (i).

(i) The geometry of Place Features (Clements & Hume 1995, Odden 1994)



Within this UFT model, the spreading of either the consonant or vowel place features can be modelled straightforwardly as in (ii-iii) below, where the C-Place features [LABIAL] and [CORONAL] spread rightwards to an epenthetic vowel for forms like **kaapu** ‘cap’ and **bokit(s)ji** ‘bucket’ in Akan loanword phonology. In (iv), on the other hand, the

V-Place feature [LABIAL] spreads to an epenthetic vowel in **kuku** ‘cook’ where the C-Place feature [DORSAL] has failed to spread to the epenthetic vowel because the feature [DORSAL] does not spread from C-Place to V-Place in Akan loanword phonology. This is not to obscure the fact that in the Akan segmental phonology involving nonloan lexids, [DORSAL] might spread from C-Place to V-Place. Let us examine (ii-iii) for C-Place feature spreading to V-Place in forms **kaapu** and **bokiti** followed by (iv). Here, a V-Place feature spreads to a V-Place underspecified for feature. (ii-iv) are adapted from Abakah (2003) replicated in Abakah and Tenteh (2005).



In (iv), the association lines do not cross by reason of the fact that they are in different plane (Odden, 1994). Other aspects of the Articulator-based/Constriction-based model of the Feature Geometry Theory will be discussed, where necessary at the relevant places in the main body of this paper.

## 0.2. ASSIMILATORY PROCESSES.

Assimilation is defined as, in the words of Lord (1974:147), “a change of sound of a consonant or a vowel brought about by the influence of a neighbouring, usually adjacent consonant or vowel.” This study will follow Schane’s (1973:49) concept of assimilatory processes. Schane (*ibid.*) has observed that

In assimilatory processes a segment takes on features from neighbouring segment. A consonant may pick up features from a vowel, a vowel may take on features of a consonant, one consonant may influence another or one vowel may have an effect on another.

It follows from Schane’s (*ibid.*) observation that a topic like Akan vowel harmony (VH), which has been extensively researched, and treated in the existing literature as an assimilatory process<sup>8</sup> comes directly under this topic. In order to cut down on the volume of this paper, we will not discuss VH in Akan in detail but just present an overview of it. We will consequently restrict this study to such assimilatory processes as palatalization or coronalization, posteriorization anteriorization, stridentization/sibilantization/assibilation, labialization, dorsalization and labial-palatalization.

## 0.3. METHODOLOGY

That all utterances and their constituent morphemes have an underlying representation (UR) and a phonetic representation is the view of phonology held in this paper. These two levels of representation are invariably linked by one or more phonological rules which clearly show the predictable features of pronunciation associated with every morpheme. Hence, this analysis of the Akan language is based on identifying the UR for utterances and their constituent morphemes on the one hand and, on the other hand, a statement of phonological rules linking the underlying representation with the phonetic representation. The rules are meant to state generalizations associated with processes. Thus, in this paper, the view that “the only time that a phonological rule is strongly motivated is when it captures regular morphological alternation” (Kiparsky, 1968) is upheld, and so, a predominantly rule based account is proposed. It is important to note that the rules will not be captured within the framework of linear generative phonology in the following form,  $W \rightarrow X/Y - Z$  but rather mostly graphical in terms of derivations cast within generative theoretical frameworks of Autosegmental Phonology and Feature Geometry.

Where two or more rules apply to an underlying representation of an utterance to generate the derived output form, the ordering of the rules shall be captured in the relevant derivation. Not all dialects or subdialects may require the same number of rules to derive the phonetic representation of an utterance. Therefore, as we shall see in a range of derivations contained in the central portions of this paper, a dash shall indicate this in the statement of the ordering of the rules (within a derivation) that a particular rule does not apply to a particular dialect or a subdialect.

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<sup>8</sup> See Schachter & Fromkin (1968), Abakah (1978, 1993, 2003), Clements (1981), Dolphyne (1988), Obeng (1989), Archangeli & Pulleyblank (1994) and Ewen and van der Hulst (2001) for a detailed study of the Akan VH process.

### 0.3.1. How the Dialectal Differences are Dealt with

The theory of generative grammar of which generative phonology (in the present context, the autosegmental phonology and feature geometry) is an indispensable component, has been conceived of as a description of the knowledge of the ideal speaker-hearer of one dialect (Schachter and Fromkin, 1968). This fact notwithstanding, applying this framework to carry out a descriptive cum comparative analysis of three distinct dialects of a language creates its own problems which need be resolved. The solutions adopted here adequately reveal the similarities, regularities and differences in the three dialects. Underlying representations of morphemes are posited so as to allow for the postulation of rules with the widest range of applicability to the three dialects. Some of the rules will apply to all the three dialects, others to two dialects and still others will be limited to only one dialect. The derivations or spreading rules applicable to all the dialects of Akan will not be marked whereas those which apply to specific dialects will be marked by the name of the relevant dialect, that is, Fante, Akuapem and Asante.

More often than not, some subdialects of the Fante dialect share remarkable similarities and differences with the Twi varieties of Akan, namely, Akuapem and Asante. When such scenarios emerge, comparisons will be made, when fascinating, insightful and appropriate to Iguae, Anee and Boka, the major subdialects of Fante.

On the question of positing of UR, linguists are divided on the way to posit it (UR) within the context of a comparative study involving varied dialects. Some linguists are of the view that what makes dialects dissimilar has to, to a large extent, be down to URs and consequently, positing a common/single underlying forms for different dialects under investigation has some improbable implications. In contradistinction to this standpoint, other linguists are of the thinking that all the dialects of a language originate from a common source and hence they must inevitably have common/single URs which each dialect may or may not process differently to generate diverse or identical surface representations. There is likelihood that the URs for these dialects might represent proto-Akan forms rather than synchronic URs for each dialect. However, for our purposes, we are assuming a common UR for all dialects, and the difference resides in the rules

## 1. AKAN VOWEL HARMONY: OVERVIEW

We begin our study of assimilatory processes in Akan with the Vowel Harmony (VH) process, generally an assimilatory process but wrongfully considered as a component of Akan segmental phonology. VH is undeniably an archetypical feature of Akan phonology that has received a great deal of attention in the existing literature but some of its essential aspects have not received any mention at all in the literature. Hence, it is not surprising that some scholars doubt the plausibility of certain phonetic representations emanating from the Akan VH process vis-à-vis the segmental melody of a given UR over and over again. We therefore hereby touch on some of the central features of the Akan VH system in this section so as to enable readers to know more about it, and especially to understand certain portions of this paper that are tied in with the Akan VH scheme. We presume that it would be evident to all readers by the end of this section that even though VH in Akan is an assimilatory process, it is prosodic rather than segmental thereby resulting in vocalic replacement(s) as determined by a spreading autosegment. A JWAL anonymous referee suggested it would be helpful to carry out the present analysis

within the theoretical framework of Articulatory Phonology<sup>9</sup>. This may well be doable, but it appears that the theory of Feature Geometry (FG) will be an adequate tool for this work. Hence, we discuss issues of Akan VH, especially, involving **CUa** strings as in §7 in this paper, under labial-palatalization/labial-coronalization, within the FG. All the same, we strongly believe that discussing the basics of the Akan VH which has hitherto not been investigated will be very desirable and useful for scholars.

To begin with, we repeat for emphasis that the VH process in Akan is not a segmental process but, for all intents and purposes, an assimilatory process involving autosegment/prosodic features only, thereby resulting in vocalic replacement process by which vowels sharing identical V-Place articulator features occur within a specified domain, i.e. the word. Thus, based basically on the distributional scheme of the Akan vowels, all the ten vowels of Akan (if the oral/nasal distinction is disregarded) /i, ɪ, e, ɛ, a, æ, ɔ, o, u, ʊ/ are classifiable into two matching sets of five each, Set I and II vowels known as [+ATR] and [-ATR] respectively. The vowels of Akan may also be classified as [+Round] vs. [-Round] as well as [+High] vs. [-High], coronal vs. noncoronal etc. No matter the classification type, the vowels of Akan are organized in pairs as clearly manifested by the following tables.

(1)	A	B	C																																					
	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="border: 1px solid black; padding: 2px;">[+ATR]</th> <th style="border: 1px solid black; padding: 2px;">[-ATR]</th> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">i</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɪ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">u</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ʊ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">e</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɛ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">o</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɔ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">æ</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">a</td> </tr> </table>	[+ATR]	[-ATR]	i	ɪ	u	ʊ	e	ɛ	o	ɔ	æ	a		<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="border: 1px solid black; padding: 2px;">[+Round]</th> <th style="border: 1px solid black; padding: 2px;">[-Round]</th> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">u</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">i</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">ʊ</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɪ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">o</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">e</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɔ</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɛ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">-</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">æ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">-</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">a</td> </tr> </table>	[+Round]	[-Round]	u	i	ʊ	ɪ	o	e	ɔ	ɛ	-	æ	-	a	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="border: 1px solid black; padding: 2px;">[LABIAL]</th> <th style="border: 1px solid black; padding: 2px;">[CORONAL]</th> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">u</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">i</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">ʊ</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɪ</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">o</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">e</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɔ</td> <td style="border: 1px solid black; padding: 2px; text-align: center;">ɛ</td> </tr> </table> <p style="text-align: center; margin-top: 5px;">æ neutral a neutral</p>	[LABIAL]	[CORONAL]	u	i	ʊ	ɪ	o	e	ɔ	ɛ
[+ATR]	[-ATR]																																							
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(1A) and (1B) demonstrate the matching pairs of [+/-ATR] vowels and [+/-Round] vowels, respectively. If a root vocalism is, for instance, prelinked to either the [+ATR] or the [-ATR] autosegment, then all the vowels of its affixal morphemes must be selected from either the [+ATR] or the [-ATR] set, respectively. Let us examine (2) with the root morpheme underlined for exemplification, critically noting that labial vowels have their coronal counterparts in Akan which are also matching pairs, as (1C) above demonstrates; and that the low vowels are neither labial nor coronal and are, therefore, neutral.

<sup>9</sup> Articulatory phonology (AP) seeks to unify phonetics and phonology by incorporating the theory that the physical system inherent in phonetics constrains the underlying abstract system associated with phonology into a single model thereby making the entities of control at the abstract planning level and those at the physical level identical (<http://en.wikipedia.org/wiki/Articulatoryphonology>). The utterance [pan], for instance, begins with a gesture whose task is lip closure. The formation of this constriction requires a change within the distance between the *lip aperture* over time. ([http://en.wikipedia.org/wiki/Articulatory\\_phonology](http://en.wikipedia.org/wiki/Articulatory_phonology)). In the Akan VH construction, the target vocalic segments are essentially pre-articulated ones simply selected to harmonize with a root vocalism, in autosegment, in a given phonetic environment. Hence, all the phonetic strategies requisite for the application of articulatory phonology are nonexistent, to a very large extent, thereby neutralizing the quest for doing this work within AP.

(2)	Fante	Asante	Akuapem	English
a.	si <b>mi-ri-ke-si</b>	mi-i-ko-si	mi-ri-ko-si	I am going to build
b.	si <b>mi-ri-ke-si</b>	mi-i-ko-si	mi-ri-ko-si	I am going to recite/say
c.	sū <b>mu-ru-ko-sū</b>	mi-i-ko-sū	mi-ri-ko-sū	I am going to weep/cry
d.	sū <b>mu-ru-ko-sū</b>	mi-i-ko-sū	mi-ri-ko-sū	I am going to pick (burning coals)

Fante Only

e.	<b>mu-ru-ko-tuw</b>	I am going to boast
f.	<b>mu-ru-ko-tuw</b>	I am going to throw
g.	<b>mi-ri-ke-tsiw</b>	I am going to pluck
h.	<b>mi-ri-ke-tsiw</b>	I am going to chase

	Fante	Asante	Akuapem	
i.	<b>mu/nu kur</b>	<b>mi/ni kuro</b>	<b>mi/ni kuru</b>	my/his or her sore
j.	<b>mu/nu ntɔn mi/ni</b>	<b>ntɔŋ<sup>w</sup>/ntɔ̃</b>	<b>mi/ni ntɔn</b>	my/his or her eyebrow
k.	<b>mi/ni d̃ɪn</b>	<b>mi/ni d̃ɪp/d̃ɪ̃</b>	<b>mi/ni d̃ɪn</b>	my/his or her name
l.	<b>mi/ni s̃ikān</b>	<b>mi/ni s̃ikāp/s̃ikā̃</b>	<b>mi/ni s̃ikān</b>	my/his or her knife

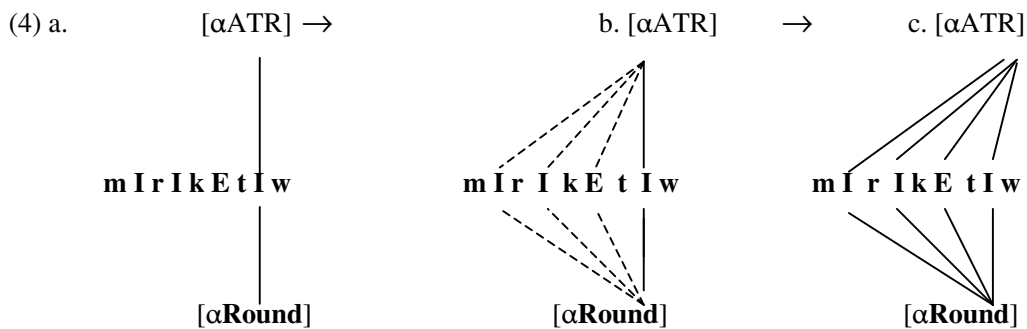
In the above data, (2a)-(2c) cover the normal ATR-based VH for all the varieties of Akan. Here, vowels of all prefixal morphemes are underspecified for the [ATR] and [Round] dependent features of V-Place [RADICAL] and V-Place [LABIAL] specifications, respectively, in their feature geometry. Hence, the [+/-ATR] and [+/-Round] features inherent in the root vocalism spread leftwards to the vowels of the prefixal morphemes. Here, we are dealing with prosodic spreading and not segmental assimilation.

An aspect of Akan VH that has not received much discussion in the existing literature is the rounding/labial harmony in the Fante dialect. Clements' (1981), Archangeli and Pulleyblank's (1994), Kenstowicz's (1994) and many others' studies of Akan VH do not cover it. We discuss it, here, briefly for the benefit of readers, as we succor them to understand certain URs as we progress in this paper. Derivation (4) below captures the rounding/labial harmony process in Fante. This schematic account elicits reduction of the ten phonetic vowels of Akan into three phonematic units, I, E, and A whereby I stands for high vowels [i, ɪ, u, ʊ], E for mid vowels [e, ɛ, o, ɔ] and A for the low vowels, [a, ɶ]. As it were, we establish the Roundedness/[αRound] tier in this present study so as to enable us to easily capture the differences in lip configuration between the vowels of the same set in the derivation. The table below summarizes the reduced vowels and their exponents in the phonetics

(3).

Phonematic Units	Tongue Root Tier		Roundedness Tier
	[+ATR]	[-ATR]	
I	<b>u</b>	<b>ɔ</b>	[+Round]
	<b>i</b>	<b>ɪ</b>	[-Round]
E	<b>o</b>	<b>ɔ</b>	[+Round]
	<b>e</b>	<b>ɛ</b>	[-Round]
A	<b>æ</b>	<b>a</b>	[-Round]

The following derivation (4), as noted above, captures the generalization manifested by the Labial Harmony in Fante and especially further reinforces the vocalic replacement processes referred to above.



In the above derivation, (4a) is the UR. The vowel quality of the verb radical is prespecified for both V-Place [RADICAL] and [LABIAL] articulator features while the vowels of the prefixal morphemes are underspecified for any of these two features. In (4b), the autosegments spread simultaneously to the prefixal morphemes yielding (4c) of a final output. If, therefore, the V-Place [RADICAL] and [LABIAL] unary features in this derivation are preassociated to the [+ATR] and [+Round] features, respectively, then **mu-ru-ko-tuw** is generated but where the [RADICAL] dominates the [-ATR] and the [LABIAL] dominates [+Round] **mu-ru-ko-tuw** is generated. However, when the [RADICAL] and the [LABIAL] features dominate [+ATR] and [-Round], respectively, the derived output is **mi-ri-ke-tsiw** and where the vowel of the stem is prelinked to the [-ATR] and [-Round] autosegments, **mi-ri-ke-tsiw** is generated.



We highlight our assertion that VH in Akan, as demonstrated above, is more of a vocalic replacement caused by prosodic spreading rather than segmental assimilatory process. A JWAL referee suggested that Articulatory Phonology would be helpful in analyzing Akan. Unquestionably, this might be probable but we have no doubt in our mind that Feature Geometry would be an adequate tool for the analysis.

## 2. PALATALIZATION AND CORONALIZATION

Palatalization, as defined by Laver (1994: 323),

... involves the body of the tongue being used to constrict the vocal tract in a stricture of open approximation at the palatal location, as an accompaniment to a stricture of greater degree. Auditorily the effect of palatalization is often impressionistically described as giving a segment a 'clear' quality. The body of the tongue is in a position analogous to that of a close front vowel. In the performance of palatalized segments in many languages, the secondary stricture tends to be relaxed from the palatal location relatively slowly, and this then gives the offset phase of the palatalized segment a characteristically [j]-like offset (or, to put it another way, gives the following segment a [j]-like onset.)

Akan has only one consonantal palatal phoneme, /j/. So, the term *palatalization* used in this paper will, within the context of the above definitions, refer to any consonantal segment that acquires a [j]-like offset/onset. This means that since the [j]-like colouring is lacking, velar consonants that become alveopalatal when they precede front /palatal/coronal vowels will not be classified as palatalized consonants despite the fact that they are traditionally referred to as palatalized segments. We refer to such consonants as *coronalized consonants* in this paper. It also means that [ts] and [dʒ] in Fante which come about as a result of /t/ and /d/, respectively, occurring in palatalizing environment, in Akan, will also not be classified as palatalized consonants despite the fact that they have hitherto been classified as such. See Schachter & Fromkin (1968), Abakah (1978) and Dolphyne (1988), among others, for such classification.

Clements and Hume (1995: 278) have distinguished between palatalization and coronalization. They have remarked that:

in many languages, velar and/or labial consonants become coronal, and anterior coronals become posterior before front vowels. This process, sometimes termed palatalization may be better termed *coronalization* since the resulting sound, though coronal, is not necessarily palatal or palatalized.

Clements & Hume (ibid: 295) argue that if palatalization applies to a form its secondary [CORONAL] articulation may be reassigned primary articulation status optionally by a process, which they term *promotion*<sup>4</sup>. By promotion a consonant's secondary articulation is delinked and copied under its C-Place node where it replaces its lexical primary articulation. They explain further that if the secondary articulation is already palatalized then it is copied together with the coronal node to generate nonanterior coronals like the

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<sup>4</sup> This term was first introduced by Clements (1989, 1991)

[ʃ, ʒ] palatoalveolar sounds. Akan has the coronalization process and there is evidence of intermediate palatalizing stage just in the same way as that which Clements & Hume (ibid.) claim occurs in some languages. However, in this paper, we distinguish between coronalization and palatalization inasmuch as it is not in all cases of coronalization that we find any element of intermediate palatalizing stage.

Palatalization, on the other hand, is essentially a secondary articulation. A front / palatal vowel, also specified as coronal,<sup>5</sup> occurring in the environment of a preceding nonpalatal consonant, imposes its palatality on the preceding consonant. In this paper, therefore, we assume that palatalization, stridentisation or affrication and coronalization are three different but closely related processes, which occur in the same phonetic environment in Akan.

## 2.1. PALATALIZATION

Palatalization, as we have already stated, refers to a phonological process in which consonants, which precede a V-Place coronal vowel maintain their identity in reference to their underlying C-Place articulator feature after the palatality/coronality of the following vowel has been spread onto them. In other words, when the V-Place [CORONAL] feature of the vowel articulation is superimposed on the C-Place primary articulation feature of the preceding consonant, the target consonant does not lose its underlying C-Place feature. This means, the secondary articulation does not supplant the primary articulation of the consonant but rather the consonant retains its primary articulation feature in addition to the secondary articulation. In the existing literature, palatalization in Akan is said to occur in the Fante dialect only. See Schachter & Fromkin (1968), Abakah (1978, 1993), Dolphyne (1988), Obeng (1989) and others. According to the data at our disposal, palatalization occurs in all the dialects of Akan within varied phonetic environments. However, it does not occur in all the palatalizing environments in Asante and Akuapem. Fante, in which palatalization is claimed to occur always, does not really have palatalization in all palatalizing phonetic environments. Coronal plosives in Fante, for instance, never palatalize but affricate/stridentize/spirantize when they occur in the context before a palatal vowel. Let us consider the following data.

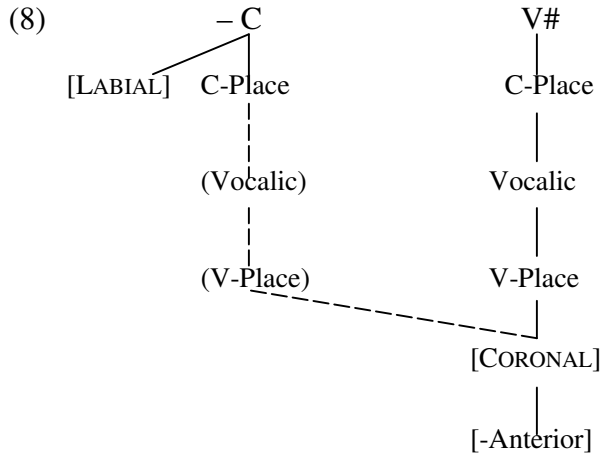
(5) UR	Fante	Akuapem	Asante	English
a. /ɔpɛ/	[ɔp̣ɛ]	[ɔpɛ]	[ɔpɛ]	drought
b. /apĩã/	[ap̣ĩã]	[apĩã]	[apĩã]	type of seed
c. /abɛ/	[aḅɛ]	[abɛ]	[abɛ]	palm fruit
d. /ferɪ /	[f̣ɛr]	[ferɪ]	[ferɪ]	embarrassment
e. /fɪ/	[f̣ɪ]	[fɪ]	[fɪ]	to vomit
f. /mɪnɪ/	[ṃɪn]	[m̃ɪñ]	[m̃ɪñ]	to swallow
g. /ɔhɪnɪ/	[ɔḥɪn]	[ɔh̃ɪñ]	[ɔh̃ɪñ]	chief/king

<sup>5</sup> As a result of unified set of articulators for both vowels and consonant within the framework of feature geometry, vowels are specified as [Coronal, -Anterior] in terms of V-Place articulation feature.

(6)	a. / <i>ebia</i> /	[ <i>(i/e)b<sup>h</sup>ia</i> ]	[ <i>eb<sup>h</sup>ia</i> ]	[ <i>eb<sup>h</sup>ia</i> ]	may be
	b. / <i>fie</i> /	[ <i>f<sup>h</sup>ie</i> ]	[ <i>f<sup>h</sup>ie</i> ]	[ <i>f<sup>h</sup>ie</i> ]	home
	c. / <i>mia</i> /	[ <i>m<sup>h</sup>iã</i> ]	[ <i>m<sup>h</sup>iã</i> ]	[ <i>m<sup>h</sup>iã</i> ]	to press hard
	d. / <i>sie</i> /	[ <i>s<sup>h</sup>ie</i> ]	[ <i>s<sup>h</sup>ie</i> ]	[ <i>s<sup>h</sup>ie</i> ]	keep/hide
	e. / <i>hiã</i> /	[ <i>oh<sup>h</sup>iã</i> ]	[ <i>oh<sup>h</sup>iã</i> ]	[ <i>oh<sup>h</sup>iã</i> ]	poverty
	f. / <i>nia</i> /	[ <i>n<sup>h</sup>iã</i> ]	[ <i>n<sup>h</sup>iã</i> ]	[ <i>n<sup>h</sup>iã</i> ]	the person / one who
(7)	a. / <i>tia</i> /	[ <i>tsia</i> ]	[ <i>t<sup>h</sup>ia</i> ]	[ <i>t<sup>h</sup>ia</i> ]	short
	b. / <i>tie</i> /	[ <i>tsie</i> ]	[ <i>t<sup>h</sup>ie</i> ]	[ <i>t<sup>h</sup>ie</i> ]	listen
	c. / <i>tmi</i> /	[ <i>t<sup>h</sup>mĩ</i> ]	[ <i>t<sup>h</sup>mĩ</i> ]	[ <i>t<sup>h</sup>mĩ</i> ]	straighten
	d. / <i>ntemu</i> /	[ <i>ntsem</i> ]	[ <i>nt<sup>h</sup>em</i> ]	[ <i>nt<sup>h</sup>em</i> ]	quickly/ immediately
	e. / <i>demu</i> /	[ <i>d<sup>h</sup>em</i> ]	[ <i>d<sup>h</sup>em</i> ]	[ <i>d<sup>h</sup>em</i> ]	maimed
	f. / <i>dmi</i> /	[ <i>d<sup>h</sup>ĩn</i> ]	[ <i>d<sup>h</sup>ĩn</i> ]	[ <i>d<sup>h</sup>ĩn</i> ]	hard/difficult
	g. / <i>kedeeuku</i> /	[ <i>ked<sup>h</sup>eeuku</i> ]	_____	_____	type of plant medicine
	h. / <i>adi</i> /	[ <i>ad<sup>h</sup>i</i> ]	[ <i>ad<sup>h</sup>i</i> ]	[ <i>ad<sup>h</sup>ie</i> ]	thing

In (5), it is only in the Fante dialect that palatalization takes place when the target consonant is an anterior labial or the C-Placeless **h** even as the palatal vowel has [-ATR] (a dependent feature of V-Place [RADICAL] articulator) specification in its feature geometry. Akuapem and Asante produce the examples in (5) above with plain labial consonants. However, regardless of consonant quality, Asante and Akuapem produce the target consonant with a palatalized or nonlabial consonant if it is followed by a [+ATR] palatal vowel as found in (6-7). Following the Constriction-Based Model of Feature Geometry appearing in Clements (1991), Hume (1992) and Clements & Hume (1995), the above palatalization process in Fante can be expressed as (8) below. According to this model, insofar as the labial becomes a palatalized labial and not a coronal, the (unary) feature [CORONAL] has to link under its V-Place as a secondary articulator. Thus, the rule spreads [CORONAL] from the V-Place node of the vowel onto the consonant, with interpolation of new V-Place and vocalic nodes as is required to preserve well-formedness (Clements & Hume 1995: 294).

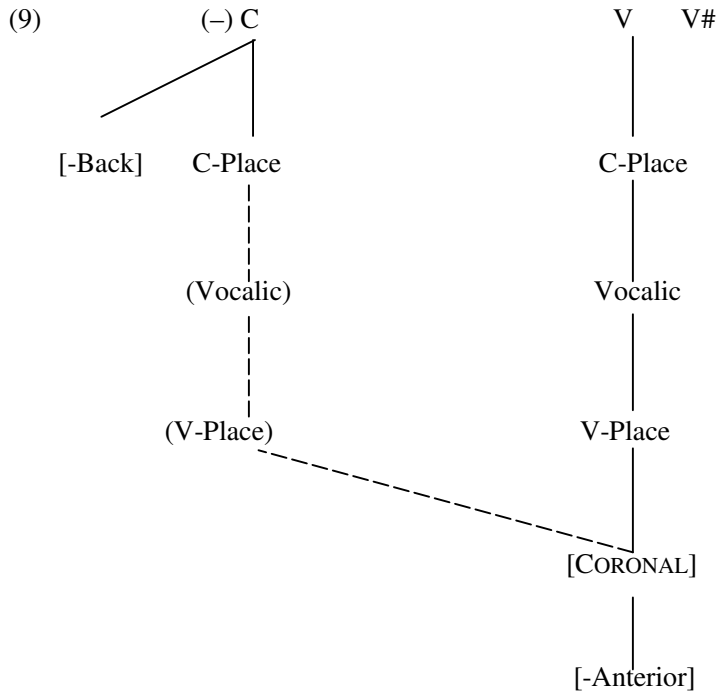
We modify this model in order to capture word structure, the requisite condition for the application of this type of palatalization process in the Fante dialect only. We do this by inserting [-] and [#] at the top preceding and following “C” and “V”, respectively, in order to specify the syllable structure of the strings that undergo palatalization in Akan. These conventions are not found in the original model.



This rule specifies that when a penultimate labial consonant precedes a (word-final) coronal/front vowel, it becomes palatalized. (9) below represents palatalization as it occurs in all the dialects of Akan, provided the word stem ends in a VV# sequence, where the V<sub>1</sub> is redundantly [CORONAL]. If we combine (6) and (7) we realize that while Akuapem and Asante consistently palatalize all consonants when they occur before front vowels within a specified domain, Fante palatalizes all non-dorsal consonants within the same phonetic environment, except for **t** and **d** which are rather assibilated, affricated, stridentized or sibilantized in that phonetic environment.<sup>10</sup> Affrication, which may also be referred to as sibilantization or stridentization or assibilation, in Fante, occurs when **t/d** occurs before a palatal vowel irrespective of word structure.

It is very important to note that the articulation of affricated, noncontinuant coronals, [ts] and [dʒ], in Fante starts off, as **t** and **d** plosives, respectively, with absolute occlusion. However, unlike plosives, the occlusion is not released at once but rather slowly thereby causing the sound to be released with frication. It is equally noteworthy that albeit these affricates occur in palatalizing environment only, they are not palatalized consonants in that their articulation does not involve the raising of the body of the tongue towards the hard palate; neither do they receive any [j]-like onset from the following palatal vowel. We therefore formulate the rule that caters for the palatalization process in all the Akan dialects, that is, palatalization in words that terminate in -CVV#. The only instance that this rule cannot apply in Fante is when the C constituent of the -CVV# is a noncontinuant anterior coronal also specified as [-Nasal].

<sup>10</sup> Affrication, sibilantization, spirantization and assibilation are synonymous in this context.



This rule specifies that a nondorsal consonant becomes palatalized in the context before a  $V_1V_2$  sequence where the  $V_1$  has the V-Place [CORONAL] articulator feature.

As mentioned above, the Fante non-continuant coronals do not go through the palatalization process but rather affrication/assibilation when they occur in a palatalizing environment. The ensuing affricates are also specified as anterior coronals. It is not possible to posit a single feature implication statement to capture the fact that, in terms of [ts] and [dz], even though the C-Place coronal articulator executes both the major and the minor articulations, the phonetic output shape is affricated. Discussion of representation of contour segments involving affricates obtains in the existing literature. We follow the *Aperture Node Model* developed by Steriade (1991) and as given a final touch by Clements & Hume (1995) in order to be able to capture the Fante affrication process within the framework of our phonological theory.

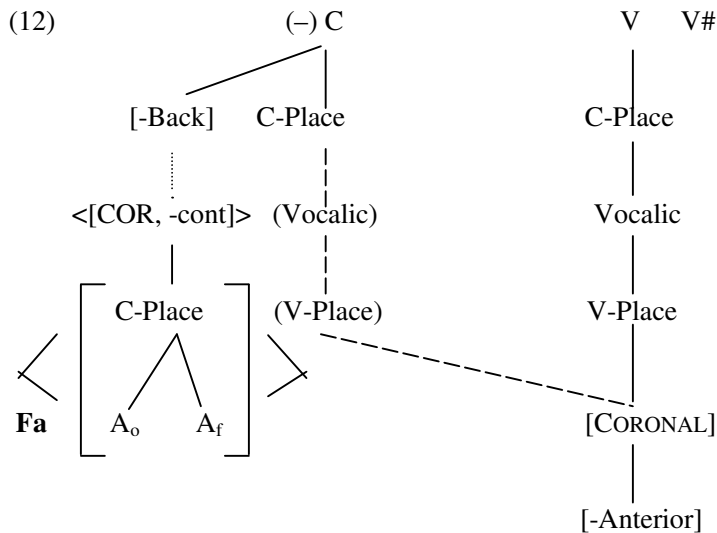
Steriade (op. cit.) has distinguished three aperture types, which she defines phonetically, recommending their incorporation into the phonological feature model with the right and proper feature labels. In view of that Clements & Hume (1995) have come up with the following root –node interpretation.

- (10)
- $A_o$  = a root node characterized as [-continuant, – Approximant]
  - $A_f$  = a root node characterized as [+continuant, – sonorant]
  - $A_{max}$  = a root node characterized as [+continuant, +sonorant]

Given the above assumptions, Clements and Hume (ibid.) configure affricates as follows using the above shorthand notations:



(11) specifies a non-continuant root node followed by a (homorganic) fricative release  $A_f$  (Clements & Hume *ibid.*). We adopt this analytical approach because, as noted above, when non-continuant anterior coronals occur before front vowels in Fante, they are affricated. Let us examine derivation (12).



The above rule simply specifies that if a noncoronal consonantal segment precedes a vowel executed by the C-Place coronal articulator at the lexical level, it emerges at the phonetic surface as a palatalized consonant. However, if the [-Back] C-Place node dominates an obstruent coronal, i.e. **t** or **d**, then it surfaces as **[ts]** or **[dʒ]** affricate, respectively, in Fante.

### 3. CORONALIZATION

We define *coronalization* in this paper as a phonological process by which a segmental sound, which does not have C-Place or V-Place [CORONAL] specification in its feature geometry in phonological representations, becomes an absolute coronal at the p-level as a result of being articulated with a constriction formed by the front of the tongue. Such segmental sounds, vowels and consonants alike, consistently precede a V-Place [CORONAL] articulator in phonological representations. In reality, coronalization involves both vowels and consonants in Akan, and whereas coronalization of consonants occurs in all the dialects of Akan, coronalization of vowels occurs in the Fante dialect only.

Having defined what we mean by *coronalization*, we move on to discuss the process in Akan. We repeat here for emphasis that our use of the term coronalization, in

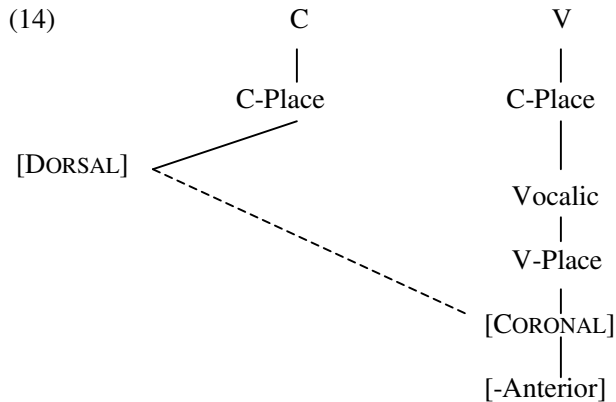
some measure, corresponds to the term palatalization which has hitherto been used for the same process in the existing literature.

### 3.1. CORONALIZATION OF CONSONANTS

To begin with, when dorsal consonants, **k** and **g**, (consonants articulated with constriction formed by the dorsum / back of the tongue) occur before coronal vowels (articulated with constriction formed by the front of the tongue) at the underlying level (u-level), they receive the coronality value of the vowel thereby emerging at the surface level as the nonanterior coronals, [tɕ] and [dʒ], respectively. As noted above, in certain cases in Akan, there is no evidence of any intermediate palatalized stage in the coronalization process as Clements and Hume (ibid.) have documented to be the case in some languages. Therefore, in Akan, the V-Place [CORONAL] feature, as in the present scenario, spreads directly to the preceding C-Place node of the dorsal consonant and then replaces its underlying [DORSAL] place articulator. Data (13) illustrate the coronalization process in all the Akan dialects.

- |                 |   |           |            |
|-----------------|---|-----------|------------|
| (13) a. /ɔkɪna/ | → | [ɔtɕɪna]  | tomorrow   |
| b. /kɪni/       | → | [tɕɪn(i)] | roam       |
| c. /ŋkɛba/      | → | [ɲtɕɛba]  | fish trap  |
| d. /gɪge/       | → | [dʒɪdʒe]  | receive    |
| e. /gɪmi/       | → | [dʒɪmi]   | stupidity  |
| f. /gɛmã/       | → | [dʒɛmã]   | perhaps    |
| g. /hɪwɔ/       | → | [ɕɪ(w)]   | burn       |
| h. /hɪrew/      | → | [ɕɪrew]   | white clay |
| i. /hɛ/         | → | [ɕɛ]      | wear       |

We express coronalization in line with Clements & Hume (1995) formulation of the rule capturing the coronalization process as (14) below.



The coronalization process applies in Akan irrespective of word structure. Examples (13e) and (13f) contain **h** which indeed is not a [DORSAL] or [+Back] consonant, albeit Schachter & Fromkin (1968) and Abakah (1993), among others, have all classified it as a [+Back] consonant. In contrast, Chomsky & Halle (1968), Ladefoged (1975) and Hyman (1975) have classified it as [-Back]. However, more recent publications, including Kenstowicz (1994), Clements & Hume (1995) and Gussenhoven & Jacobs (1998) have pointed out that **h** and **ɦ** have no specific place of articulation. In Abakah (1993), which is a study of the Fante dialect only, the classification of **h** as [+Back] was motivated by the fact that **h** is also consistently coronalized when it occurs in palatalizing environment like **k** and **g**. We believe that Schachter & Fromkin (op. cit.) may have been inspired by the same motivation to classify **h** as [+Back].

We do not see any justification for such classification in the present study because as (5e) and (6g) demonstrate, **h**, like all the nondorsal consonants in examples (5) and (6) become palatalized in the context before a palatal vowel. However, Hyman's (1975) and others' classification, of **h** as [-Back], reflects an apt phonetic fact, although it smacks of vagueness. It implies that **h** is either [LABIAL] or [CORONAL], but it is neither executed by the former nor the latter C-Place articulator. Another suitable classification of **h** can be found in Mensah (1982). Mensah (ibid.) has argued that **h** is lingual in that it is articulated in the buccal cavity. This classification is equally unclear inasmuch as it does not inform us about any specific C-Place located within the buccal cavity where **h** is articulated. Is it [LABIAL], [CORONAL] or [DORSAL]? All these classifications give credence to Kenstowicz's (1994), Gussenhoven's and Jacobs' (1998) and others' assertion that **h** has no C-Place articulation feature. Indeed, it could be argued that the assertion that **h** has no C-Place articulation feature is a restatement of Hyman's (1975), Mensah's (1982) and others' characterization of **h** but the stark difference is that while Mensah (ibid.) and Hyman (op. cit.) assign diverse imprecise C-Place features to **h**, Kenstowicz (1994), Gussenhoven and Jacobs (1998) deny that **h** has a C-Place feature.

In spite of the fact that **h** undergoes palatalization and coronalization processes with other consonants that are prespecified for C-Place feature, we do not encounter any C-Place feature problem in our formulation of rules involving it (**h**). It therefore comes as no surprise that **h** goes with all kinds of consonants in becoming not only palatalized and/or coronalized but also labialized and labialpalatalized as we shall shortly observe. It is noteworthy that **h**, as we have noted in (13), in Akan, palatalizes often when the front vowel that it precedes has [+Nasal] specification in its feature matrix. But when the front/coronal vowel is [-Nasal] it often coronalizes. Hence, /**ɔhɛnɪ**/ is realized at the phonetic surface as [**ɔhʲɛn**], /**ɔhɪwɔ**/ as [**ɔɕɪw**] and /**hɛ**/ as [**ɕɛ**].

In the Asante dialect and the Gomua subdialect of Fante, however, the minor [CORONAL] articulation of [**ɔhʲɛn**] as a result of the palatalization process is reassigned a major articulator status by the process of *promotion* thereby resulting in the production of [**ɔhʲɛn**] as [**ɔɕɛn**]. In other words, as noted above, the **h**'s minor articulation is delinked and copied under its C-Place node where it replaces its original major articulation. This process is captured by (14) above. In reality, when palatalization applies to a form like the Asante and Gomua examples in question, it gives credence to Clements' (1989) remark that promotion occurs in many languages.



### 3.2. POSTERIORIZATION

I define *posteriorization* as a sub-process or sub-type of consonantal coronalization by which an anterior [CORONAL] nasal loses its anteriority in absolute terms in favour of posteriority in the context before a palatal vowel which is also referred to as a coronal vowel. This process occurs in Fante and Asante only.

#### 3.2.1. Posteriorization in Fante

In Fante, when the anterior coronal nasal, **n**, occurs in phonological representations in the environment of a following high anterior coronal vowel, it posteriorizes, that is to say, its anteriority transmutes to posteriority thereby becoming the posterior coronal nasal, **ɲ**. In Asante and Akuapem the anteriority of the coronal nasal hangs about at the phonetic level (p-level). Examples in (15) illustrate this process.

(15)	UR	Fante	Asante	Akuapem	English
a.	<u>n</u> ĩmũ	<u>ɲ</u> ĩm	<u>n</u> ĩm	<u>n</u> ĩm	know
b.	<u>n</u> ĩpa	<u>ɲ</u> ĩpa	<u>n</u> ĩpa	<u>n</u> ĩpa	person
c.	<u>n</u> ĩfã	<u>ɲ</u> ĩmfã	<u>n</u> ĩfã	<u>n</u> ĩfã	right (hand etc)
d.	<u>a</u> nĩmũ	<u>e</u> ɲĩm	<u>æ</u> nĩm	<u>æ</u> nĩm	face
e.	<u>a</u> ɲĩdʒe	<u>e</u> ɲĩdʒe	<u>æ</u> nĩdʒe	<u>æ</u> nĩdʒe	happiness
f.	<u>a</u> ɲĩdɪ	<u>e</u> ɲĩdɪ	<u>æ</u> nĩdɪe	<u>æ</u> nĩdɪ	respect
g.	<u>o</u> -nĩnĩ	<u>o</u> -ɲĩn	<u>o</u> -nĩnĩ	<u>o</u> -nĩnĩ	python
h.	<u>n</u> ĩmã	<u>ɲ</u> ĩmã	_____	_____	faggots
i.	<u>n</u> ĩmũ	<u>ɲ</u> ĩm	<u>n</u> ĩm	<u>n</u> ĩm	be pregnant
j.	<u>n</u> ĩ	<u>ɲ</u> ĩ	<u>n</u> ĩ	<u>n</u> ĩ	to defecate
k.	<u>tɔ̃</u> ɪrɛtɔ̃ɪrɛnĩ	<u>tɔ̃</u> ɪrɛtɔ̃ɪrɛnĩ	<u>tɔ̃</u> ɪrɛtɔ̃ɪrɛnĩ	<u>tɔ̃</u> ɪrɛtɔ̃ɪrɛnĩ	teacher

#### 3.2.2. Posteriorization of Anterior Coronal Nasal Penult in Asante and Boka Fante

In Asante, the posteriorization process occurs only when a nasal coronal of a penult is preceded by a nonlabial vowel at the same time as it is followed by a word-final high coronal vowel in phonological representations. Each of the three major dialects of Akan processes any such phonological representation in a diverse fashion resulting in varied phonetic representations as demonstrated by (16) below. Whereas the Iguae and Anee varieties of Fante retain the lexical anterior coronal nasal at the p-level, the Boka sub-dialect of Fante consistently joins the Asante dialect in posteriorizing the lexical, anterior coronal nasal.

(16)	UR	Ig./An.	Akuapem	Asante/Boka	English
a.	<u>sinĩ</u>	<u>sʰĩn</u>	<u>sʰĩŋ</u>	<u>sʰĩŋ/sʰĩ</u>	short/not full
b.	<u>dmĩ</u>	<u>ɔʒĩn</u>	<u>dʒĩŋ</u>	<u>dʒĩŋ/dʒĩ</u> (As.) <u>ɔʒĩŋ/ɔʒĩ</u> (Bk)	hard/difficult hard/difficult
c.	<u>tcɛŋĩ</u>	<u>tcɛŋ</u>	<u>tcɛŋ</u>	<u>tcɛŋ/tcɛĩ</u>	wait
d.	<u>kanĩ</u>	<u>kãŋ</u>	<u>kãŋ</u>	<u>kan/kãĩ</u>	light
e.	<u>danĩ</u>	<u>dãŋ</u>	<u>dãŋ</u>	<u>dan/dãĩ</u>	house
f.	<u>smĩ</u>	<u>sʰĩn</u>	<u>sʰĩŋ</u>	<u>sʰĩŋ/sʰĩ</u>	pass by
g.	<u>dinĩ</u>	<u>i-ɔʒĩn</u>	<u>e-dʒĩŋ</u>	<u>e-dʒĩŋ/e-dʒĩ</u> (As.) <u>i-ɔʒĩŋ/ i-ɔʒĩ</u> (Bk.)	name/noun name/noun
h.	<u>ninĩ</u>	<u>ɲĩn</u>	<u>ɲĩŋ</u>	<u>ɲĩŋ/ɲĩ</u>	grow

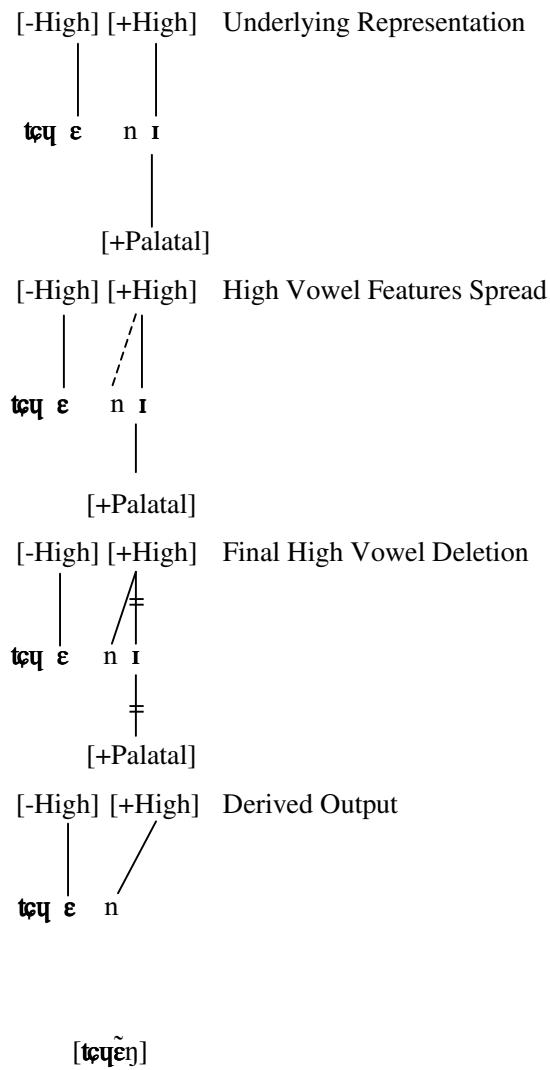
In the Iguae and the Anee varieties of Fante, a word-final postnasal coronal high vowel habitually deletes thereby generating a word-final coronal nasal, **n**. In Akuapem, prior to the deletion of the final high vowel, the [+High] feature specification inherent in the said vowel spreads to the penultimate anterior coronal nasal consonant to generate a high nasal consonant, **ŋ**, which redundantly has the C-Place [DORSAL] articulator specification in its feature geometry. Hence, while Iguae and Anee Fante retain the lexical anterior coronal nasal consonant, **n**, of a penult at word-final position, Akuapem generates a high nonanterior dorsal nasal consonant, **ŋ**, in the same phonetic environment at the p-level.

Given the same UR in Asante and the Boka subdialect of Fante, both the [+High] and the [CORONAL] features of the word-final vowel in question spread simultaneously to the preceding anterior coronal nasal, thereby generating a posterior [CORONAL] nasal, **ɲ**, at the p-level. The examples in (16) above, with both the underlying nasal and the derived dialect specific nasals underlined, illustrate the foregoing.

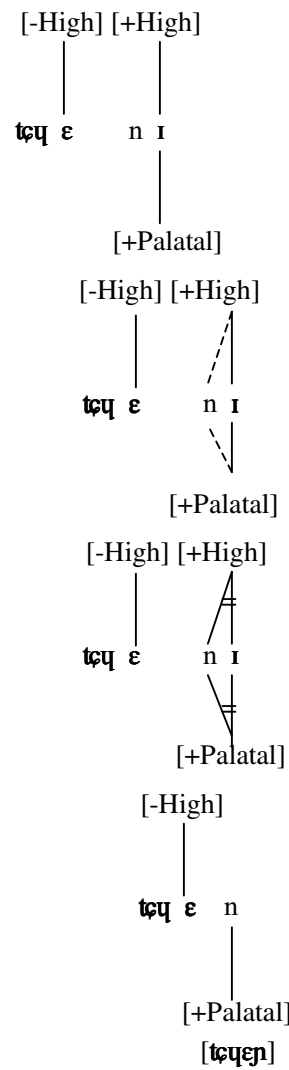
It is highly detectable from (16) that all the dialects of Akan delete the word-final postcoronal-nasal high vowel. However, whereas this vowel spreads one or more of its inherent features to the preceding anterior coronal nasal consonant in Akuapem, Asante, and Boka, the postcoronal high vowel deletes in the Iguae and Anee varieties of Fante before any of its inherent features can spread to the anterior coronal nasal in question. In other words, in the Iguae and Anee varieties of Fante, deletion of the post-coronal nasal final [+High] vowel occurs earlier in the derivation thereby bleeding the spreading of any of its inherent V-Place and aperture features to the preceding coronal nasal consonant.

In Asante and the Boka subdialect of Fante, both the [+High] and [+Palatal] features inherent in the postcoronal nasal high vowel in question spread leftwards to the anterior coronal nasal thereby resulting in its posteriorization at the p-level. So, the penultimate anterior coronal nasal consonant, **n**, transmutes into a posterior coronal nasal, **ɲ** prior to the truncation of the postcoronal-nasal high vowel. Derivations in (17) below illustrate the above processes in Asante and Akaupem, graphically.

(17) Akuapem



Asante



Asante and the Boka subdialect of Fante may put the above derivation on hold in favour of truncation of the lexical penultimate coronal nasal at the same time as Iguae and Anee delete the post-nasal C high vowel thereby bleeding the posteriorization process in question. At this juncture, the [+Nasal] feature inherent in the aforementioned final high vowel, V<sub>2</sub>, spreads anticipatorily to the V<sub>1</sub> thereby producing these coterminous Vs with nasality. These two forms are used interchangeably by Asantes and the Boka Fante speakers, ie. one form produced with posteriorized coronal nasal and the other without any hint of the lexical coronal nasal. A similar process is found in data (26) below whereby

labial/dorsal high vowels occurring in the same phonetic environment elicit two interchangeable output forms in Asante and Boka Fante.

### 3.3. CORONALIZATION OF VOWELS IN AKAN

Coronalization of vowels occurs in Fante only. Here, when a noncoronal vowel precedes a high coronal vowel, **I**, (which may have **i** or **ɪ** exponents in the phonetics) in a  $V_1 + V_2$  sequence, the  $V_1$  becomes an absolute coronal as the examples in the following data demonstrate. It is worth noting that  $V_2$  is invariably morphemic be it the past aspect morpheme (18a-n), the adjectivizer morpheme (18o-s), possessive morpheme (18t-u), among other bound morphemes. It is worth noting that when the target vowel is specified as [LABIAL], it devocalizes as **ɥ** if the consonant preceding it is [CORONAL] as in (18f-l, r, t-u) and where the said consonant is noncoronal, the target labial vowel devocalizes as **w** as in (18m-q).

(18)	Word	Suffix	Output	English
a.	<b>fa</b>	<b>I</b>	<b>fɛ-ɪ</b>	took (take + past)
b.	<b>da</b>	<b>I</b>	<b>dɛ-ɪ</b>	slept (sleep + past)
c.	<b>ɔ̃inã</b>	<b>I</b>	<b>ɔ̃inɛ̃-ɪ</b>	stopped (stop + past)
e.	<b>bisa</b>	<b>I</b>	<b>bisɛ-ɪ</b>	asked (ask + past)
f.	<b>nɥĩã</b>	<b>I</b>	<b>nɥĩɛ̃-ɪ</b>	cooked (cook + adjectiviser)
g.	<b>tɔ</b>	<b>I</b>	<b>tɥɛ-ɪ</b>	bought (buy + past)
h.	<b>so</b>	<b>I</b>	<b>sɥɛ-i</b>	held (hold + past)
i.	<b>sɔ</b>	<b>I</b>	<b>sɥɛ-ɪ</b>	ignited (ignite + past)
j.	<b>tu</b>	<b>I</b>	<b>tɥi-i</b>	flew (fly + past)
k.	<b>nũ</b>	<b>I</b>	<b>nɥĩ-ɪ</b>	fished (to fish + past)
l.	<b>tũ</b>	<b>I</b>	<b>tɥĩ-ɪ</b>	baked (bake + past)
m.	<b>bɔ</b>	<b>I</b>	<b>bwɛ-ɪ</b>	created (create + past)
n.	<b>kɔ</b>	<b>I</b>	<b>kwe-ɪ</b>	went (go + past)
o.	<b>go</b>	<b>I</b>	<b>gwe-i</b>	cooled (cool + past)
p.	<b>bubu</b>	<b>I</b>	<b>mbubwi-i</b>	broken (break + adjectivizer)
q.	<b>buwu</b>	<b>I</b>	<b>buwi-i</b>	brewed (brew + adjectivizer)
r.	<b>tutũ</b>	<b>I</b>	<b>tutɥĩ-ɪ</b>	roasted (roast + adjectivizer)
s.	<b>ɔ̃wɔ</b>	<b>I</b>	<b>ɔ̃wi-ɪ</b>	smoked (fish) (smoke + adjectivizer)
t.	<b>mansũ</b>	<b>I</b>	<b>mansɥĩ-ɪ</b>	(NP's) litigation (litigation + Possessive)
u.	<b>kɔtɔ</b>	<b>I</b>	<b>kɔtɥɛ-ɪ</b>	(NP's) crab (crab + possessive)

It is transparently obvious from the above data that when a noncoronal vowel in Fante precedes a coronal high vowel, it becomes an absolute coronal. This process has been treated as VH in Abakah (1993: 104-106) and rightly so because vowels occurring contiguously in Akan have to obligatorily agree in either two dimensions of VH, in being

[+/-ATR] and in being [+/-Round] as demonstrated by (18) or in being [-Round] only especially where the input is basically a **CUa** string as data (29) below exhibit. It is transparently obvious that vocalic coronalization in Akan as (18) demonstrates comes about via two processes. One process comes about via vocalic selection procedures by which a coronal vowel conditions a preceding noncoronal, nonlow vowel to be replaced by its coronal counterpart. The other process occurs where the target noncoronal vowel is specified as [+Low]. The low vowel in Akan does not have any coronal counterpart and so it obligatorily undergoes assimilatory raising to a mid-front coronal quality,  $\epsilon$  when it precedes a coronal vowel as (19a-f) illustrate.

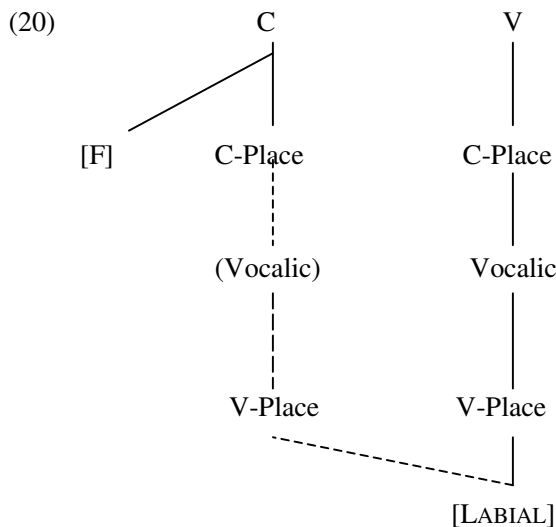
#### 4. LABIALIZATION

Labialization refers to secondary articulation formed by rounding and protruding of the lips, the same gesture that is utilized in [+Round] vowels. This configuration can be superimposed on all consonants including labials.

In Akan, like practically all languages of the world, a syllable-initial consonant, which immediately precedes a [+Round] vowel, is always labialized, or at least, subjected to some degree of labialization; that is to say, the consonant acquires the vowel's [+Round] feature specification. For other studies of labialization, see Hudson (1995), Evans (1995), and Kenstowicz (1994). Akan has a full suite of labials inasmuch as every consonantal segment whether [LABIAL], [CORONAL] or [DORSAL] receives the labiality of a following vowel prelinked to the V-Place [LABIAL] node. The following examples illustrate the process of labialization in Akan.

(19) UR	Fante	Akuapem	Asante	English
a. /kɔtɔ/	[k <sup>w</sup> ɔt <sup>w</sup> ɔ]	[k <sup>w</sup> ɔt <sup>w</sup> ɔ]	[k <sup>w</sup> ɔt <sup>w</sup> ɔ]	crab
b. /gu/	[g <sup>w</sup> u]	[g <sup>w</sup> u]	[g <sup>w</sup> u]	spread
c. /bonto/	[b <sup>w</sup> ont <sup>w</sup> o]	[b <sup>w</sup> ont <sup>w</sup> o]	[b <sup>w</sup> ont <sup>w</sup> o]	torso
d. /dumũ/	[d <sup>w</sup> ũm]	[d <sup>w</sup> ũm]	[d <sup>w</sup> ũm]	extinguish
e. /dumũ̃/	[d <sup>w</sup> ũ̃m]	[d <sup>w</sup> ũ̃m]	[d <sup>w</sup> ũ̃m]	to receive by grace
f. /dompo/	[od <sup>w</sup> omp <sup>w</sup> o]	[od <sup>w</sup> omp <sup>w</sup> o]	[od <sup>w</sup> omp <sup>w</sup> o]	a species of monkey
g. /huru/	[e $\Lambda$ ur]	[eh <sup>w</sup> ur <sup>w</sup> u]	[eh <sup>w</sup> ur <sup>w</sup> u]	vapour
h. /huru/	[ $\Lambda$ ur]	[h <sup>w</sup> ur <sup>w</sup> u]	[h <sup>w</sup> ur <sup>w</sup> u]	to wash
i. /suro/	[s <sup>w</sup> ur <sup>w</sup> o]	[s <sup>w</sup> ur <sup>w</sup> o]	[s <sup>w</sup> ur <sup>w</sup> o]	fear
j. /funũ/	[of <sup>w</sup> ũn]	[of <sup>w</sup> un <sup>w</sup> ũ]	[of <sup>w</sup> un <sup>w</sup> ũ]	coward
k. /funũ̃/	[f <sup>w</sup> ũ̃n]	[f <sup>w</sup> ũ̃ŋ]	[f <sup>w</sup> ũ̃ŋ <sup>w</sup> ]	be sated with something
l. /nũmũ/	[n <sup>w</sup> ũm]	[n <sup>w</sup> ũm <sup>w</sup> ũ]	[n <sup>w</sup> ũm <sup>w</sup> ũ]	to suck breast
m. /nũmũ̃/	[n <sup>w</sup> ũ̃m]	[n <sup>w</sup> ũ̃m]	[n <sup>w</sup> ũ̃m]	to drink
n. /sumũ/	[s <sup>w</sup> ũm]	[s <sup>w</sup> ũm]	[s <sup>w</sup> ũm]	darkness
o. /sumũ̃/	[s <sup>w</sup> ũ̃m]	[s <sup>w</sup> ũ̃m]	[s <sup>w</sup> ũ̃m]	to worship

We express this generalization, in line with the Constriction-Based model,<sup>11</sup> as (20) where [F] stands for any major articulator feature.



Labialization of this type is not as pronounced in Akuapem and Asante as it is in Fante. In other words, it (this type of labialization) is more perceptible in Fante than in Akuapem and Asante. Hence, in the examples above, we have indicated labialization in the Fante output forms with an italicized raised *w* (i.e. *w̥*) just to signal the dissimilarity in the degree of labialization.

We have so far not found any labialized consonant to be phonemic in Akan in that all labialized consonants in Akan are invariably phonetic, at least, according to the data at our disposal. However, Laver (1994: 322) has set up minimal pairs establishing labialization as phonemic in Akan. According to him, it can play a contrastive role in Twi but the words he has paired have different input strings, which calls to question his claim for the phonemic status for labialization in Akan. He, for instance, pairs [e-tɕi] ‘it thrusts’ and [e-tɕi] ‘it fears’ as well as [akwa] ‘a roundabout way’ and [aka] ‘somebody has bitten’ (SIC). The former and the latter constituents of the first pair have [e-kui] and [e-ki] input strings respectively, whereas the former and the latter constituents of the second pair have [a-kua] and [a-ka] input strings respectively. However, the *u* in [a-kua] devocalizes as *w̥* thereby yielding [akw̥a] at the output level. Thus [akw̥a] and [aka] are not contrastive at the input level. Most importantly, the pre-consonantal *a* in [akw̥a] is a nominal prefix whereas the pre-consonantal *a* in [aka] is the perfect aspect morpheme in Akan. Hence [aka] is a verb phrase meaning ‘has bitten’ and not a complete sentence meaning ‘somebody has bitten.’ ‘Somebody has bitten’ in Akan will be produced as [obi a-ka] in

<sup>11</sup> By the constriction based model the features [LABIAL], [CORONAL] and [DORSAL] are defined in terms of constrictions rather than articulator movements. Hence

[LABIAL] segments are articulated with constriction formed by the lower lip

[CORONAL] segments are articulated with constriction formed by the front of the tongue

[DORSAL] segments are articulated with constriction formed by the back of the tongue

all the dialects of the language. We presume that using a full sentence and one word as a minimal pair obscures the true phonological fact.

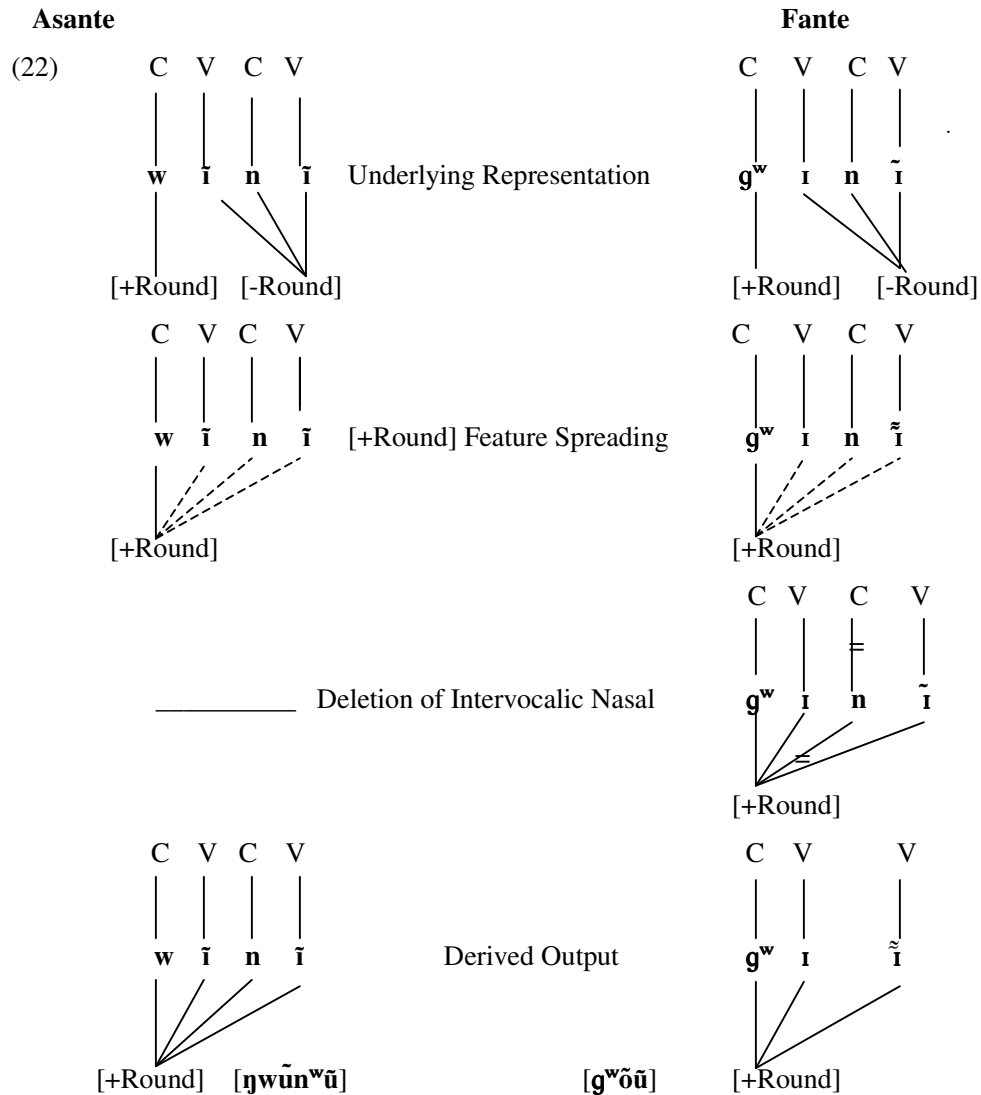
[**ɛ-kui**], on the other hand, undergoes the labial-coronalization process to generate [**ɛ-tɕi**]. This is because the [**u**] following the [**k**] labializes the [**k**] into [**kʷ**] before it undergoes the coronalization process in the context before the [**i**] coronal vowel thereby yielding the [**tɕ**] in [**ɛ-tɕi**]. On the other hand, in [**ɛ-ki**] as a lexical representation, the plain [**k**] straightforwardly submits to the coronalization process thereby generating [**tɕ**] at the output level. Thus, [**ɛ-tɕi**] and [**ɛ-tɕi**] do not contrast at the phonological level inasmuch as they have unconnected URs and, above all, labialization is not contrastive throughout the phonology of any of the varieties of Akan.

#### 4.1. PERSEVERATIVE LABIALIZATION OF VOWELS AND CONSONANTS

The foregoing represents a universal labialization process in Akan. However, there are instances of labialization that are dialect specific. In such cases in point, given identical URs, each dialect may realize the labialization process differently while some dialects may not submit to labialization at all. The relevant data (21) below reveal that when a nonlabial vowel occurs in the environment of a preceding word-initial C-Place [LABIAL] or labialized consonantal segment, as captured by (21a-e) or (21f-g), respectively, the consonant spreads its inherent or acquired C-Place [LABIAL] feature rightwards through all the vocalic segments to the rightmost boundary of the word. The affected vowels lose their underlying V-Place nonlabial articulator feature specification in favour of an absolute V-Place [LABIAL] articulation feature, as the following data, (21), illustrate.

(21)	UR	Asante	Boka	Iguae/Anee.	Akuapem	English
a.	wĩnĩ	<sup>h</sup> wũn <sup>h</sup> ũ	<sup>h</sup> ɸĩ	<sup>h</sup> ɸĩn	<sup>h</sup> ɸĩŋ	shade
b.	wĩmĩ	<sup>h</sup> wũnũ	<sup>h</sup> ɸĩ	<sup>h</sup> ɸĩm	<sup>h</sup> ɸĩŋ	weave
c.	wiriwiri	qiriqiri	ɸuruɸuru	ɸuruɸuru	ɸiriɸiri	red fish
d.	wire	ɸire	ɸorɔ	ɸorɔ	ɸire	scoop
e.	wenĩ	ɸeĩ	<sup>h</sup> ɸõũ	<sup>h</sup> ɸeĩn	ɸeĩŋ	keep v <sup>g</sup> il
f.	g <sup>h</sup> umĩ	ɛ-ɕ <sup>h</sup> ɸun <sup>h</sup> ũ	g <sup>h</sup> õũ	ɛ-ɕ <sup>h</sup> ɸĩn	ɕ <sup>h</sup> ɸĩŋ	grey hair
g.	k <sup>h</sup> uenĩ	tɕ <sup>h</sup> ɸeĩ/tɕ <sup>h</sup> ɸeĩn	tɕ <sup>h</sup> ɸõũ/tɕ <sup>h</sup> ɸõŋ <sup>h</sup>	tɕ <sup>h</sup> ɸeĩn	tɕ <sup>h</sup> ɸeĩŋ	wait

It is discernible from the above data that the labialization of vowels in the context after labialized consonants in the Asante dialect occurs only when the target vowel is specified as [+High] as (21a) – (21c) demonstrate. In the Boka variety of Fante, the target vowel could be either a high vowel as in (21c) or a mid vowel as in (21d-e). It is worth noting that in both Asante and the Boka subdialect of Fante, the [+Round] feature of the spreading [LABIAL] consonant spreads through the entire word, starting from word-initial position through the word-final segment. In Boka Fante, after the spreading has taken place, the penultimate nasal consonant deletes to generate the final output. Derivation (22) presents a graphical account of this process.



There exist a few exceptions in Asante, such as *adɔmĩ* ‘mudfish’ and *adɔpinĩ* ‘design’. See also Dolphyne (1988: 146 - 147) for more examples. In the Iguae and Anee varieties of Fante and the Akuapem dialect of Akan, this phonological process does not apply irrespective of the tongue height quality of the vowel that follows the labial, labialized or labial-palatalized consonant that triggers the labialization of vowels.

#### 4.2. ANTICIPATORY LABIALIZATION OF HIGH CORONAL VOWELS

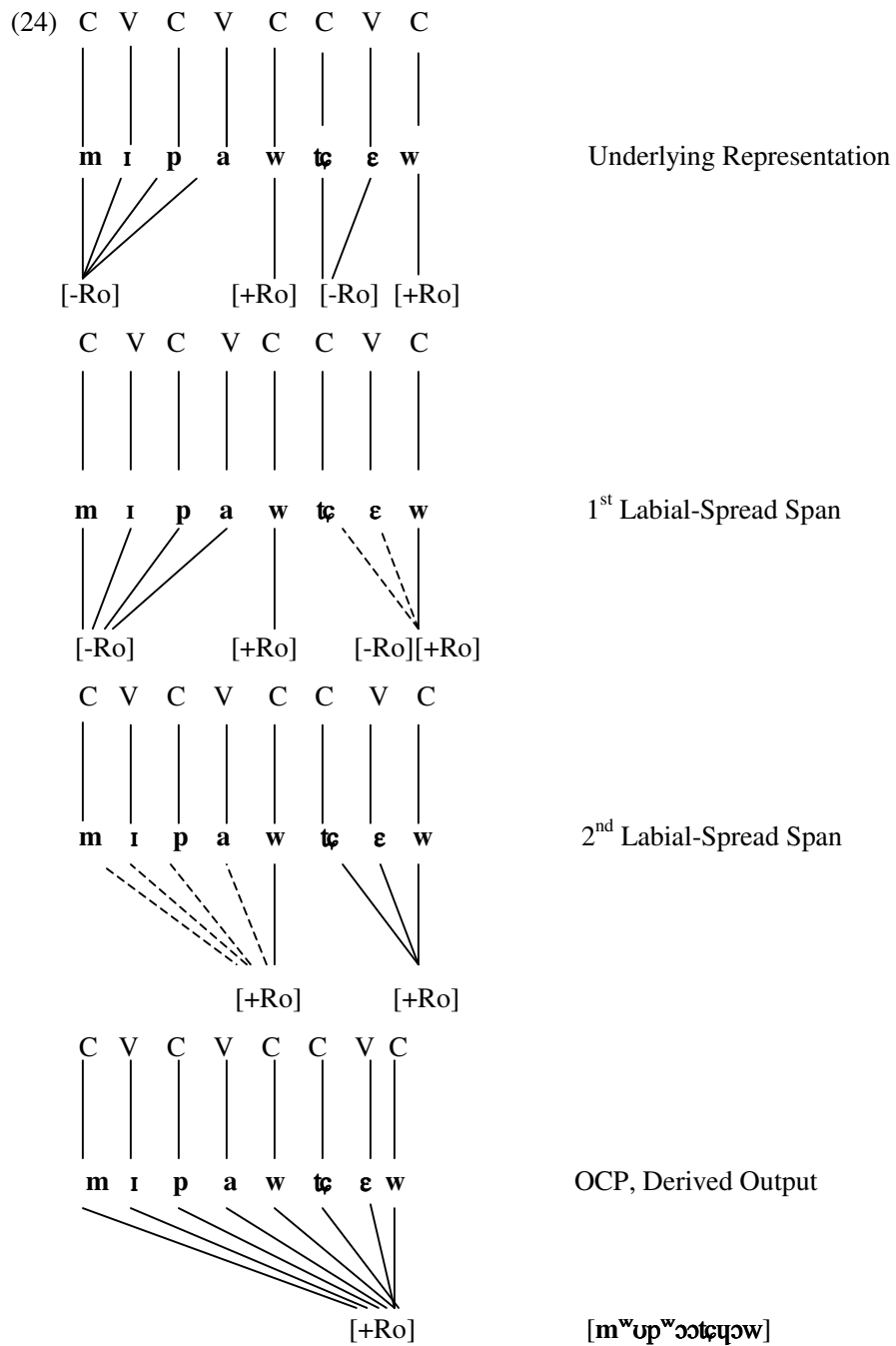
In Fante and Akuapem, a high coronal/palatal vowel, occurring after a labialized or labial-palatalized consonant, and before a word-final C-Place [LABIAL] *w*, is invariably labialized. A close examination of (23a-g, o-p) below seems to suggest that it is exactly difficult to determine the direction of Labial-Spread inasmuch as the target vowel is



sandwiched by C-Place [LABIAL] consonants. However, this difficulty is neutralized by examples (23h-i, k-n) in which the target segment is not sandwiched by the triggering labial segments but is rather only followed by the triggering segment, thereby, making it plainly predictable that the direction of the Labial-Spread is leftwards and anticipatory. Besides, Asante rarely has **w** at word-final position and for this reason, the target vowels invariably remain coronal at the phonetic stage (in Asante). In other words, the lexical word-final labial **w** does not appear at the phonetic surface to condition the preceding coronal vowel to delink and relink to the [LABIAL] node in Asante. This clearly suggests that the labialization process does not precede elision of the conditioning word-final labial segment. Consider (23) for exemplification. Note that labialization runs over all the segmental melodies of a word except for word initial **a** which blocks the Labial-Spread.

(23)	Fante/Akuapem	Asante	English
a.	<b>ɕɥɪw/ɕɥɔw</b>	<b>ɕɥɪ</b>	to drain water
b.	<b>ɕɥiw/ɕɥɔw</b>	<b>ɕɥi</b>	to scrape/scour
c.	<b>ɕɥiw/ɕɥɔw</b>	<b>ɕɥie</b>	louse
d.	<b>ɕɥiriw/ɕɥurɔw</b>	<b>ɕɥiri</b>	raze to the ground
e.	<b>ɥɪw/ɥɔw</b>	<b>ɥɪ</b>	to dry (i.e. pond)
f.	<b>ɔɥɪw/ɔɥɔw</b>	<b>ɔɥɪ</b>	finger nail
	Fante Only	Asante	
g.	<b>ɕɛw/ɕɛɔw</b>	<b>ɕɛ</b>	hat/cap
h.	<b>tsɪw/tsɔw</b>	<b>tsɪ</b>	to pluck
i.	<b>fɛw/fɔw</b>	<b>fɪ</b>	to kiss/suck
j.	<b>ɕɪw/ɕɪɔw</b>	<b>ɕɪ</b>	to fry
k.	<b>b<sup>h</sup>ɛw/b<sup>h</sup>ɔw</b>	—	bone
l.	<b>se<sup>h</sup>b<sup>h</sup>ɪw/se<sup>h</sup>b<sup>h</sup>ɔw</b>	<b>se<sup>h</sup>bɪ</b>	excuse me to say
m.	<b>ajew/ajɔw</b>	<b>aje</b>	to praise
n.	<b>mɪ-pa-wu-ɕɛw/</b> <b>m<sup>w</sup>ɔp<sup>w</sup>ɔɕɛɔw</b> I-move-you-cap	<b>mɪ-pa-wu-ɕɛw/</b> <b>mɪpaɕɛw</b> [I-move-you-cap]	please/I beg your pardon
o.	<b>ɕɪɪw/ɕɪɪɔw</b>	<b>ɕɪɪ</b>	to write
p.	<b>ɕɪɪw/ɕɪɪɔw</b>	<b>ɕɪɪ</b>	to scrape

In Akuapem and Fante, the pre-slash and the post-slash forms are used interchangeably but most speakers of Fante have lost the pre-slash forms completely in favour of the post-slash forms. Fante shows consistency in labializing a vowel that precedes the labiodorsal glide, **w**, whereas Akuapem may fail to labialize such vowel but retain the **w** at word-final position. (23n) presents a fascinating example in Fante by which all vowels that precede the two **w**'s in the sentence submit to the anticipatory labialization process. The following derivation captures the above account which displays two spreading spans and running of the labial/[+Round] autosegment over the segmental melodies of the entire stretch.



## 5. DORSALIZATION AND LABIAL-DORSALIZATION

We begin by remarking that in the Akan vocalic inventory, the V-Place [DORSAL] and the V-Place [LABIAL] articulator features have indistinguishable characteristics by reason of the fact that dorsal vowels in Akan are redundantly labial. Most importantly, and for the sake of emphasis, Akan does not have any back vowel that does not have both the V-Place [DORSAL] and [LABIAL] articulator feature specifications in its feature geometry. Even so, in the literature, the facet of the process by which a [DORSAL] vowel spreads to a [CORONAL] consonant characterized by [-Round] feature specification in phonological representations is underreported. We refer to this process as *dorsalization*, which we define as

a phonological process by which a segment, lacking either C-Place or V-Place [DORSAL] articulator feature acquires C-Place or V-Place [DORSAL] articulator feature within a relevant/specified phonetic environment. The target segment invariably occurring in the environment of an adjacent C-Place [DORSAL] consonant or V-Place [DORSAL] or [CORONAL] vowel that has the feature [+High] might also be dominated by the V-Place articulator feature, [LABIAL].

It is possible to refer to this process as *labialization when the trigger vowel is dorsal*, but we think labialization and dorsalization are two distinct phenomena in Akan and, for this reason, they must be kept at two discrete levels. We therefore have to necessarily distinguish between these two processes. Labial-dorsalization, on the other hand, refers to a process by which a segment superimposes both V-Place [Labial] and [Dorsal] articulator features inherent in it on an adjacent segment.

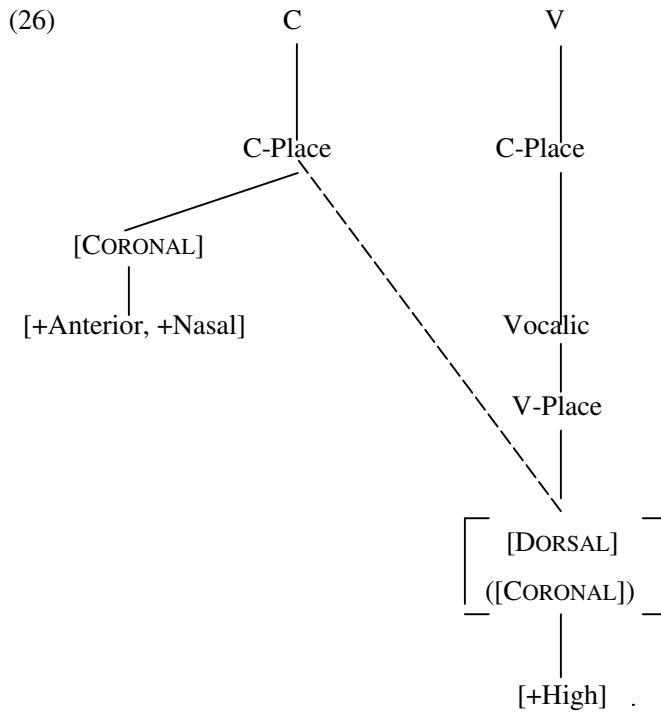
We have noted above that labialization in Akan is essentially tied in with both vowels and consonants. Here, vowels or consonants that have V-Place or C-Place [LABIAL] specifications, respectively, in their feature geometry spread to an adjacent segment lacking V-Place or C-Place [LABIAL] articulator feature. Dorsalization, on the other hand, is a phonological process associated with consonants only in Akan, at least, according to the data at our disposal. Here, when a nondorsal consonant, specifically an anterior coronal nasal occurs before a word-final V-Place [DORSAL] vocalic segment that has also labial component by reason of being [+Back] in Akan, the consonant loses its underlying C-Place [CORONAL] articulator feature specification in favour of an absolute C-Place [DORSAL] articulator feature. It is very important to note that the dorsalization vocalic trigger could be specified as a V-Place [CORONAL] which is [+High] or [-Open] in aperture terms.

Indeed, for dorsalization to occur in Akan, the trigger vowel, whether dorsal or coronal, has to have the [+High] feature specification in its feature matrix. Akuapem, for instance, does not need to have a dorsal vowel trigger to bring about dorsalization since the [+High] feature specification in a coronal vowel is as much as necessary to condition the target consonant to be high and redundantly dorsal, as all high consonants are dorsal and vice versa. Let us consider (25), in which Asante and Boka Fante forms have two interchangeable PRs, for illustration; (16) above contains examples of dorsalization in Akuapem samples of which we repeat here for convenience, as (25a).

(25a) UR	Ig./An.	Akuapem	Asante/Boka	English	
i. <b>sinĩ</b>	<b>ṣĩn</b>	<b>ṣĩŋ</b>	<b>ṣĩŋ/ṣĩ</b>	short/not full	
ii. <b>dmĩ</b>	<b>ɖĩn</b>	<b>ḍĩŋ</b>	<b>ḍĩŋ/ḍĩ</b> (As.) <b>ɖĩŋ/ɖĩ</b> (Bk)	hard/difficult	hard/difficult
iii. <b>ɕɕeĩ</b>	<b>ɕɕeĩ</b>	<b>ɕɕeĩ</b>	<b>ɕɕeĩ/ɕɕeĩ</b>	wait	
iv. <b>kanĩ</b>	<b>kãn</b>	<b>kãŋ</b>	<b>kãŋ/kãĩ</b>	light	
v. <b>danĩ</b>	<b>dãn</b>	<b>dãŋ</b>	<b>dãŋ/dãĩ</b>	house	
(25b) UR	Ig./An	Akuapem	Boka	Asante	English
i. <b>tɔnũ</b>	<b>ṭɔn</b>	<b>ṭɔŋ</b>	<b>tɔŋ<sup>w</sup>/ṭɔũ</b>	<b>tɔŋ<sup>w</sup>/ṭɔũ</b>	sell
ii. <b>fɔnũ</b>	<b>f̣ɔn</b>	<b>f̣ɔŋ</b>	<b>fɔŋ<sup>w</sup>/f̣ɔũ</b>	<b>fɔŋ<sup>w</sup>/f̣ɔũ</b>	be emaciated
iii. <b>sɔnũ</b>	<b>ṣɔn</b>	<b>ṣɔŋ</b>	<b>sɔŋ<sup>w</sup>/ṣɔũ</b>	<b>sɔŋ<sup>w</sup>/ṣɔũ</b>	be niggardly
iv. <b>tunũ</b>	<b>ṭuŋ</b>	<b>ṭuŋ</b>	<b>tɔŋ<sup>w</sup>/ṭuũ</b>	<b>tɔŋ<sup>w</sup>/ṭuũ</b>	to forge
v. <b>pɔnũ</b>	<b>p̣ɔn</b>	<b>p̣ɔŋ</b>	<b>pɔŋ<sup>w</sup>/p̣ɔũ</b>	<b>pɔŋ<sup>w</sup>/p̣ɔũ</b>	to close
vi. <b>punũ</b>	<b>p̣ũn</b>	<b>p̣ũŋ</b>	<b>puŋ<sup>w</sup>/p̣ũũ</b>	<b>puŋ<sup>w</sup>/p̣ũũ</b>	to smoke a pot
vii. <b>bunũ</b>	<b>bunũ</b>	<b>bũŋ</b>	<b>buŋ<sup>w</sup>/bũũ</b>	<b>bunũ</b>	malaria
viii. <b>kunũ</b>	<b>kunũ</b>	<b>kũŋ</b>	<b>kuŋ<sup>w</sup>/kũũ</b>	<b>kunũ</b>	husband
ix. <b>sonũ</b>	<b>soŋ<sup>w</sup></b>	_____	<b>soŋ<sup>w</sup>/ṣoũ</b>	-----	stinking odour
x. <b>oponũ</b>	<b>opoŋ<sup>w</sup></b>	_____	<b>opoŋ<sup>w</sup>/op̣oũ</b>	-----	foolish man

In (25a) and (25b) the Akuapem examples demonstrate the dorsalization process even though the trigger vowels have the V-Place [CORONAL] and [DORSAL] articulator features, respectively, in their feature geometries. These two vocalic triggers share a common phonetic distinctive feature, [+High], which presumably spreads to the preceding anterior coronal nasal of a target C. However, in (25b), it could be argued, even though not very compellingly, that the trigger dorsal contributes to the dorsalization of the target C. In other words, the word-final [DORSAL] vocalic trigger in (25b) spreads its V-Place [DORSAL] articulation feature to the preceding anterior coronal nasal in the Akuapem dialect to yield an output of a dorsal nasal C. Nevertheless, the [DORSAL] vowel trigger, being redundantly [LABIAL] and [+High] in Akan, as noted above, spreads its intrinsic combined V-Place [DORSAL] and [LABIAL] articulator features as well as their [+High] feature to a preceding anterior coronal nasal to generate labial dorsal nasal in the Asante dialect and the Boka variety of Fante. It is important to note that the spreading vowel in question deletes later in the derivation.

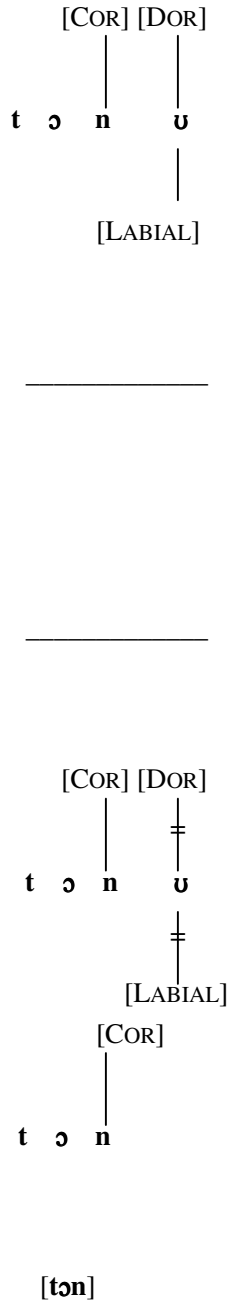
Following the UFT formulation of rules as contained primarily in Clements and Hume (1995) and also in Kenstowicz (1994), we express the dorsalization process in question as (26).



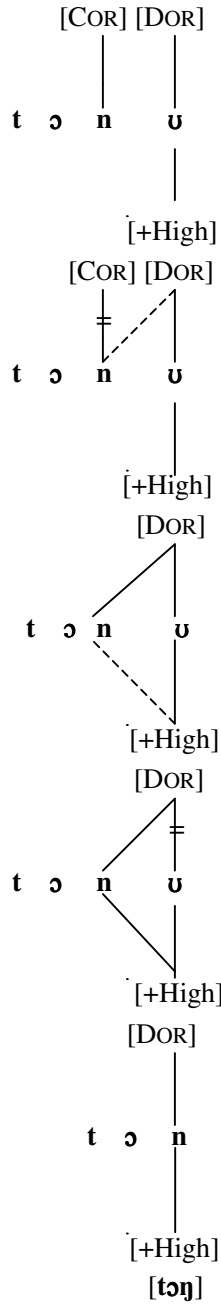
This rule states that a V-Place [DORSAL] or a V-Place [CORONAL] articulator feature also specified as [+High] may either spread to a preceding anterior coronal nasal single-handedly or it may do so in combination with its intrinsic V-Place [LABIAL] articulation feature which is as well specified as [+High]. When the combined labial and dorsal articulator features inherent in the trigger, spread with its intrinsic [+High] feature concurrently to the target nasal C, labial-dorsalization process is executed, thereby, generating a labial dorsal nasal C at the phonetic surface as in the Asante and Boka Fante output forms in (25b).

The foregoing dorsalization and labial-dorsalization processes may also be captured in the following dialect specific derivations whereby the various phonological rules that apply to the Iguae/Anee, Akuapem and Asante/Boka URs to generate the derived output forms are graphically captured. Note that these represent the pre-slash forms in (25b).

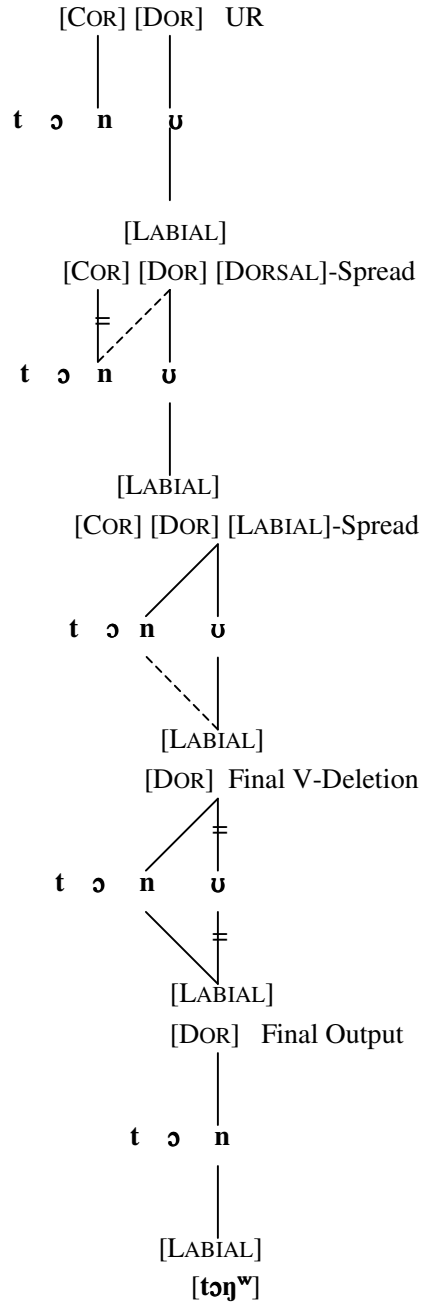
(27) Iguae/Anee



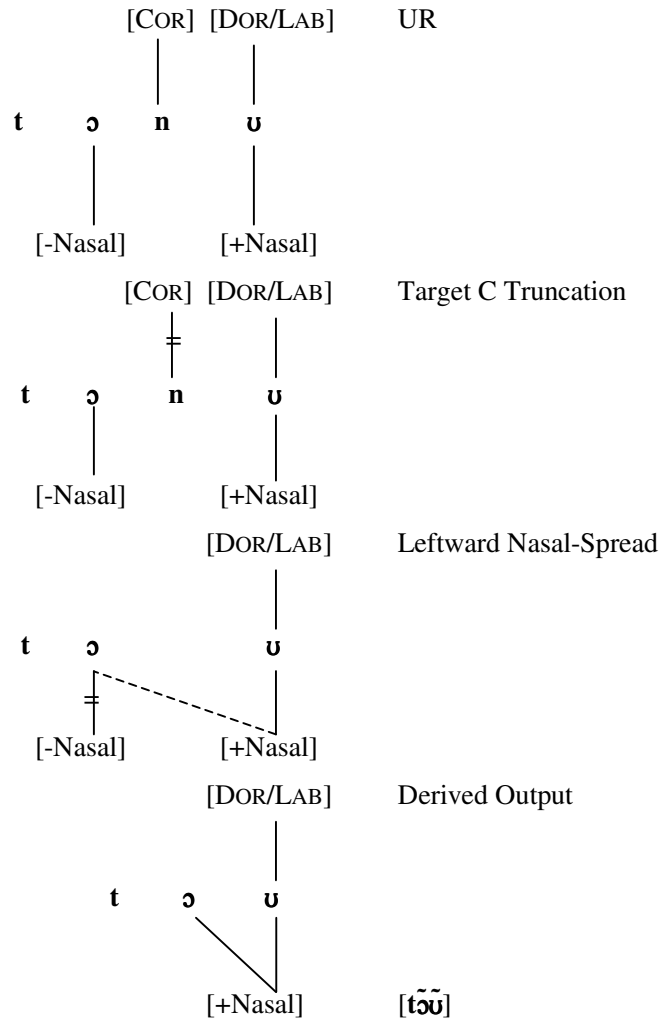
Akuapem  
(Dorsalization) (Labial-dorsalization)



Boka/Asante



(28)



The above derivation is self-explanatory. However, in the pre/slash forms in (25b) the same pre-target [-Nasal] vowel remains oral at the p-level. It is plausible to assume that a dual load of two diverse V-Place articulator features on a segment might block the spreading of an autosegment to the nonnasal vowel. This assumption is informed by the fact that in (16), samples of which constitute (25a), where a single V-Place articulator feature [Coronal] spreads to the target anterior coronal to posteriorize it, the pre-target nonnasal V receives the nasality inherent in either the target nasal C in the case pre-slash forms or the post-target V in the case of post-slash forms. If this assumption is plausible as I presume, then the explication of the inability of the [+Nasal] autosegment in question to spread to the pre-target [-Nasal] C vowel in the Asante/Boka forms in (25b) is straightforward. See also Dolphyne (1988), Obeng (1989) and Abakah (1978, 1993, 2004, 2005) for further pieces of information.

## 6. LABIAL-PALATALIZATION/LABIAL-CORONALIZATION

In the words of Ladefoged (1993: 232):

In some languages (for instance, Twi and other Akan languages spoken in Ghana), labialization co-occurs with palatalization. As palatalization is equivalent to the superimposition of an articulation similar to that in [i], labialization plus palatalization is equivalent to the superimposition of a rounded [i] – that is, [y]. ... the corresponding semivowel is [ɥ]. Accordingly these secondary articulations may be symbolized by a raised [ʷ].

The process of labial-palatalization in Akan can be referred to as labial-coronalization in view of the fact that in Akan, coronal vowels are redundantly palatal. So in this paper labial-palatalization and labial-coronalization are synonymous.

To begin with, when a sequence of [LABIAL] and [CORONAL] vowels follow a set of consonants in Akan, both vowels superimpose their C-Place [LABIAL] and [CORONAL] articulator features on the preceding consonant provided the requisite conditions are met. For instance, when an anterior coronal or the C-placeless **h**, is followed by a V<sub>1</sub>V<sub>2</sub> of a **Ue/Ua** sequence, the consonant, if it is **t**, is labial-palatalized in all the dialects of Akan. It is observed that given a **CUa/Cue** string, Fante does not labial-palatalize the **C** if it has either the C-Place [LABIAL] specification in its feature geometry as demonstrated by (29i. c-d, 29ii. h-j, 29iii. e, h-j) or, is specified as [DORSAL] having [-Voice, -Continuant] specifications in its feature matrix, as is exemplified by (29ii. f and 29iii. f). Asante and Akuapem, in contrast, invariably labial-palatalize these consonants in the same phonetic environment. See also Abakah (forthcoming) for a more detailed study. Data (29) contain illustrative examples of the labial-palatalization process in Akan.

(29) UR	Fante	Akuapem	Asante	English
i. a. /due/	[d <sup>ʷ</sup> ie]	[d <sup>ʷ</sup> ie]	[d <sup>ʷ</sup> ie]	expression of condolence
b. /tue/	[t <sup>ʷ</sup> ei]	[t <sup>ʷ</sup> ie]	[t <sup>ʷ</sup> ie]	to puncture
c. /bue/	[b <sup>ʷ</sup> ei]	[b <sup>ʷ</sup> ue]	[b <sup>ʷ</sup> ie]	to open
d. /pue/	[p <sup>ʷ</sup> ei]	[p <sup>ʷ</sup> ue]	[p <sup>ʷ</sup> ie]	to go out
e. /hue/	[ <sup>ʰ</sup> ei]	[h <sup>ʷ</sup> ue]	[ <sup>ç</sup> ie]	to pour
ii.a. /nũã/	[n <sup>ʷ</sup> ĩã]	[n <sup>ʷ</sup> ĩã]	[n <sup>ʷ</sup> ĩã]	sibling
b. /dua/	[d <sup>ʷ</sup> ia]	[d <sup>ʷ</sup> ia]	[d <sup>ʷ</sup> ia]	tree
c. /tua/	[t <sup>ʷ</sup> ia]	[t <sup>ʷ</sup> ia]	[t <sup>ʷ</sup> ia]	to apply suppository
d. /sũã/	[s <sup>ʷ</sup> ĩã]	[s <sup>ʷ</sup> ĩã]	[s <sup>ʷ</sup> ĩã]	to learn
e. /afua/	[æf <sup>ʷ</sup> u(w)a]	[æf <sup>ʷ</sup> ia]	[æf <sup>ʷ</sup> ia]	Efuwa/Afua (name)
f. /kua/	[k <sup>ʷ</sup> u(w)a]	[k <sup>ʷ</sup> ia]	[k <sup>ʷ</sup> ia]	farming
g. /hũã/	[ <sup>ʰ</sup> ũ(w)ã]	[ <sup>ʰ</sup> ç <sup>ʷ</sup> ĩã]	[ <sup>ʰ</sup> ç <sup>ʷ</sup> ĩã]	scent
h. /mũã/	[m <sup>ʷ</sup> ũ(w)ã]	[m <sup>ʷ</sup> ĩã]	[m <sup>ʷ</sup> ĩã]	to crumple



i.	/mũã/	[m <sup>w</sup> ũ(w)ã]	[m <sup>h</sup> ĩã]	[m <sup>h</sup> ĩã]	shut (mouth)
j.	/pua/	[p <sup>w</sup> u(w)a]	[p <sup>h</sup> ia]	[p <sup>h</sup> ia]	type of haircut
iii.a.	/nũã/	[n <sup>h</sup> ĩã]	[n <sup>h</sup> ĩã]	[n <sup>w</sup> ũã]	to cook
b.	/dua/	[d <sup>h</sup> ia]	[d <sup>h</sup> ia]	[d <sup>w</sup> ua]	to arrest
c.	/tua/	[t <sup>h</sup> ia]	[t <sup>h</sup> ia]	[t <sup>w</sup> ua]	to join
d.	/sua/	[s <sup>h</sup> ia]	[s <sup>h</sup> ia]	[s <sup>w</sup> ua]	to carry
e.	/fua/	[f <sup>w</sup> ɔwa]	[f <sup>h</sup> ia]	[f <sup>w</sup> ua]	to add/support/concur
f.	/akua/	[ak <sup>w</sup> ɔwa]	[ak <sup>h</sup> ia]	[ak <sup>w</sup> ua]	servant
g.	/hɔa/	[ɔwa]	[h <sup>h</sup> ia]	[h <sup>w</sup> ua]	to fade
h.	/mũã/	[m <sup>w</sup> ũwã]	[m <sup>h</sup> ĩã]	[m <sup>w</sup> ũã]	to dent
i.	/bua/	[b <sup>w</sup> ɔwa]	[b <sup>h</sup> ia]	[b <sup>w</sup> ua]	to cover (saucepan)
j.	/bua/	[b <sup>w</sup> ɔwa]	[b <sup>h</sup> ia]	[b <sup>w</sup> ua]	to help
k	/sofɔ # a/	[s <sup>w</sup> ɔf <sup>w</sup> ɔ#a:]	[s <sup>w</sup> ɔf <sup>h</sup> ɔ#a:]	[s <sup>w</sup> ɔf <sup>w</sup> ɔ#a:]	the priest who

It is discernible from (29) that in all the dialects of Akan C-Place [DORSAL] C, **k/g**, and quite often the C-Placeless **h** get labial-palatalized when they occur in a **CUa**. The briefest examination of (29) reveals that Akuapem applies the labial-palatalization process more extensively than any other dialect of Akan, even across word boundaries insofar as a **CUa** environment is created as exemplified by (29k). In other words, Akuapem labial-palatalizes a **C** in a **CUa** string both lexically and postlexically (across word boundaries in a stretch) whereas all the other dialects of Akan labial-palatalize the **C** lexically only, and never ever postlexically as example (29k) demonstrates.

Generally speaking, for the labial-palatalization process to take place in an Akan **CUa/e** string, the following strictly ordered rules, in (30) below, ought to apply rigidly regardless of the variety of Akan in which it occurs.

(30) Underlying Representation	# due #	# hue #	# tua #	# nũã #
Labialization	# d <sup>w</sup> ue #	# h <sup>w</sup> ue #	# t <sup>w</sup> ua #	# n <sup>w</sup> ũã #
VH Agreement in Unroundness	# d <sup>w</sup> ie #	# h <sup>w</sup> ie #	# t <sup>w</sup> ia #	# n <sup>w</sup> ĩã #
Palatalization of Labialized C	# d <sup>h</sup> ie #	# ç <sup>h</sup> ie #	# t <sup>h</sup> ia #	# n <sup>h</sup> ĩã #
Derived Output	[d <sup>h</sup> ie]	[ç <sup>h</sup> ie]	[t <sup>h</sup> ia]	[n <sup>h</sup> ĩã]

Even though a **CUa** string does not contain a V-Place [CORONAL] segment at the u-level, after spreading its inherent [+Round] feature to the preceding C to generate **C<sup>w</sup>Ua**, the **U** habitually undergoes nonlabiality agreement with the following **a** or **e** by means of vocalic replacement process by which a V-Place [CORONAL] counterpart of **U**, that is, **I**, replaces the **U** thereby yielding **C<sup>w</sup>Ia** or **C<sup>w</sup>Ie** where the post-U vocalic segment is **e**. Finally, the vocalic substitute, **I**, being coronal/palatal, superimposes its inherent coronality/palatality on the labialized C to derive labial palatalized/labial coronalized

[C<sup>h</sup>Ia] output. Needless to say, this process of labial-palatalization may also be referred to as labial-coronalization.

A close examination of (29) in its entirety reveals that Asante labial-palatalizes every consonant in a CUa string regardless of its C-Place feature specification if, and only if, the U is specified as [+ATR], as in (29i-ii). If, on the other hand, the U happens to be [-ATR], then (we repeat for emphasis that) Asante does not labial-palatalize any C that precedes it, as in (29iii). Fante, on the other hand, labial-palatalizes anterior coronals only in the same phonetic environment irrespective of the dependent [RADICAL] feature specification of the U as in (29i.a-b; 29ii.a-d; 29iii.a-d), while Akuapem labial-palatalizes the C, that is, all every pre-U consonants regardless of the dependent [RADICAL] feature specification inherent in the U except where the C is a bilabial obstruent or the C-Placeless h. Another point worthy of note is that in a CUa string, Fante obligatorily epenthesizes the labial dorsal glide, w, between the Ua sequence in all instances where the C does not have V-Place [Dorsal] articulator specification in its feature geometry, as in (29iii.e-j). But if the vowels in the string are associated to the [+Nasal] autosegment, the epenthesized labial dorsal glide also links to the [+Nasal] autosegment automatically. It would not be absurd to presume that the Fante epenthesis process in question applies in the early stages in the derivation thereby bleeding the labial-palatalization process.

## 7. CONCLUSION

In this paper, we have attempted to discuss some of the assimilatory processes in Akan within the theoretical frameworks of Autosegmental Phonology and Feature Geometry (Unified Feature Theory). The focus of the discussion has been on the phonology of secondary modifications like palatalization, labialization and labial-palatalization. It has been realized that when some segments occur in an environment required for the application of some secondary articulation, the target segment loses its primary articulation completely in favour of an absolutely new primary V-Place or C-Place articulator feature, thereby, moving out of the realm of secondary modification. Indeed, V-Place [LABIAL] and V-Place [DORSAL] articulator features have indistinguishable characteristics in Akan inasmuch as labial vowels in this language are redundantly dorsal. Generally speaking, not all labial segments are dorsal in Akan and vice versa. So, we have demonstrated in this paper that whereas labialization is invariably the direct result of the spreading of the [+Round] autosegment to an adjacent target segment, dorsalization may not necessarily be triggered by an adjacent dorsal vowel.

Another featural identicalness in Akan resides in coronality and palatality which results in confusion between palatalization and coronalization inasmuch as all palatal sounds in Akan are redundantly coronal, even though not all coronal sounds are palatal. Nevertheless we have, within the context of consonantal segments, distinguished between palatalization and coronalization. Furthermore, we have shown in this paper that when a coronal plosive occurs in a palatalizing environment, Fante affricates it while the other dialects of Akan palatalize it and, consequently, we have distinguished between affrication and palatalization. Some scholars refer to this affrication process in the literature as palatalization and we do not have/see any problem with this label because the process occurs simply in a palatalizing environment and no other environment.

It has also been demonstrated in this paper that a coronal nasal consonant may either lose its coronality in favour of absolute dorsality or lose its coronal anteriority in favour of coronal posteriority, depending upon the phonetic environment in which it is sited. As regards vowels, we have distinguished between labialization and dorsalization in that when coronal vowels occur in labializing environment they lose their coronality completely in favour of dorsality. Hitherto, such distinctions have not been mentioned in the literature.

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