

## VOWEL HARMONY IN NKAMI

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### Abstract

This paper draws from a large corpus of natural data to provide a descriptive account of vowel harmony in Nkami, an endangered undocumented Guang (Kwa) language of Ghana. Like most Kwa languages, Nkami has nine phonemic vowels with robust ATR harmony. Besides ATR harmony, it also shows evidence of rounding and height harmonies though the latter are restricted and epiphenomenal to ATR harmony. Typical of most nine-vowel ATR languages, Nkami displays evidence of [+ATR] dominance and the direction of the [+ATR] assimilation is predominantly regressive. Aside from morpheme internal ATR harmony, ATR harmony occurs in stems and prefixes, loanwords, pronominal possessions, compounds and across word boundaries. Though the low vowel /a/ is neutral, with no noticeable [+ATR] phonetic variant and is predictably opaque to [+ATR] spread, there is an instance where it appears to alternate with the mid vowel /e/. Both height and rounding harmonies occur in the contexts of pronouns and verbal prefixes. However, while the direction of assimilation of the former is regressive, that of the latter is progressive. Thus, Nkami differs from other Guang languages in the sense that whereas other Guang languages exhibit evidence of regressive root-controlled rounding harmony, Nkami shows evidence of progressive rounding assimilation that is prefix-controlled.

### 1. Introduction<sup>1</sup>

Vowel harmony is a phonological process that stipulates that vowels within a particular phonological, lexical and sometimes syntactic domain (word/phrase) must share specific features. When within a domain the vowel features are not harmonious, then a harmony process is triggered. Features shared by vowels in harmony may include [+/-ATR], [+/-high], [+/-back], and [+/-round]. Nkami displays three harmony types: tongue root (ATR), height and rounding. Like many other Kwa languages, while tongue root harmony is robust and pervasive, height and rounding harmonies are restricted and secondary. Furthermore, whereas one can generally predict the occurrence of tongue root and rounding harmonies given the appropriate contexts, height harmony is generally idiosyncratic, occurring in unpredictable contexts. In what follows, we discuss each one of the harmony processes in turn but because of the pervasiveness and the general typological and theoretical interests in tongue root harmony, ATR harmony naturally dominates the discussion. Moreover, since Nkami is

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<sup>1</sup> Nkami refers to both a group of people and an endangered Guang language spoken by about four hundred people living in Amankwa which is a few kilometres away from the western shore of the Volta Lake in the Afram Plains North Constituency of Ghana.

an endangered undocumented language, emphasis is placed on descriptive adequacy rather than formalizing. Portions of the data and analyses are taken from an on-going PhD dissertation which is also part of a larger documentation project on Nkami. The data comprises both designed texts and spontaneous natural speech gathered from approximately a hundred speakers of varied backgrounds in the field. Annotation and verification of media data and texts were done in conjunction with a team of two adult Nkami speakers and several other language consultants.

The paper is organized as follows: Section 3 examines ATR harmony where issues such as domains of ATR harmony, the opacity or transparency of the low vowel, /a/, consonantal influence versus ATR harmony, and dominance and direction in [+ATR] assimilatory processes. Sections 4 and 5 examine rounding and height harmonies in relation with other regional languages, while Section 6 summarizes the main points of the paper. In order to put the discussion into perspective, we first examine Nkami's vowel system in the ensuing section.

## 2. Nkami's Vowel System

The vowel inventory of Nkami shows a five-height system with nine vowels. It also has nasal and long vowels. Figure 1 represents the nine phonemic oral vowels.

(1)

i	u
ɪ	ʊ
e	ɛ
ɛ	ɔ
a	

Nkami's vowel system is reminiscent of many other systems found in Guang and Tano-Kwa languages (cf. Stewart, 2000; Casali, 2002; 2008). The vowels are distinguished on the following parameters: [+/-ATR], [+/-high], [+/-round] or [+/-back], based on the position assumed during articulation by different parts of the tongue (in the oral cavity) and on the lip posture. The chart in Figure 2 presents the nine oral vowels in the language based on the above-mentioned parameters.

Figure 2

		[-round]/	[-back]	[+round]/[+back]
[+ATR]	[high]	i		ʊ
	[mid]	e		ɔ
	[low]		a	
[-ATR]	[mid]	ɛ		ɔ
	[high]	ɪ		ʊ

Note that in Nkami all [+round] vowels—/u, ʊ, o, ɔ/—are [+back], and all [-round] vowels—/a, e, ɛ, i, ɪ/—are [-back]. Thus, since the feature [+round] is coterminous to/with [+back] in Nkami, what we call rounding harmony in this paper may as well be referred to as backness harmony. We have, however, opted for rounding because it conforms to the terminology used for the description of the phenomenon in other neighbouring Guang and Kwa languages. The use of rounding, instead of backness harmony, will also help make easy comparisons of the phenomenon between Nkami and its neighbouring languages.

It is often observed about five-height vowel system ATR languages that the -ATR high vowels /ɪ/ and /ʊ/ are impressionistically close to and, to some extent, not (very) distinct from adjacent height vowels /i, u, e, o/. There is one group of researchers who

observes that it is generally confusing distinguishing them from /i/ and /u/ (cf. Rennison 1986 on Koromfe-Gur and Tucker 1964 on Kalenjin-Southern Nilotic), and another who observes that it is difficult identifying them from /e/ and /o/ (cf. Snider 1989b on Guang languages, Hess 1992 on Akan-Kwa, and Casali 2002 on Nawuri). As far as Nkami is concerned, /i/ and /u/ are highly distinct as there is no difficulty in identifying them from adjacent height vowels /ĩ, u, e, o/. We suspect that these observations are made by non-native ATR language speakers at the initial stages of fieldwork on ATR harmonizing languages.

Still on /i/ and /u/, there exists a fairly general assumption that the two unadvanced high vowels are marked in ATR languages (cf. Stewart 1970, Archangeli and Pulleyblank 1994, Calabrese 1995). Thus, the view is that /i/ and /u/ are highly marked sounds that is why they are usually the first sounds to be omitted in nine-vowel systems that undergo vowel reduction. Notwithstanding, we agree with Casali (2002; 2008) that in most ATR African languages that have /i/ and /u/ as underlying vowels, they are frequently occurring vowels and as such may not be considered as marked sounds. Thus, Nkami behaves like other ATR African languages such as Chumburung-Guang and Dagari-Gur (Cahill, 1991), Akposo-Kwa (Anderson, 1999) and Nawuri-Guang (Casali, 2002), in the sense that /i/ and /u/ are, at least, more frequently used than /e/ and /o/. Although /i/ and /u/ do not occur at word-initial position and are also the target of deletion in disyllabic CVrV forms leading to monosyllabic CrV, they are frequently used in the language. They appear in a sizeable amount of lexical words and in most functional morphemes just as Casali (2002) notes about Nawuri, a sister Guang language. Moreover, just as they are the target of deletion in disyllabic CVrV forms, they are also the target for insertion in CrV monosyllabic loanwords to create disyllabic CVrV forms (see section 3.1.1 e.g. 8). However, the mid vowels are never the target of insertion. In a nutshell, if frequency of usage is the determining factor for deciding on markedness of sounds then, by all standards, /i/ and /u/ are not marked in Nkami.

## 2.1 Nasal Vowels

Similar to some South-Guang languages such as Larteh, Chreprepong, Gwa, Awutu and Efutu (Snider, 1990), Nkonya (Peacock, 2007; Asante, 2009; 2012), and some Kwa languages such as Akan, apart from the nine oral vowels, Nkami also has phonemic nasal vowels. So far, seven nasal vowels /ĩ, ĩ, ẽ, ã, õ, ũ, ỹ/ have been identified. Thus, only /ɔ/ and /e/ do not have nasal counterparts. Consider the minimal pairs in (3) showing phonemic distinction between the oral and nasal vowels.

(3) Oral		Nasal	
<b>du</b>	'heavy/plant/sow'	<b>dũ</b>	'bite'
<b>bu</b>	'be located/have'	<b>bũ</b>	'crow/smell/sniff'
<b>efi</b>	'leaf/husk'	<b>efĩ</b>	'rubbish/dirt'
<b>ɔsi</b>	'father'	<b>ɔsĩ</b>	'pain'
<b>tʃa</b>	'dance/step'	<b>tʃã</b>	'miss/nostalgia/divide'
<b>fɛ</b>	'nip/beautiful/be ripen'	<b>fẽ</b>	'blow nose'
<b>dʒo</b>	'wait'	<b>dʒõ</b>	'squat'

There is a strong relationship between height and nasality in Nkami and, to a large extent, Kwa languages in general; that is, there is preference for high and low nasal vowels to mid nasal vowels. Akan, for instance, has five phonemic nasal vowels comprising the four high vowels /ĩ, ĩ, ũ, ỹ/ and the low vowel /ã/ (cf. Dolphyne 1988). Observe in (3) also that all four high vowels and the low vowel have nasal counterparts. Moreover, though the frequency of usage of the nasal vowels is generally low, that of the mid nasal vowels /ẽ and õ/ is lower occurring in very few words. The vowels /ã/ and /ĩ/ are the most frequent followed by /ỹ/, /ũ/ and /ĩ/, and then the mid vowels /ẽ/ and /õ/ in that order [Any statistics in support of this claim? If not, then indicate that your assertions are based on a preliminary personal observation and that a study is needed to confirm this]. Apart from the fact that the

nasal vowels are less frequently used, they also only occur in open syllables, as we observe in (3). This is one of the reasons why it is posited in Asante (forthcoming) that Nkami should be placed in the South-Guang, rather than the North-Guang languages group. One of the reasons Snider (1989, 1990) attributes for a North-South Guang division is that whereas the North-Guang languages maintain their *VN* (vowel-nasal consonant) sequences from Proto-Guang (PG), the South-Guang languages do not. In the South-Guang languages, the final *N* has been dropped off; but before deletion, its nasal feature was transferred to the preceding *V* and so *V* is currently realized as nasal vowel. This is exemplified in (4).

(4) a.	PG	* <b>duŋ</b>	'bite'	
	Gonja	<b>duŋ</b>		North-Guang
	Chmburung	<b>duŋ</b>		
	Krachi	<b>duŋ</b>		
	Gichode	<b>duŋ</b>		
	Nawuri	<b>duŋ</b>		
b.	Larteh	<b>dũ</b>		South-Guang
	Cherepong	<b>dũ</b>		
	Gwa	<b>dĩ</b>		
	Awutu	<b>dũ</b>		
	Efutu	<b>dũ</b>		
	Nkonya <sup>2</sup>	<b>dũ</b>		
	Nkami	<b>dũ</b>		

(Snider 1990: 57)

Thus, whereas the cognates for *bite* in the North-Guang languages are all produced **duŋ** (maintaining the final *N* of the PG's form **duŋ**), those of the South-Guang languages are produced with nasal *V* without final *N*. That is, since Nkami's cognate is produced as **dũ**, it behaves similarly to the South-Guang languages. Based on this behaviour, it may be reasonable to agree with an earlier thesis (cf. Snider 1989, 1990, Asante 2009, 2012) that though the nasal vowels in South-Guang languages (and some Tano-Kwa languages) are synchronically phonemic, they are composed of remnants of diachronically syllable-final nasal consonants and preceding oral vowels.

## 2.2 Long Vowels

Long vowels are phonemic in Nkami. In (5) are minimal pairs of some long vowels (represented with double letters) and their short counterparts.

(5) a.	Short		b.	Long	
	<b>ké</b>	'possessive particle'		<b>kée</b>	'remain/stay'
	<b>mě</b>	'abdomen'		<b>měě</b>	'swallow'
	<b>se</b>	'if'		<b>see</b>	'drain off/sweep away'
	<b>ta</b>	'unless, finish'		<b>taá</b>	'often'
	<b>fā</b>	'place/there'		<b>fāā</b>	'wrong someone'
	<b>si</b>	'leave behind/abandon'		<b>sii</b>	'accompany'
	<b>li</b>	'resemble/pass/river'		<b>lii</b>	'mention'
	<b>tʃi</b>	'look/look after/fry'		<b>tʃii</b>	'arrest/fasten'
	<b>ɔ</b>	'3SG: she/he'		<b>ɔɔ</b>	'3SG.HAB'

Though it may be difficult to find the following long vowels /**ee**, **oo**, **uu**, **uu**/ in well-known major word classes such as verbs, nouns and adjectives, they may appear in vocalizations such as ideophones, interjections and particles. For instance, /**ee**/ and /**oo**/ are used in the forms **eei** and **oow** respectively to express surprise, and /**uu**/ is employed in the form **yu** to imitate the sound of a burning fire or the inappropriateness of a dress worn on the body.

<sup>2</sup> Nkonya and Nkami's insertions are ours.

## 3. Tongue Root Harmony

Nkami exhibits widespread and consistent tongue root harmony system, which is reminiscent of what is known in many languages in Sub-Sahara Africa, particularly, those in the Nilo-Sahara (mainly in East Africa) and Niger-Congo languages (mainly in West Africa). Tongue root harmony is a requirement for vowels in a domain to share a common tongue root feature. Thus, vowels of tongue root harmony languages with nine-vowel system like Nkami are generally divided into two groups, [+ATR] /*i*, *e*, *o*, *u*/ and [-ATR] /*i*, *ɛ*, *ɔ*, *u*, *a*/. Typically, the [+ATR] vowels are produced with advancement of the tongue root and/or an enlargement of the pharyngeal space, while the [-ATR] vowels are articulated with retracted tongue root and/or compressed pharyngeal space (cf. Lindau, 1978; Dolphyne, 1988; Tiede, 1996; Stevens, 1998; Gafos and Dye, 2011; Casali, 2012). Typical of nine-vowel system languages, the [-ATR] low vowel /*a*/ does not alternate in the language. Thus, it is neutral and can occur in the environment of both [+ATR] and [-ATR] vowels, as shown in (6).

(6)a. /*a*/ and [-ATR] vowels

bula	‘be full’	dʒanse	‘olden times’
kɪla	‘count/read’	tura	‘carry on head’
dʒasɔ	‘forcefully collect’	bentua	‘stringe’
tugwa	‘meet’	fɪa	‘meet’
afɪra	‘pounded yam’	tɪra	‘rear animal’
akpɪ	‘thousand’	bɔa	‘help’

b. /*a*/ and [+ATR] vowels

bisa	‘ask’	awuro	‘a type of drum’
bani	‘get’	dʒasi	‘housefly’
asumi	‘work’	dedua	‘summons’
bua	‘respond’	afunu	‘falsehood/deceitfulness’
tasi	‘aunt’	apofra	‘a type of fish’
akpɪ	‘garden eggs’	fɪpa	‘to swell’
wura	‘provide alimony/palimony’		

Thus, /*a*/ appears with [-ATR] vowels in (6a) and [+ATR] vowels in (6b). It is important to mention that it is generally difficult to find combinations of /*a*/ and mid vowels. As we observe in (6), it collocates more with high vowels than mid vowels. We are not aware of similar observations in other languages but it appears that other Kwa languages such as Akan and Nkonya behave similarly. As we will observe in section 3.2, contrary to other Kwa languages such as Akan and Nawuri, the [-ATR] low vowel /*a*/ does not have a [+ATR] phonetic variant; it is always realized [-ATR] irrespective of the ATR status of the vowels it collocates with.

As explicated later in this paper, Nkami’s harmony shows evidence of a robust system of [+ATR] dominant harmony similar to most nine-vowel ATR systems in Sub-Sahara Africa. This thus gives support to the thesis of the ‘System-Dependent [ATR] Dominance’ theory (cf. Goad, 1993; Casali, 2003; 2008). The System-Dependent [ATR] Dominance theory comes with the proposition that, in the underlying form, vowel inventory has a strong relation with the kind of [ATR] dominance a language displays. Languages that show ATR contrast among the four high vowels /*i*, *ɪ*, *u*, *ʊ*/ exhibit [+ATR] dominance, while those that do not (but show contrast among [-high] vowels) display [-ATR] dominance.<sup>3</sup> Nkami therefore behaves like a typical dominant-recessive harmonic language since only [+ATR] feature propagates to [-ATR] vowels, but not obverse. However, [+ATR] spread is not unrestricted since the direction of spread is predominantly regressive (right-to-left).

<sup>3</sup> See Casali (2003) on a comprehensive survey of over 100 African languages with the aim of justifying the System-dependent [ATR] dominance, as opposed to the Variable [ATR] dominance (e.g. Archangeli & Pulleyblank 1994, Leitch 1996) and Universal [+ATR] Dominance (e.g. van der Hulst & van de Weijer 1995, Bakovic 2000) theories.

Thus, in a phonological domain, [+ATR] harmony percolates iteratively in a regressive direction from stems through to preceding elements unless there is a [-ATR] low vowel /a/ which blocks the spread. Consequently, Nkami's harmony is, by and large, morphologically determined since [+ATR] feature spreads from stems to prefixes, but not vice versa. Moreover, Nkami's system strengthens an argument made by Casali (2012) and others that the traditional distinction between [+ATR] dominant-recessive (mainly East African Nilo-Saharan languages) and stem-controlled (mainly West African Languages) is unwarranted since a language could both be [+ATR] dominant-recessive and stem-controlled.

### 3.1 Domains of ATR Harmony in Nkami

ATR harmony abounds in the grammar of Nkami occurring in stems, stems and affixes, loanwords, compounds and across word boundaries. In this section, emphasis is put on the first three domains; the last two are discussed in later sections.

#### 3.1.1 ATR Harmony in stems and Loanwords

Typically, all roots/stems that do not contain /a/ are harmonic since only vowels of a particular set, that is either [+ATR] /i, e o, u/ or [-ATR] /ɪ, ɛ, ɔ, ʊ, a/, pattern together, as illustrated in (7).

##### (7) a. +ATR stems

kisi	'to abhor'	kikibi	'small'
bili	'to pull'	bire	'where'
duidui	'to burn'	lowu	'death'
sili	'stub'	toŋobi	'pepper'
toŋoyi	'maize/ corn'	wuli	'to stir food (banku)'
tweni	'morning'	tʃefuru	'cloth'
yire	'things'	firidzi	'jump'

##### b. [-ATR] stems

kilebi	'chicken'	kila	'count/read'
yiri	'stand'	biɔ	'mountain'
dodoo	'stutter'	sebi	'faeces'
tɛdʒi	'to spread out'	tʃekoo	'dull/inactive'
twie	'to grind'	wurɔdʒi	'to remove/undress'
twɛdɛ	'fist'	tɔntɔm	'a type of drum'

The examples in (7) provide an indication of how systemic ATR harmony is in stems of the language. ATR harmony in stems is so strict that loanwords from English strictly conform to it. Consider the examples in (8).

##### (8) Loan Words

###### a. [+ATR]

biledi	'blade'
firidzi	'fridge'
bulodo	'bread'
bootu	'boat'
sopu	'soap'
bokiti	'bucket'
tii	'tea'

###### b. [-ATR]

ɔɪlɔstɔ	'plaster'
kɔɔpɔ	'cup'
bɔɪɔgɔ	'block'
ɔɪɪɪtɪ	'plate'
tɔɔtʃɪ	'torch'
ɔɪɪɔgɔ	'plug'
sɪɪɪbɔ	'silver'

Observe that all vowels in the loanwords in (8a) are [+ATR], while those in (8b) are [-ATR]. Generally, there tends to be iconic relationship between *tenseness* and ATR; *tense* vowels in the loanwords are realized as [+ATR], while *lax* vowels are realized as [-ATR] in Nkami. Moreover, as we mentioned in Section 2, loanwords with unacceptable clusters, particularly plosive-liquid clusters, are made to conform to the dominant CV syllable structure of the language through vowel epenthesis. Observe in (8) that in loanwords containing consonant clusters such as **bulodo** 'bread', **bulɔgɔ**

‘block’, **fridzi** ‘fridge’ and **pilasta** ‘plaster’, the inserted vowel is [+high]. Thus, only the four high vowels /i, u, ɪ, and ʊ/ are selected to break plosive-liquid clusters. Which high vowel is selected to resolve clusters in loanwords depends on the ATR and round values of adjacent vowel(s). If the adjacency of the cluster is occupied by a [-ATR, +round] vowel, then /ʊ/ is inserted, as in block→[**bulɔgu**]; if it occupied by a [+ATR, +round] vowel, then /u/ is inserted, as in bread→[**bubdo**]; if the vowel is a [-ATR, -round] vowel, then /ɪ/ is inserted, as in plate→[**pɪletɪ**]; and if it is a [+ATR, -round] vowel, then /i/ is inserted, as in blade→[**biledi**]. Note that high-vowel epenthesis applies even when the adjacent vowel of the cluster is non-high such as in bread→[**bubdo**] and plaster→[**pilasta**].

Moreover, it is also worth noting that in conformity to the CV dominant syllable structure of the language, all English loanwords ending with word final coda receive word-final vowel insertion, as seen in torch→[**tɔɔtʃɪ**], soup→[**sopu**], plug→[**pulɔgu**] and bucket→[**bokiti**]. The constraints for word-final vowel insertions generally follow those for cluster insertions: only high vowels are inserted by conforming to ATR and rounding features of adjacent vowels.<sup>4</sup> Reiterating the point made earlier about the markedness behaviour of /ɪ/ and /ʊ/, following Archangeli and Pulleyblank’s (1994) seminal work that highlights the articulatory difficulty of producing the unadvanced high vowels (retracting and raising the tongue body at the same time), there has been a general tendency to assume that the unadvanced high vowels /ɪ/ and /ʊ/ are marked in nine-vowel ATR languages like Nkami. But as Casali (2002) rightly notes for Nawuri and several other languages, though /ɪ/ and /ʊ/ may be less preferred to /i/ and /u/ when it comes to selection in vowel inventories, their distribution and general behaviour in Nkami symptomize vowels that are unmarked or less marked. Apart from using them as epenthetic vowels to resolve clusters, they are among the frequently used vowels in the language. They appear in a sizeable number of lexical words and in most functional morphemes such as adpositions, pronouns, demonstratives, verbal prefixes and particles. They are, at least, more frequently used than the mid vowels /e/ and /o/.

The last thing to be said about the loanwords which apparently serves as one of the reasons for considering the low vowel /a/ as [-ATR], rather than [+ATR], is that anytime an adjacent position of a cluster is occupied by the low vowel /a/, a [-ATR] high vowel /ɪ/ or /ʊ/ is inserted, but not the [+ATR] counterparts /i/ or /u/. This is, for instance, found in plaster→[**pilasta**] and silver→[**sɪlɪba**] where /ɪ/, rather than /i/, is used to resolve the cluster. If /a/ was inherently [+ATR], then it would have been expected that /i/, rather than /ɪ/, would have been inserted. Moreover, if we consider /a/ to be unspecified, then the insertion of either /i/ or /ɪ/ should have been appropriate. However, since that does not happen and /ɪ/ is consistently selected in such contexts, it sounds reasonable to consider /a/ as [-ATR], and not [+ATR] and/or unspecified. The position taken here is consistent with the treatment of /a/ in many nine-vowel ATR languages (cf. Akan: Stewart, 1967; Dophyne, 1988; Buli: Akanlig-Pare, 2002; Casali, 2012; Nawuri: Casali, 2002; Nkonya: Peacock, 2007; Asante 2009).

### 3.1.2 Harmonizing Affixes

In Nkami the [+ATR] form is more dominant, and in a harmony domain, it spreads only from stem to prefixes but never to suffixes. The range of prefixes that are assimilated to the [+ATR] feature of stems include the nominal markers **ɛ-**, **ɔ-**, **e-**, and **o-**, subject pronominal markers, the progressive marker **lɛ-**, the perfect marker **lɛ-**, the future tense and the proximal directional marker **bɛ-**, as well as the distal directional marker **yɛ-**. Preverbal negation markers include the past negative **mun-**, the progressive negative **munɛ-**, and the perfect negative **muntɪ-** markers. We assume that these prefixes are inherently [-ATR] because, in emphatic ‘carefree’ speech, they are

<sup>4</sup> In Generative treatment of VH, another argument would be to posit one of the sets, and in Nkami, the [+ATR] as the underlying form, and when inserted will then harmonize in ATR features of the stem: /pulɔgu/ → [pulɔgu].

produced as [-ATR] but never as [+ATR].<sup>5</sup> We begin with the nominal prefixes and follow the discussion up with verbal prefixes.

### 3.1.3 Nominal Prefixes

Apart from the four high vowels /u, ʊ, i, and i/, all the other non-low vowels /e, ɛ, o and ɔ/ function as nominal prefixes. As nominal prefixes, they conform to the ATR status of the vowels in the nominal stem. This is exemplified in (9-10).

(9) Nominal prefixes e-/ɛ-

a. [+ATR]		b. [-ATR]	
<b>e-muo</b>	'clay'	<b>ɛ-bi</b>	'time'
<b>e-ɲu</b>	'head'	<b>ɛ-yu</b>	'self'
<b>e-wei</b>	'house'	<b>ɛ-dano</b>	'tongue'
<b>e-fifi</b>	'sweat, warmth'	<b>ɛ-meri</b>	'horn/antenna'
<b>e-fieli</b>	'game'	<b>ɛ-dalo</b>	'money/metal'
<b>e-dwie</b>	'lice'	<b>ɛ-sa</b>	'grass'
<b>e-moli</b>	'termite'	<b>ɛ-fuo</b>	'a monkey-like animal'

Observe that while the [+ATR] nominal stem vowels select the [+ATR] nominal prefix e- in (9a), the [-ATR] stem vowels in (9b) collocate with the [-ATR] prefix ɛ-. Nominals that select e-/ɛ- as prefixes are non-human indexing referents of semantic categories such as body parts, abstract terms, foodstuffs, plants and animals. In general, these nouns do not make number distinction morphologically; most of them use the same form for both singular and plural referents. In the data in (10) we demonstrate that the selection of the nominal prefixes o-/ɔ- is dependent on ATR status of vowels in the nominal stems.

(10) Nominal prefixes o-/ɔ-

a. [+ATR]		b. [-ATR]	
<b>o-ɲi</b>	'mother'	<b>ɔ-si</b>	'father'
<b>o-wie</b>	'owner/master'	<b>ɔ-kasi</b>	'individual/person'
<b>o-kunu</b>	'husband'	<b>ɔ-wili</b>	'skin/ book'
<b>o-fusuo</b>	'animal (like cattle)'	<b>ɔ-bori</b>	'night adder'
<b>o-dompo</b>	'animal (like bush cat)'	<b>ɔ-kileti</b>	'cat'
<b>o-tugo</b>	'buttocks'	<b>ɔ-dida</b>	'chin'
<b>o-si</b>	'waist'	<b>ɔ-ɲo</b>	'mouth'
<b>o-wurobie</b>	'ennui/laziness'	<b>ɔ-suwili</b>	'land'
<b>o-wiwili</b>	'evening'	<b>ɔ-tfuno</b>	'name of a plant'
<b>o-kpesie</b>	'lower grinding ware'	<b>ɔ-kuli</b>	'one'
<b>o-dufie</b>	'name of River'	<b>ɔ-de</b>	'happiness'
<b>o-tfeli</b>	'sponge'	<b>ɔ-fe</b>	'beauty'

Nominals that select o-/ɔ- prefixes belong to different semantic sub-classes including humans, animals, plants, home items, natural resources, body parts, and abstract objects.

Besides nominal prefix marking, there is a productive process of nominalization in the language whereby nominals are derived from action/non-stative verbs through prefixation of e- or ɛ-. In (11a), ɛ- co-occurs with [-ATR] verbs while e- collocates with [+ATR] verbs in (11b).

(11) Nominalization Prefixes

	Verb	Gloss		Noun	Gloss
a.			[-ATR]		
	<b>di</b>	'sleep'		<b>ɛ-di</b>	'sleep/sleeping'
	<b>do</b>	'weed'		<b>ɛ-do</b>	'weeding'
	<b>mɔsi</b>	'laugh'		<b>ɛ-mɔsi</b>	'laughter/laughing'
	<b>firi</b>	'swim'	→	<b>ɛ-firi</b>	'swimming'

<sup>5</sup> This situation may be seen in the speech of people, especially children, when they imitate the speech of stutterers. For instance, **Kofi bedgi** 'Kofi will eat' may be realized as **Kofi be be be bedgi**.

<b>twuro</b>	‘write’	<b>ɛ-twuro</b>	‘writing’
<b>kudzɪ</b>	‘give birth’	<b>ɛ-kudzɪ</b>	‘childbirth/delivery’
<b>fɛrɪ</b>	‘respect’	<b>ɛ-fɛrɪ</b>	‘shyness/respect’

b.		[+ATR]	
<b>pira</b>	‘get hurt’		<b>e-pira</b> ‘injury’
<b>su</b>	‘cry’		<b>e-su</b> ‘crying’
<b>fie</b>	‘fart’	→	<b>e-fie</b> ‘fluctulance’
<b>dzi</b>	‘eat’		<b>e-dzi</b> ‘eating’
<b>bie</b>	‘bathe’		<b>e-bie</b> ‘bathing’
<b>kini</b>	‘wander’		<b>e-kini</b> ‘wandering/traipsing’

The derived nominals generally belong to a sub-class of abstract nouns that designate the actions of their cognate verbs.

### 3.1.4 Verbal Prefixes

Aside from nominal prefixes, verbal prefixes in Nkami also agree with the ATR value of verb stems. Since the verbal prefixes in Nkami are all [-ATR], they become [+ATR] when they occur with [+ATR] verbal stems; and harmonize with [-ATR] verbal stems by default. The excerpts in (12-14) show verbal prefixes that agree with their stems in ATR values.

(12) Progressive prefix **lɛ-**

- |    |   |    |  |
|----|---|----|--|
| a. | ɔkplɪ amɔ <b>lɛ-wɪ</b> eye.<br>dog DET PROG-sleep<br>‘The dog is chewing bone.’ | b. | ɔkplɪ amɔ <b>lɛ-dzi</b> adzuro.<br>dog DET PROG-eat food<br>‘The dog is eating.’ |
|----|---|----|--|

(13) Perfect prefix **lɛ-**

- |    |  |    |   |
|----|--|----|---|
| a. | ɔkplɪ amɔ <b>lɛ-dɪ</b> .<br>dog DET PROG-die<br>‘The dog has slept.’ | b. | ɔkplɪ amɔ <b>lɛ-wu</b><br>dog DET PROG-die<br>‘The dog has died.’ |
|----|--|----|---|

(14) Directional prefixes **bɛ-** and **yɛ-**

- |                  |   |                  |  |
|------------------|---|------------------|--|
| a.               | Ama <b>bɛ-sɔ</b> atɔ bu mɪ<br>Ama PDP-buy thing be.at here<br>‘Ama comes to buy things here.’ | b.               | Ama <b>yɛ-sɔ</b> atɔ bu mu<br>Ama DDP-buy thing be.at there<br>‘Ama goes to buy things there.’ |
| a <sup>1</sup> . | Ama <b>bɛ-sua</b> atɔ bu mɪ<br>Ama PDP-learn thing be.at here<br>‘Ama comes to study here.’   | b <sup>1</sup> . | Ama <b>yɛ-sua</b> atɔ bu mu<br>Ama DDP-learn thing be.at there<br>‘Ama goes to study there.’   |

As we observe above, the progressive **lɛ-** (12), perfective **lɛ-** (13), and directional prefixes **bɛ-** and **yɛ-** (14) all harmonize with the [ATR] value of the verbal stems they co-occur with. Harmony is not limited to the verb stem and immediate collocating prefix, as (12-14) appears to convey; it could spread across the entire complex word as illustrated in (15).

(15) Harmony spreading across the entire complex word

- |    |   |    |   |
|----|---|----|---|
|    | [-ATR]  |    | [+ATR]  |
| a. | <b>Mini-bɛ-kudzɪ</b> abɛ?<br>2PL-FUT-give birth again<br>‘Will you give birth again?’ | b. | <b>Mini-be-bie</b> abɛ?<br>2PL-FUT-bath again<br>‘Will you bath again?’             |
| c. | Ama <b>ɔ́ -yɛ firɪ</b> . <sup>6</sup><br>Ama PROG-DDP-swim<br>‘Ama is going to swim.’ | d. | Ama <b>ɔ́ -yɛ-kini</b> .<br>Ama PROG-DDP-wander<br>‘Ama is going to wander/stroll.’ |

<sup>6</sup> Note that the progressive marker **lɛ-** may be realized as [ɔ́] or [ɔ́], as shown in (15c-d), especially when it collocates with the directional prefixes **bɛ-** or **yɛ-** to express prospective meaning. We suspect a fusion of a previous bound subject pronoun prefix **ɔ-** and the progressive prefix **lɛ-**.

As we observe in (15), ATR harmony can extend over the entire complex word. For instance, in (15b) [+ATR] feature spreads through the preceding future tense prefix **bɛ-** to the subject pronoun **mini-** ‘you’; while in (15d) it spreads from the verb stem to the distal directional prefix **yɛ-** and the preceding progressive prefix **lé-**. Thus far, we have shown the consistency of [ATR] harmony in stems, nominal stems and prefixes, and verbal stems and prefixes.

### 3.2 The Low [-ATR] Vowel /a/

The behaviour of the low vowel /a/ in ATR languages is one of the domains that have generated remarkable interests. It is invariably so because of its variability among different languages and, in some cases, within the same language. Unlike many ATR languages of the Kwa phylum such as Akan (Dolphyne 1988), Gwa/Anum (Obeng 1995), Chumburung (Snider 1989), Nawuri (Casali 2002), and Nkonya (Peacock 2007), the low vowel in Nkama has no [+ATR] allophonic variant.<sup>7</sup> It is consistently realized as [-ATR] when it occurs with [+ATR] vowels in roots and as a prefix to stems. However, as we demonstrate later in this paper, there are a few predictable instances in the language where it appears to alternate with the front [+ATR] mid-vowel /e/. Before we go into those details, we provide further evidence to justify our hypothesis that the low vowel /a/ is [-ATR]. This is particularly important since we argue that /a/ does not alternate when it occurs with both [-ATR] and [+ATR] vowels. See more examples of /a/ co-occurring with [-ATR] vowels in (16) and [+ATR] vowels in (17).

(16) /a/ occurs with [-ATR] vowels

<b>kɪla</b> ‘count/read’	<b>tura</b> ‘carry on head’
<b>bula</b> ‘be full’	<b>fi</b> ‘meet’
<b>tugwa</b> ‘meet’	<b>tira</b> ‘rear animal’
<b>bua</b> ‘help’	<b>dzasɔ</b> ‘forcefully collect’
<b>dʒansɛ</b> ‘olden times’	<b>bentua</b> ‘string’
<b>afira</b> ‘pounded yam’	<b>akpĩ</b> ‘thousand’

(17)a. /a/ appears after [+ATR] vowel(s)

<b>fɪna</b> ‘to swell’	<b>dumura</b> ‘a type of monkey’
<b>dɛdua</b> ‘summons’	<b>bua</b> ‘respond’
<b>bisa</b> ‘ask’	<b>wura</b> ‘provide alimony/palimony’

b. /a/ appears before [+ATR] vowels

<b>tasi</b> ‘aunt’	<b>dʒasi</b> ‘housefly’
<b>tʃago</b> ‘rag’	<b>bani</b> ‘acquire effortlessly’
<b>a-sumi</b> ‘work’	<b>a-wuro</b> ‘a type of drum’
<b>a-kpĩ</b> ‘garden eggs’	<b>a-funu</b> ‘falsehood/deceit’
<b>apofra</b> ‘a type of fish’	

The behaviour of /a/ in (17a) is quite expected since the active [+ATR] feature spreads from right-to-left but not the reverse. Thus, since /a/ follows [+ATR] vowels in (17a), it should be expected that it does not assimilate to [+ATR]. However, (17b) is quite intriguing since /a/ immediately precedes a [+ATR] vowel(s) either in the same root/stem (e.g. **tʃago** ‘rag’ and **bani** ‘acquire effortlessly’) or as a nominal prefix (e.g. **a-sumi** ‘work’ and **a-kpĩ** ‘garden eggs’). In all these instances, /a/ fails to assimilate to the [+ATR] value and it is consistently realized as [-ATR].

If /a/ consistently remains unchanged in both [-ATR] and [+ATR] contexts, then the question is why should we regard it as [-ATR]? Three reasons are offered here in

<sup>7</sup> Two Ghana-Togo Mountain languages Logba (Dorvlo 2008) and Tafi (Bobuafor 2013) also do not have [+ATR] phonetic variant of /a/. Note, however, that most Togo-Mountain languages are considered as Guang languages (see Ampene 2003, for instance).

addition to the one offered in Section 3.1.1 concerning loanwords. Phonetically, Nkami's /a/ is produced and sounds similar to [-ATR] vowels than to [+ATR] vowels in the language. Thus, it is produced with a relatively retracted tongue root and/or narrowing of the pharyngeal cavity, rather than advancement of the tongue root and/or enlargement of the pharyngeal space. Secondly, whenever /a/ appears to be the only or initial vowel in a stem, it selects a [-ATR] prefix, as exemplified in (18).

(18)	<b>ɔ-ma</b>	'back'	<b>ɔ-kpa</b>	'road'
	<b>ɔ-sa</b>	'lightness'	<b>ɔ-ba</b>	'child'
	<b>ɛ-ɲa</b>	'this (inanimate)'	<b>ɔ-ɲa</b>	'this (animate)'
	<b>ɔ-kwa</b>	'hardness'	<b>ɔ-ya</b>	'sharpness'
	<b>ɔ-ka</b>	'wife'	<b>ɔ-dano</b>	'tongue'

Thus, as we saw in section 3.1.2, vowels of prefixes in Nkami agree with the [ATR] value of stems they attach to such that [-ATR] stems co-occurs with [-ATR] prefixes while [+ATR] stems select [+ATR] prefixes. Since /a/ co-occurs with [-ATR] and [+ATR] vowels in (16) and (17) respectively, one would have expected that some of the prefixes attached to the stems in (18) would have been [-ATR] and others [+ATR]. However, this is not done as the prefixes consistently surface as [-ATR]. Identical behaviour shows up in nominalization and verbal prefixes, as (19) and (20) illustrate respectively.

(19)	Nominalization prefixes			
	Verb	Gloss		Noun
	<b>kpladzɪ</b>	'vomit'		<b>ɛkpladzɪ</b>
	<b>laadzɪ</b>	'sweep'		<b>ɛlaadzɪ</b>
	<b>tʃa</b>	'dance	→	<b>ɛtʃa</b>
	<b>klaga</b>	'greet'		<b>ɛklaga</b>
	<b>nani</b>	'walk'		<b>ɛnani</b>
				Gloss
				'vomit/vomiting'
				'sweeping'
				'dance/dancing'
				'greeting'
				'walking'

(20) Verbal Prefixes

a.	<b>ɔ-ba</b>	<b>mɪ inie</b>	b.	<b>ɛ-le-ta</b>
	3SG-come.PST here	yesterday		3SG.INANM-PERF-finish
	'He came here yesterday.'			'It has/is finished.'

The fact that stems that contain /a/ as the only or initial vowel in stems select [-ATR] prefixes is certainly not a mere coincidence. This is particularly so since the phenomenon is not only overwhelming, but also consistent and predictable. The predictability of the phenomenon gives credence to our thesis that /a/ is inherently [-ATR], but not [+ATR].<sup>8</sup>

Having established the [ATR] status of /a/, the obvious question to ask next is whether /a/ is opaque or transparent in Nkami. But before we turn to that, we address an instance in the language in which the position that *only-a-containing stems* consistently pattern with [-ATR] prefixes may appear to be flawed at first glance.

### 3.2.1 Consonantal influence versus ATR harmony

Though we have shown in the preceding section that *only-a-containing stems* consistently pattern with [-ATR] prefixes, there is an instance whereby certain mono-syllabic stems containing /a/ consistently pattern with [+ATR] prefixes, but not [-ATR] prefixes. Consider (21) below.

(21)	<i>Only-a-containing stems</i> versus [+ATR] nominal prefixes	
	<b>o-dʒa</b>	(*ɔ-dʒa) 'hotness/warmth'

<sup>8</sup> Note that the consistent selection of [-ATR] prefixes by stems containing /a/ as the only or initial vowel in stems is not restricted to Nkami as it occurs in all other Guang languages described (cf. Casali 2002).

**e-dʒa** (\*ε-dʒa) ‘blood’

Thus, though the nominal stems in (21) contain /a/, they pattern with [+ATR] prefixes **o-** and **e-**, instead of [-ATR] prefixes **ɔ-** and **ε-**, in contrast to the *only-a-containing stems* consistently pattern with [-ATR] prefixes hypothesis. This inconsistency is also found in verbal stems as well as in prefixes, as shown in (22).

(22) *Only-a-containing stems* versus [+ATR] verbal prefixes

- a. **o-be-ɲa** (\*ɔ-be-ɲa).  
3SG-FUT-get  
‘She/he will get (it).’
- b. **mi-ye-dʒasɔ** mi ɔsika (\*miyedʒasɔ).  
1SG-DDP-collect 1SG.POSS cutlass  
‘I am going to (forcefully) collect my cutlass.’

Clearly, this phenomenon poses a challenge to our assertion that the low vowel /a/ is inherently [-ATR] but not [+ATR]. A closer observation, however, shows that in all instances where *only-a-containing stems* consistently pattern with [+ATR] prefixes, as exemplified in (21-22), the initial consonants in the *only-a-containing stem* is a voiced palatal consonant. When these two conditions are not satisfied, then the prefixing vowels are [-ATR]. This phenomenon is also documented in Dolphyne (1988) about Akan. In (23), for instance, even though the initial consonant of the stem is a voiced palatal, it is a [-ATR] vowel prefix that is realized instead of the [+ATR] vowel prefix because the second condition required for the latter to occur namely, the occurrence of the vowel /a/ is not satisfied.

- (23)a. **ɔ-be -dʒɪdʒɪ** mɔ (\*obedʒɪdʒɪ).  
3SG-FUT-provoke 3SG.OBJ  
‘He will provoke/deceive him.’
- b. **mi-ε-dʒɪ** yɔ bã (\*miedʒɪ).  
1SG-PROG-fence self fence  
‘I am fencing it.’

Observe also that even though the data in (23) show stems with the /a/ vowel plus a palatal consonant, the prefix vowels are not [+ATR] because these palatal consonants are voiceless.

- (24)a. **mi-ε-tʃã** wɔ (\*mietʃã)  
1SG-PRF-miss 2SGOBJ  
‘I have missed you.’
- b. **mi-yε-tʃa** (\*miyetʃa)  
1SG-DDP-dance  
‘I am going to dance.’

The point here is that neither the voiced palatal consonant /dʒ/ nor the low vowel /a/ is solely responsible for triggering [+ATR] harmony to the prefixes in (21-22). For such prefixes to be [+ATR], the initial syllable of the triggering stem should consist of a ‘voiced palatal consonant followed immediately by /a/’, henceforth **C<sup>1</sup>a**. What then is so peculiar about **C<sup>1</sup>a** syllables for them to trigger [+ATR] harmony? Interestingly, Nkami is not the only language known to exhibit this phenomenon though it is generally rare among ATR languages. As noted earlier, Akan (Dolphyne, 1988) and Nkonya exhibit similar phenomenon, as exemplified in (25a) and (25b) respectively.

- (25) a. Akan (Dolphyne 1988: 20)  
**ɔ-ɲamɪ** [ɔɲamɪ] ‘God’  
**ɔ-be-dʒarɪ** [obedʒarɪ] ‘He came and left it.’  
**ɔ-be-dwanɪ** [obedwanɪ] ‘He will run away.’
- b. Nkonya (Peacock 2007: 24)  
**ð-dʒá** [ðdʒá] ‘firewood’  
**ð-tɛ-ɲá** [ðtɛɲá] ‘He habitually gets.’

ò-tè-dzà? [òtèdzà?] ‘He habitually chases.’

Thus, Nkami has identical behaviour with Akan and Nkonya with regard to the patterning of [+ATR] prefixes with **C**a syllables. For lack of historical data, it is generally difficult to provide adequate explanation as to why **C**a syllables trigger [+ATR] harmony to prefixes. However, following Stewart’s (1966) report on Akan that some linguistic forms that are synchronically realized **gya** [dʒa] are written as **gia** in Koelle’s Polyglotta Africana (which has a list of Akan words recorded in the 19<sup>th</sup> century), it is generally assumed that /a/ was previously preceded by [+ATR] vowel(s) in the **C**a syllables (cf. Dophyne 1988). If this assumption is right, then it can be argued that there is a floating [+ATR] vowel/feature lingering around before /a/ in **C**a syllables that triggers [+ATR] harmony. If this proposition is accepted, then our position that /a/ is [-ATR] because it only selects [-ATR] vowel prefixes remains valid.

### 3.2.3 Is /a/ opaque or transparent in Nkonya?

The discussion thus far makes it quite obvious that the low vowel /a/ in Nkami is opaque rather than transparent. In different words, /a/ does not only fail to assimilate to the [+ATR] value, but it also blocks [+ATR] spread to preceding [-ATR] vowels. For instance, though the [+ATR] feature spreads from verbal stems to preceding prefixes (future **bɛ-** and subject pronouns **bɛ-** ‘they’ and **ani-** ‘we’ in (26), it fails to do same in (27) because of the intervention of /a/ found in the future negative prefix **ma-**.

(26) [+ATR] spreading

- |                          |                                   |
|--------------------------|-----------------------------------|
| a. <b>be-be-tʃu</b> mɔ.  | b. <b>ani-be-dʒi</b> odʒodʒi.     |
| 3PL-FUT-lift 3OBJ        | 3PL FUT.-eat yam-eating           |
| ‘They will lift her up.’ | ‘We will celebrate yam festival.’ |

(27) /a/ blocks [+ATR] spread

- |                              |                                       |
|------------------------------|---------------------------------------|
| a. <b>bɛ-ma-tʃu</b> mɔ.      | b. <b>ani-ma-dʒi</b> odʒodʒi.         |
| 3PL-FUT.NEG-lift 3OBJ        | 3PL FUT.NEG-eat yam-eating            |
| ‘They will not lift her up.’ | ‘We will not celebrate yam festival.’ |

More interesting is a type of blocking found in compounds, as exemplified in (28-29), where the initial stem **ntʃɛ** means ‘days’ and the following stems are numerals.

(28). [+ATR] spreads

- |                                |              |
|--------------------------------|--------------|
| <b>ntʃɛ + etwe</b> ⇒ [ntʃetwe] | ‘eight days’ |
| <b>ntʃɛ + edu</b> ⇒ [ntʃedu]   | ‘ten days’   |

(29) /a/ blocks [+ATR] spread

- |                                |            |             |
|--------------------------------|------------|-------------|
| <b>ntʃɛ + apno</b> ⇒ [ntʃɛno]  | (*ntʃɛno)  | ‘two days’  |
| <b>ntʃɛ + anu</b> ⇒ [ntʃɛnu]   | (*ntʃɛnu)  | ‘five days’ |
| <b>ntʃɛ + asie</b> ⇒ [ntʃɛsie] | (*ntʃɛsie) | ‘six days’  |

As we observe in (28), [+ATR] spreads regressively from the numerals to the preceding mid vowel of **ntʃɛ** ‘days’, but fails to do same in (29) even though /a/ is not realized on the surface form. For instance, although the underlying form **ntʃɛ + apno** is not realized on the surface as [\*ntʃɛapno], but [ntʃɛno], [+ATR] fails to spread from **no** to **ntʃɛ**. This may be explained with the assumption that even though /a/ is deleted on the surface its associating [-ATR] feature still floats around to stymie [+ATR] spread. Conversely, one could argue that the phonological process requiring [+ATR] spread precedes the one requiring deletion of /a/; that is, /a/ blocked the [+ATR] spread and later got deleted.

This notwithstanding, there is an instance in the language where word final /a/ appears to be realized as /e/ when it immediately precedes the front mid [+ATR] vowel /e/ in another word. Consider the examples in (30).

- |                                       |                |
|---------------------------------------|----------------|
| (30)a. asa + ba + etwe ⇒ [asabe.etwe] | ‘eight people’ |
| people + CLAS+ eight                  |                |
| b. asa + ba + edu ⇒ [asabe.edu]       | ‘ten people’   |
| people + CLAS+ ten                    |                |

Thus, the low vowel /a/ of the human classifier **ba** alternates to [e] when it

immediately precedes the front mid [+ATR] vowel /e/ of the numerals **etwe** ‘eight’ and **edu** ‘ten’ in (30). A more interesting instance is seen in (31), where the [+ATR] feature spreads through /a/ to a preceding vowel.

- (31) ATR crosses /a/ to preceding syllable  
 ntontobi ni ε-tʃitʃi ɔfɛ amɔ sɔ amɔ ɔkɔlɪ **le-waa efi** ⇒ [le wee efi]  
 things REL 3SG-hang rope DET on REL one PRF-be.in dirty  
 ‘One of the cloths hanging on the line is dirty.’ (Akuamoah TPRS 12)

Thus, not only does [+ATR] feature spreads from **efi** ‘dirty’ to the low [-ATR] vowels of **waa** ‘be.in’ to become [wee], but it also percolates to the preceding perfect marker **le-** to surface as [le-]. Do these examples show a clear case of morphophonemic [+ATR] alternation where /a/ rises to /e/, or they are simply a case of /a/ deletion followed by compensatory lengthening from the following [+ATR] front mid vowel /e/? The latter appears more appropriate, especially since similar cases in sister Guang languages have been treated likewise. Let us, for instance, consider the following data in Nkonya.

- (32) Nkonya (Peacock: 2007: 27)  
 àmbà èbíá [àmbè:bíá] ‘Amba’s stool’  
 òtá ò-nù-kpà [òtó:nù-kpà] ‘drinking spot’

Describing the phenomenon, Peacock (2007: 27) remarks that when final /a/ is deleted, “the vowel that follows it will be lengthened in compensation for the lost vowel”. However, the choice between the two possible explanations becomes more difficult when further language internal facts are brought on board. First, whereas the front mid vowels /e/ and /ɛ/ are generally deleted when they occur as nominal prefixes in speech, /a/ rarely undergoes deletion when it functions as nominal prefix; not to talk about it functioning as the nucleus of CV syllables. More crucially, positing the second proposition (thus, deletion followed by compensatory lengthening) will hinder a more natural explanatory account for some productive synchronic phonological processes of real deletion followed by compensatory lengthening in the language. Consider the examples in (33).

- (33)a. mɔ efi [muu fi] ‘his sweat’  
 mɔ ɛbia [muu bia] ‘it’s price’  
 mɔ ɛbĩã [muu bĩã] ‘his/her thighs’
- b. tɪ efiifi [tii fi] ‘sweat’  
 tu edʒa [tuu dʒa] ‘bleed’  
 sɔ edʒa [soo dʒa] ‘collect/ buy blood’  
 kɔ edʒa [koo dʒa] ‘defecate blood’
- c. ε-bɔ -ɛta [ɛbuu ta] ‘it is dirty (lit. it has dirty).’  
 ε-bɔ -ɛsi [ɛbuu si] ‘it is tall/far (lit. it has tallness).’

Thus, the general tendency in the language is for word-initial front mid vowels e-/ɛ- to be deleted followed by a lengthening of a preceding word-final vowel, as shown in (33), rather than for a word-final vowel (nucleus) to be deleted followed by a lengthening of the following word-initial vowel, as shown in (30-31). In particular, positing that the alternation of /a/ to /e/ in (30-31) is a case of /a/ deletion followed by compensatory lengthening of the following [+ATR] vowel /e/ will disallow a more uniformed explanation for the widespread and consistent processes (i.e., deletion followed by compensatory lengthening), as exemplified in (33). Our position, therefore, is that the data in (30-31) show a case of morphophonemic [+ATR] alternation where /a/ rises to /e/. Thus, since Nkomi does not have a [+ATR] allophonic variant of /a/, it assimilates to the next [+ATR] height vowel /e/ in its inventory. Though this position may go contrary to the treatment of similar data in other Guang languages, it is not aberrant to observations in the literature on ATR

harmony systems. There are several languages that show evidence of cases where /a/ alternates with /e/. For instance, Casali (2008) mentions that Avatime: Kwa (Maddieson 1995) and Sisaale-Pasale: Gur (Toupin 1995) as two Ghanaian nine-vowel languages known to exhibit alternation of /a/ with /e/. Dorvlo (2007) also reports of a similar case in Logba, a Kwa Ghana-Togo Mountain Language. If our position is accepted, then besides Obeng's (2008) work on Efutu, Nkami would probably be the only other Guang language described, which shows alternation of /a/ with /e/, at least, in some limited domains; specifically, when it appears at word-final position before a word-initial [+ATR] front mid-vowel.

### 3.3 [+ATR] Dominance and regressive assimilation in Nkami

The purpose of this section is two-fold, to demonstrate that: (i) [+ATR] is the dominant feature; and (ii) [+ATR] assimilation is predominantly regressive in Nkami. Determining the dominant ATR feature in Nkami is crucial since unlike other vowel assimilatory processes such as labial and nasal harmonies where a particular feature is active or specified (e.g. [+labial] and [+nasal]) and the other unspecified, or where one feature spreads to another but not vice versa, ATR assimilation is found to be different. Thus, although a [+ATR] feature is generally known to be the dominant feature in majority of ATR harmonic languages studied (cf. Van der Hulst and Van de Weijer 1995, Casali 2002, 2003, 2008, 2012), there are also attested cases in several languages where [-ATR] is the dominant feature. In (34) are examples from Alur (Kutsch Lojenga 1986) showing [+ATR] dominance, while (35) exemplifies [-ATR] dominance in Mbosi Oléé (Leitch 1996 in Casali 2003: 19, 23; and in Akan toponyms (See Obeng, 2000).

(34) [+ATR] dominance in Alur

còng - wú	→	[còng wú]
knee - your		'your knee'
léb - wú	→	[léb wú]
tongue-your		'your tongue'

(35) [-ATR] dominance in Mbosi Oléé

mbósi yà nò à dè	→	[mbó̀sà̀nà̀dè]
goat of you he which		
'Which (one) is your goat?'		

In (34) the [+ATR] dominant suffix **wu** 'your (pl)' assimilates the [-ATR] vowels in the preceding stems, while in (35) the [-ATR] morpheme **ya** spreads across word boundary to the [+ATR] vowel in the preceding stem **mbo** 'goat'. The phenomenon is even more interesting in languages like Akan where both features, [+ATR] and [-ATR], have been analysed by some linguists (cf. Clement 1981, Bakovic 2001) to be both active.<sup>9</sup> Languages that have been analysed as [+ATR] dominant include Nawuri (Casali 2002), Buli (Akanlig-Pare 2002), Logba (Dorvlo 2008), and Nkonya (Asante 2009).

Similarly, whereas languages that show evidence of regressive (right-to-left) [ATR] assimilation are in the majority, there are also some languages that show progressive (left-to-right) harmony, e.g., Bolia (Leitch 1996) and Tangale (Bakovic 2003). Moreover, there are also other languages that have been analysed as exhibiting bidirectional assimilation, e.g. Akan (Clement 1981, Bakovic 2001), Buli (Akanlig-Pare 1994, 2002) and Nkengo (Leitch 1996). Like other Kwa sub-Saharan languages, but unlike Nilo-Saharan languages, Nkami shows no evidence of typical cases of dominant [+ATR] suffixes. Evidence for [+ATR] dominance is therefore taken from the behaviour of harmony across word boundaries, in compounds and possessive constructions.

#### 3.3.1 [+ATR] regressive spreading across word boundaries

<sup>9</sup> See Casali (2012) though for a detailed discussion on why [+ATR] is the dominant feature in Akan.



atɔ-tʃie	thing-give	[atɔtʃie]	‘giving’
ɔnɔ-ntʃu	mouth-water	[ɔnɔntʃu]	‘saliva’

Thus, [+ATR] spreads regressively from the [+ATR] vowels in the stems to the left. Remember, however, that /a/ fails to assimilate to [+ATR] because it is neutral in Nkami. In (40) are further examples from a productive compounding process in the language.

(40) Leftward [+ATR] spread from (o)bi<sup>10</sup> ‘child/small’

mmɔi-obi	animal-child	→	[mmuiɓi]	‘maggots/worms’
ɔfɛ-obi	beauty-child		[ɔfeɓi]	‘beautiful lady’
tɪɪ-obi	goat-child		[tɪɪɓi]	‘young goat’
ɔɔ-obi	pot-child		[ɔɔɓi]	‘small pot’
ɛdalɔ-obi	metal-child		[nnalɔɓi]	‘nails’
twɪɛ-obi	grind-small		[twieɓi]	‘lower grinding stone’
ɔɔɔ-obi	neck-small		[ɔɔɔɓi]	‘throat’

Thus, [+ATR] spreads from the productive morpheme (o)bi ‘child/small’ to [-ATR] vowels in the preceding stems. Moreover, further evidence for considering [+ATR] as the dominant value capable of spreading in Nkami is observed in what appears to be the only identified progressive [+ATR] assimilation in the language, as shown in (41a).

(41)a. Progressive [+ATR] spread from the locative morpheme (ɛ)ɔ ‘inside/containing region’.

obu-ɔ	building-inside	[obulo]	‘room’
ntʃu-ɔ	water-inside	[ntʃulo]	‘a source of water’
eɲu-ɔ	head-inside	[ɲulo]	‘inside the head’

Thus, though the data we have presented so far, i.e., prior to (41a), suggest that [+ATR] assimilation is regressive in Nkami, these data in (41a) suggest that progressive [+ATR] assimilation is also possible in Nkami. The locative morpheme (ɛ)ɔ is always realized as [ɔ] in the three concepts expressed in (41a). This therefore provides a boost to our hypothesis that [+ATR] is the dominant feature in Nkami.

The fact that regressive [+ATR] is preferred to progressive [+ATR] assimilation gathers a more boost when more data involving (ɛ)ɔ are brought to the fore. Consider the following:

(41)b. [+ATR] fails to spread rightward to the locative morpheme (ɛ)ɔ

kuro-ɔ	town-inside	[*kuroɔ]	‘city centre’
aye-ɔ	sore-inside	[*ayelo]	‘inside of sore’
osĩ-ɔ	waist-inside	[*osĩlo]	‘within the waist’
sukuu-ɔ	school-inside	[*sukuulo]	‘school compound’
otʃebi-ɔ	cloth-inside	[*otʃebilo]	‘within a cloth’
abū-ɔ	fight-inside	[*abū ɔ]	‘in the midst of a brawl’
odin-efū-ɔ	heart-fright-inside	[*odiifūlo]	‘in anger’
eweɪ-ɔ	house-inside	[*eweɪlo]	‘inside of a house’
apɛsɪ-dʒi-ɔ	eye-eat-inside	[apɛsɪdʒiɔ]	[*apɛsɪdʒilo] ‘in happiness’

Thus, unlike the three examples in (41a), the [-ATR] vowel of the locative morpheme ɔ consistently fails to assimilate to [+ATR] in (41b) when it follows [+ATR] stems. Looking at the persistency with which ɔ fails to assimilate to [+ATR] in (41b), it is reasonable to say that the three examples in (41a) are exceptions/idiosyncratic to the consistent productive process of regressive [+ATR] assimilation in the language. Thus, we may not be far from right if we assumed that the examples in (41a) show a clear case of lexicalization where the roots/stems and the locative morpheme ɔ behave as one complex stem. However, harmony fails to occur in (41b) because ɔ functions as productive suffix/enclitic which does not form complex stem with the adjacent

<sup>10</sup> The initial vowel of **obi** ‘child/small’ gets deleted when it occurs in compounds. In fact, the description of identical morpheme in similar context (40) in other Kwa languages is not uniform; while others characterize it as a root/stem, others classify it as a diminutive suffix. What interests us here, however, is that the [+ATR] feature of **bi** persistently spreads to preceding [-ATR] vowels.



Otu **lè-dɪ**  
 NAME PRF-sleep  
 'Out has slept'

Otu **lé-di**  
 NAME PROG-sleep  
 'Out is sleeping'

As we observe in (45), even though the environments of **lɛ-** are occupied by forms that have [+round] vowels, i.e., **Otu** 'NAME' and **du** 'climb', the rounding value of the mid vowel in **lɛ-** remains unchanged as it is still realized [-round]. However, when the subject of constructions in (45) **Otu** is replaced with the third person animate subject pronoun **ɔ-**, as shown in (46), the [-round] value of **lɛ-** changes to [+round] [**ɔ-**].

(46)a. Perfect  
**ɔ-lɔ-du** oyi  
 3SG-PRF-climb tree  
 'He has climbed a tree.'

b. Progressive  
**ɔ-lɔ-dú** oyi  
 3SG-PROG-climbtree  
 'He is climbing a tree.'

**ɔ-lɔ-dɪ**  
 3SG-PRF-sleep  
 'He has slept'

**ɔ-lɔ-di**  
 3SG-PROG-sleep  
 'He is sleeping'

Thus, the [-round] value of **lɛ-** in (45) alternates to [+round] **ɔ-** in (46) because of the influence of the [+round] value of the preceding 3SG subject pronoun **ɔ-**. Thus, rounding harmony in Nkami is triggered by a pronominal feature. In addition to the 3SG pronoun **ɔ-**, only the 2SG **wu-** also triggers rounding harmony, as exemplified in (47), since all the other personal pronouns, **mi** 'I', **ani** 'we', **mini** 'you (pl)' and **be** 'they', have [-round] vowels.

(47)a. **wu-lɛ-dɪ** → [wɔ-ɔ-dɪ]  
 2SG-PRF-sleep  
 'You have slept.'

b. **wu-lé-di** → [wɔ-ɔ-di]  
 2SG-PROG-sleep  
 'You are sleeping.'

In the case of **wu-**, we also witness two other processes, /l/ deletion and /u/ lowering (see section 5), in addition to the rounding harmony. As mentioned earlier, this is the only domain where any case of consistent rounding harmony is witnessed in Nkami.<sup>12</sup>

As we noted before, Nkami defers from other Guang languages with regard to rounding harmony triggers and the direction of the rounding assimilation process. First of all, as the data in (48-49) show, rounding harmony in Nkonya and Nawuri for example, moves in a regressive direction from [+round] verb/nominal stems to prefixes, while in Nkami, it spreads progressively from pronominal forms to aspectual prefixes.

(48) Nkonya (Peacock: 2007: 25-26)

a. **ì-tè-tú** àmú → [ìtòtúàm] 'It meets them.'  
 INANM-HAB-meet them

b. **ì-bé-bò** → [ìbóbò] 'It will stink.'  
 INANM-FUT-stink

c. **ò-yè-tú?** ò-kpà? → [òyètù òkpà] 'He travelled.'  
 3SG-PRF-travel NC-path

(49) Nawuri (Casali 1995: 651)<sup>13</sup>

a. **gɪ-ba** [gɪba] 'hand'

b. **gɪ-su** [gɪsu] 'ear'

c. **gɪ-lɔ** [gɪlɔ] 'illness'

Thus, while harmony spreads from the [+round] feature of the vowels in verb stems **tú** 'meet' and **tú?** 'travel' to the preceding aspectual prefixes **tè** [tɔ] and **yè** [yɔ] in Nkonya (48), in the case of Nawuri harmony spreads from the nominal stems to the

<sup>12</sup> As a reviewer rightly observes, example (47a-b) is not truly parallel to (46a-b), since the two vowels end up adjacent to each other (after /l/ deletion and /u/ lowering). That is, it is not surprising that rounding harmony occurs in (47a-b), since a [+round round] sequence of vowels of the same height, with no consonant between them, e.g. [œ] or [œ̃], is not permitted in Nkami.

<sup>13</sup> Certain fine phonetic details have been ignored.

noun class prefix marker **gr**; that is, while **gr** is realized **gr** in (49a) because the low vowel in **ba** is [-round], it is realized **gʊ** in (49b-c) because the value of the stem vowels is [+round].

Another area where a distinction can be drawn between Nkami and other Guang languages relates to the relationship between labial consonants and rounding harmony. In other Guang languages, as again exemplified in (50-51) with data from Nkonya and Nawuri, (some) labial/labialized consonants can trigger vocalic rounding harmony. In these examples, the labial harmony trigger will not be the preceding labial consonants or the preceding rounded vowel since in Guang, the spread is regressive and not progressive.

- (50) Nkonya (Peacock: 25-26)
- |                         |   |                |                        |
|-------------------------|---|----------------|------------------------|
| ɔ̀- <b>bé</b> -kʷí:     | → | [ɔ̀bókʷí:]     | ‘She will give birth.’ |
| SG -FUT -give birth     |   |                |                        |
| ɔ̀- <b>tè</b> -wá? à-tó | → | [ɔ̀tówá:tó]    | ‘He wears things.’     |
| 3SG-HAB-wear PL-thing   |   |                |                        |
| <b>nbé</b> -kʷí? ɔ̀bó   | → | [nbókʷí? ɔ̀bó] | ‘I will dig a hole.’   |
| 1SG-FUT-dig hole        |   |                |                        |
- (51) Nawuri (Casali 1995 : 651)
- |               |         |            |
|---------------|---------|------------|
| <b>gr</b> wa: | [gʊwa:] | ‘doing’    |
| <b>gr</b> wɛ  | [gʊwɛ]  | ‘sympathy’ |

Thus, although labial/labialized consonants can trigger rounding harmony in Nawuri and Nkonya, as exemplified in (50-51), this does not occur in Nkami, as the examples in (52) indicate.

- (52)a. **ani**-**lɛ**-waa odzo amu                      b. kle**bi** amu **lɛ**-kwaĩ  
 1PL-plant yam DET                                      chicken DET PROG-cackle  
 ‘We are planting yam.’                                      ‘The hen is cackling.’
- c. ɔ̀kuadzɛ **lɛ**-mɔ̀si                                      d. mi yɔ **lɛ**-**dwiri** mi  
 everyone PROG-laugh                                      1POSS self PRF-shock 1OBJ  
 ‘Everyone is laughing.’                                      ‘I have been shocked.’

Thus, **lɛ** fails to undergo rounding harmony when it collocates with verbal stems that begin with labial/labialized consonants /**w**, **kw**, **m** and **dw**/, as shown in (52).

## 5. Height harmony

Unlike ATR harmony and rounding harmony, height harmony is phonologically less predictable in the language. Thus, unlike ATR harmony for instance, where one could safely predict that a [-ATR] non-low vowel would be realized as [+ATR] whenever it occurs before a [+ATR] vowel, such a prediction cannot be made for lowering harmony. Thus, a vowel ‘A’ may be lowered to become ‘B’ in the (phonetic) environment ‘C’ in one domain (say progressive aspect), but that same vowel ‘A’ will remain ‘A’ (not become B) in the same environment ‘C’ in a different domain (say habitual aspect); so there is in fact a constraint motivated by the grammar of the language. In other cases too, though there is synchronic evidence of height harmony, one cannot establish the phonetic environment that conditions the process. What is obvious, however, are evidence of interfaces between phonology and syntax in those instances. Apart from the high vowel of the 2SG subject pronoun **wu** ‘you’ which changes to [ɔ] in the progressive/perfect situations as observed in (47), lowering also shows up in a few domains as we examine shortly.

### 5.1 Future tense conditioned high-lowering

The first domain of a lowering we look at relates to the front high vowel /**i**/ of the 1SG pronoun in the future tense. See in (53) and (54) that the underlying forms of 1SG subject pronoun and the future tense prefixes are **mì**- and **bè**- respectively.

- (53)a. **mí**-dí<sup>14</sup>    b. **mí**-dí  
 1SG-sleep.HAB    1SG-sleep.PST

<sup>14</sup> Certain fine phonetic details have been ignored.

- (54) a. wu-bɛ-dɪ 'I sleep.'  
2SG-FUT-sleep  
'You will sleep.'
- b. anɪ-bɛ-dɪ 'I slept.'  
2SG-FUT-sleep  
'We will sleep.'

However, in the future tense the high vowel /ɪ/ of **mɪ** 'I' surfaces as a mid vowel [ɛ], as shown in (55).

- (55) a. mɛ-ɛ-dɪ (\*mɪ-bɛ-dɪ) 'I will sleep.'  
1SG-FUT-sleep
- b. mɛ-ɛ-dɔ (\*mɪ-bɛ-dɔ) 'I will farm.'  
1SG-FUT-farm

In this syntactic construction the future tense morpheme **bɛ** causes /ɪ/ to /ɛ/ lowering, a case of phonology-morphology interface. In (56) is a derivation explaining the processes involved.

- (56) mɪ-bɛ-dɪ ⇒ mɛɛdɪ  
mɛɛdɪ (1) **b** deletion  
mɛɛdɪ (2) /ɪ/ lowering harmony to [ɛ]  
mɛɛdɪ Output

One may assume that /ɪ/ lowers to [ɛ] because of a possible constraint in the language that prohibits the sequence of unround front high /ɪ/ and the mid /ɛ/ vowels. This, however, is not tenable because there are several cases of /ɪ/ and /ɛ/ sequence in the language, as example (57) illustrates in the progressive and perfect situations.

- (57) a. mɪ-ɛ-dɪ 'I have slept.'  
1SG-PERF-sleep
- b. mɪ-ɛ-dɪ 'I am sleeping.'  
1SG-PROG-sleep

We opine, rather, that a plausible explanation for the lowering of /ɪ/ in the future is for the avoidance of a possible ambiguity between the future (e.g., 55a) and perfect (e.g., 57a) situations. Thus, because both the future **bɛ-** and perfect **lɛ-** tense-aspects associate with low tone, the deletion of their initial consonants /b/ and /l/, would have resulted in the same form [mɛɛdɪ]. Therefore, to avoid the situation where both situations would be pronounced as [mɛɛdɪ], Nkami speakers lower /ɪ/ of **mɪ** 'I' to /ɛ/ in the future (55) while leaving that of the perfect (57a) intact.

Another case of idiosyncratic lowering relates to the third person plural subject pronoun in the progressive and habitual. Consider the 3PL subject pronoun in relation to other personal pronouns in the progressive in (58); where **dɪ** is 'sleep', **lɛ-** is the progressive marker and the initial forms are the pronouns.

- (58) a. mɪ-lɛ-dɪ → [mɪɛdɪ] 'I am sleeping.'  
b. wu-lɛ-dɪ → [wɔɔdɪ] 'You are sleeping.'  
c. ɔ-lɛ-dɪ → [ɔlɔdɪ]<sup>15</sup> 'S/he is sleeping.'  
d. anɪ-lɛ-dɪ 'We are sleeping.'  
e. mɪnɪ-lɛ-dɪ 'You are sleeping.'  
f. bɛ-lɛ-dɪ → [bàádɪ] 'They are sleeping.'

As we observe above in (58), the progressive is marked by **lɛ-** which may be realized as [lɛ, ló, lɔ] depending on the ATR and rounding values of surrounding vowels. However, as (58f) shows, the mid vowels of the 3PL subject pronoun **bɛ-** 'they' and the following progressive prefix **lɛ-** are both synchronically realized as low [a], although there is no triggering low vowel in the environment. Observe, however, that both syllables maintain their tonal values even after lowering, i.e. /bɛlɛdɪ/ → [bàádɪ]. A similar phenomenon also happens in the habitual.

- (59) a. mɪdɪ 'I sleep.'  
b. wudɪ 'You sleep.'  
c. ɔdɪ → [ɔɔdɪ] 'S/he sleeps.'  
d. anɪdɪ 'We sleep.'  
e. mɪnɪdɪ 'You (pl) sleep.'  
f. bɛ-dɪ → [bàádɪ] 'They sleep.'

Unlike the progressive, the habitual has no segmental manifestation. However, like

<sup>15</sup> Note that in Nkami syllables in a grammatical/phonological word, consisting of a subject pronoun and a verb stem, generally associate with high tones when a sentence is said in the habitual.

the progressive, there is a synchronic lowering and lengthening of the mid vowel in the 3PL pronoun (i.e. /**bɛdɪ**/ → [**bààdɪ**]), although there is no appropriate conditioning environment.

## 5.2 Negation conditioned Pronoun-vowel Lowering

This section looks at a case where lowering in the language is sanctioned by a conditioning environment. Two main domains, the habitual and future negative, are observed. The future and habitual negatives are expressed by the same segmental form **ma**, but with a tonal difference. The former associates with a low-tone and the latter, a high-tone, as illustrated in (60).

- (60) a. Kofi **mà** yiri mɔ  
 NAME NEG.FUT stand there  
 ‘Kofi will nt stand there.’  
 b. Kofi **má** yiri mɔ  
 NAME NEG.HAB stand there  
 ‘Kofi does not stand there.’

With the exception of the 1PL and 2PL, all the other personal pronouns undergo lowering change whenever they occur before the negative morpheme **ma-** in both the habitual and future situations. Example (61) contains the full set of the subject personal pronouns in both the future and habitual negatives, where **yiri** is ‘stand’.

- (61) Future Negative  
 a. **mɪ**-ma-yiri → [**maayiri**]<sup>16</sup> ‘I will not/ don’t stand.’  
 b. **wɔ**-ma-yiri → [**waayiri**] ‘You will not/ don’t stand.’  
 c. **ɔ**-ma-yiri → [**amayiri**] ‘S/he will not/ doesn’t stand.’  
 d. **ani**-ma-yiri ‘We will not/don’t stand.’  
 e. **mini**-ma-yiri ‘You will not/don’t stand.’  
 f. **bɛ**-ma-yiri → [**bamayiri/mamayiri**] ‘They will not/don’t stand.’

Thus, the non-low vowels in the singular **mɪ-**, **wɔ-**, **ɔ-** (61a-c) and 3PL **bɛ-** (61f) subject pronouns have synchronically been lowered/shortened to [a] because of the [+low] feature of the low vowel of the following negative prefix **ma-**. The reason(s) why the 1PL **ani-** ‘we’ and 2PL **mini-** ‘you’ pronouns fail to undergo the lowering process is not very clear, though it looks quite likely that they fail to change because they are disyllabic while the assimilating pronouns are all monosyllabic. Frequency of occurrence may also be a factor for the deviation; thus, it appears that Nkami speakers use the assimilating pronouns more frequently than the non-assimilating ones.

## 6. Conclusion

This paper has discussed vowel harmony<sup>16</sup> in Nkami, an endangered undocumented Guang (Niger-Congo, Kwa) language of Ghana, drawing from a large corpus of natural data. Like most Kwa languages, Nkami has nine phonemic vowels with robust and pervasive ATR harmony. Besides ATR harmony, it also shows evidence of rounding and height harmonies though the latter are restricted and epiphenomenal to ATR harmony, just as Aoki (1968) observes cross-linguistically. Typical of most nine-vowel ATR languages, Nkami displays evidence of [+ATR] dominance and the direction of [+ATR] assimilation is predominantly regressive. Aside from morpheme internal ATR harmony, ATR harmony shows up in stems and prefixes, loanwords, pronominal possessions, compounds and across word boundaries. Though, the low vowel /a/ is neutral, with no noticeable [+ATR] phonetic variant and is predictably opaque to [+ATR] spread, there is an instance in the language where it appears to alternate with the front mid vowel /e/. Both height and rounding harmonies show up in the contexts of pronouns and verbal prefixes. However, while the direction of assimilation of the former is regressive (i.e., from verbal prefixes to pronouns), that of the latter is progressive (i.e., from pronouns to verbal prefixes). Thus, Nkami differs from other Guang languages in the sense that whereas it exhibits evidence of left-to-right rounding assimilation that is prefix-controlled, other Guang languages exhibit evidence of left-to-right root-controlled rounding harmony. Lastly, and more crucially, whereas in many Guang languages the trigger of rounding harmony can be a labial/labialized consonant, labial/labialized consonants do not trigger rounding

<sup>16</sup> Hansford (p.c.) tells us that the lowering/shortening in (61a) is attested in Chumburung, but not for (61b, c and f).

harmony in Nkami.

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