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VOWEL HARMONY IN IGEDE*

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Igede is a language that operates a nine vowel system. It displays harmony system constraint by pharyngeal constriction. Vowels fall into two harmonic sets of [+ATR] and [-ATR] with no overlap. Where we have disharmonic morphemes, our analysis shows that the harmony constraint remains unviolated.

0. Introduction

Ever since Clements [1976a] proposed the analysis of vowel harmony within the autosegmental theory, there have been a number of scholarly articles on different languages that offered analysis within the framework—Clements [1981, 1984] on Akan, Chumbow [1982] on Ogori, Van der Hulst [1985] on Hungarian among others. The basic tenet of a theory will continue to be subjected to test, as its validity depends largely on "empirical evidence involving the extent to which the theory accounts for a wider range of data than the initial set of data on which it was based " [Chumbow 1982:62-63]. Our effort in this paper is to show how much the autosegmental theory accounts for a set of facts relating to the harmony constraint in Igede, an Idomoid language of the Benue-Congo family.[1]

In §1 of our paper we present the vowels of Igede, in §2 we present the facts of vowel harmony, and in §3 we account for these facts.

* This paper has benefited from comments made at the Departmental Seminar of the Department of Linguistics and Nigerian Languages, University of Ilọrin. Whatever error remains in the article, however, is in spite of the comments.

[1]Igede is spoken in the Oju Local Government Area of Benue State in Nigeria.

1. Igede Vowel System

Igede has nine phonetic oral and seven phonetic nasal vowels. There is no marked difference in the behaviour of the oral and the nasal vowels in relation to the harmony constraint. The vowels are shown in (1) below:[2]

(1)

i	*ĩ*		*ũ*	*u*
ɪ̣	*ɪ̃*		*ʊ̃*	*ʊ̣*
e				*o*
ɛ̣	*ɛ̃*		*ɔ̃*	*ɔ̣*
		a *ã*		

Clements' [1974:281] claim in relation to vowel harmony in African languages is true of Igede. He notes "the role of tongue root advancing in the so-called 'horizontal' vowel harmony systems found widely in African and elsewhere." He goes further to say that

> In such systems, vowels are classified into two sets (with possible overlap) such that only members of a single set may co-occur within the domain of harmony; the primary phonetic characteristic distinguishing the two sets...is the position of the tongue root.

We distinguish the [+ATR] and the [-ATR] in (2) below:

(2)

[+ATR]				[-ATR]			
i	*ĩ*	*ũ*	*u*	*ɪ̣*	*ɪ̃*	*ʊ̃*	*ʊ̣*
e			*o*	*ɛ̣*	*ɛ̃*	*ɔ̃*	*ɔ̣*
					a *ã*		

[2]The following symbols are used: *ɪ̣* = lower high front unrounded vowel, *ʊ̣* = lower high back rounded vowel, *ɛ̣* = lower mid front unrounded vowel, *ɔ̣* = lower mid back rounded vowel, *ạ* = lower mid central unrounded vowel (schwa), *dž* = voiced alveopalatal affricate, *tš* = voiceless alveopalatal affricate. The symbol *ạ*, with a dot, represents the schwa [ə], which does not occur at the surface level and therefore does not appear in (1) and (2).

We present in the table below the feature matrices of the vowels:

	i	*u*	*i̱*	*u̱*	*e*	*o*	*ẹ*	*ọ*	*a*	*ĩ*	*ũ*	*ɪ̃*	*ʊ̃*	*ɛ̃*	*ɔ̃*	*ã*
Syllabic	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
High	+	+	+	+	-	-	-	-	-	+	+	+	+	-	-	-
Back	-	+	-	+	-	+	-	+	+	-	+	-	+	-	+	+
Low	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+
ATR	+	+	-	-	+	+	-	-	-	+	+	-	-	-	-	-
Nasal	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+

2. Evidence for Harmony

As a mark of the harmony constraint the [+ATR] vowels on the one hand and the [-ATR] ones on the other do not normally co-occur with each other within a phonological word. In the subsections below we present data to reflect both root and prefix harmony constraints.

2.1. Root Harmony. Within a root there is harmony constraint to the effect that [+ATR] and [-ATR] vowels do not occur together. Words illustrating this constraint are seen in (3):

(3)

[-ATR] roots		[+ATR] roots	
i̱tšá	'arrow'	*ĩdẽ*	'saliva'
i̱tẹ̃	'pepper'	*ígo*	'calabash'
i̱dž^{w}ọ̃	'stones'	*mĩle*	'to swallow'
ú̱tẹ	'root'	*ókùɲĩ̃*	'nose'
ú̱vọ́hí̱	'cat'	*òp^{j}èkpō*	'kite'
ọba	'mat'	*róné*	'to run'
kọ́nɪ̃́dzí̱	'to vomit'	*egbedžu*	'head'
ẹ̃ɟi̱rɪ̃̄	'teeth'	*ẽnɪ̃̄*	'water'
ẹmã̃	'salt'	*edže*	'song'
džẹ̀rụ	'to walk'	*égbòdù*	'okro'
mọ̃̀ọ̃̀nẹ̃̀	'to taste'	*ùbè*	'room'
àgbū	'ashes'	*úgbōdžī*	'orange'
ádi̱dà	'father'	*ūdō*	'basket'
falẹ	'to refuse'		

2.2. Prefix harmony. Igede has prefixes but no suffixes or infixes. The vowels of the prefixes harmonise with the [ATR] feature of the vowel(s) of the root morpheme. We discuss and illustrate the prefixes in §§2.2.1-5 below.

2.2.1. Genitive marker *ọlị/oli*

(4) a. [-ATR] roots

ẹmã̄	'salt'	*ọlẹmã̄*	'owner of salt'
ẹ́rū	'farm'	*ọ́lẹ́rū*	'owner of farm'
úvọ́hị́	'cat'	*ọ́lúvọ́hị́*	'owner of cat'
ụtẹ	'root'	*ọlụtẹ*	'owner of root'
ọ̀dẓ̌i	'mortar'	*ọ̀lọ̀dẓ̌i*	'owner of mortar'
ọba	'mat'	*ọlọba*	'owner of mat'
ịtẹ̄	'pepper'	*ọlịtẹ̄*	'owner of pepper'
ịtšá	'arrow'	*ọlịtsá*	'owner of arrow'
àgbṵ́	'ashes'	*ọ̀làgbṵ́*	'owner of ashes'

b. [+ATR] roots

ēnī̄	'water'	*ōlēnī̄*	'owner of water'
edže	'song'	*oledže*	'owner of song (singer)'
īdžū	'yam'	*olīdžū*	'owner of yam'
ígo	'calabash'	*ólígo*	'owner of calabash'
ówú	'cotton'	*ólówú*	'owner of cotton'
ògbì	'guinea corn'	*òlògbì*	'owner of guinea corn'
ùbè	'room'	*òlùbè*	'owner of room'
úgbōdžī	'orange'	*ólúgbōdžī*	'owner of orange'

2.2.2. Verbal nouns. The derivation here involves the reduplication of the initial syllable of the root verb and the prefixation of the nominalising prefix *ọ/o*:

(5) a. [-ATR] roots

rụ̀	'to come'	*ọ̀rụ̀rụ̀*	'coming'
dẓ̌ẹ́	'to know'	*ọ́dẓ̌ẹ́dzẹ́*	'knowing'
rọ	'to buy'	*ọrọrọ*	'buying'
dị́	'to beat'	*ọ́dị́dị́*	'beating'
wà	'to count'	*ọ̀wàwà*	'counting'
dẓ̌ẹrụ	'to walk'	*ọdẓ̌ẹdẓ̌ẹrụ*	'walking'

b. [+ATR] roots

gbú	'to die'	*ógbúgbú*	'dying'
hò	'to fly'	*òhòhò*	'flying'
je	'to get'	*ojeje*	'getting'

bi	'to loose'	*obibi*	'loosing'
róné	'to run'	*óróróné*	'running'

2.2.3. Plural prefixes. Plurality is effected in Igede by substituting the singular noun prefix with an appropriate vowel. The substitution is constrained by the harmony system:[3]

(6)

a. [-ATR] roots

Singular	Plural	
ụ́-rụ̄	*á-rụ̄*	'ear'
ụ̄-lẹ̄	*ā-lẹ̄*	'hoe'
ọ̄-ɲụ̀rẹ̀	*ì-ɲụ̀rẹ̀*	'stone'
ẹ-ba	*ị-ba*	'mat'
ẹ́-rụ̄	*á-rụ̄*	'farm'
ẹ́-tā	*á-tā*	'leg'

b. [+ATR] roots

ū-dō	*ē-dō*	'basket'
ù-bè	*è-bè*	'room'
ō-lōhī	*ī-lōhī*	'thief'
ō-b^{w}ē	*ī-b^{w}ē*	'door'

2.2.4. Concord prefixes. Igede operates a concord system whereby each noun modifier in a grammatical construction takes a concord prefix. The verb in a verb phrase also takes a concord prefix. The concord prefixes are *ọ/o* for singular nouns, and *ị/i* for plural nouns (see Abiodun [1989]).

(7) a. Noun modifier concord

i.	*ūdō*	*ọ̀tụ́kà*	*òjéńwé*	*òkpókpó*	'one new big basket'
	basket	big	new	one	
ii.	*ēdō*	*ì̀tụ́kà*	*ì̀jéńwé*	*ímíjé*	'two new big baskets'
	baskets	big	new	two	
iii.	*ógo*	*ọ̀tụ́kà*	*òjéńwé*	*òkpókpó*	'one new big calabash'
	calabash	big	new	one	

[3]There is also the cross height constraint, but this has been fully discussed in Abiodun [1989].

iv.	*ígo*	*ìtṵ́kà*	*ìjéńwé*	*ítā*	'three new big calabashes'
	calabashes	big	new	three	
v.	*ọba*	*ọ̀tṵ́kà*	*òjéńwé*	*òkpókpó*	'one new big mat'
	mat	big	new	one	
vi.	*ìba*	*ìtṵ́kà*	*ìjéńwé*	*ìrụ*	'five new big mats'
	mats	big	new	five	

b. Verbal concord

i.	*obú*	*ògbú*			'the dog died'
	dog	die			
ii.	*ibú*	*ìgbú*			'the dogs died'
	dogs	die			
iii.	*obú*	*ọ̀hụ*	*ìtẹ̄*		'the dog scattered (the) pepper'
	dog	scatter	pepper		
iv.	*ibú*	*ìhụ*	*ìtẹ̄*		'the dogs scattered (the) pepper'
	dogs	scatter	pepper		

2.2.5. Subject Pronouns. The subject pronouns (except the first person singular) provide evidence for harmony. The pronouns exhibit allomorphic variation, and the form of the pronoun in a grammatical construction depends on the vowel(s) of the verb that follows the pronoun. The subject pronouns are shown in (8) below:

(8)

	Singular	Plural
1st person	*m*	*āhí/āhị́*
2nd person	*ō/ọ̄*	*ānṹ́/ānụ́*
3rd person	*ó/á*	*i/ị*

Note that [*ahí*] and [*anṹ*] are disharmonic, and note further that we have *o/a* alternation in the 3rd person singular. We shall have more to say on these in §2.3 below. In the meantime we present data to show the harmonic nature of the pronouns and the verbs.

(9) a. [-ATR] verbal roots

ọ̄	*hú*	*áfù*	'you washed cloth'
ọ̄	*ŋʷà*	*ēnī̄*	'you drank water'
a	*rʲi*	*īdžū*	'he ate yam'
a	*rọ*	*ílō*	'he bought a snake'
i	*rú*		'they came'
i	*kẹ*		'they went'
āhí	*gụ*	*olojí*	'we caught a thief'
anu	*họ*	*áḍìdà*	'you (pl) saw my father'

b. [+ATR] verbal roots

ō	*hò*		'you flew'
ō	*je*	*áfù*	'you got (the) cloth'
ó	*wū*	*īdžū*	'he planted yam'
ó	*mĩle*	*īdē*	'he swallowed saliva'
i	*tú*	*èdži*	'they swept (the) floor'
ānű́	*wū*	*edže*	'you (pl) planted seed'
āhí	*wo*	*úgbōdžī*	'we peel orange'

2.3. Mixed vowel morphemes. Despite the harmony constraint illustrated in our data above, we still have a few lexical items where both [+ATR] and [-ATR] vowels mix. These items are few but we need to present them. They are:

(10)	*ùkpẹ̀dži*	'navel'
	ọtākomū	'cassava'
	ēvùnằ	'groundnut'
	úcẹ́gba	'mountain'
	ūgbẹ́mā̄	'matchet'
	āhí	'we'
	ānű́	'you (pl)'

We observe that we do not have verbs with mixed vowels. In fact, verbs in Igede are mainly monosyllabic. The few that have more than one syllable do not violate harmony constraint.

3. Accounting for Harmony

One basic assumption of the autosegmental theory is that certain features of the phonological representation are represented on independent levels parallel to the segmental level. Such features that include tone, nasality, vowel harmony, stress, etc. have autosegments that are "related to the segmental level by a set of conventions that preserve well-formedness" [Chumbow 1982:78].

There are normally two levels in the discussion of vowel harmony [Clements 1981]: the level at which the harmony autosegment [ATR] is represented and the level at which the vowels (and intervening consonants) are represented. We have these two levels in Igede, and they are associated subject to the well-formedness condition in (11) below:

(11) Well-Formedness Condition (WFC)

i. Link harmony autosegment to harmony bearing units through spreading from right to left.

ii. Association lines do not cross.

We recognize five vowels at the underlying level. These underlying vowels are not bound to the harmonic features. Their surface realizations will be determined by the association convention. The vowels are:

I
U
E
O
A

From what we have said so far in this section, we can proceed to account for the data in §2.

3.1. Regular harmony. We mean by "regular harmony" cases where [+ATR] and [-ATR] vowels do not mix within a root as contained in (3) above. They are derived as shown in (12) below:

(12) a. [-ATR] → [-ATR]
U v O h I — *ụvọhị* 'cat'

b. [-ATR] → [-ATR]
dž E r U — *džẹrụ* 'to walk'

c. [-ATR] → [-ATR]
A gb U — *agbụ* 'ashes'

d. [+ATR] → [+ATR]
E gb O d U — *egbodu* 'okra'

e. [+ATR] → [+ATR]
r O n E — *rone* 'to run'

The prefixes also harmonise with the root as illustrated in (4-8) (we disregard the case of [*ānű́*] and [*āhí*] for the meantime). The root and prefix harmony is accounted for in the same vein as in (12) above.

(13) a. [-ATR] → [-ATR]
OlI + UvOhI — *ọlị ụvọhị* 'owner of cafe'

b. [-ATR] → [-ATR]
O + tUKA — *ọtụka* 'big'

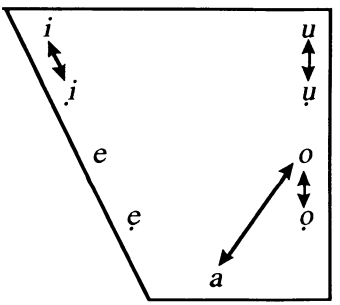
c. [+ATR] → [+ATR]
OlI + EnI — *oli eni* 'owner of water'

d. [+ATR] → [+ATR]
O + JEnwE — *ojenwe* 'new'

3.2. Mixed vowel morphemes. In §2.3 we draw attention to morphemes that mix [+ATR] and [-ATR] vowels (see (10) above). As we shall show below, the analysis of the clitics [*ānű́*] and [*āhí*] differs from that of the other items in (10).

For the clitics, we posit that the [*a*] in both cases is derived from an underlying schwa [*ạ*]. The schwa as we shall argue undergoes absolute neutralization to become [*a*]. At the surface level, the pairing of the [+ATR] and the [-ATR] vowels is assymetrical as shown in (14).

(14)



Our pairing in (14) is explained in (15).[4]

(15) *o* ~ *ọ* pairing in the Genitive marker, verbal noun and singular concord prefix

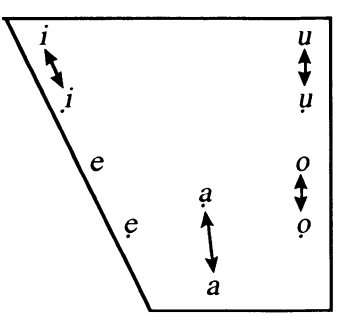
i ~ *i̱* pairing in the 1st and 3rd persons plural subject pronouns and in the plural concord prefix

u ~ *u̱* pairing in the 2nd person plural subject pronoun

o ~ *a* pairing in the 3rd person singular subject pronoun

Despite this surface assymetrical pairing however, we propose a symetrical pairing at the underlying level. This we present in (16).

(16)



[4]The vowels *e* and *ẹ* do not occur as any of the prefixal morphemes. It is logical to assume that they too are paired against each other as [+ATR] and [-ATR].

We believe that the surface realizations of *o* ~ *a* in the 3rd person singular subject pronoun and the *a*~*a* of [*āhí/āhị́*] and [*ānű́/anű́*] are derived from the same underlying source of *a*~*ạ*. The schwa becomes [*o*] in the 3rd person singular subject pronoun and [*a*] in the 1st and 2nd persons plural subject pronouns through the application of an absolute neutralization rule:

(17) $\begin{bmatrix} +\text{syll} \\ -\text{high} \\ -\text{back} \\ -\text{round} \\ -\text{ATR} \end{bmatrix} \rightarrow \left\{ \begin{array}{l} [+\text{low}] \\ \text{1st \& 2nd pl. sub. pro.} \\ \\ \begin{bmatrix} +\text{round} \\ -\text{low} \end{bmatrix} \\ \text{3rd sg. sub. pro.} \end{array} \right\}$

Following our explanation so far we believe that at the more abstract level the derivation of the 1st and 2nd persons plural subject pronouns takes the form:

(18) a. [+ATR] [-ATR] [+ATR] [+ATR]

Ahi wU ## IdzU[5] → *ạhi wu* *idžu*

b. [+ATR] [+ATR] [+ATR] [+ATR]

AnU + mIlE ## IdE → *ạnu mile* *ide*

These abstract derivations undergo the first part of our phonological rule in (17) so that /*ạ*/ becomes [*a*]. The application of the rule however triggers yet another phonological process, i.e. delinking the output of our rule from its association to the autosegmental tier. However, no segment can occur unassociated at the surface level. There is therefore a constraint that relinks the [*a*]. The constraint can be stated as:

(19) Link an unassociated vowel to an autosegment opposite in value to an adjacent autosegment.

Since *ạ* does not occur at the surface level, it undergoes rule (17) thereby becoming *a*. The output of (18) will therefore appear at the surface level as:

(20) a. [-ATR] [+ATR] [+ATR]

ahi *wu* *idžu*

[5]Vowel harmony does not operate across word boundaries. The object in this and other such constructions must have their own autosegment.

b.

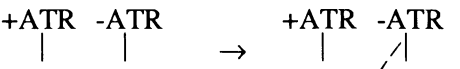
The case of the other mixed morphemes differ from the pronouns treated above. The vowels in these items (roots) are opaque because they "influence vowel harmony in that they impose their harmonic category upon other vowels" [Clements 1976b:54]. That they impose their harmonic category is clear from the genitive construction below:

(21) *ọtākomū* *ọlọtākomū* 'owner of cassava'

évùnà *ólévùnà̀* 'owner of groundnut'

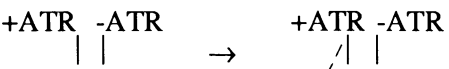
The genitive marker *oli/ọlị* is determined by the initial vowels of the root. To account for the disharmonic surface realization we posit that the high and low vowels in these roots are lexically associated. The vowels that are not lexically associated, however, link to the autosegment from right to left as constrained by the WFC. The derivation is shown in (22).

(22) a.



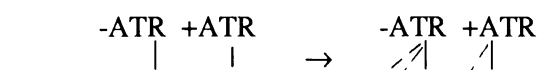
'navel'

b.



'groundnut'

c.



'owner of cassava'

By assuming that certain vowels are lexically linked we are able to account for the surface forms of these items without any cost to the grammar.

4. Conclusion

The autosegmental theory readily accounts for the facts of harmony in Igede without cost to the grammar. We do not have harmony rules and neither do we need separate and unrelated statements to account for root and affix (prefix) harmony. In all we only have a universal well-formedness condition.

REFERENCES

Abiodun, M.A. 1989. "The class system of Igede Nouns." *Journal of West African Languages* 19(2):51-56.

Chumbow, B.S. 1982. "Ogori vowel harmony: an autosegmental perspective." *Linguistic Analysis* 10(1):61-93.

Clements, G.N. 1974. "Vowel harmony in Ewe." *Studies in African Linguistics* 5:281-301.

Clements, G.N. 1976a. "Vowel harmony in non-linear generative phonology." Indiana University Linguistic Club.

Clements, G.N. 1976b. "Neutral vowels in Hungarian vowel harmony: an autosegmental interpretation." Ms.

Clements, G.N. 1981. "Akan vowel harmony: a non-linear analysis." *Harvard Studies in Phonology* 2:108-173.

Clements, G.N. 1984. "Vowel harmony in Akan: a consideration of Stewart's Word Structure Condition." Ms.

van de Hulst, Harry. 1985. "Vowel harmony in Hungarian: a comparison of segmental and autosegmental analysis." In Henry van der Hulst and N. Smith (eds.), *Advances in Non-Linear Phonology*, pp. 267-304. Dordrecht: Foris Publications.