Agbirigba: The birth of an Igboid language[1]

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1.0 Introduction

Agbirigba is a new (possibly artificial) 'lect' based on the Ogbakiri dialect of Ikwere, an Igboid language spoken in Port Harcourt. The Ogbakiri people are surrounded by Emowhua [émɔ̀hwá], Tombia [tɔ́mb�í à], Rumolumini [rúmɔ̀lúmìnì]. This artificial language was apparently born from the need to communicate secretly by a (recently) persecuted section of the Ogbakiri community. Our consultants claim that there are only about 30 speakers of Agbirigba[2], and that speakers of the main Ogbakiri dialect do not understand it.

In this paper, we discuss the phonological strategies used to derive Agbirigba from Ogbakiri. Four aspects of the formation will be discussed: (a) Consonant epenthesis, (b) vowel epenthesis, (c) Tone copying, and (d) tone mapping.

Agbirigba is phonologically interesting in several respects, including the two we discuss here. First, it appears on the surface as if there is epenthesis of a whole [CV] syllable, in specific phonological locations. We claim, following many researchers (Goldsmith 1990, Hayes 1986a,b, McCarthy 1986, McCarthy and Prince 1995, and others) that phonological processes perform one operation at a time, and affect one segment at time. Just as deletion affects one segment at a time, epenthesis inserts one segment at a time. The reasons for this are fairly straightforward. Empirically, the prosodic contexts for consonant epenthesis are in general different from the contexts for vowel epenthesis. Formally, operations like insertion and deletion do not take prosodic categories like the syllable, the foot, etc., as input (McCarthy and Prince 1995). Secondly, Agbirigba provides evidence for the position that single vowels or moraic nasals (Clements and Osu 2005) may not constitute syllables. The syllable, in Agbirigba, must consist minimally of a CV sequence. Vowels and syllabic (or moraic) nasals are "less than" full syllables (cf. Ola 1995, Orie 1997). They are sub-syllabic units in Agbirigba because they do not trigger the processes that full syllables trigger.

2.0 Segmental inventory

Clements and Osu (2005) provide an excellent descriptive account of the Ogbakiri sound inventory. The summary provided in this section is based entirely on their description. For full details, the reader is referred to Clements and Osu's important work.

The authors propose the following vowel inventory for Ogbakiri (Ikwere): a set of nine contrastive oral vowels, and nine contrastive nasal vowels. All the nasal vowels contrast after obstruent consonants, and they all nasalize preceding sonorant consonants. (See Clements and Osu (2005:168) for the examples in (1) and (2)).

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[2] The data discussed here was gathered on July 31, 2010, by both authors. Our consultants were Mr. Ikechi Emesiobi (male, 44) and Apostle Sydney N. Chigeru (male, 51).

(1)   Ogbakiri vowel inventory
Oral Vowels   Nasal Vowels

i		u	[+ATR]	ĩ		ũ
ɪ		ʊ	[-ATR]	ɪ̃		ʊ̃
e		o	[+ATR]	ẽ		õ
ɛ		ɔ	[-ATR]	ɛ̃		ɔ̃
	a		[-ATR]		ã	

(2)   Vowel contrast in Ogbakiri
oral   nasal

ákâ	'hand, arm'	ákã̀	'sickness of hens'
èhʷê	'to blow (of wind)'	èhʷέ̃	'to float'
ὲhî̃	'not straight	ὲhî̃	'body'
ὲ'ɓέ	'to talk too much'	ńhɛ̂̃	'thing'
ézí	'big'	éz̃ǐ	'pig'
ódó	'mortar'	òdǒ̃	'yellow dye'
ɪ̀gʷù	'share' (n.)	ɪ́↓gʷű	'fishbone'
ɔ̀dʊ̀	'a dry sauce'	ɔ́dʊ̃̌	'tail'
ɔ̀yɔ̀	'amicable gesture'	ɔ̀ỹɔ́̃ (ń↓sí̃)	'to defecate'

Clements and Osu (2005:169) also propose the following consonant inventory for
Ogbakiri. The inventory includes two symmetrical sets of oral and nasal sonorant
consonants, in B and C, in (3).

(3)   Ogbakiri consonant inventory
Set A: obstruents

voiceless explosive stops	p	t	c	k	kʷ	
voiced explosive stops	b	d	j	g	gʷ	
voiceless fricatives	f	s				
voiced fricatives	v	z				

Set B: oral non-obstruents

voiced nonexplosive stop	ḅ					
glottalized nonexplosive stop	'ḅ					
lateral approximant		l				
central approximant		r	y	ɣ	w	
aspirates					h	hʷ

Set C: nasal nonobstruents

plain nasal stops	m	n				
glottalized nasal stop	'm					
central approximants		r̃	ỹ	ɣ̃	w̃	
aspirates					h̰	h̰ʷ

Of this chart, Clements and Osu (2005:170) write:

> "The organization of (3) into three sets is based on both distributional and phonetic criteria. The sounds in set A, all of which are obstruents, occur before both oral and nasal vowels. Those in set B (none of which are obstruents) occur only before oral vowels, while those in set C (also non-obstruents) occur only before nasal vowels. In prevocalic contexts, the consonants of sets B and C are in complementary distribution."

One of the most significant contributions of Clements and Osu is the description of [ḅ] and ['ḅ] (in Set B) as non-explosive stops. Their explosive counterparts are [b] and [p] (in Set A) respectively. They note that these consonants are reflexes of earlier [gb] and [kp] in other Igboid languages (Williamson 2000), and are assumed related to implosives in some dialects of Igbo (Ladefoged and others 1976). These stops do not involve occlusion at the velum and they are not implosives in the usual sense of this term, since neither employs the glottalic airstream mechanism (Clements and Osu 2002). The authors conclude that [ḅ] and ['ḅ] are [-obstruent, -sonorant]. Like other oral non-obstruents, they have nasal counterparts before [m] and ['m] contrastive nasal vowels.

3.0 **Word Initial Phonotactics and the Phonological root**
        In preparation for the following discussion of Agbirigba, it is important to note the importance of the word-initial phonotactics in Ogbakiri. In Ogbakiri, a word may begin with a vowel, a consonant, a "moraic" nasal or a glottal stop, as exemplified in (4). In the following examples a dash separates the initial element from the rest of the word.

(4) Ogbakiri Word Initial Phonotactics

(a) ɔ́-tʃí   'leg'
     rí-ˈʃí   'head'
     ń-dá   'father'
     ʔm̄-bɔ́rɔ̂   'dream'
     ʔɔ̀-fɔ́   'to respect'

(b) mɔ́́nɔ̂   'oil'
     tó:ˈlú   'nine'

As seen in the last two forms in (4a), the glottal stop may precede a vowel or a moraic nasal. In part for this distribution, Clements and Osu (2005) propose that moraic nasals are underlyingly nasal vowels, since the glottal stop may not precede any other consonant. In fact no other segments may be preceded by a glottal stop in Ogbakiri. Secondly, Clements and Osu analyze initial vowels, moraic nasals, initial [ʔV], and initial [rV] as being outside of the "phonological root", or essentially "phonological prefixes". As we show below, initial vowels and moraic nasals pattern together in Agbirigba. (4b) shows that apart from [ʔV] and [rV], words may begin with other forms of CVs, and these initial CVs form part of the "phonological root".

4.0 From Ogbakiri to Agbirigba

On the surface, the derivation of Agbirigba forms from Ogbakiri appears simple. There is a [-tV-] sequence (the coronal stop [t] followed by a high vowel) before every [CV] syllable of the equivalent Ogbakiri form. The following examples illustrate the point.

(5) The epenthesis of [-tV-]

Ogbakiri	Agbirigba	
ìmì̀	ìtìmì̀	nose
á˥ká	átí˥ká	hand
ńnɛ̋	ńtíné̋	mother
ńhɛ̋̃	ńtɪ́hɛ̃̀	thing
òwù	òtùwù / òtùhù	goat
ɛ́fɔ́	ɛ́tʊ́fɔ́	run
m̀fù	ǹtùfù	horn
ńdá	ńtʊ́dá	father
ḿ˥'b̥ɔ́ ɔ́mà	ńtʊ́˥'b̥ɔ́ ɔ́tùmà	chest

However, this is where the simplicity ends. There are several constrains on the apparent surface epenthesis of the [-tV-], which we describe below. The examples in (5) give the false impression that the epenthesis takes place only with vowel initial words. This is not the case. If the word begins with a CV sequence, the [-tV-] sequence comes before this

initial CV, as examples in (6) show.

(6) Epenthesis before initial CV-

	Ogbakiri	**Agbirigba**	
(a)	mɪ́nɪ́	tímɪ́tínɪ́	water
	bʊ́	túbʊ́	kill
	vò	tùvò	buy
	mɔ́nɔ̃̀	tʊ̃mɔ́tʊ̃nɔ̃̀	oil
(b)	rí⁺ʃí	tírítí⁺ʃi	head
	r̀ɪtʃá	tìr̀ɪtɪtʃá	white
	r̀ɪdʒîi	tìrìtídʒîi	black

First, the examples in (6a) on the other hand show that it does not matter whether the form is monosyllabic or disyllabic. The epenthesis occurs before all CV sequences.

Secondly, the examples in (6b) show that the [rV-] "phonological prefixes" are treated as any other initial CV sequences. This is in contrast to the vowel and nasal consonant prefixes in the examples in (5). Recall that Clements and Osu (2005) show that all "phonological prefixes", including the vowel and nasal consonant prefixes, are exempted from nasal harmony and ATR harmony. The forms in (6b) suggest that the vowel and nasal prefixes do not have the same status as [rV-] prefixes. We propose that while the [rV-] prefixes constitute full syllables, the vowel and nasal prefixes are just moraic, that is, they constitute only syllable peaks.

As the examples show, there are no initial epentheses before vowel-initial words (5), but there is epenthesis before consonant initial words (6). If we assume that vowels are syllables, then we must conclude wrongly that there is no epenthesis initially. But this is clearly false, because epenthesis occurs before consonant initial words. If however we assume that epenthesis can occur anywhere, we must find a way to rule out epenthesis before vowels or initial nasals. The simple way to do this is to assume that they do not have the same prosodic status as CV sequences: they are not syllables.

Since only a [-CV-] counts as a syllable, and not a V or a nasal, the number of epenthetic [-tV-] sequences depends on the number of underlying CVs.

5.0 **A Phonological Analysis of the Agbirigba epenthetic [-tV-]**

In this section, we examine the constraints responsible for the Agbirigba output forms. We propose that the surface forms are derived from the following "constraints". As proposed above, we assume that moraic elements like vowels and non-onset nasal consonants are not syllables.

(7)   Descriptive "constraints" for Agbirigba epenthetic [-tV-]
(a)   Insert [t] before every syllable.
(b)   Split the consonant cluster with a high vowel.
(c)   The ATR value of the high vowel depends on the root vowel; and the labial value depends on the labial quality of the following syllable.

(d)   The tone of the high vowel is a copy of the tone of the following syllable.

5.1 [t] Epenthesis
         The first constraint has two implications: (a) that [t] is inserted by itself and not at the same time with the vowel, and (b) that the target is a syllable and not just any mora. The first point finds support in the fact that in most cases, especially when the onset of the syllable is a nasal consonant, there are two variant forms. The examples in (8) illustrate this.

(8) Output variation before nasal onsets:

Ogbakiri	Agbirigba	
ɔ́ˑnṹ	ɔ́ˑtṹnṹ / ɔ́ˑtnṹ	mouth
ámã̀	átʋ̀mã̀ / átmã̀	knife
ìmĩ̀	ìtìmĩ̀ / ìtmĩ̀	nose
ńnḗ	ńtínḗ / ńtnḗ	mother
mĩ́nĩ́	tímĩ́ tínĩ́ / tmĩ́ tnĩ́	water

This creates all sorts of [t-nasal] clusters that are otherwise unattested in Ogbakiri. One of our consultants regularly uses the only the forms with the clusters, while the other alternates between the forms with an epenthetic vowel and the forms without. In fact, the first consultant also sometimes uses other [t-consonant] clusters, while the second consultant did not. These [t-C] clusters included all classes of consonants. The only common denominator is that they only occur with the epenthetic [t].

(9) Other t-C clusters

Ogbakiri	Agbirigba	
ɔ̀rɔ̀	ɔ̀tʋ̀rɔ̀ / ɔ̀trɔ̀	house
ìlì	ìtìlì / ìtlì	neck
ɛ́fɔ́	ɛ́tʋ́fɔ́ / ɛ́tfɔ́	run
ńdá	ńtʋ́dá / ńtdá	father
áˑká	átɪ́ˑká / átˑká	hand

Therefore, given data like those in (8) and (9) we must conclude that [t] is inserted by itself, and the high vowel is simply inserted to break up the resulting cluster. Inserting a syllable [tV-] and then deleting the high vowel makes no sense, because there is no prosodic motivation for deleting the high vowel to create a consonant cluster! More-over, a deletion analysis would be poor case of the "Duke-of-York" derivation (i.e. inserting a vowel only to delete it later. Pullum 1976, Kenstowicz and Kisseberth 1977).
         The second point, that target or domain of epenthesis is the syllable, finds support in the fact that there is no epenthesis before a vowel or a moraic nasal. This is true regardless of whether the vowel or moraic nasal occurs initially as in (10a), or finally as in (10b).

(10) No epenthesis before moraic elements

	Ogbakiri	Agbirigba	
(a)	ìtè	ìtìtè	clay pot
	ɛ́fɔ́	ɛ́tʊ́fɔ́	run
	ǹrí	ǹtìrí	ten
	ìʃínù	ìtíʃìtùnù	six
(b)	bìá	tùbìá	come
	àhĩ̂a	àtíhĩ̀a	wash
	lém̀	tílèm	aspectual marker (completed aspect)

5.2 <u>High vowel epenthesis</u>

As stated above, the sole purpose of the high vowel epenthesis is to break up the resulting consonant cluster from the [t] epenthesis. The surface appearance is thus as if a syllable [-tV-] is inserted. On the surface, the epenthetic high vowel takes one of four melodies: [i, ɪ, u, ʊ]. The data in (11) – (15) illustrate the high vowel epenthesis.

(11)   [i] as epenthetic vowel

Ogbakiri	Agbirigba	
rí⁺ʃí	tírítí⁺ʃi	head
ìm̃ĩ	ìtm̃ĩ / ìtìm̃ĩ	nose
ìlì	ìtlì / ìtìlì	neck
ìtè	ìtìtè	clay pot
ńnɛ̃́	ńtnɛ̃́ / ńtínɛ̃́	mother
mĩ́nĩ́	tmĩ́ tnĩ́ / tímĩ́ tínĩ́	water
rí	tírí	eat
rìdʒĩ̂i	tìrì tídʒĩ̂i	black
ídʒí	ítídʒí	yam
ìsê:	ìtíse	five
ǹrí	ǹtírí	ten

(12)   [ɪ] as epenthetic vowel

ɔ̀⁺tʃɪ́	ɔ́⁺tɪ́tʃɪ́ / ɔ́⁺ttʃɪ́	leg
rìʃìrì ɔ̀⁺tʃɪ́	tìrìtìʃì ɔ́tɪ́⁺tʃɪ́	foot
ɲ́jɛ̃́ rĩ̀jã̀	ńtíjɛ̃́ tìrɪ tĩ̀jã̀	female
rɪ̀tʃá	tɪ̀rɪ tɪ́tʃá	white
àhĩ̂a	àtíhĩ̂a (àtɛ̀hĩ̂a)³	wash

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³ Whereever we indicate a form in parenthesis, it is an alternative way we heard the word pronounced.

mˈ'ba áˈká	ńtúˈ'bá átɪ́ˈká / ńtˈ'bá átˈká	shoulder
ɛ̀sâː	ɛ̀tɪ̀sà	seven

(13)   [u] as epenthetic vowel

òwù	òtùwù / òtùhù	goat
bʊ́	túbʊ́	kill
òbʊ́	otúbʊ́	to kill
ótù	ótùtù	one
tóːˈlú	tútóˈtúlú	nine

(14)   [ʊ] as epenthetic vowel

ɔ́ˈnʊ̋	ɔ́ˈtnʊ̋ / ɔ́ˈtʊ̋nʊ̋	mouth
mˈ'bɔ́ ɔ́mà	ńtúˈ'bɔ́ ɔ́tʊ̀mà	chest
ɔ̀rɔ̀	ɔ̀trɔ̀ / ɔ̀tʊ̀rɔ̀	house
ɲ̂ĵɛ̋ rʊ̀kã̀	ńtîĵɛ̋ tʊ̀rʊ̀ tʊ̀kã̀	male
bɪ́á	tʊ̀bɪ́á (tòbɪ́á)	come
ɛ́fɔ́	ɛ́tfɔ́ / ɛ́tʊ́fɔ́	run
ɛ́wʊ̋	ɛ́tʊ̋wʊ̋	die
ɛ̀bɔ̀	ɛ̀tʊ̀bɔ̀	two
ɛ̀tɔ́	ɛ̀tʊ́tɔ́	three
ɛ̀nɔ̂ː	ɛ̀tnɔ̂ / ɛ̀tʊ́nɔ̀	four

Broadly speaking, the ATR and labial qualities of the epenthetic vowel depend on the following syllable. The ATR quality is straightforward to explain. The epenthetic vowel is [+ATR] ([i], [u]) if the following vowel is [+ATR] (as in (11)), and it is [-ATR] ([ɪ], [ʊ]) if the following vowel is [-ATR] (as in (12)).

The labial quality however depends on the entire following syllable, and not just the following vowel. The high vowel is labial (or rounded) under two conditions: (a) if the following syllable has a labial vowel, or (b) if the following consonant is labial. This implies that the epenthetic vowel can be labial if the following consonant, but not the following vowel is labial. A form like (Ogbakiri) bɪ́á → (Agbirigba) tʊ̀bɪ́á 'come', confirms this. In this form, the labial consonant [b] is followed by non-labial vowel [ɪ].

The second complication on labiality arises when the stem contains the vowel [a], as in the examples in (15).

(15)   Epenthetic vowels before syllables with [a]

	Ogbakiri	Agbirigba	
(a)	mˈ'bɔ́ ɔ́mà	ńtúˈ'bɔ́ ɔ́tʊ̀mà	chest
	ámã̀	átmã̀ / átʊ̀mã̀	knife
	ńdá	ńtdá / ńtʊ́dá	father

(b)	r̀ɪtʃá	tìrì títʃá	white
	ɲ̃jɛ̃́ r̀ɪ̃jã̀	ńtĩ́jɛ̃́ tìrì tĩ̀jã̀	female
	ã́jã̀	ã́tĩ̀jã̀	eye
	á⁺ká	át⁺ká / átɪ́⁺ká	hand
	ὲsâː	ὲtɪ́sà	seven

When the following syllable has a vowel [a], the epenthetic vowel may be [ʊ] or [ɪ]. It is [ʊ] if the following consonant is a non-palatal consonant. Otherwise the epenthetic vowel is [ɪ].

There is an interesting alternation in this regard, involving the epenthetic vowels in the Agbirigba forms for "male" and "female".

(16) Ogbakiri   Agbirigba
      ɲ̃jɛ̃́ r̀ʊkã̀   ńtĩ́jɛ̃́ tùrù tùkã̀   "male"
      ɲ̃jɛ̃́ r̀ɪ̃jã̀   ńtĩ́jɛ̃́ tìrì tĩ̀jã̀   "female"

In the form for 'male' the epenthetic vowel is [ʊ] in [tùrù tùkã̀], but in the form for 'female', the epenthetic vowel is [ɪ], as in [tìrì tĩ̀jã̀]. One can assume that it is [ʊ] in [tùrù], because the stem has [ʊ], and that it is [ɪ] in [tìrì] because the stem has [ɪ]. But the following stem vowels in the next syllable are identical, and yet the epenthetic vowels are different. There are two ways to explain this, we can either blame the quality of the epenthetic vowel on the vowel of the preceding syllable, or we can blame it on the following consonant. We have no evidence in our data that preceding segments affect the quality of the epenthetic vowel, but we have evidence that following segments do. That is, the epenthetic vowel anticipates the quality of the following segments, vowel and consonant. Therefore we propose that the epenthetic vowel is [ʊ] in [tùkã̀], because the following consonant is [DORSAL], and it is [ɪ] in [tĩ̀jã̀], because the following consonant is a posterior [CORONAL].[4]

5.3 The tone of the [-tV-] syllable

The final issue is the determination of the tone of the epenthetic syllable. In the default case, the tone of the epenthetic syllable is simply a copy of the tone syllable that it precedes. The nasality of the following vowel is also copied on the high epenthetic vowel.

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[4] We must distinguish between anterior and posterior [CORONAL] here because [t] has no influence on the quality of the epenthetic vowel. We also hasten to say that the proposal in this paragraph is tentative, pending further investigation of Agbirigba.

(17)   Tone copying
        Ogbakiri   Agbirigba
        ámǎ   átŭmǎ / átmǎ   knife
        ájǎ   átĩjǎ   eye
        ótù   ótùtù   one

        ὲtɔ́   ὲtútɔ́   three
        ǹrí   ǹtírí   ten
         r̀ɪtʃá   tɪ̀rɪ̀ tɪ́tʃá   white

If the Ogbakiri syllable has a contour tone, the contour is split into its component High and Low and distributed over the epenthetic [-tV-] syllable and the input syllable as in (18). The tonal sequences LH and HL are treated as one unit that is mapped onto the derived form.

(18)   Mapping Input contour tones
        Ogbakiri   Agbirigba
        bɪ̀á   tʊ̀bɪ́á   come
        àhĩ̂a   àtíhɪ̀à   wash
        mɔ̃́nɔ̃̂   tʊ̃́mɔ̃́tʊ̃̀nɔ̃̀   oil
        ὲnɔ̂ː   ὲtnɔ̂ / ὲtʊ̃nɔ̀   four
        ὲsâː   ὲtísà   seven
        ìsêː   ìtísè   five

6.0 **Other Issues**

        While our study of the details of Agbirigba continues, it is important to end this introductory paper by noting that we have not noticed any difference in the phrase structures of Ogbakiri and Agbirigba. Our initial observation is that the phrase structure is exactly that of Ogbakiri. The basic clause structure is "Subject-Verb-Object" (SVO), as the following forms in (19) show. The only variation is the epenthesis of the appropriate [-tV-], before the appropriate CV syllable.

(19) Agbirigba simple phrase
Ogbakiri –   ńkétʃí   vò   ré   ídʒí   Nkechi bought yam
Agbirigba –   ńtíkétitʃí   tùvò   tíré   ítídʒí
               Nkechi   buy   past   yam

Ogbakiri –   ówù   rí   rí   ídʒí   The goat ate yam
Agbirigba –   ótúwù   tírí   tírí   ítídʒí
               Goat   eat   past   yam

Ogbakiri –	ŋ́gɔ́zí	rí	rí	ídʒí	Ngozi ate yam
Agbirigba –	ńtʊ́gɔ́tízí	tírí	tírí	ítídʒí	
	Ngozi	eat	past	yam	

Ogbakiri –	ŋ́gɔ́zí	wṹ	lêm	Ngozi died
Agbirigba –	ńtʊ́gɔ́tízí	tṹwṹ	tílèm	
	Ngozi	die	completed-aspect	

7.0 Conclusions

Given the social and ethnic strife that gave birth to Agbirigba, one would be tempted to conclude that it is an attempt by the speakers to create a means of communication not understood by their persecutors. It is an attempt to create a language. But the details appear to show no more than a complicated language game, based on Ogbakiri. Amazingly, other speakers of Ogbakiri who are not part of the group do not understand Agbirigba, even though ALL of the forms are based on Ogbakiri. Agbirigba reflects at least two things about human language. First, it reflects the computational and creative powers of the human brain. The computation is seen in the assignment of an extra syllable to every underlying syllable, and the assimilation of the vocalic melody to the following vowel. Secondly, Agbirigba shows that it takes very little variation for two speech forms to become distinct lects. In this case, it is the addition of a somewhat predictable syllable to every underlying syllable, with various changes to make the vowel fit the context. More complication arises with the new C-Nasal clusters that Agbirigba permits, but which Ogbakiri forbids.

References

Clements, George, N. and Syslvester Osu. 2002. Explosives, implosives, and non-explosives; some linguistic effects of air pressure differences in stops. In Laboratory Phonology 7, Carlos Gussenhoven and Natasha Werner (eds.). Pp. 200-350. Berlin: Mouton de Gruyter.

Clements, George, N. and Syslvester Osu. 2003. Ikwere nasal harmony in typological perspective. In Typologie des langues d'Afrique et universaux de la grammaire; Patrick Sauzet and Anne Zribi Hertz (eds.) vol. 2: 70-95. Paris: L'Harmanttan.

Clements, George, N. and Syslvester Osu. 2005. Nasal harmony in Ikwere, a language with no phonemic nasal consonants. Journal of African languages and linguistics 26: 165-200.

Goldsmith, John. 1990. Autosegmental and Metrical Phonology. Oxford: Blackwell.

Hayes, Bruce. 1986a. Inalerability in CV Phonology. Language 62: 321-351.

Hayes, Bruce. 1986b. Assimilation as spreading in Toba Batak. Linguistic Inquiry 17: 467-499.

Kenstowicz, Michael and Charles Kisseberth. 1977. Topics in Phonological Theory. New York: Academic Press.

Ladefoged, Peter, Kay Williamson, Ben Elugbe and Ann Angela Uwulaka. 1976. The stops of Owerri Igbo. *Studies in African Linguistics*, Supplement 6: 147–163.

McCarthy, John. 1986. OCP effects: Gemination and Antigemination. Linguistic Inquiry 17: 207-263.

McCarthy, John and Alan Prince. 1995. Prosodic Morphology 1986. Technical Report 32. Rutgers Center for Cognitive Science, New Brunswick, NJ.

Ola, Olanike. 1995. Optimality in Benue-Congo prosodic phonology and morphology. Ph.D. dissertation, University of British Columbia.

Orie, Olanike Ola. 1997. *Benue-Congo Prosodic Phonology and Morphology in Optimality Theory*. Muchen: Lincom Europa.

Pullum, Geoffrey. 1976. The Duke of York gambit. Journal of Linguistics 12: 83-102.

Williamson, Kay. 2000. Reconstructing Proto-Igboid obstruents. In Trends in African Linguistics 4. Proceedings of ACAL 28. Vicki Carstens and Frederick Parkinson (eds.) Pp. 1-18. Trenton: Africa World Press.