

NASALITY IN URHOB0: AN AUTOSEGMENTAL PERSPECTIVE

Dr. (Mrs.) Rose Aziza
Dept. of Languages and Linguistics,
Delta State University, Abraka, Nigeria

The primary aim of this article is to describe nasality in Urhobo, a southwestern Edoid language of Delta State, Nigeria, within the autosegmental model of generative phonology. The Edoid family of languages falls within the 'new' Benue-Congo group. We show that although both oral and nasal sound segments exist, nasality is better analysed as an autosegment since it is independent of the segments that bear it in the phonetic representation; it is root controlled, it can float and be relinked onto a neighbouring segment and it can spread onto other sound segments which are receptive to it within the stem.

Le but principal de cet l'article est de décrire la nasalité en urhobo, langue édoïde du sud-est dans l'état nigérian du Delta, en utilisant le modèle autosegmental de la phonologie générative. Les langues édoïdes font partie du groupe Bénoué-Congo « nouveau ». Nous montrons que malgré l'existence de sons segmentaux nasals et non-nasals, la nasalité urhobo s'analyse le mieux comme autosegment, puisqu'elle est indépendante des segments auxquels on l'attribue dans la représentation phonétique. C'est un trait de la racine même, elle peut flotter et se rattacher à un segment voisin, et elle peut atteindre d'autres segments du thème susceptibles de la recevoir.

0. INTRODUCTION

Hyman (1982) observes that nasality is a feature exploited by most languages within their respective sound systems, although variations arising from paradigmatic and syntagmatic factors exist in the way the feature is allowed to manifest. Paradigmatically, a [+Nasal] specification may be restricted to non-continuant sonorant consonants such as /m/ /n/ and /ŋ/ or is allowed on both continuant and non-continuant sonorant consonants as well as on vowels, in which case, nasality bearing units include /V/, /w/, /a/, etc. Syntagmatically, the domain of a [+Nasal] specification may be the nasal segment or NBU itself or is subsegmental, in which case the language allows either or both prenasalised consonants like /mb/, /nd/, and post nasalised consonants like /b^m/, /dⁿ/. It may also be suprasegmental such that the language allows nasal 'prosodies' and the domain of a [+Nasal] specification covers a spread which is larger than the segment itself and may encompass several segments and even morphemes. In this last case, nasality often survives even after the nasal segment is deleted from the phonetic string. Such behaviour accounts for the proposal in the autosegmental model of generative phonology that nasality, like tone and vowel harmony, can be accounted for, not as a feature of the segments that bear it but as an autosegment which exists independently of the segments. He describes Gokana, an Ogoni language of Nigeria as one in which nasality may better be treated as an autosegment and in this article we present Urhobo as another of such languages.

Previous analysis. Donwa-Ifode (1996) examines nasals and nasalization in Southwestern Edoid, but her main focus lies in understanding the origin of nasalization particularly in vowels, since diachronic evidence seemed to suggest that nasal consonants always existed in SWE. She concludes that all synchronic nasal vowels are derived from the loss of preceding nasal consonants in Proto SWE. Her account shows that she sees nasality as a property of the segments that bear it, although she recognises

that nasality can spread over syllables or even morphemes, a fact that supports a non-linear analysis. Since she sees nasality as a property of the segment, she formulates a number of rules to account for the behaviour of nasality beyond the segment. We believe that a nonlinear approach would account for the phenomenon more naturally.

In the autosegmental framework, a phonetic representation is split up into several parallel sequences of segments each of which is represented on an independent tier or level. Elements of each tier are linked to each other by formal entities known as association lines which indicate how they are to be co-articulated and segments on different tiers are co-articulated only if they are linked by these association lines. However, phonological rules may insert or delete elements on any tier but such a deletion does not entail deletion of the element to which it is linked on another tier since each tier is independent of the other. In any case, the outputs of such processes are subjected to conventions governing well-formedness.

Overview. In §1 of this paper, Urhobo sound segments are outlined; in §2 the synchronic behaviour of sound segments with respect to nasality is described; and in §3 it is demonstrated that the [Nasal] autosegment belongs to a separate tier independent of other segmental features.

1. URHOBO SOUND SEGMENTS

1.1 CONSONANTS

Urhobo has the following consonant segments:

p	b		t	d	c	ɟ	k	g	kp	gb
	f	v	s	z	ʃ	ʒ	h	y		
			r							
	m			n		ɲ				ŋm
		u				j				w

Table 1. Urhobo consonants

The table above shows that paradigmatically, Urhobo has four noncontinuant sonorant consonants which occur with the feature specification [+Nasal], namely, /**m**, **n**, **ɲ**, **ŋm**/. Nasal complexes such as /**mb**, **nd**, **ŋg**/ do not exist in this language, neither does the velar nasal /**ŋ**/ occur as a separate segment. Below we present lexical items in which oral and nasal stops are contrasted.

Oral and nasal stops contrasted

(1) /**b**/ ~ /**m**/

- | | | | |
|---------------------------|---------------|---------------------------|--------|
| a. be ₁ | watch out for | d. me ₁ | plait |
| b. bũ | be plentiful | e. mu | carry |
| c. ubi | seed | f. umi | filter |

- (2) /d/ ~ /n/
- | | | | |
|---------------------------|---------------------|---------------------------|-------|
| a. do ₁ | throw | d. no ₁ | shine |
| b. dī | grow (e.g. of hair) | e. ni | look |
| c. o₂de | tomorrow | f. o₂ne | race |
- (3) /j/ ~ /ɲ/
- | | | | |
|----------------------------|------------------|----------------------------|-----------|
| a. jɛ | run | d. ɲɛ | press |
| b. ujɔ ₁ | horn (of animal) | e. ɛɲɔ ₁ | to listen |
| c. o₂ja | soap | f. e₂ɲa | spittle |
- (4) /gb/ ~ /ɲm/
- | | | | |
|-----------------------------|-------|----------------|-------|
| a. gba | tie | d. ɲma | wring |
| b. ugbõ ₁ | knee | e. uɲmu | drug |
| c. o₂gba | fence | f. aɲma | cloth |

1.2 VOWELS

At the surface phonetic and orthographic levels, Urhobo has seven oral vowels, namely, [i, e, ɛ, a, ɔ, o, u]. However, the behaviour of /e/ and /o/ indicate that at the phonological level, we must recognise nine oral vowels, namely, /i, e₁, e₂, ɛ, a, ɔ, o₁, o₂, u/. (We follow Elugbe (1991) in our use of lowered indices in making this distinction.) This is because /e/ and /o/ sometimes behave as [+High] vowels, and are then /e₂/ and /o₂/ respectively; and at other times as [-High] vowels, and are then /e₁/ and /o₁/ respectively.

In order to fully understand the behaviour of Urhobo vowels, a brief statement about vowel harmony is necessary. (A full account of the phenomenon is beyond the scope of this work.) Vowel harmony is attested in many West African languages, and the terms ‘Advanced Tongue Root’ [ATR] and ‘Expanded’ [EXP] are the common labels used for describing such systems. In this work we use the term ‘Advanced Tongue Root’ [ATR] and a vowel is either [+ATR] or [-ATR]. Urhobo vowels can be categorised into two sets using the feature [ATR]:

- (5) Set 1 [+ATR] Set 2 [-ATR]
- | | | | |
|----------------------|----------------------|----------------------|----------------------|
| i | u | e₂ | o₂ |
| e₁ | o₁ | ɛ | ɔ |
| | | a | |

At the phonetic level, there is absolute neutralization of contrast between e₁ and e₂ and o₁ and o₂ respectively, thereby reducing a nine vowel system to a seven vowel system. Studies have shown that e₂ and o₂ are reflexes of vowel merging from *I and *U respectively, which are [+High] vowels in the Edoid systems that still have them. (See, for example, Donwa-Ifode, 1989). This means that although e₂ and o₂ have merged with e₁ and o₁ respectively at the phonetic level, they still retain the feature [+High] which is manifested in their behaviour with neighbouring sounds. It should be noted though that vowel harmony is minimally present in the Urhobo noun, as many nouns in the language do not follow a strict patterning. However, it is highly attested in the verbal system as affixes occur in two phonetic shapes depending on the [ATR]

requirements of the verb stem vowel. In the matrix below, we present the nine phonological vowels of Urhobo.

	i	e ₁	e ₂	ɛ	a	ɔ	o ₁	o ₂	u
HIGH	+	-	+	-	-	-	-	+	+
FRONT	+	+	+	+	-	-	-	-	-
BACK	-	-	-	-	-	+	+	+	+
ATR	+	+	-	-	-	-	+	-	+

Table 2. Minimally specified matrix for urhobo vowels

Each of the nine vowels is receptive to nasality.

With regard to syllable structure, four types of syllables exist at the phonological level, namely V, CV, CCV, CVV; but only three are found at the phonetic level, namely C, CV and CCV. This is because all underlying CVV syllables obligatorily undergo either glide formation if V₁ is [+High] or vowel elision if V₁ is [-High].

In the following examples, we present lexical items in which oral and nasal vowels contrast.

Oral and nasal vowels contrasted

(6) /i/ ~ /ĩ/

- | | | | |
|--|---------------|---------------------------|----------------|
| a. fi | throw gift | d. fĩ | blow (eg nose) |
| b. e₁fio₁ | to throw gift | e. ɛfĩɔ | to blow nose |
| c. ubi | seed | f. o₁dĩ | grass |

(7) /e₁/ ~ /ẽ₁/

- | | | | |
|---------------------------------------|------------------|---------------------------------------|-----------|
| a. se₁ | read, call | d. wẽ₁ | to thread |
| b. e₁se₁ | to read, to call | e. e₁wẽ₁ | to thread |
| c. ukpe₁ | year | f. ugbẽ₁ | pencil |

(8) /e₂/ ~ /ẽ₂/

- | | | | |
|---------------------------|--------|---------------------------|----------------------|
| a. re₂ | eat | d. sẽ₂ | reject, refuse |
| b. ɛrio | to eat | e. ɛsĩɔ | to reject, to refuse |
| c. aje₂ | woman | f. ajẽ₂ | they, them |

(9) /ɛ/ ~ /ẽ/

- | | | | |
|---------------------------|------|---------------|------------|
| a. ʃɛ | sell | c. yẽ | be foolish |
| b. o₂kɛ | gift | d. ukẽ | egg |

(10) /a/ ~ /ã/

- | | | | |
|----------------------------|--------|----------------------------|-----------|
| a. yare₂ | divide | c. yãre₂ | expensive |
| b. ja | catch | d. jã | walk |

(11) /ɔ/ ~ /õ/

- | | | | |
|---------------------------|--------------------|---------------------------|----------|
| a. yɔ | entertain formally | c. yõ | be stiff |
| b. o₂kɔ | boat, canoe | d. o₂kõ | asset |

(12) /o₁/ ~ /õ₁/

- | | | | |
|---------------------------------------|----------|--|------------------|
| a. do₁ | throw | d. gbõ₁ | be rotten |
| b. e₁do₁ | to throw | e. e₁gbõ₁ | to be rotten |
| c. uko₁ | cup | f. ujõ₁ | horn (of animal) |

(13) /o₂/ ~ /õ₂/

- | | | | |
|---------------------------|----------|---------------------------|--------------|
| a. so₂ | sing (V) | d. fõ₂ | be clean |
| b. ɛsuɔ | to sing | e. ɛfũɔ | to be clean |
| c. ɔro₂ | growth | f. ɛrõ₂ | type of fish |

(14) /u/ ~ /ũ/

- | | | | |
|--|-----------|--|---------------|
| a. ku | pour | d. fũ | extinguish |
| b. e₁kuo₁ | to pour | e. e₁fũo₁ | to extinguish |
| c. o₁tu | age group | f. e₁vũ | stomach |

Syntagmatically, a single [+Nasal] specification covers a spread which is larger than the segment itself. Each nasal stop seems to have a nasalizing effect on a following oral vowel, while each nasal vowel seems to have a nasalizing effect on a [+Sonorant] segment adjacent to it within the stem; but this spreading is blocked by a prefix vowel or an obstruent. (In this regard the voiceless velar fricative /h/ behaves as a sonorant, although there is audible frication in its articulation.) Thus within a stem, all oral vowels and the consonants /m, n, ɲ, ŋm, r, h, v, j, w/ can bear nasality, while all other segments are opaque to it. In what follows, we shall present the behaviour of nasality syntagmatically.

2. ALTERNATIONS IN NASALITY

In Urhobo, the derivation of certain constructions such as the infinitive or gerundive (the two are one and the same process), the past tense form of verbs, as well as the verb + object pronoun involves the addition of an affix to the verb stem. (For the purpose of this discussion, we would regard the object pronoun as a suffix attached to the stem.) Prefix vowels are unaffected by nasality but suffixes have to agree in nasality with the verb stem. If the verb stem bears a [+Nasal] specification, the suffix must be realised as [+Nasal]; and if it is [-Nasal], the suffix must surface as [-Nasal]. If the suffix is made up of both a consonant segment (which is usually a [+Sonorant]) and a vowel segment, both segments are affected by the nasality phenomenon. It therefore means that each suffix appears in two phonetic shapes and the choice of the surface form depends on the [Nasal] specification of the verb stem vowel. We shall therefore not repeat this point in the forms below.

2.1 INFINITIVE/GERUNDIVE FORMS

The derivation of the infinitive/gerundive form involves the addition of a discontinuous morpheme which we indicate underlyingly as **E...O**, since each member of this morpheme is realised in two phonetic shapes depending on the [ATR] vowel harmony requirements of the verb stem vowel. If the verb stem vowel is [+ATR], the infinitive morpheme is realised as **e...o** and if it is [-ATR], the morpheme is realised

as $\epsilon\dots\epsilon$. However, if the verb stem vowel is [-High] this suffix is obligatorily deleted from the phonetic string.

We said earlier that vowel sequences are not permitted at surface level. Therefore, if in an underlying CVV syllable V_1 is [+High] it obligatorily undergoes glide formation to [j] for front vowels and [w] for back vowels; but if V_1 is [-High] then one of the two vowels obligatorily undergoes vowel elision and the choice of the eliding vowel is determined by the morphosyntactic relations occurring between the lexical items bearing the vowels. A fuller account of glide formation and vowel elision is beyond the scope of this article. Below are some examples.

(15)	<i>Verb Stem</i>	<i>Infinitive / gerundive form</i>
a.	si write, pull	e₁sio₁ [esjo] to write, to pull / pulling
b.	ku pour	e₁kuo₁ [ekwo] to pour
c.	so₂ sing	esu₂ [esw₂] to sing
d.	se₁ call, read	e₁se₁ [ese] to call, read
e.	fa flog, play (e.g., football)	efa [efa] to flog, play
f.	dī grow (e.g., hair)	e₁dīo₁ [edjō] to grow
g.	sū lead	e₁sūo₁ [eswō] to read
h.	sē₂ reject, refuse	esī₂ [esjō] to reject, refuse
i.	wē₁ thread	e₁wē₁ [ewē] to thread
j.	fā confess	efā [efā] to confess
k.	mu carry	e₁muo₁ [emwō] to carry

2.2 PAST TENSE FORMS

The derivation of the past tense form involves the addition of a CV suffix which we represent underlyingly as **-rI**. This is realised in two phonetic shapes, **-ri** and **-re** depending on the [ATR] requirements of the verb stem vowel; [+ATR] vowels select **-ri** while [-ATR] vowels select **-re**. If the verb stem vowel is [+High], assimilation takes place and the suffix vowel is realised in the same shape as the stem vowel. However, both the consonant and vowel segments are affected by the nasality in the verb stem. Consider the following examples.

(16)	<i>Verb stem</i>	<i>Past tense forms</i>
a.	si write, pull	siri wrote, pulled
b.	so₂ sing	so₂ro sang
c.	ku pour	kuru poured
d.	se₁ call, read	se₁ri called, read
e.	ko₁ sew	ko₁ri sewed
f.	fa flog, play	fare₂ flogged, played
g.	kp₂ be dry	kp₂re₂ was dried
h.	dī grow (e.g., hair)	dīrī grew
i.	sē₂ refuse, reject	sē₂rē₂ refused, rejected
j.	sū lead	sūrū led
k.	fā confess	fārē₂ confessed
l.	mē₁ plait	mērī plaited

2.3 VERB + OBJECT PRONOUN CONSTRUCTION

Generally, when the verb takes an object, the past tense morpheme is obligatorily deleted. However, the object pronoun must agree in nasality with the verb stem. Below are some examples.

- (17)
- | | | | |
|----|-----------------------------------|---------------|-----------------|
| a. | si + ve₁ | pulled me | [sive] |
| b. | ku + ro₁ | poured it | [kuro] |
| c. | fa + we | flogged you | [fawɛ] |
| d. | sū + we₁ | lead you | [sūwě] |
| e. | fã + we | confessed you | [fãwě] |
| f. | mũ + ve₁ | caught me | [mũvě] |
| g. | sě₂ + vɛ | rejected me | [sěvě] |

2.4 VERB + NOUN CONSTRUCTION

In Urhobo, most verbs are either monosyllabic or disyllabic while most nouns are either disyllabic or trisyllabic, being made up of a prefix vowel and a stem. All syllables are open ended. Stems usually comprise one or two consonants and one or two vowels. Recall that in a CVV structure, the first vowel is always a [+High] front or back vowel which obligatorily undergoes glide formation in the phonetic realisation, while in a CCV syllable C2 is the tapped alveolar /r/ at the phonemic level and [w, j] or [r] at the phonetic level. In the Verb + Noun construction, vowel sequences always occur in the boundary between the verb and the noun and it is the vowel of the verb that undergoes either glide formation if it is [+High], or vowel elision if it is [-High]; while the prefix vowel of the noun is retained because it indicates number relations in the noun. However, nasality survives whether the vowel segment bearing the [+Nasal] specification gets elided or becomes a non-syllabic glide. The following are some examples.

- (18)
- | | | | |
|----|---|----------------|---------------------|
| a. | fi + o₂ja | throw soap | [fjoj a] |
| b. | ku + e₁vr i | pour oil | [kwev r i] |
| c. | fɛ + udi | sell a drink | [f udi] |
| d. | do₁ + ɔ be₂ | throw a book | [dɔ be] |
| e. | so₂ + une₁ | sing a song | [swuně] |
| f. | fĩ + uwě₁ | blow nose | [fjũ wě] |
| g. | sě₂ + o₁huo₁ | reject someone | [sjõhwo] |
| h. | kõ + iribo₁ | plant pepper | [kĩ ribo] |
| i. | gbě + ay ua | clear bush | [gbã y wa] |

3. DISCUSSION

Most studies on Urhobo have been done as part of studies on Edoid or Benue-Congo languages. Synchronically, nasalisation has been attested in both consonants and vowels in many of these languages and, obviously, vowels appear to be nasalised after nasal consonants. However, Donwa-Ifode (1996) cites diachronic evidence which attributes nasals to two sources: (i) only nasal consonants exist, and so all cases of nasal or nasalised vowels are derived from the influence of nasal consonants on

contiguous oral vowels, some of which become phonemicized after the nasal consonant is lost; or (ii) nasal vowels have always existed in these languages, and the nasal feature earlier concentrated on vowels later spread on to adjacent oral consonants to give rise to nasal consonants.¹ It should be noted that both positions regard nasality as a property of the segment that bears it.

However, based on synchronic evidence, a consideration of the behaviour of nasality in Urhobo as evidenced from the examples presented so far indicates that we cannot see nasality as a property of the segments that bear it. We believe that an autosegmental analysis accounts for the phenomenon more naturally, and avoids the numerous rules which Donwa-Ifode proposes to account for the derivation of nasal or nasalised vowels on the surface.

Within the autosegmental framework, a particular phenomenon may occur on different tiers within a phonological representation; but since the tiers are independent of one another, what affects the phenomenon on one tier may not affect it on another tier (cf. Halle and Vergnaud (1982)). Consequently, nasality may exist paradigmatically as a distinctive feature which is part and parcel of the segmental make-up of nasal segments. These nasal segments like all other sound segments, together with their distinctive features, are to be found on the segmental tier. Nasality may also exist syntagmatically as an autosegment capable of being mapped on to a lexical morpheme or stem. It is borne in the phonological representation by a sound segment which is receptive to nasality, that is, an NBU; but it exists on a separate autosegmental tier. It is independent of that segment because it survives even in its absence; it can float and it can spread on to adjacent segments which are receptive to it. A lexical morpheme is either marked positive for nasality or it has no underlying nasal specification. The nasal autosegment will henceforth be written as [N].

Considering our data, we propose that in this language, nasality exists as a distinctive feature only on the four nasal consonants, i.e., /m, n, ɲ, ŋm/, and that all other cases of nasality may be derived autosegmentally. In other words, there are no nasal vowels underlyingly. [N] is mapped on to only one slot on the CV tier, and that is a V slot. The nasality borne by nasal consonants is a distinctive feature and is not capable of spreading. All other cases of nasality are autosegmental, and are borne only by the first vowel of the stem. This means that although there may be more than one vowel in a stem, [N] can be mapped only on to the first vowel. The domain within which [N] is realised is all [+Sonorant] segments within the stem. [N] is root controlled, that is, stems are specified as either [+N] or [-N]. Suffixes are unspecified for [N], and receive their [N] specification from the stem. However, noun prefixes are unaffected by [N] within a word boundary. The [N] agreement noticeable between stems and their suffixes is the result of the spreading of an underlying [N] on to unspecified NBUs. Spreading of [N] affects all [+Sonorant] segments adjacent to it, so that spreading is bi-directional, affecting any such segments before and after the vowel mapped for [N]. However, spreading is vacuous if the adjacent segment is a nasal consonant and it is blocked by an obstruent or by a prefix boundary.

¹ Donwa-Ifode for her part claims that Proto-Edoid never had nasal vowels, and that all cases of nasal or nasalised vowels can be derived from the loss of a preceding nasal consonant, more so as she has data in which phonemic nasal vowels in some Edoid languages correspond to nasal consonant + vowel sequence in some others.

In our analysis, we shall follow the model of autosegmental theory developed by Halle and Vergnaud (1982), Clements and Keyser (1983), Pulleyblank (1986) and Goldsmith (1990), in which autosegments are linked to each other in an indirect manner via a structural CV skeleton. This CV skeleton constitutes a separate autosegmental tier and forms the core of the phonetic representation. A segment is given phonetic realisation only if it is linked to a position on the CV tier (cf. Goldsmith 1990). We shall thus have three tiers in the derivations that follow, namely the Autosegmental or Nasality tier, the CV tier and the Segmental tier. Each tier is independent of the others and tiers are co-articulated only if they are linked by association lines. The following are some examples.

- (19)
- | | | | |
|----|---------------------|---------|---------|
| a. | ɔmɔ | [ɔmɔ] | child |
| b. | mre | [mre] | see |
| c. | o ₁ nĩ | [onĩ] | mother |
| d. | e ₂ nã | [ɛnã] | spittle |
| e. | uwẽ ₁ vi | [uũẽũĩ] | house |
| f. | ujõ ₂ ta | [ujõta] | truth |
| g. | dũvu | [dũũũ] | pierce |

In the examples in (15)–(17) above, we have shown that the suffix always agrees in nasality with the verb stem, while in example (18) we showed that where the NBU undergoes glide formation or vowel elision, nasality survives and gets relinked on the following vowel which then becomes the nucleus of the new syllable. This confirms the fact that the nasal autosegment belongs to the stem, and is not a property of a particular segment. It is only borne by a vowel segment in the underlying representation, from where it spreads to other sound segments which are receptive to it within the stem. There are no instances of the deletion of a nasal consonant in my data to help us determine whether or not the nasal feature borne by them is an autosegment. We therefore conclude that [N] is borne only by vowels in this language. We present some sample derivations below.

- (20) a. *Autosegmental tier* [N] (underlying representation)
- |
- CV tier* C V
- | |
- Segmental tier* s u lead

- b.
- [N] (by affixation)
- |
- V ... C V ... V
- | | | |
- e₁ s ũ o₁

- c.
- [N] (by [N] spreading)
- | /
- V ... C V ... V
- | | | |
- e₁ s ũ o₁

- d. (by glide formation and resyllabification)
 V ... C V ... V
 | | | |
 e₁ s w õ [eswõ] to lead
- (21) a. *Autosegmental tier* (underlying representation)
CV tier C V
 | |
 f a
Segmental tier f a confess
- b. (by suffixation)
 C V ... C V
 | | | |
 f ã r e₂
- c. (by [N] spreading)
 C V ... C V
 | | | |
 f ã r e₂
- d. (surface representation)
 C V ... C V
 | | | |
 f ã r̃ ẽ₂ [fãrẽ] confessed

4. CONCLUSION

We have shown in this article that nasality is better accounted for in a nonlinear framework such as autosegmental phonology, than in a linear framework as presented by Donwa-Ifode (1996). This is because our data show that nasality exists on two separate tiers in Urhobo. Although both oral and nasal consonants and vowels appear to exist at surface structure, in the underlying structure nasality as a distinctive property belongs only to nasal consonants, which are represented on the segmental tier, while nasality as an autosegment is mapped on to a stem on the autosegmental tier. Nasality as an autosegment has the following properties: (1) it is root-controlled, being mapped on to only one slot, i.e. the first vowel segment within the stem; (2) nasal spreading is bi-directional, affecting all segments that are receptive to nasality within the stem, and even across morpheme boundaries—but its effect is vacuous if the adjacent segment is a nasal consonant and it is blocked by an obstruent and a prefix-boundary; and (3) it is stable, which accounts for its independence, so that when a

vowel bearing it is elided or becomes a nonsyllabic glide, the phenomenon is not deleted with the vowel segment.

REFERENCES

- Clements, G. N. and S. J. Keyser 1983. *CV Phonology: A Generative Theory of the Syllable*. Cambridge, MA: M. I. T Press.
- Donwa-Ifode, S. 1989. Prefix Vowel Reduction and Loss of Noun Class Distinction: The Edoid Case. *Afrika und Übersee* 72:229–253.
- Elugbe, B. O. 1991. The Limits of Accuracy in the Design of Orthographies. *JWAL* 21:49–54.
- Goldsmith, John A. 1990. *Autosegmental and metrical phonology*. Oxford: Basil Blackwell.
- Halle, M. and J. R. Vergnaud 1982. On the Framework of Autosegmental Phonology. In H. van der Hulst and N. Smith (eds.), *The Structure of Phonological Representations 1*. Dordrecht: Foris Publications.
- Hyman, Larry M. 1982. The representation of nasality in Gokana. In H. van der Hulst and N. Smith (eds.), *The structure of phonological representations 1*. Dordrecht: Foris Publications.
- Pulleyblank, D. 1986. *Tone in Lexical Phonology*. Dordrecht: Reidel.