

Locating Rules by Traditional Lexical and Post-Lexical Properties:  
Towards a Lexical Phonology of Garifuna

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## 0.0 Overview

This study will present several phonological rules from Garifuna, an Arawakan language spoken in Central America.<sup>1</sup> These will be examined in light of predictions concerning properties of lexical vs. post-lexical rules made by the theory of Lexical Phonology (as summarized by Kaisse & Shaw, 1985; following work by Kiparsky, 1982; Mohanan, 1982; among others). As this study represents work in progress, it will not attempt to make strong claims about various aspects of the theory of Lexical Phonology, many of which are currently controversial (morphological vs. prosodic bracketing, bracket erasure, post-lexical cyclicity, etc.).

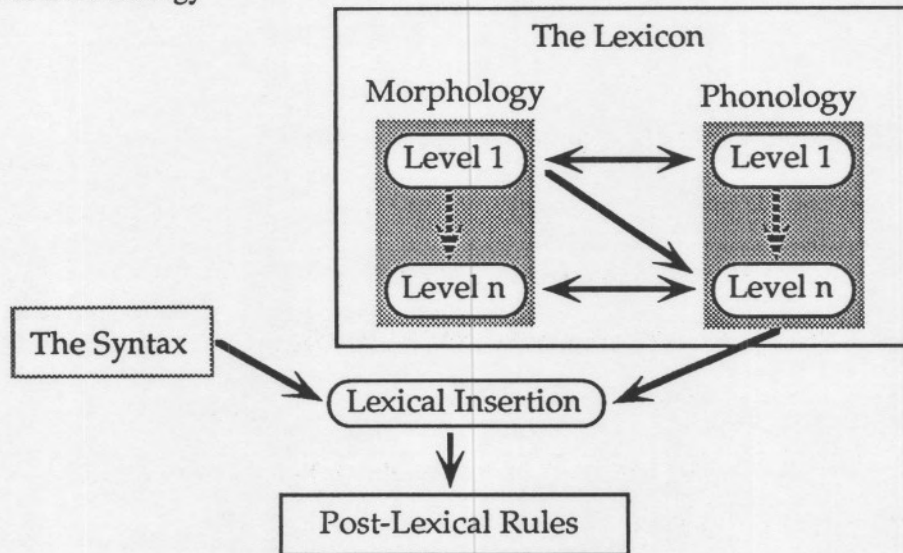
Instead, this paper assumes a fairly simple model of Lexical Phonology to be discussed in Section 1. Section 2 will discuss the phonological rules of Garifuna, presenting the relevant data and discussing the generalizations being made.<sup>2</sup> In each case, attention will be paid to the activity and characteristics of the rule with respect to the differential properties predicted by the assumed model. As will be seen, the Garifuna data do not provide the strongest traditional desiderata of lexical vs. post-lexical rule application: no phonological process observed so far critically exhibits cyclical application (a property of lexical rules) or applies between two inarguably independent words (a property of post-lexical rules). However, many of the rules presented in Section 2 are more or less intimately related to morphological structure, and these clues along with other observed properties will allow the rules to be located, at least generally, within a Lexical Phonology. Finally, Section 3 will summarize the conclusions from Section 2 by presenting a "skeleton" of the Lexical Phonology of Garifuna.

## 1.0 A simplified model of Lexical Phonology

The model of Lexical Phonology, now familiar to most readers, derives a number of effects from the interaction of morphological and phonological rules, and from restricting the application

of phonological rules to particular levels within (or outside) the lexicon. Graphically, the model assumed for the purpose of this study is presented as (1).

(1) Lexical Phonology



Critical gains made by this model of phonology over its predecessors were deriving cyclic application of phonological rules and derived environment effects from “passing” forms between morphological and phonological rule components, and the distinction between lexical and post-lexical rules. As is evident from the diagram in (1), a phonological process which operates between words (except perhaps in compounds) is by definition post-lexical, since only the operation of syntactic rules and lexical insertion can concatenate independent words. By the same token, words restricted in their application to particular morphemes or levels had to be lexical.

The table in (2) presents some of the traditional characteristics attributed to lexical and post-lexical phonological rules.

(2) Lexical rules:

- cannot apply between words
- may apply cyclically
- have categorial output
- are neutralizing
- may have lexical exceptions
- only apply within words
- are obligatory
- may be restricted to derived environments

Post-Lexical rules:

- may apply between words
- are non-cyclic (except possibly in phrasal domains)
- may have gradient output
- may create novel segments
- apply across the board
- may apply between words
- are optional, and may be sensitive to rate, register and pause
- may apply in underived environments

- may be lexically or morphologically conditioned.

- apply across the board (left to right), whenever their structural descriptions are met.

While individual points in (2) may be matters of some controversy, generally speaking, various models of Lexical Phonology will ascribe to a rule it identifies as “lexical” many of the properties of the left-hand column in (2) and few of the properties of the right-hand column, and vice versa.

## 2.0 Phonological processes in Garifuna

This being so, a lexical phonologist expects that a given rule in some language will exhibit some cluster of properties or other which identify it as lexical or post-lexical. This section will address to what extent the phonological rules of Garifuna conform to this typology of rule characteristics. Section 2.1 provides a brief overview of the general properties of Garifuna phonemics. The discussion of phonological rules in Garifuna begins with Section 2.2.

### 2.1 Garifuna phonemics and orthography

Garifuna has sixteen phonemic consonants, presented in (3), along with six phonemic vowels. The consonants have their expected English orthographic values; voiceless stops are aspirated, <ch> represents a postalveolar affricate (IPA [tʃ]), etc. For the dialect studied, <ɽ> represents a retroflex approximant of the American English variety, though other dialects reportedly have tapped or trilled /t/. The vowel system includes six phonemic vowels (one marginal), arranged in roughly a symmetrical-five vowel pattern with the addition of a high, back, unround vowel (IPA [ɯ] or perhaps [ɨ], written <ü>). The five uncontroversial vowels show considerable allophonic variation which does not appear to be rule governed. However, such within-type variation is not atypical in languages with relatively few, widely spaced, vowels.

#### (3) Phonemes of Garifuna (in UCLA orthography)<sup>3</sup>

##### Consonants:

p, b    t, d    ch    k, g  
f        s  
m        n  
          l

##### Vowels:

i            u, ü (= [+bk, -rd])  
e        (o)  
          a

w r y h

Additional Orthographic Conventions:

nasalization = Vn

stress =  $\acute{v}$  ( $\acute{u}$  =  $\hat{u}$ )

Nasalization of vowels is phonemic, length is not. Stress is apparently lexically determined, although confined to one of the first two syllables. Syllables are maximally CV except in the case of some borrowings or when a nasal vowel decomposes into a nasal-vowel nasal-stop sequence before an oral stop.

## 2.2 Vowel variation with possessive and person marking prefixes

### 2.2.1 Prefixal person markers

Garifuna has a robust seven-category agreement system, used to indicate or agree with arguments of verbs, possessors of possessible nouns, and objects of prepositions. In the case of possessors, prepositional objects and subjects of some transitive verbs, the seven categories are indicated with prefixes, given in (4).<sup>4</sup>

#### (4) Garifuna person marking prefixes

n-	first singular (1s)	wa-	first plural (1p)
b-	second singular (2s)	h-	second plural (2p)
l-	third singular masculine (3m)	ha-	third plural (3p)
t-	third singular feminine (3f)		

When prefixed to vowel initial stems, the consonantal prefixes (the singulars and second person plural) create a CV syllable with the stem-initial vowel. The syllabic prefixes *wa-* and *ha-* (1p and 3p, respectively) generally cause deletion of the stem vowel; if the deleted syllable head was stressed, as in (5), the /a/ quality of the prefix inherits the stress. Note that with /a/ initial stems as in (5a), this results in effective homophony between the second and third plural forms.

#### (5) "Possessive prefixes" attaching to V-initial stems

a. <i>áti</i> 'older brother'	
náti my older brother	wáti our older brother
báti your (sg) older brother	háti your (pl) older brother
láti his older brother	háti their older brother
táti her older brother	
b. <i>úguchuru</i> 'mother' <sup>5</sup>	
núguchu my mother	wáguchu our mother

búguchu your (sg) mother  
 lúguchu his mother  
 túguchu her mother

húguchu your (pl) mother  
 háguchu their mother

c. *ûgürai* 'hammock'

nûgüra my hammock  
 bûgüra your (sg) hammock  
 lûgüra his hammock  
 tûgüra her hammock

wágüra our hammock  
 hûgüra your (pl) hammock  
 hágüra their hammock

d. *íbugayan* 'sibling'

níbugayan my sibling  
 bíbugayan your (sg) sibling  
 líbugayan his older sibling  
 tíbugayan her older sibling

wábugayan our sibling  
 híbugayan your (pl) sibling  
 hábugayan their sibling

Some sort of rule deleting a stem-initial vowels after /wa-/ and /ha-/ is required.

However, there are cases when such a vowel fails to delete after these prefixes, notably with certain instances of /wa-/ with stressed /i/. A phonologically similar prefix, /ma-/ 'not have *N*; not be able to *V*', also shows this kind of exceptionality.

(6) Exceptions, /wa-/ + stressed /i/

wítu 'our older sister' <	wa + ítu 'older sister'
wéidi 'we're leaving' <	wa + ídi 'go'
míbiagua 'not cut' <	ma + íbiagua 'cut'

Interestingly, 3p /ha-/ and /ga-, the affirmative counterpart to /ma-/ meaning 'have *N*; be able to *V*', have not so far been observed to behave this way, never deleting /a/ before a following vowel. It has been suggested that this is an instance of homophony avoidance in the case of /ha-/ which would be homophonous with 2s /h-/ if the /a/ were to delete. However, no such explanation has been suggested for /ga-/ (there being, so far as can be determined, no competing /g-/ prefix), but occurrences of /ga-/ with vowel initial stems are relatively uncommon in the UCLA Garifuna corpus.

Thus, in addition to the rule deleting the second vowel out of V+V string (that is, a stem initial vowel after /wa-/ or /ha-/ as in (5), a rule deleting the first vowel out of a V+V string must also be posited. These rules are formalized below, along with others affecting the paradigm of prefixes in (4).

C-initial possessed nouns, before being prefixed with a consonantal person-marking prefix, are first prefixed with a high vowel, either [u] or [i], indicating possession. This high vowel is known to be a prefix rather than an epenthetic vowel because it occurs with possessed nouns with unspecified (i.e. WH-type) possessors.

(7) Possessive prefixation without person marking

*gárada* 'book, letter, paper' (< Sp. *carta* 'letter')  
 Ká igárada ... ? 'Whose book ...? '  
 Ká gárada ... ? 'What/Which book ...? '

The distribution of the [i] and [u] qualities of this vowel is determined phonologically. In general terms, the [u] quality occurs when the following consonant (i.e. the initial consonant of the stem) is a labial ([p, b, f, m, w]) and the following vowel is not [i].

(8) Possessive prefixation before a labial consonant not followed by [i]

nupéni	'my pen'	<	péne	'pen' (< E.)
nubésina	'my neighbor'	<	besína	'neighbor' (< Sp. <i>vecino</i> )
nufáluma	'my coconut'	<	fáluma	'coconut' (< Sp. <i>palma</i> 'palm')
numúrisi	'my murisi (palm)'	<	murísi	'murisi palm'
nuwéyali	'my man'	<	wéyali	'man'

If the initial vowel of the stem is [i], or if the initial consonant is not labial, the prefix vowel is [i]. That is, the labiality of an initial consonant can only exert rounding (and backness) on the prefixal vowel if the following vowel is not itself [+high] and [-back].

(9) Possessive prefixation before a labial consonant followed by [i]

nibímena	'my banana'	<	bímena	'banana'
nimíbi	'my vine'	<	míbi	'vine'
nifiádaü	'my dollar'	<	fiádaü	'dollar' (< P. <i>fiado</i> 'credit')

(10) Possessive prefixation before nonlabial consonants

nigárada	'my book'	<	gárada	'book/letter/paper'
niléma	'my wood/my fire'	<	léma	'wood/fire'
niháti	'my (special) month'	<	háti	'month, moon'
ninádiri	'my plant'	<	nádiri	'plant'
nidúругu	'my truck'	<	durúгу	'truck' (< E.)

Two disjunctively ordered rules are required to cover these alternations. The first spreads the distinctive quality of the /i/ vowel of the stem to the prefix. The second allows the labial quality of the stem consonant to cause the prefix vowel to round, thus surfacing ultimately as [u].

The generalizations regarding the surface form of the possessive prefix vowel when prefixed to consonant initial stems can be summarized as the rather cumbersome set of ordered statements in (11):

(11) Possessive vowel specification:

- In a string [Poss V<sub>1</sub> [Stem C V<sub>2</sub> ... ],
- a) if V<sub>2</sub> is [i], then V<sub>1</sub> is [i]; if not, then
  - b) if C is labial, then V<sub>1</sub> is [u]; otherwise
  - c) V<sub>1</sub> is [i].

The 'default' quality of [i] in (11c) and the reactivity of underspecified vowels to labial consonants (as in 11b) is not limited to the possessive prefix

### 2.2.2 Excursus on the generality of these processes

It is important here to indicate that the phonological generalizations motivated in this section are not limited to allomorphy under prefixation. Rather, these are reflexes of more general processes in the language. At least the last two clauses of (11) can be seen applying in other cases of un(der)specified high vowels.

The first of these is involves stem-final epenthesis to C-final stems in recent borrowings (notably, names of people), in which an [i] or [u] is appended to the stem in order to adhere to the general preference for open syllables in Garifuna (occasionally, non-final consonant clusters are preserved; for instance *askɪpahani* 'to jump rope' which is borrowed from English *skip*. Forms of this type, however, strike the speaker as 'un-Garifuna-like'). With stem-final epenthesis, if triggering consonant is a labial, the epenthetic vowel is [u], as in *Pam-u* or *Rob-u*. Otherwise, it is [i], as in *Jonathan-i* or *Shantel-i*. This illustrates both the reactivity of the epenthetic vowel to the labiality of the adjacent consonant, and the default nature of the [i] quality.

Another process, that of 'salutative' formation, is similar. A salutative is a particle added to a proper name used as a greeting or hail. In Garifuna, men appear use the particle *wéi* exclusively, but women vary the particle according to phonological properties of the name being used.<sup>6</sup> For example, (12a) illustrates salutative formation with labial-consonant final stems, (12b) with vowel or non-labial consonant final stems, and (12c) the interesting case of round vowel final stems.

(12) Salutative formation

- a. Pam-áú ([əu])  
Rob-áú
- b. Jonathan-éi (</ai/)  
Darcy-éi  
Nita-éi
- c. Sue-áü  
Kaoru-áü (Kaoru-áú has also been reported)

Here, the generalization seems to be that the final vowel (the off-glide of the surface diphthong) surfaces as [u] when the name-final consonant is labial, [i] if the name ends in a non-labial consonant or an unround vowel, and [ü] if the name ends in a round vowel. (The different reports with the name Kaoru suggest that the round vowel can in some cases exert rounding on the salutative vowel.) The orthographic conventions here mask the processes involved. In every case, vowel coalescence, to be discussed below, applies to the salutative particle, but the three surface varieties are derived from a phonological /a+u/, /a+i/ or /a+ü/ sequence. In the case of the [labial] features of the consonant spreading over /a/ (12a), it should be pointed out that rounding occurs to some degree throughout the salutative particle, and thus salutative formation does not constitute an instance of feature-copy vs. feature-spread.

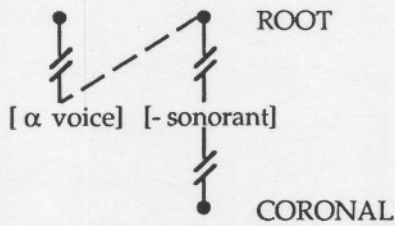
In a similar manner, the processes of deletion out of V+V sequences have been applied to other instances of (ostensible) V+V sequences formed under suffixation. However, whether or not these processes can apply depends on the analysis of these suffixes, and thus will not be discussed here.

### 2.2.3 Formalizing vowel specification and deletion rules

In autosegmental terms, it is preferred that assimilations and harmony processes be explained in terms of spreading of independently specified features to unspecified segments. For instance, standard voicing assimilations, such as in the English plural and past tense markers may be formalized as in (13).

(13) English voicing assimilation<sup>7</sup>

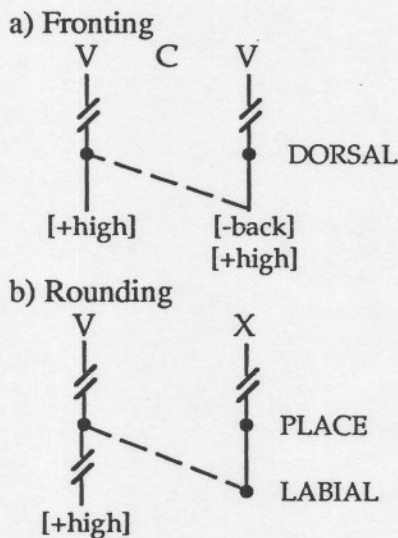




(13) assumes that the rule is limited to derived environments and applies only on certain levels of the lexicon, thus obviating the possibility that (13) could apply to anything other than the intended affixes.

The seeming inelegance of the generalization in (11) is mitigated with the realization that what is being described is a series of bleeding assimilations. First is the spreading of [-back] from a stem-internal /i/ to an epenthetic, underspecified [+high] vowel in the possessive prefix. Second, labial features, depending on treatment either the feature [round] or the labial node, are spread from the following labial consonant. One possible formalization, assuming articulator-specific featural geometry, such as suggested by Sagey (1986) is presented in (14).

(14) Spreading rules



filter: \*[-back, •LABIAL]

Additional structures or stipulations are required to assure that only appropriate structures cause or block spreading, etc. However, by capturing the generalization in (14) in terms of

spreading of features, the stipulative qualities of the (11) are alleviated. Later rules will further specify any vowel with a labial node as [+round] and other features as relevant.

Fronting and Rounding, being morphologically restricted in application (variously to the possessive prefix, salutative particle, and epenthetic vowels) and subject to a filter, are therefore quite likely to be lexical rather than post-lexical.

It should be noted at this point that such an interpretation of the Garifuna facts is *not* compatible with a strong form of Radical Underspecification (e.g. Archangeli, 1984; Archangeli & Pulleyblank, 1986). Radical Underspecification requires that underlying vowels (or, more accurately, vocalic timing slots) which have the same surface quality as a default epenthetic vowel be completely underspecified in the lexicon. Such a vowel, having only 'default' feature values, should be specified by the same rules which determine the surface quality of 'empty' epenthetic vowels.

If this were the case, and underlying /i/ vowel in a Garifuna stem would have all and only those features associated with epenthetic [i]. In the strongest case, this would be no features at all. In such an analysis, then, there would be no features available in the stem vowel to spread onto the prefixal vowel, and thus no principled reason for the presence of such a vowel in the stem to block Rounding.

In the present analysis, stem vowels are assumed to be fully specified in the absence of evidence to the contrary (e.g. alternation). Some morphemes, in particular, the possessive prefix, would be underlying underspecified, and thus are predicted to be particularly 'vulnerable' to assimilations. In this way, 'harmonizing' affixes such as the Garifuna possessive prefix and salutative particle perhaps are a sub-case of partial reduplication (Hagiwara, 1992).

In any case, the possessive prefix is analyzed as an otherwise unspecified [+high] vowel. Assimilation of the possessive prefix to a following /i/ is seen as an instance of height-agreeing backness harmony, where [+high] /i/ but not [-high] /e/ can induce Fronting. A filter disallowing [-back, •LABIAL] segments effectively blocks Rounding. When Fronting does not occur,

Rounding can apply. Later, default rules, including those which specify epenthetic vowel quality, will fill in the the other features of [i] and [u] as appropriate.

The late rules of Vowel Specification alluded to above ‘clean up’ representations left underspecified by the lexical phonology. The idea that possessive prefix vowels which do not under go Fronting or Rounding remain underspecified through the lexicon is further supported by the phenomenon of ‘Fast Speech Harmony’.

(15) Examples of ‘Fast Speech Harmony’

<u>fast speech</u>	<u>careful speech</u>		
nugúsiyun	nigusíyun	‘my knife’	(< Sp. <i>cuchillo</i> )
nügûnwi	nigûnwi	‘my fish hook’	

Fast speech harmony has only been observed occurring over a ‘g’ phoneme. It is perhaps significant that /g/ is a dorsal consonant, but probably lacks specification for the major vowel features of concern to the late rules of vowel specification. ‘Fast Speech Harmony’ and the rules of Late Vowel Specification are most likely be post-lexical, if they are phonological rather than phonetic in nature.

Returning now to the cases of vowel deletion either out of or caused by the /wa-/ and /ha-/ prefixes, at least two distinct cases of vowel deletion out of V+V sequences has been observed. These can be summarized as (16):

(16) Vowel deletions

- a. Delete (some instances of ) /a/ from a prefix before /i/.
- b. Delete the stem vowel at a morpheme boundary when a V is affixed adjacent to it.

Formalization of the deletion rules, though not quite determining when they do and do not apply, is a relatively easy matter in standard transformational (i.e. SPE) terms.

(17) Formalizations corresponding to (16)

- a. A-Deletion:        a --> Ø / \_\_\_\_ + í
- b) V-Deletion:        V --> Ø / V + \_\_\_\_

However, some exceptions to these rules do exist. As can be seen in (19), stem initial /u/ and /i/ are expected to delete after *wa-* and *ha-*. However, in at least one instance, the [u] does not delete. The result is a diphthong of variable quality, ranging between [əu] and [o].

(18) Some exceptions to the vowel deletion rules

wauwénedi	'our dream'	<	uwénedi	'dream'
wéidi	'we left'	<	ídi	'go'

(from 6)

The rule which results in the coalescence of /a/ and a following high vowel will be discussed in greater detail in Section 3.2. For the moment, note simply that Coalescence may bleed the application of both rules of vowel deletion.

The exceptional nature of these deletion rules is further underscored by the forms *wábugayan* in (5d) and *wítu* in (6), which are preferred forms. However, it is possible to say both *wíbugayan* (which has undergone A-deletion) and *wátu* (which has not).

### 2.2.3 Lexical or post-lexical

The sum up this section, the properties of the four most important rules discussed in the above sections are compared against the lists of properties of lexical and post-lexical rules.

Fronting (14a) and Rounding (14b): These rules are unquestionably lexical, meeting so many of the criteria of lexical rules and none of post-lexical rules: they are categorial (rather than gradient) in their application; they do not create novel segments; they are obligatory; and they are apparently restricted to derived environments. The fact that they seem exceptionless (at least in the case of possessive prefix vowel) is not in itself a desiderative factor, while a lexical rule may have exceptions, it may not. Similarly, it is possible to formulate the rules in such a way that they apply specifically to the possessive prefix vowel, i.e. in a way that is morphologically conditioned. However, lexical rules need not be so conditioned.

A-Deletion (17a) and V-Deletion (after /a/, 17b): Deletion rules are by definition categorial and neutralizing in nature; thus these criteria cannot be applied to the process of locating these rules. As we have seen, however, A-Deletion is apparently morphologically (or lexically) conditioned, occurring out of /wa-/ and /ma-/ (but not /ga-/ or /ha-/) and only when combined with certain stems. Independently, V-Deletion has apparent lexical exceptions beyond the cases where A-Deletion bleeds it. The forms *wéidi* (from wa+ídi '1p + go') and *wáuwenedi* '1p + (poss + ) dream' make this clear. Further, as will become clearer below in the discussion of vowel

coalescence processes, these rules are restricted to derived environments. Thus, they are most likely lexical.

An additional point must be made about these vowel deletion rules. Recall the possessive prefix, which cooccurs with consonantal person marking prefixes, but apparently deletes when syllabic /wa-/ or /ha-/ is prefixed. If this vowel were epenthetic, this would not pose a problem. However, since the [i/u] possessive prefix is demonstrably a separate morpheme (7), we must account for its deletion (or non-affixation) a) after /wa-/ and /ha-/ and b) before V-initial stems.

Something so clearly an instance of a more general trend of vowel deletion across morpheme boundaries should not be relegated to allomorph selection. Thus, there is a need to extend both rules in (17), such that A-Deletion, perhaps more technically seen as 'First Vowel Deletion' is able to delete a possessive prefix vowel before a V-initial stem, and V- (or Second V-) Deletion is allowed to delete a stem-initial vowel after syllabic /wa-/ or /ha-/. The strict order of these rules in the lexicon follows the ordering of the affixes, i.e. V-Deletion precedes A-Deletion. This suggests an analysis which should be pursued in further research: that the two vowel deletion rules are restricted to separate domains, i.e. that First Vowel Deletion can be located on one phonological level (call it P Level 1), and Second Vowel Deletion can be located on another (P Level 2).

Although the correspondence of morphological levels to phonological levels is not necessarily 1-to-1 in the assumed model of Lexical Phonology, it makes sense to assume further, as a working hypothesis, that the possessive prefix, one which might equally be called 'derivational' or 'inflectional' in traditional terms may be locable in a morphological domain *higher* than the person-marking prefixes. That is, the possessive [i/u] prefix is located on M Level 1, a morphological level analogous to the P Level 1; the person marking prefixes, which most would not hesitate to call inflectional, are located on a later morphological level, M Level 2.

As more and more cases of vowel deletion are investigated (perhaps more examples of /ma-/ and /ga-/ and more examples of all the prefixes with verbal stems that begin with vowels other than [a] or stressed [í], if any are to be found in the language), the general finding here may assist

in further elucidating exactly how many morphological and phonological levels there are in Garifuna, and to which any given morpheme or phonological rule may belong.

For the time being however, this study will continue to seek answers to the simpler question, is rule X lexical or post-lexical. The more ambitious undertaking, the elaboration of a Lexical Phonology of Garifuna, will be left for further research.

### 2.3 Vowel coalescences and R-Deletion

In a sense competing with the vowel deletion rules discussed above are a set of vowel coalescence rules. These rules take a string of vocalic segments and reorganizes them into a single (sometimes long) element of intermediate quality. Vowel coalescences of different elements have slightly different properties, so they will be discussed separately.

#### 2.3.1 AI-Coalescence and R-Deletion

AI Coalescence replaces an /a+i/string with a monophthongal [e] vowel which is usually slightly higher or tenser than phonemic /e/. Sometimes, this vowel is long, but length is never distinctive in Garifuna (see First Vowel Lengthening, below). It often occurs over morpheme boundaries (such as when future particle *ba* is suffixed with a masculine singular /-i/ suffix) and when the /a+i/ string is created by a rule of R-Deletion (see below).

(19) Some examples of AI Coalescence

a. in nouns

Garífuna	[gaɪfuna]	-->	Géífuna	[ge:funa]	
arígei		-->	éígei		'ear'
mawádigimaríti		-->	mawadigimeíti		'bum'

b. in verbs

tágurubei	<	t+águru+ba+i	'she will throw him out'
wéídi	<	wa+iídi	'we come'

Here as in other examples, orthographic <ei> represents only an [e] segment that is produced by AI Coalescence. The digraphic representation is only a cue for derivational history, and is not meant to imply any diphthongal movement in this vowel (spectrograms show a remarkably flat formant structure; Sands, 1991). AI Coalescence is sensitive to stress in that a stressed /a/ followed by an unstressed /i/ does not coalesce: *gáriti* 'pain' --> *gáiti*, \**géiti*.

AI Coalescence and R-Deletion can be formalized as follows:

- (20) AI Coalescence:      ǎ i    -->   [e]  
 (21) R-Deletion:           r --> Ø / V \_\_\_ V

R-Deletion is quite common within words, both in morphologically complex and underived forms. Additional examples of R-Deletion, with other vowel contexts, are given in (22).

(22) Some examples of R-Deletion

gáchuru	>	gachúu	'bead'
iséri	>	iséi	'new'
líra	>	lía	'that(m) over there'
múra	>	múa	'earth'
surúsiya	>	súusiya	'doctor' (< Fr. <i>chirurgien</i> 'surgeon')

R-Deletion is an optional rule; the speaker may choose to apply it or not. It does not apply over word boundaries (that is, to /r/-initial words), but is not restricted to derived environments. It is also sensitive to rate and register, applying more often in casual and rapid speech. It seems, in short, like a post-lexical rule. However, it does have a number of exceptions:

(23) Some exceptions to R-Deletion

wíra	'calabash tree'	*wía, *wée
gubári	'tick'	*gubái, *gubéi
usári	'deer'	*usái, *uséi
barúru	'plantain'	*báuru, *barúu, *báuu

This fact requires that this rule be lexical. The fact that R-Deletion is not restricted to derived environments is interesting, but more elaborate versions of Lexical Phonology allow lexical rules one last chance to apply on the final cycle (sometimes on every level), so this in itself is not a problem for concluding that R-Deletion is lexical. However, the fact that it is sensitive to rate and register is greatly troubling; among the controversies surrounding lexical phonology, rate-and-register dependencies in the lexicon have not been widely mentioned.

AI Coalescence, on the other hand, is a good candidate for a lexical rule, being categorial in application, neutralizing rather than allophonic and being obligatory rather than optional. If AI Coalescence is taken as lexical, then R-Deletion, which feeds it, must also be lexical, at least in one domain of its application.

### 2.3.2 AU Coalescence

Apparently related to AI Coalescence is another coalescence, occurring with /a/ and /u/ or /ü/. However, in the case of AU Coalescence (using capital U as a neutral representation for both /ü/ and /u/), the output is clearly diphthongal, though to varying degrees. The resulting diphthong can have any quality along a continuum from clearly diphthongal [əw] and [əu] to nearly monophthongal [ou] and [əu]. Again fed by R-Deletion or by concatenation of morphemes, it is not restricted to derived environments:

(24) Some examples of AU Coalescence

a. derived environments

háuga [həwɔə, houga]	<	harúga	'tomorrow'
Ka téigibau?	<	t-arígi+ba+u	'What(f) is she eating?'
wáuwenedi	<	wa+uwénedi	'our dream'
háü [həu]	<	hárü	'ant'

b. underived environments

báulu [bəulu]	'bowl'	(< E. <i>bowl</i> , cf. gólu 'gold', óku 'oak')
báübei [bəuβəi]	'to bring'	

AU Coalescence differs from AI Coalescence in that its output is gradient, rather than categorical, and it does not have the same sensitivity to stress. It applies in underived as well as derived environments. It is, in short, a good candidate for a post-lexical rule. It does, however, have a few apparent exceptions.

(25) Failure of AU Coalescence to apply to the *á* auxiliary

Háu náü fáluma.	[həu nau faluma]
háu n-á-u fáluma	
eat 1sS-AUX-3fO coconut	
'I ate the coconuts.'	

The auxiliary particle *á*, when suffixed with the third feminine singular suffix /-u/ never undergoes AU Coalescence. This is in rather striking contrast to the combination of the future auxiliary *bá* with the /-u/ suffix, which routinely under-goes coalescence. Similarly, the instrumental preposition stem, which is written <-áu> never coalesces; this again is in contrast with the verb stem *háu* 'eat' which usually coalesces, at least before the *á* auxiliary.



There is at least anecdotal evidence that some speakers accept the instrumental preposition as /-áwu/ rather than /-áu/, in which case it may be subject to a lexicalized version of Final Vowel Weakening (see below), resulting in a diphthong /aw/.

Thus, careful analysis of the *á* auxiliary and the underlying representation of the *háu* verb stem, which is one of a set of suppletive verb stems apparently conditioned by aspect (Chen 1991), before these should be regarded as unambiguously exceptions to the rule of AU Coalescence.

### 2.3.3 Vya Coalescence

Like the vowel deletion rules discussed above in Section 2.2, it may ultimately be that the rules of vowel coalescence should be treated as instances of a more general rule. However, for the purposes of this study, it seems apparent that many similar rules exhibit different properties in the 'typology' in (2). Vya Coalescence is a good example. It is similar to the above coalescences in that it affects a string consisting of /a/ and another vocalic element which is [+high]. Vya Coalescence has been observed only in two morphemes, the stem used to form independent pronouns and ablative *-giya*.<sup>8</sup>

#### (26) Coalescence in pronoun-forming *-igíya/-ugúya*

(1s)	nugúya	-->	[nugé:]
(2s)	bugúya	-->	[bugé:]
(3f)	tugúya	-->	[tugé:]
(3m)	ligíya	-->	[ligé:]
(1p)	wagíya	-->	[wagé:]
(2p)	hugúya	-->	[hugé:]
(3p)	hagíya	-->	[hagé:]

#### (27) Coalescence in ablative *-giya*

lídagíya	-->	[lídagé:]	'through it'
Seine Beidigíya	-->	Seine Beidi[ge:]	'(starting) from Seine Bight'

Like AI Coalescence, the result of Vya Coalescence results in a longish, monophthongal [e], even in cases where one of the effected vowels is /u/.<sup>9</sup> Being restricted, so far as is known, to these three allomorphs of two morphemes, it may be lexical. It is, however, optional, and occurs more often in casual speech than in careful. The only other criterion applicable to these forms fails to provide a concrete answer; the morphemes to which Vya Coalescence may apply are bound, so

Vya is always observed occurring in derived forms. However, the actual string being coalesced is contained *within* a unit morpheme, rather than being the result of morphological concatenation or the output of a previously applied phonological rule.

## 2.4 Additional Phonological Rules

Some additional phonological processes in Garifuna are worth examining in terms of the typology in (2).

### 2.4.1 Final Vowel Weakening

One of the striking characteristics of spoken Garifuna is the presence of weakened vowels. Sands (1991) describes Final Vowel Weakening as “a low-level process of lenition at the end of an intonational phrase.” All five of the uncontroversial monophthongal vowels of Garifuna are subject to it, though nasal vowels, long vowels (created by suffixation vocalic suffix) and diphthongs do not weaken. Weakening is very common in declaratives, but rare in questions.

According to Sands’s (1991) acoustic study, a phrase final vowel devoices when following a voiceless consonant, though it usually does not shorten appreciably. The vowel quality is easily recovered, since the middle formants are excited by aspiration noise or by the offset of sibilant friction. When the vowel follows a voiced contoid, the vowel undergoes a sharp loss of amplitude compared to other vowels and shortens (or deletes altogether). When following a glide ([y, w, r, h] in this analysis) the vowel deletes or (less commonly) weakens in amplitude and duration.

Being the only rule discussed in this paper which makes reference to higher-than-lexical-word prosody, no hesitation should be encountered in declaring this rule as post-lexical. It creates novel segments (voiceless vowels), applies gradiently, and apparently applies without exception. Its seeming obligatoriness (failing to apply weakening in an appropriate context is a sure sign of non-native Garifuna speech) is not in itself a difficulty for this decision.

### 2.4.2 Labial Effect

The rule called 'Labial Effect' in this paper is troubling because it is very consistent, and very productive, but has absolutely no phonetic motivation. In this study, it will be regarded as a backing rule, but this is by no means clear.

Under Labial Effect, an [e] in a derived monophthong <ei> or underlying diphthong backs to [əɪ] (or for some transcribers [wɪ]) when following a labial consonant, /p, b, f, m, w/. That is, the sequence written <Bei> where B stands for any of the five labials, is pronounced with a diphthong of the [əɪ] variety, regardless if the diphthong is and underlying /ei/ or and underlying /a(r)i/ sequence. It does not effect [e] followed by an underlying consonantal /y/, such as in *béya* 'beach'.

(28) Some examples of Labial Effect

Seine Béidi  
féidi  
wa+arihi ba+d+ü  
3p+see FUT+D+2p  
'we will see you(pl)'

[sen bæɪdi]  
[fəɪdi]  
[wəɪhi badũ]

Seine Bight, Belize  
'party' (<Fr. *fête* 'party')

If one were to analyze all Labial Effect-ed [əɪ] sequences as underlyingly /a+i/, then Labial Effect can be formulated as the blocking of a fronting rule, one which along with a raising rule forms AI Coalescence. However, it is difficult to maintain such a position in which forms like *féidi* 'party' also exhibits Labial Effect, even though presumably the word was borrowed from a source word with a unit monophthong of a type which exists in the modern language independently. There would be no compelling reason for modern Garifuna speakers to reanalyze this vowel as a diphthong.

Being unrestricted as to environment, creating a non-underlying segment, and having no known exceptions, Labial Effect is most likely a post-lexical rule. Like Final Vowel Weakening, it is apparently not optional, on the contrary, applying whenever the appropriate sequence of phonemes is encountered. It is difficult to judge the gradience of Labial Effect because the output diphthong is so novel to the analysts. However, it has been recorded variously as [əɪ], [iɪ] and [wɪ] by transcribers adhering to strict IPA traditions, suggesting that it does in fact have gradient output.

### 2.4.3 Nasal Spread<sup>10</sup>

V-to-V spreading of nasality in Garifuna occurs over the voiced glides [r, w, y], and perhaps over [h] as well (those cases where nasality does not spread over [h] are arguably instances of failure to spread over a clitic- or word-boundary). Nasal spreading is blocked by all other consonants, including the nasals. Careful listening and spectrographic analysis reveals that underlyingly oral vowels in fact nasalize at least partially before nasal consonants, but such nasalization does not continue to spread rightward over glides, as true V-to-V nasalization. Thus, evidence in Garifuna indicates that the feature [nasal] as applied to vowels behaves quite differently from [nasal] in consonants. Whether this is because vowels may be underlyingly specified as [nasal] where nasal consonants are only redundantly so specified remains to be determined.

Nasal Spread, as alluded to above, is limited to occurring within words, rather than continuing over word boundaries. It occurs in both derived and underived environments, such that a string of two or more vowels separated only by glides always agree in nasality/orality. Nasal Spread has been observed in derived environments applying from right to left (i.e. anticipatorily), and for that reason is assumed to occur right to left in all instances. This is represented orthographically by writing a post-vocalic <n> only after the last vowel in the sequence.

(29) Some examples of Nasal Spread

- |                                  |                               |   |
|----------------------------------|-------------------------------|---|
| a) <u>hiyárun</u>                | [híyārũ]                      | ‘woman’ (w.s.) (underived)  |
| b) <u>háutiyan</u> ...           | [həufiyã]                     | ‘(...) ate’<br>cf. háuti [həuti] ‘ate’ + yán (PLUR)   |
| c) <u>mérenguti</u>              | [mērēguti]                    | ‘it is difficult’   |
| d) <u>afiyenti</u>               | [afiyēti]                     | ‘he believes’   |
| e) <u>Yaráfayahan niyán</u> tún. | [yaráfã yãhã niyã tũ]         | cf. Yaráfatu nuba.<br>yaráfa-t-u      n-uba<br>be.close-T-3fS 1s-house<br>“My house is nearby.” |
|                                  | yaráfa-yahan    n-yán    t-un |   |
|                                  | be.close-CONT 1s-PRG 3f-DAT   |   |
|                                  | “I’m keeping close to her.”   |   |

Nasal spread may be optional; with difficulty, the speaker can fail to nasalize vowels in some words, in a way that is impossible for the speaker to control other apparently obligatory but otherwise clearly post-lexical processes. The other log to be thrown on this fire is that the UCLA Garifuna Group’s principal speaker has generally very clear intuitions as to ‘where the n’s should

go', which conform strongly with the version of Nasal Spread described here in for morphologically complex forms. However for some forms, such as *hfyarun* 'woman' (w.s.) which has nasal vowels throughout, the speaker perceives "n's" on the first and last syllables, but not the second, stressed syllable. Tentatively, this study concludes that Nasal Spread is a post-lexical rule which cannot apply over word boundaries. In a more complicated Lexical Phonology, this rule might be located within the lexicon, but in a boundary-insensitive 'final cycle'.

#### 2.4.4 Stress Shift

Stress shift in Garifuna is not of the 'clash-avoidance' variety, but rather the result of foot-building over morphologically complex strings. It exhibits no positive property of post-lexical rules. However, it does not exhibit any properties of lexical rules beyond the facts of its environment. Stress shifts, like deletions, are necessarily categorial. Garifuna stress shift can only be seen applying in complex forms, but these could equally well occur post-lexically as lexically, since stress in Garifuna, beyond being limited to the first two syllables of the word, is unpredictable.

The facts of Stress Shift (or more accurately, Leftward Stress Shift) are these: if stem with second syllable stress is prefixed, the stress will shift onto the derived second syllable. In metrical terms, a maximally binary, right-headed foot is built from (or if a lexical second-syllable stress is to be treated as an autosegmental foot, associated to) the left edge of the word.<sup>11</sup>

(30) Some examples of Stress Shift

<i>faniya</i>	'lidless basket'	<i>nufaniya</i>	'my lidless basket'
<i>durugu</i>	'truck'	<i>nidurugu</i>	'my truck'

In such terms, it is not clear whether this rule is lexical or post-lexical. While obligatory, it is exceptionless. It exhibits no other desiderative characteristic, and as formulated, could apply equally well either lexically or post-lexically. Tentatively, it will be assumed that this rule is post-lexical.

#### 2.4.5 First Syllable Lengthening<sup>12</sup>

As discussed above, stress in Garifuna is limited to one of the first two syllables in the word. When it is the initial syllable, the vowel becomes lengthened. Stressed second syllables are not so lengthened. Unless the result of prosodic (contrast?) effects or concatenation of morphemes, long vowels are limited to this context, and are not contrastive. Interestingly, a word with initial syllable stress which is prefixed (placing stress on a now derived second syllable) does not receive (or retain) length.<sup>13</sup>

This fact suggests strongly that the rule applies quite late, i.e. post-lexically. If the rule were to apply in the lexicon, derived second syllables which retain stress ought also to retain length. It is not otherwise conditioned by morphological or lexical factors.

### 3.0 Summary and conclusion

Obviously this analysis requires more data and deeper analysis. However, the findings thus far have been quite suggestive, and the beginnings of a lexical phonology of Garifuna has been discussed. A sketch of this proposal is given in (31).

#### (31) Sketch of the Lexical Phonology of Garifuna

##### a) Lexical Rules

- Fronting
- Rounding
- A-Deletion
- V-Deletion
- R-Deletion
- AI Coalescence
- Vya Coalescence ?

##### b) Post Lexical Rules

- AU Coalescence ?
- Final Vowel Weakening
- Labial Effect
- Nasal Spread ?
- Stress Shift ??
- First Syllable Lengthening
- Fast Speech Harmony
- Late Vowel Specification

Further, in formalizing these rules, the theories of underspecification and feature geometry have been called into play. The conditions and stipulations placed on these rules, and their

ramifications throughout the phonology, may well provide evidence in favor of particular versions of, and alternatively against other versions of, these important theories in phonology.

This study has used 'clusterings' of properties associated with phonological rules, and has shown that for the majority of cases these can be seen 'clustering' together in ways in which the theory of Lexical Phonology predicts. Any renovations made to the theory, then, should be able to account for why these properties cluster together, or why, in the case that they do not, they do so often.

## Notes

<sup>1</sup>This paper represents a revised and considerably expanded version of Hagiwara (1991b). Data in this study were collected by the author and colleagues in the UCLA Garifuna Language Group taking part in a year-long investigation of Garifuna. Accordingly, the data are presented with the caveat that the observations were made with only one speaker and information that could be gleaned from written sources. I wish to express my gratitude to the Garifuna Language Group, in particular Anita Martinez, for many provocative discussions. I also want to thank participants in Donca Steriade's *Seminar on Markedness and Underspecification*, and accompanying "Underspecification Festival" conference, for helping me to crystallize the discussion in Section 2.2.3.

<sup>2</sup>The rules presented should not be taken to be a complete list of phonological processes of Garifuna, or even the speech of the one speaker investigated so thoroughly. Only those rules whose applications were general and predictable are included; alternations which occur only in very limited contexts or which were observed only haphazardly are not included in this study. Among these are a number of instances of palatalization of the /g/ phoneme, which occurs in many forms but not in any cohesive environment that distinguishes the forms in which it does occur from those in which it does not (Hagiwara 1990). Similarly, rules proposed to derive particular instances of

extremely limited sets of data are excluded from this study, as are rules which have been proposed which apply (or fail to apply) in morphological contexts with particularly volatile analyses (if it's a separate word, the rule works one way; if it's a suffix it works another). Until careful analyses of such forms are made, discussion of the properties of the rules involved is pointless.

<sup>3</sup>The UCLA orthography for Garifuna is based on one proposed by Cayetano (n.d.), though with some differences. Data in this paper will be presented in UCLA orthography, except when more subtle phonetic distinctions are under discussion, in which case the orthography will be accompanied by a phonetic transcription. The UCLA orthography is meant to capture distinctive features of phonemes in words, but is not intended in all cases as a phonemic representation and should not be regarded as such.

<sup>4</sup>The analysis of the prefixes in (4) is, with orthographic differences, identical to that given in Taylor (1956).

<sup>5</sup>The final syllable of *úguchuru* 'mother', as well as the final syllable in *úguchili* 'father' delete when these words are possessed. Similarly, the final vowel in the citation form of 'hammock', *úgurai*, deletes when possessed. I take this to be part of a morphologically conditioned alternation between 'absolute', or citation, and 'possessed' forms discussed by Taylor (1956). Except for an additional reference to the general phenomenon later, with respect to the rule of final-vowel weakening, this alternation will not be addressed in this paper.

<sup>6</sup>Differences between the speech of men and that of women occur mostly in the selection of vocabulary items such as the salutative particle. Men's speech *per se* is being used less, with traditional 'women's' forms being used relatively freely by both men and women.

<sup>7</sup>From here forward, I will use standard square bracket notation for terminal features, and 'bullet' notation (e.g. •ROOT, •CORONAL) to refer to class nodes in feature geometries. The feature geometry used here is based on that of Sagey (1986), but none of the discussion of Garifuna depends on this model over any other. In rule formulations, the 'broken' line represents



intervening structure which is not pertinent to the rule, and the 'dotted' line represents the association governed by the rule.

<sup>8</sup>Munro (1991) uses 'ablative' for another prepositional stem /-wéi/. This was only a convenient term for a stem which was sometimes translated as 'from'. which has a number of uses, including 'cause of emotional change' (as in 'scared of them') and standard of comparison ('taller *than* her'). I suggest the term 'source' should be used for /-wéi/, and reserve the term 'ablative' for this use of /-giya/ meaning 'from a place'. *Lídagiya* is derived by suffixing ablative -giya to -ida, another prepositional stem, which has general locative uses. The resulting compound literally means 'into and out of'.

<sup>9</sup>Occasional instances of *nugúya* 'I' have been transcribed as [nugí(j)ə], strongly suggesting a stage (in casual and relatively quick speech) in which the /u/ of the second syllable is fronted to [i], or a situation in which an underlying /i/ in the second syllable backs and rounds to [u] under the influence of the preceding /u/.

If this process preceded Vya-Coalescence, it would greatly simplify the rule. However, such a treatment would not solve the problem with the selection /u/ or /i/ in the first syllable.

Compare 3m *ligíya* with 3f *tugúya*.

<sup>10</sup>This section is revised from Hagiwara (1991a).

<sup>11</sup>Unfortunately, Garifuna is not particularly rich in prefixes. At most, one syllable has been seen added via prefixation. It would be interesting, to say the least, if longer strings of prefixes could be found.

The interesting thing about Stress Shift is not its placement within a Lexical Phonology, but its implications for metrical phonology, when compared to a less-well understood process of Rightward Stress Shift. Rightward Stress Shift has not been well studied. It seems at present to be limited to men's speech. Men's speech and women's speech in modern Garifuna are differentiated mostly by the choices of lexical items, mostly in the realm of words for people.

Anecdotal evidence indicates that men's speech is dropping out of usage, the words and morphemes being replaced by the analogous forms from traditional women's speech.

Rightward Stress Shift occurs when in men's speech certain suffixes are added to some lexical items. If the item in question has initial stress, it will shift onto the *second* syllable. In this case, it appears as if an unbounded, or at least non-binary foot is build from the right edge of the word, and suffixation causes it to associate to the word differently. Little enough is known about Rightward Stress Shift that no conclusions should be drawn from the limited data in the currently in the corpus.

<sup>12</sup>The generalizations discussed in this section are thanks in large part to Abby Kaun and Pam Munro, who first elucidated the phenomenon for the Garifuna Language Group and placed bounds on its application. I remain, unhappily, impervious to attempts made at getting me to hear length differences in running speech.

<sup>13</sup>To my knowledge, no careful study of vowel duration has been made to determine the validity of this claim. It is based on observation and auditory impression among the Garifuna Language Group. It has been suggested (Kaun p.c., Hayes p.c.) that first vowel length may be underlying and may account for first syllable stress, if the maximally binary foot posited in Section 2.4.4 is weight-sensitive. If this were so and the observation of no appreciable length in stressed *derived* second syllables is valid, then some rule must shorten such vowels as appropriate. This rule would have the same typological properties of the rule assumed here.

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