

LONG VOWELS
AND UNDERLYING POSTVOCALIC r
IN CREOLE FRENCH

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A fundamental problem in generative phonology is that of the motivation of abstract underlying forms. This problem raises many theoretical issues even in the analysis of languages exhibiting extensive inflectional and derivational morphophonemic alternations and whose well-documented historical development permits appeal to diachronic rules which can be assumed to be reflected at the synchronic level. The motivation of abstract underlying forms is particularly troublesome in the case of languages lacking inflectionally related forms and whose historical development is not well charted. Such is indeed the case for Creole French,¹ hereafter referred to as Creole, a creolized language resulting from the convergence of Northern (Oil) varieties of French and West African languages, presumably in a situation of multilingual contact. Given the multiplicity of its putative source languages, it is difficult to specify with confidence the terminus a quo of Creole. In this paper, I will attempt to show that the postulation of abstract underlying forms on the basis of isolated derivationally related forms and appeal to uncertain diachronic relationships results in erroneous analyses that obscure structural facts. Indeed, the misanalysis I will attempt to refute is the result of the view, espoused by many creolists, that, in its phonological and lexical systems at least, Creole derives directly from Standard French (SF). The specific phonological problem discussed here is that of the relationship between the so-called 'long' vowels and postvocalic r on the one hand, and between long and nasal vowels on the other.

Long vowels. The oral vowel system consists of seven units characterized by the following

(1)		i	u	e	ɛ	a	ɔ
	high	+	+	+	-	-	-
	mid	-	-	+	+	-	+
	front	+	-	+	+	+	-
	round	-	+	-	-	-	+

Supporting contrastive data is given in (2).

(2)	i/e	[si]	'if'
	e/ɛ	[pe]	'hush'
	ɛ/a	[pɛ]	'priest'
	i/u	[si]	'if'
	u/o	[pu]	'for'
	o/ɔ	[bo]	'kiss'

In Lesser Antilles varieties of Creole, no Saint-Lucian, there are in addition contrastive low-mid ([-high, +mid]) vowels:

(3)	[nɛf]	<u>neuf</u>	'nine'
	[sɔt]	<u>sot</u>	'stupid'
	[pot]	<u>pot</u>	'pot'

In these varieties of Creole there are also contrastive short a in which the longer vowel may also occur or vary freely with the short back vowel:³

(4)	[pak]	<u>Pâques</u>	'Easter'
	[lam]	<u>lame</u>	'wave'

Finally, in Dominican and Saint-Lucian Creole there are also contrastive utterance-final free syllables:

(5)	[pa]	<u>pas</u>	'not'
	[la]	<u>la</u>	'there'

On the basis of their correspondence to French cognates, Douglas Taylor (1947) writes that the 'long' vowels are sequences vowel + r, so that /nerf/ is [nerf], [lapɔ:t] as [laport/], and [pa:k] as

Long vowels. The oral vowel system of Creole is composed of seven units characterized by the following distinctive feature matrix:²

(1)	i	u	e	ɛ	a	ɔ	o
high	+	+	+	-	-	-	+
mid	-	-	+	+	-	+	+
front	+	-	+	+	+	-	-
round	-	+	-	-	-	+	+

Supporting contrastive data is given in (2).

(2)	i/e	[si]	'if'	[se]	'it is'
	e/ɛ	[pe]	'hush'	[pɛ]	'priest'
	ɛ/a	[pɛ]	'priest'	[pa]	'not'
	i/u	[si]	'if'	[su]	'under'
	u/o	[pu]	'for'	[po]	'skin'
	o/ɔ	[bo]	'kiss'	[bɔ]	'edge'

In Lesser Antilles varieties of Creole, notably in Dominican and Saint-Lucian, there are in addition contrasts between short and long low-mid ([-high, +mid]) vowels:

(3)	[nɛf]	<u>neuf</u>	'nine'	[nɛ:f]	<u>nerf</u>	'nerve'
	[sɔt]	<u>sot</u>	'stupid'	[sɔ:t]	<u>sort</u>	'to go out'
	[pɔt]	<u>pot</u>	'pot'	[lapɔ:t]	<u>porte</u>	'door'

In these varieties of Creole there are also contrasts between long and short a in which the longer vowel may also have a backer articulation or vary freely with the short back vowel:³

(4)	[pak]	<u>Pâques</u>	'Easter'	[pa:k]	<u>parc</u>	'enclosure'
				or [pɑ:k] or [pɔk]		
	[lam]	<u>lame</u>	'wave'	[la:m]	<u>larme</u>	'tear'
				or [lɑ:m] or [lɔm]		

Finally, in Dominican and Saint-Lucian [a] and [ɑ] may contrast in utterance-final free syllables:

(5)	[pa]	<u>pas</u>	'not'	[pɑ]	<u>par</u>	'through'
	[la]	<u>la</u>	'there'	[lɑ]	<u>lard</u>	'lard'

On the basis of their correspondence to vowel + r combinations of French cognates, Douglas Taylor (1947) was led to interpret the 'long' vowels as sequences vowel + r, so that [nɛ:f] was analyzed as /nerf/, [lapɔ:t] as /laport/, and [pa:k] as /park/.

Blocking of assimilation of nasality. While phonetically long vowels are absent in Haitian Creole, one finds vowels that have a peculiar behavior in the environment of nasal consonants.⁴ To place these facts in proper perspective, it is necessary first to characterize vowel nasalization in that variety of Creole.

At first sight the nasal vowel system of Creole differs from that of SF only by the absence of front rounded [œ] and by the presence of the high nasals [ĩ] and [ũ] about whose phonological status there is considerable debate among creolists.⁵ But the differences are more profound. First, nasal vowels are differently distributed in the two languages. In SF, nasal vowels do not occur before utterance-final nasal consonants, and it is this feature of their distribution that makes it possible to interpret them as underlying sequences of vowel plus nasal consonant. In Creole, on the other hand, the three nasal vowels that have SF equivalents--[ẽ], [ã], [õ]--occur freely before nasal consonants, see (6).⁶

(6) Final position		Before final nasal consonant	
[vɛ]	'wish'	[vɛ̃]	'twenty'
[vɛ]	'glass'	[vɛ̃n]	'vein'
[mɔ]	'word'	[mɔ̃n]	'world'
[mɔ]	'dead'	[mɔ̃]	'hill'
[sɑ]	'that'	[sɑ̃]	'blood'
		[ʃɑ̃m]	'room'
		[vɛn]	'our wish'
		[vɛ̃n]	'our glass'
		[mon]	'our word'
		[mɔ̃n]	'world'
		[mɔ̃]	'hill'
		[ʃam]	'spell'

The nasal quality of Creole has been noted by various analysts who have attempted to account for it by positing powerful nasal assimilation rules operating in the environment of nasal consonants. Thus Carrington (1967) states that any vowel may be optionally nasalized when it precedes a nasal consonant.⁷ For Hall (1950) nasal assimilation occurs in the vicinity of a nasal consonant with shift to casual speech. Jourdain (1956) proposes an obligatory assimilation of vowels by the effect of any neighboring nasal consonant to which only a small set of morphemes are exempt. Tinelli (1970) and d'Ans (1968) propose nasal assimilation rules that are more narrowly constrained. Tinelli posits a regressive nasal assimilation rule that operates only across morpheme boundaries:⁸

(7) pu li 'for him' vs. pũ mwẽ 'for me'

For d'Ans vowels are nasalized if (i) they are followed by an utterance-final nasal consonant or (ii) preceded by a nasal consonant and followed by a voiced obstruent, that is:

- (8) (i) V → [+nasal] / _____ [+cons] [+nasal]
 (ii) V → [+nasal] / [+cons] _____ [+nasal]

It is clear that some of the items appealing to d'Ans, [vɛ̃n] 'our glass', [mɔ̃n] 'our word', [ʃam] 'spell', constitute counter-examples to the rules proposed except that posited by Carrington. The rules of nasal assimilation in [vɛ̃n], [vɛ̃n], and [mɔ̃n] are the existence of a morpheme boundary and the truncated alternant of the possessive morpheme 'our'. But it cannot be explained in terms of a morpheme composed of a single morpheme.⁹

Underlying *r* solution. D'Ans claims that the exceptions to the first of his two nasal assimilation rules in Haitian Creole followed in fact by a velar glide which he represents by [ʁ]: [mɔ̃ʁ] 'our word' (1968:53, 73)--it will be recalled that Taylor (1968) has shown long vowels. D'Ans then suggests that the glide is a palatal glide since that phoneme is realized in other environments as an articulated palato-velar continuant ([ɣ] is distinguishable from [w] before a rounded vowel, e.g. [pɣwɔ̃mne] 'to take a walk'). In addition, the progressive assimilation rule in (8. ii) does not subject to nasalization when they occur before a consonant other than a voiced obstruent. According to d'Ans the forms in (6) would be reanalyzed as:

- (9) [vɛ̃n] /ven/ 'vein' vs. [vɛ̃n] /vɛ̃n/ 'vein' vs.
 [mɔ̃n] /mon/ 'world' vs. [mɔ̃n] /mɔ̃n/ 'world' vs.
 [ʃam] /ʃam/ 'room' vs. [ʃam] /ʃam/ 'room' vs.

Postvocalic /r/, termed 'r structurel' or 'r plan phonologique' (1968:57), posited by d'Ans as the basis of its identification.

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		Before final nasal consonant	
		[ven]	'our wish'
'twenty'	[vɛ̃n] 'vein'	[vɛn]	'our glass'
		[mon]	'our word'
'name'	[mɔ̃n] 'world'	[mɔn]	'hill'
'blood'	[ʃɔ̃m] 'room'	[ʃam]	'spell'

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. pũ mwɛ 'for me'

alized if (i) they are followed by an utterance-) preceded by a nasal consonant and followed is:

(8) (i) $V \rightarrow [+nasal] / \text{---} \begin{bmatrix} +cons \\ +nasal \end{bmatrix} \#$ pan→pãn 'to hang'

(ii) $V \rightarrow [+nasal] / \begin{bmatrix} +cons \\ +nasal \end{bmatrix} \text{---} \begin{bmatrix} +cons \\ +obs \\ +voice \end{bmatrix}$ remɛd→remɛd
'medicine'

It is clear that some of the items appearing in (6), namely, [ven] 'our wish', [vɛn] 'our glass', [mon] 'our word', [mɔn] 'hill', and [ʃam] 'spell', constitute counter-examples to all the nasal assimilation rules proposed except that posited by Tinelli (7). The blocking of nasal assimilation in [ven], [vɛn], and [mon] may be accounted for by the existence of a morpheme boundary, for all three forms contain the truncated alternant of the possessive determiner [nũ] 'our, inclusive'. But it cannot be explained in the other two forms which are composed of a single morpheme.⁹

Underlying r solution. D'Ans claims that vowels which constitute exceptions to the first of his two nasal assimilation rules (8. i) are in Haitian Creole followed in fact by a weakly articulated centro-palatal glide which he represents by [ʷ]: [mɔʷn] 'hill', [ʃaʷm] 'spell' (1968: 53, 73)--it will be recalled that Taylor (1967) notes these items with long vowels. D'Ans then suggests that the glide blocks nasal assimilation. The assignment of this glide to /r/ is fairly well motivated since that phoneme is realized in other environments as a weakly articulated palato-velar continuant ([ɾat] 'rat', [diɾi] 'rice'), hardly distinguishable from [w] before a rounded vowel ([ɾʷuʒ] 'red', [pɾʷɔmne] 'to take a walk'). In addition, since by proposing the progressive assimilation rule in (8. ii) d'Ans claims that vowels are not subject to nasalization when they occur after a nasal consonant and before a consonant other than a voiced obstruent, the centro-palatal glide cannot be a voiced obstruent, a condition met by /r/. According to d'Ans the forms in (6) ending with a nasal consonant would be reanalyzed as:

(9) [vɛ̃n]	/ven/	'vein'	vs.	[vɛʷn]	/ver+n/	'our glass'
				[ven]	/ve+n/	'our wish'
[mɔ̃n]	/mon/	'world'	vs.	[mɔʷn]	/morn/	'hill'
				[mon]	/mo+n/	'our word'
[ʃɔ̃m]	/ʃam/	'room'	vs.	[ʃaʷm]	/ʃarm/	'spell'

Postvocalic /r/, termed 'r structurel représenté par zéro sur le plan phonologique' (1968:57), posited to account for the blocking of nasalization on the basis of its identification with a glide that d'Ans

alone among creolists is able to perceive, is now available to handle contrasts between 'long' and short low-mid and low vowels:

- (10) [nef] /nef/ 'nine' vs. [nɛ^of] /nerf/ 'nerve'
 [sot] /sot/ 'stupid' vs. [sɔ^ot] /sort/ 'to go out'
 [pak] /pak/ 'Easter/' vs. [pa^ok] /park/ 'enclosure'

It will be noted that underlying postvocalic r always follows a low-mid or low vowel. Several creolists (d'Ans 1968, Tinelli 1970) seem to think that Creole, like SF, is characterized by an inherent drive toward the complementary distribution of high-mid and low-mid vowels: the high-mid member occurring in free syllables and the low-mid member in checked syllables; this state of affairs is termed *la loi de position*. Contrasts between high and low-mid vowels in utterance-final free syllables, such as [pe] 'hush' vs. [pɛ] 'priest' constitute violations of this inherent complementation. But if in these contrasts it is assumed that low-mid vowels are checked by an underlying postvocalic r, complementation is preserved and, in addition, the oral vowel inventory reduced.

To recapitulate, utterance-final vowels exhibit two sets of surface phonetic features that may be related if an underlying r is posited. First, in some Lesser Antilles varieties of Creole length is contrastive before low-mid and low vowels; in Haitian Creole length corresponds to a centro-palatal glide [ʷ], although the accuracy of this observation is questionable. Second, when they occur before a nasal consonant in some morphemes low-mid and low vowels block regressive assimilation of nasality. In addition, the postulation of an underlying postvocalic r permits a reduction of the oral vowel inventory from eight to five units:

- (11)

i	u		i	u
e	o	→	e	o
ɛ	ɔ			
a	ɑ			a

This solution requires only an independently motivated nasal assimilation rule and rules specifying that [+mid] vowels are [+high] when they occur in a checked syllable but [-high] when they occur in a free syllable and that low ([-mid, -high]) vowels are [+front] in a free syllable but [-front] in a checked syllable. Dominican and Saint-Lucian Creole would also require a rule lengthening all vowels in the environment rC. Finally, the underlying r solution has the added advantage of relating Creole morphemes containing 'long' (including nasal assimilation-blocking vowels) and syllable-final low-mid or low vowels to their presumed SF etymon.

Objections to the underlying postvocalic r observation of an underlying postvocalic r obscure about the phonological structure of Creole on the basis of the following six sets of considerations:

(1) There are no alternations involving low-mid vowels or non-nasal vowels followed by r on one hand, and forms containing a phoneme r on the other. In other words, the postulated underlying r is subject to deletion. There are a handful of derivational alternations r and zero: [tɛ] 'earth' vs. [tɛr] 'to bury', [ʒumɛ] 'profanity' ~ [ʒuɣɛ] 'to load' [ʃaɣɛt] 'cart'. In view of the uncomplementary distribution between members of these derivational classes, of the alternation, it is doubtful that Creole has an underlying r; it would be difficult to prove that for the underlying r had any psychological reality.

(2) Within the framework of an interactionist system based on the postulation of an underlying r, a view that emerges is that of an unstable system evolving toward a three-tongue height system. The complementary distribution of high-mid and low-mid vowels facts suggest in fact a contrary view. In fact, (2), do high-mid and low-mid vowels co-occur, but apocope of the final vowel of verb forms, a characteristic of Haitian Creole, results in many sets of vowels in checked syllables:

- (12)

- [met] maître 'master' vs. [mɛt]
 [paɣɛt] paraître 'to appear' vs. [paɣɛt]
 [sot] sot, sotté 'stupid' vs. [sɔt]
 [lapot] porte 'door' vs. [lapot]

Nor is there complementary distribution of high-mid vowels in non-final syllables. Numerous examples, particularly, of low-mid vowels in intervocalic positions do not correspond to SF sequences mid-vowel: [bəkɔ] 'sorcerer, voodoo priest', [gɣwɔ] 'large', [vɔɛ] 'thief'.

(3) The postulation of an underlying r has a double origin for nasal vowels in Creole: one in checked syllables, independently of a nasal consonant, and one from underlying nasal vowels, i. e. vowel raising. In the context of a nasal consonant...

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and short low-mid and low vowels:

nerve'	vs.	[nɛ ^o f]	/nerf/	'nerve'
stupid'	vs.	[sɔ ^o t]	/sort/	'to go out'
enclosure'	vs.	[pa ^o k]	/park/	'enclosure'

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Objections to the underlying postvocalic r solution. The postula-
tion of an underlying postvocalic r obscures many important facts
about the phonological structure of Creole and is to be rejected on the
basis of the following six sets of considerations.

(1) There are no alternations involving forms containing long
vowels or non-nasal vowels followed by a final nasal consonant on the
one hand, and forms containing a phonetically manifest r, on the other.
In other words, the postulated underlying r would undergo absolute
deletion. There are a handful of derivationally related forms contain-
ing alternations r and zero: [tɛ] 'earth' ~ [ʔtɛmʔ] 'burial' ~ [ʔtɛy e]
'to bury', [ʒumʔ] 'profanity' ~ [ʒu ʔe] 'to swear': [ʃaʒ] 'load' ~ [ʃaʒmʔ]
'load' [ʃa ʔɛt] 'cart'. In view of the uncertain semantic relationship
between members of these derivational sets and the marginal nature
of the alternation, it is doubtful that Creole speakers relate them, and
it would be difficult to prove that for the speakers of the language
underlying r had any psychological reality.

(2) Within the framework of an interpretation of the Creole vowel
system based on the postulation of an underlying postvocalic r, the
view that emerges is that of an unstable four-tongue height system
evolving toward a three-tongue height system by means of the comple-
mentary distribution of high-mid and low-mid vowels. Descriptive
facts suggest in fact a contrary view. Not only, as is indicated in
(2), do high-mid and low-mid vowels contrast in final free syllables,
but apocope of the final vowel of verb forms particularly character-
istic of Haitian Creole, results in many contrasts between these two
sets of vowels in checked syllables:

(12)

[mɛt]	<u>maître</u>	'master'	vs.	[mɛt] ~ [mete]	<u>mettre</u>	'to put'
[paɣ ɛt]	<u>paraître</u>	'to appear'	vs.	[ɣɛt] ~ [ɣete]	<u>rester</u>	'to remain'
[sɔt]	<u>sot, sotté</u>	'stupid'	vs.	[sɔt] ~ [soti]	<u>sortir</u>	'to leave'
[lapot]	<u>porte</u>	'door'	vs.	[pot] ~ [pote]	<u>apporter</u>	'to bring'

Nor is there complementary distribution between high-mid and low-
mid vowels in non-final syllables. Numerous instances are found,
particularly, of low-mid vowels in internal free syllables which do
not correspond to SF sequences mid-vowel plus r: [bɛbɛ] 'mute',
[bɔkɔ] 'sorcerer, voodoo priest', [gɣ^Wɔsɛ] 'size' (compare to [gɣ^Wo]
'large'), [vɔlɛ] 'thief'.

(3) The postulation of an underlying postvocalic r entails assuming
a double origin for nasal vowels in Creole. When they occur in free
syllables, independently of a nasal consonant, they are derivable
from underlying nasal vowels, i. e. vowels marked [+nasal] in the
lexicon. In the context of a nasal consonant it is impossible to

distinguish between underlying nasal vowels and those generated by nasal assimilation rules such as (8). For the underlying postvocalic r solution to hold, it must be demonstrated that there are no oral vowels in the environments meeting the structural description of rules (8). Such is not the case, however, for there are counter-examples to these rules too numerous to be handled by a list of exceptions, e.g. [emab] 'nice', [somɛj] 'sleep', [nɛg] 'guy', [menaʒ] 'concubine', [limonad] 'lemon juice'.

Furthermore, analyses of vowel nasalization in Creole in terms of an underlying set of nasal vowels and another introduced by assimilation rules do not reveal the real descriptive problems in this aspect of the phonology of Creole. First, opposed to the nasalized vowels of SF, those of Creole appear to represent two distinct types from a perceptual point of view. When they occur in free syllables the vowels [ɛ̃], [õ], and [ã] are as fully nasalized as their SF corresponding vowels and it may be assumed that they share their articulatory and acoustic characteristics (Delattre 1965, 1968). But when they occur in the environment of a nasal consonant, Creole nasal vowels, including [ĩ] and [ũ], have a more diffuse and less perceptible nasality.¹⁰ It is tempting to posit that this latter type of nasality is derivable by transformational rules such as (8) applied to underlying oral vowels. But, unfortunately, it is not the case that vowels with diffuse nasality occur only in the environment of a nasal consonant. High nasal vowels occur in free syllables, e.g. [nũ] '1st pl. inclusive pronoun'--although such cases are quite rare. On the other hand, non-nasal high vowels occur before a nasal consonant, e.g. [mun] 'person', [maʃin] 'machine'. Second, there appears to be considerable free variation in the appearance of nasal and oral vowels in the context of a nasal consonant: [demõ] ~ [dẽmõ] 'malevolent supernatural being', [samdi] ~ [sãmdi] 'Saturday'. This type of alternation cannot be accounted for in terms of style shift, as Hall (1947, 1953) advanced. There are also alternations between nasal and oral vowels in derivationally related sets of words with obvious French etyma containing an oral vowel: [amu] 'self-esteem, pride, vanity' vs. [fɛlãmu] 'to make love', [amtije] 'type of climbing plant' vs. [zãmi] 'friend'; [tutõm] 'each one' vs. [nõm] 'man'. These facts, which require detailed empirical study, are best accounted for, not by analyzing nasalization as automatic or non-distinctive in the environment of a nasal consonant, but by assuming that it must be specified in the lexicon for every morpheme. Thus, whereas [mõn] 'world' would be listed as mõn, forms in which nasalization is blocked would be specified with an oral vowel, viz. [mõn] ~ [mõ:n] 'hill' would be entered as mõn.

(4) All varieties of Creole exhibit alternations in the form of the postposed definite determiner conditioned by the nature of the final

segments of the immediately preceding vowel. In Haitian Creole, where the system of postposed definite determiners is particularly complex, there are five variant forms [a], [ã], [ã̃], [ã̃̃], [ã̃̃̃].

(13) fig la		'the banana'
ʃɛn nã	}	'the chain'
ʃɛn ã̃		
papa a		'the father'
ʃɛ ã̃		'the dog'
pɛ a		'the priest'
bɔ a		'the edge'

The truncated forms [a] and [ã] occur after full forms occur after consonants. If for [bɔ] 'edge' contained a final underlying r followed by the [la] alternant, i. e. per-l. Instead, as shown in (13), these forms are a variant of the post-posed definite determiner.

(5) Another shortcoming of the postvocalic r is that it would introduce the oral consonant cluster in the language: [mõn] 'nerve', [ʃam] ʃarm 'spell'.¹¹ Elsewhere related Standard French forms have final forms end in a single consonant. Compare maître 'master', [ʃãm] chambre 'room', juste 'just'.

(6) Finally, the reduction of the oral preting low-mid vowels as sequences of features [high] and [mid], needed to specify are also required to characterize the re-

(14)	i	e	a	o	u
high	+	+	-	+	+
mid	-	+	-	+	-
front	+	+	+	-	-
round	-	-	-	+	+

NOTES

*I am indebted to Yves Dejean for most of the Creole examples contained in this paper. I also welcome criticism of Valdman (1968), which forced me to re-examine the oral vowel system of Creole in terms of short and long low and mid vowels in favor of

ying nasal vowels and those generated by such as (8). For the underlying postvocalic be demonstrated that there are no oral s meeting the structural description of case, however, for there are counter- o numerous to be handled by a list of ex- e', [somɛj] 'sleep', [nɛg] 'guy', [menaʒ] 'non juice'.

of vowel nasalization in Creole in terms of vowels and another introduced by assimilation. The real descriptive problems in this aspect

First, opposed to the nasalized vowels of e to represent two distinct types from a When they occur in free syllables the vowels y nasalized as their SF corresponding ned that they share their articulatory and Delattre 1965, 1968). But when they occur al consonant, Creole nasal vowels, in- more diffuse and less perceptible nasality.¹⁰ this latter type of nasality is derivable by h as (8) applied to underlying oral vowels. t the case that vowels with diffuse nasality of a nasal consonant. High nasal vowels g. [nũ] '1st pl. inclusive pronoun'--al-

e rare. On the other hand, non-nasal high l consonant, e.g. [mun] 'person', [maʃin] appears to be considerable free variation and oral vowels in the context of a nasal [ʃ] 'malevolent supernatural being', [samdi] type of alternation cannot be accounted as Hall (1947, 1953) advanced. There are nasal and oral vowels in derivationally re- vious French etyma containing an oral , pride, vanity' vs. [fɛlɛmu] 'to make nging plant' vs. [zɛmi] 'friend'; [tutɔm] . These facts, which require detailed -accounted for, not by analyzing nasali- -distinctive in the environment of a nasal ; that it must be specified in the lexicon s, whereas [mɔn] 'world' would be listed salization is blocked would be specified on] ~ [mɔ:n] 'hill' would be entered as

ole exhibit alternations in the form of the er conditioned by the nature of the final

segments of the immediately preceding element of the noun phrase. In Haitian Creole, where the system of alternation is the most com- plex, there are five variant forms [a], [ɛ], [la], [lɛ], and [nɛ] (13).

(13)	fig la	'the banana'
	ʃɛn nɛ	'the chain'
	ʃɛn lɛ	
	papa a	'the father'
	ʃɛ ɛ	'the dog'
	pɛ a	'the priest'
	bɔ a	'the edge'

The truncated forms [a] and [ɛ] occur after vowels while the three full forms occur after consonants. If forms such as [pɛ] 'priest' or [bɔ] 'edge' contained a final underlying \underline{r} , we would expect them to be followed by the [la] alternant, i. e. per-la [pɛla] and bor-la [bɔla]. Instead, as shown in (13), these forms are followed by the [a] alter- nant of the post-posed definite determiner.

(5) Another shortcoming of the postulation of an underlying post- vocalic \underline{r} is that it would introduce the only type of productive final consonant cluster in the language: [mɔn] morn 'hill', [nɛf] nerf 'nerve', [ʃam] ʃarm 'spell'.¹¹ Elsewhere, where etymologically related Standard French forms have final consonant clusters, Creole forms end in a single consonant. Compare, for example, [mɛt] maitre 'master', [ʃɛm] chambre 'room', [bab] barbe 'beard', [ʒis] juste 'just'.

(6) Finally, the reduction of the oral inventory obtained by inter- preting low-mid vowels as sequences of vowel + \underline{r} is illusory. The features [high] and [mid], needed to specify the eight-vowel system, are also required to characterize the reduced five-vowel system:

(14)		i	e	a	o	u
	high	+	+	-	+	+
	mid	-	+	-	+	-
	front	+	+	+	-	-
	round	-	-	-	+	+

NOTES

*I am indebted to Yves Dejean for most of the crucial Haitian Creole examples contained in this paper as well as for his judicious criticism of Valdman (1968), which forced me to abandon an analysis of the oral vowel system of Creole in terms of contrastive underlying short and long low and mid vowels in favor of the present analysis.

¹The term Creole French here subsumes Caribbean varieties for which fairly reliable and systematic descriptions are available: Dominican (Taylor 1947), Guyanese (Saint-Jacques-Fauquenoy 1972), Haitian (Hall 1953, d'Ans 1968, Valdman 1970, Tinelli 1972, 1973), Saint-Lucian (Carrington 1967, Valdman and Carrington 1968). Except for those relevant for the discussion of phonetically long vowels, examples cited are from Haitian Creole. Specifically excluded from our study are Indian Ocean dialects of Creole which appear to have a phonetically manifest postvocalic r (Moorghen 1972).

With regard to the genesis of Creole note that by the choice of the term 'convergence' we are rejecting implicitly the theory according to which Creole is a mixed language composed of a Northern French-based lexicon and phonology and a grammatical system derived from West African languages.

²Front rounded vowels ([y], [ø], [œ]) need to be posited for certain dialects to account for such contrasts as [plim] 'feather' vs. [plim] or [plym] 'pen', [pɛ] 'priest' or 'pair' vs. [pɛ] or [pœ] 'fear', and [de] 'thimble' vs. [de] or [dø] 'two'. In Haiti, because the variant containing the front rounded vowel is often attested in the speech of French-Creole bilingual members of the elite or monolingual Creole speakers who come in frequent contact with them, it has been proposed that the front rounded vowels constitute a sub-system borrowed from French. However, variants with front rounded vowels are also attested among rural monolingual speakers (Hyppolite 1950). In addition, Taylor (1947:173) reports a high back unrounded vowel (sometimes centralized in the speech of the younger generation) which contrasts with [i]: [šik] 'chigoes (parasites)' vs. [tik] 'ticks (parasites)' and [si'me] 'sowed' vs. [fime] 'smoke'. The front rounded vowels can be accommodated by the set of distinctive features proposed:

	[y]	[ø]	[œ]
high	+	+	-
mid	-	+	+
front	+	+	+
round	+	+	+

³Taylor (1947) points out, however, that this distinction is characteristic of the speech of older speakers. In the course of fieldwork in Saint-Lucia many of our younger informants also distinguished their speech from that of older persons.

⁴A preliminary investigation of the perception of vowel length on the part of speakers of Haitian Creole and its acoustic correlates reveals that there is no consistent difference between short and 'putative' long vowels. A bilingual informant born in Gonai'ves and

educated in Port-au-Prince was asked to identify the putative contrasts [pot] 'pot' vs. [po:] 'pot', [pa:k] 'enclosure', [pɛ] 'hush' vs. [pɛ:] 'hush', [so:t] 'to have just' vs. [so:] 'to have just'. These utterances were presented to the same informant in random order, and he was only able to identify correctly four out of ten. He was only able to identify correctly four out of ten recorded, slightly better than chance. There is no significant difference in length between the two members of the pairs. (Grateful acknowledgment is made to the informant who administered the perception test and to the data.)

⁵These vowels generally occur preceding a nasal consonant ([kačimbo] 'earthenware pipe', [bündä] 'a...') (Hall 1953) who cites numerous instances of [mĩ] 'ripe', [ũ] 'indefinite determiner' (occurring also [õ] and [nũ] 'first person plural inclusive'), but in all cases there is a variant containing a homorganic nasalization to the following oral consonant ([ũm] 'first person plural inclusive'), [ũfɔ] or [ũm̩fɔ] 'voodoo temple'). Before a nasal consonant, the high vowel is subject to perceptible nasalization, e.g. /kuzin/ 'cousin', 'person'. Tinelli claims that they do not exist. There is no evidence of opinion among creolists by the presence of a nasalization accompanying high vowels: [ũm̩] 'first person plural inclusive' can be missed on first hearing, especially if the speaker does not have any high nasal vowel phoneme (Hall 1953) that the nasalization is clearly audible when the high vowel occurs before the definite determiner in that environment: [pitimĩ] 'millet' vs. [pitim̩]. Only instrumental evidence can resolve this.

⁶Hall (1953:18) was first to note Haitian Creole has a set of IPA symbols different from those used to represent the nasal vowels of French, namely [ũ], [õ], [nũ] respectively. This choice of symbols would be appropriate if Haitian Creole nasal vowels are higher and more fronted than their French equivalents. This appears only partially true. In the preliminary acoustic evidence we have gathered so far.

Spectrograms were made of the five nasal vowels in the phonological analyses of Haitian Creole. The results are given by the speaker described in note 4 of this study, but with reference to a key word, and the

ch here subsumes Caribbean varieties for systematic descriptions are available:

Guyanese (Saint-Jacques-Fauquenoy 1972), 1968, Valdman 1970, Tinelli 1972, 1973), 1967, Valdman and Carrington 1968). Ex- the discussion of phonetically long vowels, Haitian Creole. Specifically excluded from a dialects of Creole which appear to have a vocalic \underline{r} (Moorghen 1972).

Analysis of Creole note that by the choice of the rejecting implicitly the theory according language composed of a Northern French- and a grammatical system derived from

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[œ]

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educated in Port-au-Prince was asked to produce four renditions of the putative contrasts [pot] 'pot' vs. [pɔ:t] 'door', [pak] 'Easter' vs. [pa:k] 'enclosure', [pɛ] 'hush' vs. [pɛ:] 'priest', and [sɔt] 'stupid vs. [sɔ:t] 'to have just'. These utterances were then presented to the same informant in random order, and he was asked to identify them. He was only able to identify correctly fourteen of twenty-three items recorded, slightly better than chance. Spectrograms were made of the utterances and the duration of the vowels measured; there was no significant difference in length between members of the various pairs. (Grateful acknowledgment is made to Dr. Marvin Carmody who administered the perception test and collected the spectrographic data.)

⁵These vowels generally occur preceding a nasal consonant, e.g. [kačimbo] 'earthenware pipe', [būnda] 'arse'. Except for Tinelli (1973) who cites numerous instances of [ĩ] and [ũ] following but not preceding a nasal consonant ([mĩ] 'ripe', [mũri] 'to die'), creolists have noted only two morphemes that contain a nasalized high vowel: [jũ] 'indefinite determiner' (occurring also in the variants [ũ] and [õ]) and [nũ] 'first person plural inclusive pronoun'. There are other instances of [ũ] occurring outside of the context of a nasal consonant but in all cases there is a variant containing a brief nasal closure homorganic to the following oral consonant: [ũgã] or [ũ^hgã] 'voodoo priest', [ũfɔ] or [ũ^mfɔ] 'voodoo temple. A point at issue is whether, before a nasal consonant, the high vowels occur at all without perceptible nasalization, e.g. /kuzin/ 'cousin', /larim/ 'mucus', /mun/ 'person'. Tinelli claims that they do not and accounts for the difference of opinion among creolists by the particular phonetic nature of nasalization accompanying high vowels: 'the nasality of [ĩ] can easily be missed on first hearing, especially if one's native language does not have any high nasal vowel phoneme' (1973:8). Tinelli also adds that the nasalization is clearly audible when the alleged nasal high vowel occurs before the definite determiner la which is nasalized in that environment: [pitimĩ] 'millet' vs. [pitimĩ^l] 'the millet'. Clearly, only instrumental evidence can resolve the controversy.

⁶Hall (1953:18) was first to note Haitian Creole nasal vowels with a set of IPA symbols different from those used traditionally to represent the nasal vowels of French, namely [ẽ ẽ õ], instead of [ɛ ɛ ɔ], respectively. This choice of symbols would seem to indicate that Haitian Creole nasal vowels are higher and more central than their French equivalents. This appears only partially correct on the basis of preliminary acoustic evidence we have gathered.

Spectrograms were made of the five nasal vowels posited by most phonological analyses of Haitian Creole. The vowels were produced by the speaker described in note 4 of this article, first in isolation, but with reference to a key word, and then in a variety of word-length

utterances illustrating the typical environments in which the vowels occur. The first and second formant (F_1 and F_2) values obtained appear in Table 1. These values represent the average of the number of vowel tokens (appearing in parentheses) and they are compared to values for Standard French nasal vowels given by Delattre (1965) and obtained from one of our Parisian informants--no doubt, the values given by Delattre are more reliable than ours but only ours are relevant in this discussion since they were obtained under the same experimental conditions as the Creole data:

TABLE 1.

Haitian Creole	Standard French						
	F_1	F_2		Our values		Delattre values	
	F_1	F_2		F_1	F_2	F_1	F_2
ĩ (3)	450	2200					
ẽ (9)	700	2200	ẽ	600	1500	550	1800
ɛ̃ (7)	950	1400	ã	500	1100	550	1000
õ (8)	700	1100	õ	450	900	550	750
			œ	550	1400	550	1400
ũ (4)	500	900					

On a two-dimensional logarithmic plot in which F_1 values are plotted on the ordinate with values increasing from top to bottom and F_2 values plotted on the abscissa with values increasing from right to left (so that vowels form a display comparable to that of the articulatory quadrilateral), Haitian Creole nasal vowels are much lower than their Standard French equivalents. In the case of [ẽ], [ɛ̃], and [õ] they are also more fronted and, in the case of [ɛ̃] and [õ], more central. In addition to a front rounded series ([ĩ], [õ], [œ̃]), d'Ans (1968:64) recognizes two low vowels equivalent to Hall's [õ].

⁷Saint-Jacques-Fauquenoy notes a similar phenomenon in Guyanese Creole: 'à une nasalité pertinente . . . s'ajoute une nasalité contextuelle qui n'est pas distinctive . . . Nous dirons donc que l'opposition /e/ - /ẽ/ est neutralisée dans les cas où /e/ est suivi d'une consonne nasale' (1972:43).

⁸But Tinelli posits a morpheme structure condition by which all vowels are nasal before a nasal consonant. In effect, this has the same result as the nasalization rule posited by Jourdain, d'Ans, and Saint-Jacques-Fauquenoy.

⁹Tinelli grants the existence of such contrasts--he cites [pan] 'breakdown' vs. [sispãn] 'to hand') but claims that they are attested only in the speech of bilinguals and that in /pan/ the vowel is slightly nasalized. For him, oral vowels occurring before nasal consonants are gallicisms absent from the speech of monolinguals. Indeed,

existing phonological descriptions of Haitian Creole on the speech of bilinguals or on that of monolinguals served in an urban setting fail to reflect the speech of speakers of the language, the monolinguals.

¹⁰Some creolists (Hall 1950, Valdman 1973) have commented on perceptual differences between oral and nasal vowels in Creole. Tinelli accounts for this 'the relative opening of the nasal cavity resulting from the raising of the velum' (1973:3). We would account for this difference in terms of the two types of nasalization described by Delattre (1968). Delattre distinguishes two types of nasalization: those characterized by 'cancellation' (annulation) and those characterized by 'damping' (amortissement). The first type are characterized by a first formant that is lower than the counter-resonance produced by a cavity of the (oral or nasal) cavity. Nasal vowels characterized by the second type of nasalization have a velic and pharyngeal cavities of equal volume. The first type of nasal vowels is typical of the relatively low nasal vowels and the second type of nasal vowels are characterized by a first formant over a greater number of harmonics, and the lowering of the velum without the formation of a counter-resonance. Delattre points out that nasal vowels produced by the first type give an impression of greater nasalization than those produced by the second. Also, the higher a nasal vowel, the more nasalization, or, to put it differently, high nasal vowels are produced by damping and low nasal vowels by cancellation. This is shown in spectrograms of nasal vowels pronounced by speakers from the Cape Haitian region. These appear in Figure 1. The theory: nasal vowels such as those of [põ] are produced in free syllables or in syllables checked by a nasal consonant; a weakened first formant; nasal vowels occur only before a nasal consonant and the high vowels [ĩ] and [õ] are produced by a first formant.

¹¹However, there are a few morphemes that end in two-consonant clusters of the type [maks] 'Max', [fiks] 'fixed', [rɛks] 'Vicks'.

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typical environments in which the vowels and formant (F_1 and F_2) values obtained (values in parentheses) and they are compared to the values for nasal vowels given by Delattre (1965) and Parisian informants--no doubt, the values are more reliable than ours but only ours are relevant since they were obtained under the same experimental conditions as the Creole data:

Standard French				
	Our values		Delattre values	
	F_1	F_2	F_1	F_2
ɛ̃	600	1500	550	1800
ã	500	1100	550	1000
ɔ̃	450	900	550	750
œ̃	550	1400	550	1400

orthographic plot in which F_1 values are plotted on the vertical axis (increasing from top to bottom) and F_2 values are plotted on the horizontal axis (increasing from right to left). The display is comparable to that of the articulation of the nasal vowels of the Creole. The nasal vowels are much lower in the Creole than in French. In the case of [ɛ̃], [ɔ̃], and [œ̃], the values are lower and, in the case of [ã] and [ɔ̃], more similar to the front rounded series ([ɥ̃], [ø̃], [œ̃]), d'Ans notes a similar phenomenon in Guyanese Creole.

d'Ans notes a similar phenomenon in Guyanese Creole. . . s'ajoute une nasalité distinctive . . . Nous dirons donc que l'opposition est plus nette dans les cas où /e/ est suivi d'une voyelle nasale. . .

phoneme structure condition by which all vowels are followed by a nasal consonant. In effect, this has the effect of neutralizing the opposition rule posited by Jourdain, d'Ans, and others. . .

presence of such contrasts--he cites [pan] (hand) but claims that they are attested in the speech of monolinguals. Indeed,

existing phonological descriptions of Haitian Creole based as they are on the speech of bilinguals or on that of monolingual speakers observed in an urban setting fail to reflect the speech of the primary speakers of the language, the monolingual rural masses of Haiti.

10 Some creolists (Hall 1950, Valdman 1968, Tinelli 1973) have commented on perceptual differences between two types of nasal vowels in Creole. Tinelli accounts for the difference in terms of 'the relative opening of the nasal cavity related to the relative lowering of the velum' (1973:3). We would account for this phonetic difference in terms of the two types of nasalization posited by Pierre Delattre (1968). Delattre distinguishes two types of nasal vowels: those characterized by 'cancellation' (annulation) and those characterized by 'damping' (amortissement). Nasal vowels of the former type are characterized by a first formant of reduced intensity due to the counter-resonance produced by a cavity formed behind the velum. This velic cavity partially cancels the effect of the pharyngeal (back mouth) cavity. Nasal vowels characterized by cancellation often have velic and pharyngeal cavities of equal volume, a situation which is typical of the relatively low nasal vowels of French. The second type of nasal vowels are characterized by the spread of the first formant over a greater number of harmonics, and they are produced by the lowering of the velum without the formation of the velic cavity. Delattre points out that nasal vowels produced by cancellation produce an impression of greater nasalization than those resulting from damping. Also, the higher a nasal vowel, the less distinctive its nasalization, or, to put it differently, high nasal vowels tend to be produced by damping and low nasal vowels by cancellation. We have studied spectrograms of nasal vowels pronounced by a bilingual informant from the Cape Haitian region. These appear to confirm Delattre's theory: nasal vowels such as those of [pɔ̃] and [pɛ̃] occurring in free syllables or in syllables checked by an oral consonant exhibit a weakened first formant; nasal vowels occurring in the context of a nasal consonant and the high vowels [ĩ] and [ũ] have a diffuse first formant.

11 However, there are a few morphemes (mostly proper nouns) that end in two-consonant clusters of the type stop + [s]: [viks] 'Vicks', [maks] 'Max', [fiks] 'fixed', [rɛps] 'rep, a type of cloth'.

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