In Elena Benedicto (ed.), *University of Massachusetts Occasional Papers* 20, *The UMOP on Indigenous Languages*, Amherst: Graduate Linguistic Student Association, pp. 29-50.

# The Prosodic Morphology of Jamaican Creole Iteratives[1]

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## 1. Introduction

The input of a reduplicative word formation process in Jamaican Creole (JC) is restricted prosodically. In this paper, the prosodic restrictions are analyzed in terms of constraints that are generally operative in JC prosody. The study therefore provides empirical support for the Prosodic Morphology Hypothesis of McCarthy & Prince 1986. Investigation of the constraints operative in JC prosody leads to two further theoretical conclusions. First, on the basis of stress facts and various morpho-phonological phenomena, it is argued that the JC foot is a moraic trochee, a member of a restrictive inventory of foot types. Second, the analysis of various restrictions on the reduplicative base requires a loosening of the principles governing the layering of prosodic categories within in hierarchical structure.

### *1.1. Preliminaries: What is an 'iterative'?*

(1) a. /me logo logo wid i bo mi kyaan masu dat basket/
'I *logo logoed* with it but I can't lift that basket.'

b. /mi pupa nof nof taala an mi muma/
'My father is much taller than my mother.'

c. /da gal-ya lef me paia paia outa duo met rien a wet dem/
'That girl has left my few pieces of clothers outdoors and let rain wet them.'

d. /i hav likl likl hol hol/
'It is full of little holes.'

The examples in (1) demonstrate uses of 'iteratives' in Jamaican Creole (JC) sentences, a term due to Cassidy 1957. JC iteratives, sometimes referred to as instances of (total) reduplication, are word phrases composed to two identical elements. Thus they are different from echo words in Standard English like *ding dong* and *hocus pocus* in that there are no segmental alternations between iterative internal words.

Cassidy's study characterizes iteratives as having a variety of semantic functions, as well as arising from diverse historical circumstances. Semantically, iteratives can convey the idea of plurality, as in *bwaai bwaai* 'boys'. They can also describe repeated or habitual activities, e.g., *kil kil* 'to kill repeatedly', as well as describe the continuation of an activity, *lok lok* 'to keep on looking'. Outside of these trends, there are many lexical uses of iteratives which describe plants and animals: *díbi dìbi* 'the

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[1]This paper, with some minor editorial changes, was submitted as my M.A. paper at UC Santa Cruz in 1993.
I would like to thank Junko Itô, Armin Mester, and Jaye Padgett who served on a committe to make this a better paper, especially Junko who chaired the committee. I would also like to thank Peter Patrick and Geoffrey Pullum for alerting me to many important empirical issues, and thanks also to Lotus Goldberg for all her support.

tree *Caesalpinia coriaria'*. In sum, JC iteratives serve various semantic functions commonly found in many reduplicative systems.

In the plural examples, the iterative base which is repeated in forming an iterative word phrase is an actual JC word. Many iterative base words, however, are not free stems. For example, we have *kába kàba* 'poorly done, worthless', which is historically related to an iterative phrase in Yoruba (*kába kàba* which means 'confused, not smoothly'), yet Jamaican Creole has no (non-iterative) base word **kaba*. It is sometimes the case that the JC iteratives are related to iterative word phrases or non-iterative forms in African languages like Twi, Ewe, or Yoruba, which conributed to JC grammar in different respects. But it is more often the case that iteratives are based on words in the colonial language, English, and that the resulting iterative word phrase has no corresponding iterative phrase in this language. Hence, Jamaican Creole has *likl likl* 'little, or little by little', but British English never did and doesn't have such a word phrase. For a detailed discussion of the semantic functions of iteratives, as well as a more elaborate etymological classification, the reader is referred to Cassidy 1957.

*1.2. Why are JC iteratives interesting?*

This paper takes its point of departure from an observation made in DeCamp (1974), namely that JC iterative bases, for the most part, follow a specific phonological pattern.

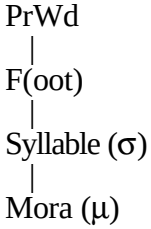
> These 561 (composite list of iteratives) are remarkably similar phonologically. With a few exceptions, the form iterated conforms to the pattern CV, CVC, or CVCV (i.e. CV(C(V))), where the first C can be either a single consonant or a cluster of consonant plus liquid or semivowel. (DeCamp, 1974: 50).

The fact that the iterative base is restricted phonologically is interesting because the JC plural is different from, for example, plural iteratives in Indonesian, which are, in effect, unrestricted with regard to base word size: *harian harian* 'newspapers', *kerusahan kerusahan* 'riots'.

The essential goal of this paper is to precisely characterize the restriction(s) on iterative word formation. My account will be guided by certain leading ideas within Prosodic Morphology (McCarthy & Prince 1986) and more generally Prosodic Hierarchy Theory (Selkirk 1980).

Current phonological theory generally accepts the organization of prosodic units within hierarchical structure, i.e., the Prosodic Hierarchy.

(2) Prosodic Hierarchy (Selkirk 1980)




Prosodic Morphology has built on this assumption by advancing the very strong claim that morphological templates are defined in terms of authentic units of prosody. In the study of reduplication and root and pattern morphology, this claim amounts to giving a direct prosodic interpretation to observed invariant forms. Thus, as an example, the template predicting the form of the reduplicative

prefix in Ilokano is specified as a heavy syllable, and not as a sequence of generic timing level units like C's and V's, or X's (McCarthy 1992).

With these theoretical assumptions providing a background, this paper will examine iterative data alongside data that can help us describe JC prosodic structure. In section 2, I examine my corpus of iterative forms after first characterizing JC syllable structure. Here, I will argue against a previous segmental analysis for iterative base words, in favor of a more general description in terms of JC syllables. Section 3 will consider the predictions of two different analyses of JC foot structure with the ultimate goal of providing a structural description for the iterative base forms. In this section, I will present three empirical arguments for describing JC foot structure as a moraic trochee. The general question we will be concerned with in this comparative work is to what extent, if at all, the restrictions on iterative word bases are independent of those that govern Jamaican Creole word structure. In section 4, a prosodic analysis will be given in the context of a current debate concerning how prosodic categories are organized, or layered, within hierarchical structure. It will be shown that by assuming looser requirements on prosodic layering, dubbed Weak Layering, as these principles are introduced in Hayes 1991 and McCarthy & Prince 1991, Itô & Mester 1992, the iterative base can be straightforwardly described as a JC minimal word.

## 2. The iterative data: a description in terms of syllables

DeCamp's observation, cited in the introduction, highlights the fact of main interest in this investigation, namely that the base word which is repeated in iteratives conforms to certain invariant patterns. In this section we will examine a representative sample of my list of 360 forms and formulate a descriptive generalization governing the canonical form of iterative base words.

It turns out that the phonological pattern given in DeCamp 1974 does not describe substantial classes of base forms, and that a more general pattern in terms of syllables is observed. Since we are attempting to discern whether units of JC prosody play a role in iterative formation, it is important to ask if the syllable constituents of iteratives bear a resemblance to the typical JC syllables. It is for this reason that we begin this section with an overview of JC syllable structure, followed by a comparison of these structures with iterative syllable structures. An alternative description in terms of C's and V's will then be noted, and I will argue that it is inferior to the syllabic description.

### *2.1. Jamaican Creole syllable structure*

The overall structure of syllables in Jamaican Creole is given in (3).

(3) Jamaican Creole Syllable Template

(s) C (C) V (V) (C)
<N> <C>

The onset is obligatory, except some word-initial onsets, and the second C of the onset can only be a glide or a liquid. JC also allows some triconsonantal clusters beginning with /s/, e.g., *splif* 'ganja cigarette'. Such clusters are marginalized, however, and certain phonological strategies are often invoked as a way of resolving these clusters (see the Introduction to Cassidy & LePage 1980 for detailed discussion). Of the phonemic vowels /i e a o u/, /i a u/ can be long. JC has two falling diphthongs /ie uo/, and two raising /ai ou/. Apparently, the JC syllable admits non-nasal coda consonants, as in *nigret.fl* 'irresponsible', yet this seems to occur infrequently. A nasal consonant is allowed to occupy the coda only if it is homorganic with the following consonant. NC clusters are

allowed word-finally if the coda nasal is followed by a voiceless stop, as in *foNk* 'strong smell'. Lastly, any single consonant may occupy a word-final coda position.

*2.2. The iterative data*

With this rough characterization in hand, let us now turn to the iterative data. First, possible amd impossible syllables internal to iteratives will be presented and discussed. Then the observed iterative syllable patterns will be exemplified and a descriptive generalization in terms of syllables will be given.

2.2.1. Possible syllables

I will begin by pointing out that the full range of JC syllables are found within base words for iteratives. Thus, one finds syllables having both simple (4a) and complex (4b) onsets. However, word-internal consonant clusters as in *bogro bogro* do seem statistically marked; my corpus only contains 5 or 6 examples which appear to contain a complex onset in the second syllable of the iterative base word. The apparent restrictiveness of this second consonant will receive special attention in section 2.3.[2]

(4)

| a. Simple Onset | b. Complex Onset |
|---|---|
| peg peg 'vegetable process' | pram pram 'brambles' |
| šam šam 'scrapings' | šrif šrif 'spirit' |
| tam tam 'large firefly' | traš traš 'trash' |
| bugo bugo 'rough and crusty' | bogro bogro 'coarse' |
| kaba kaba 'large red ants' | klaba klaba 'sour milk' |
| pam pam 'river snail' | pyaa pyaa 'weak, inferior' |
| sof sof 'softy' | swamp swamp 'swampy' |

We also find interative internal syllables containing long vowels and diphthongs, as well as syllables whose nucleus is composed of a single short vowel.

(5)

| a. VV Nucleus | b. V Nucleus |
|---|---|
| piin piin 'simple, trivial' | priti priti 'attractive' |
| flaa flaa 'codfish fritters' | flaba flaba 'worthless' |
| fuu fuu 'foolish' | kulu kulu 'plentiful' |
| jien jien 'johnny cakes' | bufu bufu 'clumsy, stupid' |
| taiti taiti 'thich, gummy' | coko coko 'back and forth sounds' |
| mouti mouti 'gossiper' | lege lege 'plenty, in abundance' |
| huol huol 'many holes' | |

Lastly, one finds iterative base words containing syllables with (complex) coda consonants. Word-medially we find CVN syllables (6a), and word-finally we even find, admittedly rare, CVNC syllables. The examples in (6b) are all the examples in my word list.

[2]The examples here and throughout are given in IPA, except /š/ which is a voiceless palato-alveolar fricative, /ñ/ and /N/, which are palatal and velar nasals respectively, and /c/ and /j/, which represent palato-alveolar affricates.

(6) a. CVNCV

leNga leNga 'slender'
graNgi graNgi 'brushwood'
feNke feNke 'cowardly'
camba camba 'to mince up'
lompi lompi 'non-cohesive thing'

b. CVNC

lomp lomp 'cassava head'
bomp bomp 'The Itch'
swamp swamp 'swampy'

Now that we've seen possible iterative internal syllables, it is important to note that onsetless syllables are not found in iterative base words.[3] This observation allows us to make an interesting conclusion. With respect to syllable-level concerns, the range of syllables internal to iterative bases is actually quite similar to the range of syllables internal to JC prosodic words. JC syllables in general must have an onset, and so must syllables internal to iteratives. These (word-initial) onsets can be simple, or they can be complex; compare the structure in (3) with the range of onsets in iteratives shown in (4). Furthermore, one finds monomoraic syllables, as well as bimoraic syllables internal to iteratives (see 5-6), just as is found in non-iternative words. That VV and VC syllables constitute bimoraic syllables is supported by JC stress patterns (see section 3.3.). Moreover, iterative internal NC clusters are licensed by the same principles mentioned in 2.1., namely a following homorganic consonant, which is a voiceless stop word-finally, as shown in (6b).

I will speculatively conclude, therefore, that iterative internal syllable structure is governed by principles very similar to the ones that govern the structure of JC syllables generally. This claim is the first step in supporting the Prosodic Morphology Hypothesis. Section 3 will continue with this investigation, attempting to organize the syllable patterns given directly below into JC foot structure.

2.2.2. General patterns

The general patterns for iterative bases are given in (7). Three different syllable sequences are observed in base words: they can either be a heavy syllable, i.e., a bimoraic syllable composed of either CVV or CVC, a sequences of two light syllables (CV), or a heavy syllable followed by a light.[4]

(7) a. Single Heavy

jeg jeg 'rattling noise'
kil kil 'kill repeatedly'
lim lim 'stalky'
mus mus 'a mouse'
flaa flaa 'codfish fritters'
pyaa pyaa 'weak'
siid siid 'small seeds'
tief tief 'steal repeatedly'
*nb:* pra pra[5] 'pick up'

b. Two Lights

bebe bebe 'bigger than big'
kara kara 'rough terrain'
dege dege 'sole'
peki peki 'greedy'
takro takro 'do repeatedly'
slaki slaki 'wet, sloppy'
wara wara 'misc. things'

c. Heavy plus Light

camba camba 'mince up'
taiti taiti 'thick, gummy'

[3] *ic ic* 'dry rash' may be a counterexample to this claim. In any case, consetless syllables internal to iteratives are quite uncommon.

[4] There are a few examples that involve the repetition of whole word phrases, e.g., *kot-op kot-op* 'very cut up' and *straan-it op straan-it op* 'to pull apart by strands'. This study will not have anything to say about iterations of word phrases. There are also two iteratives in my sample formed by iterating a disyllabic base composed of a light syllable followed by a heavy, e.g., *difran difran* 'scattered'. Having an occurrence rate of less than 1%, this pattern is not represented because it is statistically unimportant.

The following list shows how well each pattern is attested; note that bimoraic bases are far more common than trimoraic base forms.

(8) Description of Possible Iterative Bases in terms of JC Syllables (out of 360 forms)

| | | | |
|---|---|---|---|
| a. | H | *kil kil* | 51% |
| b. | L L | *wara wara* | 40% |
| c. | H L | *camba camba* | 9% |

The following generalizations emerge from this description in terms of syllables:

- Bases are at least one syllable, and at most two syllables.
- If the base is just a syllable, it is a heavy syllable.
- If there is a heavy syllable, it is the first syllable.
- A heavy syllable can only be followed by a light syllable, if there is one.
- H L bases are rare in this type study.

The challenge for the following two sections will be to provide a principled explanation for the various generalizations given above. Section 3 will describe JC foot structure, with the ultimate goal of organizing the observed syllable sequences into higher prosodic structure. Section 4 will explore an analysis which incorporates iterative syllable sequences into a JC minimal word. Before we move to investigate foot level matters, however, it is worth discussing the predictions of a non-prosodic analysis.

*2.3. A segmental analysis: McCarthy 1983*

Recasting DeCamp's CV pattern for iterative words, McCarthy 1983 proposed that the template restricting the Jamaican Creole iterative base is defined in terms of segmental units, as shown below.

(9) Iterative Template (McCarthy 1983)

On V (C(V)) (where "On" is a possible JC onset)

This statement is clearly more restrictive than the syllable-based description given in (8). In particular, the following restrictions are encoded in the segmental template:

1. "Long vowels ... are not permitted in iteratives" (McCarthy 1983: 29).
2. "Only a single consonant is possible in the intervocalic position in C*VCV iteratives, i.e. On V CV iteratives" (ibid.).
3. "C*VC iteratives may not have final clusters (with some noted exceptions in 'the basilect')" (ibid.).
4. Disyllabic iteratives ... may not have a final cluster or even a final consonant — they must end in a (short) vowel" (ibid.).
5. Monomoraic, monosyllabic iterative bases are possible (inferred).

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[5] *Pra pra* 'to steal repeatedly', whose base word only contains a single vowel, appears to be a counterexample to the above generalization. This form, which interestingly represents a class of forms with the pattern /CrV CrV/, will be discussed in section 2.3.

Let us examine these predictions one by one, in light of the generalizations fleshed out above in 2.2.2.

2.3.1. Predictions

Long vowels are predicted to be non-occurring in iteratives — this is the interpretation of the single vocalic segments in (9) cited above. Yet, as we have already seen (5a), our corpus abounds with iterative bases whose only syllable contains a long vowel, e.g., *flaa flaa* and *piin piin*. One even finds some disyllabic counterexamples as well, e.g., *daabi daabi* 'dirtying' and *saaka saaka* 'to cut with a dull tool'.

It is not clear whether the singular segmental V's in (9) are meant to restrict diphthongs from occurring in iteratives as well, but this prediction is clearly stated in DeCamp 1974: 50. In any case, we have already seen evidence in (5a) illustrating this is not right in monosyllable words, e.g., *jien jien* and *buo buo*, and there are also disyllabic forms counter-exemplifying this claim: *jieri jieri* 'very small fish' and *taiti taiti* 'thick, gummy'.

In light of these findings, it is clearly too strong to rule out long vowels and diphthongs from iterative base words. This finding therefore constitutes a strong empirical argument against the segmental analysis, and in favor of the syllable description which characterizes iterative syllable peaks as conventional JC syllable peaks.

The single intervocalic C segment in (9) predicts that a) disyllabic iterative bases will not start the second syllable with a complex onset, and b) that the first syllable of the disyllabic base words will not admit a coda consonant. The restriction on the second onset may in fact hold for many forms. Of the disyllabic, bimoraic iterative base words, only the six forms shown in (10a) could have word-internal complex onsets. Furthermore, my corpus of iterative types containts no trimoraic iteratives with a word-internal complex onset, something with the shape of **freNkra freNkra*. This fact may simply be due to the general paucity of trimoraic forms, yet it does further substantiate the above mentioned restriction on iterative internal onsets.

With respect to the no-coda restriction, the forms in (10b) show that this restriction on the second C is just not true; most nasal consonants are admitted in the coda.

(10)

| a. CV.CCV | b. C(C)VN.CV |
|---|---|
| bógro bógro 'coarse' | camba camba 'mince up' |
| búgra búgra 'rugged' | feNka feNka 'cowardly' |
| bufro bufro 'clumsy, stupid' | freNka freNka 'delicate' |
| makla makla 'bad mixture' | hiNka hiNka 'loitering' |
| takro takro unattractive' | jeNge jeNge 'old word clothes' |
| takra takra 'do roughly' | graNgi graNgi 'sticks, brushwood' |
| | buNgo buNgo 'ugly, stupid' |
| | wiñji wiñji 'strink' |
| | meñji meñji 'slender' |

It may be true that JC favors simple CV syllables word-finally in disyllabic forms. This claim would account for the apparent markedness of complex onsets like those in (10a) and their non-existence in trimoraic forms. But the segmental template reduces this prediction with the no-coda restriction, and as shown above, these two restrictions are clearly independent of each other.[6] The general syllable

[6]One avenue for unifying the admission of coda C's with the restriction on complex onsets would be to syllabify the forms in (10a) as having simple onsets and a word-medial coda, e.g., *tak.ra tak.ra*.

description of iterative bases does not avoid this problem. It simply admits both word-initial and complex onsets by admitting a wide range of syllables. Given the robustness of the medial codas, however, and the questionable status of complex onsets, I conclude again in favor of the syllable-based generalization.

Moving to the prediction that iteratives will not have final consonant clusters, we find only a few counterexamples, e.g., *lomp lomp* 'cassava head' and *bomp bomp* 'The Itch'. This apparent gap, however, may simply be the result of a general avoidance of final clusters (see section 10 of the introduction of Cassidy & LePage 1980, pg. lxii, for discussion of reduction of word-final clusters from British English).

The prediction that the final syllable in disyllabic iteratives must essentially consist of a short vowel is largely correct. This prediction, however, is not one which distinguishes the segmental template from the syllabic description: as specified in (8), disyllabic iterative base words are either composed of two light syllables, or a heavy syllable followed by a light.

The two competing descriptions diverge, however, with the case of monosyllabic, monomoraic base forms. The syllabic description in (8) predicts that iterative bases are at least bimoraic. Any monomoraic bases, therefore, constitute counterexamples to (8), whereas the segmental template predicts they are possible by putting the second CV in parenthesis. Such forms do exist, but interestingly, almost all of them seem to fit a specific phonological pattern, as exemplified below.[7]

(11) Words with /CrV/ bases

fro fro 'matches or fire'
gra gra 'vaguely threatening'
bru bru ~ bruu bruu 'disorderly, untidy'
bre bre 'many, much'
bró bró 'brow'
brá brá ~ braba braba 'loud talking'
kra kra ~ kraa kraa 'nervous and clumsy'
pre pre ~ prek prek 'loss of control'
pro pro ~ pR-o pR-o 'black ant' (R receives strong stress)

While the monomoraic forms in (11) do pose a serious problem for the claim that iterative bases are at least bimoraic, it is interesting to note that all these forms follow a consistent pattern. If the disjunction in (9) is correct and monosyllabic base forms can contain a single short vowel, then we might expect to find examples of 'truly light' CV syllables, sometimes called a core syllable. Furthermore, we might expect to find more variation in the distribution of consonants in the complex onsets, and not just C + /r/.

Second, as one can see from the variation in (11), many monomoraic forms have bimoraic alternates. For example, *kra kra* can be lengthened to *kraa kraa*, and *pre pre* can become *prek prek*. Another interesting case of free variation is found in the pair *pro pro ~ pR-o pR-o*, where the onset sonorant may be set apart from short /o/ and actually receive stress. One account of this fact is to analyze this variation as a resyllabification where onset /r/ is restructured as the peak of its own syllable. That /r/ can support its own syllable in JC is shown by forms like *br bij* 'lime juice', a variant of *ber rij*. These augmentation processes may thus be interpreted as evidence that Jamaican Creole disfavors subminimal (less than two moras) bases, which would at least substantiate the hypothesized bimoraic minimum as a target output. Although this variation does not entirely explain away the empirical

[7] The only two exceptions are *fla fla* and *še še*, which have alternate multi-moraic pronounciations.

problem posed by the forms in (11), it does seem suggestive of a general avoidance of monomoraic words in JC.

To sum up, on the one hand, there is a sizable body of monomoraic forms, which argues against the proposed bimoraic minimum entailed by the syllabic account. Yet these subminimal forms belong to a restricted class of forms which have a complex onset with /r/ in second position. This finding casts serious doubt on the segmental analysis because it does not predict the various gaps in the distribution of consonants. Also, lengthening and resyllabification processes seem to suggest that the monomoraic forms are marked in some sense, and that proposed bimoraic minimum is an optimal target for word structure.

2.3.2. Summary and conclusion

We have just explored many empirical issues raised by the segmental analysis of iterative base words. The empirical points that argue in favor of the segmental analysis are:

- Complex onsets are limited to the first syllable in disyllabic forms (but see 10a).
- There is a limited class of monomoraic base forms (11).

The following facts, however, support the looser description in terms of JC syllables:

- By and large, the range of iterative syllables very strongly resembles conventional JC syllable structure: onsets are obligatory and both heavy and light syllables are possible.
- Long vowels (and diphthongs) are allowed in iteratives.
- Coda consonants are admitted in the first syllable of the base forms (10b).
- The bimoraic minimum is supported by lengthening and resyllabification processes.

On the basis of these points, I conclude in favor of the syllable-level description because it provides a more adequate account of the iterative data than the segmental analysis. Furthermore, this empirical finding is supported by an interesting theoretical conclusion, namely that the syllable description characterizes the base template in terms of authentic units of JC prosody.

## 3. Foot level concerns

Within the prosodic hierarchy, syllables support metrical feet, and feet are organized into prosodic words. In line with the assumptions within Prosodic Morphology, this section will investigate two plausible analyses for incorporating iterative base syllables into prosodic feet. In the process, we will examine a rule of vowel harmony found in some iteratives, as well as stress in Jamaican Creole. At each step, I will argue for a moraic trochee as a simple and adequate characterization of JC foot structure.

### *3.1. Two competing analyses*

Recalling the syllabic description of iterative base words from section 2, i.e., H, L L, and H L, one might first think to posit a quantity sensitive (QS) binary trochee, a structure parameterized within an early metrical theory (introduced in Hayes 1980). This QS structure-assigning mechanism correctly predicts that feet will be built on a sequence of H L or H syllables, and in the absence of heavies, on a L L syllable sequence. Moreover, trochaic feet are left prominent. Thus, such an analysis also rightly predicts that we will not find L H feet. A virtue of this tight organization of syllable is therefore that nothing more need be said; all the occurring base forms are predicted and the non-occurring light-heavy sequences are not.

An alternative analysis, which would require further elaboration to account for the absence of H L forms, can be developed by describing the core syllable patterns, H and L L, as moraic trochees, along the lines of Hayes 1985 and McCarthy & Prince 1986. The moraic trochee is a pair of moras, either contained within a single syllable or extended over two. Compare the foot structures predicted by the two analyses:

(12) a. QS Trochees b. Moraic Trochees


The moraic trochee is a member of a more restrictive inventory of foot structures which excludes feet which are built upon H L structures. Typological evidence for the moraic trochee has been given in Hayes 1985, 1991; further, McCarthy & Prince 1986 *et seq*, Kager 1989, 1992 and Mester 1994 all argue against trochaic feet schematized as in (12a) in favor of the moraic trochee.

With respect to the iterative data, one problem for the QS trochee is that apparent statistical markedness of the H L base forms. Instead of assigning disyllabic foot structure only reluctantly, this theory predicts that it will be the most prevalent case by maximizing foot structure to two syllables. This point may be viewed as an empirical argument against the QS trochee analysis.

Recalling a virtue of the QS trochee foot structure, we said that its tight organization of syllables straightforwardly describes only and all the observed syllable patterns. We also said that, if one adopts the moraic trochee analysis, something more needs to be said in order to account for the iterative bases composed of a heavy syllable (which is exhaustively contained by the prosodic foot) and a light syllable. Presumably, one would posit higher prosodic structure to license the final light syllable, yet what principle of grammar would then rule out an iterative base composed of a light syllable which follows a different moraic trochee? In other words, how will this analysis rule out the unattested H L and L L L bases? These empirical questions, which seem to pose serious problems for the moraic trochee analysis, will be discussed in the final section of this paper.

To summarize, an organization of syllables which makes use of the moraic trochees requires a non-obvious structural description for the H L cases, while still ensuring that the unattested base forms are ruled out. Before moving to the word level organization of iterative prosody, the following two subsections will flesh out two empirical arguments in favor of the moraic trochee analysis of iterative base forms.

*3.2. Iterative vowel harmony*

DeCamp's 1974 article describes some remarkable vowel and prosodic form alternations found with iterative words. The examples below give flavor to the variety of meanings and forms an iterative root can have.[8]

[8]It should be noted that in verifying the systematicity of these alternations, DeCamp did not always find universally ambiguous judgments for each form. Considering the sociolinguistic variation in Jamaica, this finding is not surprising. The scale of his project, however, and the care with which he conducted his work both seem to suggest that these morphological altnernations were at one time systematic.

(13) a. maka maka ‘mud’
moko moko ‘thick mud’
meke meke ‘thin, watery mud’

b. mak mak —less intensive than forms in (a).
mok mok
mek mek

c. maki maki —familiar or jocular versions of (a) forms
moki moki
meki meki

(14) a. taga taga ‘to drag’
togo togo ‘to drag something heavy’
tege tege ‘to drag something light’

b. laga laga ‘to carry, lift’
logo logo ‘to carry, lift something heavy’
lege lege ‘to carry, lift something light’

c. graNgi graNgi ‘bushwood, sticks’
*groNgo groNgo
*greNge greNge
*graNga graNga

The interest of these forms for the present investigation is the observed non-high vowel alternation (corresponding to semantic distinctions in size and scale of object), which can be seen by comparing the mini-paradigms given in (13) and (14). The iterative bases that exhibit this non-high vowel agreement are strictly of the CVCV type. Thus, the bases with monosyllabic forms in (13a) contrast with those in (13b), giving an ‘intensifying effect’. Importantly, it is only within these bimoraic, disyllabic sequences that one finds the harmonic agreement of vowels, never among CVXCV forms as in **graNga graNga* and **groNgo groNgo*.

How is one to approach this gap in the distribution of vowel harmony? Assuming the moraic trochee analysis, this generalization can be straightforwardly formulated as follows: vowel harmony found in iteratives is foot internal.

(15) Restrictions on Association of Vowel Features in Expanded Iterative Forms

Argument: [-high]

Domain: Foot

Let us now consider the awkwardness of formulating this generalization in a theory that assumes the QS trochee. We certainly cannot stipulate that harmony is possible only foot-internally, since trimoraic H L bases are prosodic feet in this theory. Nor can we say that association of the non-high vowel is restricted to a single syllable, or that this process is non-iterative, as this makes no distinction between the two crucial cases: L L versus *H L. Given the straightforward definition of the domain for the association of non-high vowels as bimoraic, the moraic trochee seems to provide a nice account of these harmony facts.

*3.3. JC Stress patterns*[9]

The stress patterns found in JC also provide a basis for choosing between the two competing foot structures. Let us consider them here.

The generalization governing the assignment of primary stress is given in (16). On the basis of these stress patterns, long vowels, diphthongs, and short vowel plus consonant sequences count as heavy syllables in JC. I have no independent evidence, aside from the iterative data, supporting this claim, however.

(16) If there is a heavy syllable in one of either the first or second syllables of a word, primary stress falls on the first heavy syllable from the left. In the absence of heavy syllables, primary stress falls on the first syllable.

| | | | | |
|---|---|---|---|---|
| A. | H H | | | |
| | dúoduo | 'sleep of children' | | |
| | jíizas | 'Jesus' | | |
| | íivnin | 'evening' | | |
| B. | H L | | H L L | |
| | núojo | 'type of plant' | jímbili | 'type of tree' |
| | fáifa | 'trumpeter fish' | nómbari | 'nobody' |
| | máami | 'mommy' | sámpáta | 'type of sandal' |
| C. | L H | | L H L | |
| | papúus | | kukúmba | 'cucumber' |
| | gilánt | 'to flirt' | nigrétfl | 'irresponsible' |
| | bikáaz | 'because' | paláNka | 'type of fishnet' |
| D. | L L | | L L L | |
| | éda | 'other' | mógikl | 'mug' |
| | féne | 'to vomit' | áfrikan | 'African' |
| | krébe | 'something odd' | krákasa | 'fan palm' |

Secondary stress assignment is governed by (17):

(17) Secondary stress falls on the third syllable of a trisyllabic word if it is heavy. (No stress is assigned to a final, third syllable if it is light, as in 16D above). In four syllable words in which all the syllables are light (primary stress falls on the first syllable, and) secondary stress falls on the third syllable.

| | | | |
|---|---|---|---|
| A. | | L L L L | |
| | see 16D | ínikwìti | 'a small dumpling' |
| | | bániklèva | 'curdled milk' |
| | | álikàša | 'type of plant' |

[9]The assignment of stress in JC is not always perceptable. That is, the relative prominence of syllables is often quite level in rapid connected speech. Cassidy & LePage 1980 suggest that this fact is due to the influence on JC from West African tone languages such as Twi (p. xliv).

Peter Patrick (personal communication) speculates that what is perceived as JC 'stress' is really a unique compounding of three factors: loudness, pitch, and length. Pitch and loudness peaks, for example, don't always match as they appear to in American English, producing an odd, seemingly level, stress pattern to the American ear.

B. H L H

| | |
|---|---|
| búosifàì | ‘to show off’ |
| báabikyùu | ‘rectangular platform’ |
| frúutapàN | ‘breadfruit’ |
| báNgaràm | ‘rubbish’ |

C.

| | |
|---|---|
| fósifàì | ‘fussy’ |
| fútapàN | ‘breadfruit’ |
| bánawìs | ‘edible bean’ (compound) |

Sometimes the first stress peak in a word is not louder than the second peak, as shown by the following comparisons.

D. L L L L

| | | |
|---|---|---|
| kókomáka | ‘heavy stick’ | cf. álikàša from 17A. |
| jérimáia | ‘kind of fruit’ | |
| álikyáca | ‘type of plant’ | |

E. [L L] [L L]

| | | | |
|---|---|---|---|
| báta báta | ‘to beat severly’ | sági sàgi | ‘shaggy’ |
| dége dége | ‘sole, single’ | díbi dìbi | ‘type of tree’ |

There are also a large body of data where the left word level prominence generalization is actually reversed: primary stress is sometimes assigned to the rightmost heavy syllable, or the first of two word-final light syllables.

(18) Final Primary Stress

A.

| L L L | | L L L L |
|---|---|---|
| bàgabú | ‘insects’ | sànanána |
| kàrató | ‘species of wood pine’ | |

B.

| L L H | | L L H L | |
|---|---|---|---|
| èbeláit | ‘Edoe-Light tree’ | kàkifíeva | ‘sea mullet’ |
| kàkabán | ‘box-like trap’ | tòfiróutn | ‘skin disease’ |

C. H L L

| | |
|---|---|
| sàNkúku | ‘to stoop down’ |
| stàarápl | ‘type of tree’ (compound) |
| sàNkóco | ‘a rich soup’ |

D. H L H

| | |
|---|---|
| àianái | ‘Rastafarian’ |
| gàNgalú | ‘bully’ |
| pùotagíi | ‘Portuguese’ |

The significance of this data is that it provides further empirical support for the moraic trochee analysis, and more generally, that the overall stress pattern is trochaic. The pervasive fact that stress always falls on heavy syllables, and, in the absence of heavy syllables, on the first of two lights, lends support for both trochaic analyses. Trisyllabic forms such as *krákasa* suggest that stress assignment moves from left to right because stress falls on the first syllable, and not on the second, which would be

the prediction if a foot was built on the final two light syllables. The variation with respect to word-level stress prominence, compare (16) and (17) with (18), I take to simply be a loose interpretation of this 'parameter'.

The interesting contrast, however, is between the different word-level stresses on words with H L L sequences, repeated directly below.

(19) H L L Forms

| a. Left Prominent | b. Right Prominent |
|---|---|
| jímbili | sàNkúku |
| nómbari | stàarápl (though this is a compound) |
| sámpáta | sàNkóco |

With the left prominent forms in (19a), the relative prominence of syllables is not always perceptible. (Though note second syllable stress in *sámpáta*.) But with the words with rightmost primary stress in (19b), primary stress is consistently assigned to the penultimate syllable. How would the two foot structures account for this fact?

(20) a. *(sáNku)ku b. (sàN)(kú̲ku)

Here we find a crucial difference in the predictions of the two analyses. (20a) illustrates the structure assigned by the QS trochee, where the first foot is built over the first H L sequence. Of course this is not the right structure since it doesn't predict that the penultimate syllable will receive stress. On the other hand, the structure assigned by the moraic trochee analysis, given in (20b), does make the right prediction. Parsing the initial heavy syllable as its own foot leaves the final two lights free to be assigned a second trochee, which invariably gives penultimate stress. This fact therefore constitutes further empirical evidence in favor of the moraic trochee.

### *3.4. Conclusion*

I conclude that the moraic trochee is an operative prosodic category in Jamaican Creole. This conclusion is supported by the ability of this analysis to account for the following facts:

- H and L L bases constitute the core data.
- Vowel harmony internal to iterative base words is restricted to bimoraic structures.
- The penultimate syllable in H L L words is stress.

## 4. The minimal word in iterative word formation

In the preceding two sections, I have made the following claims:

- Iterative internal syllables are, in general, governed by the rules of JC syllabification.
- Iterative bases are composed of a H syllable, or a sequences of L L or H L syllables.
- The JC foot is a moraic trochee.

In the interest of pursuing the Prosodic Morphology Hypothesis, we will attempt to describe the restrictions on iterative base words in terms of moraic trochees. This gives rise to two questions with respect to the prosodic structure above the foot.

•How shall we account for the existence of H L syllable bases, as well as for the fact that they are statistically marked?

•How can we account for the fact that L H syllable bases are non-occurring, as well as L L L syllable bases?

If we say that iterative bases are moraic trochees, then we must posit higher level structure to account for the cases which have a moraic trochee plus a light syllable, i.e., (H) L. Furthermore, once we admit higher level structure, what principles rule out forms with unfooted initial light syllables, i.e., L (H) and L (L L)? In this section we will attempt to answer these questions in the context of a recent theoretical debate concerning the principles which govern the organization of prosodic structure.

*4.1. Two layering hypotheses*

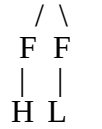
In the bases with H L syllables, the question is whether the light syllable should be footed, or whether it should be directly dominated by the PrWd (prosodic word). This question is central in a recent debate concerning the status of the Strict Layering Hypothesis (Selkirk 1984), which maintains that every prosodic category must be exhaustively contained within a category of the immediately superordinate type.

(21) Strict Layering Hypothesis (Selkirk 1984)

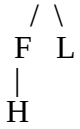
A category of level *i* in the hierarchy immediately dominates a (sequence of) categories of level *i*-1.

Following (21), the H L base forms can only be represented as in (22a), and not as shown in (20b) where the light syllable is immediately dominated by PrWd.

(22) a.



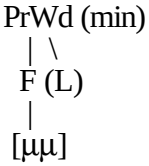

b.




Recently, a number of researchers (McCarthy & Prince 1991, Hayes 1991, Itô & Mester 1992) have argued for a loosening of the 'strict succession' requirement entailed by (21), and for admitting non-uniformly-layered structures like those in (22b) under the ensemble of assumptions called Weak Layering.

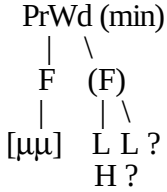
Under Weak Layering, the base word syllables can be analyzed as a minimal prosodic word which must at least contain a single foot (the moraic trochee), and can maximally contain a foot and an unfooted light syllable, as in (23) below. Itô & Mester's 1992 constraint, Maximal Parsing, coupled with the proposed minimal word requirement, ensures that the minimal word will be no more than trimoraic: if the unfooted syllable to the left is, for example, heavy, then it can support a second foot, and so the structure would not be maximally parsed.

(23) Iterative Base Template (under Weak Layering)




Before proceeding, notice the problem immediately confronted by an analysis that maintains the Strict Layering Hypothesis. The core cases will involve a minimal prosodic word composed of a single foot, i.e, the H and L L cases, yet the marked H L syllable base words will not be minimal because the parsing of these two syllables requires positing two prosodic feet. This point is illustrated in (24) below. This asymmetry raises the question, why don't we find sequences of two unmarked feet? If we must posit two feet in order to account for the marked H L bases, what principles of grammar restrict the rightmost foot from being composed of a heavy syllable, or even two lights?

(24) Iterative Base Template (under Strict Layering)

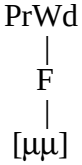



Both templates introduce a disjunction in order to account for the possible final light syllable. In (23), general principles of phonological layering work to restrict the admitted prosodic unit to a light syllable. The template in (24), however, along with (21), does not restrict the optional foot in the required way and it is not obvious how this restriction might be achieved. Thus, Weak Layering allows for a straightforward formulation of the iterative base template, whereas an account formulated under the assumptions of Strict Layering requires additional stipulation. In the next subsections, I will show how two further restrictions on iterative base words, mentioned at the onset of this section, can be handled quite straightforwardly if we assume Weak Layering.

*4.2. Strict versus loose minimal word*

Let us turn now to the question of why H L bases are infrequent. On the assumption that the final syllable is left unfooted in the (H) L cases, Weak Layering distinguishes between two types of minimal word, introduced in McCarthy & Prince 1991 as STRICT MINIMAL WORD and LOOSE MINIMAL WORD. The former is the subclass of minimal word that contains a single foot and nothing more, i.e., H and LL in languages with a moraic trochee, and this type is the unmarked case in our study. Loose minimal words differ from strict minimal words in that they admit an unfooted light syllable in addition to a prosodic foot. Compare the structures given below.

(25) a. Strict Minimal Word (x)
x = 1F




b. Loose Minimal Word (x)
2F > x > 1F

Exploiting these structural differences, we can now move to explain why iteratives that contain bimoraic bases, e.g., *wara wara*, are more common than ones containing trimoraic bases, as in *taiti taiti*. The trimoraic bare loose minimal words, and they are marked because they have unfooted syllables. Thus, at the same time that Weak Layering admits non-uniformly organized prosodic structure, it retains one of the essential insights of Strict Layering, namely that unfooted syllables are disliked in many languages (see also Mester 1994 for a demonstration of such avoidances in Latin).

To recapitulate, Weak Layering enables us to characterize the markedness of the H L base forms in terms of marked prosodic structure. It is not apparent how an analysis that must assign two feet to these forms would distinguish these base forms from the unmarked types.

*4.3. Left Edge Matching*

Now we turn to the question of how to account for the fact that we find base words composed of a foot followed by a light syllable, but at the same time, we find almost no bases where a light syllable precedes the foot.

One way of deriving this fact is to appeal to a matching requirement like the one used in Itô 1990 to account for the fact that similar minimal word structures are avoided in Japanese truncations.

(26) Left Edge Matching $_{PrWd}[ = {}_{F}[$

Left word edges (preferentially) coincide with foot edges.

Left Edge Matching entails that the prosodic word and the foot be flush at the left edge, thus predicting that the unfooted syllables will only follow the foot in loose minimal words: [(tai) ti], cf *[ta (tii)]. As pointed out in Itô & Mester 1992, the structural assumptions under Weak Layering render the fulfillment of (26) an empirical issue: admitting unfooted syllables allows foot level structure which can intervene between the left PrWd edge and the left foot edge. Within uniformly-layered theories, however, matching constraints like those in (26) are trivial. Word edges are always flush with foot edges, as is the case with edges at each prosodic level under Strict Layering.

Two phenomena that parallel the effects of the matching constraint are worth mentioning. One is the fact that sometimes iteratives formed with bimoraic base words have alternate pronounciations where the vowel lowest in sonority drops from the iterative-final diphthong, as shown by the examples below.

(27) buo buo ~ búobò 'pretty'
dúo duo ~ dúodo 'bread'
díe díe ~ díedè 'Good day'
šai šai ~ šie še 'lively dance'

These shortenings are interesting in light of the PrWd-to-F matching constraint. If Left Edge Matching is a principle of JC grammar, then we only expect word-final vowel shortening in these cases, and never instances of shortening of the first syllable, as in **bobuo*.

Secondly, as mentioned in 3.3.1., stress is assigned from left to right, e.g., *krákasa* 'fan palm'. This fact, too, could presumably be derived from (26), as stress assignment from the right would build feet flush with the right edge, which is an illicit structure by Left Edge Matching: [kra(kása)].

To bring this subsection to a close, I have proposed an edge matching constraint to control the distribution of the unfooted material in the iterative base. Furthermore, I have presented two phenomena that may provide independent motivation for such a principle. The fact that vowel shortening is word-final and not word-intial is consistent with (26). Also, the fact that the first syllable always receives stress further supports the matching constraint as feet are always aligned to the left word edge.[10]

*4.4. *L L L*

Our analysis so far doesn't have a principled account for why we never find trisyllabic base forms. *Prima facie*, it's not apparent to what extent universal principles should account for such gaps. After all, echo words like *higaty pigaty* can be found in American English and I suspect in many other languages as well.

Pursuing a more language particular account, one avenue open to us is to simply stipulate a disyllabic maximum on the input base form, as given below. The Arabic broken plural, discussed in McCarthy & Prince 1990, may have a similar restriction.

(28) Disyllabic Maximum for JC Base

Base = σ σ

A different approach might be to exploit the fact that the output form, based on a trisyllabic word, would be composed of a sequence of six syllables. This string of syllables could support three feet, following the copying procedure, and would hence violate the two foot maximum implicit in the minimal word requirement. What I am suggesting is to allow something along the lines of Deforestation of Liberman & Prince 1977, where prosodic structure can be reassigned to the melody material following reduplication. Hence, while the input for the iterative formation would be a minimal word, [(higa)ty], the resulting output, after Deforestation and reassignment of foot structure would be an over-sized prosodic compound, as in [(higa)(ty-pi)(gaty)]. At any rate, something along the lines of the two proposals given above is necessary to account for the lack of L L L bases.

---

[10]The directionality of stress assignment seems to provide further support for the matching constraint, yet the satisfaction of this constraint deserves further consideration in view of facts like *bikáaz* where a word-final heavy syllable is footed, leaving an unfooted light syllable to its left.

One possible explanation of this fact can be formulated quite nicely within an optimality theoretic framework (Prince & Smolensky 1993, McCarthy & Prince 1993). In such a theory, phonological constraints are ranked and violable. Surface forms are selected by virtue of their optimal satisfaction of well-formedness constraints that are ranked within a language particular constraint hierarchy.

The way to account for the case of *bikáaz*, therefore, is to propose and additional constraint which will dominate the matching constraint, as matching is violated in this case. Without getting into the formal details, one idea is to give importance to a syllable integrity condition that ensures a parse of the long vowel as a heavy syllable. This approach may simply boil down to an onset requirement, which we have already seen to be important in JC; a footing of the first two CV sequences would result in an onsetless final syllable, as in *[(bíka)az]. Another possible scenario, suggested to me by Armin Mester, is to employ Prince's 1991 Weight-to-Stress principle and rank this constraint above Left Edge Matching. Weight-to-Stress ensures that heavy syllables are stressed, and with the case of [bi (káaz)], the optimal satisfaction of the hierarchy leads to the violation of the matching constraint.

## 5. Summary of conclusions

The general conclusion of this paper is that a sizable body of data, which had previously been argued to resist a prosodic interpretation, can be most insightfully analyzed within Prosodic Morphology. More specifically, I have argued for a description of iterative base words in terms of a JC minimal word. Furthermore, I have presented evidence that supports an analysis of the JC foot as a moraic trochee, a member of a highly restrictive inventory of foot types. I have also shown that the generalizations governing the structure of JC syllables can extend to iterative internal syllables. In summary, the prosodic categories internal to the minimal word template are analyzed here as authentic units of JC prosody.

This study has also outlined some empirical issues surrounding a recent debate concerning two layering hypotheses. I have argued that the principles governing the assignment of prosodic structure are actually less rigid than have been previously hypothesized. In particular, I have argued in favor of the Weak Layering Hypothesis. This assumption enabled me to give an adequate formulation of the requirement on iterative base words, characterize the markedness of H L forms in terms of marked prosodic structure, as well as to formulate the well-motivated constraint, Left Edge Matching.

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