Foot structure in the Ibibio verb[1]

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Abstract

This paper argues that monosyllabic verb root-suffix combinations in Ibibio form a foot, specifically, a (bi)syllabic trochee. Our argument is that without the assumption of a bisyllabic foot, phonological generalizations regarding root-suffix structures cannot be captured. The suffixed verbs take one of two shapes: a heavy-light trochee, or a light-light trochee. The templatic choice is strictly determined by morphological inflection. We explain processes affecting vowel quantity: vowel lengthening and shortening, as forced by the prosodic requirement of template satisfaction. The overall picture is that Ibibio is a language with every possible form of the trochee, which forms the domain of several phonological processes and the basis of segmental distribution.
Keywords: Ibibio, metrical structure, foot, optimality theory, verb morphophonology

1. Introduction

The foot is a prosodic category of sound organization (Hayes 1980, 1985, 1987, 1995; Nespor and Vogel 1986; McCarthy and Prince 1986, 1990, 1993, 1996;

1. This is a revised version of a paper of the same title that has been cited in many places as Akinlabi and Urua 1993 or 1994. We decided to publish this version to make this data available to a wider audience. Earlier versions of this paper benefited from comments by Brian McHugh, Francis Oyebade, Yetunde Folarin-Schleicher, and Hubert Truckenbrodt. Our indebtedness to Bruce Connell, Laura Downing, Alan Prince, Douglas Pulleyblank, Donca Steriade and an anonymous JALL reviewer is obvious throughout this version. Earlier analyses of parts of the data were presented at the 11th WCCFL, at the 23rd Annual Conference on African Linguistics and at the Departmental colloquium at Rutgers University. We thank the audiences at these meetings for discussion and suggestions. All remaining errors are, of course, our responsibility. This research was partly funded by a Rutgers University Minority Faculty Development Grant awarded to the first author.

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Halle and Vergnaud 1987, and others). In this article we propose that various affixation processes in the Ibibio[2] verb target a prosodic foot, though the verb roots themselves may be sub-minimal in isolation. Our argument is that without the assumption of a bisyllabic foot, phonological generalizations regarding root – suffix structures cannot be captured.

In discussing the Ibibio foot, this article provides support for a number of issues in prosodic theory (Hyman 1985; Nespor and Vogel 1986, McCarthy and Prince 1986, 1990; Hayes 1989; Archangeli 1991, and others). The first issue is whether segmental phonology (i.e., phonological rules) may refer to prosodic bracketings. Kiparsky (1979) and Prince (1980) propose that the American English flapping rule (/**t, d**/ → [**r**], write/writer) may be stated as applying foot-medially (see also Flemming (1994), Harris (forthcoming), and Harris and Urua 2001). But other work, such as Hammond (1982) and Prince (1983) give principled reasons why segmental rules should make no reference to metrical bracketing. The second issue is whether a trochaic foot may have the structure heavy-light (McCarthy and Prince (1986, 1996) Hayes (1987, 1995)). A number of phonological processes in Ibibio have as their domain of operation a bisyllabic structure; since these processes do not operate elsewhere we take this as indication that a prosodic foot in Ibibio consists precisely of this structure. Secondly, suffixed verbs in Ibibio may take one of two structures: a heavy-light template or a light-light template. These weight requirements are true regardless of the underlying weight of the verb root. We take this as indication that the heavy-light trochee exists in Ibibio. The overall picture therefore is that except for lack of stress Ibibio is a language with every possible form of the trochee, which forms the domain of phonological processes.

The analysis of Ibibio verb morphology and phonology proposed in this article assumes prosodic theory (Hyman 1985; McCarthy and Prince 1986, 1990, 1993, 1996; Hayes 1989, 1995; Archangeli 1991; and others). We will especially adopt McCarthy and Prince (1990)'s fundamental thesis of prosodic theory that "templates are defined in terms of authentic units of prosody: mora (μ),

2. Ibibio is spoken in Akwa Ibom State in the Niger-Delta region of Nigeria. Essien (2001) puts the number of speakers at 4 million. Greenberg (1963) classifies Ibibio under the Benue-Congo branch of the Niger-Congo family. It is subclassified as a Lower-Cross language of the Cross-River subfamily. Williamson's (1989) classification groups it as part of the Lower Cross branch of Delta Cross, along with Efik and AnaaN. In the most recent and currently generally accepted classification, Connell (1994) classifies Ibibio as part of the Central Lower Cross subgroup, with Efik, AnaaN and Ukwa forming its most closely related neighbors within this subgroup. (See also Williamson and Blench 2000.)
Ibibio itself has a fair amount of dialect variation. The dialect we will discuss in this article is the Uruan dialect, as spoken in Mbaya, about eight miles from Uyo, the location of the state headquarters.

syllable (σ), Foot (F), prosodic word (W), and so on" (McCarthy and Prince 1990: 209).

McCarthy and Prince (1986, 1996) propose the following distinct foot types within this theory (see also Hayes 1987, 1995):

(1)

[σ	σ]	syllabic trochee
[μ	μ]	moraic trochee / bimoraic foot
[$\sigma\mu$	$\sigma\mu$ μ]	iambic foot

Given this theory, the foot structures in (1) also serve as the minimal template requirements that footed items must satisfy; a foot must be minimally bimoraic. Furthermore, following the prosodic hierarchy and the minimality requirements, a prosodic word must be at least a prosodic foot, etc.

In addition to the prosodic theory, the formal analysis proposed here employs Optimality Theory (Prince and Smolensky 1993). Since the article is primarily intended to be descriptive, phonological constraints will be stated as clearly and informally as possible.

1.1. Ibibio verb roots

On the surface, monosyllabic verb roots in Ibibio may take one of three shapes: they may be CVVC[3], CVC, or just CV.

(2)

wààk	'tear'	**déép**	'scratch'	**kɔ́ɔ́ŋ**	'hang up [a dress]'
wàt	'paddle'	**dép**	'buy'	**kɔ̀ŋ**	'knock [on the head]'
wà	'sacrifice'	**sé**	'look'	**kpɔ̀**	'carry'

Each of the items in (2) may be used in isolation (i.e. without any suffix); as, for example, in imperatives. The first problem a prosodic analysis of Ibibio encounters from these examples is that of minimality. If the CV verbs in (2) are prosodic words we expect them (given evidence that we are about to show) to be at least the size of a prosodic foot; we therefore expect them to be (lengthened to) CVVs like ***wàà** 'sacrifice' in isolation, making them minimally bimoraic (i.e., each vowel dominated by a mora μ).[4] This lengthening does not happen to verbs in isolation. These verbs therefore constitute counterexamples

3. A number of verbs in Ibibio have the form Ci/u V (C). We assume that the initial Ci/u in these forms is CG. Given this assumption such forms are therefore CGV(C), and not CVVC sequences. See also Footnote 9. They are thus predicted to behave like the CVC verbs.
4. An alternative to lengthening, as Alan Prince pointed out to us, is syllabic augmentation as in Lardil. Note that nonlexical items such as pronouns, prepositions, and grammatical particles frequently escape the minimality restrictions (see Ito 1990 for example). This is understandable because in languages with stress these items often fail to receive stress and they tend to cliticize. The same is however not true of the lexical class such as nouns, verbs, adjectives, etc., to which the Ibibio examples belong.

to prosodic (bimoraic) minimality. Similar problems relating to the minimality restrictions have been noted in Manam (McCarthy and Prince 1986), Arabic (McCarthy and Prince 1990), Japanese (Ito 1990), Chinese dialects (Yip 1992), and Yoruba (Orie 2000). Therefore we regard the CV verbs such as in (2) as subminimal.[5]

What is interesting about the CV verb roots in (2) is that in productive word formation, they are often brought to the minimal, through lengthening; **dá** 'stand', [**dáá-ɣá**] '… not standing' (see the various forms in (7)). In her work on the minimality problem as exemplified in Japanese Ito (1990) suggests that bimoraic minimality is overridden in nonderived lexical items. Nonderived monosyllabic forms may thus be subminimal. Hence regular foot construction may start with productive (inflectional) word formation processes, as appears to be the case in Ibibio. In this article we examine all types of verb roots in Ibibio (as in (2)), in various affixation processes.

Aside from the monosyllabic verb roots in (2), Ibibio also has synchronically underived bisyllabic verbs which could take the form of CVCCV, CVVCV, or CVCV as in (3).

(3)

a.	**dáppá**	'dream [vb.]'
	dámmá	'be mad'
	dɔ́kkɔ́	'tell'
	tèmmé	'explain'
b.	**fááŋá**	'argue'
	yɔ́ɔ́ŋɔ́	'plaster a wall [surface]'
	yèèmé	'wilt'
	dààrá	'rinse'

5. The pattern in (2) is open to a reanalysis, as pointed out to us by Alan Prince: the CV verbs may be derived from CVV by postlexical truncation (cf. McCarthy and Prince (1990: 253–256) for Arabic monomoraic imperatives). This reanalysis will not work for Ibibio since there are in fact a few CVV verbs on the surface: **kàá** 'go', **nàá** 'tie'; these CVV verbs form (near) minimal pairs with the CV forms they are supposedly truncated to. Furthermore, while postlexical truncation can be used to explain the occurrence of CV forms in imperatives it runs into trouble because the same CV forms may also be found in declarative sentences, in which the verbs are followed by other lexical categories. In other words, the occurrence of CV verbs is not restricted to imperatives. Also, unlike the cases in Rotuman where similar items clearly violate structure preservation by creating otherwise impossible closed syllables, light diphthongs, and front rounded vowels (see McCarthy and Prince 1991), the Ibibio cases respect structure preservation: the vowels and consonants that occur in these forms are those that contrast in Ibibio. Finally Ibibio CV verbs behave as if they are monomoraic in terms of tonal structure. The tone-bearing unit in Ibibio is the mora. If the CV forms result from postlexical truncation, one expects that there will be several CV verbs with contour tones which will result from relinking the surviving tone of the truncated mora. CV verbs in Ibibio however usually have only one tone (see Urua 1994 for a discussion of Ibibio contours).
As Orie (1997, 2000) has noted, it is instructive to note that the verbal subminimality noted here for Ibibio is indeed widespread in Benue-Congo where lexical verbs are often CV.

c.	**sàŋá**	'walk'
	kɔ́ŋɔ́	'choke'
	fèɣé	'run'
	bɔ́ɣɔ́	'overtake'
	kéré	'think'
	sárá	'comb'

While anticipating our analysis we note that each of the underived shapes in (3) represents a (bi)syllabic trochee, heavy-light in (3a) and (b), and light-light in (3c), the same shapes that suffixed verbs target in morphological processes.

A crucial fact to note about bisyllabic CVCCV verbs as in (3a) is that such verbs may only have geminates and not a sequence of nonidentical consonants. Note also that Ibibio lacks inter syllabic NC clusters which share only place of articulation, except when the nasal is syllabic: **ǹsámà** (**ǹ – sá – mà**) "type of beans", **ḿbɔk** (**ḿ – bɔk**) "please". This suggests that adjacent consonants must assimilate in Ibibio. The assimilation suggests a key role for constraint AGREE in surface forms, as in (3a). We give a preliminary statement of this constraint in (4) (to be revised later).

(4) AGREE (preliminary statement)
Adjacent consonants must agree in place/manner of articulation.

A constraint such as AGREE makes the prediction that a potential violation is avoided except forced by a more powerful constraint, such as the one that prevents syllabic nasals from complete assimilation. This prediction is borne out by the facts of Ibibio, since (derived) word internal codas are geminates derived through complete assimilation as in the negative morpheme discussed in Section 2.1, and there are no underived bisyllabic verbs with nonidentical CC in the coda of the first syllable and onset of the second syllable. Therefore AGREE constrains all output forms in the language.

The basic proposal for monosyllabic verb root + suffix combinations in Ibibio in this article is that together they form a foot, specifically, a (bi)syllabic trochee. The suffixed verbs take one of two shapes: a heavy-light trochee (an obviously questionable trochee, the status of which is addressed in Section 2), or a light-light trochee. The templatic choice is strictly determined by morphological inflection. We explain processes affecting vowel quantity: vowel lengthening and shortening, as forced by the prosodic requirement of template satisfaction. The rest of this article is organized as follows. First we propose and then provide both morphological and phonological support for the bisyllabic trochee in Ibibio (Sections 2.1 and 2.2). Then in Section 2.3 we show that Ibibio segmental distribution is dependent on this foot structure. We briefly consider an alternative account of the data in Section 3. Finally in Section 4, we show that Ibibio has a distinct bimoraic (monosyllabic) foot, which forms the target of prefixing reduplication.

2. Ibibio foot structure

Though monosyllabic verb roots may be subminimal, the morphology of the Ibibio verb contains evidence that this language employs a bisyllabic foot, which forms both the target of morphological processes and the domain of phonological processes. It also has a bimoraic foot, which forms the template for other morphological processes. It is to these that we now turn. We propose the following foot structures for Ibibio and provide support for them in the next several sub-sections:

(5) Ibibio foot structures:
$[\sigma\ \sigma]$[6] syllabic trochee
$[\mu\ \mu]$ bimoraic foot

We begin with evidence for the bisyllabic foot before we proceed to the bimoraic foot. The bisyllabic foot is best exemplified in verbal suffixation (i.e., verb root + suffix combinations). The verb root plus suffix structures can be seen as forming an "Inflectional Stem" in the sense of Hyman (1990) (see also Harris forthcoming). This is the domain that we will be examining. Ibibio has a variety of suffixal formatives which on the surface appear as either a syllable (CV), or as a mora (V). This opposition is however only surface apparent, as the same suffix may sometimes show up as a CV and at other times as a V. In our conception there are two templates for all verb root + suffix combinations in Ibibio; the heavy-light template and the light-light template, both of which constitute the bisyllabic (trochaic) foot. Therefore the suffixal formatives may be split prosodically into those that form a heavy-light structure with the verb and those that form the light-light structure. The overall picture is that suffixes determine the prosodic shape of the inflectional stem.

2.1. The Heavy-light template

2.1.1. The negative/reversive suffix. Essien (1990) refers to Ibibio morphemes that mark verb negation, reversion of action, and relativization as verbal extensions. These morphemes are homophonous (for example, [**kɔ̀p-pɔ́**] (from [**kɔ̀p**] 'lock (door)') can mean either 'not lock' or 'unlock'); and their melodic form depends on the verb root. In this discussion what we call the negative suffix translates in English as 'not Verbing' while the reversive suffix translates as 'unVerb'. Since not all verbs have a 'reversed' counterpart, these forms are (more) limited. We present the suffixed forms of CVC, CV,

6. This structure allows a Light-Heavy (iambic) foot in principle, however such a foot is nonexistent in Ibibio.

and CVVC verb roots in that order.[7] Roots with high vowels are discussed separately in Section 2.4, because they involve additional complications.

(i) CVC Roots. After CVC verbs, the negative and reversive suffixes take the form of a CV whose consonant is identical to the coda and the vowel is identical to the preceding vowel, i.e., the suffix is identical to the preceding consonant and vowel. The verb root itself remains unchanged as we have in (6). The forms in (6a) are the negative forms while those in (6b) are the reversive forms.

(6) a. Negative forms

dép	'buy'	**í-dép-pé**	's/he is not buying'
kòp	'hear'	**í-kòp-pó**	's/he is not hearing'
yét	'wash'	**í-yét-té**	's/he is not washing'
bót	'mould'	**í-bót-tó**	's/he is not moulding'
dát	'take/pick up'	**í-dát-tá**	's/he is not taking'
ɲèk	'shake'	**í-ɲèk-ké**	's/he is not shaking'
kɔ̀k	'vomit'	**í-kɔ̀k-kɔ́**	's/he is not vomiting'
dóm	'bite'	**ń-dóm-mó**	'I am not biting'
nám	'do/perform'	**ń-nám-má**	'I am not performing'
bòn	'father a child'	**ḿ-bòn-nó**	'I am not fathering a child'
bén	'carry [with hand]	**ḿ-bén-né**	'I am not carrying . . .'
sàŋ	'go'	**ń-sàŋ-ŋá**	'I am not going'
kòŋ	'knock'	**ŋ́-kòŋ-ŋɔ́**	'I am not knocking'

b. Reversive forms

kòp	'lock [door]'	**kɔ̀p-pɔ́**	'unlock'
sɔ̀t	'squat'	**sɔ̀t-tɔ́**	'move from squatting position'

7. Since not every verb can semantically be used in every role, we do not supply examples for all types of verbal extensions for each verb type.

tèm	'cook'	**tèm-mé**	'remove cooked foof from fire'
byòm	'carry load on the head'	**byòm-mó**	'remove load from the head'

(ii) CV Roots. After CV verb roots this suffix takes the form of a dorsal continuant [ɣ] and a vowel identical to the preceding vowel, but the CV roots now become CVV.

(7)	**sé**	'look'	**ń-séé-ɣé**	'I am not looking'
	nɔ̀	'give'	**ń-nɔ̀ɔ̀-ɣɔ́**	'I am not giving'
	dó	'be [copula]'	**ń-dóó-ɣó**	'I am not'
	dá	'stand'	**ń-dáá-ɣá**	'I am not standing'

(iii) CVVC Roots. After CVVC verbs, there is a distinction between the negative and reversive forms. The negative takes the form of a V identical to the preceding vowel, while the reversive takes the form of a CV as in the CVC roots, but the CVVC root now becomes CVC. Note the first two verb roots in (8a), whose reversed counterparts are given in (8b).

(8) a. Negative Forms

fáák	'wedge between two objects/screw on'	… **fáá-ɣá**	'… not wedged/ not screwed'
kɔ́ɔ́ŋ	'hang on hook'	… **kɔ́ɔ́-ŋɔ́**	'… not hanging on hook'
ɲɔ̀ɔ̀n	'crawl'	… **ɲɔ̀ɔ̀-nɔ́**	'… not crawling'
wèèm	'flowing'	… **wèè-mé**	'… not flowing'
kóót	'read/call'	… **kóó-ró**	'… not reading/calling'
déép	'scratch'	… **déé-βé**	'… not scratching'

b. Reversive Forms

fáák	'wedge between two objects'	**fák-ká**	'remove wedged object'
kɔ́ɔ́ŋ	'hang on hook'	**kɔ́ŋ-ŋɔ́**	'remove from hook'

(iv) Bisyllabic roots. Finally, the negative suffix takes the default form [**ké**] after bisyllabic verbs, no matter the segmental melody of the verb. Consider the negated forms of the bisyllabic verbs below (from (3)):

(9)

dáppá	'dream [vb.]'	… **dáppá-ké**	'… not dreaming'
dámmá	'be mad'	… **dámmá-ké**	'… not being mad'
dɔ́kkɔ́	'tell'	… **dɔ́kkɔ́-ké**	'… not telling'

For all of (6)–(9), we assume that the negative or reversive suffix is underlyingly **/ké/**, since this is the invariant form after bisyllabic verbs. A clear generalization is obvious from the shape of the derived verbs: whatever the underlying form of the *monosyllabic* verb root in (6)–(8), the root-suffix outcome has to take the form of a heavy (bimoraic) syllable followed by a light (monomoraic) syllable. All of the data can be accounted for if we assume that the prosodic target of the suffixed verb is a bisyllabic trochaic foot. We propose the following foot template to account for them:

(10) Ibibio Foot Template 1
[$\sigma\mu\mu$ $\sigma\mu$] heavy-light trochee

The relevant templatic constraint that determines the prosodic shape of the "inflectional stem" can be stated as follows:

(11) Inflectional Stem = [$\sigma\mu\mu$ $\sigma\mu$] (INFLST)
The Inflectional Stem is a heavy-light trochee.

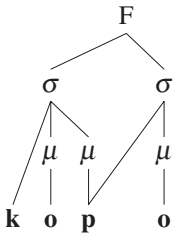
The proposal works as follows. We will assume that the left edge of the verb root is aligned with the left edge of the bisyllabic foot, and the right edge of the suffix is aligned with the right edge of the bisyllabic foot. (Compare with the mapping approach of McCarthy and Prince (1990), and Mutaka and Hyman (1990).) The constraint system that we will develop in this section accounts for the rest of the phonological form of the outputs.

In illustrating and accounting for these data we will only show the input to, and the output of the inflectional stem, following Prince and Smolensky (1993) in assuming that phonological theory has no step-by-step derivation. We will however describe the phonological differences between the input and the output. We illustrate this with an example each from (6)–(8).

Descriptively, the data in (6) is derived by spreading the root node of the nucleus of the first syllable to the nucleus position of the second syllable, and the root node of the coda in the first syllable to the onset of the second syllable. Essentially, as in metrical systems the first syllable is behaving as the "strong" syllable (or head) of a trochee in assimilating the second "weak" syllable (or non-head) completely.[8]

8. We are deliberately avoiding the use of "stressed" and "unstressed" syllables here to prevent any possible misconception.

(12) **kòp + ké** 'hear' + 'neg' → … **[kòp-pó]**$_{\text{FT}}$ '… not hearing'
Input: **kòp + ké**
Template: $[\sigma\mu\mu\ \sigma\mu]_{\text{FT}}$
Output:



Formally, we follow Beckman (1998) in assuming that the direction of assimilation here is determined by positional faithfulness. But anticipating our observation that all of the processes here are foot based, we propose that this is faithfulness to segments of the head of a foot (or the strong syllable of a bisyllabic foot) as opposed to the non-head (or weak syllable of a bisyllabic foot)). We assume that faithfulness to the segments of the foot-head outranks faithfulness to the segments of the non-foot-head, hence assimilation. But the output segments still correspond to the input segments, so there is no outright deletion of the suffix (non-foot-head) segments. The relevant faithfulness constraints can be stated as follows.

(13) IDENT-HEAD (ID-HD)
Features of segments of the foot-head are identical in the input and output.

(14) IDENT-NONHEAD (ID-NONHD)
Features of the segments of the non-head of the foot are identical in the input and output.

(15) Ranking for direction of assimilation: ID-HD ≫ ID-NONHD

As noted in the preceding section, the actual constraint responsible for assimilation is the AGREE family of constraints. The AGREE constraint in (4) can be dispersed for consonants and vowels, as well as for place and manner of articulation.

(16) AGREE-PLACE
Adjacent consonants/vowels must agree in place of articulation.

(17) AGREE-MANNER
Adjacent consonants/vowels must agree in manner of articulation.

For the purposes of this paper, both of these constraints will be merged into one constraint AGREE, but the reader should be aware that forms are evaluated for

both place and manner of assimilation in consonants and vowels. In this and subsequent tableaux and examples, [. . .] enclose feet. The symbol (-) separates foot head from the non-head. The output in (12) has the following derivation:

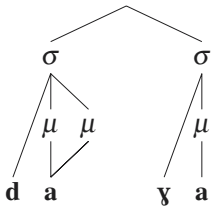
(18) Non-head (suffix) assimilation: AGREE ≫ ID-NONHD
kòp-pó '. . . not hearing'

kòp + ké	IDENT-HEAD	AGREE	IDENT-NONHEAD
[kòp-ké]		*!	
[kèk-ké]	*!		
☞ [kòp-pó]			**

The actual output in (18) is the one in which the non-head is assimilated, resulting in two violations of ID-NONHD. Since this constraint is at the bottom of the hierarchy the competing candidates fair much worse by violating the higher ranked constraints. The first candidate fails because the suffix (non-head) is not assimilated, and the second one fails because the root (head) is assimilated instead of the suffix.

In the data in (7) with open syllables, the onset **/k/** of the suffix becomes [ɣ] in the absence of an underlying coda consonant in the root to assimilate to. In addition, the underlying vowel lengthens to fill the bimoraic template of the first syllable.

(19) **dá + ké** 'stand' → . . . [**dáá-ɣá**]$_{FT}$ 'not standing'
Input: **dá + ké**
Template: [$\sigma\mu\mu\ \sigma\mu$]$_{FT}$
Output:



Formally, we propose that the markedness constraint, *STOP, is responsible for stop weakening. Depending on where this constraint is ranked, an underlying stop may or may not emerge in the output. To rule out (singleton) stops from the second (weak) syllable of a foot in Ibibio, *STOP has to be ranked above IDENT-NONHEAD. This makes stops marked in weak syllables, but not in strong syllables. As seen above, stops do emerge in weak syllables when they assimilate to the preceding coda of the strong first syllable. In these cases *STOP is violated under pressure from a higher ranked constraint IDENT-HEAD; therefore IDENT-HEAD dominates *STOP. In general, stops are never weakened in foot-heads in Ibibio. Vowel lengthening is accounted for by the

templatic constraint INFLSTEM stated in (11). This constraint is highly ranked in Ibibio. It actually dominates IDENT-HEAD.

(20) *STOP: Oral stops are marked.

(21) *STOP ≫ ID-NONHEAD … [**dáá-ɣá**]$_{\text{FT}}$ not standing'

dá + ké	INFLSTEM	ID-HD	AGREE, *STOP	ID-NONHD
☞ [dáá-á]		*	*	**
[dá-ɣá]	*!		*	**
[dáá-ɣé]		*	**!	*

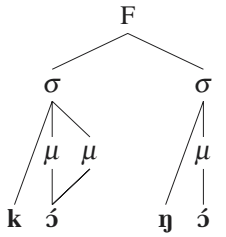
In this Tableau (21), the actual output violates ID-HD because the vowel is lengthened; it violates *STOP because there is one oral stop in the head syllable, and the two violations of ID-NONHD are from stop weakening ([**k**] → [**ɣ**]) and the vowel assimilation. The competing candidates both fare worse. The second candidate fails because the vowel is not lengthened as the template calls for, and the last candidate fails because the vowel of the suffix is not assimilated.

In the data in (8) with CVVC roots there are two alternatives. Descriptively, in the negated verbs the onset of the suffix is deleted and last consonant of the root is syllabified as onset of the second syllable while the long vowel "maps" onto the bimoraic template of the first syllable. In the reversives however, the final consonant of the root geminates, assimilating the initial consonant of the suffix. Both of these alternatives are available under template satisfaction, and the choice in this case is obviously morphological (**kɔ́ɔ́ŋ** 'hang on hook', **kɔ́ŋ-ŋɔ́** 'remove from hook', **kɔ́ɔ́ŋ** 'hang on hook', … **kɔ́ɔ́-ŋɔ́** '… not hanging on hook'). What is important here is that in both cases the first syllable is heavy, giving the initial CVC an equivalent status to CVV. The output of the reversives is similar to the CVC roots in (6); this time however there is vowel shortening in the underlying CVVC root. The alternative of syllabifying the root final consonant as onset is presumably not available with the CVC roots because this will lead to a light first syllable in the output in those cases.

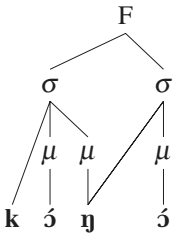
(22) **kɔ́ɔ́ŋ + ké** → … [**kɔ́ɔ́-ŋɔ́**]$_{\text{FT}}$ '… not hanging on hook '
[**kɔ́ŋ-ŋɔ́**]$_{\text{FT}}$ 'remove from hook'
Input: **kɔ́ɔ́ŋ + ké**

Template: $[\sigma\mu\mu\ \sigma\mu]_{FT}$
Outputs:

a. Negatives



b. Reversives



In our formal account we will separate the negative from the reversive. We will first account for the negatives, which appear to be exceptions to the general pattern of keeping the suffix undeleted. The reversives appear to follow the general pattern we have already developed above (see the account of the forms in (6), given in tableau (18)), although they have the long vowel of the head shortened. We will account for them last.

In the negatives the input long vowel of the root is kept intact. We see this as resulting from the high ranking of IDENT-HEAD. IDENT-HEAD is only violated under pressure from INFLSTEM, as we have already noted. However, since the overall size of the stem must be heavy-light, the consonant of the suffix is deleted instead. We propose that a constraint protecting the deletion of suffix segments is violated in the process. We call this MAX-SUFFIX. IDENT-HEAD must dominate MAX-SUFFIX because it is preferred for the suffix segment to be deleted than for the vowel of the head to be shortened. The consequence of this is that forms with the shortened vowels as in the reversive [**kɔ́ŋ-ŋɔ́**] are non-optimal here. MAX-SUFFIX must in turn dominate IDENT-NONHEAD, because suffix segments are not deleted when the root is CVC, they are just assimilated. We give a statement of MAX-SUFFIX as follows.

(23) MAX-SUFFIX: Input segments of the suffix have correspondents in the output (i.e., do not delete suffix segments).

(24) IDENT-HEAD $\gg$ MAX-SUFFIX: It is preferred for the suffix segment to be deleted than for the vowel of the head to be shortened.

(25) … [**kɔ́ɔ́-ŋɔ́**]$_{FT}$ '… not hanging on hook '

kɔ́ɔŋ + ké	INFLSTEM	ID-HD	AGREE, *STOP	MAX-SUF	ID-NONHD
☞ [kɔ́ɔ́-ŋɔ́]				*	*
[kɔ́ŋ-ŋɔ́]		*!			**
[kɔ́ɔŋ-ŋɔ́]	*!	*			
[kɔ́-Nɔ́!]	*!	*		*	

In the above Tableau, the last two competing forms are not optimal for the same reason: they both violate INFLSTEM. The third candidate, with the long vowel and the geminate, fails because the first syllable is superheavy, while the last candidate fails because the first syllable is light. The most important competitor here is the second candidate, but it fails because the vowel of the head is shortened. Let us now turn to the situation under which this candidate can be optimal.

Formally, the reversives with the CVVC roots violate IDENT-HEAD by shortening the long vowel, while keeping the suffix segments undeleted. This is presumably because not doing so will result in a super-heavy first syllable, as in *[**kɔ́ɔŋ-ŋɔ́**]. There is however another choice, deleting the initial consonant of the suffix, as seen in the negative [**kɔ́ɔ́-ŋɔ́**]. Both of these alternatives must be ruled out. The first alternative, *[**kɔ́ɔŋ-ŋɔ**], is easily ruled out by having INFLSTEM dominate IDENT-HEAD, as we saw immediately above. However in contrast to the negative suffix, the "reversive" suffix cannot be deleted, ruling out [**kɔ́ɔ́-ŋɔ́**] as an option. We propose that "faithfulness" to the reversive suffix is high ranked, dominated only by INFLSTEM. We will call this MAX-IO$_{(REV)}$.

(26) MAX-IO$_{(REV)}$
Input segments of the reversive suffix have correspondents in the output (i.e., do not delete the segments of the reversive suffix).

The ranking of the constraints necessary for deriving [**kɔ́ŋ-ŋɔ́**] is therefore as follows:

(27) Deriving the reversive:
INFLSTEM ≫ ID-HD: The head syllable may be modified to make the foot heavy-light.
MAX-IO$_{(REV)}$ ≫ MAX-SUF: There is preference for retaining the reversive suffix segments than retaining the segments of suffixes in general.

(28) [**kɔ́ŋ-ŋɔ́**]$_{FT}$ 'remove from hook'

kɔ́ɔ́ŋ + ké	INFLSTEM	ID-HD, MAX-IO$_{(REV)}$	AGREE, *STOP	MAX-SUF	ID-NONHD
☞ [kɔ́ŋ-ŋɔ́]		*			**
[kɔ́ɔ́-ŋɔ́]		*		*!	*
[kɔ́ɔ́ŋ-ŋɔ́]	*!				**
[kɔ́-ŋɔ́]	*!	**		*	*

The only difference between the first two competing forms is that while the real output (**[kɔ́ŋ-ŋɔ́**]) assimilates the reversive suffix consonant, the competing second candidate deletes it. MAX-SUF must therefore dominate IDENT-NONHEAD. Notice that the first two candidates tie on the high ranking constraints, IDENT-HEAD and MAX-IO$_{(REV)}$. While the optimal candidate violates IDENT-HEAD, the non-optimal second candidate violates MAX-IO$_{(REV)}$. The decision on optimality is thus passed on to the general faithfulness to suffixes. On this constraint, [**kɔ́ɔ́-ŋɔ́**] fails. It is the failure of this candidate that shows that MAX-SUF dominates IDENT-NONHEAD. The last two candidates in the above tableau (28) fail quickly because they violate the templatic constraint calling for a heavy-light output, as we have see in earlier tableaux.

A comparison of the data in (6) and (7) indicates that coda consonants contribute to syllable weight in Ibibio, making closed syllables heavy. Note that vowel lengthening takes place in (7) but not in (6). The closed syllables in (6) are therefore bimoraic, just as the long vowels in (7). Thus they satisfy the requirement that the first syllable be heavy in (6). The templatic equivalence of the outputs of the negative and reversive in (25) and (28) is further proof of this. This follows completely if we assume, following Hyman (1985), McCarthy and Prince (1986, 1996), Hayes (1989) and others, that geminate consonants of the type we have in (6) and (8b) are dominated by at least one mora. The conclusion therefore is that whatever the moraic structure of the underlying monosyllabic verb, the inflectional stem must be a *heavy-light* bisyllabic foot. Ibibio is therefore a language with this type of trochee.

One important fact is that Ibibio does not have stress prominence, so evidence for the prosodic foot can only be sought from other parts of the phonology and morphology. Five processes, all of which have been seen above, can be shown to provide additional support for this bisyllabic prosodic structure in that each process restricts its domain to exactly this bisyllabic constituent.

(29) a. Vowel Lengthening: Short vowels become long in CV roots (7);
b. Vowel Shortening: Long vowels become short in CVVC roots (8b);

c. Consonant Gemination: The features of verb root coda spread to the onset of the second syllable (6, 8a);
d. Vocalic Spreading: The root vowel spreads to the nucleus of the second syllable (6–8);
e. Stop Weakening: The suffix onset /k/ is converted to a dorsal continuant [ɣ] after roots ending in vowels (7).

The first two processes (Vowel Lengthening and Vowel Shortening) have been shown to result from template satisfaction, while the next two processes (Consonant Gemination and Vocalic Spreading) have also been shown to be the direct result of preference to keep the features of the head syllable (faithfulness to the head of the foot) outweighing the preference for the features of the non-head (faithfulness to the non-head). The last process, Stop Weakening, is somewhat independent, and it is the more crucial process for us here. Note that outside of this (bi)syllabic trochee none of the assimilatory processes takes place, not even vocalic spreading. For example, the negative suffix takes the default form [**ké**] after bisyllabic verbs, no matter the segmental melody of the verb, as shown in (9) above. Consider the negated forms of the bisyllabic verbs below (from (3)):[9]

(30)	a.	**dáppá**	'dream [vb.]'	… **[dáppá]$_{FT}$ -ké**	'… not dreaming'
		dámmá	'be mad'	… **[dámmá]$_{FT}$ -ké**	'… not being mad'
		dɔ́kkɔ́	'tell'	… **[dɔ́kkɔ́]$_{FT}$ -ké**	'… not telling'
	b.	**sàŋá**	'walk'	… **[sàŋá]$_{FT}$ -ké**	'… not walking'
		kɔ́ŋɔ́	'choke'	… **[kɔ́ŋɔ́]$_{FT}$ -ké**	'… not choking'

The crucial point to note from these examples (in 30) is the failure of stop weakening, i.e., the suffixal **/k/** does not weaken to a dorsal continuant. Aside from stop weakening, the only other process that requires additional comments is consonant gemination, which application one would not expect in (30) since a coda consonant is required for the [**k**] to assimilate to.

There is however evidence that gemination is restricted to the inflectional heavy-light template proposed in (11). In complete reduplication of two closed monosyllabic roots, two morphemes beginning and terminating in consonants occur next to each other, creating a consonant cluster. When such reduplicated forms arise, neither the onset of the reduplicant nor the coda of the input stem geminates. In this situation the reduplicated form is treated as two stems; the final consonant of the first stem is syllabified as an onset of a new syllable whose nucleus is an epenthetic vowel, which breaks up the resulting consonant cluster. This new syllable is footed with the preceding root. The following reduplicated

9. The foot form in (30b) will be discussed in Section 2.2.

examples illustrate the points. (Note the application of Stop Weakening in the second syllable of the first foot in these examples).

(31) **kèèt** → **[kèèrè]**$_{FT}$ **[kèèt]**$_{FT}$ (< **kèèt kèèt**)
'one' 'one by one/one each'
dwòp → **[dwòβò]**$_{FT}$ **[dwòp]**$_{FT}$ (< **dwòp dwòp**)
'ten' 'ten by ten/ten each'

Therefore, consonant gemination is restricted to the cases of assimilation within the template proposed in (11).

The question is why do we have gemination at all? Why don't we just have the default form [**ké**] as in (30), just as we have in closely related Efik, **dép-kɛ́** '... not buying'? Our proposal is that this (difference) is due to the ranking of the constraint AGREE. The difference between Efik and Ibibio is that AGREE is low ranked in Efik, hence its effect is not seen. The domain of AGREE has to be the bisyllabic foot in both Ibibio and Efik. With the high ranking of AGREE in Ibibio, the language disallows such forms as **dép-kɛ́** '... not buying' found in Efik (for which it has **déppé**) (Welmers 1973), either within a root or across root+suffix (i.e., stems).[10] Note that our proposal that the constraints responsible for this are IDENT-HEAD and IDENT-NONHEAD (rather than IDENT-ROOT and IDENT-SUFFIX) must be the correct one, since in bisyllabic verbs in (30a) there is no root versus suffix, yet the first syllable assimilates the second.

Let us now return to Stop Weakening. As the examples in (31) suggest, Stop Weakening is actually a more pervasive process in the language, and **/k/** weakening in (7) is only part of its actualizations. The stops [**p**, **t**, **k**] are productively weakened to [**β**, **ɾ**, **ɣ**] respectively in intervocalic position,[11] comprising either the second consonant of a bisyllabic CV(V)CV verb (32) or the final consonant of a closed syllable followed by any vowel initial morpheme (33); that is, a coda (re)syllabified as onset of a following vowel. (See Harris and Urua 2001 for a different take on stop weakening in Ibibio.)

10. Two types of clusters exist in Ibibio, both of which occur in the onset position. The first are CG clusters as in **djɔ́k** 'be bad', **twàk** 'push', etc. The second arise from vowel deletion in fluent speech: **/tìdé/** (**tìre**) → [**trě**] 'stop', **/fùdó/** (**fùró**) → [**frǒ**] 'jump'. Such clusters are barred from syllable / morpheme final positions, and across morphemes. See also Kaufman (1968) for similar analysis.

11. Bruce Connell has pointed out to us that the nasals [**m**, **n**] are also weakened (shortened) in this (C2) position. He notes that the dorsal nasal is also affected in terms of degree of contact in normal speech to the point that "one often hears a nasalized approximant." See Connell (1991) for a detailed discussion of the phonetic realization of Ibibio consonants.

(32)

[**tòβó**]$_{FT}$	'make an order'
[**tɨɾé**]$_{FT}$	'stop'
[**fèɣé**]$_{FT}$	'run'
[**dààrá**]$_{FT}$	'rinse'

(33)

		C_1 C_2 C_3	
dwòp	'ten'	[**dwòβ è**]$_{FT}$ **bà**	'twelve' (ten plus two)
èfɨt	'fifteen'	**è**[**fɨr è**]$_{FT}$ **nààŋ**	'nineteen' (fifteen plus four)
úfɔk	'house'	**ú**[**fɔɣ ì**]$_{FT}$ **bà**	'two houses'

What is crucial here is that the independent process of *stop weakening* applies only within a bisyllabic structure which is equivalent to a bisyllabic trochee, and *nowhere* else. For example, the rule applies to C_2 in (33) but not to C_3.

In the foregoing section we have attempted to show two things: (a) that the morphology of the negative/reversive suffix in Ibibio requires a bisyllabic heavy-light prosodic structure, which we propose is a foot template and, (b) an independent process of consonant weakening has as its domain this particular template. The Ibibio negative/reversive suffix is not an isolated case. The same template is in fact needed to account for the relative suffix, to which we now turn.

2.1.2. The Relative suffix. The relative suffix follows the same pattern as the negative/reversive suffix discussed above. In (34) we show its form with the CVC, CV and CVVC verb roots in that order.

(34)

a. With CVC Roots

dép	'buy'	**á à**	**dèp-pè**	'one who has bought'
wàt	'drive'	**á à**	**wàt-tà**	'one who has driven'
wòt	'kill'	**á à**	**wòt-tò**	'one who has killed'
tèm	'cook'	…	**tèm-mè**	'… which is cooking'
bòm	'break'	…	**bòm-mò**	'… who has broken'

b. With CV Roots

má	'love'	**á à**	**màà-ɣà**	'one who loves'
bó	'say'	…	**bòò-ɣò**	'… who is saying'
kpé	'judge a case'	…	**kpèè-ɣè**	'… who is judging'

c. With CVVC Roots

wààk	'tear'	…	**wàà-ɣà**	'… which is torn'
kpéép	'teach'	…	**kpèè-βè**	'… who is teaching'
kóót	'read'	…	**kòò-rò**	'… who is reading'
kɔ́ɔ́ŋ	'hang on hook'	…	**kɔ̀ɔ̀-ŋɔ̀**	'… which is hung'
sóón	'mock'	…	**sòò-nò**	'… who is mocking'
wèèm	'flowing'	…	**wèè-mè**	'… which is flowing'

As with the negative/reversive suffix, a clear generalization is obvious from the shape of the derived verbs: whatever the underlying form of the verb root, the root-suffix outcome has to take the form of a heavy (bimoraic) syllable followed by a light (monomoraic) syllable. Again, all of the data can be accounted for if we assume that the prosodic target of the suffixed verb is a bisyllabic trochaic foot. The derived relative verb can be accounted for with the same heavy-light foot template as in the negative/reversive suffix.

The formal account proposed for the negative/reversive CVC verbs in (6) also applies to the relatives in (34a). The account proposed for the CV verbs in (7) also applies to the forms in (34b), and the account given for the negative CVVC verbs in (8a) also applies to the equivalent relative CVVC verbs in (34c).

Note that the phonological processes discussed in the preceding section are again exemplified here, and they operate within the same domain. As in the negative/reversive suffix, the relative suffix takes the (invariant) default form [**kè**] after a bisyllabic verb root irrespective of the segmental makeup of the root.

(35)

a.	**dáppá**	'dream'	… **dàppà-kè**
	wóŋŋɔ́	'turn'	… **wòŋŋɔ̀-kè**
	yòmmó	'boo at'	… **yòmmò-kè**
b.	**dààrá**	'rinse'	… **dààrà-kè**
	yɔ́ɔ́ŋɔ́	'plaster [a wall]'	… **yɔ̀ɔ̀ŋɔ̀-kè**
	tòòró	'praise'	… **tòòrò-kè**
c.	**sàŋá**	'walk'	… **sàŋà-kè**
	sɔβɔ́	'boil [food]'	… **sɔβɔ̀-kè**
	kéré	'think'	… **kèrè-kè**

The relative suffix thus confirms all the proposals made with the negative/reversive suffix in the preceding section. There is however one difference between the negated/reversed verb and the relativised verb. First, the relativised verb is low toned regardless of the underlying tone of the verb root, or the number of syllables. We propose to handle this by assigning the prosodic word (including the bisyllabic verb and suffix) a single low tone. Therefore one piece of evidence for the prosodic word in Ibibio is that it sometimes serves as the domain of tonal assignment (or the tonal OCP), as in the relative verb stems in (34) and (35) above.

One comment is crucial here. In these word formation processes, note that the bisyllabic verb is left untouched (in 30 and 35). That is, there is no modification of the bisyllabic verb. CVCV verbs for example do not become CVVCV. Therefore if a form contains the basic bisyllabic foot, the foot is left untouched. Thus when the bisyllabic foot is filled underlyingly, it is left untouched. As we will show in the next section, the same thing happens when the template is a

bisyllabic bimoraic foot (i.e., two light syllables) and the verb is underlyingly heavy-light. In this case also the heavy-light foot does not become light-light.

The formal analysis that we propose for the examples in (30) and (35) is that these bisyllabic verbs are "stems", rather than "roots", and therefore they remain unchanged from their input forms whether they are heavy-light or light-light. This is an example of what Prince and Smolensky (1993) refer to as "Do something except when". In this case the verb is modified into a bisyllabic heavy-light stem except when the input is already bisyllabic. We propose that a constraint IDENT-STEM (ID-ST) protects the modification of a bisyllabic stem. The constraint is stated as in (36), and it sits at the top of the hierarchy in Ibibio. This constraint crucially dominates INFLSTEM, and by implication all of the constraints that we have proposed so far.

(36) IDENT-STEM:
Input-Output forms of "stems" remain unchanged.

We now recapitulate the account of Ibibio suffixation given in the last two sub-sections.

All of the data can be accounted for if we assume that the prosodic target of the inflectional stem is a bisyllabic trochaic foot. We propose to account for the data in (6)–(8) by assuming that the heavy-light foot template in (11) determines the output structure of the inflectional stem. If we assume that the relevant foot template constraint ([$\sigma\mu\mu$ $\sigma\mu$]) must be satisfied by the output of suffixation irrespective of the underlying form of the monosyllabic verb root, then the overall shape of the suffixed verb is accounted for. The fact that the first syllable must be heavy forces lengthening in CV verb roots, and vowel shortening in CVVC verb roots in the reversive. All the phonological alternations that take place have this bisyllabic foot as their domain.

We now turn to the light-light template in verbal suffixation.

2.2. The light–light template

The foregoing section was devoted to the heavy-light template in Ibibio suffixed verbs. In this section, we turn to another set of suffixes. These suffixes create the "reflexive" or the "agentless passive" (i.e., suppressed external argument) forms of verbs (Essien 1990, Urua 1990). As in the preceding section the suffix melody is derived from the verb root; however this happens in a slightly different way. The suffixed forms of CVC and CVVC verbs are presented in (37) and (38) respectively.[12]

12. There is an obvious gap in the examples here. CV roots do not undergo suffixation in forming the passive. In this case the passive is formed with a high tone prefix and the verb root remains

(37) With CVC Roots

yàt	'wear a hat'	**yàrá**	'wear a hat on oneself'
dòt	'place on top of'	**dòró**	'place on top of oneself/be on top'
wèt	'write'	**wèré**	'be written'
kɔ̀p	'lock'	**kɔ̀βɔ́**	'be locked'
bót	'create/mold'	**bóró**	'be shaped'
màn	'give birth'	**màná**	'be born'
bɔ́p	'tie'	**bɔ́βɔ́**	'tie on oneself'
tát	'loosen'	**tárá**	'be loosened'
dɔ̀ŋ	'put in'	**dɔ̀ŋɔ́**	'be put in'
wáŋ	'wrap around'	**wáŋá**	'be wrapped around/wrap around oneself'
fɔ́p	'roast'	**fɔ́βɔ́**	'be roasted'

(38) With CVVC Roots

dɔ́ɔ́n	'talk smoothly [derogatory]'	**dɔ́nɔ́**	'be smooth'
kɔ́ɔ́k	'stack'	**kɔ́ɣɔ́**	'be stacked'
béék	'remove corn (with finger from cob)'	**béɣé**	'be removed [of corn]'
wààk	'tear'	**wàɣá**	'be torn to pieces'
kɔ́ɔ́ŋ	'hang'	**kɔ́ŋɔ́**	'be hung/hang on oneself'

It is important to separate the examples in (37) from those in (6) where the result of negation changes a CVC verb root to CVCCV (with consonant gemination). In the above cases involving passive formation, there is no consonant gemination. Rather, there is a weakening of the final oral stop of the verb root. Verb roots that occur with both the negative suffix and the agentless passive suffix as in (39) clearly reveal the distinction between the two.

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unchanged. We will not discuss this process here. The following examples illustrate the point:

(i)

nɔ̀	give	**é!é nɔ̂**	it has been given
mà	complete/finish	**é!é mâ**	it has been finished
sé	look	**é!é sé**	it has been seen
tá	chew	**é!é tá**	it has been chewed

When forced to give what the passive form of **kɔ́** 'gather' would be if it were to be formed with a suffix, two native speakers of Ibibio gave **kɔ́ɣɔ́** for 'be gathered'. While this is a non-occurring form, it confirms the hypothesis proposed here on templates.

(39)

wèt	'write'		**wèré**	'be written'
		cf. …	**wèt-té**	'not writing'
bót	'create/mould'		**bóró**	'be shaped'
		cf. …	**bót-tó**	'not creating/moulding'
kɔ̀p	'lock'		**kɔ̀β́**	'be locked'
		cf. …	**kɔ̀p-pɔ́**	'unlock'

There is again a clear generalization from the reflexive/passive forms in (37) and (38). Whatever the weight of the monosyllabic input, the suffixed verb ends up as two light (monomoraic) syllables. The data in (37) and (38) can be accounted for if we assume that the target template of the entire suffixed verb is a bisyllabic bimoraic foot. We give this second template as follows:

(40) Ibibio Foot Template 2
[$\sigma\mu$ $\sigma\mu$] light–light trochee

The relevant templatic constraint that determines the prosodic shape of the "reflexive/passive stem" can be stated as follows:

(41) REFL Stem = [$\sigma\mu$ $\sigma\mu$] (REFLST)
The Reflexive/Passive Stem is a light–light trochee.

We can interpret suffixation here as an instruction to "form a bisyllabic bimoraic foot." Descriptively, the reflexive/passive stem is derived by inserting a final vowel to satisfy the bisyllabic bimoraic foot template. Again, this template is always satisfied regardless of the underlying moraic structure of the verb root. Note in this regard that the CVVC roots start out being heavy (bimoraic), but the stem ends up as two light (monomoraic) syllables. This confirms that what is crucial is the prosodic shape of the suffixed verb (stem).

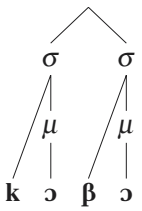
Formally, we propose that the reflexive/relative suffix is null; that is, it has no segmental content. This is because when a verb is underlyingly bisyllabic, the verb remains unchanged in the reflexive (see examples in (46)). The overall proposal is thus that the template determines the entire bisyllabic stem in the reflexive. The constraint REFLSTEM forces the constraint DEP (which forbids insertion) to be violated. The features of the inserted vowel are derived through assimilation. This follows completely from the constraints already proposed, since IDENT-HEAD is ranked higher than IDENT-NONHEAD.

The question here is, what is the relationship between the constraint INFLSTEM which determines the template of the inflectional stem and the constraint REFLSTEM that we have just proposed? The reflexive/passive stem must be seen as a special kind of inflectional stem. Therefore the constraints REFLSTEM and INFLSTEM share a relationship of special versus general. This has two implications. First, the special constraint REFLSTEM has to dominate the general constraint INFLSTEM for the special kind of inflectional

stems to emerge. Secondly, it implies that the primary foot template in the Ibibio verb stem is the heavy-light template.

As in the negative/reversive and relative suffixes, we illustrate with one example each of the CVC and CVVC roots. In the next and subsequent tableau REFL stands for the reflexive or passive suffix.

(42) **kɔ̀p** 'lock' → $[$**kɔ̀βɔ́**$]_{FT}$ 'be locked'
Input: **kɔ̀p** + REFL
Template: $[\sigma\mu\ \sigma\mu]_{FT}$
Output:



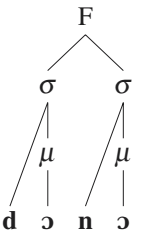
(43) $[$**kɔ̀-βɔ́**$]_{FT}$ 'be locked'

kɔ̀p + REFL	REFL-STEM	INFLST	ID-HD	AGREE, *STOP	DEP	ID-N ONHD
☞ [kɔ̀-βɔ́]		*			*	*
[kɔ̀p]	*!	*				
[kɔ̀ɔ̀-βɔ́]	*!		*		*	*
[kɔ̀-pɔ́]		*		*!	*	

The optimal candidate from CVC roots is one which ends up as two monomoraic syllables, with both vowels identical and the second oral stop weakened, as in the first candidate in tableau (43). This candidate satisfies all higher ranked constraints, except INFLSTEM. In addition, it also violates DEP, the constraint against insertion. The direct opposite of this is the faithful candidate, the second candidate. Doing nothing incurs a violation of REFLSTEM, which requires the output to be a bisyllabic bimoraic foot. This proves that REFLSTEM must dominate DEP. The third candidate lengthens the input vowel, violating the REFLSTEM weight requirement in the process. This candidate confirms that REFLSTEM dominates INFLSTEM. In the last candidate stop is not weakened to a continuant. None of the candidates in this tableau violates IDENT-NONHEAD for the vowel specification because the reflexive is null in the input. The next derivation shows the output of a CVVC input.

(44) **dɔ́ɔ́n** 'talk smoothly [derogatory]' → $[$**dɔ́nɔ́**$]_{FT}$ 'be smooth'
Input: **dɔ́ɔ́n** + REFL
Template: $[\sigma\mu\ \sigma\mu]_{FT}$

Output:



(45) [**dɔ́nɔ́**]$_{FT}$ 'be smooth' (REFLST ≫ IDENT-HEAD)

kɔ̀p + REFL	REFL-STEM	INFLST	ID-HD	AGREE, *STOP	DEP	ID-N ONHD
☞ [dɔ́-nɔ́]		*	*		*	
[dɔ́ɔ́n]	*!	*				
[dɔ́n-nɔ́]	*!		*		*	
[dɔ́ɔ́-nɔ́]	*!				*	

In the case of CVVC inputs, REFLSTEM forces vowel shortening and thus a violation of IDENT-HEAD. This is the crucial difference between the first and second candidates in tableau (45). Template satisfaction also calls for bi-syllabicity, hence a violation of DEP. The remaining two candidates violate IDENT-HEAD because they have a heavy first syllable.

In both CVC and CVVC roots the final consonant of the verb root associates onto the onset position of the second syllable. Note finally that these data confirm that stop weakening takes place within the bisyllabic trochee, whether it is heavy-light or light-light, both of whose existence we have now shown in Ibibio morphology.

There is one crucial difference between negative/relative formation and passive formation in the treatment of underived bisyllabic verbs. As we showed in the negative formation, the suffix simply takes a default form [**ké**]. In the passive, there is no suffixation after bisyllabic verbs; i.e bisyllabic verbs are simply left uninflected, as the following examples show. These examples confirm that the reflexive/passive suffix is null, as we proposed.

(46) a. **wàkká** 'tear'
ɔ̀fɔ̀ŋ á à <u>wàkká</u>
cloth c. pref. tear
'the cloth is torn'

b. **wɔ́ŋŋɔ́** 'turn'
úbɔ́k ŋ̀kànìkà á à <u>wɔ́ŋŋɔ́</u>
hand clock turn
'the hand of the clock has turned'

c. **fwɔ̀rɔ́** 'peel'
ikpa á à <u>fwɔ̀rɔ́</u>
skin peel
'the skin has peeled off'

d. **bèèré** 'open'
úsʌ́ŋ á à <u>bèèré</u>
door open
'the door is open'

Compare the passive (pass.) forms of CVVC and CVC verbs:

(47) a. **fáák** 'wedge in/screw on/ stick in'
úbɔ́k á à <u>fáɣá</u>
hand c. prefix wedge:pass
'the hand is wedged in/stuck in'

b. **wèt** 'write'
ḿkpɔ́ á à <u>wèré</u>
something write:pass
'something is written'

To derive the examples in (46) we return to our proposal in Section 2.1.2 that bisyllabic verbs are stems. The constraint IDENT-STEM introduced in the last section forbids any modifications to fit the relevant template, therefore they are realized without change. To ensure this, IDENT-STEM must dominate both of the templatic constraints INFLSTEM and REFLSTEM which delimit the sizes of the relevant stems. The following tableau illustrates this point.

(48) **bèèré** 'open'
úsʌ́ŋ á à <u>bèèré</u>
door open:pass
'the door is open'
(IDENT-STEM ≫ REFLST): [**bèèré**]$_{FT}$

bèèré + REFL	ID-STEM	REFLSTEM	IDENT-HEAD
[bèè-ré]		*	
[bè-ré]	*!		*

This tableau shows that shortening the vowel of a heavy-light bisyllabic verb to satisfy the templatic constraint is not an option.

To sum up, we have proposed above that "suffixation" in passive/reflexive formation imposes a bisyllabic bimoraic template which is a foot in Ibibio. While monosyllabic roots are modified, bisyllabic verbs are left untouched. Aside from the morphological evidence, we also showed that vowel shortening applies in heavy monosyllabic inputs to satisfy the template and that a foot-based process, consonant weakening, applies within this domain.

From the above discussion we have established the following paradigm in Ibibio verb morphology. This example shows a verb that can be inflected for all categories discussed above.

(49) PARADIGM
fáák 'screw on'

Formative	Template		Output Form	
Negative	$[\sigma\mu\mu\ \sigma\mu]_{FT}$	...	**fáá-ɣá**	'not screwing'
Reversive	$[\sigma\mu\mu\ \sigma\mu]_{FT}$		**fák-ká**	'unscrew'
Relative	$[\sigma\mu\mu\ \sigma\mu]_{FT}$	...	**fàà-ɣà**	'... which is screwed'
Reflexive/passive	$[\sigma\mu\ \sigma\mu]_{FT}$		**fá-ɣá**	'be screwed'
Negative of Reversive	$[\sigma\mu\mu\ \sigma\mu]_{FT}$ **-ké**		**fák-ká-ké**	'not unscrewing'

We now turn to provide additional segmental evidence for the bisyllabic foot in Ibibio before we discuss monosyllabic roots with high vowels.

2.3. Segmental evidence for the Bisyllabic Trochee

The phonemic system of Ibibio has been the subject of much debate among Ibibio scholars, and accounts vary from author to author (see for example Kaufman 1968, 1985; Essien 1983, 1984, 1985, 2001; Umoh 1985; Urua 1987, 1990, 2000; and Utip 1989, and others). A detailed summary of the points of disagreement is given in Urua (2000). We believe that much of this disagreement, especially on the vowel system, is due to dialect variation. In this section our goal is simply to account for the distribution of segments based on the prosodic framework developed so far.

2.3.1. Consonant distribution. Welmers (1968, 1973: 74–76), and Cook (1969) describe an unusual kind of consonant distribution in Efik.[13] As Connell (1994) demonstrated, what they describe for Efik is in fact found throughout Lower Cross, including Ibibio, if one abstracts away from syllable structure differences in these languages.[14] We will follow Welmers' descriptions as closely as possible in describing the Ibibio data below.

In word initial position, or in syllable-initial position medially if preceded by a nasal or by a vowel allophone which is not restricted to closed syllables, the following consonants occur (see Urua 2000):

---

13. Hyman (1990) reports similar phenomena in Gokana and Basaa.
14. The basic syllable structure difference between Ibibio and Efik is that Ibibio has CVVC syllables (and consequently long vowels) which Efik lacks.

(50)

p	t	k	kp
b	d		
m	n	ɲ	ŋ
f	s		
w		y	

Examples of this occurrence follow:

(51)

èkpàt	‘bag’	**étó**	‘tree’	**ìkó**	‘calabash’
ébót	‘goat’	**adan**	‘oil’	**íyák**	‘fish’
úfɔ̀k	‘house’	**àsàt**	‘a type of fish’	**áɲɨŋ**	‘name’
ìwá	‘cassava’	**únék**	‘dance’		
ḿmɔ́ɔ́ŋ	‘water’				
ìŋwáŋ	‘farm’				

In syllable/word final position, the set in (52) occurs, as demonstrated by examples in (53).

(52)

p	t	k
m	n	ŋ[15]

(53)

dép	‘buy’	**yét**	‘wash’	**kpók**	‘cut up’
tèm	‘cook’	**fɔ́n**	‘be good’	**táŋ**	‘speak’

The final environment is what Welmers (1973: 75) describes for Efik as occurrence ‘after vowel allophones which are elsewhere characteristic of closed syllables, but with a vowel following the consonant as well – that is intervocalically’. For Ibibio, this environment can be described simply as an intervocalic position of a bisyllabic verb (i.e., CVCV or CVVCV). In this environment, the consonants that occur are a ‘bilabial tap’, an ‘alveolar tap’, a ‘uvular tap’[16], and the three nasals which also occur in syllable final position.

(54)

β	ɾ	ɣ
m	n	ŋ

The relevant examples in this case are the following (see 32 above for additional examples):

15. Urua (1990) analyzes [**ŋ**] a word final variant of [**ŋw**], but Urua (1999) sees [**ŋw**] as a word initial variant of [**ŋ**]. We adopt the 1999 analysis here.
16. The actual production may vary between a bilabial ‘tap’ and ‘fricative’, and from a ‘uvular tap’ to a ‘velar fricative/approximant’ depending on the dialect and speaker. Cook (1969) refers to them as ‘taps’, but their exact phonetic output will not concern us here. It is easier to see these segments as “weakened stops”, and we will refer to them as such.

(55)

tòβó	'make an order'	**wùùɾó**	'collapse'
yòmó	'talk noisily'	**yèèmé**	'wilt'
sárá	'comb'	**wéénέ**	'be poor'
sɨ́né	'put on dress'	**ɲùùŋɔ́**	'peep'
fèɣé	'run'		
sàŋá	'walk'		

As we have shown in the preceding sections, this last context corresponds to the bisyllabic foot in Ibibio; and the weakened consonant is foot internal (second consonant of the foot).[17] If we abstract away from consonant weakening, the sets of consonants in (52) and (54) are the same. Thus consonant distribution in Ibibio reduces to two sets: those in (50) and those in (52). Interestingly, it is this second set that also occurs in geminates, underlying or derived (through assimilation):

(56)

dáppá	'dream [vb.]'
sɨ́ttέ	'remove stopper'
dɔ́kkɔ́	'tell'
tèmmé	'explain'
ɲànná	'stretch'
wɔ́ŋŋɔ́	'turn'

This distribution has a straightforward explanation if we see the fuller distribution (in 50) as occurring in foot initial position (first consonant of a verb stem or the first consonant of a noun) and the restricted set (in 52) as occurring foot internally or finally (the second consonant of a foot).

2.3.2. Vowel distribution. The restricted distribution of consonants discussed above has a parallel in vowel distribution. The vocalic inventory consists of six phonemic vowels **/i**, **e**, **a**, **ɔ**, **o**, **u/**.[18] These six vowels are found

17. In his study of Efik vowels Cook (1985) proposes that the weakening of Efik stops takes place within a "phonological syllable" which he calls a "syllabeme". He proposes that "an Efik syllabeme may in some cases consist of a C1(C2)V1C3V2 sequence" (p. 16). If we divide the examples in (33) into his "syllabemes", we have the following (- represents syllabeme division):

    (i) **-dwòβè-bà-**
    è-fɨ́rè-nàŋ-
    ú-fɔ́ɣì-bà-

    Cook's basic "syllabemes" may therefore be summed up as having the structures in (b).

    (ii) C(G)V, C(G)VC, C(G)VCV

    Hyman (1990) reinterprets Cook's "syllabeme" as a "foot" in Efik. See also Connell (1994) and Harris and Urua (2001) on the description of 'foot-internal' lenition in Lower Cross.

in (open?) monosyllabic verbs CV and CVVC, as the first vowel in bisyllabic verbs of the type CVVCV, and as the initial vowel in nouns.

(57)	**dí**	'come'	**tíík**	'flatter'	**ítêm**	'advice'
	sé	'look'	**wèèm**	'flow [of garment]'	**èkpàt**	'log'
	dá	'stand'	**fáák**	'wedge in'	**àkàm**	'prayer'
	dɔ́	'marry'	**ŋɔ̀ɔ̀n**	'crawl'	**ɔ̀fɔ̀ŋ**	'cloth'
	bó	'say'	**kóót**	'read/call'	**ówó**	'person'
	dù	'live'	**túúk**	'touch'	**úbɔ́k**	'hand'

A second set comprising [**ɨ**, **e**, **a**, **ɔ**, **o**, **ʌ**] occur in closed (mono)syllables (CVC), and the first syllable of bisyllabic CVCV and CVCCV verbs.

(58)	**dɨ́p**	'hide'	**nɨ́ɣé**	'tickle'	**bɨ̀mmé**	'startle'
	yét	'wash'	**fèɣé**	'run'	**bèkké**	'belch'
	dát	'take/ pick up'	**sàŋá**	'walk'	**dáppá**	'dream [vb.]'
	kɔ̀k	'vomit'	**sɔ́βɔ́**	'be expensive'	**dɔ́kkɔ́**	'tell'
	kòp	'hear'	**yòmó**	'talk noisily'	**tònnó**	'protude'
	kʌ́p	'cover [with lid]'	**tʌnɔ́**	'discipline'	**yʌ́ttɔ́**	'twist'

Clearly, it is the high vowels **/i/** and **/u/** that become centralized (and lowered) vowels [**ɨ**] and [**ʌ**] respectively,[19] in this context. Length alternations are accompanied by vowel quality alternations when the allophonic centralizing process is applicable, as in (59) and (60) below. These centralized vowels are therefore variants of the high vowels.

18. Bruce Connell (p.c) notes that some dialects of Ibibio have as many as seven to nine phonemic vowels (see also Essien 1990). In this direction, Urua (1999) proposes seven contrastive vowels for the Uruan dialect, on which this study is based, including the vowel [**ʌ**] in the phonemic inventory. She notes however that [**ʌ**] "is restricted in distribution to C__C position" (1999: 243). This implies that [**ʌ**] cannot be shown to contrast with a short **[u]**. Though a full justification of the phonemic vowel inventory of the Uruan dialect is beyond the scope of this paper, we will here assume a six-vowel inventory for this dialect (see also Kaufman 1968).
19. Certain dialects, such as Ibiono, have high vowels in this context: compare Ibiono [**bɨ̀m**] 'carry' [**bít**] 'resemble' with cognates [**byòm**] and [**byót**] in "General Ibibio". B. Connell (p.c.) notes that both **/i/** and **/u/** are sometimes centralized and lowered to the point that the difference between them is little indeed. Here and elsewhere we use the IPA symbol [**ɨ**] to represent the centralized lowered [**i**] in Ibibio, in keeping with the general tradition in Ibibio texts (see for example Essien 1990 and Urua 2000).

(59) **u/ʌ** alternation

/kùk/	**[kʌ̀k]**	‘shut [door]’	**kùùk**	‘shut doors/many times’
/dùt/	**[dʌ̀t]**	‘drag’	**dùùt**	‘drag many things/many times’
/mùm/	**[mʌ̀m]**	‘catch’	**mùùm**	‘catch many things/many times’
	[wʌ́kkɔ́]	‘remove a driven in object’	**wúúk**	‘drive something in [e.g., stakes for yam]’

(60) **i/ɨ** alternation

/bìk/	**[bɨ̀k]**	‘be wicked’	**bìik**	‘be wicked [many times]’
	[dɨ́ppé]	‘lift up’	**díímé**	‘lift up many things’
	[fɨ́ppé]	‘remove sucked object from the mouth’	**fíip**	‘suck on something’

What is common to the contexts in which high vowels become centralized in all the data in (58) is that it is the first vowel of a foot: **[dɨ́p]**$_{FT}$ ‘hide’, **[nɨ́ɣé]**$_{FT}$ ‘tickle’, **[bɨ́mmé]**$_{FT}$ ‘startle’. Thus *short* high vowels become centralized in V_1 position of a foot. Therefore high vowel centralization takes the prosodic foot as its domain.[20]

The third and equally interesting context is the second syllable of any bisyllabic verb (CVCV, CVVCV, or CVCCV). In this context only four vowels [**e**, **a**, **ɔ**, **o**] occur. (See (58) above for examples of CVCV and CVCCV).

(61)

fìimé	‘maltreat’
yèèmé	‘wilt’
dáárá	‘rejoice’
yɔ́ɔ́ŋɔ́	‘plaster a wall’
wùùró	‘collapse [building]’
tòòró	‘praise’

Again if we abstract away from short high vowel centralization, then the first two sets ([**i**, **e**, **a**, **ɔ**, **o**, **u**] and [**ɨ**, **e**, **a**, **ɔ**, **o**, **ʌ**]) are the same; they consist of the six contrastive vowels. Thus Ibibio vowels also fall into two distributional sets; the full set in (57) ([**i**, **e**, **a**, **ɔ**, **o**, **u**]) and the restricted set in (61) ([**e**, **a**, **ɔ**, **o**]). This distribution again has a straightforward explanation if we assume that

20. An additional explanation is possible here. If the second consonant of CVCV stem is seen as ambisyllabic, then the context is the first closed syllable of a foot in all contexts. Though this explanation is consistent with our proposals, we shall not explore this line of reasoning here.

the fuller set occurs in the V_1 position (first/head syllable) of a foot while the restricted set occurs in the V_2 position of the bisyllabic foot (or foot finally).

A crucial prediction of the above account is that Ibibio lacks bisyllabic verbs (derived or underived) with high vowels in both syllables (i.e., CiCi, or CiCCi or CiiCi). This prediction is indeed borne out by the data.

The above broad vocalic distribution can be accounted for with a Beckman (1998) type positional faithfulness constraint such that vowel contrast is neutralized in the non-head position of a foot. We have appealed to this type of constraint in accounting for the occurrence of continuants in non-heads above. In the case of vowels the relevant markedness constraint is *[High], stated as follows.

(62) *[High]: High vowels are marked.

We are now in a position to account for all of the bisyllabic verbs seen so far. All that needs to be done is to position *[High] such that the following situations hold: (a) There is vocalic assimilation between the head and nonhead of the bisyllabic verb, (b) high vowels are marked in the nonhead position. The first point is derived from the activity of the constraint AGREE, which we have already seen. The latter situation can be achieved if *[High] is dominated by IDENT-HEAD, but *[High] in turn dominates IDENT-NONHEAD, resulting in the following partial ranking.

(63) No high vowels in the nonhead syllable of a bisyllabic foot:
IDENT-HEAD ≫ *[High] ≫ IDENT-NONHEAD

This ranking makes is preferable to change a high nonhead vowel (whatever its input), because it is marked to have a high vowel in the nonhead position.[21] In the following tableau, we will ignore the *[High] violations in the head syllable to make the tableaux easier to read.

(64) (*[High] ≫ ID-NONHEAD): [**fìmé**]$_{FT}$ 'maltreat'

fìmí	IDENT-HEAD	*[High]	AGREE	ID-NONHEAD
a. ☞ [fìmé]			*	*
[fìmí]		*!		
fìmé				
b. ☞ [fìmé]			*	
[fìmí]		*!		*

21. The reader may wonder why this is the case, since high vowels are in general the least marked. The answer is that Ibibio regards high vowels as marked in the nonhead position of a foot, and this is exactly what this ranking derives.

As we have seen in earlier sections, AGREE must dominate ID-NONHEAD so that the nonhead may agree with the head. However, *[High] must dominate both constraints because if high vowels are marked in nonheads then it means that a high vowel in the head will not occur in the nonhead, giving up agreement in the process. The two tableaux above are provided to show that regardless of the assumed input of the bisyllabic verb (i.e., with or without a high vowel), the second syllable will turn out without a high vowel. In the two tableaux above, the winning candidate is one where the second syllable occurs without a high vowel, violating both AGREE and ID-NONHEAD when the input has a high vowel or just AGREE when the input has a nonhigh vowel.

Forms with the back vowel **/u/** deserve additional comments. When head syllable has [**u**], the nonhead syllable has [**o**], but when the head syllable has [**ʌ**], the nonhead syllable has [**ɔ**]. We regard the latter as resulting from a further co-occurrence restriction imposed by ATR harmony. Note that the distribution of [**ʌ**] is parallel to that of [**ɨ**].

We are now in a position to discuss the derived forms of monosyllabic verb roots with high vowels, and it is to these that we now turn.

2.4. High vowel roots

The vocalic restrictions independently motivated above for underived bisyllabic verbs are manifested in derived verbs as well, providing additional support for the proposals made above. As we did with nonhigh vowel roots, we will illustrate the different templatic restrictions on derived verbs with negative/ reversive suffix, and the reflexive suffix; this time focusing only on roots with high vowels.

The heavy–light template: Negative/reversive suffix

(65) CV roots

kpì	‘cut [with matchet]’	… **kpìì-ɣé**	‘… not cutting’
dí	‘come’	… **díí-ɣé**	‘… not coming’
dù	‘be alive’	… **dùù-ɣó**	‘… not living’
kpù	‘be in vain’	… **kpùù-ɣó**	‘… not being in vain’

(66) CVC roots

/kúp/ [kʌ́p]	‘cover [with lid]’	**kʌ́p-pɔ́**	‘uncover’
/dùt/ [dʌ̀t]	‘drag’	**ń-dʌ̀t-tɔ́**	‘I am not dragging’
/dúk/ [dʌ́k]	‘enter’	**ń-dʌ́k-kɔ́**	‘I am not entering’

/díp/	**[dɨ́p]**	'hide'	**ń-dɨ́p-pé**	'I am not hiding'
/bít/	**[bɨ́t]**	'spread [e.g., mat]'	**í-bɨ́t-té**	'he has not spread…'
/bìk/	**[bɨ́k]**	'be wicked'	**ḿ-bɨ́k-ké**	'I am not being wicked'

(67) CVVC roots

Negative			
wúúk	'drive something in'	**wúú-ɣó**	'not driving in'
síít	'seal an opening'	**síí-ré**	'not sealing an opening'
Reversive			
wúúk	'drive something in'	**wʌ́k-kɔ́**	'remove an object driven in'
síít	'seal/block an opening'	**sɨ́t-té**	'remove seal from opening'
fííp	'suck'	**fɨ́ppé**	'remove [sucked] object'

Light–light template: Passive/reflexive suffix

(68) CVC roots

sɨ́n	'put on [e.g., dress]'	**sɨ́né**	'put on [or by] oneself'
yɨ́t	'fasten'	**yɨ́ré**	'be fastened/fasten on oneself'
dɨ́p	'hide'	**dɨ́βé**	'hide oneself'
kʌ́p	'cover [with lid]'	**kʌ́βɔ́**	'be covered [as with a hen]'
fʌ́k	'cover [with cloth]'	**fʌ́ɣɔ́**	'cover oneself'

(69) CVVC roots

síít	'seal/block an opening'	**sɨ́ré**	'be sealed/be blocked'
fíík	'press down'	**fɨ́ɣé**	'be piled up'
fííp	'suck'	**fɨ́βé**	'have an object stick out of the mouth'
wúúk	'drive something in' [e.g., stakes for yam]	**wʌ́ɣɔ́**	'be driven in'
bùùk	'bury'	**bʌ̀ɣɔ́**	'be buried'

As in the case of nonhigh vowels, the monosyllabic high vowel roots in (65)–(67) are constrained by a heavy-light bisyllabic inflectional foot template as

proposed above, while the examples in (68) and (69) are constrained by a light-light reflexive bisyllabic foot template.

The only remarkable thing about these forms is the surface realization of the vowels. Just as it was the situation in the underived bisyllabic verbs none of the derived verbs has a high vowel in the second syllable, though a high vowel is assumed spread onto this syllable. This follows completely from the analysis proposed in the preceding section. Also as expected, the foot based process of high vowel centralization centralizes and lowers high vowels in (66)–(69). One implication of this is that long high vowels in (66) and (69) are indeed shortened due to template satisfaction. This shortening is accompanied by centralization, as expected. In spite of their centralization, the underlying rounding of the root high vowel shows up on the second syllable of the derived verb.

Finally as in the cases with nonhigh vowel roots, after bisyllabic verbs with high vowels, the negative suffix takes the invariant form [**ké**] as in (70), while bisyllabic verbs remain uninflected in the passive construction as in (71).

(70) Negated bisyllabic verbs: Default [**ké**]
… **[nɨɣé]$_{FT}$ -ké** '… not tickling'
… **[tànɔ́]$_{FT}$ -ké** '… not being disciplined'
… **[dɨ́ppé]$_{FT}$ -ké** '… not lifting up'
… **[yʌ́ttɔ́]$_{FT}$ -ké** '… not twisting'

(71) Passive bisyllabic verbs: Uninflected

a. **tɨ́ppé** 'bore a hole'
ísɔ̀ŋ á à <u>tɨ́ppé</u>
ground c.pref. bore a hole
'the ground is open'

b. **sʌ̀kkɔ́** 'faint'
ènɔ̀ á à <u>sʌ̀kkɔ́</u>
name c.pref. faint
'Eno has fainted'

Compare (71) with equivalent passive constructions with monosyllabic CVC and CVVC verbs from (68) and (69).

(72) a. **sɨ́n** [**áféré**] 'put soup'
áféré á à sɨ́né
soup c.pref. put
'there is soup'

b. **wúúk** 'drive in/ stick in'
étó á à wʌ́ɣɔ́
stick c.pref. drive.in
'the stick is driven in'

A verb paradigm equivalent to that in (49) with a nonhigh vowel can be illustrated with the verb **síít** 'seal/block an opening', as in (73) below.

(73) Verb: **síít** 'seal/block an opening'

Formative	Template	Output Form	
Negative	$[\sigma\mu\mu\ \sigma\mu]_{FT}$	… **síí-ré**	'not sealing an opening'
Reversive	$[\sigma\mu\mu\ \sigma\mu]_{FT}$	**sɨ́t-té**	'remove seal from opening'
Relative	$[\sigma\mu\mu\ \sigma\mu]_{FT}$	… **síí-ré**	'… which is sealed'
Reflexive	$[\sigma\mu\ \sigma\mu]_{FT}$	**sɨ́ré**	'be sealed/be blocked'
Negative of reversive	$[\sigma\mu\mu\ \sigma\mu]_{FT}$ **-ké**	**sɨ́tté-ké**	'not removing from opening'

In the foregoing section we presented both morphological and phonological evidence for the existence of a bisyllabic (trochaic) foot in Ibibio. The morphological evidence consists of several formatives whose outputs require this foot structure. These formatives determine the foot template as heavy-light or light-light. The phonological evidence on the one hand consist of phonological processes which take the bisyllabic foot as their domain, and segmental restrictions within the bisyllabic foot on the other. The fuller distribution of segments occur in foot initial position (C1 or V1) while a more restricted distribution is found in the foot final position (C2 or V2).

3. An alternative account

The argument presented in Section 2.1 is to the effect that suffixed verbs such as **kǎ** 'go'; … **kàà-ɣá** '… not going' form the 'disallowed' heavy-light (bi)syllabic trochee. An alternative templatic analysis of these suffixed verbs is one that regards this suffixation as "suffix-to-foot". This alternative analysis will regard the suffix as falling outside the foot in Ibibio. It is equivalent to denying the presence of a heavy-light foot in this language. Such an analysis however fails to capture two significant generalizations in Ibibio, which our proposed analysis captures. The first generalization has to do with the fact that stop weakening takes place *only* within a bisyllabic structure which includes both the *heavy–light* template and the *light–light* template. Within the alternative analysis, the domain of stop weakening will have to be the prosodic word, which must include both of these templates. Note immediately that this approach has no explanation for vowel shortening in CVVC roots when the template is light-light. But the approach makes the wrong prediction on other grounds as well.

The fact that the domain of stop weakening is not the prosodic word is demonstrated by the fact that this process is blocked after all bisyllabic verbs, which in our proposal represents a foot:

(74)	**dáppá**	'dream (vb.)'	… [[**dáppá**]$_{FT}$-ké]$_{Wd}$	'… not dreaming'
	kɔ́ŋɔ́	'choke'	… [[**kɔ́ŋɔ́**]$_{FT}$-ké]$_{Wd}$	'… not choking'
	dèèmé	'share'	…[[**dèèmé**]$_{FT}$-ké]$_{Wd}$	'… not sharing'

In these forms, the consonant **/k/** of the suffix is never weakened to a dorsal continuant [ɣ], though the whole form (including the suffix) should be equivalent to a prosodic word. Recall that the same is true for the relative suffix (as in (35), and in this case the entire form is assigned a single low tone which gets a straightforward explanation if the tone is assigned to the prosodic word. If the first two syllables in each of the examples (in 74) represents a bisyllabic foot and the domain of stop weakening is the bisyllabic foot, the failure of the process is explained on principled grounds: **/k/** falls outside the bisyllabic foot.[22] The second related generalization is the segmental distribution, which we discussed in the preceding section. The segmental distribution has no explanation unless CVVCV and CVCV are both feet in Ibibio, since the distribution of consonants is the same in both structures. Since our account captures both facts, we prefer the analysis proposed here.

There is indeed a more compelling reason why the domain of stop weakening has to be the bisyllabic foot, and not the prosodic word. There is independent evidence for a bimoraic monosyllabic foot in Ibibio. In a prosodic word consisting of only this monosyllabic bimoraic foot and another syllable, a stop is not weakened. The evidence comes from contrastive reduplication, to which we now turn.

4. The Bimoraic monosyllabic foot

Contrastive reduplication in Ibibio is a prefixing reduplication in verbs which gives the interpretation: 'X rather than or as opposed to …' as in for example **bɔ́p** 'build', **bɔ́ɔ́-bɔ́p** 'build rather than/as opposed to …'. It is a productive morphological process which any verb can undergo. In the following list, we organize our examples based on syllable structure of the verbs. We will restrict our examples to one per vowel.

22. A JALL reviewer noted that while it is clear why the velar stop of **/-ke/** does not lenite, the foot internal labial stop of the bisyllabic verb … [**dáppá**]$_{FT}$ "dream" does not lenite either (see also Examples (9), (30a), and (35a)). Synchronically, we follow Keer (1999) in assuming that lenition processes in general result in inalterability of geminates because geminates pass the markedness constraint against "short closure" while non-geminate stops fail it.

(75) With CV verbs

bó	‘say’	**bóó-bó**
kɔ̀	‘gather’	**kɔ̀ɔ́-kɔ́**
tá	‘chew’	**táá-tá**
mé	‘endure’	**méé-mé**
sù	‘tell a lie’	**sòó-sù**
dí	‘come’	**déé-dí**

(76) With CVC verbs

dép	‘buy’	**déé-dép**
bɔ́p	‘build’	**bɔ́ɔ́-bɔ́p**
kàt	‘show’	**kàá-kàt**
kpòt	‘grumble’	**kpòó-kpòt**
nɨ̀m	‘believe’	**nèé-nɨ̀m**
kʌ́p	‘cover [a pot]’	**kɔ́ɔ́-kʌ́p**

(77) With CVVC verbs

bɔ́ɔ́k	‘nurture’	**bɔ́ɔ́-bɔ́ɔ́k**
kóót	‘read/call’	**kóó-kóót**
dààk	‘put underneath’	**dàá-dáàk**
kpéép	‘teach’	**kpéé-kpéép**
tíík	‘flatter’	**téé-tíík**
nùùk	‘bend’	**nòó-núùk / nɔ̀ɔ́-núùk**

(78) With CVCV verbs

bèɣé	‘arrive [from journey]’	**bèé-béɣè**
dòró	‘be bitter’	**dòó-dórò**
sɔ̀βɔ́	‘boil [of food]’	**sɔ̀ɔ́-sɔ́βɔ̀**
yámá	‘be bright’	**yáá-yámá**
bɨ̀mé	‘scramble for’	**bèé-bɨ́mè**
tʌ̀nɔ́	‘chastise’	**tɔ̀ɔ́-tʌ́nɔ̀**

(79) With CVVCV Verbs

bɔ̀ɔ̀rɔ́	‘respond’	**bɔ̀ɔ́-bɔ́ɔ́rɔ̀**
tòòró	‘praise’	**tòó-tóórò**
kààmá	‘stir (food)’	**kàá-káámà**
bééŋé	‘borrow’	**béé-bééŋé**
fíímé	‘maltreat’	**féé-fíímé**
ŋwùùnó	‘smell’	**ŋwòó-ŋwúúnò**

(80) With CVCCV verbs

yómmó	'be pregnant'	**yóó-yómmó**
wɔ́ŋŋɔ́	'turn'	**wɔ́ɔ́-wɔ́ŋŋɔ́**
démmé	'wake up'	**déé-démmé**
dáppá	'dream '	**dáá-dáppá**
ɲɱmmé	'agree'	**ɲéé-ɲɱmmé**
sɔ̀kkɔ́	'faint'	**sɔ̀ɔ́-sʌ́kkɔ̀**

In all of the above examples the basic generalization is that the reduplicant takes the shape of a heavy (bimoraic) syllable. This syllable is identical to the first CV of the verb if the (first) root vowel is nonhigh. If the (first) vowel of the verb root is underlyingly high, then the vowel of the reduplicant is of the same quality that it takes in the second syllable of a bisyllabic verb, i.e., nonhigh.

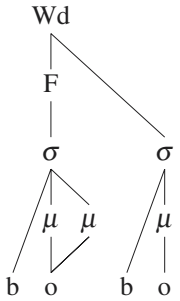
Our analysis is that the template of the reduplicant is a bimoraic monosyllabic foot, prefixed to the base. While we will not go into the details of the analysis of the reduplication here for reasons of space, we offer the following two crucial proposals. We propose that the vowel quality in the reduplicant is guaranteed to be nonhigh because it is in a reduplicant (prefix) rather than a root and thus it qualifies as a non-prominent position. Along the same direction, the shape CVV (rather than CVC) of the prefix is guaranteed from the markedness of NO-CODA in reduplicants, the emergence of the unmarked in a form without an input structure (McCarthy and Prince 1994). What is interesting about these examples is that the prefix is treated as an individual stem, such that the prefix forms a foot on its own. We illustrate the first example in (75), in (81).

(81) **bó** 'say' → $[\textbf{bóó}]_{\text{FT}}$ **-bó** 'say [contrastive]'

Notice that in all of the examples, the first stop of the base is never weakened even when the following base is only one syllable as in (81) above, resulting in forms similar to derived negative verbs in (7). This follows completely if the prefix forms a foot and the base initial consonant falls outside of that foot.

Both the reduplicant and the base however form one prosodic word. We show the input-output structure of the example in (81), in (82):

(82) **bó** 'say' [[**bóó**]$_{FT}$ -**bó**]$_{Wd}$ 'say (contrastive)'
Input: **bó** Reduplicant template: [$\sigma\mu\mu$]$_{FT}$
Output:[23]



[[**bóó**]$_{FT}$-**bó**]$_{Wd}$

Other examples in (75)–(80) can be given a similar analysis based on the proposals outlined here. The implication of the above representation is that the domain of stop weakening cannot be the prosodic word, otherwise its nonoccurrence in (82) cannot be explained.

There is one final question: why is it that we cannot assume that the prefix forms a prosodic word on its own, such that the base falls outside of that prosodic word? The prefix cannot be assumed to form a prosodic word, because its tone pattern is determined by the base. If the (first) tone of the base is high then the reduplicant is high; if however the (first) tone of the base is low, then the reduplicant has a low-high pattern. In fact the tonal output of the reduplicated verb must be assigned to the entire prosodic word (stem and reduplicant). If the (first) tone of the base is high then the prosodic word is assigned a high tone; if however the (first) tone of the base is low then the prosodic word gets a rise-fall pattern, regardless of the number of syllables in the form. Therefore the reduplicant and the base form part of the same prosodic word.

In summing up, the above discussion shows two things. First, it confirms that stop weakening must be a foot internal process. Secondly, it shows that Ibibio has a bimoraic foot which is different from the bimoraic bisyllabic foot already discussed. Like the other foot structures, it forms the template of a morphological process in the language.

5. Conclusion

In the foregoing sections, we have presented evidence indicating that Ibibio is a language with every possible form of the trochee. We presented both morpho-

23. We assume here that monosyllabic monomoraic syllables cannot form a foot on their own following McCarthy and Prince (1986), Hayes (1986).

logical and phonological evidence for the existence of a bisyllabic (trochaic) foot in Ibibio. The morphological evidence consists of several formatives whose outputs require this foot structure. These formatives determine the foot template as heavy-light or light-light. Suffixation results in stems of a heavy-light bisyllabic foot or a light-light bisyllabic foot, depending on the formative. If we assume that the relevant foot template requirement must be satisfied by the output of suffixation irrespective of the underlying form of the verb root, then the overall shape of the inflected verb is accounted for. While monosyllabic verbs are modified, bisyllabic verbs are left untouched. Two crucial aspects of the surface form of the inflected verb are explained. Vowel lengthening in CV verb roots results from template satisfaction; it is forced by the fact that the first syllable must be heavy. Secondly, vowel shortening in CVVC verbs is also the result of the need to satisfy the light-light template.

The phonological evidence consists on the one hand of phonological processes which take the bisyllabic foot as their domain, and of segmental restrictions within the bisyllabic foot on the other. On the one hand stop weakening and high vowel centralization apply only within the bisyllabic foot, and on the other hand the fuller distribution of segments occur in foot initial position (C1 or V1) while a more restricted distribution is found in the foot final position (C2 or V2). The fact that the bisyllabic foot forms the domain of segmental processes makes it inevitable to conclude that segmental processes may make reference to prosodic bracketing.

Finally we also presented morphological evidence for the monosyllabic bimoraic foot, distinguishing it from the bisyllabic bimoraic foot. The bimoraic foot forms the template of the reduplicant in contrastive verbs.

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