

A MORAIC MODEL OF THE PROSODIC PHONOLOGY OF SOMALI

by

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1. Introduction

1.1 Aim of the paper

The aim of this paper is to present a model of prosodic phonology for Somali. That is to say a model will be proposed for the way in which segments are represented in a string and a set of rules through which underived strings are converted into surface strings. A number of prosodic phonological phenomena found in Somali will be explained using this model as a basis, and it is hoped that the model will prove useful for the further study of prosodic phonological phenomena in Somali as well as other languages, especially Cushitic languages.

Since this paper is intended primarily as a tool for the further investigation of the Somali language we shall not compare the theoretical stance with other theoretical possibilities. This is not to say that the discussion has no bearing on universal aspects of phonological structure, it does, but we do not look into that here.

1.2 Somali phonology a general overview

The phonology of Somali has not been discussed in the linguistic literature on the language to the same extent as have, for example, aspects of syntax such as focus. From the earliest written descriptions of the language, reference has been made to descriptions of the sounds and the behaviour of those sounds with varying degrees of accuracy given subsequent hindsight. One work which stands out in particular is Armstrong's work on the phonetics of the language published in 1934 *The phonetic structure of Somali* which still stands out as essential reading for anyone interested in pursuing any aspect of the sound system of Somali.

In more recent years certain aspects of the sound system have received more attention than others. The system of tonal accent has been discussed in some detail by Hyman (1981, 1981a) and Banti (1988a) and the system of metre of Somali poetry is also understood through the work of Abdillahi Deria Guled, Maxamed Xashi Dhamac

"Gaariye"¹ and Johnson (1979, 1984 1988). Both of these phenomena will figure in the following discussion.

1.2.1 Somali prosodic phonology

By the prosodic phonology of Somali is meant aspects of phonological behaviour which are primarily explained by the prosodic structure of strings. The two phenomena mentioned above, namely, the metrical system and the tonal accent system are both prosodic phenomena which have been explained in terms of moras and syllables, entities which provide the basis of the model proposed here. After setting out the model, which is developed making reference to these two phenomena, attention will be turned to other prosodic phenomena of Somali phonology, specifically reduplication in adjectives and verbs and the status of diphthongs and semivowels.

1.3 General theoretical background to the model proposed here

1.3.1 Moraic phonology as opposed to segmental phonology

Since we are dealing here with a model of the prosodic representation of Somali we shall not discuss the representation of the melodies of segments, ie. the representation in terms of distinctive features of the sounds of Somali. A model of melodic representation has been proposed for Somali in Orwin 1994. In this paper, however, when referring to the sounds of Somali the letters of the Somali alphabet will be used to represent them. In other cases we shall have cause to refer to consonants and vowels in general in which case consonants will be referred to as C and vowels referred to as V, in addition to this certain groups of segments will be referred to. The inventory of segments in Somali is set out below:

Stops:	b	d	dh		g	q		'
			t	j ²	k			
Fricatives:		f	s		sh		kh	x
								h
								c
Nasals:		m	n					
Liquids:			r					
			l					
Semi-vowels:	w			y				
Vowels ³	i		u					
	e		o					
		a						

Before looking at the specifically prosodic aspects it must be pointed out here that this whole account is couched within the theory of lexical generative phonology. Without going in to details this theory proposes that phonological rules may apply in the lexicon or in the post-lexical component which follows the syntax. Furthermore, the lexicon may be divided into different levels and phonological rules may be specified as applying at one level or another or at any one of a specified set of levels. This accounts for the application of rules to certain strings and not to others.

Returning to the nature of prosodic representations, any model of representation which takes as its basis the individual segment as a countable unit is a segmental model of representation. This is exemplified in the system of representation which builds up prosodic structure from a series of timing slots represented by X's or C's and V's⁴. For example, the following is a representation of the Somali word *tag* "go" in a timing slot model:

(1)

x	x	x
t	a	g

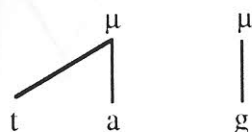
It can be seen that each individual segment may be counted and may therefore play a role in any prosodic phonological process.

The model of representation proposed here for Somali is a model based on the *mora*. This is assumed given the general arguments in favour of the mora (particularly as expounded in the work of Hyman 1985 and Hayes 1989 as well as on the basis of work undertaken within the domain of Somali language studies in particular, specifically on tonal accent and poetic metre.

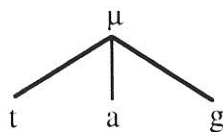
The essential idea behind a moraic approach to prosodic organization is that not all the sound segments in a particular string are counted prosodically. Specifically this means that, universally, the onsets of syllables are not counted; and that the consonant at the end of a syllable in a surface string may be counted or not according to the language concerned. Thus, the string *tag* may be represented in one of the two following ways in a moraic system of representation according to whether the final consonant is counted or not, the symbol μ stands for mora:

(2)

(a)



(b)



Languages in which the consonant counts in phonological phenomena, case (2a) above, include Latin and most dialects of Arabic whereas languages in which the final consonant does not count, case (2b) above, include Huasteco and Khalka Mongolian. A segment which may be counted will be referred to as having weight, and a segment which may not be counted as not having weight. This reflects the distinction which is made between syllables which are described as heavy if they include more than one mora, or light if they comprise only one mora. What about Somali, is it a language in which CVC syllables count as heavy or light syllables? It will be shown that this issue is not quite clear cut one way or the other and that Somali is a language in which CVC syllables are heavy up to a certain derivational stage following which they are light.

1.3.2 Hyman's model

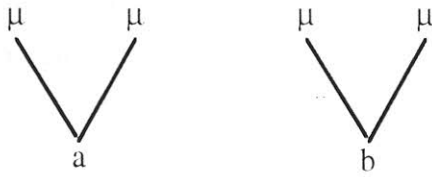
Since we are basing our model of prosodic representation on Hyman's model we shall provide a brief outline here of this general model leaving specific aspects relating to Somali to the next section. Note that in his work Hyman refers to weight units and uses the symbol "x" to represent these. In our model we shall use the symbol μ^5 and refer to the entities as moras.

The following are four important aspects of Hyman's model:

- A. All segments are associated with a mora in underived representation.
- B. The onset creation rule.
- C. The margin creation rule.
- D. The projection of syllable nodes.

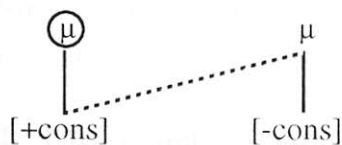
The first aspect states that all segments are represented in underived representation with associated moras. This means that all segments may potentially have weight at some point in the derivation of a string⁶. The underived representation of long vowels and long consonants comprises two moras, thus the long segments **aa** and **bb** are represented as follows:

(3)



The onset creation rule is a universal rule and is the first rule which applies to a phonological string in the derivation. Hyman formalizes the onset creation rule as follows.

(4)



Hyman 1985 p.15 (note that in Hyman's formalism the symbol x is used instead of μ)

This accounts for the fact that in no language does an onset add weight to a syllable and affect the behaviour of the syllable⁷.

The margin creation rule is a language specific rule which accounts for the different types of languages mentioned above. That is to say that in certain languages it applies and in these CVC syllables count as light syllables. In other languages it does not apply and in those CVC syllables count as heavy syllables. It is formalized by Hyman as follows:

(5)

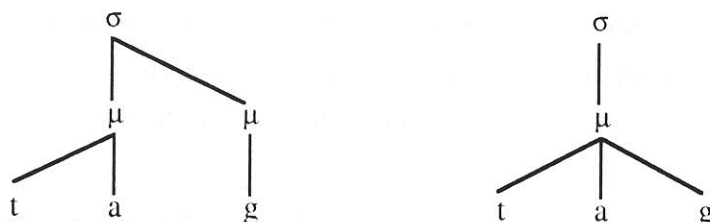


Hyman 1985 p.18 (note again that in Hyman's formalism the symbol x is used instead of m)

The final aspect of Hyman's model to be mentioned is the projection of syllable nodes. Syllables are not regarded by Hyman as being universal aspects of prosodic representation in languages. He cites arguments for the language Gokana which show that, for that language at least, syllables are not needed. We shall show that syllables are needed in Somali. Syllable nodes are projected from the mora tier, thus the word

tag 'go', when syllabified, will result in one of the following two representations according to whether or not the final *g* has weight or not, which depends on whether or not the margin creation rule has applied.

(6)



Note that there is no direct association between the syllable tier and the melodic tier, all melodies are immediately dominated by a mora node.

2. The model of Somali prosodic phonology

Having briefly outlined Hyman's model the Somali specific aspects proposed here will be outlined. Firstly, however, a review of the evidence which supports the assumption of a moraic basis to Somali prosodic structure will be given.

2.1 The moraic basis of Somali prosodic structure

There are two aspects of Somali phonology which have been discussed in the literature which provide strong evidence in favour of assuming a moraic basis to the prosodic representation of Somali. These are the metrical system of poetry and the assignment of tonal accent.

2.1.1 Tonal accent assignment in Somali

It was the work of Hyman 1981 (and 1981a), which revealed the fundamental nature of the Somali system as a tonal accent system. Hyman demonstrated that neither tone nor accent is marked underlyingly for most forms. Accent is assigned via morphological rewrite rules which assign the feature [+accent], represented in his work by an asterisk, *, to the appropriate vowel. Following accent assignment there are a number of accent shift and accent deletion rules. These are, in turn, followed by the process of pitch assignment to accented and unaccented vowels. Hyman assigns the pitch level 1 (highest pitch level) to accented vowels and the pitch level 2 to unaccented vowels. These unaccented vowels are marked by the diacritic, °, which represents the feature [-accent] (see Hyman 1981 p.177). Although it is not explicitly stated, the implicit assumption in Hyman's argument is that all vowels must be specified for the binary feature [±accent]. Following the accent shift and deletion rules, all vowels which

remain without a specification for $[\pm\text{accent}]$ are assigned the feature value $[-\text{accent}]$ by default.

As far as the accent bearing units are concerned, Hyman does not go into any specific detail as to what these units are in prosodic terms. In his rule formalisms accent asterixes are assigned to V's, representing vowel units; that is to say, a single vowel is represented as V whereas a long vowel is represented as VV. The following is an example of one of his accent assignment rules.

(7) Example of accent asterisk assignment in Hyman's model

$$\circ \rightarrow * / \bar{v} C_0 (V(C)) \#] \begin{matrix} \text{D1} \\ \text{D2} \end{matrix} \text{ m.} \}$$

Hyman 1981 p.181

D1 and D2 are labels for declensions as detailed in Hyman's account.

Despite this use of vowels in the rules, Hyman does also mention moras as accent bearing units. One instance is in relation to the difference between the accent assignment in a language such as English and that in a language such as Somali. "Accent in Somali is clearly a property of the vowel (or mora), while it is a property of syllables in English" (Hyman 1981 p.177).

Others have indicated their assumption that it is the mora which is the accent bearing unit in Somali. Biber (no date), for example, writing on Central Somali, states that "the accent assignment rules count moras rather than syllables" (Biber no date p.1). Banti 1988a also mentions "that the units that bear tones in Somali are not the syllables but rather the moras" (Banti 1988a p.13).

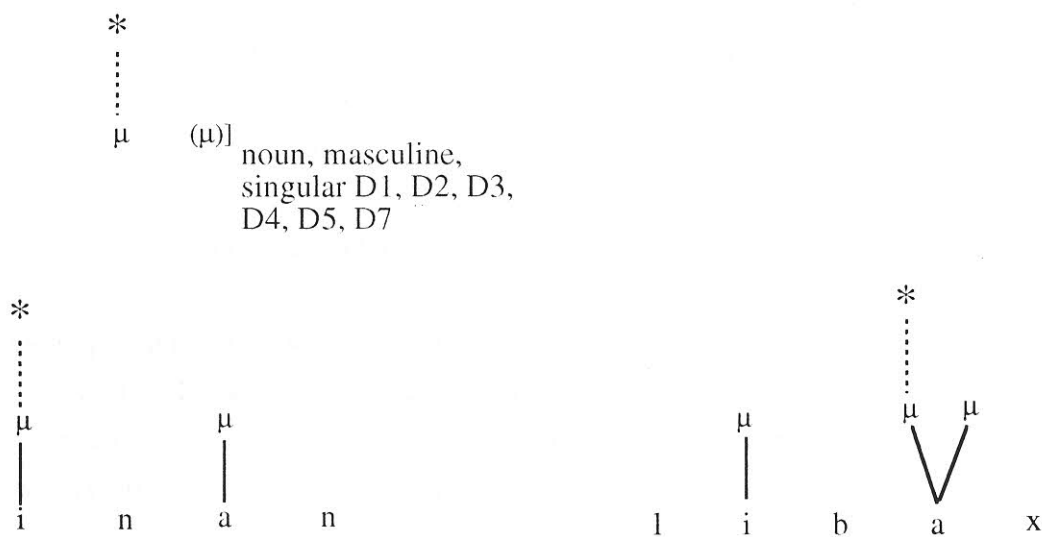
This point of accent assignment being to the mora can clearly be demonstrated by the following set of masculine nouns where the tonal accent is represented by an acute accent. The words here are written in the Somali script in which long vowels, comprising 2 moras, are written as digraphs. Note that, at the stage of the phonology at which tonal accent is assigned, only vowels are associated with moras. We shall return to this matter later.

(8) Examples of masculine nouns showing accent assignment to the penultimate mora

<i>[ʼ]éy⁸</i>	“dog”
<i>túug</i>	“thief”
<i>[ʼ]ínan</i>	“boy”
<i>libáax</i>	“lion”

By referring to a moraic basis of the prosodic organization of Somali a rule may be formalized which very simply accounts for the pattern of accent assignment demonstrated in these words. In the following diagram such a rule is formalized and two examples of its application, namely in the words *[ʼ]inan* and *libaax*, are given.

(9) Accent assignment rule and examples of application in *[ʼ]inan* and *libaax*⁹



The parentheses are needed in the rule of tonal-accent assignment to account for monosyllabic nouns such as *nin* “man” to which accent is also assigned.

2.1.2 The metrical system of Somali poetry

The second aspect which provides strong evidence in favour of the moraic basis of Somali prosodic phonology is the metre of Somali poetry. It was Maxamed Xaashi Dhamac "Gaarriye" and Abdillahi Deria Guled who made the breakthrough in the study of Somali metre. Apart from an article by Abdullahi Deria Guled 1980, most of their work was published in a series of articles in the Somali national newspaper of that time *Xiddigta Oktoobar*, “The October Star”¹⁰ and has been made available to scholars who have no access to these articles primarily through the work of John W. Johnson who has worked closely with Abdillahi Deria Guled in particular¹¹.

To show the importance of moras in the metrical system there follows a summary of the metrical rules applicable to the *gabay* genre of poetry as given in Andrzejewski 1982 (note Andrzejewski uses the word *morae* as the plural of *mora*):

(10)

- A. Each line consists of two hemistichs divided by a caesura.
- B. The first hemistich normally has 12 morae, with an optional but rare possibility of anacrusis, consisting of one additional mora at the beginning of the line.
- C. The second hemistich always has eight morae and contains two long syllables.
- D. Foot boundaries do not occur in the middle of a long syllable.
- E. The caesura coincides with a word boundary.
- F. Line boundaries do not cut across major syntactic components of a sentence.

Andrzejewski 1982 p.72

One important matter which must be borne in mind with regard to the moras referred to in the metrical system is that they are always associated with vowel melodies. This coincides with the facts given above that in Somali the moras to which accent is assigned are always moras associated with vowel melodies.

This view of moras contrasts with other languages in which, as we have seen, syllable final consonants are associated with moras. One such language is Classical Arabic which also has a metrical system in which the number of moras in a line is counted. The crucial difference in Arabic, however, is that CVC syllables are heavy¹².

It is interesting to note that the details of the metrical system as given above also show that syllables are important, particularly in the matter which is set out in (10) section C which states that two long syllables are needed in the second hemistich of a *gabay* poem. The matter of the role of syllables in the metrical system is something which has been set out in detail by Johnson in terms of what he calls "moro-syllabic relationships" (see Johnson 1988 pp.124-128). It can be seen from the above outlines that the tonal accent system in Somali and the Somali metrical system provide evidence for a mora-based phonological prosodic structure. The way in which diphthongs fit into the picture of tonal accent assignment and poetic metre, will form part of the discussion below.

2.2 Prosodic underived representations in Somali

The prosodic aspects of underived representations in Somali are assumed to be as those proposed by Hyman. That is to say, all segments are associated with at least one mora in underived representation. Vowels and certain consonants may also be associated with two moras in which case they represent long vowels and underived geminate consonants respectively.

2.3 The syllabification process

2.3.1 The onset creation rule in Somali

The syllabification process of Somali will now be discussed. It will be assumed, following Hyman, that the rule of onset creation is the initial part of the syllabification process, accounting for the fact that all syllables have onsets in the language. The formalization of that rule, however, will be a little different to Hyman's formalization in that it is not only consonants which may form the onset of syllables in Somali. As demonstrated in words such as *yar* "small", and *webi* "river", a semivowel may also constitute the onset of a syllable. There are two ways in which this matter may be approached, the assumption may be made that the semivowel is somehow represented, melodically, as a consonantal segment; or it may be assumed that semivowels in Somali are represented in a manner analogous to the other vowels but that they undergo the margin creation rule. If the first possibility is assumed then it follows that semivowels are not vocalic melodies. This would lead to problems in explaining the behaviour of semivowels occurring in diphthongs, since, as shown above in the example [*'jéy* "dog", the two parts of a diphthong may have weight for the purposes of tonal accent assignment also in the metrical system of poetry diphthongs may be counted as two moras.¹³

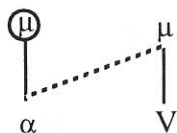
The assumption will therefore be made here that the melodic representation of vowels and semivowels is analogous¹⁴. Returning to the matter of the onset creation rule, the rule proposed by Hyman, given in (4) above, prevents any vocalic melodies becoming onsets. In order to account for the fact that semivowels may constitute a syllable onset in Somali the Somali onset creation rule will refer to a sonority hierarchy of Somali segments¹⁵. This is as follows.

(11) Sonority hierarchy for the melodies of Somali

All consonants	1
The vowels i and u	2
All other vowels	3

The Somali onset creation rule will therefore be formalized as follows.

(12)



Where α represents any melody of sonority <3

Note that the melodies associated with the two moras are separate. This prevents the possibility of the rule applying to underived forms such as *uun* “to create” or *iibi* “to sell”¹⁶ in which cases one vocalic melody is associated with two moras as in diagram (3) above. Note that since semivowels and vowels are assumed to be analogous in terms of their melodic representation they will all be referred to as vowels. Thus, whenever vowels are referred to, the sounds which are represented in the Somali alphabet with *y* and *w* are included.

2.3.2 The margin creation rule in Somali

Since tonal accent is only assigned to moras associated with vowel melodies it will be assumed that the margin creation rule applies in Somali. Furthermore in the metrical system of poetry, the units which are counted are moras and in Somali, unlike Classical Arabic, the moras are only associated with vowel melodies. The margin creation rule proposed here for Somali is a revised version of Hyman’s formalism since, as was the case with the onset creation rule, there are certain phenomena which are not captured by Hyman’s formalization as it stands. These are the matter of the assignment of tonal accent to open syllable diphthongs in bisyllabic nouns¹⁷ and the fact that diphthongs in open syllables in the metrical system of poetry may be counted as heavy or light¹⁸. Furthermore it will be demonstrated that the way in which the margin creation rule fits into the system of syllabification as a whole allows for an explanation of the prosodic aspects of reduplication to be proposed.

It was mentioned above that, in terms of tonal accent assignment, moras are only associated with vowel melodies. This may be explained by the assumption of the margin creation rule applying prior to the application of any tonal accent assignment rules. There are, however, nouns in which accent assignment is not as expected. Examples are given in (13b) below, and, as can be seen the common characteristic of all these nouns is that they all end in open syllable diphthongs. All of the masculine nouns are nouns to which the tonal accent assignment rule in (9a) above is applicable,

but it is not the penultimate vowel segment which surfaces with the tonal accent rather it is the ante-penultimate vowel. This contrasts with the examples in (13a), also incorporating diphthongs but in closed syllables apart from the example *ey* "dog" which is a monosyllabic noun. In this set the masculine nouns also undergo the same tonal accent assignment rule but the accent surfaces on the vowel melody expected, namely the penultimate vowel.

(13)

(a)

da'ýr (f.)	"lesser rainy season"
dáyr (m.)	"fence"

'a'wr (f.)	"male camels"
'áwr (m.)	"male camel"

'e'ý (f.)	"dogs"
'éy (m.)	"dog"

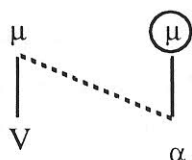
(b)

árdey (m.)	"student"
ardéy (f.)	"students"
báadow (m.)	"inhabitant, rustic"
badów (f.)	"inhabitants, rustics" ¹⁹
íley (m.)	"one eyed man"
híley (m.)	"strap"
cáday (m.)	"stick for cleaning teeth"

In (13) feminine nouns are also listed and in (13a) display the expected accent assignment namely on the final vowel²⁰. In (13b) on the other hand it is the accent surfaces on the penultimate vowel. This is evident from the phonetic realization of these words which are pronounced with falling pitch on the final diphthong.

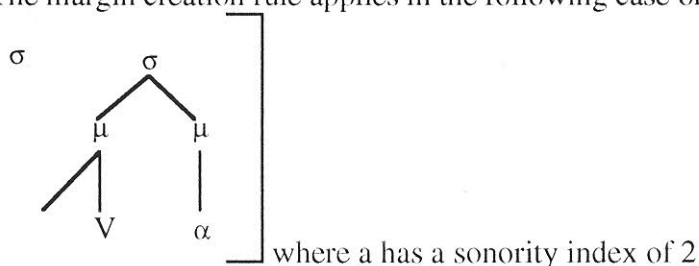
An explanation for this behaviour is that the final melody in a diphthong (the melody represented as *y* or *w* in the Somali orthography) in an open syllable in a multisyllabic word is not associated with a mora, hence accent is not associated with it. The fact that this particular segment is not associated with a mora will be accounted for by assuming the mora to be deleted by the margin creation rule. Thus we must formalize the margin creation rule accordingly. The following is such a formalization.

(14) Somali specific margin creation rule



The rule applies as follows:

- (a) The margin creation rule always applies when α has a sonority index of 1. This application occurs at all lexical levels.
- (b) The margin creation rule applies in the following case only at lexical level I



- (c) The margin creation rule may apply for the purposes of poetic metre when α has a sonority index of 2²¹.

(14a) accounts for all the applications of the margin creation rule to consonants. In other words, this accounts for why Somali is a language in which CVC syllables are light. This application needs no further discussion aside from the matter of how it fits into the overall process of syllabification. This is detailed below.

The application under (14b) accounts for the cases such as those in (13b) above. It is important that the syllables are represented in this formalism since it is only in bisyllabic words that this application of the margin creation rule applies (but see footnote 16). The example *éy* demonstrates this since the tonal accent surfaces on the penultimate vocalic melody the margin creation rule has not applied to this form.

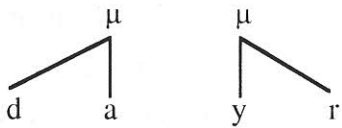
The application in (14c) accounts for the metrical system of Somali regarding open syllable diphthongs as heavy or light.²²

Applications (14b) and (14c) need a little further discussion. It was stated under (14b) that this particular instance of the margin creation rule applies at level I, this is for the following reasons. An important fact to bear in mind with all of the diphthong examples of application of the margin creation rule (as specified in (14b) and (14c)) is

that they are interrelated. Since the margin creation rule applies to all examples of bisyllabic words ending in open syllable diphthongs then all such diphthongs are necessarily monomoraic if they occur in a line of poetry. The majority of instances of diphthongs in open syllables in poetry, however, are not such words but instances of inflectional endings such as the endings of the general past tense all of which apart from the 2nd and 3rd person plural end in **-ay**. A glance at any poem will show this to be the case. These endings, being inflectional endings, are suffixed to verb stems at the inflectional level in the lexicon, which is assumed to be level II in Somali.²³ If the margin creation rule were to apply in such cases it would imply that all cases of open diphthong syllables in poetry be monomoraic, which is not the case. It is assumed therefore that the specific case of (14 b) of application of the margin creation rule only applies at level I in the lexicon. Hence it applies to all instances discussed but does not apply to those instances which are the result of the concatenation of inflectional morphological suffixes since these suffixes are only added at level II in the lexicon. More detailed work on a large corpus of poetry will hopefully shed more light on the finer details of these points.²⁴

Hyman 1981 also discusses these bisyllabic words ending in diphthongs in a footnote (Hyman 1981 footnote 2 p.171-172). Here he writes: "Vy and Vw sequences are written Vi and Vu in *monosyllabic* words in order to correctly predict placement of the tonal accent.". Thus examples such as **dayr** he would write 'dair' bisyllabic words on the other hand, in his work, are written with 'y' or 'w', **arday** being written 'arday'. In other words, the behaviour we have outlined above is accounted for by Hyman by a difference in the melodic representation of the semivowel melody allowing 'i' and 'u' to exist alongside 'y' and 'w'. In addition, he provides details of the distribution of these melodies. 'Vi' and 'Vu' in monosyllabic words and 'Vy' and 'Vw' in multisyllabic²⁵ words. This is the approach which was decided against at the outset of the discussion here and in general the approach here is considered to be more adequate than Hyman's depending as it does on prosodic matters without reference to the melodic tier and in the way it accounts in a simple manner for the matters outlined.

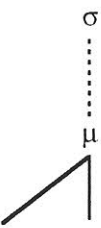
One matter which remains to be explained is why the margin creation rule application in (14b) does not apply in closed syllables. This is explained by the fact that the margin creation rule will have already applied deleting the mora associated with the consonant following the diphthong and thus the string no longer meets the structural description of the rule. This is demonstrated in the representation of the word **dáyr** following the application of the margin creation rule.



Here the onset creation rule has applied as has also the margin creation rule. Looking back to the margin creation rule case in (14b), it is seen that the rightmost mora is deleted if the node *a* is a segment of sonority hierarchy 2 and at lexical level I. In the case of *dayr* in diagram (15), however, it may be seen that the mora is not only associated with a melody of sonority hierarchy 2 but also, at the same time, with a melody of sonority hierarchy 1. Thus the rule may not apply.

Another aspect of the process of syllabification will now be considered and namely how and at what stage in the syllabification process the projection of the syllable node occurs. The examples of words in (13b) give a hint to this matter since the rule which accounts for these words crucially incorporates the syllable tier. The assumption must therefore be that it applies before the application of this rule. However, some way of ascertaining the mora nodes from which the syllable node projects is required. Syllable node projection prior to the application of the onset creation rule cannot be assumed without reference to the melodic tier which is less desirable than an account solely determined on prosodic aspects. The assumption made here therefore will be that the syllable node is projected immediately following the application of the onset creation rule, this being formalized as follows.

(16)



It can be seen from this formalism that no reference is made to the melodic tier since the melodies associated with the mora node are necessarily an onset followed by a vowel resulting from the application of the onset creation rule. Thus the process of syllabification begins with the underived string to which the onset creation rule applies, following which the projection of the syllable node applies.

2.3.3 Where the margin creation rule applies and reduplication in Somali

he basic aspects of the model of prosodic representation have now been set out and how as well as how this explains certain aspects of Somali prosodic phonological behaviour. One further aspect of the model will be discussed in this section, namely the stage in the syllabification process at which the margin creation rule, as expounded in sections (14a) and (14b) above, applies. This matter will be considered with reference to the process of prefixal reduplication in adjectives in Somali.

2.3.3.1. Prefixal reduplication in adjectives and verbs

Prefixal reduplication occurs in adjectives and verbs in Somali, the prosodic details in both cases are identical, thus only adjectives will be referred to here to simplify the discussion, assuming remarks made here to be equally applicable to verbs. The following list is taken from Banti 1988 who divides the reduplicative adjectives into three types.

(17)

(a)			
dhaadheer	from	dheer	"long"
waaweyn	"	weyn	"big"
(b)			
ad'adag	"	adag	"hard"
xirxiran	"	xiran	"tied up"
dildillaacsan	"	dillaacsan	"burst open"
taagtaagan	"	taagan	"stand"
qaybqaybsan	"	qaybsan	"divided"
(c)			
gugguban	"	guban	"burnt"
duudduuban	"	duuban	"rolled up"
jajaban	"	jaban	"broken"

"the subsequent consonant is geminated whenever phonologically possible"²⁶

Banti 1988 p.213

In the general and pedagogical literature on Somali this reduplication is generally described as the copying of the first syllable of the singular form followed by the prefixing of this to the beginning of the singular form (see, for example, Saeed 1987)

prefixing of this to the beginning of the singular form (see for example Saeed 1987)

p.178 or Lamberti 1988 p.133). Another approach to the description of this process is given by Andrzejewski 1969 who calls the reduplicated string of segments the "preradical" and provides a description of the various shapes of the preradical in terms of the simple (or singular) form of the adjective, stating that "when the s. mld. [simple mould] begins with or consists of the following sequences, such sequences are identical in shape with the preradical of the corresponding r. mld. [reduplicative mould]" (Andrzejewski 1969 p.65). Those sequences are:

(18)

- (a) a consonant + a vowel + a consonant...
- (b) a consonant + a vowel + the semivowel *y* + a consonant...
- (c) a consonant + a vowel + the semivowel *w*...²⁷

(Andrzejewski 1969 p.65)

Andrzejewski also points out that, if a singular form begins with a vowel, then the preradical is the same vowel (long or short), followed by the same consonant, followed by the glottal stop (Andrzejewski 1969 p.65). (This is the case of words such as *ad'adag* given above in (17)). He mentions further that, despite these observations, there are a number of exceptions. These formulations, along with the exceptions, have been further analysed by (Banti 1988) who reduces adjective reduplication to the three types listed above and which he describes as follows:

(19)

In the first type the reduplicative segment is distinctly Caa-, i.e. the first consonant of the stem followed by long aa; it occurs only with dheer 'long' and weyn 'big'. In the other two types of reduplication, whose distribution with respect to each other has not been cleared yet, what is repeated is the first CV(V/G)C and, respectively, the first CV(V/G) segment of the stem; in this second type the subsequent consonant is geminated whenever phonologically possible...

(Banti 1988 pp.212-213)

The observations of both Andrzejewski and Banti are founded on the segment being the basis of prosodic structure. In the model proposed here it is the mora which is the basis of prosodic structure. In the model proposed here it is the mora which is the

basis of prosodic structure and this prosodic basis allows for the proposal of a simple account of the prosodic aspects of reduplication.

In their unpublished article *Prosodic Morphology* McCarthy & Prince (1986) develop a theory of reduplication which draws particularly on ideas of reduplication processes in Marantz 1982 and on the ideas of moraic representation. The essence of McCarthy and Prince's theory is that reduplication is the result of appending a prosodic constituent²⁸ to the form to be reduplicated. The string of melodies is then copied along with all the prosodic structure which is subordinate to the reduplicative constituent (see McCarthy and Prince 1986 p.102). Following this the melodic string, along with the copied prosodic structure is associated with the reduplicative prosodic constituent according to universal and language specific rules of association.

Returning, then, to the Somali case the prosodic matters relevant to the reduplication process are summarized in the following statements.

- a) The reduplicative affix is always a full syllable with an onset and a syllable final consonant;
- b) The base-affix boundary is opaque to the onset creation rule, ie. in cases in which the stem begins with a vowel the onset for the reduplicative prefix is not the final consonant of the prefix, but a glottal stop which is inserted immediately before the vowel of the adjective stem (eg. [ʔ]ad'adag < adag this is in contrast to the unattested form *[ʔ]adadag without the medial glottal stop);
- c) The reduplicative prefix vowel is the same length as that of the initial syllable of the simple form.

In order to account for these characteristics the assumption will be made that the prosodic constituent which makes up the prefixal reduplicative affix in Somali is a syllable node which is subsequently satisfied to the fullest extent. The matter of what constitutes satisfaction to the fullest extent is made on the basis of the Somali data and the work of McCarthy and Prince 1986 who, for the language Ilokano, propose the following.

We propose that the target is simply s; given a copy of the bare melody, it satisfies itself to the fullest extent allowed by the usual rules of the language.

McCarthy and Prince 1986 p.5

It must be made more clear, however, what is precisely meant by "to the fullest extent". At first sight this means that in the process of syllabification the largest number of

segmental melodies possible become associated with the syllable node. However, in the model proposed here, and in McCarthy and Prince 1986, the entities which are counted are prosodic entities, which at the lowest level are moras. Furthermore a margin creation rule has been proposed here which, as part of the syllabification process, deletes the mora node associated with consonant melodies which follow the vowels which form the nucleus of syllables. Thus in order for such a consonant to be counted as part of "satisfying a syllable to its fullest extent", as is required given the Somali data, it must be possible to count the segment. Since only prosodic entities may be counted, that melody must be associated with a prosodic entity, specifically with a mora at the stage at which reduplication occurs. Thus, the process of reduplication must be assumed to occur prior to the application of the margin creation rule. Indeed, it must be assumed that the process of reduplication applies prior to the onset creation rule, otherwise the mora associated with the melody of the segment which surfaces as the final consonant of the reduplicative prefix would be deleted by the onset creation rule prior to its being copied as part of the reduplication process.

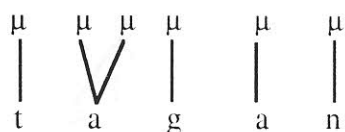
The process of reduplication will therefore be assumed to be a specific instance of syllabification characterized by the addition of a syllable node to the left-hand edge of the base string (See also Orwin 1994 pp.239-240). Following this, the general process of syllabification, as outlined above, takes place. It is important to note, however, that syllabification occurs in the prefix and base form independently. This is what accounts for the fact that the stem-prefix boundary is opaque to the onset creation rule. This is one of two possibilities mentioned by McCarthy and Prince 1986 (see p.16) the other possibility allowing syllabification across the prefix-stem boundary.

Note that the matter of the vowel length in the reduplicative prefix being the same as that of the simple form is explained by the fact that the mora tier is copied with the melodic information since the mora tier is subordinate to the prosodic constituent of the reduplicative prefix which is a syllable. The mora tier encodes the length of the vowel. Thus if the vowel is long two moras are associated with the copied melody, whereas if the vowel is short then only one mora is associated with it.

To demonstrate these points the derivation of the word **taagtaagan** from **taagan** will be given below.

The underived representation of **taagan** is:

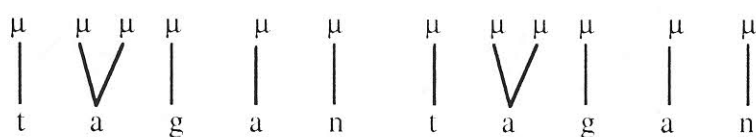
(20)



The initial step in the reduplication process then appends the syllable to the left-hand edge of the simple form and copies the string of the simple form.

(21)

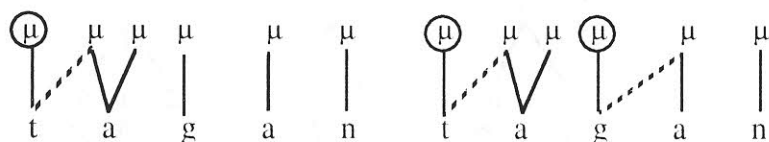
σ



Following this the onset creation rule applies.

(22)

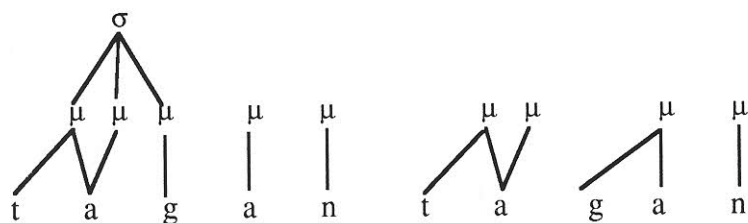
σ



Note that the onset creation rule does not apply to the **g** in the reduplication of the simple form because of the specific nature of the syllabification process here. That is to say, since it is an instance of reduplication, then the syllabification applies once since there is only one syllable node with which the moras of the copied string may become associated. The fact that it applies at the left-hand edge of the form is due to the fact that it is prefixal reduplication.

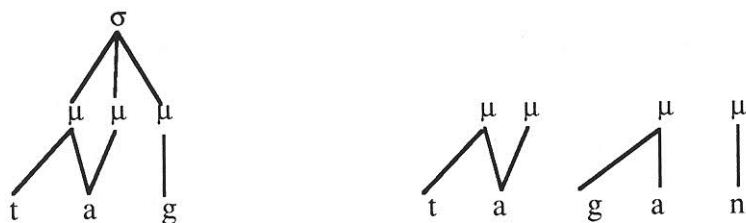
Following this the syllable associates with the maximum number of moras possible; the syllable satisfies itself to the fullest extent.

(23)



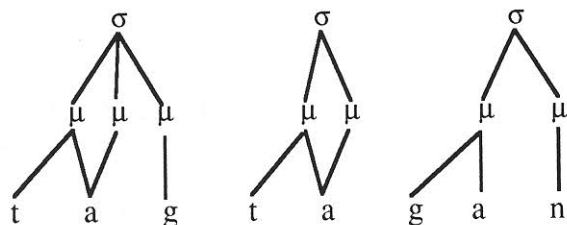
Melodic material which is then unassociated with the syllable node is deleted.

(24)



Whilst this specific syllabification occurs the rest of the string is also syllabified according to the syllabification process set out above. Note the prefix and base are syllabified separately and then surface as one syllabified string.

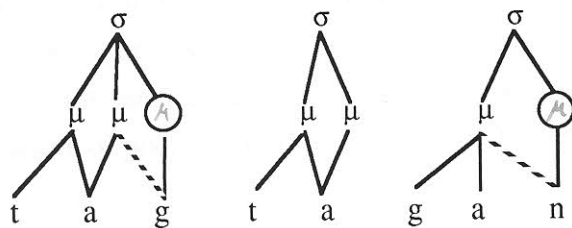
(25)



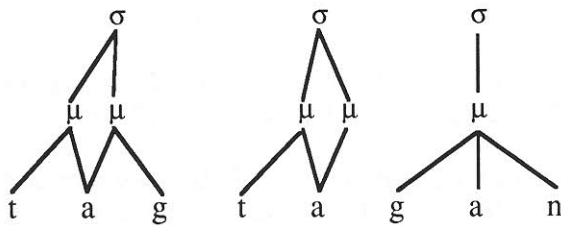
It is only following all of these parts of the syllabification process that the margin creation rule may apply resulting in the surface form given in (26b).

(26)

(a)



(b)



This concludes the discussion on the prosodic aspects of reduplication. The details of the exceptional behaviour of the forms *waaweyn* and *dhaadheer* will not be discussed. Neither will the matter of the examples given in (17c). It is assumed that the only difference between the examples in (17b) and (17c) is that the potential consonant clusters in potential reduplicated forms in (17c) are not allowed in Somali. The details of this matter will not be discussed here. The prosodic facts are nevertheless explained in the same way as the facts pertaining to the examples in (17b).

Having discussed the matter of prefixal reduplication the matter of the stage at which the margin creation rule applies may be returned to. The assumption is made here that the margin creation rule as given in (14a) above is the final part of the syllabification process. That is to say it occurs following all other aspects of syllabification.

3. Conclusion

In this paper a model of the prosodic phonology of Somali has been proposed on the basis of the ideas put forward by Hyman 1985, Hayes 1989 and McCarthy and Prince 1986. The model is based on the mora as opposed to the segmental timing slot and a process of syllabifying underived strings into surface strings is proposed. A number of prosodic phonological phenomena are explained using the model including the behaviour of diphthongs and the prosodic facts of prefixal reduplication. It is hoped that this model also proves to be useful in the explanation of further prosodic aspects of Somali phonology such as the suffixal reduplication in the plural formation of Saeed's declension four nouns²⁹. Other aspects for which it is hoped the present model may provide the basis of an explanation are prosodic phonological phenomena with a wider domain, such as the domain of spreading of vowel frontness referred to above and the nature of poetic prosodic units greater than the syllable.

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¹ For a full set of references to works by these two authors, most of which appeared in the Somali newspaper *Xiddigta Oktoobar*, see Johnson (1979).

² This segment, on the surface, is an affricate. It is assumed, however, that its underived representation is a voiceless palatal stop given the fact that it patterns with the other voiceless stops, (see Orwin 1993 p.252).

³ Note that the vowels in Somali are generally referred to as two series one of which is a fronted series (see: Andrzejewski 1955, Armstrong 1934,

Farnetani 1981). In the present paper the difference in quality of these vowel series plays no apparent role, thus this quality will not be referred to in the representation of the segments. Note that this is not to suggest that the prosodic nature of Somali has no bearing on the behaviour of fronting in Somali. Indeed, it has been shown in Andrzejewski 1955 that the quality of fronting may spread in a string of segments, although the precise nature of the domain of this spreading has not been investigated. It seems likely that the nature of the prosodic representation of strings of segments in Somali plays a role in this. Thus the model proposed here may hopefully lead to development in understanding of this aspect of vowel fronting.

⁴ See for example Clements and Keyser 1983 and Hayward 1988.

⁵ This symbol is used by Hayes (1989) and also by Pillinger (1989).

⁶ It is this matter which is one of the important distinguishing characteristics when comparing Hyman's model with Hayes' model in which only consonants which are geminates are associated with a mora node in underived representation.

⁷ Vennemann 1988 mentions the Central Australian language Aranda (following Davis 1982) stating that the assignment of stress is dependent on the presence or absence of a syllable onset. This matter is noted here, but is not regarded as being detrimental to the arguments proposed here for the Somali facts.

⁸ Note the glottal stop at the beginning of this word is on the surface only.

⁹ The declensions referred to as D1, D2 etc are those given in Saeed 1987. It may be that a more economical way of referring to this set of nouns is possible but this matter will not be discussed here. It does not have any bearing on the prosodic aspects discussed here.

¹⁰ See the bibliography in Johnson 1979 for a full set of references to these articles.

¹¹ See Johnson 1979, 1984, 1988.

¹² It is not possible here to go into the details of the Classical Arabic system of metre. See Prince 1989 pp.68-79 and Wright 1859 Vol. 2 pp.358-368 for further details.

¹³ Note that there are cases in which diphthongs are associated with only one mora. We return to this matter below.

¹⁴ In formal terms this means they are all specified SONORANT in the system of melodic representation proposed in Orwin 1994. Consonants on the other hand are all represented by the feature CONSONANTAL (nasals and liquids are specified for both features).

¹⁵ Note that this sonority hierarchy in the model developed in Orwin 1994 is based more formally on melodic characteristics of the segments as represented in the system of distinctive features discussed in that work. In the present work the hierarchy is set up informally referring to the segments themselves. This, however, has no particular bearing on the arguments discussed here.

¹⁶ There is a very small number of cases which do not fit into this model as proposed here. The two words *wufuud* "delegates" (plural of *wafdi* "delegate") and *wuqiyaad* "ounce (measure of weight)" are regarded as exceptions due to their marked status as Arabic loan words. The case of the words *yib* "a game" and *Yibir* "itinerant hunter and pedlar social caste" is, however, more difficult to resolve. In Orwin 1994, the matter is resolved by assuming the initial *y* in these cases to be a melody which does have consonantal characteristics in terms of the root node

17 Bisyllabic nouns only will be referred to here, since the examples the author has found have all been bisyllabic nouns, that is to say the author is not aware of any nouns ending in an open syllable diphthong which are greater than two syllables. It is highly likely that the matter under discussion here with regard to bisyllabic nouns is applicable to multisyllabic nouns in general but given the lack of examples bisyllabic nouns only will be referred to here. Should it prove to be the case that such multisyllabic words with more than two syllables are present in the language the general conclusions arrived at here will not be invalidated, the formalism in (14b) will merely need to reflect multisyllabicity rather than bisyllabicity. The matter of whether monosyllabic words which comprise diphthongs, such as *ey* "dog" may be monomoraic or bimoraic, that is to say whether they may undergo the specific instance of the margin creation rule under (14c) will be left open here, since it would require much work on a large corpus of poetry to ascertain the facts.

18 Note it is not just diphthongs which behave in this manner. Johnson 1984 gives details of other bimoraic sequences which may be counted as monomoraic. These are the singular subject pronouns *-aan*, *-aad* and *-uu*, the mood classifier *waa* and the focus marker *baa*, the conjunction *iyo*, the definite article *-kii* / *-tii* and the subordinate negative marker *aan* (see Johnson 1984 p.318).

19 Note that this noun also has the following plural form: *badowyo*
(f.).

²⁰ The rule of accent assignment for these cases is as follows

*

•

 $\mu]$

noun, feminine, D1, D2,
D3

²¹ No reference need be made to melodies with a sonority index of 1 here, since the margin creation rule will already have applied to all such cases.

22 Note that what would determine whether the rule applies is the whole line (or half line in some instances) of poetry. It is not known in lines with more than one such diphthong which of the diphthongs would be regarded as light and which as heavy and this matter is left open for future research.

²³ It is assumed here that there are only two levels in the Somali lexicon. The derivational level, level I and the inflectional level, level II.

24 Further evidence in favour of the inflectional diphthong endings not undergoing the margin creation rule is the fact that accent is assigned to the final part of a diphthong in the reduced paradigm, for example: *Wíilka báa cunǵ* 'The boy ate it' in which 'the boy' is focussed. The accent may only occur with this melody on the surface if the melody is associated with a mora to which the accent may be assigned. This particular verb paradigm is used when the subject of the verb when it is in a main clause is focussed or, in relative clauses, when the antecedent of the clause is the subject of the clause.

25 Hyman actually says "bisyllabic (or longer) words" (Hyman 1981 p.
172 footnote 2).

26 The qualification "whenever phonologically possible" is to account for examples such as *jajaban* in which the second *j* is not a simple consonant because geminate **jj* is not allowed in Somali.

27 Note that the example given by Andrzejewski under (c) is *gawgawracan*. Banti states of this that it may be a misspelling of *gawggawracan* and therefore an instance of reduplication of the third group in Banti's table given here in (17).

28 The possible prosodic constituents are: prosodic word, foot, syllable, light (monomoraic) syllable, heavy (bimoraic) syllable and core syllable (a syllable of the shape CV or V in languages which allow such syllables), (see McCarthy and Prince 1986 pp.7-8 for further details).

29 These are nouns such as the following: *koob* "cup", *koobab* "cups"; *af* "mouth", *afaf* "mouths" etc (see Saeed 1987 p. 123).