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IN DEFENCE OF THE SKELETAL TIER*

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This paper investigates empirically the viability of a hypothesis (advanced by Lowenstamm & Kaye [1986]) that morphological classes (in particular, those typical in languages with nonconcatenative morphologies) are fully definable in terms of syllabic structure. This hypothesis has theoretical significance, for, if correct, the skeletal tier—generally regarded as a core object in autosegmental phonology—becomes a derivative and, consequently, redundant entity. Data from four Ethiopian Semitic languages are presented as evidence that it is not always possible to posit unique syllabifications for morphological classes and that underlyingly many such classes are only partially syllabified, full syllabifiability being secured by processes occurring later in the derivation. Analyses are proposed for the data, which demonstrate the necessity for a non-derivative skeletal tier.

1. The Skeletal Tier vs. Syllable-Based Templates

For the past eight or so years a substantial portion of the success that has been enjoyed within Autosegmental Phonology has been due to the recognition of the "CV tier". The CV tier (or some functionally similar entity—see section 2) serves within a multitiered phonological representation as

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the base to which elements of otherwise mutually independent tiers are associated. It has, then, a mediating role in interrelating reciprocally autonomous tiers. The most important aspect of such a function is that the CV tier furnishes the programme for temporal coordination within phonology, and for this reason the CV tier is often referred to as the "timing tier". Referring all matters involving phonological timing to the CV tier (rather than treating them as properties of segments) has provided satisfying solutions for such longstanding problems as the analysis of vowel and consonant length and the analysis of complex segments of various sorts. Most recent literature on the subject has been at pains to point this out. For a particularly clear overview see Clements [1986].

A number of arguments justifying the recognition of the CV tier are advanced by Clements and Keyser in Chapter 3 of their 1983 monograph. Their first argument (pp. 64-66) is based upon McCarthy's extensions of the principles of Autosegmental Phonology to handling the problems of non-concatenative morphology of the type commonly (though not exclusively) found in Semitic languages [McCarthy 1979, 1981, 1983]. For the present purpose it is not necessary to go beyond this first argument, for it is precisely on account of purportedly simpler analyses that have recently been advanced for problems of this type that the CV tier has been declared redundant.

The essential insight of McCarthy's model consists in distinguishing three morphemic elements at the level of phonological representation for stems exhibiting non-concatenative morphology:[1]

(i) The "Consonantal Melody": In Semitic languages this consists of two, three, or four consonants bearing the basic lexical identity of the root.

(ii) The "Vocalic Melody": In Semitic languages this consists of one or more vowels which together with the "prosodic template" bear grammatical (and sometimes lexical) information.

(iii) The "Prosodic Template": This defines the canonical shape of a given stem form in terms of C and V elements.

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[1]"Non-concatenative morphology" is morphological structure exhibiting discontinuity, infixation, etc.

It is not possible simply to recognize only a consonantal skeleton within which vowels are interdigitated any more than it is possible to posit a basic vocalic skeleton between the elements of which the various components of the consonantal melody are slotted. The reciprocal discontinuities of consonantal and vocalic melodies require the intermediation of the prosodic template because both melodies give evidence of having autosegmental status. For example, each of them is independently subject to principles governing autosegmental entities.[2]

The linking of elements of the two melodic tiers to the C and V elements of prosodic templates is accomplished for the most part by means of conventions of association that within the theory of Autosegmental Phonology are conceived of as belonging to Universal Grammar, so that language specific rules are kept to a minimum. For a general account of this the reader is referred to van der Hulst and Smith [1985:11-29].

In a recent paper, however, Lowenstamm and Kaye [1986] have argued that the CV tier is redundant since its function can be adequately performed by the syllabic structure, which, of course, has often been conceived of as an independently necessary autosegmental level (cf. Clements and Keyser [1983], Halle and Vergnaud [1980]). The essential premise for Lowenstamm and Kaye's argument is their assumption that phonological representations have full prosodic, i.e. syllabic, structure from the outset. This assumption is one which has been advanced in earlier publications of theirs (see in particular Kaye & Lowenstamm [1982]). Since in the analysis of very many languages there is a considerable degree of mismatch between phonological and phonetic structures as far as syllabification (or, indeed, syllabifiability) is concerned, the claim that phonological representations have full prosodic structure needs to be explained. For example, we expect processes such as epenthesis to create prosodic structure that does not exist at a more underlying level. Lowenstamm and Kaye's claim is made possible by positing null elements in the prosodic structure of phonological representations: prosodic

[2]For example, both consonantal and vocalic melodies are independently subject to the Obligatory Contour Principle.

structure is erected fully with the inclusion of null elements at those nodes of structure where they are required, i.e. at sites where epenthesis will occur.[3]

In spite of appearing to create an enormous degree of redundancy with respect to lexical entries, such an approach promises high dividends as far as epenthesis is concerned since it would enable us to dispense with the multifarious detail of language specific and context sensitive rules, replacing them by a maximally simple characterization of the process, which would be made available by Universal Grammar, viz. *Insert Segment* [Lowenstamm & Kaye 1986:102, 7ii].

An illustrative example would be provided by the East Cushitic language Arbore, which exhibits a process which we may refer to as "post-laryngeal epenthesis". An epenthetic copy of a single vowel preceding a laryngeal (h , ʔ) is inserted after the latter when it is followed within a word by any non-glottalized obstruent or a nasal, e.g.

(1) /leh-t-aw/ → [leḧetaw][4] 'my ewe'
ewe-fem.-1st sg. possessive

(2) /seʔ-t/aw/ → [seʔẹtaw][4] 'my cow
cow-fem.-1st sg. possessive

The same language displays another process which may be labelled "I-epenthesis", which occurs at the juncture of a sequence of two (dissimilar) consonants with a third consonant or at a word boundary, e.g.

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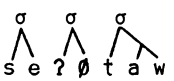
[3]Epenthesis is not the only means whereby null elements may be resolved. The other means which is specifically mentioned by Lowenstamm and Kaye is resyllabification [1986:101ff.]. Although Lowenstamm and Kaye adopt the idea that epenthesis involves the substitution of a null element in the prosodic structure by a real segment, the proposal is not without precedents. The idea can be traced back to an unpublished paper by Halle and Vergnaud [1978], and is also made use of in work by Selkirk [1981]. A comprehensive survey of the notion of null elements and related issues in syllable theory is furnished by Itô [1986].

[4]Diaresis under a segment symbolizes breathy phonation (according to IPA usage). A single dot under a vowel letter symbolizes laryngealization.

(3) /daNf-t-e/ → [daŋfɪtɛ] 'it boiled'
boil-fem.-perfect

(4) /daNf/ → [daŋfɪ] 'boil!'

Rules that might be proposed for these processes would probably need to refer to the specific syllable structure constraints of the language and (in the case of the first process at least) to particular features of segments in the environment. In other words, the essential similarity of the two processes could hardly be expressed without reference also to certain presupposed or attendant factors. Under the proposal made by Lowenstamm and Kaye, however, the quintessential generalization is given straightforward expression. Thus, appropriate underlying representations for [sę?ętaw] 'my cow' and [daŋfitɛ] 'it (feminine) boiled' might be as follows:

(5)


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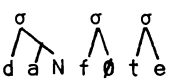

In both cases the null elements (Ø) in the underlying prosodic structure come to be "associated with" ("replaced by" ?)[5] an epenthetic segment. The simplicity and generality of all this is very attractive.[6]

The redundancy inherent in distinguishing a two-term vocabulary of C and V in the skeletal tier has been criticized on several occasions (see Levins [1983], Archangeli [1984]), and the analyses presented in the second part of this paper give recognition to that criticism. For the present purpose, however, whether the skeletal tier contains differentiated C and V elements or

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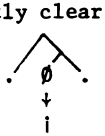
[5]It is not exactly clear to me what is implied by diagrammatic representations such as



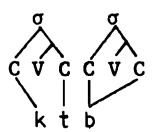
(cf. Lowenstamm and Kaye [1986:101]; cf. also (18), (34), and (36) in the present paper, which are based on the original diagram).

[6]If such a proposal proved to be properly motivated, it would further enhance Archangeli's insightful suggestion that epenthesis inserts segments that from the point of view of distinctive content (within a given language) require the absolute minimum of specification (cf. Archangeli [1984:58]).

not is irrelevant; the real question is whether the skeletal tier itself is a redundancy, for if underlying canonical shapes can be defined fully by means of prosodic structure, where this is provided with a suitably constrained device of null elements, any form of skeletal tier will be unnecessary.

The relevance of this issue comes very much to the fore in the analysis of morphology of the Semitic type. Lowenstamm and Kaye report McCarthy as saying that the representation of his prosodic templates in terms of elements of the CV tier or in terms of elements of syllable structure were simply notational variants. They deny, however, that this is the case. They pinpoint the difference by envisaging a "Semitic hybrid" having an Arabic-type prosodic template of the form CVCCVC but incorporating the possibility of a certain type of branching onset for syllables, which is a feature permitted by Modern Hebrew (though not by Arabic). In such a language a triliteral radical such as k-t-b might license only one syllabification (as in (7)) whereas a radical such as s-b-r would be syllabifiable in two ways (as in (8) and (9)) on account of the fact that the sequence br is a permissible onset cluster, and given the markedness hierarchy for syllables in Modern Hebrew, (9) would present a less marked option than (8).

(7)



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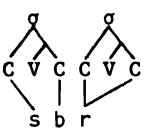
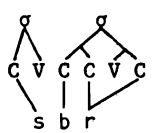


(9)



What the argument demonstrates is that in terms of the CV tier the potential for ambivalence for syllabification with a radical such as s-b-r is simply not captured and, furthermore, that since the prosodic structure *on its own* does capture it, the CV tier is unnecessary. Clearly McCarthy was incorrect in supposing that the two ways of representing prosodic templates were notational variants. But whether the ability to express such a distinction as

that illustrated by the hypothetical language example will make for any greater overall insight may not necessarily be the consequence. Among the languages to be considered below is one which exhibits a situation closely akin to that elaborated by means of the hypothetical language, but it will be concluded that in this case a significant generalisation would have to be forfeited by an insistence that prosodic templates be defined syllabically.

Lowenstamm and Kaye [1986:122] then proceed to propose the following principle ("Principle (55)"):

> "Morphological classes defined canonically must observe syllabic homogeneity."

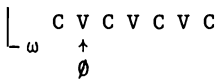
The full context of the article makes it abundantly clear that when speaking of "morphological classes" the authors are referring to entities of the type for which McCarthy (and subsequently others) have taken over the term binyanim from traditional Hebrew studies cf. sg. binyān , pl. binyānîm). The terms imposed by "Principle (55)" are very restrictive. The principle requires a unique syllabification for all members of a particular morphological class (hereafter abbreviated MC).[7] As its proposers point out, the principle makes predictions as to how a process such as epenthesis will operate for a given MC. The operation of epenthesis with respect to certain MC's of Arabic (discussed in McCarthy [1982]) is adduced as support for the principle. Defined in terms of the CV tier the MC's in question have in common the fact that they begin with the sequence CC: they are CCVCVC, CCVVCVC, and CCVCCVC. Lowenstamm and Kaye (pace McCarthy) note

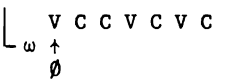
> "...that the initial consonant is resyllabified as the coda of the preceding syllable when the stem follows a vowel-final word or prefix. ... Now consider the case where no vowel precedes the CC-initial stem. Since Arabic has no branching onsets, epenthesis must occur. But where?
>
> "In fact, the vowel is inserted before the CC-cluster. It could have been inserted between the two consonants. Principle (55) predicts

[7]It seems clear that since in Lowenstamm and Kaye's theory units of skeletal structure are, in fact, syllables which dominate various sets and configurations of segmental terminal points, a conclusion such as that embodied in Principle (55) is quite inescapable.

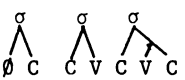
> this state of affairs; if the vowel were inserted to the right of the first consonant, i.e., CiC- instead of iCC- , the initial consonant would constitute the onset of the first syllable; while in all other cases, this consonant occupies a coda position." (p. 123)

The point is made very clearly; a MC defined in terms of the CV tier is neutral with respect to where epenthesis will occur. If we consider the case of the CCVCVC template the potential violation of the syllable structure constraint in Arabic against branching onsets would be obviated just as well by the epenthesis in (10) as by that in (11).

(10) 

(11) 

A syllable-based definition of the same MC (making use of a null element in a nuclear position), as in (12), predicts only one possibility for epenthesis, and so provides a more adequate grammar.

(12) 

The behaviour of epenthesis in Arabic then certainly appears to come out in support of Principle (55). I believe, however, that this is purely fortuitous. This opinion rests upon the fact that in some languages having the same type of morphology as Arabic there are epenthetic processes which simply do not permit us to posit a unique underlying syllabification for a MC.

The data to be considered come from certain Semitic languages spoken in Ethiopia, namely, Amharic, Chaha, Tigrinya, and Harari.

1.1. Case 1: The Amharic Jussive (Type A) Stem. Comparison of surface forms of the affirmative paradigms of the Imperfect and Jussive show that the latter lacks forms for the second person.[8] The paradigms presented are those

[8]The main function of the Jussive is the expression of indirect commands and (when interrogative), requests for permission. Triliteral verbs in Ethiopian Semitic belong to two main classes, which have commonly been referred to in the literature as Types A and B. The division goes back to the protolanguage, where the characteristics of the two classes (represented by s-b-r

of the triliteral (Type A) radical z-f-n 'dance'.

(13)	Affirmative Imperfect		(14)	Affirmative Jussive	
	'I (etc.) dance'			'let me (etc.) dance!'	
	1s	ɨzäfnallähu		1s	lɨzfän
	2ms	tɨzäfnalläh		2ms	
	2fs	tɨzäfňallääš		2fs	
	3ms	yɨzäfnall		3ms	yɨzfän
	3fs	tɨzäfnallääč		3fs	tɨzfän
	1p	ɨnnɨzäfnallän		1p	ɨnnɨzfän
	2p	tɨzäfnallaččɨhu		2p	
	3p	yɨzäfnallu		3p	yɨzfänu

The affirmative paradigm of the Imperative given in (15) could also be regarded as defective, since it has only second person forms.

(15)	Affirmative Imperative
	'dance!'
	2ms zɨfän
	2fs zɨfäňi
	2p zɨfänu

To "fill the gap" in the paradigms of (14) and (15) by merging them is an obvious move and one which gives recognition to the long established practice of scholars of the language (cf. Cohen [1936:179], Dawkins [1960:26]).

The claim that Jussive and Imperative forms make up a single paradigm

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'break' and f-s'-m 'finish') have been reconstructed as follows [Hetzron 1972:22ff.]:

	Perfect	Imperfect
Type A	*säbärä	*yɨsäbbɨr
Type B	*fäs'säma	*yɨfes'ɨm

Subsequent developments in the two main groups of Ethiopian Semitic, i.e. North Ethiopic (the group to which Tigrinya discussed as Case 3 in this paper belongs) and South Ethiopic (the group to which the remaining languages discussed here belong), have obscured some of the original features, but the classes have nevertheless remained distinct throughout much of their paradigms.

would lead us to expect the stem to constitute a single unitary MC. This explanation holds very obviously for other paradigms such as the Perfect, where each verb type seems to present an invariant stem form. (In the following examples the canonical shapes are presented in an informal way.)

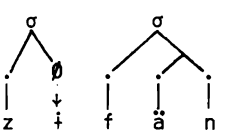
(16)

triliteral		quadriliteral
Types A & B	Type C	
$C_1äC_2C_2äC_3$-	$C_1aC_2C_2äC_3$-	$C_1äC_2äC_3C_3äC_4$-

But an examination of (14) and (15) reveals stem allomorphy, viz. -zfän- ∿ zɨfän- (*ɨzfän) . If we assume that the stem form (defined in terms of C and V) is CCVC, the longer alternant can be accounted for by means of epenthesis. Amharic syllabic structure permits no branching onsets (cf. Part II, Case 1.). In affirmative Imperative forms, where a CC cluster might otherwise occur initially in the word (and syllable), epenthesis operates to split the sequence. To handle this alternation with reference to syllable structure would require us to define the stem shape with an onset consonant initially, as in (17). The surface alternant zɨfän would be derived as in (18).[9]

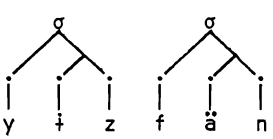
(17)

(18)



The prefixed forms, however, would require the initial stem consonant to belong to the coda, viz.

(19)



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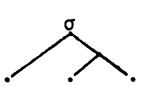
[9]In representing the CV skeleton as a series of dots in this section of the paper, I am simply following the practice of Lowenstamm and Kaye, viz.



Now the ɨ in yɨzfän can itself be regarded as epenthetic, for comparison of the forms of this same morpheme show the ɨ to be in alternation with zero, e.g

(20) yɨzäfnall 'he is dancing'
ayzäfnɨmm 'he is not dancing'

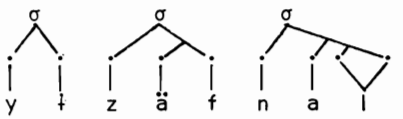
Furthermore, in the form

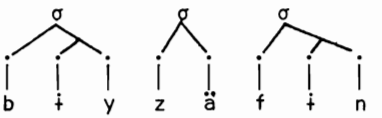
(21) b[ɨ˙]zäfɨn (← bɨyzäfɨn ← b-y-zäfn)
if he dances

we find further complications: (i) there appears to be a third alternant of the 3ms prefix, [ɨ˙] , which derives from an epenthetic ɨ preceding the y- (by a late phonetic rule the two segments undergo coalescence); (ii) there is an alternant for the Imperfect stem, i.e. zäfɨn . This alternant is also accounted for by epenthesis. Although Amharic word structure does permit syllables with multiply-branched rhymes in final position, Amharic syllable structure does not allow this kind of rhyme structure when the ultimate segment has greater sonority than the penultimate one. Once more epenthesis saves the day! If, however, we attempt to define the Imperfect stem in a syllable-based way, we again find that the final consonant behaves sometimes as an onset (22) and sometimes as a coda (23).[10]

In section 2 I represent the Skeletal Tier employed there as a series of X slots. The distinction, however, is not simply one of graphic notation. Lowenstamm and Kaye's dots are totally derivative since each one corresponds to a terminal node of prosodic structure. Furthermore, their contention is that if this proves always to be the case (and they stress that this is an empirical issue), then the Skeleton, in whatever way it is symbolized, is redundant. In the representations used in section 2 some X slots occur that do not correspond to terminal nodes of prosodic structure and are, therefore, not derivative.

[10]One suspects that exactly the same ambivalence with respect to syllabic categories must also arise in the Arabic examples discussed by Lowenstamm and Kaye [1986:123] since the addition of a vowel-initial inflection to a consonant-final stem would automatically require resyllabification of the final consonant. Thus, a template such as CCVCVC with the prosodic structure hypothesized in (12) would presumably take a vowel-initial suffix such as -u(n) , -o , etc. in the 3(m)p, and then resyllabification would be neces-

(22) 

(23) 

Elsewhere I have attempted to demonstrate that the overwhelming majority of occurrences of the high central vowel ɨ in Amharic have to be regarded as epenthetic [Hayward 1986]. The important thing about this process is that it scans word-sized[11] strings of segments rectifying any prosodic deficiencies by the creating of syllable heads but without any regard to predesignated prosodic categories, e.g. onset or coda, of stem consonants.

Of course, the initial identification of the Imperative and Jussive as one MC might be objected to; after all, the Imperative forms not only have a different stem shape, they also differ from Jussive forms in having no prefixes. Inspection of the following Negative Imperative forms shows (i) the presence of prefixes throughout and (ii) the same stem alternant, viz. -zfän- , as that found in the affirmative Jussive.

(24) Negative Imperative 'do not dance!'

2ms	attɨzfän	2p	attɨzfänu
2fs	attɨzfäňi		

Consideration of other verb types also points solidly to the conclusion that the Imperative and Jussive stems do indeed belong to one MC.

(25)

	Type B 'hide (tr.)'	Quadriliteral 'overturn'
3ms Jussive	yɨdäbbɨk'	yɨgälbɨt'
2ms Imperative	däbbɨk'	gälbɨt'

1.2. Case 2: The Chaha Jussive II Stem. According to Leslau [1983], there are two Jussives in Chaha.[12] One of them has the generalized stem shape

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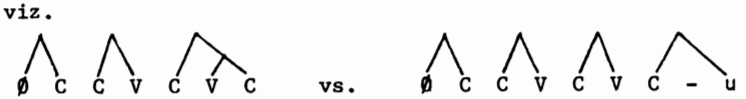
sary, viz.



[11]By "word-sized" I mean that such strings are morphologically complete, even if only partially syllabifiable.

[12]Chaha is one of the more important and better studied of the "Gurage"

$-C_1C_2\ddot{a}C_3-$ and is virtually confined to intransitive verbs. The other one (here termed Jussive II), which is found for all other simple triliteral verbs, has two stem shapes, viz. $-C_1C_2\dot{+}C_3-$ and $-C_1\dot{+}C_2C_3-$. In his original descriptions Leslau [1951a, 1951b] presented these two as distinct types, but in his later accounts [1964, 1983], he provides a wealth of data to justify his analysis that the two forms are in complementary distribution. Quite clearly the variability relates to the position of the $\dot{+}$ vowel, and, as Leslau shows, this is determined by phonetic features inherent to the consonant radicals. In section 2 I try to motivate an analysis of this stem based on syllabification procedures and epenthetic processes which have a high degree of sensitivity to the relative sonorities of the root consonants. Typical (3ms) forms of Jussive II exhibiting the two stem shapes are given in (26).

(26) 3ms Jussive II forms

a. yä-$C_1C_2\dot{+}C_3-$		b. yä-$C_1\dot{+}C_2C_3-$	
yägf+r	'release'	yäs+rt	'cauterize'
yäk'β+r	'plant'	yät+rx	'make incision'
yäkm+r	'pile up'	yäd+rg	'strike'
yäft'+m	'block a hole'	yäf+rm	'break bread'
yäg+m*	'bleed (tr.)'	yäg+mt'	'chew off'
yät'+β*	'wash something'	yäk'+ms	'taste'
yäs+β*	'think'	yäd+md	'join'
yäsd+β	'curse (tr.)'	yät'+βk'	'be tight'
yäfk'+d	'permit'	yät'+βs	'fry (tr.)'
yänf+g	'be mean'	yäg+df	'break a fast'
yänk'+s	'limp'	yäd+fk'	'soak a cloth'
yätk+s	'kindle (tr.)'	yäk+ft	'open'
yänf+s	'blow (of wind)'	yäk+tf	'cut up meat'

(An effort has been made to select verbs displaying a wide range of consonant types in the C_2 : C_3 sequences. This has necessitated

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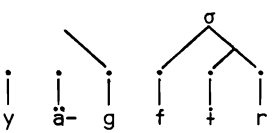
languages. According to Hetzron's classification of Ethiopian Semitic, Chaha belongs to the Central Western Gurage group of his Outer South Ethiopic division [Hetzron 1972, 1977].

utilizing some verbs (marked with an asterisk) which on the surface do not appear to be triradicals. At a more abstract level of representation, however, I would claim that these verbs have indeed to be analysed as triradicals. The analysis of parallel forms to these which are found in Amharic is taken up in Alemayehu Haile and Hayward [in preparation].)

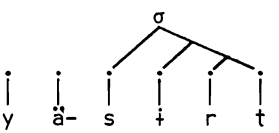
Without entering into details (which are taken up in section 2), it can be seen that in the forms of (26a), C_3 has a greater sonority than C_2, while in the forms of (26b) this is not the case.

Assuming Leslau to be correct in setting up a single MC for forms such as those presented in (26) obliges us to relinquish any insistence on syllabic homogeneity for such classes. The mismatch between the syllable structures of (27a) and (27b) is most striking.

(27) a.



b.



It should be noted that Chaha provides an example of a scenario of the sort sketched by Lowenstamm and Kaye for their "Semitic hybrid", for we have what purports to be a single morphological class with two distinct possibilities for syllabification.

In a synchronic analysis utilizing the CV tier—at least a generative one operating with morpheme invariance—we might seem obliged to choose between (28a) and (28b) when positing a unique underlying morphological template for Jussive II.

(28) a. -CCVC- b. -CVCC-

Expressed in terms of syllable structure, these entities would have to be analyzed as in (27a) and (27b) respectively. It will be noted that in (27a) the initial C has to be syllabified as a coda of some preceding syllable. Now a consideration of syllable markedness might lead us to opt for (28a), since it contains a simpler syllable type, viz. C.CVC, and CVCC syllables are not only universally more marked [Kaye and Lowenstamm 1982], but are recognized as such by Chaha word structure, which tolerates them only finally.

It would not seem possible to derive surface alternants containing the -CVCC- stem without invoking a transformational rule of metathesis. Faced with an analysis requiring recourse to this sort of rule might incline us to drop the analysis of Jussive II as a single MC in favour of one with two MC's, thus reverting to Leslau's earlier analysis.

There is, in fact, another possibility open to us. I believe that it is not only possible but independently desirable to analyze occurrences of the high central vowel ɨ in Chaha verb forms as resulting from epenthesis, just as in Amharic. Thus, we are enabled to set up a unitary morphological template, viz.

(29) -CCC-

A rule of epenthesis, which is sensitive to the relative sonorities of consonants that come to be associated with the last two C slots, derives the two alternants (cf. the case taken up in 2.2). It should be noted, however, that even with ɨ supplied epenthetically, no unique (homogeneous) syllabic structure can be assigned to (29).

1.3. Case 3: The Tigrinya (Type A) Imperfect. The Imperfect stem of the so-called Type A triliteral verbs in Tigrinya poses an interesting problem. An examination of the paradigm of s-b-r 'break' given in (30) (pace Leslau [1941:Tableau VI]) reveals two stem alternants, the shorter of the two occurring whenever an inflectional suffix is added.

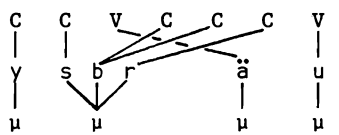
(30) Type A Imperfect

'I (etc.) am breaking'

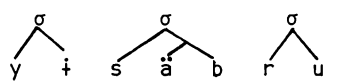
1s	ʔɨsäbbɨr	1p	nɨsäbbɨr
2ms	tɨsäbbɨr	2mp	tɨsäbru(ta)
2fs	tɨsäbrɨ	2fp	tɨsäbra(ta)
3ms	yɨsäbbɨr	3mp	yɨsäbru(ta)
3fs	tɨsäbbɨr	3fp	yɨsäbra(ta)

If we were to assume that the short alternant is closer to the underlying stem form, we should need to derive the gemination of the second radical, which would be an operation for which there would certainly be no motivation

in the phonology of Tigrinya; word forms terminating in sequences of single C + ɨ + C being not at all uncommon. If, however, we start with the longer form and (as for Amharic and Chaha) assume ɨ to be epenthetic, a plausible analysis is available. This means that in terms of C and V the prosodic template would be -CV$\overset{\frown}{C}$CC-.[13] Tigrinya syllable structure permits neither branching onsets nor multiply-branching rhymes; thus given a morphological representation for the 3mp such as

(31) 

a rule degeminating the second radical and the insertion (post-lexically) of ɨ between the prefix and stem would render the form fully syllabifiable, viz.

(32) 

The other alternant preserves the gemination and achieves syllabification by means of ɨ-Epenthesis. (The relationship between degemination and ɨ-Epenthesis as alternative modes of rectifying inadequate prosodic structure is discussed in the case taken up in 2.3).

The stem alternations of the Tigrinya (Type A) Imperfect pose considerable difficulties for "Principle (55)". Making use of the theoretical device of null elements for handling gemination as proposed in Lowenstamm and Kaye's treatment of Tiberian Hebrew and Arabic (see especially pp. 117ff), we may posit a syllable-based definition for this MC such as (33),

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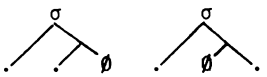
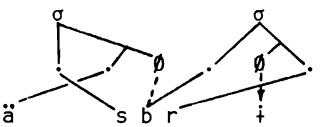
[13] I have made use of a simplified symbolization for gemination here, i.e. as $\overset{\frown}{CC}$. The fuller symbolization appears in example (38). Arguments which justify treating gemination as involving a special configuration on the Skeletal Tier are presented in Hayward [in preparation]. A brief discussion of the matter appears in the present paper in the introductory portion of section 2.

(33) 

and derive the long alternant as in (34).

(34) 

But it would seem likely that whatever means we adopt for deriving the short alternant, we shall not be able in doing it to avoid changing the prosodic categories (onset, coda) for both the second and third radicals.

1.4. Case 4: The Harari (Type A) Imperfect. Like Tigrinya Harari does not permit multiply-branching rhymes; potential violations of this syllable structure condition are avoided by an epenthesis involving the vowel i . According to Kenstowicz and Kisseberth [1979:223-225], who follow Leslau [1958:17ff.], one situation where epenthesis is needed arises in those forms of the Imperfect that lack a (word-final) inflectional vowel, i.e. all members of the paradigm except 2fs, 2p, and 3p. Expressed in terms of C and V, the template for the (Type A) triliteral Imperfect is -CVCC-. In the following paradigm of č'-m-k' 'squeeze' epenthetically inserted vowels appear in phonetic brackets.[14]

(35) Type A Imperfect

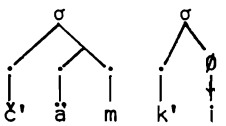
'I (etc.) am squeezing'

1s	ič'ämk'[i]	1p	n[i]č'ämk'[i]
2ms	t[i]č'ämk'[i]	2p	t[i]č'ämk'u
2fs	t[i]č'ämk'i		
3ms	y[i]č'ämk'[i]	3p	y[i]č'ämk'u
3fs	t[i]č'ämk'[i]		

[14]It is not unlikely that the prethematic i in the 1s is also epenthetic. This can be maintained if we posit an underlying X slot for the 1s prefix. This may be linked to the minimally specified consonantal segment, viz. [?] under certain conditions. Leslau [1958:3] does list glottal stop among

The fact that epenthetic i appears word-finally means that throughout the paradigm the stem-final consonant maintains its prosodic categorization as an onset, viz.

(36)



Harari then joins the Arabic case adduced by Lowenstamm and Kaye as evidence for their principle. But what does it amount to? Sometimes the principle holds, sometimes it doesn't. A statistical count of all the available relevant language data might or might not allow us to conclude that non-conformity to Principle (55) was the marked situation; this remains an empirical issue. We are, however, obliged to conclude that since a syllable-based definition for morphological classes cannot be consistently applied, some form of Skeletal Tier is still necessary.

2. Analyses of the Amharic, Chaha, and Tigrinya Cases

In the remainder of the paper I present analyses of the cases in 1.1-1.3 and consider further data from Harari which suggests that the analysis presented in the preceding section is not the entire story.

In the approach we have just reviewed, full prosodic structure is assumed to be present at an underlying level, with the result that an entity such as the Skeletal Tier turns out to be entirely derivative and, in consequence, redundant. The wholly opposite view would, of course, be to start with the Skeletal Tier and, after proper association of consonantal and vocalic melodies, derive prosodic structure by means of redundancy rules. However, given an Autosegmental approach to non-concatenative morphology such as McCarthy's, it does not seem possible that prosodic structure could be made entirely redundant.[15] The differential association of consonantal and vocalic

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the phonemes of Harari, but he does not set one up for the 1s prefix, nor, indeed, for any otherwise vowel-initial situations in words. I leave the matter open here since our concern for the moment is with word-final vowels.

[15]It is presumed, however, that prosodic structure could be erected en-

melodies will require the presence of some differentiating mechanism in the Skeletal Tier. McCarthy's V and C elements, which serve to anchor the vocalic and consonantal melodies, are, by definition, [+syllabic] and [-syllabic] respectively. Such an intrinsic distinction also provides the information required for an algorithm of syllabification. But, as the various examples discussed in Part I will have made clear, there is no guarantee that syllabification will be complete until the entire surface word is derived.

The arguments levelled against a CV skeleton of the type proposed by McCarthy (see Levins [1983:12ff.], Archangeli [1984:183-185]), seem to the present writer to be quite compelling. The main point of the argument is that [syllabic] is not really a distinctive feature in the way that, say [coronal] or [low] are, and that "syllable-headedness", i.e. syllabicity, is expressed by means of the prosodic structure itself. Thus, it is claimed that a skeletal tier in which syllable heads are distinguished will provide just enough information for the association of vocalic and consonantal melodies, and will, at the same time, constitute an embryonic prosodic structure. Accordingly, CV-based morphological templates[16] such as, for example, that of (37a), which defines the Jussive stem for Amharic quadriliteral verbs, will be replaced by a partially syllabified template such as that of (37b).

(37) a. CVCCVC b. $\overset{\mid\ \mid}{\text{XXXXXX}}$

In fact, I would maintain that entities with such a limited vocabulary are not always adequate for the association of autosegmental melodies and that certain cases call for an enrichment of the representation [Hayward, in preparation]. It is marginally necessary to enter into this here because a discussion of the Tigrinya data confronts us with gemination. Let it suffice here simply to observe that geminate consonants are represented as two (non-syllable head) skeletal slots linked to one element of the consonantal melody.

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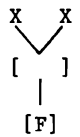
tirely by redundancy rules in languages not operating with distinct consonantal and vocalic melodies: cf. remarks by Levins [1983:22].

[16]Since it is being argued here that prosodic structure may be incomplete at the levels where morphological structure is assembled, it seems preferable to speak of "morphological" rather than "prosodic" templates, which was McCarthy's original term.

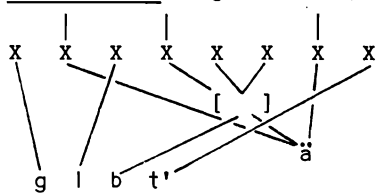
However, rather than achieving this configuration by means of spreading (which presents certain technical difficulties), the two skeletal slots are prelinked to a single "receptor matrix". This is symbolized as in (38).[17]

(38)



Properly associated representations for the Perfect stem of an Amharic quadrilateral such as g-l-b-t' 'overturn' would appear as in (39).

(39) Perfect stem (gäläbbät'-)



The arguments for this mode of representing gemination are too detailed to rehearse here. They appear in full in the paper referred to above.

We return now to an account of the Amharic data presented earlier.

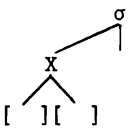
2.1. Case I: The Amharic Jussive (Type A) Stem. In an earlier paper [Hayward 1986] I discuss a number of issues concerning Amharic syllable structure, but for the present purpose it is only necessary to note that there are no complex onsets in the language. This point, however, needs some clarification since there are many instances of word-initial (and hence syllable-initial) consonant + w sequences, e.g.

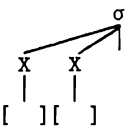
(40) [k͡w]as 'ball'
[g͡w]äddälä 'it got less'
[b͡w]am[b͡w]a 'pipe'
[t'͡w]at 'morning'

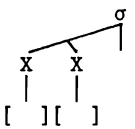
[17] Cf. also Smith's [1985] proposals vis à vis the representation of invariant gemination.

[mw̥]äräd 'file'

However, these are analysed as complex segments, rather than as complex (or branching) onsets, i.e. as (41) rather than as (42) or (43).

(41) 

(42) 

(43) 

It is of interest that the capacity to express such a distinction formally is by no means unimportant. Differential behaviour is predicted by such structural distinctions.[18] Thus, we might well expect the leftmost elements of the structure depicted in (42) or (43) to be capable of resyllabification (as a coda) word-internally, whereas we should not expect it for (41). With the exception of consonant + w all types of consonant sequences in Amharic may be split by epenthetic processes and so require resyllabification [Hayward 1986:316-317]. This behaviour supports the analysis of such phonetic complexes according to the configuration of (41). It is not immediately obvious how the complex segment vs. complex/branching onset distinction would be expressed within a theory operating without a skeletal tier.

Although Amharic syllable structure does permit syllables with certain types of multiply-branching rhymes, no syllable of this type is permitted other than in word-final position. Onset-less syllables are also permitted, but are restricted to word-initial position. These distributional constraints can be expressed by means of Negative Word Structure Conditions such as the following[19] (cf. Clements and Keyser's [1983:29] Negative Syllable

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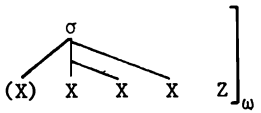
[18]It is clear that the configurations of (42) and (43) also present different structures, and if both are not available, which of the two best represents the nature of pre-rhyme complexity is an important theoretical issue. This is not taken up here.

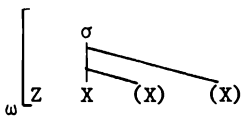
[19]Idiosyncrasies of syllable distribution both here in Amharic and in Chaha (see (65)) are handled as word-structure properties. I have preferred this approach to one invoking considerations of extrametricality. Many languages appear to furnish phenomena requiring the recognition of the word as a domain exercising distinct phonotactic constraints. I suggest that such con-

Structure Constraints):

(44) * 

(Z represents any permitted structure but may not be null.)

(That is, syllables with multiply-branching rhymes may not occur non-finally.)

(45) * 

(Z represents any permitted structure but may not be null.)

(That is, onset-less syllables may not occur non-initially.)

I assume a maximally general algorithm for syllabification such as (46).

(46) Syllabification

(i) Co-syllabify all skeletal slots to the left of a syllable head, subject to the (language-specific) constraints governing (a) onsets and (b) word structure.

(ii) Co-syllabify all skeletal slots to the right of a syllable head, subject to the (language-specific) constraints governing (a) codas and (b) word structure.

As far as prosodic structure is concerned, morphological templates distinguish only those syllable heads that define the morphological class. Syllabification operates at all levels in the morphology (after the association of consonantal and vocalic melodies has taken place) as well as post-lexically. Unsyllabified elements (marked with a tick) are accomodated by the creation of syllable heads, i.e. by epenthesis. The epenthetic vowel is [ɨ], which (following Archangeli [1984:38-64]) can be regarded as the maximally underspecified vowel of the language. Except when its derivation is impinged upon by some phonological rule (such as assimilation), all the distinctive feature values for the epenthetic vowel are supplied by redundancy rules.

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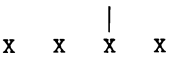
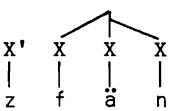
straints govern the distribution of syllable types in the languages discussed here, though there seem to be cases where the distribution of particular segments requires reference to word structure.

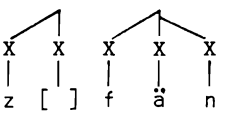
The template for the Type A Jussive stem is assumed to be as in (47).

(47)


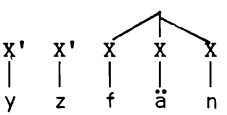
Application of (46) to the underlying forms of the prefix-less second person forms of the paradigm, represented by the 2ms form of (48), fails to accomodate the initial element.

(48)

'dance!' (2ms)

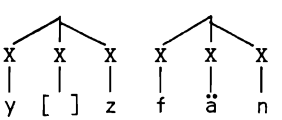
Creation of a syllable head after the unsyllabified element renders the latter syllabifiable as an onset, viz.

(49)


The prefixes of the remaining forms of the paradigm are single consonants underlyingly, with the result that there are two unsyllabified elements, viz.

(50)

'let him dance!' (3ms)

A single syllable head created after the leftmost element renders both of them syllabifiable, viz.

(51)


Since most occurrences of ɨ , which is a very common vowel in Amharic, are of an epenthetic nature, it is instructive to examine the rule(s) involved. In my earlier account it seemed necessary to distinguish as many as five distinct rules. Subsequent consideration, however, has made it appear

possible to reduce this number.[20] One matter that originally appeared to present a complication was gemination. Allowing syllabification to apply at all points in the derivation makes a rule such as (52) (operating progressively from left to right) perfectly adequate for items such as those in (53):

(52)
$$\emptyset \rightarrow \begin{matrix} | \\ X \\ | \\ [\ ] \end{matrix} \ / \ X' \text{ —— } X$$

(That is, a syllable head is created after an unsyllabified skeletal slot.)

(53)	z[ɨ]fän	'dance'
	y[ɨ]zfän	'let him dance!'
	s[ɨ]nt	'how many/much?'
	ayzäfn[ɨ]m(m)	'he is not dancing'
	t[ɨ]nn[ɨ]š	'small'
	etc.	

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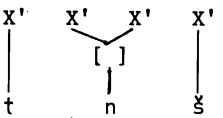
[20]One type of ɨ-Epenthesis, described in Hayward [1986:317], Rule (39), remains intractable as far as unification is concerned. It is a rule that inserts ɨ in front of words beginning with r, creating surface words such as ɨrob 'Wednesday', ɨrguz 'pregnant', ɨrk'ät 'distance', etc. It might appear that this rule could be accommodated if we were to propose a Negative Word Structure Condition prohibiting syllables with r as their onset consonant in word-initial position. However, the rule is optional for some lexical items, but obligatory for others. This is quite unlike the operation of of other ɨ-Epenthesis rules, which are exceptionless. Furthermore, the pre-r ɨ-Epenthesis rule operates as an alternative to the regular ɨ-Epenthesis in words such as ɨrgɨb ∿ rɨgɨb 'pigeon'. Pre-r ɨ-Epenthesis might be analysed as a late lexical rule. This would explain the obligatory nature of its operation in some items only. In cases such as the word for 'pigeon' above, where the rule could optionally apply but happens not to (Case 2 below), we find that regular ɨ-Epenthesis applies post-lexically, viz.

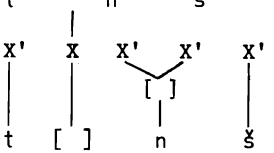
	Case 1	Case 2
Underlying Representation	r g b	r g b
ɨ-Epenthesis (lexical)	ɨrgb	-----
ɨ-Epenthesis (post-lexical)	ɨrgɨb	rɨgɨb

Consider the derivation of the final item in the list in (53)

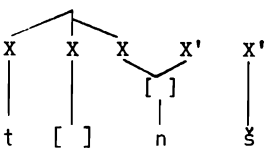
(54) Underlying Representation[21]



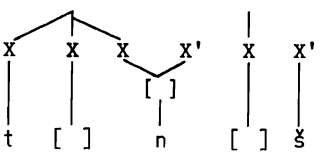
Epenthesis (Rule 52)



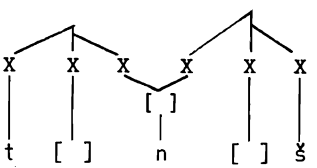
Syllabification (46)



Epenthesis (Rule 52)



Syllabification (46)



Surface Form (after the redundancy rules have supplied features for the epenthetic vowel)

t i n n i š

Rule (52) makes wrong predictions, however, in items such as the following.

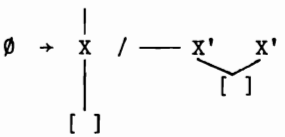
---

[21]As used here the term "Underlying Representation" defines a form in which consonantal and vocalic melodies are already associated with the template and the erection of prosodic structure has proceeded as far as possible. Unsyllabified skeletal slots are marked with a tick.

(55)	[ɨ]dd[ɨ]l	(*d[ɨ]d[ɨ]l)	'luck, lot, chance'
	[ɨ]zz[ɨ]h	(*z[ɨ]zh, *z[ɨ]z[ɨ]h)	'here'
	[ɨ]kkʷ[ɷ]l	(*k[ɨ]kʷ[ɷ]l)	'equal'
	t[ɨ]n[ɨ]nn[ɨ]š	(*t[ɨ]nn[ɨ]nš)	'small (intensive, distributive)'
	etc.		

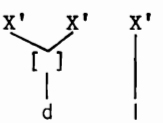
For this reason it was deemed necessary to provide a further rule, such as (56), which would be sensitive to the geminate configuration [Hayward 1986: 316]:

(56)

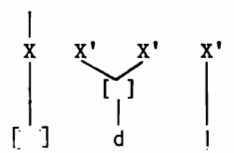


The derivation of the item [ɨ]dd[ɨ]l 'luck, lot, chance' would proceed as in (57).

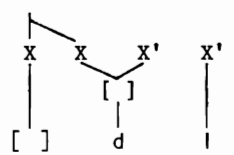
(57) Underlying Representation



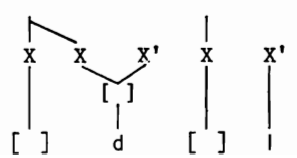
Epenthesis (Rule 56)



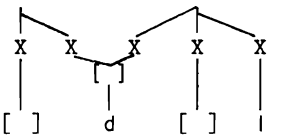
Syllabification (46)



Epenthesis (Rule 52)



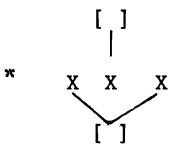
Syllabification (46)



Surface form (after all redundancy rules have applied) ɨddɨɨ

The real question, however, is whether Rule (56) is necessary. Rules such as (56) are devised in an essentially *ad hoc* way to prevent a general rule of epenthesis from "splitting" a geminate. But are geminates ever split? One of the surest universals we have in phonology concerns the "integrity" of geminates.[22] A constraint, stated tentatively as in (58), must surely be part of Universal Grammar.

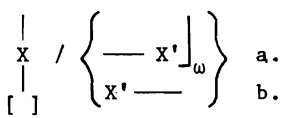
(58) Geminate Integrity Constraint



In dealing with the facts of Amharic may we not simply rely upon this universal constraint to overrule any mis-application of epenthesis rules such as (52)? Thus, while a grammar containing (56) might achieve a measure of descriptive adequacy, one without it, appealing intrinsically to Universal Grammar with (58), comes closer to achieving explanatory adequacy.

Rule (59) represents a fully revised rule for ɨ-Epenthesis in Amharic. (It may be noted that another special rule, which had been set up for dealing with unsyllabified elements word-finally [Hayward 1986:314-315] is incorporated here according to the Elsewhere Condition.

(59)



[22] Claims to this effect have been made repeatedly ever since the appearance of Kenstowicz and Pyle's classic article in 1973.

(That is, if an unsyllabified skeletal slot occurs word-finally, create a syllable head to its left; otherwise, create a syllable head to its right.)

2.2. Case 2: The Chaha Jussive II Stem. According to Leslau [1964:53] the historical developement of Jussive II involved the merging of jussive forms with distinct vocalic melodies. This is illustrated here with reconstructed 3ms forms.

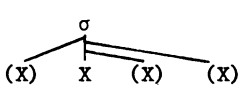
(60) $^{*}ya\text{-}C_1C_2\,\text{ɨ}C_3$ → yä-C_1ɨC_2C_3 ~ yä-C_1C_2ɨC_3
$^{*}ya\text{-}C_1C_2uC_3$ →

For Chaha synchronically, as for Amharic, it seems entirely plausible to claim (for verbs at least) that ɨ has now to be regarded as generated by epenthesis. No doubt neutralisation of the original contrast between the short high vowels in Jussive II forms contributed to this phonological restructuring. Elimination of ɨ from the inventory of underlying elements in verb forms enables us to re-interpret the phonological history of the Jussive II stem depicted in (60) as in (61).

(61) $^{*}ya\text{-}C_1C_2\,\text{ɨ}C_3$ → yä-C_1C_2ɨC_3 → yä-$C_1C_2C_3$
$^{*}ya\text{-}C_1C_2uC_3$ →

What then are the conditions under which ɨ-Epenthesis in Chaha operates so as to generate the two surface variants? It should be pointed out straightaway that the distribution of the present-day -CCɨC- and -CɨCC- alternants shows no correlation whatsoever with the original distinction in vocalism. That distinction is irrecoverable from internal reconstruction. The modern alternation relates entirely to considerations of syllable structure. A generalized syllable template for Chaha appears to be exactly like what one would propose for Amharic, viz.

(62)



The template permits CV, CVC, CVCC, V, VC, and VCC syllable types. What is of immediate interest concerns the types of consonant clusters that are per-

mitted within the rhyme. Earlier it was observed that the key determinant for the differential distribution of i̤ in Jussive II forms seemed to be the relative sonorities of the second and third radicals. To account for this state of affairs formally requires reference to some scale of sonority. Of the various suggestions that have been made for evaluating sonority and for making use of such values in linguistic description, e.g. Hankamer & Aissen [1974], Hooper [1976], etc., Selkirk's [1984] proposal appears promising. Selkirk sets up a scale of sonority with numerical indices ranging from 10 (for the open vowel a) to 0.5 (for the voiceless stops). Selkirk is careful to say that such indices are a "provisional assignment", but adds (p. 112):

> "It is not clear whether the absolute integer value of the sonority indices assigned to each of these segment types is important. I assign absolute values for expository convenience, though for the moment I will assume that only the sonority *relations* expressed by the indices are important. Later we will see that in fact a purely relational characterization of the sonority hierarchy is inadequate and that some indication of absolute sonority values is needed after all."

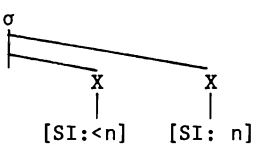
Thus, she is fully aware that a successful exploitation of such a sonority hierarchy by linguists presupposes that definite sonority values for all segment types will eventually be established. An even more fundamental problem concerns the definition of sonority itself. Here, I believe that Selkirk [1984:111-112] is correct in stating that the programme of research that will provide the basis for such a necessarily phonetic definition will be the observation of the relative sonority values assigned to various segments in the phonologies of natural languages. For the present, however, I am only concerned with relative sonority in Chaha, and the hierarchy presented in (63) facilitates the expression of relevant patterning in rhyme clusters in that language. It will be observed that the scale starts with an assignment of an index of 1 to a class of segments that behave as the *least sonorous sounds in the phonology of Chaha*, an index of 2 is assigned to the next set, and so on. However, having insisted that the scale is language specific, it will nevertheless be immediately obvious that the classes defined correspond well with

classes defined for similar purposes in the phonologies of other languages.[23]

(63)

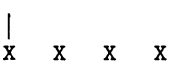
obstruents				nasals	liquids	glides
1	2	3	4	5	6	7
f	s	d	β	m	r	w
t̪		g	(z)	n		y
x						
k						
t'						
k'						

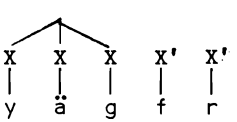
Utilizing (63) the following Negative Syllable Structure Condition is proposed for Chaha.

(64) * 

(That is, a rhyme cluster is not permitted in which the sonority index (SI) of the first (leftmost) member is less than that of the second member.)

Chaha shares with Amharic the two Negative Word Structure Conditions given in (44) and (45). The template in (65), which is proposed for the Jussive II stem, terminates in three consonants, i.e. a structure which does not allow an associated representation such as that in (66) for the 3ms of g-f-r 'release' to be fully syllabified.

(65) 

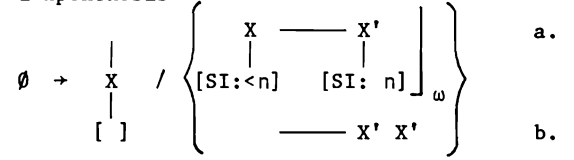
(66) 

[23]The scale used here is set up then solely with the description of Chaha in mind. Although there is no intention here to attack Selkirk's Sonority Hierarchy, it may be of interest to note that in Chaha voiced and voiceless

The presence of the final consonant ensures that only the g will be co-syllabified with the initial syllable head; leftward co-syllabification of the f, even if (64) did not obtain, would be barred by Word Structure Condition (44).

As far as epenthesis is concerned the issue may be whittled down to the simple question of whether the relative sonorities of C_2 and C_3 are such as to allow them to constitute a rhyme cluster. If they can form such a cluster, i.e. if (64) is not violated, epenthesis will create a syllable head after C_1, but if they cannot, epenthesis creates a syllable head after C_2. A Rule of epenthesis formulated for sensitivity to these conditions is proposed in (67).

(67) ɨ-Epenthesis[24]



(That is, if an unsyllabified skeletal slot occurs word-finally and it is linked to a segment which has greater sonority than that of the segment linked to the preceding skeletal slot, create a syllable head to its left; otherwise, create a syllable head to the left of two unsyllabified skeletal slots.)[25]

---

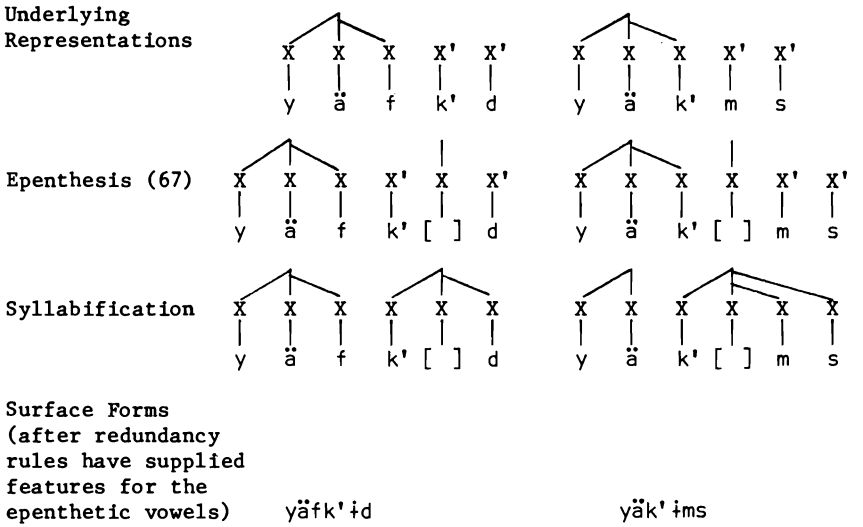
fricatives do not pattern in accordance with her proposal [Selkirk 1984:112].

[24]The leftmost X slot in the more specific environment of the rule is not marked as unsyllabified. This is because the same process applies in word-final sequences even when the string consists of only two consonants. In other words, it does not matter whether the penultimate consonant is unsyllabified or not.

[25]One point to note is that rule (67) for Chaha makes final consonant clusters in Jussive forms the unmarked member of the pair of stem alternants, whereas if we follow Leslau, we must assume that their historical antecedent was uniformly of the shape *VCCVC. This evidence of reversal of the dominant pattern provides strong support for the interpretation advanced here to the effect that restructuring of the vowel system simply eliminated ɨ phonologically.

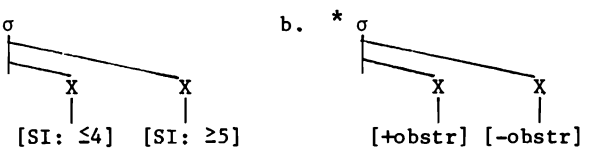
The operation of this rule is illustrated in the derivations of the 3ms forms yäfk'ɨd 'let him permit!' and yäk'ɨms 'let him taste!'.

(68)



In Hayward [1986:314-315] some cases of epenthesis in Amharic were also described for word-final clusters. But Amharic does not employ the delicate selection mechanism of Chaha, where obstruents need several subdivisions. A gross distinction between obstruents and non-obstruents, i.e. "sonorants", is all that is required. Since both languages allow syllables with multiply-branched rhymes in word-final position, the difference between them reduces to one of Syllable Structure Conditions. The Amharic counterpart of the Chaha Negative Syllable Structure Condition in (64) is (69a), which could also be expressed as in (69b).

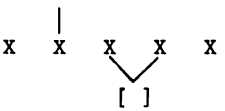
(69)



2.3. Case 3: The Tigrinya Imperfect. For three of the Ethiopian Semitic languages considered in this paper epenthesis rules that insert a high central vowel ɨ have been postulated. In the fourth case (Harari) the epen-

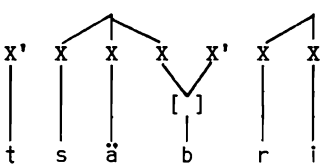
thesis involved the high front vowel ʼi .[26] Furthermore, it has been claimed that every one of these rules is motivated by considerations of syllabification. The analysis sketched out in section 1 for the stem in the Imperfect of Type A verbs in Tigrinya raises an important question concerning the stage in the morphology/phonology at which i-Epenthesis takes place because an alternative to i-Epenthesis is available for Tigrinya in the shape of a rule of Degemination. Since both rules "conspire" towards the same end, i.e. the complete syllabification of the surface word, it is necessary to determine the precise conditions under which each rule operates. The template hypothesized for the stem in question is shown in (70):

(70)

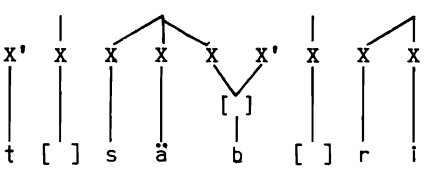


Seen from the point of view of phonology *per se* there is no obvious reason why suffixation of the vowel-initial suffixes in 2fs, etc. (see (30)) should trigger Degemination; i-Epenthesis would have been just as effective in rendering these forms syllabifiable, as can be seen by a consideration of the 2fs form. (In the derivation in (71) an i-Epenthesis rule is assumed to operate very much as in Amharic, and, as far as the verb forms under discussion are concerned, this assumption seems to be a reasonable one.)

(71) Underlying Representation

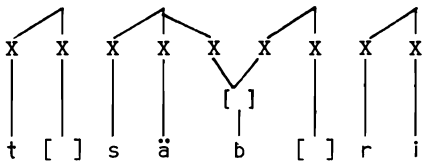


Epenthesis (two applications)



[26]Even in Harari this vowel is often centralized in its pronunciation.

Syllabification (46)



Eventual surface form t+säbb+ri

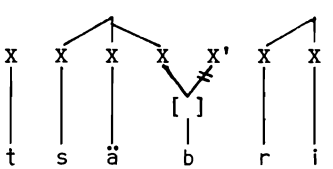
In fact, t+säbb+ri is incorrect, but there is nothing ill-formed about the word phonologically. The 2fs form of the Jussive of a Type B word such as f-s'-m 'finish (tr.)' in Tigrinya presents just such a surface structure, viz. (ʔay)t+fäs's'+mi . The non-occurrence of such a form as *t+säbb+ri must be attributed in part to morphological factors.[27] The conjunction of the vocalic suffixes (found in 2fs, 2mp, 2fp, 3mp, 3fp) together with [imperfect] and [Type A] defines the conditions under which Degemination takes place. Together with the appropriate suffixes the degeminated alternant offers no obstacle to a satisfactory syllabification. (It will be noted, however, that ɨ-Epenthesis will still be required to handle the junctural clusters of prefix and stem.) The remaining forms, in which the full set of requisite morphological features do not co-occur, do not undergo Degemination, though subsequently they all undergo ɨ-Epenthesis.

Given the model of Lexical Phonology, this sort of behaviour can be ac-

---

"...the Harari vowel i is often interchanged with ə [= + as employed here—RJH] in Harari itself and corresponds to the vowel ə [= + RJH] of the other Ethiopic languages." [Leslau 1958:4]

[27]Kenstowicz [1982:110] also clearly regards the stem shape alternation in the Tigrinya Type A Imperfect as morphological, though he does not suggest that it is in any way motivated by concerns of syllable structure. I assume Degemination to be something like the following. (The rule is illustrated with 2fs t+säbri 'you(f) broke (sthg)'.



commodated without difficulty.[28] Tigrinya Degemination is clearly a rule constrained to apply only at a particular lexical level, in this case the level at which inflectional suffixes are introduced. For Tigrinya, as indeed for all the languages discussed here, i-Epenthesis has to be seen as a post-lexical rule, i.e. a truly exceptionaless phonological rule triggered by purely phonological determinants.

The same model explains very well the problem in Harari discussed by Kenstowicz and Kisseberth [1979:233-235]. Examination of the Type A Imperfect of Harari (given above in (35)) shows that the final i of the 2fs form is hypothesized as an underlying vowel. (It is, in fact, cognate with the 2fs -i suffix of Tigrinya, which we have just considered.) For many verbs 2fs and 3fs forms are identical, though in the latter, final i is claimed to be epenthetic. However, in triliteral verbs in which C_3 is a coronal, palatalization occurs in 2fs forms, but not in 3fs forms, e.g.

(72)	2fs Imperfect	3fs Imperfect			
	tič'ämk'i	tič'ämk'i	<	č'-m-k'	'squeeze'
	tilämǰi	tilämdi	<	l-m-d	'learn'
	tiläbši	tiläbsi	<	l-b-s	'dress'
	tinädyi	tinädli	<	n-d-l	'make a hole'

Moreover, as Leslau [1958:18] observes:

> "The palatalization can also affect the 1st or 2nd radical of the root if it is a dental, liquid or sibilant. Thus, tišäbri , from sbr 'break'; tikäčbi , from ktb 'write'; tič'älfi , from t'lf 'rob'; ..."

Very clearly palatalization, occasioned by suffixation of the 2fs inflection, is a rule restricted to a specific lexical level—probably the same level as that at which Degemination takes place in Tigrinya.

It will be recalled that the discussion of the Harari Type A Imperfect in Part I conceded that the phonology of the language provide support for the putative "Principle (55)". I should like finally to look at a further aspect

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[28]For a good overview of the model the reader is referred to Kaisse and Shaw [1985].

of Harari verb morphology that suggests that Harari too is at heart a non-conformist with respect to the said principle.

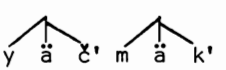
A side-by-side inspection of the Jussive and Imperative forms for Type A verbs in Harari, as in (73), would seem to suggest that postulation of a single paradigm as argued for Amharic (see the case in section 1.1) would be fraught with difficulties.

(73)

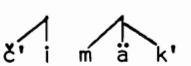
	Jussive	Imperative
1s	näč'mäk'	
2ms		č'ɨmäk'
2fs		č'ɨmäk'ɨ
3ms	yäč'mäk'	
3fs	täč'mäk'	
1p	näč'mäk'	
2p		č'ɨmäk'u
3p	yäč'mäk'u	

In fact Leslau [1958:25-26] does make precisely this claim. He achieves this by analyzing the prethematic ä (in the non-Imperative forms) as part of the prefix, rather than as part of the stem, i.e. as 1s nä-č'mäk' , 3ms, yä-č'mäk' , 3fs tä-č'mäk' , etc. This enables him to set up the common canonical form $-C_1(ɨ)C_2äC_3-$ for the Jussive/Imperative of Type A triliteral verbs. The longer stem alternant č'ɨmäk'- , found in Imperative forms,[29] can well be accounted for by epenthesis.[30] If this is the case, then we have a further instance of a consonant in a morphological class behaving at certain times as a coda and at others as an onset, viz.

(74) a.



a.



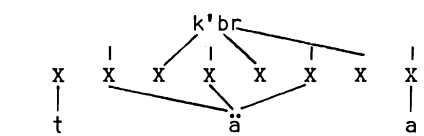
[29]It is also found throughout the negative.

[30]Leslau does not actually say this, but his representation of the ɨ in parenthesis, plus his explicit recognition of final ɨ as "euphonic" in forms with consonant clusters stem-finally, suggests a tacit recognition of the status of this vowel.

The crux of Leslau's analysis is the analysis of ä with the prefixes. But is this either desirable or necessary? I believe it is undesirable since it obliges us to posit morphologically determined allomorphy for these prefixes, i.e. yä- , tä- , etc. with the affirmative Jussive stem, but y- , t- , etc. elsewhere.

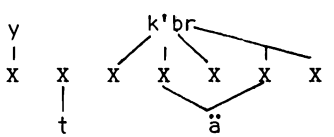
Moreover, reflection on the principled behaviour of vocalic elements in the verb systems of Ethiopian Semitic languages in general makes it possible to suggest an alternative. It has been claimed [Taddese Beyene, forthcoming] that underlyingly the Amharic verb system employs just one vowel, namely, the mid central vowel ä . The significance of this insight, when viewed from the vantage point of a model of phonology utilizing Autosegmental and Underspecification theories is developed in Hayward and Watson [in preparation]. Furthermore, the insight carries over to many aspects of verb morphology in other Semitic languages of Ethiopia. This is not the place to enter into a discussion of how fully Taddese Beyene's claim can be substantiated, but in our forthcoming paper we demonstrate that at *all lexical levels* the monovocalic melody,[31] which in the default case comes to be realised as ä , is associated with any skeletal slot functioning as a syllable head. Moreover, as exemplified by comparison of the Perfect and Imperfect 3ms imperfect forms of the Type A Passive stem in Harari, ä can be associated with a skeletal slot preceding that associated with the first consonant radical.

(75) a. Perfect täk'äbära
'he was buried'



[passive]

b. Imperfect yitk'äbär
'he will be buried'



[passive]

[31]In accordance with the insights of Underspecification Theory, this vowel could be distinguished simply as [-high], though see Hayward and Watson [in preparation].

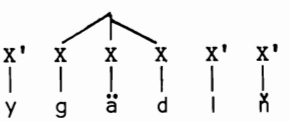
There is some evidence which can be used to argue that ä may spread to skeletal slots altogether outside the template itself. In Harari, for example, all the object pronoun suffixes (except the 3fs form) have alternants with ä . These alternants occur with those verb forms which do not have a final vowel inflection, viz.

(76)

3ms subject		3p subject	
yɨgädɨ -äx	'he kills you(m.)'	yɨgädɨu-x	'they kill you(m.)'
yɨgädɨ -äǩ	'he kills me'	yɨgädɨu-ǩ	'they kill me'
yägdäɨ -äš	'may he kill you(f.)!'	yägdäɨu-š	'may they kill you(f.)!'

If we assumed that these object suffixes are underlyingly consonant-initial, the occurrence of the ä could be seen as comparable to that of the epenthetic (post-lexical) ɨ for Harari, i.e. as supplying prosodic structure. In such a case we would have a morphologically determined creation of a syllable head.[32] Here, however, phonic substance might become associated with the new slot by assimilation, as in the derivation in (77) of yɨgädɨäǩ 'he kills me'.

(77) Underlying Representation

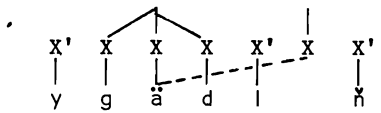


[32]The argument might appear to be weakened by the fact that ä appears (with the same distribution) together with the plural forms, e.g.

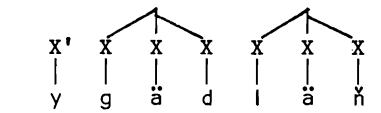
Imperfect (3ms subject)		Jussive (3ms subject)	
yɨgädɨ -äna	'he kills us'	yägdäɨ -äna	'may he kill us!'
yɨgädɨ -äxu	'he kills you(p)	yägdäɨ -äxu	'may he kill you(p)!'
yɨgädɨ -äyu	'he kills them'	yägdäɨ -äyu	'may he kill them!'

Consideration of the Jussive forms shows that no violation of syllable structure would occur if ä were not present. We have probably to reckon with analogical levelling to explain these plural forms. But it has to be recalled that we are considering patterns that should be regarded as lexicalized from a synchronic point of view, i.e. forms where fully phonological explanations are no longer possible.

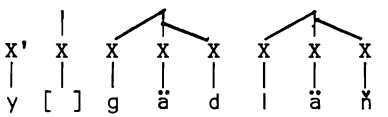
Epenthesis (Lexical) and assimilation



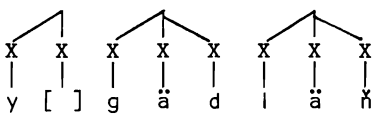
Syllabification (46)



Epenthesis (post-Lexical)



Syllabification (46)



Surface Form yigädläň

The view that the vocalic melody may extend its influence beyond its primary and proper domain, i.e. the stem, is in some ways reminiscent of vowel harmony.

Returning to the Harari Type A Jussive it is now possible to suggest that the prethematic ä in näč'mäk' , etc. results from just such a lexical attempt to resolve an unsyllabifiable string, as was outlined for the object suffixes. The morphological restrictions on this process are comparable to those governing the rule of Degemination in Tigrinya, for example. Both processes have to be sharply distinguished from fully pervasive post-lexical processes such as ɨ-Epenthesis.

3. Conclusion

In Section 2 of this paper I have proposed a series of analyses for morphological alternations found in several African Semitic languages. In every case the analysis has depended heavily upon a particular theoretical construct, namely, the Skeletal Tier. The analyses would not have been possible without this entity. The analyses themselves then furnish evidence for the value of the Skeletal Tier, and so complement the arguments adduced in Section 1, which attempted to demonstrate that a recent proposal to define morphological templates in strictly prosodic (syllable-based) terms was untenable.

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