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MORRIS HALLE

RESPECTING METRICAL STRUCTURE

The paper argues that in order to locate stress in languages such as Macedonian, Latin and Cairene Arabic, where words have one stressed syllable, it is necessary to assign metrical structure to the entire word even though most of it is subsequently erased. In a discussion of Latin enclitic stress it is shown that this erasure of metrical structure must be combined with stages in the derivation where previously assigned metrical structure is scrupulously respected. This leads to a digression concerning the similar enclitic stress in the Austronesian language Manam. Attention is then focussed on the fact that in some languages – e.g., in Winnebago – foot boundaries may occur inside syllables that have more than one stress-bearing element, whereas in other languages – e.g., in Cairene Arabic and Yupik Eskimo – syllable-internal foot boundaries are not allowed. To deal with this type of variability it is proposed that in addition to idiosyncratic stresses the theoretical framework must admit also idiosyncratic constituent boundaries. The effects of these theoretical innovations are illustrated by an examination of stress assignment in different Yupik dialects.

1. When and How is Previously Assigned Metrical Structure Respected in the Derivation of Stress Contours?

A striking difference among languages is that in some the word characteristically contains a great many stresses whereas in others there is only one stress per word. English, Winnebago, Yupik Eskimo are of the former kind, whereas Macedonian, Lithuanian and French are of the latter kind. To be quite specific, in Winnebago stress falls on every odd-numbered mora of the word beginning with the third mora with main stress falling on the first of these, as shown in (1). (Data from Hale and White Eagle (1980) and from K. Hale p.c.)

(1)	heenága 'second born son'	hakirújikshàna 'he pulls it taut'
	kiriína 'returned'	bootáana 'he hit him'
	hochichínik 'boy'	hirakórohònirà 'the fact that you do not dress'
	yuukíihinangkì 'if I could mix them . . .'	guushíichananrí 'the day before yesterday'

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It has now become almost standard procedure in metrical phonology to treat facts such as those in (1) by marking the first mora of the word extrametrical and by constructing binary right-headed feet from left to right. The feet in turn are organized into a left-headed unbounded constituent, which has the effect of placing main stress on the head of the left-most foot. When this procedure generates stress on two adjacent syllables, stress on the right syllable is removed by a special rule. As a consequence there is no stress on word final syllables when the penult is stressed, but the rule also removes stress from the third syllable in *yuukíihinangkì* and *guushíichananrì*.

The data are treated here in terms of the metrical theory of Halle and Vergnaud (1987) (hereinafter HV) with some simplifications introduced for expository purposes. For readers unfamiliar with this study I include at this point a brief discussion of its most salient features.

A fundamental observation about sequences of linguistic elements of all kinds is that these are never made up by stringing together one element after another. Rather when linguistic elements are concatenated they are grouped into *constituents* in which one element is always specially marked as the *head*. This is true of concatenation both in syntax and phonology, and it is especially true of stress.

In the HV framework the computation of the constituents and the heads that are ultimately reflected in the stress contour of a word is carried out on a separate autosegmental plane that intersects other autosegmental planes – such as those required for the representation of discontinuous morphemes in Semitic or the computation of syllable structure – in a line made up of *timing slots* (see Levin 1985).

Stress is characteristically assigned only to certain phonemes in a string and never to others. In the most familiar cases only heads of syllables can be stress-bearing; all other phonemes in the string can never be stressed. Since languages differ as to what elements in the string are stress-bearing, a device is required to reflect this fact formally. In the HV framework this is done by projecting the stress-bearing elements onto the metrical plane; i.e., by constructing on the metrical plane a line of asterisks where each asterisk represents a stress-bearing element. It is on this line – designated as *line 0* – that the computation of metrical structure is carried out.

In this paper I refer to the elements that constitute line 0 in the metrical plane by the term MORAs. By capitalizing the word MORA I distinguish this technical term from the homophonous word used in other theoretical frameworks.

The metrical organization is imposed on a string of MORAs breaking

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it up into a number of sub-sequences, termed metrical constituents or *feet*, whose boundaries are marked by parentheses located in appropriate places among the line 0 entities. The placement of constituent boundaries is subject to a number of constraints among which the most important are constraints on the length of the constituents. In particular, constituents can be *unbounded* – i.e., unconstrained as to length – or *bounded* – i.e., constrained as to length. The choice between bounded and unbounded constituents is one of the means for determining the placement of stresses in words of different languages.

As noted, in a constituent not all elements are equal. Rather, one is selected as the head to which the rest are subordinate. There are severe constraints on head location. In the unmarked case the head is *terminal*, i.e., located at one of the ends of a constituent, and the language then must choose between the two options: *left-headed* or *right-headed*. In the marked case, the head is non-terminal. It is argued in HV that the option of choosing a nonterminal head is available only in the case of bounded constituents; unbounded constituents are invariably head-terminal. Moreover, non-head-terminal, bounded constituents are of a single type: they are composed of three elements of which the one in the middle is the head. In traditional metrics such ternary feet are called *amphibrachs*, and following the terminological practice of HV, this term is used in this paper. A stress system based on amphibrachs is discussed at the end of section 5.

As illustrated below when bounded constituents are constructed from left to right different constituent structures emerge than when the construction proceeds from right to left. Thus, the left-most MORA in the string is included in the same constituent when these are constructed from left to right, but not when they are constructed from right to left.

left to right: (* *)(* *)(*)   right to left: (*)(* *)(* *)

It is therefore necessary to add to the three parameters above yet a fourth that stipulates the direction in which the constituents are constructed. This parameter, which we symbolize as L-R (left to right) vs. R-L (right to left), is available only in the case of the three bounded constituent types. The theory thus admits the following eight types of constituent:

$$\left.\begin{array}{l}\text{non-head-terminal, bounded, L-R:}\\\text{non-head-terminal, bounded, R-L:}\end{array}\right\}\text{ amphibrachs}$$

$$\left.\begin{array}{l}\text{head-terminal, bounded, left-headed, L-R:}\\\text{head-terminal, bounded, left-headed, R-L:}\end{array}\right\}\text{ trochees}$$

$$\left.\begin{array}{l}\text{head-terminal, bounded, right-headed, L-R:}\\\text{head-terminal, bounded, right-headed, R-L:}\end{array}\right\}\text{ iambs}$$

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head-terminal, unbounded, left-headed
head-terminal, unbounded, right-headed

These eight constituent types are the basic building blocks that underlie all types of stress systems.

In the HV framework, heads are marked by placing an asterisk on the line immediately above the head element. It is thus the presence of an asterisk on line 1 that formally distinguishes stressed from stressless entities. In many languages, constituents are constructed not only on line 0, but also on line 1. The heads of line 1 are then marked with asterisks on line 2. It is in this way that different degrees of stress are notated. Languages that distinguish n degrees of stress require constituent structure on $n-1$ lines. Thus, English, which distinguishes systematically as many as four degrees of stress in words pronounced in isolation, has constituents on three lines as illustrated below. The two-dimensional array of lines and columns of asterisks generated in this fashion is called a *metrical grid*.

```
line 3     .     .     .     .     *     .
line 2    (*     .     .     .     *)    .
line 1    (*     .     *     .) (  *)    .
line 0    (*     *) (  *     *) (  *)   ⟨*⟩
           on    o    ma     t  o  p  e  i    a
```

In the grid above we have constructed left-headed bounded constituents from right to left on line 0, left-headed bounded constituents from left to right on line 1, and right-headed unbounded constituents on line 2. Heads of constituents are marked with asterisks on the line immediately above. The dots on the grid lines represent elements that are invisible as far as metrical constituent construction is concerned; they are placed there solely to facilitate reading of the grid.

It will have been noticed that in the diagram above the last syllable has a line 0 asterisk enclosed in angled brackets and no asterisks on higher lines of the grid. This reflects the fact that in English words, the last syllable is commonly disregarded in the assignment of stress. Like other metrical frameworks, the HV framework reflects this fact by making use of *extrametricality*, which might be thought of as a diacritic mark that renders an element invisible to the metrical rules. This device is effective only when assigned to peripheral elements in the string. Thus, in the English word *oríginal* the suffix *-al* is extrametrical, but it loses its extrametricality and becomes stress-bearing when the suffix *-ity* is added after it in *originálity*.

I have given in (2a) a formal statement of the rules necessary to charac-

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terize the Winnebago facts in (1) in terms of the metrical framework just sketched, and in (2b) I have illustrated the effects of the rules prior to the application of (2a–vii).

(2)a.
- i. All elements in a syllable nucleus are stress-bearing (i.e., represented on line 0 of the metrical grid).
- ii. The first MORA in a word is extrametrical.
- iii. Line 0 parameter settings: binary, right-headed, L-R.
- iv. Construct constituents (feet) on line 0 and mark heads on line 1.
- v. Line 1 parameter settings: unbounded, left-headed.
- vi. Construct constituents on line 1 and mark heads on line 2.
- vii. If stress is assigned to two adjacent syllables, delete the stress (i.e., the line 1 asterisk) on the syllable on the right.

b.

```
 .  .  *  .       .  .  *  .   .  .  .       .  .  *  .  .  .     line 2
(.  .  *  *)     (.  .  *  .   *  .  *)     (.  .  *  .  *  *)    line 1
⟨*⟩(*  *)(*)     ⟨*⟩(*  *)(*   *)(*  *)     ⟨*⟩(* *)(* *)(*)      line 0
he  e ná  ga      hi ra kóro   hòni  rà      ha ki rú jikshàna

 .  .  *  .   .  .     .     line 2
(.  .  *  .   *  .     *)    line 1
⟨*⟩(*  *)(*   *)(*     *)    line 0
ya  a kí  i  hi nang  kì
```

In constructing the binary feet in (2b) by means of rule (2a iv), implicit use was made of what in HV we called the Exhaustivity Condition:

(3) Rules constructing constituents apply exhaustively over the entire string.

It is by virtue of this condition that we constructed metrical structure over the entire string rather than stop after one or any number of iterations. At this point this may seem to be the only natural way to proceed and the Exhaustivity Condition may therefore appear to be little more than a statement of the obvious; but as we shall see directly, it is anything but a mere formality.

Macedonian was cited above as one of the languages where there is but a single stress in the word. Specifically, in Macedonian stress goes on the antepenult in all but a small minority of foreign borrowings. In the HV

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framework, Macedonian stress is characterized by means of the rules in (4a), and the application of these rules is illustrated in (4b) with forms of the word *vodeničar* '*miller*'.

(4)a.
i. Only heads of syllable nuclei are stress-bearing (i.e., represented on line 0 of the metrical grid).
ii. The last mora in a word is extrametrical.
iii. Line 0 parameter settings: binary, left-headed, right-to-left.
iv. Construct constituents (feet) on line 0 and mark heads on line 1.
v. Line 1 parameter settings: unbounded, right-headed.
vi. Construct constituents on line 1 and mark heads on line 2.
vii. Conflate lines 1 and 2.

b.
```
 .  *  .  .          .  .  *  .  .          .  .  .  *  .  .        line 2
(*  *  .  .)        (*  .  *  .  .)        (*  *.    *  .  .)       line 1
(*)(*  *)⟨*⟩        (*  *)(* .*)⟨*⟩        (*)(*  *)(*  *)⟨*⟩       line 0
vo dé ni čar        vo de ní ča ri         vo de ni čá ri te
```

The rules (4a i–vi) correctly locate the main stress on the third syllable from the end. However, they incorrectly generate a host of secondary stresses which are not present in actual pronunciations of Macedonian words. In order to account for the absence of subsidiary stresses – in Macedonian and other languages of this type – we introduced in HV a special rule of Conflation (4a vii), whose function it is to eliminate all but the main stress in a word.[1]

[1] Formally the operation of Conflation has the effect of eliminating in two or more adjacent lines of the grid, asterisks that fail to appear on all the lines in question. Moreover, when a given asterisk is deleted the constituent of which it is the head is also eliminated. Thus, if in the grid

```
line 3    . .  * .   . .  . .
line 2   ( . .  * .   . .  * . )
line 1   ( * .  * . )( * .  * . )
line 0   ( * *)( * *)( * *)( * *)
           AB   CD   EF   GH
```

conflation affects lines 2 and 3, both the line 2 asterisk above column G and the parentheses delimiting the right-most constituent on line 1 are eliminated. If conflation affects lines 1, 2, 3 then in addition all asterisks in line 1 are eliminated except those in column C, and so are all constituents on line 0, except the one composed of columns C and D. A modification in the formal implementation of conflation is proposed in Halle and Kenstowicz (1989).

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The Exhaustivity Condition is not a part of all stress frameworks. In studies like those of Hayes (1981, 1987) and Levin (1988) we find in place of the Exhaustivity Condition the parameter [+/− Iterative]. In the unmarked case the parameter is set to 'plus' and the treatment then is indistinguishable from that of the HV framework. In marked cases, however, the parameter is set to minus, and only a single constituent is constructed. The parameter seems to be a very natural means for capturing the difference between languages with multiple stresses in the word, like Winnebago, and those with a single word stress, like Macedonian.

We thus have two alternatives that appear to handle the facts equally well. On the one hand we have the Exhaustivity Condition supplemented by the rule of Conflation and on the other hand the Iterative parameter that may be set to two values. Our next task therefore is to find some additional facts that might allow us to choose between the two alternatives.

Perhaps the simplest type of evidence that has bearing on this issue is provided by the words with exceptional stress in Macedonian. As illustrated in (5a) the exceptional words deviate from the rest in that they can have stress on the penultimate or final syllable.

(5)a.	literatúra 'literature'	konzumátor 'consumer'
	odváj 'scarcely'	onolkáva 'of that size'
b.	konzumátori 'consumers'	konzumatórite 'the consumers'

If such words are entered in the lexicon with stress (line 1 asterisk) on their penultimate (respectively, final) syllable (cf. Franks 1983), the same rules as those used in the native words will correctly assign the stress. The reason for this is the Faithfulness Condition (Halle and Vergnaud 1987, pp. 14–15), which insures that the metrical constituents will be constructed so that a lexically stressed syllable will always be a constituent head.

The situation is slightly more complicated in suffixed forms of the irregularly stressed words. As shown in (5b) stress remains on its original lexically designated syllable only when this syllable is one of the last three syllables of the words. As illustrated by *konzumatórite*, however, when as a result of suffixation the lexicaliy stressed syllable is no longer inside this three syllable window, stress shifts to the antepenult. This result follows automatically from the rules (4a), as shown in (6), where the effects of Conflation have been omitted.[2]

[2] Stresses present in lexical representations or assigned by special rules are marked by # (crosshatch) in order to distinguish them from stresses that are the result of the construction of constituents. The latter are marked by asterisks. This distinction has been introduced for expository purposes only.

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```
(6)    .   .    *  .   .      .    .    .  *   .   .       line 2
       (*  .    #  .   .)     (*   .    #  *   .   .)      line 1
       (*  *)   (* *)  (*)    (*   *)   (*)(*  *)  (*)     line 0
       kon zu   má to  ri     kon  zu   ma tó  ri  te
```

In a framework with a [+/− Iterative] parameter a form such as *konzumatórite* will surface with two stresses: the lexically assigned stress on /ma/ and the antepenult stress assigned by the normal stress rules of the language which generate a single trochaic foot as shown in (7).

```
(7)    .   .    *  *   .    .
       *   *    * (*   *)  (*)
       kon zu   ma to  ri   te
```

It is, of course, a trivial matter to obtain the correct output by adding a rule deleting all but the last stress in the word; i.e., by adding to the grammar a rule imitating the effects of Conflation. But the need to have recourse to such a rule casts doubts on the proposed alternative, for we have seen above that given a rule of Conflation all facts can be accounted for without the extra power provided by replacing the Exhaustivity Condition with the parameter [+/− Iterative]. In the example under discussion the parameter does no work for us and this immediately raises the question as to whether the parameter is ever needed. The facts of Cairene and Latin to be reviewed next suggest that the answer is "no" and that the parameter should be dispensed with.

In Cairene Arabic each word has a single stressed syllable.[3] It is therefore to be expected that to account for the stress of Cairene words the parameter will be set to [−Iterative]. We shall now see that this parameter setting fails to provide for a correct account of Cairene stress.

The main facts of Cairene stress are stated in (8a) (cf. McCarthy 1979).

(8)a.
- i. If the last syllable of the word is super-heavy (CVVC or CVCC), it is stressed, otherwise
- ii. if the penultimate syllable is heavy (CVV or CVC), it is stressed, otherwise
- iii. stress goes on the antepenult or on the penult, depending on which of the two is separated by $2n$ (an even number

[3] Although it has been argued that Cairene has secondary stresses – see Welden (1980) and Harms (1981) – the majority of writers represent Cairene as having only one stress per word, and it is the majority view of stress that has been followed here.

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or zero) syllables from the preceding heavy syllable or – in the absence of such a syllable – from the beginning of the word.

b.	i.	katábt 'I wrote'	sakakíin 'knives'
	ii.	ʕamálti 'you (f.sg.) did'	haðáani 'these' f.du.)
	iii.	ʔadwiyatúhumaa 'their drugs'	ʔadwiyatúhu 'his drugs'
		martábatu 'his mattress'	martába 'mattress'
		muqaatílatun 'fighter'	muqaatilatúhu 'his fighter'
	iv.	kátaba 'he wrote'	katabítu 'they wrote'
		šajarátuhu 'his tree'	šajaratuhúmaa 'their (dual) tree'

We consider at this point only the words in (8b iv), which exemplify the stress distribution stated in (8a iii).[4] In order to assign the stress correctly we need to count the number of syllables between the beginning of the word and the antepenultimate syllable: if it is even, the antepenult will get the stress (*kátaba*, *šajarátuhu*); if it is odd, the stress will go on the penult (*katabítu*, *šajaratuhúmaa*). Binary feet are the only mechanism available to a language (UG) for determining whether an element is odd or even.[5] Specifically to account for the stress distributions illustrated in (8b iv), we construct left-headed binary feet on line 0 from left to right as shown in (9). The word stress is then located on the head of the right-most foot.[6]

```
(9)   .  .  .  .  *    .      .  .  *  .   .  line 2
      (*  .  *  .  *   .)     (*  .  *  .  .) line 1
      (*  *)(*  *) (*) ⟨*⟩    (*  *)(*  *) ⟨*⟩ line 0
      ša ja ra tu hú maa      ša ja rá tu hu
```

[4] The rest of the examples in (8) are discussed in section 4. Long vowels are transcribed as geminates.

[5] Binary feet (the odd-even count) are utilized in domains of language other than the assignment of stress. For example, in Yidinʸ the penultimate syllable is lengthened in words where it is separated from the beginning of the word by an even number of syllables. (See HV for details.) Another example of this type is Ulwa, a language of Nicaragua, (see Hale and Lacayo Blanco 1988), where the construct state morpheme *ka* is inserted into the word after the first foot. McCarthy and Prince (1990) show that this bi-section of words into Base and Residue – where the base is constituted by a single binary foot – is required for the characterization of a great many morphological processes such as reduplication, infixation, resyllabification, etc. in a host of different languages.

[6] In (9) I have marked the final syllable extrametrical and have constructed an unbounded right-headed constituent on line 1 thereby placing main stress on the head of the last foot. The rule of Conflation subsequently eliminates all but the main stress. A fuller discussion of the Cairene stress rules is given section 4 below.

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Since more than two syllables may intervene between the beginning of the word and the antepenult we cannot obtain the correct results if we set the parameter to [−Iterative]. Thus, there exists at least one language – Cairene – where there is only one stress per word, yet where the parameter cannot be set to [−Iterative].

2. Enclitic Stress in Latin

The stressing of words with enclitics in Latin has many similarities with the Macedonian case discussed above. It is generally assumed that Latin words have only a single stress, which falls on the penult if it has a branching rime, but on the antepenult otherwise, as illustrated in (10a) with the 3. person present active and passive forms of the word *opprimere* 'to oppress'.

(10)a. ópprimit ópprimunt opprímit-ur opprimúnt-ur

We shall assume as a first approximation that Latin has the same stress rules as Macedonian (cf. (4a)) supplemented by a special rule ordered between (4a ii) and (4a iii) that assigns stress (line 1 crosshatch) to metrical syllables with branching rime (cf. (12a iii) below).

It is obvious that the passive forms are derived from the corresponding active forms by the addition of the suffix *-ur*. What is important for our purpose here is that as far as stress assignment is concerned the passive forms show no influence of the stress of the active forms. Put somewhat differently, if stress is assigned by cyclic rules in Latin – as it is for example in English – stress assigned on earlier cycles is not reflected in the output. We shall formalize this fact by saying that Latin is subject to the Stress Erasure Convention (HV p. 83) and that at the beginning of each pass through the cyclic rules previously assigned stresses and their associated metrical constituent structure are removed.

There is an interesting class of exceptions to stress erasure. These are forms with enclitics of the sort illustrated in (10b).[7]

[7] The reviewers have drawn attention to the widely held view that the proposed rule of stress retraction operative in (10b) is – in the words of Allen (1973) – 'simply another example of the grammarians' copying of Greek models' and is thus not a genuine rule of the language. As pointed out to me by Steriade (pc), this skepticism is without foundation once the argumentation in its support is carefully examined.

In attacking the Roman grammarians' rule of stress retraction, which following Steriade 1988 I accept as genuine, Allen (1973, p. 159) writes: 'This rule implies, for example, *Mu:sáque*, *li:mináque*, where the position of the accent in the combination is different from what it would be in a single word of the same syllabic pattern .... But generally the examples

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(10)b. lí:mina 'thresholds' homínibus 'to men'
li:miná-que 'and thresholds' hominibús-que 'and to men'

As Steriade (1988) has noted, "Latin has a few accentual clitics, monosyllabic and disyllabic. When these morphemes are added to an orthotonic word, the stress of that word shifts rightward and *lands invariably on its final syllable*" (p. 297, emphasis supplied). She explains this by saying that

---

which the grammarians actually cite are of the type *uirúmque*, where the accent is the same as for a single word of this pattern (cf. *relínquo*)'. Since he thus accepts stress retraction to the ultima in the case of *uirúmque*, Allen's doubts are limited to the genuineness of retractions such as *li:mináque*. Moreover, since, as we have just seen, Allen accounts for the stress pattern *uirúmque* by the same rule as *relínquo* we must conclude that for Allen the sequence word + enclitic is stressed like an ordinary word. Although he does not say so explicitly this implies that he also predicts the stress contour *li:mínaque* paralleling orthotonic words such as *agrícola*, *opprímitur*. There is, however, no evidence whatever in support of such a stress contour as against *li:mináque*, and none is cited by Allen, as already noted.

To sum up, Allen admits that enclitics caused stress retraction. He only doubts the statement of the grammarians that the retraction was always to the final syllable, regardless of its quantity, and assumes that retraction was the result of the reapplication of the quantity-sensitive main stress rule of Latin, but he cites no examples of retraction to any syllable other than the final syllable.

Allen's second line of attack is based on the fact that in the last two feet of the Latin hexameter – i.e., the so-called *cadence* – 'agreement between metrical and accentual patterns is the rule.' A survey of these cadences shows no instances of sequences where stress is retracted to a word final syllable that is light (i.e., of the type *li:mináque*), but numerous cases where stress is retracted to a word final heavy syllable (of the type *uirúmque*) or where the orthotonic stress is maintained intact as e.g., in *suspéctaque dó:na* and *Satúrniaqu(e) árua*. Allen takes the absence of cadences where stress is retracted to the syllable before the enclitic as evidence against the reality of the grammarians' rule.

This is, however, an unwarranted inference. Such stress contours as *Satúrniaque*, *suspéctaque* show that stress retraction to the syllable preceding the enclitic was optional, not obligatory, as Allen himself observes at the end of the section from which we quoted: '. . . full word + enclitic was generally accented as a single word; but . . . alternative pronunciations were at least conceivable and metrically acceptable, in which the enclitic was treated as more or less separable and so as not affecting the isolate accentuation of the full word' (p. 161). Since *Satúrniaque*, *suspéctaque* as well as *Saturniáque*, *suspectáque* are thus well-formed, the fact that only the former but not the latter stress patterns are attested in cadences says nothing about the well-formedness of the unattested stress patterns.

The absence of instances where retracted stress of the *li:mináque*, *Saturniáque* type coincides with the metrical strong position of the fifth or sixth foot has a simple explanation. Since the final syllable in these words is light, this syllable can never appear in a strong position of the hexameter, for only heavy syllables can coincide with strong positions in the meter. It must not be overlooked that quantity, rather than stress, is the basis of Latin verse, and a light syllable cannot appear in a verse position where a heavy syllable is required, regardless of whether or not it is stressed. By the same token, although *uírumque* is a well-formed Latin stress contour, it is never encountered in hexameter cadences, where only *uirúmque* is found. The reason is straightforward: if the first syllable of *uírumque* is in a strong position of the verse the word must be scanned as a spondee with the consequence that *que*, a light syllable, is placed in the strong position of the following dactylic foot, and this is prohibited by the rules of Latin versification.

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stress resulting from clitic adjunction respects previously assigned metrical structure: additional metrical structure can therefore be constructed only on the subsequence consisting of the part of the word that is extrametrical plus the enclitic.

In this respect Latin differs strikingly from Macedonian. As was shown in (4) and (5) in Macedonian, words with enclitics such as the definite article *te* are treated exactly like words without enclitics; but in Latin, as we have just seen, enclitics place stress on the last syllable of the preceding (orthotonic) word, whereas in words without enclitics stress placement is governed by the main stress rule of the language. We clearly need some means for capturing this difference between Latin and Macedonian.

I will assume in conformity with views shared by many workers that the rules of the phonology are separated into two large blocks or *strata*, one cyclic and the other noncyclic. I assume further that in Macedonian the stress rules are assigned only to the noncyclic stratum, whereas in Latin the stress rules are assigned to both the cyclic and the noncyclic stratum. It is readily seen that by assigning the stress rules in Macedonian only to the noncyclic stratum we account for the uniform treatment of words with and without enclitics: since the noncyclic stratum follows the cyclic one, the stress rules will assign metrical structure to the entire phonological word (base plus enclitics) and will thus treat enclitic suffixes no differently from nonenclitic ones.

To account for the distinction Latin makes between words with and without enclitics, I postulate that in Latin enclitics are noncyclic suffixes (like English class 2 suffixes such as *-ness*, *-hood*, *-ly*), whereas ordinary suffixes are cyclic (like English class 1 suffixes such as *-ity*, *-ic*, *-al*). Rules of the cyclic stratum apply to each cyclic suffix in turn in the familiar fashion and, moreover, trigger on each pass the Stress Erasure Convention which eliminates previously assigned stresses and metrical structure. By contrast, the rules of the noncyclic stratum apply to the entire word only once, after all passes through the cyclic rules have been completed. The rules of Latin stress are stated in (11).

(11)a. *Cyclic Stratum*

i. Heads of syllable nuclei are stress-bearing (i.e., represented on line 0 of the metrical grid).
ii. The last syllable in a word is extrametrical.
iii. Supply stress (line 1 asterisks) to syllables with branching rime.
iv. Line 0 parameter settings: binary, left-headed, right-to-left.

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v. Construct constituents (feet) on line 0 and mark heads on line 1.

b. *Noncyclic Stratum*

i. The last syllable in a word is extrametrical.
ii. Line 0 parameter settings: binary, left-headed, right-to-left.
iii. Construct constituents (feet) on line 0 and mark heads on line 1.
iv. Line 1 parameter settings: unbounded, right-headed.
v. Construct constituents on line 1 and mark heads on line 2.
vi. Conflate lines 1 and 2.

We illustrate in (12a–d) a part of the derivation of the stress contours of the forms *opprímitur* and *li:miná-que*. At the beginning of the last pass through the cyclic rules the two words will have the forms shown in (12a). Note that since *-ur* is a cyclic suffix previously assigned stresses will be erased in *opprimitur*, but since *-que* is a noncyclic suffix previously assigned stresses are preserved in *li:mina-que*.

```
(12a)   .    .  .  .       *   .   .     .
        *    *  *  *      (*   *) *      *
        [opprim it-ur]    [li:min a-qu e]
```

The cyclic rules will apply only to *opprimitur* and yield the representation (12b).

```
(12b)   *    *  .  .
        (*)  (*  *)⟨*⟩
        [opprimit -ur]
```

The rules of the noncyclic stratum are applied next. As no stress erasure applies here the application of (11b i–iii) is vacuous for *opprimitur*, but not for *li:minaque*, as shown in (12c).

```
(12c)   *    *  .  .       *     *     .
        (*)  (*  *)⟨*⟩    (*  *) (*)  ⟨*⟩
        [opprimit -ur]    [li:  mina-que]
```

Next rules (11b iv–v) apply with the effects shown in (12d).

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```
(12d)   .    *   .   .        .   .    *    .
        (*   *   .   .)       (*  .    *    .)
        (*)  (*  *)⟨*⟩        (*  *) ( *)  ⟨*⟩
        [opprimit - ur]       [li:mi  n  a-que]
```

The subsequent application of Conflation (11b vi) completes the derivation.

If the analysis just sketched is correct it provides support for the Exhaustivity Condition as against the [+/− Iterative] parameter in a manner quite parallel to that of Macedonian. In order for the noncyclic stress rules to apply correctly to a form such as *li:miná-que* 'and thresholds' the metrical structure and stresses assigned to *lí:mina* in (12a) must be there, because the stress rules would otherwise assign stress incorrectly to the antepenult (i.e., *li:mínaque*). Since the previously assigned stress does not surface we require in addition – as was also the case in Macedonian – an extra rule of stress deletion. Thus we encounter once again a situation where stress location must be computed in two stages, and as the metrical structure assigned in the first stage does not surface it must be eliminated by the rule of Conflation or its functional equivalent. The availability of the extra power provided by the [+/− Iterative] is of no relevance here.

3. Excursus on Manam Stress with Special Reference to Enclitic Stress

Michael Kenstowicz has drawn my attention to the stress patterns of Manam, an Austronesian language, which presents an interesting counterpart to the Latin facts discussed in the preceding section.

"If no other factor intervenes, Manam primary stress falls on the penultimate syllable" (Lichtenberk 1983, p. 51). Words ending with certain suffixes including the phonetically zero 3. sg. adnominal (possessive) suffix have antepenultimate stress. By contrast words ending with a heavy syllable have final stress.[8] We illustrate the preceding in (13).

(13)a. améri?a 'América' zipáru 'mattress' malípi 'work'
tamá-da 'our father' tamá-gu 'my father' u-balú-r-i 'I stirred them'

b. táma-di 'their father' táma-ma 'our excl. father'
sápara 'his branch' sáriNa 'his space' moagáruNa 'his nose'

[8] For a more extensive treatment of the Manam facts, see Halle and Kenstowicz (1989).

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c. malabóN 'flying fox' zaranóm personal name manám 'Manam island'
tamá-N 'your sg. father' tama-míN 'your pl. father'

We shall assume that the basic stress rule of Manam is identical with that of Latin (11a iii, iv, v). The Manam counterpart of the extrametricality rule (11a ii) is restricted in that it applies only to specific morphemes and in forms ending with the 3. sg. adnominal zero suffix. We shall also assume that the extrametricality rule in Manam is ordered after the rule assigning stress to closed syllables, and we assume that a general convention prevents stressed syllables being marked extrametrical. This is one respect in which Manam differs from Latin. As in Latin, in Manam stress rules also figure in the noncyclic rule block. For present purposes we may assume that the Manam rules are identical with those in (11b).

Included in (13) are suffixed forms of the noun *tama* 'father' which exhibit the same stress as unsuffixed nouns. The only special assumptions that need to be made about suffixed nouns is that their suffixes are cyclic (and therefore trigger stress erasure) and that some of them (e.g., *-di* and *-ma*) are extrametrical whereas the rest are regularly visible to the stress rules of the language.

Unlike the cyclic suffixes in (13), which do not respect previously assigned stress and/or metrical structure, the enclitics *be* 'and', *ʔi* 'or' and *ʔa*, which is a focus marker, illustrated in (14) (and a number of other morphemes) generally respect previously assigned metrical structure and must therefore be treated as noncyclic.[9]

(14)a.	moagáruNa	'his nose'	moagaruNá-be	'his nose and . . .'
	ʔú-do-i	'you took'	ʔu-doʔ-í-ʔi	'you took or . . .'
b.	wabúbu	'night'	wabúbu-ʔa	'night' foc.
	labalába	'old'	labalába-ʔa	'old' foc.

Since the enclitics in (14) are never stressed we shall assume that they are extrametrical. We observe that when the orthotonic word has penultimate stress the enclitic leaves the stress on the original syllable intact (cf. (14b)), but when the orthotonic word has antepenultimate stress, stress is shifted

[9] Lichtenberk (1983, p. 70) states that three of the four enclitics in (14) 'can appear also in noncliticized form'. He assumes that when this happens they behave like extrametrical cyclic suffixes and shift stress to the right; (cf. (13a)):

(i)	áine 'woman'	áine-be 'woman and . . .'
	émbéʔi 'sacred flute'	émbeʔi-be 'sacred flute and . . .'

For a different treatment, see Halle and Kenstowicz (1989).

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to the last syllable of the word (cf. (14a)). Recall that in Manam orthotonic words with antepenultimate stress, the last syllable is extrametrical and is therefore invisible to the stress rules. Hence stress is shifted by the enclitics in (14) only to a previously extra-metrical syllable, or, more relevantly, to a syllable that was not subject to the stress rules on any previous pass through the cycle.

In other words, the enclitics in Manam behave exactly like those in Latin. We will therefore postulate that the Manam enclitics, like those of Latin, aie noncyclic. As already noted Manam differs from Latin in that in Latin all word-final syllables are extrametrical, whereas in Manam this is true only of a marked subset. As as consequence, our treatment predicts that in Latin enclitics should always shift the stress to the final syllable of the orthotonic word, whereas in Manam stress is shifted to the final syllable of the orthotonic word only if it was marked extrametrical. As we have seen above this prediction is fully borne out by the data. The derivations in (15) illustrate the advocated procedure.

```
(15)                 *.  *  .  .              *.  *.   .            line 1
     (11a)           (**) (*  *) ⟨.⟩          (*  *)(*  *)          line 0
                     moa  garu Na             laba laba

                     *.   *  .  .  .          *  .  *  .  .         line 1
     (11b i)         ( **)(.*  *)  *⟨.⟩       (*  *)(*  *)⟨.⟩       line 0
                     moa  garu Nabe           laba laba ʔa

                     *.   *  .   *  .                               line 1
     (11b ii,iii)    (**)( *  *) (*) ⟨.⟩      not applicable        line 0
                     moa  garu Na  be

                     . .   . .   *  .         . .  *  .  .          line 2
                     (*.   *  .  *) .         (*  .  *  .) .        line 1
     (11b iv,v)      (**) (* *) (*) ⟨.⟩       (*  *)(*  *) ⟨.⟩      line 0
                     moa  garu Na  be         laba laba  ʔa
```

As illustrated in (14) since the enclitics are extrametrical they can bring about stress shift only when attached to words whose last syllable is marked extra metrical. When attached to words like *labalaba* 'old', whose last syllable is not extrametrical, the enclitics leave the cyclically assigned stresses intact. We recall that noncyclic rules apply only once in the derivation of each word. Moreover, as already noted, by marking the

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enclitics extrametrical we account for the fact that they never surface with stress.[10]

Readers will no doubt have noticed that in the derivations in (15) the Conflation rule (11b vi) was not applied. The reason for this is that unlike Latin words, Manam words surface with numerous secondary stresses. The Conflation rule (11b vi) must therefore not figure among the Manam stress rules. In the absence of the Conflation rule we expect alternating secondary stress preceding the main stress, and this is by and large borne out by the somewhat sparse data on secondary stress given in our source, Lichtenberk (1983). The major deviation from the predicted distribution of secondary stresses is accounted for if, as suggested in note 10, we postulate a rule that deletes the first of two stresses falling on consecutive syllables.

4. Idiosyncratic Constituent Boundaries

The facts of Cairene presented in (9) above not only provide evidence in favor of the Exhaustivity Condition as against the alternative constituted by the [+/−Iterative] parameter, they also bear on a number of further theoretical issues to which I now turn. To see what is involved consider the stress in the Cairene words in (16), which include heavy syllables; i.e., syllables that end in a consonant or in a long vowel.

```
(16)a.                                b.
     line 2   ..  *  .                    .   .   .   .  *  .   .
     line 1  (*.  *  .)                  (*   .   *   .  *  .)  .
     line 0  (**)(*)⟨.⟩                  (*   *)(*    *)(* *)⟨.⟩
               m ar tá ba              **muqa  a  ti  látu hu
```

[10] The intensive clitic *tina* must be assumed to be noncyclic but not extrametrical. Main stress will then be assigned to the first syllable of the enclitic, and secondary stresses to the stressed syllable of the orthotonic word as well as to the previously extrametrical syllable. As shown in the examples in (i) this prediction is not fully borne out by the facts.

i. tanèpwa-tína 'real chief' èmbeʔi-tína 'real sacred flute'
gòai-tína 'real star'

The rules in (10) predict the stress patterns in (ii):

ii. tànèpwa-tína èmbeʔì-tína gòaì-tína

The extra stresses are readily removed by postulating a rule deleting the first of two stresses falling on consecutive syllables.

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Examples such as (16a) suggest that we can obtain the correct stress assignment provided that in heavy syllables we treat both elements of the rime as potential stress bearers (MORAs) and therefore represent them on line 0 in the grid. In this respect Cairene resembles Winnebago (see (2b) above).

Examples such as (16b) show, however, that this procedure will assign the stress incorrectly to the antepenultimate syllable, rather than to the penult. (For correct stress assignment of all starred forms here and below, see (8b iii).) The reason for this incorrect stress assignment is that there is a fundamental difference between foot construction in Winnebago and in Cairene: in Winnebago the two MORAs of a long syllable need not belong to a single foot; they may also belong to two distinct feet as shown in (2b). In Cairene by contrast the two MORAs of a long syllable may not be split between two feet. We need therefore a formalism that reflects this difference.

In our discussion of Cairene stress in HV we dealt with this fact by assigning stress (line 1 asterisk) to the left MORA of every heavy syllable. In retrospect this solution seems to me unsatisfactory, for it uses idiosyncratic stress assignment to ensure that foot boundaries not occur syllable-internally. The solution implies that we might encounter a language exactly like Cairene where feet are left-headed, yet where the stress on bi-MORAic syllables is assigned by rule to the right MORA so that the two MORAs of a heavy syllable will always belong to distinct feet. In such a language in words without heavy syllables main stress would be assigned as in Cairene to the penult or antepenult, whichever is separated from the beginning of the word by an *even* number of syllables. But in words with heavy syllables main stress would be located on the penult or antepenult whichever is separated from the nearest heavy syllable by an *odd* number of syllables, and in cases where the antepenult is heavy and the penult light, stress would go on the antepenult. I have illustrated this in (17).

```
(17)      .   *   .  .       .  .  .  .  * .  .      .  .  .  *  .  .
         (*)(#   .) .       (*  .  #  .  * .  .     (*  #   .  *  .  .)
         (*)(*   *)⟨.⟩      (*  *)(*  *)(* *)⟨.⟩    (*)(*   *)(*  *)⟨.⟩
       **ma  ŕ  ta ba    **mu qa  a  ti lá tu hu   ʔ a  d  wi yá tu hu
```

Such a language has never been encountered and should be ruled out as a matter of principle. A constraint that achieves this is given in (18).

(18) Idiosyncratic stress (line 1 asterisks) may not be assigned to syllables with more than one stress-bearing element (MORA).

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Constraint (18) does not allow us to assign stress to heavy syllables in Cairene since these are bi-MORAic. It is impossible to treat Cairene heavy syllables as containing only a single stress-bearing element which is always stressed, for as shown in (19) this leads to incorrect stress assignments in certain cases.

```
(19)      *  .  .          .  .  .  *  .  .          .   .  *  .  .
         (#  .  .)        (*  #  .  *  .  .)        (#   .  *  .  .)
         (*   *)⟨.⟩       (*)(*   *)(* *)⟨.⟩        (*    *)(* *)⟨.⟩
       **már ta ba     **mu qaa ti lá tu hu      **ʔad wi yá tu hu
```

Since it is necessary to treat Cairene heavy syllables as bi-MORAic and since in the light of constraint (18) it is not possible to assign stress by rule to bi-MORAic syllables, we must find another means for capturing the stress contours of Cairene words with heavy syllables. I propose to do this by introducing idiosyncratic constituent boundaries, which parallel idiosynractic stresses (=line 1 asterisks). However, in order not to increase the expressive power of the theory excessively, the conditions under which such constituent boundaries can be introduced will be constrained. The proposed constraints are given in (20).

(20)a. A constituent boundary given in the lexical representation or introduced by a special rule must coincide with a syllable boundary; it cannot be syllable-internal.

b. Only one of the two constituent boundaries – the left or the right – may be introduced in this manner. When the constituents are constructed from left to right it is the left boundary that may so be assigned, whereas when constituents are constructed from right to left it is the right boundary. When the direction of constituent construction is not stipulated, the choice of boundary assigned by rule is arbitrary.

I illustrate the proposal in (21). Since in Cairene feet have to be constructed from left to right it is the left foot boundary that is pre-assigned by rule. In (21) a pre-assigned boundary is symbolized by a square bracket, whereas other constituent boundaries are symbolized by parentheses.

```
(21)  ..  *  .      . .. . . *  .        .. .  .  *  .  .      line 2
      (*. *  .)     (* *. *  . * .)      (*.  *  .  *  .  .)   line 1
      [**)(*)⟨.⟩    (*)[**)(* *)(*)⟨.⟩   [**)(* *)(* *) ⟨.⟩    line 0
      mar tá ba     mu qaa ti la tú hu   ʔad wi ya tú hu maa
```

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The stress rules of Cairene are given in (22).

(22) i. All elements in the rime are stress bearing.
ii. The last syllable is extra-metrical unless extra-heavy.
iii. Assign (left) foot boundaries to heavy (and extra-heavy) syllables.
iv. Line 0 parameter settings: binary, left-headed, left-to-right.
v. Construct constituents on line 0 and mark heads on line 1.
vi. Line 1 parameter settings: unbounded right-headed.
vii. Construct constituents on line 1 and mark heads on line 2.
viii. Conflate lines 1 and 2.[11]

In summary, in addition to the regular machinery for metrical constituent construction given by the parameter settings and rule pairs such as (22 iv, v), there are three "wild cards": extrametricality, and the idiosyncratic assignment of stress (=line 1 crosshatches) as well as of constituent boundaries. The string that serves as input to the rules of metrical grid construction may be modified by the application of one or more of these three special rules, and only they have lexical exceptions.

5. The Stress Pattern of Yupik Eskimo

In the stress rules of Yupik Eskimo both devices – idiosyncratic stress assignment and idiosyncratic constituent boundary assignment – are employed. The data below come from the papers by Jacobson, Leer and Miyaoka in Kraus (1985), from Woodbury (1987), from all of which I have learned a great deal. Moreover, my analysis of Chugach was largely anticipated in an interesting study by Curtis Rice (1988).[12]

The basic stress pattern in Alaskan Yupik is as illustrated in (23): stress is placed on even-numbered syllables from left to right.[13]

[11] Stress assignment to constitutent heads in Cairene is implemented by the language-specific rules (22 v) and (22 vii). Analogous rules are found in all other cases of stress discussed in this paper. Since stress assignment is thus treated as distinct from metrical constituent construction we expect to find languages with metrical constituents without the accompanying stress assignments. See also footnote 5.

[12] In the following transcriptions L stands for the voiceless /l/ ('barred l'), N stands for the velar nasal (*angma*), r stands for the voiced uvular fricative (*gamma*) , R stands for the voiceless uvular fricative (dotted *x*). I have systematically omitted from the representations the secondary lengthening of vowels and consonants as well as a number of other supplementary phenomena occasioned by stress.

[13] The capital letter after each example indicates its source.

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(23) ma lì gu tuq 'he goes along with'(M)
qa yà mi ni 'in his own kayak' (M)
ma Lù su tù Li nì lu ni 'he apparently always hunted for beached sea animals' (W)
pi sù tu Lì ni lùni 'he apparently always hunted' (W)
u tèR ten rìl Nur ni '(ones) who don't come home (loc.)' (W)

It is obvious that to capture this stress pattern formally we require right-headed binary feet constructed from left to right. As Woodbury notes such a construction will invariably result in stress on the word final syllable, but this stress does not surface when the item is final in an intonational phrase. No final stress is shown in the examples here as we assume that the examples constitute intonational phrases by themselves. Formally the absence of stress on the last syllable requires – as Woodbury remarks – a special rule that defoots the last foot of an intonational phrase.[14]

In all dialects discussed in my sources syllables with long or di-vocalic nuclei bear stress, regardless of whether or not these syllables are even-numbered. Interestingly, with the sole exception of the Siberian dialect discussed by Jacobson, in all dialects the syllable preceding a long syllable is invariably stressed. I have illustrated this in (24).

(24) qù: yur nìt ka: 'he smiled about it' (W)
cì tùaR su tù Li nì lu ni 'he apparently always hunted beluga' (W)
à: Rà Nì: ra:t 'oldsquaw ducks' (W)
qà yà: ni 'in his (another's) kayak' (J)

We obtain these results quite straightforwardly by employing the same device as in Cairene: we stipulate that in Yupik both nucleus slots of a long vowel are stress-bearing (i.e., represented on line 0) and that, like in Cairene, boundaries of these bi-MORAic syllables are also foot boundaries. I illustrate this in (25).

[14] Miyaoka observes (p. 65) that in the Nunivak dialects phrase final destressing results in shift of stress from the final syllable to the preceding unstressed syllable. Thus, the first form in (23) has in Nunivak two stressed syllables: *malìgùtuq*, rather than just one. The difference between Nunivak and Central Yupik is that in Nunivak final destressing is implemented by a rule which renders the phrase-final syllable incapable of bearing stress, but does not delete the foot. As a consequence the stress of the last foot is automatically shifted to the only remaining stress-bearing element in the foot. When the penultimate syllable of the word has its own stress, destressing of the final syllable will have the same effect as defooting.

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(25) * [** * * * * * * [** * [** [**
cì tuàR su tù Li nì lu ni à: Rà Nì: ra:t

* [** * line 0
qà yà: ni

When binary right-headed feet are constructed on the representations in (25) by the regular stress rule of Yupik (see (29 v, vi) below) the attested stress patterns are readily generated.

I noted above that the Siberian dialect does not follow the treatment of long syllables exhibited above. Like the other dialects Siberian stresses long vowels; however, in Siberian stressing of long syllables is not accompanied by automatic stress on the preceding syllable, as shown in (26).

(26)
. # . . . . # . line 1
* * * * * * * * line 0
qa yà: ni qa yà pig kà: ni 'in his (another's) future authentic kayak (J)

Formally the Siberian facts are captured by postulating that in Siberian all syllables are mono-MORAic (contain but a single stress-bearing rime element), and that long syllables are stressed by rule. I have illustrated this in (26).

It is noted in all studies of Yupik stress that the language differentiates long syllables from closed syllables. Whereas long syllables are always stressed, closed syllables are stressed only when certain other conditions are met.

(27)a. àN ya mì ni 'in his own boat'(M)
àk Nir tàt Na 'they hurt me' (inter. mode) (M)
qùs Nir Nàl Nur pàg taN qèR sug nàr quq 'there seems to be a big goat' (M)
b. ca Nà tèn rì tua 'there is nothing wrong with me' (M)
àt ràr lu ni '(he) going down' (M)
ùl ùr nia 'he says it is slowly flooding' (M)
(but cf. u lùr nia 'he says she looked away' (M))
àN yàr ka mi 'in the materials for boats' (M)
c. àN yag kà-mi 'how about my two boats?' (M)
àN yag kà-mi kèn ri tuk 'my two boats are not small' (M)

As shown in (27a) a closed syllable is stressed in word initial position regardless of the weight of the following syllable. The examples in (27b) show that a closed syllable is stressed when followed by a light or long

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syllable. Note that as shown by the second form in (27a) noninitial closed syllables are not stressed when followed by a closed syllable. (27c) shows that stress is not assigned to closed syllables if the following light syllable is word final.[15]

All cases in (27) can be dealt with by the general stress rule of Yupik provided that closed syllables are stressed by rule (see 29 iii) if followed by a word medial light syllable.[16] In (28) I illustrate a few of the input forms. Since the calculation of the stress contours is straightforward, it is omitted.

```
(28)         #                                          #
      *  *  *   * [**     * [**   *  *  *  *  *  *    *    *  *  *
      ca Nà tè n rì tua   cì tuàx su tù Li nì lu ni   à N ya mì ni
```

As a comparison of the last two forms in (28) shows, the assignment of idiosyncratic foot structure has a different effect on the stress contour of the word than the assignment of idiosyncratic stress. Idiosyncratic foot structure can disrupt the regular stress assignment to its left: it causes stress invariably to be on the preceding syllable even it is odd numbered, but it has no effect on the stress contour to its right. On the other hand, as shown by *àNyamìni* idiosyncratic stress assignment can disrupt the stress assignment to the right. In this and other words in (27a) we get stress on odd numbered, rather than on even numbered syllables because the first syllable is closed and therefore stressed.

In (29) we summarize the main features of the Central Alaskan Yupik stress system:

(29)
- i. All elements of the syllable nucleus are stress-bearing.
- ii. Assign (left) foot boundaries to every syllable with a long vowel or diphthong.
- iii. The heads of closed syllables are stressed (supplied with line 1 asterisks) in word initial position, or if followed by a word-medial light syllable.

---

[15] In the first example in (27c) the dash represents the boundary between a full word and an enclitic; whereas the equals sign (=) in the second example represents the non-enclitic (ordinary word) boundary. Given the strings in (27) we would expect stress on the closed syllable *yag* since it is followed by the light syllable *ka*, but since *ka* is word-final it does not trigger stress assignment. This should be compared to *àk Nir tàt Na* (27a), where the stress on the penult is not due to the special rule for closed syllables but is rather assigned by the general stress rule of Yupik.

[16] The fact that a closed syllable is stressed whenever followed by a light open syllable is attributed in (29 vi) to a rule of iambic reversal. Mechanically the rule renders the head syllable of a foot nonstressbearing, by deleting its line 0 asterisk. Rules of this kind are needed elsewhere; e.g., Indonesian (for details, see Halle and Kenstowicz (1989)).

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iv. Line 0 parameter settings: binary, right-headed, left-to-right.
v. Construct constituents on line 0 and mark heads on line 1.
vi. Defoot word final foot at the end of an intonational phrase.

Interesting light is cast upon the Central Yupik stress pattern by the stress facts of the Chugach dialect of Alutiiq as described by Leer and much illuminated in Rice 1988. Some representative examples are given in (30).[17]

(30)	i.	ta.qù.ma.lu.nì	'apparently getting done'
		a.kù.tar.tu.nìr.tuq	'he stopped eating akutaq'
	ii.	naà.qu.ma.lù.ku	'apparently reading it'
		pi.lù.lià.qa	'the fish pie I'm making'
	iii.	èL.tu.ʔa.qà	'my grandchild'
		èL.tu.ʔàq	'grandchild'
		àg.ku.tàr.tuà.nga	'I'm going to go'
		àg.Nuà.qu.tàr.tuà.Na	'I'm going to dance'

As pointed out by Rice, the major difference between Chugach and the dialects discussed above is that Chugach utilizes ternary rather than binary feet. As was noted in section 1, there is only a single type of ternary foot, the amphibrach, with its head in foot-medial position. We captured this formally by postulating that the parameter left-headed vs. right-headed is not available in the case of ternary feet. The Chugach data in (30 i) clearly support this proposal.

Like the other Yupik dialects Chugach stresses all long syllables and this fact will be formally captured by the same device as that used in the other dialects; i.e., by a rule placing a left constituent boundary. As a consequence the following syllable – unless long itself – is always unstressed because it is the third mora to be included in the ternary foot beginning with the long syllable. The remaining major differences between Chugach and the dialects examined above are (a) that in Chugach closed syllables are stressed only word initially, but not in position before a short

[17] All Chugach examples from Leer (1985); most of the examples are also discussed by Rice (1988).

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syllable, and (b) that in Chugach the word final foot is not defooted as it is in the majority of the Yupik dialects. We reflect this in (31) which should be compared with (29).

(31)
i. Same as (29 i).
ii. Same as (29 ii)
iii. Same as (29 iii)
iv. Line 0 parameter settings: ternary, left-to-right.
v. Same as (29v).

We illustrate the procedure of deriving the stress patterns of the words in (30) in (32).

```
(32)a.  . *  . . *              . *  . .  * .
        (* *  *)(* *)           (* * *)(*  * *)
        ta qù ma lu nì          a kù tar tu nìr tuq

   b.   . * .* .                .*  . . * .
        (* *)[** *)             [** *)(* * *)
        pi lù lià qa            naà qu ma lù ku

   c.[18] #  . . *              #  . *
        (*  *)(* *)             (*  *)(*)
        èL ˆtu a qà             èL ˆtu àq

        #  . * .* .             #  .* . * .* .
        (*  *)(*) [** *)        (*) [** *)(*) [** *)
        agˆku tàrˆtuà Na        àg Nuàˆqu tàrˆtuà Naa
```

Leer observes that in Chugach word initial consonants are fortis; i.e., they are marked by "complete lack of voicing with voiceless consonants (stops and voiceless fricatives), and preclosure" (p. 84). Fortition also occurs word internally at the beginning of a foot in the consonants marked with ˆ in (33a).

```
(33)a.  (* *) [**)
        a lì ˆkaà     'she is afraid of it' (L. p. 84)
        #
        (*  *) (* *)
        àn ci ˆqu kùt   'we'll go out' (L. p. 84)
```

[18] The diacritic mark ˆ before a consonant indicates fortition.

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b. (* * *) (*)
a kù^ta mèk
'abl. of *akutiq* (a food)'
(L. p. 84)

(*) [** *)(*) [** *)
àg Nuà^qu tàr^tuà Na
'I'm going to dance' (L. p. 92)

#
(* *)(*) [** *)
à g ^ku tàr^tuà Na
'I'm going to go' (L. p. 92)

#
(* *)(*)
è L^tu àq 'grandchild'
(L. p. 98)

c. #
(* *)(*)
n à q ^Lu kù 'reading it'
(L. p. 89)

[** *) (*)
maà ^ma q̀a 'my mother'
(L. p. 86)

The examples in (33a) thus show that in Chugach foot-initial consonants undergo fortition and this provides us with another means for determining where foot-boundaries are placed in Chugach words. Examination of the data from this point of view, however, reveals a number of instances where the appearance of fortition is not correlated with foot boundaries constructed by means of the rules in (31). This is true of three of the examples in (32c) as well as of the forms given in (33b, c)

In the examples (33b) the rules (31) fail to assign a foot boundary before a syllable with fortition, whereas those in (33c) exemplify instances where no fortition is found in a syllable that is foot-initial by the rules (31). Following Rice I assume that these divergences from the predicted distribution are due to an avoidance of mono-MORAic feet in Chugach, except word-initially. This is formally implemented by a refooting rule that has the effects of (34).

(34) line 0 * *)(*) → *)(* *)

It can readily be seen that when (34) is applied to the examples in (33 b,c), the resulting foot structure predicts the distribution of fortition correctly.[19]

[19] The distribution of fortition given here does not apply to the Prince William Sound dialect of Chugach, where additional rules must be postulated. (See Leer, p. 99). The stress pattern for the Kenai Peninsula dialect pronunciation of *eL:̂tuaqa* 'my grandchild' with fortition of the onset of the second syllable suggests that *tua* is treated as a single long syllable rather than as a bi-syllabic sequence, as I have analyzed it above. The bisyllabic analysis is required for the Prince William Sound dialect pronunciation *èltua:̂qà*. As noted immediately above, this dialect is not subject to the refooting rule (34).

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6. Conclusions

Examples have been presented suggesting that the extra descriptive power introduced by replacing the Exhaustivity Condition by the [+/−Iterative] parameter does no useful work. It was then argued that the difference between languages like Winnebago that admit syllable-internal foot boundaries and those like Latin that prohibit such a placement of foot boundaries require special rules that identify certain syllable boundaries as foot boundaries of the metrical grid. The introduction of foot boundaries made possible a transparent account of the rather complex stress distributions found in different dialects of Yupik Eskimo.

I note in closing that the change introduced above in the theoretical framework by admitting idiosyncratic foot boundary assignment has left intact . the assumptions that stress is computed by means of a metrical grid composed of hierarchies of linear elements organized into constituents and that constituent structure and stress marks are independent yet related entities. To the extent that the analyses are valid they also validate these assumptions and the theoretical frameworks – including that of HV – of which they are a central component.

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