Issues in foot typology

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1. *Introduction*

In this article I discuss one of the central concerns of metrical theory: the inventory of feet. Firstly, I will look into the question as to whether feet are even or uneven (section 2).[1] Secondly, I will examine in section 3, in the spirit of van de Vijver (1995), whether the foot inventory can be reduced to trochaic feet, taking into account ternary systems in section 4. I conclude that certain systems simply are iambic and I propose in section 5 that they can perhaps be derived but using iambic prosodic words, rather than iambic feet. Having studied these issues from the view point of standard metrical theory, I will then investigate the consequences of the theory advanced in van der Hulst (1984, 1992, 1996, 1997) and van der Hulst & Kooij (1994) in section 6. This theory claims that the treatment of primary accent and rhythmic structure should be formally separated. I will argue that if this theory is accepted some obstacles to the reduced trochaic foot inventory disappear. Then, following van der Hulst (ms.) and van der Hulst & Rowicka (1997), I will argue that the claim of separating primary and rhythmic accent should be reformulated as the claim that we must separate lexical from post-lexical prosodic structure. Finally, section 7 summarizes the main points of this article.

2. Uneven and even feet

2.1. Views on the foot inventory

In early versions of metrical theory two parameters are proposed for foot form: headedness (trochee/iamb) and weight sensitivity (Y/N). These two parameters defin four foot types:

(1)

	trochee	iamb
W-Ins.	| \ σ σ	/ | σ σ
W-Sen.	| \ σ l	/ | l σ

The vertical constituent line indicates headedness; hence trochees are left-headed feet and iambs are right-headed feet. "l" means "light syllable" and "σ" means "any syllable".

Combined with the parameter of Direction (LR/RL) and Word Headedness (LH/RH), the theory produces 16 possible systems of word accentuation. The essential claim of metrical theory is that word accentuation patterns are represented by directionally grouping syllables into feet and then grouping the feet into a word tree.

In addition to the parameters mentioned, further parameters have been proposed:
- foot formation may be non-iterative (if no rhythmic pattern is present and only the location of primary accent must be accounted for).
- to derive ternary SWW rhythmic patterns feet may be ternary or, alternatively, one (light) syllable is left unparsed in between binary feet.
- feet may be unbounded to derive systems in which primary accent can be deeper in the word than what can be reached by a binary or ternary foot plus extra-metricality, and to have secondary accents on heavy syllables only and thus no binary or ternary rhythmic accents.
- a peripheral syllable may be extrametrical, i.e. be invisible for foot formation. It has been proposed that only fina syllables can be extrametrical.
- other peripheral units may be extrametrical: a fina consonant to make the last closed syllable open, and thus light, a fina (non-branching) foot.

This list of additional parameters is not exhaustive, but it is obvious that no full consensus was ever reached on what the complete list of metrical parameters is. It

will be clear, at any event, that the total set of possible metrical systems was quite large.

Although Hayes (1980) sets out to show that all the 'cells' of the metrical theory can be 'filled' Hayes (1985, 1987, 1995) concludes that some serious "data gaps" remain, especially in so-called iterative systems:

(2) Data gaps
- a. Iambic footing: rare if weight-insensitive
- b. Trochaic footing: absent in LR weight-sensitive systems

He proposes to eliminate the parameters for headedness and weight-sensitivity, replacing these with an asymmetrical inventory of basic metrical units, as in (3):[2]

(3)

a. Syllabic trochee	x (σ σ)	otherwise	· σ
b. Moraic trochee	x (σ σ)	[= x or x] otherwise (l l) (h)	· l
c. Uneven iamb	x (l σ)	otherwise x or (h)	· l

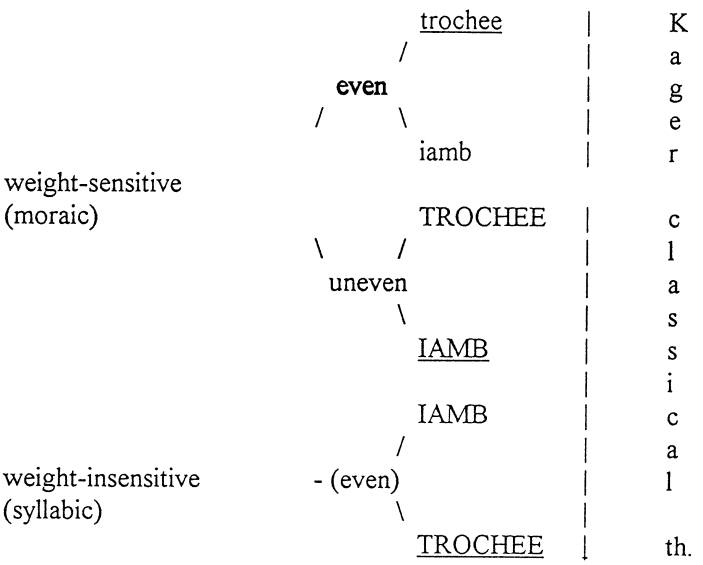
The notation "σ" indicates that the syllable in question in not incorporated in a foot. This indicates that Hayes also introduced the idea that foot parsing need not be exhaustive for the purpose of deriving the accentual pattern (leaving aside whether and how unparsed syllables are eventually incorporated into the word prosodic structure). The reason for leaving certain syllables unparsed is that they would otherwise form unary feet. Hayes does consider the option, however, that such feet are allowed only under primary accent. Kenstowicz (1994) discusses the justificatio of banning unary feet that do not express primary accent.

Hayes argues that the iambic or trochaic choice is dependent on a general rhythmic law which says that sequences of stimuli differing in loudness tend to be parsed trochaically, whereas sequences of long and short stimuli lead to an iambic grouping; Rice (1992) offers extensive discussion of this rhythmic law.

For weight-**in**sensitive systems, then, only the trochee survives (i.e. 3a), whereas sensitive systems are claimed to be iambic (i.e. 3c), although those which were formerly analyzed in terms of trochaic feet, now require a new foot type, the **moraic trochee**. The essential point of this foot type is that heavy syllables always will form a foot by themselves and that in a LR system a light syllable to the immediate right of a heavy syllable can also be accented. This, at fir t sight, unexpected tolerance of accent clashes has a certain amount of empirical motivation, as we will see below.

In this article I will henceforth adopt the following terminology to refer to various types of feet (excluding ternary feet for the moment):

(4)



The old theory adopted the CAPITALIZED feet, whereas the new theory only recognizes those that are underlined. Below, we will also consider the theory proposed in Kager (1993) who only makes use of the moraic even foot types, i.e. the **bold** section.

Trochaic foot types all have the property of combining two 'units' into an even foot: syllables in the case of the syllabic trochee (i.e. 3a) and moras in the case of the moraic (even) trochee (i.e. 3b). The moraic even trochee, like the moraic uneven iamb, is sensitive to the distinction between heavy and light syllables. Thus, while systems that are syllabic have no choice (they are always even trochaic), systems that pay respect to weight (i.e. moraic systems) are either uneven iambic or even trochaic.

The choice that moraic systems have is unexpected, given the rhythmic law that was just mentioned. A system that is moraic necessarily differentiates between long (bimoraic) and short (monomoraic) syllables. But, and this is the problem, given the rhythmic law one would expect such systems to be always uneven iambic. It is, after all, not claimed to be the case by Hayes that systems requiring moraic even trochees refer to a different kind of weight distinction than even iambic systems. The implicit assumption appears to be that trochaic patterning is triggered if the relevant units are of the same type (i.e. moras or syllables), but this is *not* what the rhythmic law says. In my view, this problem reduces the importance that we must attach to the rhythmic law. It may be true that syllabic systems are always trochaic, but systems that pay respect to weight (thus making a distinction between monomoraic and bimoraic syllables) can apparently be trochaic or iambic.

Let us now establish precisely the empirical differences between the old (classical) theory and the new Hayes (1995/6) theory.[3]

2.2. *Syllabic systems*

The new theory excludes the iambic foot in syllabic systems. It is claimed that patterns which were derived by this foot in the old theory can be analyzed in other ways. To show this, we have to look at the two directions of footing separately and for both directions we must consider an uneven and even string of syllables:

(5)

i.	DIR (LR)	OLD	DIR (LR)	NEW
a.	Word (LH) Foot (ia)	x (x x x) (1 2) (3 4) (5)	Word (LH) Foot (tr)	x (x x) <1> (2 3) (4 5)
b.	Word (LH) Foot (ia)	x (x x) (1 2) (3 4)	Word (LH) Foot (tr)	x (x) <1> (2 3) 4
ii.	DIR (RL)	OLD	DIR (RL)	NEW
a.	Word (RH) Foot (ia)	x (x x x (5) (4 3) (2 1)	Word (RH) Foot (tr)	x (x x x) (5 4) (3 2) (1)
b.	Word (LH) Foot (ia)	x (x x) (4 3) (2 1)	Word (LH) Foot (tr)	x (x x) 4 (3 2) (1)

Let us look at the two directions in more detail.

i. Left-to-right (LR).

Weight-insensitive systems with primary accent on the second syllable are not frequent. Nonetheless they exist and if they cannot be derived with a syllabic iamb, another analysis must be developed. The most obvious route is to invoke extrametricality at the left word edge, followed by trochaic footing. This is shown in (5ia) under NEW. In the absence of a clear indication for foot boundaries, it is hard to see what would block such a reanalysis.[4] Using left-edge extrametricality implies giving up the idea that extrametricality is confine to the right-edge. The need to avoid left-edge extrametricality was more pressing, however, in the old theory because combining it with LR iambic feet could produce primary accent on the third syllable, a possibility that is not empirically instantiated. A possibly candidate, Winnebago, is discussed extensively in Hayes (1996).

Contrary to expectation, Hayes (1995: 267–68) analyzes a few systems, which could be reanalyzed in this way, with iambic feet after all. We can do this, he argues, if we

say that the relevant systems use uneven moraic iambic feet (i.e. weight distinctions are recognized) but just happen to miss a weight distinction. What the theory in (3) excludes, he argues, is a syllabic iambic parsing in languages that have a weight-distinction, i.e. long and short syllables. Clearly, this suggestion further undermines the importance of the rhythmic law. We already noted that systems with (recognized) weight can be either (even) trochaic or (uneven) iambic. Now we also learn that systems without a weight distinction can be trochaic or iambic. What remains is only that systems that choose not to recognize a weight-distinction must be trochaic. (Note that systems that effectively only have light syllables cannot exist if vowel aperture can also contribute to weight).

ii. Right-to-left.

With RL mode, (5ii), a different situation holds. The old theory produces cases with fina accent straightforwardly. Without a syllabic iamb there are two ways of producing fina accent. First, one could say that in such cases there is a separate statement that locates primary accent on the fina syllable (cf. 6a). With this primary accent in place, trochees can be assigned from right to left.[5]

(6) a.
```
                x
[ σ  σ  σ  σ  σ ]
```

b.
```
                x
   ( x     x    x)
[ (σ σ)  (σ σ)  (σ) ]
```

This mode of accent assignment is labelled 'primary accent first' in van der Hulst (1984, 1990, 1992, 1996, 1997) and 'top down parsing' in Hayes (1995). I will expand on this view in section 6. For now let us note that 'first' does not necessarily imply a *derivational* priority. The point is rather that, firstly, there is a statement about primary accent location which is independent from the statement about rhythmic structure and, secondly, that the former statement takes precedence over the latter. In the style of Optimality Theory (Prince & Smolensky 1993) we would say that the contraint(s) bearing on primary accent location rank above the constraint(s) that bear on rhythmic structure. On the other hand, it is not the case that the described state of affairs necessarily argues against a derivational interpretation of 'first', as suggested in Prince & Smolensky (1993). This is only so if *representationally* primary accent and secondary accent are placed in the same plane (as is done in standard metrical theory). We can easily imagine having both on different planes in which case there is no geometrical contradiction in placing primary accent first (cf. section 6.1).[6]

A second alternative to RL iambs is the postulation of a 'silent' syllable in fina position so that again trochees can be used. This mechanism, called catalexis, has

been proposed by Kiparsky (1991) and elaborated in Kager (1995) (the '**Ω**' represents a 'silent syllable'):

(7)
```
x     x     x     x ·
(σ  σ) (σ σ ) (σ σ ) (σ Ω)
```

This type of misalignment between the morphological word and the prosodic word forms the logical counterpart to extrametricality.[7] Extrametricality pretends that a syllable that is there cannot be footed, whereas catalexis pretends that something that is not there can.

As a third alternative, one might expect that Hayes (1995) would suggest that RL iambic syllabic parsing is possible if the language in question has no weight distinction to begin with. But instead, Hayes (1995: 262–266) says, when talking about right-to-left iambs: "[i]n general, it seems that the existence of such systems is hard to prove". The reason he gives for this involve the possible reanalysis given in (6).

But if the availability of plausible alternatives decides the issue, it is not clear to me why we could not just as well say that left-to-right systems are also difficult to prove. We have seen, after all, that these can be reanalyzed as trochaic systems with the help of left-edge extrametricality. Presumably, Hayes is more reluctant to see this as a desirable alternative, because left-edge extrametricality is considered to be a marked option (Hayes 1995: 57), although this in itself could explain the low frequency of second syllable accent.

Ignoring Hayes' reluctance, we can conclude this section by saying that syllabic iambic feet are completely unnecessary. In section 4 and 5 I will address the need for moraic iambs, but fir t we will continue our comparison of the old (cf. 1) and new (cf. 3) foot typology.

2.3. M*oraic systems*

2.3.1. T*rochaic systems*

The descriptive capacity of the uneven trochee and the even trochee are the same in right-to-left application, if we ignore differences in bracketing:

(8)

Uneven, RL
```
          x  x  x  x  x
. . .   (h) (l l) (h l) (l l) (h l)  ]
```

Even, RL
```
          x  x  x  x  x
. . .   (h) (l l) (h) l (l l) (h) l ]
```

However, in LR-mode a systematic difference comes out:

(9) a. Uneven, LR
x x x x
[(h l) l (h l) (l l) (h l) . . .

b. Even, LR
x x x x x
[(h) (l l) (h) (l l) l (h) l . . .

According to Hayes (1987, 1995) no LR systems using the uneven trochee have been attested, whereas systems that have the pattern with the even trochee occur. The documented cases involve a number of Arabic dialects (p. 67–71: Cairene Arabic and p. 125–130: Palestinian Arabic among others) and Cahuilla (p. 132–140). These cases suggest that where the uneven trochee and the moraic trochee differ, the moraic trochee wins on empirical grounds. Crucially, these systems assign an accent to the fir t of a sequence of two post-heavy light syllables:

(10)
(x) (x .)
... h l l ...

2.3.2. *Iambic systems*

Accepting the replacement of the uneven trochee by the even trochee, Kager (1993) takes the next logical step and argues that the moraic uneven iamb can be replaced by a moraic even iamb. This calls for an examination of the empirical differences between both foot types. As one might expect, both types produce the same pattern in LR-mode:

(11) a. Uneven, LR
x x x x x
[(l h) (l l) (h) (l l) (l h) . . .

b. Even, LR
x x x x x
[l (h) (l l) (h) (l l) l (h) . . .

The moraic iamb simply leaves those light syllables which adjoin to a heavy syllable in the uneven iamb unparsed. In principle, then, both approaches are equivalent. In RL-mode, however, both foot types produce different results; underlined syllables are wrongly (un)accented:

(12) a. Uneven, RL

```
        x   x   x   x
. . . (l h) l̲ (l h) (l l) (l h) ]
```

b. Even, RL

```
        x   x x   x x
. . . l (h) (l̲ l̲) (h) l (l̲ l̲) (h) ]
```

It now turns out that the empirical advantage is with neither approach. Both produce patterns that are slightly off the mark. We can demonstrate this by studying a pattern that comes close, viz. that of Tübatulabal, which assigns accents as follows (Hayes 1995: 263):

(13) a. Final syllables, whether heavy or light
b. Heavy syllables
c. Every other light syllable before a heavy syllable

If unary feet are disallowed, the uneven iambic theory, (12a), fails in two ways. Firstly, it will not assign an accent to the fina syllable when a word ends in a hl sequence. Secondly, it will not assign an accent to the left-hand light syllable in a llh sequence; if unary feet are allowed both defects would be removed, however.

(14) a.

```
                                  x
Uneven iamb   ( x  x  x   x  x)
& unary feet  (l h)(l)(l h)(l l)(l h)
```

The moraic parsing, (12b), fails in a more fundamental way. Firstly, it will also skip the fina light in a hl case provided that unary feet are disallowed. Secondly and more seriously, it assigns an accent to a pre-heavy light syllable, which would be incorrect for Tübatulabal. This can only be avoided by allowing unary feet and invoking some kind of clash-driven skipping (a light syllable to the left of a heavy syllable is skipped):

(14) b.

```
                                  x
Even iamb     ( x  x   x   x   x)
& skipping    l (h)(l) l (h)(l l) l (h)
& unary feet
```

If the conclusion is that the Tübatulabal pattern cannot be derived without appealing to moraic iambs (whether uneven or even), essentially due to banning unary feet over light syllables, two questions must be answered. Firstly, how can the Tübatulabal patterns be derived, and, secondly, why is it that patterns created by RL iambs (even or uneven, depending on the theory) do not occur?

In response to the second point, Kager (1993) says that RL applications of the moraic iamb do not occur because they will always produce backward clashes in "l l

h" environments. He suggests that such systematic backward clashes (and thus systems that systematically have them) are universally prohibited. This argument is not so strong because we could invoke clash-driven skipping, although this, without using unary feet, will still not produce Tübatulabal:

(14) c.

		x
Even iamb	(x	x x x)
& skipping	l (h) l l (h)(l l) l (h)	
	=	

Kager (1993) does not consider this option however.

Tübatulabal is a rare type of system. Only three such systems are known in the literature: Aklan, Tübatulabal and Tiberian Hebrew. This point is acknowledged in Hayes (1995: 262 ff.). Kager (1993) proposes to analyze the required pattern by adopting the primary accent fir t approach proposed in van der Hulst (1984, 1990, 1992, 1996, 1997), followed by a RL moraic trochee:

(15) a. primary accent fir t x
Even trochee (x x x x x)
l (h)(l l)(h) l (l l)(h)

b. primary accent fir t x
Even trochee (x x x x x)
l (h)(l l)(h) l (l l)(l)

Note that the primary accent foot must also be assigned to a fina light syllable, as in (15b). The fact that such systems require a primary accent fir t account explains why they are relatively rare, according to Kager (1993).[8]

Thus, in Kager's theory the scope of even moraic iambic footing is reduced to LR systems. Hayes (1995) seems to agree with this conclusion. Both Hayes and Kager (1993), then, only recognize iambic systems that can be analyzed with even iambs (adopted by Kager) and uneven iambs (adopted by Hayes). This leaves the decision with respect to iambic systems (all weight-sensitive and LR) undecided.

2.3.3. *Summary concerning moraic systems*

The table in (16) summarizes the different predictions made for moraic systems dependent on the choice of either even or uneven feet. I show the effect of these feet in three different contexts. The cases that are underlined are crucially different in the two theories:

(16)

MORAIC	FOOT: trochee	FOOT: iamb
DIR: LR	even (x ·) [l l (x) [h l (x) (x ·) h l l ========== uneven (x ·) [l l (x ·) [h l (x ·) h l l	even (· x) [l l (x) (· [h l (x) (· x) h l l uneven (· x) [l l (x) (· [h l x) (· x) h l l
DIR: RL	even (x ·) l l] (x) l h] (x ·) (x) l l h uneven (x ·) l l] (x) l h] (x ·) (x l l h	even (· x) l l] (x) l h] (· x) (x) l l h ========== uneven (· x) l l] (· x) l h] (· x) l l h

In case of the upper lefthand box the empirical evidence weighs in favour of the even trochee (crucial witnesses: various Arabic systems, Cahuilla). This has been taken to mean that the uneven trochee can be dispensed with entirely.In van der Hulst & Klamer (1995) it is argued that the uneven trochee may deserve a place along side the even trochee after all. The arguments will not be repeated here.

In the case of the lower righthand box, proponents of both theories agree that this mode should not be appealed to, which makes it more problematic to decide whether moraic iambic systems are even or uneven because both theories produce the same rhythmic pattern in left-to-right mode (cf. 12).[9]

In the next section I will discuss a number of LR trochaic systems and re-open the case against uneven feet. Then I will investigate LR iambic footing in more detail.

3. *Reducing the foot inventory to trochaic feet?*

We have seen that the syllabic iamb is unnecessary (cf. section 2.2), whereas (even or even) iambs perhaps only operate from left to right. The directional bias of moraic iambs requires some sort of stipulation. No such stipulation would be required if we do away with iambic feet alltogether. Van de Vijver (1995, 1998) addresses this issue. In his 1998 work, adopting an OT approach he proposes to allow the iambic foot only

as a last resort, i.e. if the formation of trochaic feet is barred by constraints that outrank the constraint 'make trochees'.[10]

We have seen that syllabic iambs can be circumvented by appealing to extrametricality in LR mode and to a primary accent first analysis for the RL cases. For moraic iambic systems the RL mode has been denied (because it produces backward clashes) and for systems that were thought to be of this type, like Tübatulabal, it has been suggested that the primary accent first approach can again be adopted. This leaves us with LR moraic systems. Let us first explore whether the extrametricality approach can be used for LR moraic systems. Consider the following string:

(17)
(x)(x ·)(x)(x ·)(x ·)	trochaic parsing
[<l>l h l l h l l l]	
(· x)(x)(· x)(x)(· x) ·	iambic parsing

The 'traditional' iambic parsing can indeed be matched by making the first syllable extrametrical and appying an uneven trochaic parsing that makes use of degenerate feet, which will usually be 'rescued' through 'iambic lengthening', a process that must be renamed if the present perspective is adopted. For the moment let us accept this possibility; I return to the issue of completely disallowing iambic feet in section 5.

At this point we have dispensed with all iambic feet, while recognizing three trochaic foot types: the syllabic trochee, the moraic trochee, the uneven trochee; for uneven trochaic feet see van der Hulst & Klamer (1995) and Kenstowicz (1994). Assuming, then, that we can get away with this purely trochaic theory, let us define this set and at the same time incorporate ternary patterns (anticipating the discussion as to whether we need ternary feet in the next section). I propose the following three FootForm parameters:

(18) FootForm Parameters
- a. Unit: syllable/mora
- b. SizeFoot: min/max
- c. SizeUnit: min/max

The first parameter decides whether the foot is syllabic (weight-insensitive) or moraic (weight-sensitive). The SizeFoot parameter defines the size of feet in terms of the number of syllables irrespective the setting of the unitparameter. The SizeUnit defines the size with reference to the relevant unit.The three parameters generate a set of eight possible combinations of values of which three are logically impossible:

(19)

		Unit: syllabic	moraic
SizeFoot	SizeUnit		
min	min	(σ σ)	(μ μ)
	max	-----	((μ μ)$_{\circ}$ μ)
max	min	-----	-----
	max	((σ σ) σ)	((μ μ) μ)

Combining the two 'min' values produces strictly binary (syllabic or moraic) feet, while combining the 'max' values produces ternary feet. Of the min/max combinations, the uneven trochee is allowed by combining mimimal bisyllabicity with maximal trimoraicity. No possible foot type corresponds to the other min/max combinations. If the size in terms of syllables is set on min, the max value for unit (if unit is syllable) produces a contradiction. Similarly, if the SizeFoot parameter allows three syllables, limiting the foot to a minimum of two units again leads to a contradiction. The typology in (19) incorporates ternary systems. In the next section I discuss ternary systems to see whether or nor such pattern call for ternary feet. Our findi gs will not be conclusive, however.

4. *Ternary feet*

In the early days of metrical theory it was argued that ternary feet could be banned from the theory entirely. Ternary feet that occurred on either the left or right side of words could be handled with deaccenting rules and extrametricality, conspiring for initial dactyls and fina dactyls, respectively. Hayes (1980), in favour of a strictly binary theory, noted that the pattern in Cayuvava (which we discuss below) is problematic if only binary feet are admitted, but he offered no solution at the time. Since then, however, more and more languages with ternary rhythmic patterns throughout the word have come to the forefront (Levin 1988, Haraguchi 1991, Rice 1992, Hayes 1995: 307–366). This necessitates a reconsideration of the ban on ternary feet. Let us consider some examples of ternary systems in order to establish how they can be treated.

As our point of departure we take a typology of ternary foot types, proposed in Rice (1992), that includes the dactyls (SWW) in (19) and various types of amphibrachs (WSW) and anapests (WWS). He allows four moraic and four syllabic possibilities. I give all the possibilities in (20), underlining those that our typology has acknowledged:

(20)

MORAIC	foot: iamb	foot: trochee
head: trochee	x (μ (μ μ)) 'moraic amphibrach'	x ((μ μ) μ) 'moraic dactyl'
head: iamb	x (μ (μ μ)) 'moraic anapest'	x ((μ μ) μ) 'moraic amphibrach'
SYLLABIC		
head: trochee	x (σ (σ σ)) 'syllabic amphibrach'	x ((σ σ) σ) 'syllabic dactyl'
head: iamb	x (σ (σ σ)) 'syllabic anapest'	x ((σ σ) σ) 'syllabic amphibrach'

So far no appeal has been made to the anapest (WWS) in either moraic or syllabic systems. Let us assume that these are banned and that this essentially follows from banning iambic feet since the anapest is right-headed like the iamb. Let us turn to dactyls (SWW) which are in a way extensions of the trochaic pattern.

In Cayuvava (Hayes 1995: 309–314) primary accent lies on the antepenultimate syllable, and preceding that syllable we fin ternary rhythm. If we approach such a pattern in terms of the **syllabic dactylic foot** (assigned from right to left and ignoring foot internal brackets) we derive the representations in (21):

(21) a. x x x
(σ σ σ) (σ σ σ) (σ σ σ)

b. x x
σ σ (σ σ σ) (σ σ σ)

c. x x
σ (σ σ σ) (σ σ σ)

It is of interest to note that no secondary accent is reported if the available span of syllables is shorter than three, as in (21b). The dactylic foot does not account for this fact.

Hayes (1995) proposes an alternative to (21) that appeals to a special parsing mode, weak local parsing. The footing algorithm is allowed to 'skip' a unit each time

after having assigned a foot.[11] In Cayuvava this mode applies in conjunction with extrametricality:

(22) a.
```
x       x       x
(σ σ) σ (σ σ) σ (σ σ)<σ>
```

b.
```
        x       x
σ σ (σ σ) σ (σ σ)<σ>
```

c.
```
        x       x
σ (σ σ) σ (σ σ)<σ>
```

The unstressedness of the initial syllables in (22b) is again hard to understand.

So far, then, we see that depending on whether or not one adopts weak local parsing, syllabic dactyls may be called for. What about moraic dactyls?

Dresher & Lahiri (1991) analyze Germanic in terms of a **moraic dactylic foot** (SWW). Since primary accent is strictly initial, also in case an initial light syllable is followed by a heavy syllable, Dresher & Lahiri claim that heavy syllables in second position, following an initial light, carry no secondary accent; they act as light syllables and are incorporated into the foot that contains the preceding light syllable. This is what Dresher and Lahiri call **resolution**. The moraic dactyl-cum-resolution is called The Germanic Foot. The resolution effect is not a necessary property of ternary moraic systems and must thus be stated in the form of a further parameter.[12,13] This means that Germanic is not a pure case of the moraic dactyl and that currently such a case is lacking. There is no straightforward alternative using weak local parsing for Germanic. Van der Hulst & Lahiri (1998), Halle, O'Neil & Vergnaud (1993), Kenstowicz (1994) and Hayes (1995) argue in favour of various alternatives for Germanic, using the moraic trochee instead of the moraic dactyl/Germanic foot.

The conclusion with respect to dactyls is as follows, then: if we assume that the Dresher & Lahiri analysis stands, and weak local parsing is not accepted, we may conclude that we need a syllabic dactyl (for Cayuvava) and a moraic dactyl (for Germanic). If, however, weak local parsing *is* accepted it may be too early to admit syllabic dactyls, and if it is true that Germanic can be analyzed in terms of the moraic trochee, then the moraic dactyl may also be unnecessary. In that case the typology in (19) can be simplifie by dropping the SizeFoot parameter, which effectively leaves only the syllabic trochee and the even/uneven moraic trochee; the evidence for the uneven trochee, however, is not generally accepted; cf. above.

We now turn to amphibrachs (WSW). In the typology of Rice there are even two types of both syllabic and moraic amphibrachs because these feet are internally left- or right branching. I will ignore this difference involving internal bracketing for syllabic amphibrachs (because the difference involves bracketing only and does not lead to difference rhythmic patterns). Let us now consider the evidence for syllabic and

moraic amphibrachs. A syllabic amphibrach was introduced in Halle & Vergnaud (1987) to analyze Cayuvava, combined with extrametricality.

(23) a. x x x
(σ σ) (σ σ σ) (σ σ σ)<σ>

b. x x
σ (σ σ σ) (σ σ σ)<σ>

c. x x
(σ σ σ) (σ σ σ)<σ>

The amphibrachic mode makes more sense of the unstressed character of the initial syllable in (23b).

We have seen, however, that Cayuvava can also be analyzed in terms of dactyls or trochees (with weak local parsing). The syllabic dactyl and syllabic amphibrach would more clearly differ in descriptive potential if extrametricality is not involved to neutralize the difference. A pure amphibrachic system would have penperipheral primary accent and a further ternary rhythmic pattern. At present I am not aware of such cases, however. This raises doubts concerning the syllabic amphibrach, especially if the syllabic dactyl or weak local parsing is accepted.

Turning to the moraic amphibrach we note that Rice suggests to use the right-branching amphibrach (μ ($\overset{x}{\mu}$ μ)) for Sentani, RL. Hayes (1995: 330–332) proposes an alternative with the even moraic trochee combined with weak local parsing. In other words he skips the light syllable that Rice sees as being left-adjoined in the foot.

Rice puts the left-branching moraic amphibrachs (($\mu\overset{x}{\mu}$) μ) to use in Chugach (in a LR mode). Hayes uses uneven iambic feet, but Kager (1993) points out that this raises problems. Kager uses even iambs plus weak local parsing which skips the light syllable that Rice see as right-adjoined in the foot.

We conclude that among ternary systems only left-headed feet are probably necessary. Whether we need left-headed dactylic feet or adopt trochees combined with weak local parsing needs further investigation. The following table summarizes our findi gs:

(24)

ternary feet	syllabic	moraic
anapest	not attested	not attested
dactyle	Cayuvava alternative: syll. trochee + WLP	Germanic alternative: moraic trochee
amphibrach	Cayuvava alternative: syll. trochee + WLP	Sentani (RL) alternative: moraic trochee + WPL Chugach (LR) alternative: moraic iamb + WLP

It seems that only for systems like Chugach LR moraic iambs are necessary after all. In addition to Chugach, Hayes (1996) identifie a whole further range of such systems. It is true that in (17) we in fact proposed a trochaic alternative but this alternative has two drawbacks: it uses unary feet and it uses the *un*even trochees.

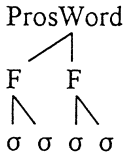
5. LR *iambic feet as prosodic words*?

In this section I will tentatively suggest that there may be a way to represent weight-sensitive LR iambic patterns without admitting iambic feet and without adopting questionable trochaic alternatives. My suggestion is partly based on some conclusions reached in van der Hulst (1997) where it is argued that the LR iambic systems are mostly found in languages with a rich polysynthetic morphology. Many of such systems, in addition, either lack primary accent or are reported to be "count systems"; in the latter type of system primary word accent is said to fall on the rightmost foot, with feet having been assigned LR (trochaic count systems or count systems that have RL footparsing are rare; cf. van der Hulst 1997). Count systems are special then in the sense that primary word accent is crucially dependent on foot formation and as such they do not fi into the claim van der Hulst (1997) makes, viz. that all word level primary accents are non-metrical (in the sense that no prior footing is required). The non-metrical theory of word accentual patterns, which is explained in more detail in the next section, proposes to represent primary and secondary separately.

The "impression" of the foot dependency of word accent in count systems is explained in the following manner. Let us assume fir tly that word accent is **prosodic word accent**. It has been proposed (e.g. in Helsloot 1993) that the prosodic word is

not an endless (i.e. unbounded) domain, but rather maximally consists of two feet (possibly with limited adjunction of stray syllables at the periphery of these feet or the prosodic word itself); the feet making up the prosodic word must be trochees (cf. section 3 and 4). An ideal prosodic word thus looks as follows:

(25)



In (25) I have represented a prosodic word that is iambic. The structure in question corresponds to penultimate accent, a pattern found in many languages. Of course we can not exclude trochaic prosodic words given the widespread occurrence of initial accent systems.

Given the template in (25) in languages with very "long words" (i.e. polysynthetic morphology) many morpho-syntactic words will not fi even the maximal template of the prosodic word in (25). Such long words must therefore be parsed into several prosodic words. The tentative suggestion I wish to make here is that under such circumstances there is a "tendency" for parsing to be 'syllable-timed' which implies that feet are not expanded into SW patterns but rather all comprise one syllable. I have to admit that at this point I do not really understand why the prosodic word would default to an iambic minimum in case of a typical mismatch situation. Another way of looking at what happens is that the foot layer is not activated in these cases. Whatever may be the correct view, effectively the result will be a situation of parsing words into iambic units. My suggestion here is that these units are not feet but (minimal) prosodic words.

If, with respect to the morpho-syntactic words, a 'primary accent' is perceived that accent would not be a (prosodic) word level accent, but rather a higher level accent like in compounds or even phonological phrases. This, then, gives rise to the so called count systems; cf. van der Hulst (1997) for further details.

Bisyllabic iambic words arise, in this view, in the context of a major mismatch between morpho-syntactic words and maximal prosodic words. One might expect then that this may happen not only if morpho-syntactic words are very long, but also when they are very short (monosyllabic). This prediction is borne out in the Austronesian language Hatem (described by G. Reesink, Leiden University), but it needs to be tested on a larger sample of languages.

In conclusion to this section we can say that it is perhaps possible to analyze iambic languages in terms of bisyllabic iambic prosodic words, rather than iambic feet. Thus the claim that all feet are trochaic can be maintained.

6. Primary accent assignment

In metrical theory (irrespective of its foot inventory), primary accent assignment is represented as rhythm- or foot-based. Primary accent is assigned on the basis of prior foot parsing. In van der Hulst (1984, 1990, 1992, 1996, 1997) I argue in favour of an accentual theory that separates primary accent from secondary (or rhythmic) accent assignment. For arguments supporting this separation I refer especially to van der Hulst (1997). It seems likely that the separation of primary and secondary accent has consequences for the typology of foot types. In particular, I would like to show that if the task of foot structure is reduced to accounting for rhythmic structure, we stand a greater chance of maintaining the simple inventory proposed in the previous section because some of the potential problems that this inventory might face are 'taken care of' by the primary accent calculus. I discuss these point in sections 6.1–6.3. The theory discussed there was termed primary accent fir t (PAF) in van der Hulst (to appear a, b) because apart from separating primary and secondary accent, the claim was also that both aspects of the accentual structure apply at different levels of the grammar, i.e. the lexical and post-lexical level respectively. In section 6.4 I elaborate on this point arguing that the crucial point is indeed separating the lexical from the post-lexical structure and not separating primary and secondary accent, although these two distinctions typically coincide.

6.1. A theory of primary accent placement

I will focus on bounded systems and show that the attested variety, if handled in a purely trochaic foot-based theory, poses some problems. These problems, in fact, are not confine to an approach that adopts the restricted trochaic inventory. Consider the following variety of bounded systems:[14]

(26) a. Rotuman : final in case of σh], otherwise penultimate: TROCHEE

x	x	x	x
x)	x)	x x)	x)
(h l)]	l (h)]	(h)(h)]	(l l)]

b. Yapese : penultimate in case of hl], otherwise final: IAMB

x	x	x	x
x) ·	x)	x x)	x)
(h) l]	(l h)]	(h)(h)]	(l l)]

c. Aklan: penultimate in case of hσ], otherwise final: ???

x	x	x	x
x	x	x	x
h l]	l h]	h h]	l l]

d. Awadhi: penultimate except in case of lh]: ???

x	x	x	x
x	x	x	x
h l]	l h]	h h]	l l]

(27) a. Ossetic: initial in case of [hσ, otherwise postinitial: IAMB

x	x	x	x
(x	(x	(x x	(x
[(h) l	[(l h)	[(h)(h)	[(l l)

b. Malayalam: postinitial in case of [lh], otherwise initial: TROCHEE

x	x	x	x
(x	(x	(x x	(x
[(h l)	[(l h)	[(h)(h)	[(l l)

c. Capanahua: peninitial in case of [σh, otherwise initial: ???

x	x	x	x
x	x	x	x
[h l	[l h	[h h	[l l

d. Unattested: peninitial except in case of hl: ???

x	x	x	x
x	x	x	x
[h l	[l h	[h h	[l l

That we cannot derive (27d) might be considered good, given that it has not been attested, but this may be an accidental gap because its counterpart at the right edge

has been reported (i.e. 36d: Awadhi). The cases marked with a question mark pose a problem to all known current foot inventories. In addition, those that appeal to iambic feet are problematic to the restricted trochaic inventory if the languages at issue do not fall in the class discussed in the previous section.

In van der Hulst (1996, 1997) I propose a theory for (primary) accent placement that operates without appeal to foot structure. The key idea is that primary accent is assigned directly within a specifi **accentual domain;** to represent so called bounded accent systems a bisyllabic domain is created at the right or left edge of the word, possibly skipping a peripheral syllable:

(28) Domain setting
  a. The domain of accent assignment is: left/right
  b. Nonperipherality: left/right

I assume that **not** setting the domain parameter implies that the whole word forms the accentual domain, but one could also see this as a third value. In any event that option leads to unbounded systems. Non-peripherality allows the accentual domain to be one syllable removed from the word edge; in case of an unbounded domain, the edge where the mismatch occurs must be independently specified but for bounded domains the edge setting of non-peripherality follows from the edge setting of the domain.

The accentual domain may contain accent-attracting syllables; I distinguish two types:

(29) a. Heavy syllables
  b. Marked syllables (i.e. lexical/diacritic "weight")

If the domain contains special syllables these are projected at level 1 of the grid. If there is no special syllable, level 1 will be provided with a mark at the left or right edge by a **default rule**. Hence the general scheme for primary accentuation is:

(30) a. Projection
    Project special syllables of type X to level 1
    (X = heavy, marked)
  b. Default rule
    Assign a mark to the leftmost/rightmost syllable in case level 1 is empty
  c. End Rule
    Assign primary accent to the leftmost/rightmost level 1 mark

The two types of special syllables may occur alone, in combination, or not at all. In the latter case, the system shows sensitivity to edges only. Formally such systems always invoke the default accent rule (30b). The End Rule will in such cases do no more than reinforce the work of the default rule. As said, I will here discuss bounded

systems only. It will be clear, however, that the four logical possibilities that arise within an accentual domain correspond to the familiar unbounded types (last/first, last/last, first/last, first/first). An extra argument for the domain approach proposed here is that it gives this uniform characterization of bounded and unbounded systems. Such uniformity in treatment was in fact present in the standard metrical theory (Vergnaud & Halle 1978, Hayes 1980), but due to later developments the parallels were obscured. For a discussion of unbounded systems I refer to van der Hulst (1996, 1997, 1998).

The first step in deriving bounded system is to delimit at the right or left edge of the word a two-syllable domain. The second step is to project special syllables and the third step is to apply the default rule to provide the domain with a mark just in case no other special syllable is available for projection to level 1. If primary accent is weight-sensitive (i.e. moraic) this means that heavy syllables project a mark to level 1 in the two-syllable domain. The account is made complete by setting the value for the End rule. This approach allows four types of bounded weight-sensitive systems. In all cases I ignore the non-peripherality parameter; the first four cases have their domain on the right, the second four cases on the left:

(31)

a. Rotuman : final in case of σh], otherwise penultimate

```
x          x          x      x
x          x        x x      x
(h  l) ]   (l  h) ]   (h  h) ]   (l  l) ]
```

=> rightmost heavy, otherwise leftmost

Project X: X = heavy syllable
Default: left
End rule: right

b. Yapese : penultimate in case of hl], otherwise final

```
x          x          x        x
x          x        x x        x
(h  l) ]   (l  h) ]   (h  h) ]   (l  l) ]
```

=> rightmost heavy, otherwise rightmost

Project X: X = heavy syllable
Default: right
End rule: right

c. Aklan: penultimate in case of hσ], otherwise final

```
x          x        x          x
x          x        x x        x
(h  l) ]   (l  h) ]   (h  h) ]   (l  l) ]
```

=> leftmost heavy, otherwise rightmost

Project X: X = heavy syllable
Default: right
End rule: left

d. Awadhi: penultimate except in case of lh]

```
x          x        x        x
x          x        x x      x
(h l) ]    (l h) ]   (h  h) ]  (l l) ]
```

=> leftmost heavy, otherwise leftmost

Project X: X = heavy syllable
Default: left
End rule: left

(32) a. Ossetic: initial in case of [hσ, postinitial otherwise

```
  x        x      x        x
  x        x      x x      x
[ (h l)  [ (l h)  [ (h h)  [ (l l)
```

=> leftmost heavy, else rightmost

Project X: X = heavy syllable
Default: right
End rule: left

b. Malayalam: postinitial in case of [lh], initial otherwise

```
  x        x      x        x
  x        x      x x      x
[ (h l)  [(l h)   [ (h h)  [ (l l)
```

=> leftmost heavy, else leftmost

Project X: X = heavy syllable
Default: left
End rule: left

c. Capanahua: peninitial in case of [σh, otherwise initial

```
  x        x      x        x
  x        x      x x      x
[ (h l)  [ (l h)  [ (h h)  [ (l l)
```

=> rightmost heavy, else leftmost

Project X: X = heavy syllable
Default: left
End rule: right

d. => rightmost heavy, else rightmost: unattested

```
  x        x      x        x
  x        x      x x      x
[ (h l)  [ (l h)  [ (h h)  [ (l l)
```

Project X: X = heavy syllable
Default: right
End rule: right

The theory proposed here is almost completely instantiated for bounded system. For the left edge domain setting we miss one example, i.e. (32d).

Syllabic systems differ from the moraic systems in (31) and (32) in that no special syllables are available for projection to level 1. Most systems of this type have exceptions, however. Exceptions are marked in two ways in the majority of cases. Either words are marked for non-peripherality or syllables are marked with diacritic weight (cf. van der Hulst 1998, section 3.8).

The parameter settings for Polish, a syllabic penultimate system allowing words to have exceptional final accent and antepenultimate accent, is given in (33):

(33) Polish primary accent
- a. Non-peripherality: no
- b. Domain: right
- c. Project: mark
- d. Default: left
- e. End Rule:

Regular forms are unmarked lexically (cf. 34a), forms with final and antepenultimate accent have the lexical representations in (34b) and (34c), respectively:

(34)

a.	b.	c.
	x	
s s]	s s]	(s s) s]

(33c) projects lexical marks to level 1. If there is no lexically marked syllable, (33d) inserts a level 1 mark on the leftmost syllable. It stands to reason that no accentual domain will contain more than one lexically marked syllable because the same one will always win due to the algorithm. Note that the End Rule cannot be fi ed on a value; it always reinforces the level 1 mark that is present in the domain. If the domain is lexically specified as in (34), this blocks regular application of (33b).

Moraic systems may combine heavy syllables with lexically marked syllables. Thus in a system like that of Rotuman a final light syllable, if exceptionally bearing primary accent, could be lexically marked. By the End rule (right) it would receive a level 2 mark even if it is preceded by a heavy syllable.

A consequence of the approach I propose is that rhythm (i.e. footing) does not play a role in primary accentuation in bounded systems. Thus, the default rule with its left and right option, is **not** regarded as creating a trochaic or iambic foot.

The theory of primary accent placement outlined here deals with all bounded and unbounded accent locations, including thus those that would be problematic if we were to adopt the foot-based perspective of the standard theory (cf. the questions marks in 26 and 27), and even more so if we adopt the limited trochaic foot inventory. The independent assignment of primary accent is also motivated by cases in which

a foot-based account simply does not work, i.e. cases that Hayes (1995) analyzes with a top-down parsing mode.

6.2. Broken window systems

In the familiar cases of 'extrametricality' (or non-peripherality) antepenultimate or third syllable accent results if the window is one syllable removed from the edge. In some cases, however, (referred to as **broken window systems** in Visch, 1996), the window is moved only if a specifi condition is met. Consider the case of Munster Irish (Doherty 1991, Rowicka 1995 and Gussman 1994):[15]

(35) a. If the second syllable is heavy it receives accent
b. Otherwise the leftmost heavy syllable is accented (but only within an initial trisyllabic window)
c. Otherwise the initial syllable is accented.

According this rule we get the following types of patterns; capital H or L represent the primary accented syllable:

(36)

a. Second h	b. First h	c. Initial light
[l H l	[H l h	[L l l
[h H l	[H l l	
[h H h	[l l H	
[l H h		

All patterns, except the one that is underlined, are compatible with a bounded system such as that of Capanahua (cf. 27c).

In this case, it would seem that non-peripherality applies under special circumstances only, viz. if this results in accent placement on a heavy syllable instead of a light syllable. The preference for placing primary accent on a heavy syllable outranks the dispreference for non-peripherality of the accent window. These are the situations that seem to crucially appeal to a ranked constraint approach (cf. Prince & Smolensky 1993 and section 6).

6.3. A theory of rhythmic structure

With primary accent in place, trochaic foot theory (cf. section 3 and 4) is responsible for rhythmic structure only. In by far the majority of cases we fin that the rhythm 'echoes away' from the primary accent. I will assume here that primary and secondary accent are represented on different planes, as was originally suggested in van der Hulst (1984):

(37)

```
    x                    primary accent plane
    x
( σ σ ) σ σ σ σ
  (x  ·) (x ·) (x)       rhythm plane
```

A system as in (37), although iambic at fir t sight, can be represented with a trochaic pattern, as we have seen in section 2.1.[16]

Whether rhythmic structure requires feet (i.e. constituents) or a bracketless grid is difficult to decide (cf. Prince 1983, Halle & Vergnaud 1987, Kenstowicz 1993). Arguments in favour of constituent structure often involve the primary accent foot which, in our view, is in any event a constituent (i.e. the accentual domain).

The direction of rhythm, however, is not always 'away from the primary accent'. Another possibility appears to be that rhythm comes from the opposite edge. We may call both modes **echo** (cf. Garde 1968) or **polar**, respectively. In case of polar rhythm it often seems that a strong non-primary accent is placed on the side where the rhythmic wave starts. Thus Polish, claimed to have a trochaic left-to-right rhythm (Booij & Rubach 1987), could be analyzed as having an extra layer in the rhythmic plane:

(38)

```
                  x          primary accent plane
                  x
[ (σ  σ) (σ σ)....(σ  σ) ]
  x      x
  x
```

Dogil (to appear) claims that under focus, the initial strong syllable accent bears the primary accent. Gussenhoven (1991) also proposes two accent locations in his analysis of English word accent, suggesting that the actual location of primary accent is often dependent on phrasal context.

It seems that the domain of rhythmic structure in Polish is the (prosodic) word. Another possibility is that rhythmic structure is assigned in the phrasal domain (as suggested in Roca 1985, van der Hulst & Kooij 1994). The domain in which rhythm is assigned can thus differ from language to language and is possibly dependent on the morphological complexity of the language. This issue is presumably related to the fact that we often see a distinction between "word" languages and "phrase" languages, not only with respect to rhythm, but also with respect to syllabificatio and sandhi processes.

6.4. Lexical structure versus postlexical structure

The representation in (38) now raises the following question: is it now the case that we have reintroduced classical metrical theory by erecting a standard metrical structure consisting of a foot layer and a word level layer?

It seems to me that the answer is affirmative. This does not imply, however, that the separation of primary accent and rhythmic structure we have argued for no longer exists. But rather than viewing the separation in terms of primary accent versus rhythmic structure we now learn, however, that the separation involves a (lexical) primary word accent versus (postlexical) accentual structure; the latter may comprise a primary accent that competes with the lexical primary accent. This view fit the so called **Duality Hypothesis** that is proposed in van der Hulst (ms.) and van der Hulst & Rowicka (1997). The starting point of this hypothesis is the by now general claim that there is prosodic structure in the lexicon (syllable structure, accentual structure, a '(prosodic) word level'). The presence of lexical prosodic structure raises the question whether this structure survives in the post-lexical prosodic organization or not. According to the Duality Hypothesis post-lexical prosodic structure is not erected 'on top of' lexical prosodic structure, but independently, on a separate plane. In this way we account for many so called phonological structure paradoxes, i.e. cases in which there appear to be mismatches between the structure that is most appropriate from the lexical point of view and the structure that best suites the post-lexical point of view. An interesting example of this is found in Gussenhoven (1995) who agues for a particular type of post-lexical foot structure in Dutch (needed for rhythmic structure but also for aligning intonational pitch accents) that differs from the foot algorithm that has been proposed for primary accent (van der Hulst 1984). From the perspective of the Duality Hypothesis this mismatch can simply exist because primary accent in Dutch is quite clearly lexical (like in English). In fact the situation in (38) represents a mismatch concerning the location of primary accent. The lexical primary accent is penultimate, whereas the post-lexical 'primary' accent is initial.

I would now like to argue that the Primary Accent First theory is really about this lexical/post-lexical separation. The algorithm in section 6, then, deals with the lexical prosodic organization. The post-lexical organization involves trochaic foot construction and the erection of higher prosodic structure. Normally the lexical primary accent survives as the post-lexical primary accent, but sometimes, apparently, the post-lexical primary accent takes over under the infl ence of phrasal pressure (i.e. accentual clashes leading to 'rhythmic reversal'). Van der Hulst (ms) and van der Hulst & Rowicka (1997) also consider the option that languages may lack a lexical accentual structure altogether. In retrospect then, we acknowledge the domain of metrical theory as "determining the role of rhythm in linguistic stress patterns" (Hayes, 1995: 1) without admitting that lexically determined primary accent is metrical.

7. Conclusion

In the preceding sections, we have shifted some of the burden of accounting for accentual patterns from the typology of feet to a parametric algorithm that is designed to deal with primary accent alone. With primary accent in place, we can probably maintain a fairly simply trochaic foot inventory to deal with rhythmic patterns. Certain systems, called iambic, may be best analyzed using iambic prosodic words rather than iambic feet.

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Notes

1. This issue is also addressed in Kenstowicz (1994) and van der Hulst & Klamer (1995), who reach similar conclusions.

2. A very similar foot inventory was independently proposed in Prince and McCarthy (1986, 1990).

3. The standard theory provided an additional foot-type, the obligatory branching foot (cf. Hayes 1980). It has been shown (e.g. in van der Hulst 1990) that the relevant systems (Yapese and Malayalam for example) can make use of moraic (even or uneven) iambic or trochaic feet, provided that peripheral light syllables flan ed by penperipheral heavies can remain unparsed. In the theory discussed in section 6, in which primary accent assignment is not foot based, we come across the relevant systems.

4. In LR mode (5ia) in a word with an odd number of syllables an accent clash on the last two syllables is produced in the old theory. (i.e. on syllables 4 and 5). A significan property of the new theory is that no clash is produced in the parallel string in (4ia). Presumably this is a desirable result, since clashes of this type typically do not arise. But if the word consists of an even number of syllables, the prohibition against unary feet (adopted in the new theory) will lead to the generation of a lapse, i.e. a sequence of two unaccented syllables on syllables 3 and 4 in (5ib). This is a less desirable result since sometimes we do fin an accent on syllable 4. According to Hayes (1995: 100), such cases must be explained as phonetic word edge effects. Another possible view on these matters is that unary feet can be created unless they lead to a clash; cf. De Haas (1991). In section 4 I take an even more fle ible attitude toward unary feet. Cf. Kenstowicz (1994).

5. With an accent mark present on the fina syllable, the trochaic algorithm has no choice but to turn the last syllable into a unary foot (cf. 6b). In Hayes (1995: 87) such unary feet are allowed under "weak prohibition".

6. Hayes (1995: 116) has chosen to ignore the geometrical contradiction by suggesting that in case of top-down parsing the word tree is built fir t. A foot layer is "tucked under" later. It is not clear to me what this means, formally.

7. Kiparsky (1991) proposes that Turkish has a final catalectic mora, so that all final syllables are long. Final accent arises from a moraic uneven iamb. This analysis is confirmed, he says, since there is a class of words that has an extrametrical syllable (which makes catalexis impossible), and in these words the uneven iamb emerges. Although it is true that this special class requires an uneven iamb in a foot-based analysis, it is not true that final mora catalexis automatically leads to an iambic foot. If all final syllables are long, final accent also arises from a moraic trochaic foot. Kager (1995) offers a discussion of catalexis.

8. The derivation of such systems is in fact identical to that proposed for weight-insensitive final accent systems (cf. 6).

9. Kager (1993) argues that a proper analysis of Chugach points to the even moraic iamb. In section 5 I return to this case.

10. To get rid of uneven iambs one could regard them as "left-specified trochees. Van Oostendorp (1995) suggests that the even moraic trochee and the uneven iamb simply instantiate the typical X-bar schema, without and with a specifier, respectively. He also suggests that the specifier are perhaps universally on the left (referring to Chomsky 1994 and Kayne 1993, who claim this for syntax). This view allows two moraic foot types in (a) and (b) only:

a. 

b. 

Thus, no room is left for the uneven moraic trochee in this typology.

11. To order skipping after foot assignment is crucial, since otherwise a 'fourth from the edge' pattern can be derived if the weak local parsing mode is combined with extrametricality.

12. The picture changes if the post-light heavy is always a closed syllable, since in that case the closed syllable can simply count as light (by contextually suppressing weight-by-position; van der Hulst & Rosenthall, in prep), so that resolution is no longer required. Another important issue is that in a 'primary accent first' approach (cf. section 6) primary accent assignment is treated as essentially syllabic (cf. Van der Hulst & Lahiri 1988), in which case the argument in favour of a moraic dactylic foot also becomes less easier to make.

13. Dresher & Lahiri (1991) and Rice (1992) suggest that ternary feet arise if it is (parametrically) required that the head of the foot must be branching.

14. References: Rotuman (Hayes 1980: 63), Yapese (Hayes 1980: 65), Aklan (Hayes 1980: 59), Awadhi (Hayes 1995: 179–180), Ossetic (Hayes 1995: 261), Capanahua (Safi 1979).

15. Notice that no appeal is made in this theory to extrametricality to achieve this result; cf. section 2.2.

16. Another example is Maithili, for which Hayes (1995: 149–162) proposes a moraic trochee and final foot non-peripherality for Maithili. Doherty proposes something similar for Munster Irish, i.e. initial foot non-peripherality. An alternative suggested in Rowicka (1995) and Gussman (1994), who both discuss the Munster Irish case, involving the use of ternary dactylic footing. Other examples of "broken" window systems are discussed in Visch (1996).

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