

# Primary accent is non-metrical

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In this article I propose that primary accent assignment is non-metrical, i.e. not derived from the rhythmic or foot-based pattern of secondary accent. For both bounded and unbounded accentual systems I will defend a strictly *edge-based* theory of primary accent location. I regard rhythmic structure as secondary, possibly assigned phrasally. After motivating and outlining the edge-based approach, I pay special attention to a residue of accentual systems in which the location of primary accent does appear to require prior parsing of the whole word into binary feet. My suggestion will be that such systems do not present strong evidence for foot-based primary accent location, however, since in a number of them we are presumably dealing with systems that lack the notion of word level primary accent.

## 1. Introduction

In this article I propose that primary accent assignment is non-metrical. For both bounded and unbounded accentual systems I will defend a strictly *edge-based* theory of primary accent location. Rhythmic structure is regarded as secondary, possibly assigned phrasally in terms of trochaic feet.

After motivating and outlining the edge-based approach, I pay special attention to a residue of accentual systems in which the location of primary accent appears to require prior parsing of the whole word into binary feet. The necessity for full binary parsing arises from the fact that the precise location of primary accent is dependent on the number of syllables of the whole word. The edge at which primary accent lies is opposite to the edge at which binary footing starts. Such systems, which I will call *count systems*, form a minority among accentual systems, but that in itself cannot be a reason for denying them a proper treatment. I will suggest that there is reason to believe that count systems do not present convincing evidence for foot-based primary accent location, however, because at least in a number of cases we are presumably dealing with systems that lack the notion of word level primary accent.

The organization of this article is as follows. In section 2, I will briefly present standard metrical theory, focusing on the relation between direction of footing and location of primary accent. Section 3 briefly

discusses a variety of systems for which the standard metrical perspective is not adequate. Among these are the so called unbounded systems, which metrical theory was not designed for in the first place (because in these systems accent location is not foot-based under any reasonable interpretation of the concept foot). Section 4 presents an approach to both bounded and unbounded systems that is not foot-based, but edge-based. In section 5, I will subsequently turn to count systems, in which primary accent location appears to be foot-based. In this more speculative part of the article, I will try to show that this may not be the case. Section 6 summarizes the main points of this article.

## 2. The metrical approach to word accent

Having noted the correspondences between metrical patterns of verse lines and the accentual pattern of words, Liberman (1975) proposed to analyze the latter in terms of the concept that is basic to the former: the foot. Liberman's basic insight was that the edge preference of primary accent and the alternating character of non-primary accents simply follow as necessary properties if accentual patterns are represented by feet (which group together the syllables of words) with primary status being assigned to the accent of the leftmost or rightmost foot. Liberman developed this approach for English. A subsequent extremely important development in metrical theory has been the move to represent the accentual patterns of different languages by varying the ingredients in the construction rules that Liberman proposed for English.

Thus, Liberman's language-specific construction rules were transformed into *parameters*:

- (1) *Metrical algorithms*  
 foot structure  
 i. left-headed (LH)/right-headed (RH)  
 ii. left-to-right (LR)/right-to-left (RL)  
 word structure: left-headed (LH)/right-headed (RH).

This parametric approach to accent was first proposed by Prince (1976) and Vergnaud & Halle (1978), and further developed and richly exemplified in Hayes (1980).

Over the years various notations have been proposed to represent accentual patterns metrically. In this article, I adopt the bracketed grid notation proposed in Halle & Vergnaud (1987) and Hayes (1987, 1995) because of its graphical simplicity. I believe this notation is equivalent to a standard tree diagram in which feet are binary and the word tree is n-

ary. The representation in (2a) represents a word with initial primary accent and a rightward alternating rhythmic pattern. The 'recipe' in (2b) specifies the metrical parameter settings (with some additional current terminology):

- (2) a.  $\begin{matrix} x & & 2 \\ (x & x & x) & & 1 \\ (\sigma & \sigma) & (\sigma & \sigma) & \sigma & & 0 \end{matrix}$
- b. *Metrical algorithm*  
 foot structure  
 i. left-headed (trochee)  
 ii. left-to-right iteration (left-aligned)  
 word structure: left-headed (end rule left)

In (2), we see that a single syllable cannot form a foot by itself. Allowing stray syllables implies that we do not require foot parsing to be exhaustive. Exactly how stray syllables are incorporated into the metrical structure is an open issue. They can be adjoined to a neighbouring foot (creating a peripheral ternary foot) or be the immediate daughter of the prosodic word (violating the Strict Layer Hypothesis); cf. Nespor & Vogel (1986), Vogel (to appear) for discussion.

The algorithm in (1) allows us to represent eight different accentual patterns. To detect the consequence of directionality one must examine a word with an uneven string of syllables. The four possibilities in (3) assign head status to the foot that is created first (i.e. leftmost in left-to-right, and rightmost in right-to-left parsing). This correlation between directionality and primary accent location is typical (cf. van der Hulst 1984, Hammond 1984):

- (3)
- |               | Odd         | Even            |
|---------------|-------------|-----------------|
| a. Word (LH)  | x           | x               |
| Foot (LH, LR) | (x x x)     | (x x x)         |
|               | (σ σ)(σ σ)σ | (σ σ)(σ σ)(σ σ) |
| b. Word (LH)  | x           | x               |
| Foot (RH, LR) | (x x x)     | (x x x)         |
|               | (σ σ)(σ σ)σ | (σ σ)(σ σ)(σ σ) |
| c. Word (RH)  | x           | x               |
| Foot (LH, RL) | (x x x)     | (x x x)         |
|               | σ(σ σ)(σ σ) | (σ σ)(σ σ)(σ σ) |

- d. Word (RH)  $x$   
 Foot (RH, LR)  $(x \ x) \ (\sigma \ \sigma)(\sigma \ \sigma)(\sigma \ \sigma)$

To account for antepenultimate accent, Liberman (1975) proposed the concept of extrametricality: a peripheral syllable can be excluded from the accentual domain. Some languages, such as Classical Latin or Macedonian, incorporate extrametricality systematically, whereas in a language like English it applies to specific word classes and is subject to overapplication ("positive exceptions") as well as underapplication ("negative exceptions").

Metrical theory adopts two foot types, now commonly referred to as the trochee (left-headed) and the iamb (right-headed). A theory of accent based on these two foot types can be called *symmetrical*. An issue that has come up is whether trochees and iambs are equally popular in languages. Hayes (1985, 1987, 1995) and McCarthy & Prince (1986, 1990), for example, argue that iambs only play a role in weight-sensitive systems. Van der Hulst (to appear b), following van de Vijver (1995, 1996), argues in favour of a foot typology that is exclusively trochaic.

Whatever the foot inventory, derivationally speaking, metrical theory views primary accent as 'secondary' and secondary accent as 'primary', i.e. in bounded systems (like English) the location of primary accent is claimed to be rhythmically determined or *foot-based*. Van der Hulst (1984) draws attention to the fact that full rhythmic parsing is only necessary in the systems exemplified in (4), called *count systems* in van der Hulst (1992, to appear a, b). In the systems in (3) it is, after all, not *necessary* to parse the whole word into feet in order to determine the location of primary accent. In such systems, primary accent *could* simply be assigned in terms of an edge-based algorithm. The characteristic of count systems, however, is that the exact location of primary accent is *crucially* dependent on the number of syllables that the word is composed of. This means that in order to determine the location of primary accent in count systems, the whole word must first be parsed into feet. Van der Hulst (1984) and Hammond (1984) argue that count systems are much less typical than those in (3), pointing out that within a standard metrical perspective this fact remains unexplained:

- (4) Odd Even  
 a. Word (RH)  $x$   $x$   
 Foot (LH, LR)  $(x \ x) \ (\sigma \ \sigma)(\sigma \ \sigma)(\sigma \ \sigma)$

- b. Word (RH)  $x$   
 Foot (RH, LR)  $(x \ x) \ (\sigma \ \sigma)(\sigma \ \sigma)$
- c. Word(LH)  $x$   
 Foot(LH, RL)  $(x \ x) \ (\sigma \ \sigma)(\sigma \ \sigma)$
- d. Word (LH)  $x$   
 Foot (RH, RL)  $(x \ x) \ (\sigma \ \sigma)(\sigma \ \sigma)$

Van der Hulst (1984, 1992, to appear a, b) and van der Hulst & Kooij (1994) claim that non-count systems can be understood in terms of a set of primary accent location parameters that make no appeal to foot structure. In this view, which I describe in section 4, rhythmic structure is assigned with reference to primary accent, possibly at the word level or even at the phrasal level (cf. Roca 1986). In those cases where primary accent is clearly lexically governed, and rhythmic accents are present, it would seem that this particular ordering, or (stated in non-derivational terms) dependency, is forced upon us by standard considerations. Hurch (1995) also provides strong arguments for a 'primary accent first' approach.

In the next section, I will briefly provide some further reasons for doubting the validity of the metrical approach to primary accent. For the moment, let me refer to count systems as 'the metrical residue'. I will return to these systems in section 5, arguing that count systems are *not* word level accentual systems. Rather, they are to be identified with systems that *lack primary accent* at the word level.

### 3. Non-metrical accentual systems

In the preceding section, I pointed out that the systems in (3) *can* but *need not* be derived in a foot-based manner. (Exactly how an edge-based approach could work is shown in section 4).

I also mentioned that unbounded systems appear not to be foot-based, unless one is prepared to either adopt "unbounded feet" or non-exhaustive parsing (cf. Prince 1985). My point is that accent location in such systems is certainly not based on rhythm. I will elaborate that point here with reference to three types of unbounded systems (5a-c). I will then continue to consider three varieties of bounded systems that present problems for a foot-based theory (5d-f). In these cases it is not

just the case that a foot-based and an edge-based approach are both possible (as in the systems in (3)). Rather, as I will argue, a foot-based approach involves conceptual problems or is simply inadequate:

- (5) a. Weight sensitive unbounded systems
- b. Fixed edge-based accent without rhythmic structure
- c. Fixed edge-based accent with weight-sensitive rhythmic structure
- d. Fixed edge-based accent with polar rhythmic structure
- e. Fixed edge-based accent with weight-determined secondary accent
- f. "Funny" weight-sensitive systems.

### 3.1. *Weight-sensitive unbounded systems*

Consider the following accent rules (Hayes:296-297<sup>1</sup> gives several examples of all of these, some of which we list below in section 4):

- (6) *Weight-sensitive unbounded systems*
  - a. RIGHT/LEFT (last/first):  
Primary accent falls on the RIGHTmost heavy syllable, LEFTmost syllable  
Default: if there is no heavy syllable, primary accent falls on the LEFTmost syllable
  - b. RIGHT/RIGHT (last/last):  
Primary accent falls on the RIGHTmost heavy syllable,  
Default: if there is no heavy syllable, primary accent falls on the RIGHTmost syllable
  - c. LEFT/RIGHT (first/last):  
Primary accent falls on the LEFTmost heavy syllable,  
Default: if there is no heavy syllable, primary accent falls on the RIGHTmost syllable
  - d. LEFT/LEFT (first/first):  
Primary accent falls on the LEFTmost heavy syllable,  
Default: if there is no heavy syllable, primary accent falls on the LEFTmost syllable

Primary accent falls on the left- or rightmost heavy syllable. If there is no heavy syllable in systems with these rules, the default accent lies on the 'same edge' or the 'opposite edge'. Systems of this type seem to lack an alternating pattern of secondary accents. Moreover the restriction

that the location of primary accent is bound to a three- or two-syllable window clearly does not hold.<sup>2</sup>

Various approaches to unbounded systems, employing both bounded and unbounded feet, have been proposed over the years (cf. van der Huist 1990, to appear c for overviews). Hayes (p. 33) remarks that since "the facts in this area are quite simple and fill out all the logical possibilities, it is hard to develop a theory that goes much beyond just describing the facts". He handles 'opposite edge' systems by constructing unbounded weight-sensitive feet (as in the standard theory proposed). 'Same edge' systems are handled by 'projecting prominence distinctions' (heavy syllables) and directly assigning primary accent to the left- or rightmost heavy or (in the absence of a heavy) left- or rightmost syllable. I propose to extend this strategy to 'opposite edge' systems. In that case, we simply say that unbounded systems assign primary accent to the rightmost or leftmost heavy syllable, assuming furthermore that the default rule is independent and may select the same or the opposite edge of the word. Goldsmith (1990: 180ff.) seems to suggest an approach of this type, which is integrated in the theory of accent placement that I describe in section 4.

### 3.2. *Fixed edge-based accent without rhythmic structure*

With respect to certain cases it has been argued that foot assignment is *non-iterative*, because no secondary accents are reported. Latvian (Dogil, to appear b) and Hungarian, both with strict initial accent, and French, with final accent, have been mentioned as examples.<sup>3</sup>

Instead of proposing non-iterative footing, Halle & Vergnaud (1987) propose a mechanism of conflation, which is meant to wipe out secondary accents resulting from an exhaustive parse. To describe systems of this kind, however, it would seem that a foot-based analysis (iterative or non-iterative) offers the least plausible treatment, since foot assignment must either be unnaturally restricted to one application (stipulation: non-iteration) or undone (stipulation: conflation). A plausible alternative, which is more straightforward in my view, is to assign a primary accent with reference to the left- or right edge of the word. In effect, we then treat such systems as unbounded systems that have no weight distinction.<sup>4</sup>

### 3.3. *Fixed edge-based accent with weight-determined secondary accent*

In this category we find cases that are like those in the preceding section, except for the fact that heavy syllables are said to be prominent.

Hayes (1980: 58) mentions Koya and Southern Sierra Miwok (Hayes: 250) as examples:

- (7) a. *Koya*  
 i. Primary accent falls on the initial syllable  
 ii. Secondary accent falls on heavy syllables  
 b. *Southern Sierra Miwok*<sup>5</sup>  
 i. Primary accent falls on the second syllable  
 ii. Secondary accent falls on heavy syllables

It is clear that systems of this type make no obvious appeal to binary foot structure. They could be analyzed in terms of unbounded feet:

- (8) a. *Koya, Southern Sierra Miwok*  
 foot structure:  
 a. quantity sensitive  
 b. unbounded  
 c. left/right-headed  
 word structure: left-headed

The point, however, that I wish to make is that we do not *need* unbounded feet to represent systems of this type. We can also adopt an edge-based approach and simply assign primary accent to the first or second syllable in the word, and, in addition, project all heavy syllables to level 1 in the grid.

Summarizing our results so far, we have established that the varieties of unbounded systems that have been reported in the literature make no crucial appeal to rhythmic footing. A number of such systems *can* but *need not* be handled with unbounded feet, but in all cases an edge-based approach seems to be a more straightforward and perfectly adequate alternative. We now turn our attention to some bounded systems for which, likewise, a foot-based approach is not obvious at all.

### 3.4. Fixed edge-based accent with polar rhythmic structure

A number of languages have been claimed to combine fixed accent with a rhythmic wave 'coming from the other side'. An example that is often cited is Garawa, with initial accent and rhythmic structure coming from the right edge (Hayes:202-203, Goedemans 1991):

- (9) *Garawa* (polar)  
 Word (LH) x 2  
 Foot (LH,R) (x x x x ) 1  
 [ (σ σ) σ (σ σ) (σ σ) ] 0.

Gugu-Yalanji (Hayes:204) has this pattern with a non-iterative secondary stress foot on the right edge.

The mirror image case is exemplified by Piro (Hayes:201). Booij (1995) analyzes Dutch in this way, too, and Booij & Rubach (1987) propose a similar analysis for Polish; cf. Hayes:204. Although in Dutch and Polish the direction of the rhythmic structure cannot be determined so clearly (because underived words of sufficient length are simply not available), it is certain that initial syllables tend to have a strong secondary accent, irrespective of the number of syllables. Whatever the direction of rhythm, the point here is that in languages with a polar rhythmic structure, a foot-based analysis of primary accent is as unmotivated as in the previous cases, in which all rhythmic structure is lacking. To derive the strong initial secondary accent as well as the primary penultimate accent, the most straightforward analysis posits *two* edge-based accent rules (cf. van der Hulst to appear b and section 4). Again foot-structure plays no crucial role.

### 3.5. Fixed edge-based accent with weight-sensitive rhythmic structure

Hayes acknowledges that some bounded systems must be derived via primary accent first mode. He calls this "top-down stressing" (Hayes:116-117). In general, languages that show weight-sensitivity in their rhythmic structure, while primary accent is invariably located on a (near-)peripheral syllable, *must* be analyzed in this way. A language showing this pattern is Tibatulabal, which assigns accents as follows (Hayes:263):

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

Other languages showing the relevant properties are Finnish, Germanic and Cahuilla (Hayes:132-140), all with fixed (stem)initial accent.

Systems of this type are important because they show that at least in some cases primary accent *must* be assigned first, i.e. before rhythmic footing. This implies that the primary accent first approach is theoretically available anyway. A point in favor of the central claim of this article

is that this kind of dependency between primary and secondary accents is generalized to *all* cases of accentuation.

### 3.6. *Funny* systems

"Funny" systems are those that cannot be handled with standard trochaic or iambic feet. Standard metrical theory was designed to handle only certain kinds of bounded systems. Let us consider right-edge bounded systems. There are four logical possibilities, all attested:

(11) a. *Rotuman*: final in case of oh], otherwise penultimate: trochee

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

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

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

Metrical theory can handle the cases in (11a) and (11b), using a trochaic and iambic weight-sensitive foot, respectively. The patterns of Aklan and Awadhi (the 'funny' ones) cannot be straightforwardly derived. Aklan can be derived in the same way as Yapese, but then we must add a rule retracting accent to the penultimate syllable in the hh] case. Awadhi can be analyzed as Rotuman - with a similar retraction rule. The point I wish to make is that such indirect analyses cast doubt on a foot-based analysis, especially in the face of an alternative approach such as the one I develop in section 4.

### 3.7. *Conclusions*

In this section, I have discussed 6 accentual systems that make no

obvious appeal to rhythmic foot structure in order to locate the syllable that carries the primary accent. In some cases, a foot-based analysis is possible if either unbounded feet are allowed or additional machinery is invoked (non-iterativity, conflation, retraction).

They all have in common that the accent lies on the leftmost or rightmost syllable if the system is weight-insensitive. If the system is weight-sensitive, accent falls on the leftmost or rightmost *heavy* syllable if there is one in the word, and otherwise on the leftmost or rightmost.

I have suggested that a purely edge-based approach is possible in all cases, and I will describe a formal system that can do this in the next section. I conclude that only *count systems* seem to make crucial use of rhythmic footing.

In section 5, I turn to an examination of count systems.

### 4. *Primary Accent First theory*

Van der Hulst (1984, 1990, 1992, to appear a) challenges the view that the full accentual organization at the word level is derived by first directionally constructing a layer of feet and then selecting a peripheral or near-peripheral foot to bear primary accent, while the other feet express non-primary accents. Instead a 'Primary Accent First (PAF)' theory is proposed in which primary and non-primary accent assignment are regarded as separate algorithms.

By way of introducing the PAF theory let us say that primary accent is always assigned to the left- or rightmost "special" syllable. Special syllables are visible at level 1 of the grid. Syllables can be special in three ways:

- (12) a. Heavy syllables  
 b. Marked syllables (i.e. diacritic weight, lexical marking)  
 c. Strong syllables (due to foot structure).<sup>6</sup>

These factors may occur separately, in combination, or not at all. If there is no special syllable, level 1 will be provided with a mark by a default rule referring to the word edge. Hence, the general scheme for primary accentuation is that in (13):

- (13) a. Project special syllables of type X to level 1  
 (X = heavy, marked, strong)  
 b. Assign a mark to the leftmost/rightmost syllable in case level 1 is empty  
 c. Assign primary accent to the leftmost/rightmost level 1 mark.

Following Prince (1983) I refer to the rule in (13b) as the *Default Rule* and to the rule in (13c) as the *End Rule*. To differentiate between bounded and unbounded systems, PAF incorporates a domain parameter. In bounded systems, the domain for primary accent is not the word, but the first or last two syllables of the word (with the extra option of extrametricality). In unbounded systems, the domain for primary accent is the whole word (also with the extrametricality option).

The basic rule schema generates four types of bounded systems (both on the left and right side of the word) and four types of unbounded systems. We have seen in section 3.6 that on the right side four types of bounded systems have indeed been attested (Rotuman, Yapese, Aklan and Awadhi). On the left side only three have been attested (Ossetic, Malayalam, Capanahua); the left-edge counterpart of Awadhi has not been attested.

The four bounded systems in (11) are repeated here in (14):

## (14) BOUNDED SYSTEMS

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

x ) x )  
 x ) x) x x) x )  
 (h l)] (l h)] (h h)] (l l)]  
 => rightmost heavy, otherwise leftmost

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

x ) x )  
 x ) x) x x) x)  
 (h l)] (l h)] (h h)] (l l)]  
 => rightmost heavy, otherwise rightmost

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

x ) x )  
 x ) x) x x) x)  
 (h l)] (l h)] (h h)] (l l)]  
 => leftmost heavy, otherwise rightmost

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

x ) x )  
 x ) x ) x x) x )  
 (h l)] (l h)] (h h)] (l l)]  
 => leftmost heavy, otherwise leftmost

The unbounded systems in (15) are the ones we listed in (6):

## (15) UNBOUNDED SYSTEMS

a. *Classical Arabic, Huasteco, Eastern Cheremis*

x )  
 ( x x ) ( x )  
 l h l l h l l l l  
 => rightmost heavy, otherwise leftmost

b. *Aguacatec, Golin, Western Cheremis*

x )  
 ( x x ) ( x )  
 l h l l h l l l l  
 => rightmost heavy, otherwise rightmost

c. *Komi, Kwak'wala*

x )  
 ( x x ) ( x )  
 l h l l h l l l l  
 => leftmost heavy, otherwise rightmost

d. *Indo-European accent, Murik*

x )  
 ( x x ) ( x )  
 l h l l h l l l l  
 => leftmost heavy, otherwise leftmost

The proposal, then, that the simple rule schema in (13), combined with the domain parameter generates all the relevant primary accent locations is almost fully instantiated.

The analysis of unbounded systems without foot structure (i.e. those in 6) raises the question of whether the syllables that carry primary accent are the heads of prosodic words. Clearly the accentual domain itself cannot be a prosodic word as a whole unless we permit heads to occur anywhere within the prosodic word. It would seem more likely that prosodic words are constructed post-lexically in terms of the grid configuration that results from application of the accent rules. I leave this point for further research.

In my approach, bounded and unbounded systems differ in the setting of the domain parameter only. A similar affinity was also part of the standard approach to these systems, but had to be given up because the parallels were not expressed in the proper manner.

Having separated the assignment of primary accent from the assignment of non-primary accent we can see the latter as resulting from a

fairly simple word- or phrase level "rhythm box". Roca (1986) assumes that the domain of rhythm is the phonological phrase, but it is possible that other domains of the prosodic hierarchy are also relevant. The content of the rhythm box cannot be universally fixed because there are differences among languages. Rhythmic footing, for instance, can be weight-sensitive or weight-insensitive, and the alternating pattern can be binary or ternary; Van der Hulst (to appear b) argues, following van de Vijver (1995, 1996), that all rhythmic footing (also in ternary patterns) is trochaic.<sup>7</sup>

In this section, I have not discussed the distinction between cyclic and non-cyclic accentuation. I assume that accent rules are *all* non-cyclic, applying at the word level (in the sense of Borowsky 1992). So called cyclic effects result from the lexicalization of effects that accents may have on segmental properties. Thus, following Kager (1989), I assume that syllables receiving cyclic secondary accents are in fact heavy syllables, intrinsically marked at level 1.

##### 5. *Count systems: The metrical residue?*

In the preceding sections we have seen how unbounded and bounded accent systems can be analyzed non-metrically. In this section, we turn our attention to count systems. For these systems it would seem that primary accent is foot-based. If this is indeed so, count systems make it impossible to claim that *all* word accentual systems are non-metrical. In this section, I will suggest that it is probably too early to give up on this strong claim, however, and therefore premature to conclude that count systems represent a real 'metrical residue' of primary accent systems.

The key to my argumentation lies in admitting that some languages simply lack the notion of primary word accent. Hayes (1995) refers to a number of languages in which words have several equally strong accents; several of these will be mentioned below. Whatever the appropriate treatment of such systems may turn out to be, they do not refute the claim that all primary accentuation is non-metrical, simply because they lack 'primary accent'. In this section, I will try to show that there is some plausibility in the conjecture that count systems fall into the class of systems that lack primary word accent, and that the 'primary word accent' mentioned in their source descriptions is really a phrasal accent or an intonational effect. If this can be maintained, count systems cease to be counterexamples to the non-metrical approach to primary accent.

I will explore the idea that 'lacking primary accent' may have two sources. First, a situation of this type may be indicative of a historical

accentual change involving a shift of primary accent from one side of the word to the other. In such cases the location of a 'primary accent' is perhaps entirely dependent on the position of words in the phrase. It may even be the case that the 'primary accent' is really a phrasal accent at that point. I will show why, in this stage of development, a system may come across as a word-level count system.

To illustrate this point I will refer to an account of the development from 'early' Latin (with initial accent) to Classical Latin (with (ante)penultimate accent), and to accentual variation in Arabic languages which include initial accent, (ante)penultimate accent and (trochaic and iambic) count systems. I will also apply this line of reasoning to Australian count systems, although in these cases the lack of word accent may also be the result of another source, which I will now discuss.

The second source for 'lacking word accent' can lie in the morpho-syntactic structure of a language. In languages with a richly developed polysynthetic morphology, and therefore with words of considerable length, it is, as we will see below, not uncommon to avoid a unique word-level prominence peak. The reason for this may be that very long words do not 'fit' a single prosodic word template, although I have not encountered this claim in the literature.

Although in the approach I present in section 4 accent is assigned to (circumscribed parts of) grammatical words (i.e. underived and derived lexical entries), in most cases the resulting structure will be parsed into a single prosodic word.<sup>8</sup>

Assuming, however, that there is a tendency to avoid very long (i.e. unbounded) prosodic words, it follows that very long grammatical words cannot form single prosodic words and will be either only footed or split up in a succession of smaller prosodic words. I suggest that this state of affairs correlates with the absence of a word-level primary accent rule, and it seems plausible that this may lead to descriptions which state that there is no primary word-level accent. Such descriptions, in fact, would be correct in this situation. One may expect that, as in the previous case, phrasal accentuation is built on the internal accentual structure of the grammatical word (which involves rhythmic structure only). As in the first case, this may create the impression of a count system, if the word level rhythm is left-to-right, while phrasal accent occurs on the right edge of the phrase. With respect to this class of count systems there is another noteworthy tendency, which also points to the relevance of phrasal accentuation: in several descriptions it is explicitly mentioned that the location described as having 'primary accent' is identified by a tonal accent, which is sometimes explicitly referred to as part of the intonational system. In this case, the identification of count systems with systems that lack primary accent is further supported by the observation



that both types of systems are reported for languages that occur within the same language families.

If my conjectures can be sustained in the face of a deeper investigation of the relevant cases, it may turn out that 'count' systems do not exist as word-level primary accent types, simply because these systems do not involve the notion of primary word-level accent. This would mean that there is no metrical residue. Primary accent is always calculated with references to domain edges and properties of syllables. What is left for metrical theory is to provide an account of (post-lexical) rhythmic structure. In this article, it will not be possible to offer a thorough (re)analyses of all count systems taking into account the relevant historical, morpho-syntactic, and phrasal aspects. I set a more modest goal here, namely to try and elaborate the above suggestions somewhat by quoting and commenting on the relevant descriptions in Hayes (1995).

In the next section, I will first discuss the cases that may involve an accentual shift (5.1). Afterwards I turn to the polysynthetic cases (5.2).

### 5.1. 'Count systems' as transitional stages

#### 5.1.1. Latin

Classical Latin has been reconstructed as a right-edge weight-sensitive system with extrametricality. It is claimed that, prior to this system, Early Latin (or Italic) had initial accent; cf. Salmons (1992: 146 ff.) for a discussion. Assuming that this is correct, we take a special interest in the development from the initial to the (ante)penultimate system. McCarthy (1979: 462) offers an interesting speculation on this development that I would like to take one step further.

Evidence for the correlation between metrical ictus and accent cited in McCarthy (1979), shows that words like *facilius* could be accented initially (as in Early Latin), antepenultimately (as in Classical Latin) or on the penultimate syllable: *facilius*. The third form, occurring before 'major constituent breaks', can only be explained if it is assumed that there was a left-to-right trochaic rhythmic structure (*fāci*)(*līus*) or, stated more generally, that the initial accent was accompanied by a rhythmic pattern creating a relatively secondary accent on the antepenultimate syllable in words with an odd number of syllables (assuming that final syllables refuse secondary accent) or on the penultimate syllable in words with an even number of syllables. (Possibly the rightward rhythmic count restarts with heavy syllables; cf. *corpore* and *corpore*, also mentioned by McCarthy).

It then seems reasonable to suppose that before 'major constituent breaks' these secondary accents were 'promoted' to primary accent status. The point I wish to draw attention to is that in that specific position, then, Latin showed a *count system* since the location of primary accent

on the right would be dependent on a full count of all the syllables starting at the left-edge.

If this scenario is correct, we have evidence that a 'count system' may historically intervene between a left-edge and a right-edge system, since Latin eventually underwent this shift. We also obtain evidence, however, for saying that a word-level count system does not really exist, because in the above scenario there is no word level primary accent at the intervening stage. The impression of a word-level count system is created by the fact that it is the last strong syllable of a word in phrase final position that receives extra prominence (perhaps the phrasal accent itself).

McCarthy says that it is not clear why the intervening count system develops into a right-edge system, but perhaps we can understand this if we look at it from the viewpoint of the language learner, and assume that the count stage is very marked precisely because words do not have a fixed accent location. A generation of language learners confronted with this marked situation might try to interpret the phrase final accentual structure in terms of a word-level accent system. If I am correct in saying that UG does not allow for the option of a count system, the child would have to interpret the situation in terms of a right-edge system. The data that the child encounters are the following:

- (16) a.i    \ /    a.ii    \ /  
           [σ...hll]            [σlllll]
- b.i    \ /    b.ii    \ /  
           [σ...hll]            [σlllll]

All forms in (16) are compatible with a right-edge weight-sensitive system with extrametricality, except the one in (16bii). If the learner persists in his or her reanalysis, the accentual pattern of these words will change into antepenultimate accent (in accordance with the Classical Latin accent rule).

The stage of Latin in which primary accent can fall on the rightmost rhythmically strong syllable may be interpreted as a word-level count system. The point of this section, however, has been to suggest that it may be more appropriate to regard the alleged word-final accents as resulting from the fact that when words occur phrase-finally, a phrasal stress reinforces the rightmost secondary accent. Under this interpretation, we assume that in the transitional period words have a left-to-right moraic trochaic rhythmic pattern (presumably a reflection of the stage with fixed initial accent), but no longer a lexically specified primary accent. If this is a tenable assumption, we do not have to recognize the phenomenon of a word level count system.<sup>9</sup>

5.1.2. *Arabic*

McCarthy (1979) draws attention to the fact that the development that we have seen in Latin also applies to Arabic, which had a LAST/FIRST system in the Classical period and a Latin-like right-edge weight-sensitive system in most of the modern reflexes, e.g. *Damascene Arabic* (discussed by McCarthy 1979). He sees the count system of *Cairene Arabic* as a later development. With the above in mind, however, one is tempted to see the Cairene system as another transitional phase, forming the link between the initial (default) accent of Classical Arabic and the Latin-like accent rule of Damascene Arabic. The difference with the Latin case is that here the 'intervening' stage is attested and described as a stable system that exists next to the other systems. If the hypothesis that count systems are intermediate stages in which a fixed primary accent location is lacking is correct, it follows that the Cairene system must not have a word-level primary accent and that what is described as word accent must actually be the phrasal accent. We would then expect the precise location of this accent to be dependent on the position of words in the phrasal context. I have not (yet) tested this prediction.

A few other Arabic systems are reported as count systems. *Palestinian Arabic* differs minimally from Cairene Arabic: the primary accent is located further to the left and the facts seem compatible with an analysis like that proposed for Cairene (by Hayes) combined with final foot extrametricality; see Hayes ....:67-71 and 125-130 for analyses of Cairene and Palestinian Arabic, respectively. Assuming (as we do for Classical Arabic) that the final syllable is extrametrical, no appeal to foot extrametricality has to be made, however, as was pointed out in Jacobs (1990). The relevant cases are:

- (17) a. (L)l l <l>
- b. (h) (L)l <l>
- c. (l)l (L)l <l>

The pattern in (17a) shows that footing takes place from left to right and that degenerate feet are not allowed. The patterns in (17b,c) show that primary accent falls on the rightmost foot. Thus, Palestinian has a regular 'count' system. Accent lies on the rightmost 'strong' syllable. The fact that all data patterns except those in (17b,c) are compatible with a Classical LAST/FIRST system shows how close this system is to the Classical unbounded system. *Egyptian Radio Arabic*, according to Hayes (1995: 130-2) allows the Cairene and the Palestinian pattern in free variation. Such variation supports the idea that we are dealing with transitional systems.

As in the Latin case, the left-to-right rhythm in all these cases is that caused by a moraic trochee, however. *Negev Bedouin Arabic* (p. 226-228) and *Cyrenaican Bedouin Arabic* (p. 228-239) also have count systems which Hayes analyzes in terms of iambic feet. He (p. 228) conjectures that the iambic pattern is an innovation, and Negev first had the trochaic foot type, also found in Cairene, Palestinian and Radio Egyptian Arabic. Another interpretation which would make the innovation less dramatic is to say that both languages developed an uneven trochee. Such an analysis has to postulate initial (light) syllable extrametricality and allow degenerate feet. I refer to van der Hulst (to appear b) for a defence of the reanalysis of 'iambic' systems in this way.

5.1.3. *Australian languages*

A few Australian languages are also reported as trochaic right-to-left count systems:

- (18) *Malakmalak, Ngankikurrungkur* (Goldsmith 1990: 173-177)  
*Wargamay, Nyawaygi* (Hayes ....:140-2, p. 180)

Most Australian languages have initial accent, taken by Dixon (1980) as the proto-Australian pattern. Several languages in the upper Northern territory, however, have penultimate accent, and this is also where we find the count systems. In addition, many systems have bounded left-edge weight-sensitive accent (Thurawa, Thaua, Kitabal; cf. Cornелиsse 1991).

Cornелиsse (1991) points out that the existence of RL count systems is easier to understand if we see them as a step in an historical development from a penultimate system to an initial system:

- (19) Penultimate → RL count → initial.

The existence of the bounded weight-sensitive initial systems also fits into the pattern, since these can be seen as possible interpretations of the count systems in terms of a bounded accent schema (cf. 16 and related discussion). Given this view on the historical development, and given the hypothesis adopted in this article, I speculate that the Australian count systems are really systems without a fixed primary word accent.

5.2. 'Count systems' in polysynthetic languages

The cases mentioned in this section all involve languages that have a highly developed polysynthetic morphology. The idea that very long

words cannot form single prosodic words has not been explicitly stated in the prosodic literature. It has been mentioned, however, that sometimes long words form *two* prosodic words; cf. Dresher & van der Hulst (forthc.) who discuss the case of Italian where long words in phrase-final position count as two prosodic words. Helsing (1995) also claims that prosodic words and (prosodic phrases) may very well be subjected to maximality constraints. Several cases have been reported in which 'short' (i.e. monosyllabic) suffixes integrate with their base, whereas long (bisyllabic) suffixes tend to form prosodic words by themselves (e.g. Dixon 1977, discussed in Booij 1983). All this indicates that longer grammatical words tend to split up into more than one prosodic word.

With respect to languages that typically have very long grammatical words, I suspect that this is the reason that descriptions state that primary accent is lacking, or occurs on the rightmost foot. If, because the morphology is polysynthetic, it is typically the case that one grammatical word consists of more than one prosodic word, we can understand why the words sound as if they have right edge accent (which would be the phrasal accent) or as if they have more than one equally strong accent (which would be the case if no attention is paid to the phrasal accent but only to the word-accent of the different prosodic words).

In the latter case, one might expect words that are reported to have three accentuation levels: foot-level, word-level and phrase-level. Below, we will see that cases of precisely this type have been reported, albeit with a different labelling of the two higher levels. Because the whole structure is taken to be a prosodic word, rather than a phrase, the intermediate level has been referred to as a *colon*. The perspective that I have outlined above makes reference to this ad hoc unit superfluous.

In the next subsection, I will quote Hayes' descriptions of languages that could qualify as 'count' systems and of closely related languages that have been reported to lack primary accent. All these systems are reported to have left-to-right footing.

### 5.2.1. Syllabic systems

Consider the description of the following languages. The first two are count systems, the third apparently lacks primary accent:

(20) *Auca* (unclassified, Equador)

*Auca* allows degenerate feet. Primary accent can therefore be on the final or penultimate syllable of the stem (Hayes:365). In the suffixes, trochaic parsing proceeds from right-to-left (p. 365).

*St'at'imcets* (Interior Salish languages)

"stress alternates from the left edge of the Root"

"the rightmost stressed syllable receives primary stress"  
Hewitt & Shaw (1995: 5)

*Anguthimri* (Paman, Cape York Peninsula, Australia)

"No distinction marked between primary and secondary stress"  
(Hayes:198).

Interestingly, Pike (cited by Hayes on p. 183) does not designate any particular accent as the strongest for *Auca*, but on the basis of information on intonational contours Hayes concludes that the rightmost, i.e. stemfinal, accent is the primary accent.

*St'at'imcets* is discussed in Hewitt & Crowhurst (1995), who do not focus on the accentual system, however. Apparently, accent location can vary quite a lot in the Salish family: Spokane (dialect of Kalispel), also Interior Salish, has lexical marked accent. Squamish (Coast Salish) has penultimate accent. Lushootseed (another Salish language) has a first/first system (Hayes:297). This may indicate that the notion of primary accent is rather unstable in Salish.

### 5.2.2. Moraic systems

The languages described in this section are analyzed as iambic in Hayes (1995). In van der Hulst (to appear b), I argue that we can also represent these in terms of left-to-right trochaic parsing, assuming an *uneven trochee*. This issue, however, is not directly relevant here.

Hayes (1995) discusses a number of Muskogean languages. Some are described as count systems, others somehow involve intonation, still others are reported to lack primary accent:

(21) *Creek, Seminole* (Hayes:64-67)

"The extent to which [secondary stresses] are actually realized in phonetic forms is an unsettled issue" (p. 66). "Typically, a High tone is placed on the metrically strongest syllable" and "[...] additional tones sometimes dock onto the strongest syllables of feet other than the rightmost one in the word" (p. 67).

Rather than saying that the High tone associates to the metrically strongest syllable, we could also say that the association of an intonational pitch accent decides which syllable is the 'strongest' one. Hence we do not have compelling evidence showing that any particular syllable carries primary accent. The description of the following Muskogean languages supports this point:

(22) *Choctaw, Chickasaw* (Hayes:209-211)

"[...] the selection of which syllable is most prominent in the word as a whole is determined by the pitch accent system, which is entirely independent of metrical structure" (p. 210).

We now turn to Algonquian languages. The following three cases are different from the Muskogean systems, although they, too, do not strongly support the notion of a word level count system:

(23) *Delaware (Unami, Munsee)* (Hayes:211-215),

The primary stress is said to fall on the last non-final strong vowel.

*Malecite-Passamaquoddy* (Hayes:215-216)

The pattern is similar to that of Delaware, except for the fact that "there is an alternating pattern of prominence among stressed syllables going from right to left before the main stress" (p. 216).

*Eastern Ojibwa* (Hayes:216-218)

"Accounts of main stress vary". According to Bloomfield (1965), there is no primary accent. The Odawa dialect (Kaye 1973) has primary accent on the antepenultimate foot.

For Delaware Hayes postulates foot extrametricality. The case of Passamaquoddy is often cited for its colon layer, i.e. a right-to-left grouping of feet into a higher order constituent. The rightmost colon is said to bear primary accent. Hayes also postulates a colon layer for Eastern Ojibwa, combined with foot extrametricality (p. 217).

As mentioned above, I would like to suggest that the colon layer is really the layer of prosodic words, assuming that long words are split up into several prosodic words. Prosodic word formation, then, proceeds from right-to-left. The 'primary accent' can be seen as a prosodic compound accent (i.e. the accent that we also find in English compounds) or as part of the phrasal accentual system. If this perspective is adopted we do not need a new prosodic category (the colon), which strikes me as an advantage.

There are two further cases in the Algonquian family that Hayes mentions which also do not make very strong candidates for languages with primary accent. I refer to these without further comment:

(24) *Menomini* (Hayes:218-221)

"The pattern of main stress in Menomini [...] is an odd one: for example, words without long vowels apparently have no main stress" (p. 221).

*Potawatomi* (Hayes:221-222)

No information on how the iambic rhythm relates to "surface stress" is reported in the sources (Hayes:221).

We turn to three count systems from the Iroquoian language family which "are noteworthy for having evolved iambic accentual systems out of an original penultimate stress system" (p. 222):

(25) *Cayuga*# (Hayes:22-225)

Described as having right-edge primary accent, but according to Chafe (1977: 176), "Cayuga is a counterexample to the principle of culminativity" (p. 225).

*Seneca* (Hayes:225-226)

"words lacking non-final closed syllables [...] are described by Chafe (1977: 180) as accentless" (p. 225).

*Onondaga* (Hayes:226)

Retains the penultimate accent of Proto-Iroquoian to a greater degree, but also has iambic characteristics (Hayes:226, 266-267); cf. below.

In these cases, it seems clear that interpretations of the systems differ among various researchers. But it is not totally clear that there is primary accent (in all words). We also cannot fail to notice that the systems, as described, form stages in a historical development from penultimate to perhaps initial accent. This might reinforce the 'no primary accent' situation (cf. section 5.1). Interestingly, Dijk (1996) proposes a 'top-down' (i.e. primary accent first) analysis of the Cayuga system.

A third class of relevant cases is formed by the Yupik languages. The fairly well-documented set of Yupik languages clearly shows the natural bond between a highly polysynthetic morphology ("long words") and the absence of word accent. In all cases analyzed in Hayes (1995), the location of primary accent is simply not mentioned, or it is explicitly stated that the system has no clear primary accent. No count systems are reported in this family. The following languages or dialects are mentioned:

- (26) *St. Lawrence Island*  
 "As the sources disagree on main stress, I do not attempt to analyze it here." (p. 241)  
*Norton Sound, General Central Yupik, Chevak subdialect, Pacific Yupik* (Chugach)  
 No comments on primary accent.

An isolated North American language in the class of LR iambic systems is Winnebago, which combines footing with weak local parsing (p. 363), i.e. binary feet assignment which skips a syllable after each application. Hayes treats all accents as equal (p. 349) and again there is a reference to tonal structure:

- (27) *Winnebago*  
 [...] I will assume that Winnebago has a tonal prosody; that is, it is a pitch accent system with optional downdrift. For this reason, I will treat all accents as equal [...].

Outside North America, the Carib languages offer clear examples of LR iambic systems in which the location of primary accent is dependent on intonational patterns:

- (28) *Hixkaryana, Carib, Macushi*  
 Hayes (205-208) discusses Hixkaryana and points out that the location of 'primary accent' is dependent on the intonation pattern and not on the rhythmical structure. Accent falls on the final or penultimate syllable depending on the specific intonation pattern. Carib and Macushi are said to be similar.

In my view this kind of dependency on intonation reveals that the location that we talk about is not a 'level' location, but rather a phrasal location. In van der Hulst & Visch (1993), an analysis is given of Carib, in which a tonal accent is said to fall on the second foot (Hoff 1968). This is a puzzling fact, unless we are prepared to analyze the first two feet as a prosodic word to which the remaining syllables of the word 'cliticize'.

Finally, I refer to some isolated cases of iterative moraic systems, two of which are reported as 'count systems'. Of these two, the second has already been discussed, while for the first, interestingly, there is a need for a colon over the two rightmost feet:

- (29) *Kashaya*  
 Apparently a pitch accent language. No remark about primary accent. (p. 260)

### *Yidinʷ*

The last long vowel must occur in an even position, which suggests a LR iambic count.

### *Asheninca campa*

This is a 'count' system, i.e. primary accent reported to be on the right edge. Colon formation is invoked (p. 294).

*Negev Bedouin Arabic, Cyrenaican Bedouin Arabic*  
 Also a count system; cf. end of section 5.1.2.

This concludes the overview of LR moraic systems. No system with both moraic and iterative footing is reported to have left-edge primary accent. It is not clear why this is so. We do find left-edge systems among cases which involve LR iambic footing without showing weight effects (p. 266-267): Southern Paiute and Araucanian both with second syllable primary accent and further rhythmic structure and Dakota also with second syllable accent and no rhythm. These cases are treated as if the iamb is uneven, even though the languages "lack a weight-distinction".<sup>10,11</sup>

Hayes (p. 260-261) also lists a few languages with non-iterative iambs: Hopi, Ossetic, Sierra Miwok and Maidu, which all have initial accent if the first syllable is heavy otherwise second syllable primary accent. These cases then have simple left-edge accent.<sup>12</sup>

### 5.3. *Conclusions on count systems*

It has been my intention, first, to show that 'count' systems are closely related to 'no primary accent systems'; both types of description have been provided for closely related languages. Second, I have drawn attention to the fact that the primary accent location in count systems is often specified with reference to intonational features, or involves 'foot extrametricality', skipping the last foot (i.e. Delaware) or the first foot (i.e. Carib), sometimes combined with 'colon formation'. I suggested that these 'special' properties may indicate that prosodic words are formed over pairs of feet. Third, it has been my intention to provide grounds for saying that count systems seem to flourish when words are very long (due to polysynthetic morphology) or when the accentual system is changing. Of course both factors may conspire, as in the case of the Australian languages.

## 6. Concluding remarks

In this article, I have argued that *all* primary word accents are non-metrical, i.e. primary accent location can be seen as edge-based in all cases. In section 2, I showed that simple rhythmic systems are compatible with a standard metrical approach, but do not require it. Then, I demonstrated that a fairly large class of cases is not even compatible with the standard metrical theory. This was done in section 3. In section 4, I then demonstrated how all these cases can be analyzed in an edge-based theory. Finally, in section 5, I have turned to the 'metrical residue': count systems. Here I have tried to show that there is reason to believe that a number of these cases do not involve word level primary accent. Although this suggestion has been supported to some extent, it is clear that the relevant systems deserve a closer look, taking into account historical, morpho-syntactic, and phrasal aspects.

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## Notes

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- <sup>1</sup> References to "Hayes p." here and below refer to Hayes (1995).
- <sup>2</sup> Finally, let us note that unbounded systems may also involve lexically marked syllables rather than heavy syllables; cf. van der Hulst (to appear c).
- <sup>3</sup> Cf. Dell (1984) on French & Hammond (1987) on Hungarian. Both argue for rhythmic structure.
- <sup>4</sup> If the possible loci of lexical marks that trigger exceptional accent are restricted to the periphery of words, such systems may also be represented as bounded, however.
- <sup>5</sup> For Sierra Miwok we must assume that all words start with an "iambic" light-heavy sequence.
- <sup>6</sup> In section 5, I will cast doubt on (18c), arguing that *word level* primary accent is never assigned to rhythmically strong syllables. For the time being, I stick to the proposal in van der Hulst (to appear a).
- <sup>7</sup> Since in this approach unbounded systems do not involve foot construction, we might expect to find such systems that have a rhythmic alternation.
- <sup>8</sup> The assumption here is that the systems accounted for in section 4 belong to languages in which grammatical words 'do not have this problem', i.e. generally underived and derived words in these languages will be parsed into a single prosodic word. Compounds, prefixes and certain 'compound-like' suffixes very often form prosodic words by themselves, however.
- <sup>9</sup> Perhaps we can explain the variation between penultimate accent in Polish and

antepenultimate accent in Macedonian as two possible cases of fixing the right edge of a count phase, assuming that both developed from an initial accent position (still found in Czech); cf. Dogil (to appear a). The antepenultimate pattern in Macedonian may of course have been 'stimulated' by the neighbouring Greek pattern.

<sup>10</sup> Onondaga requires LR iambic syllabic footing to account for a lengthening rule.

<sup>11</sup> The Stoney dialect of Dakota has another rule: final if heavy otherwise penult; Hayes (1995: 267).

<sup>12</sup> He also mentions Cambodian which uses the iamb as a template for word structure.

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