FOOT TYPOLOGY IN OPTIMALITY THEORY

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This document contains two texts on Optimality Theory. The first text (Foot Typology) was written during a 1993 – 1994 stay at The Netherlands Institute for Advanced Study in the Humanities and Social Sciences (NIAS) as part of my work on the ESF-project Word prosodic systems. In the final version of that chapter, published in 1999, I had removed the OT parts because during that year I had become critical of OT. [1]

1 Introduction

Prince & Smolensky (1993) offer a new perspective on the organization of grammar: Optimality Theory (OT). The key idea is that the language-specificity of grammars lies in the way a universal set of constraints is ranked.

One could perhaps motivate the approach in the following terms. Assume that there are output properties that languages like to be have (what is often referred to as 'unmarked states', e.g. open syllables) or that languages strive for an ideal (i.e. transparent) relation between the lexical (input) form and the surface output. Since, however, it is entirely likely that such different 'demands' are grounded in different domains (perception, articulation, learnability, economy, etc.) situations may easily arise in which **conflicts** reveal themselves; a certain output property may be 'good' from a perceptual point of view, but 'bad' in terms of articulatory considerations. We can regard OT as an attempt to formally express this situation, i.e. that at any point in time a grammar attempts to reconcile a set of partially conflicting constraints by ranking them.

Applied to phonology, OT assumes that the phonological side of entries in the lexicon consists of phonological material that is partially specified with respect to the output. The morphology, as usual, may combine lexical entries to form complex forms. Simplex or complex forms are subjected to a function GEN which maps each of these on an infinite set of candidate 'outputs'. This set is then handed over to a function EVAL, which selects a unique output as optimal with respect to a ranked set of constraints. An output best satisfies the constraint if the first constraint it violates is lower in the ranking than the first constraint that is violated by any other candidate.

At present GEN is assumed to have the capacity to randomly add phonological material (structure and content) in an unlimited fashion (overrepresentation). At the same time the output can also underrepresent the input by not incorporating phonological information into the hierarchical (subsegmental and surprasegmental) organization. Phonological information that is unparsed in this way remains part of the output, but it will not receive a phonetic interpretation. (It is not "prosodically licensed".) It is to be expected that the possibilities of over- and underrepresentation must be limited in some way, for example by allowing these options for structural information only

[1] I gave this text to Alan Prince to read during the Girona Summer school in Linguistics in1994 (4-29 July).

(as suggested in Polgardi 1994). In this paper we will only be concerned with this form of misrepresentation.

The present work is the result of an attempt to find out how OT works and how one works with OT. The focus of this exercise is on accentual systems (i.e. the domain of metrical theory). In section 2, I introduce a set of constraints which directly or indirectly bear on accentual patterns and propose partial orderings of these which produce specific accentual types. Some of the constraints come from Prince & Smolensky (1993), McCarthy & Prince (1994), Hung (1993), Kager (1994); others echo proposals in earlier metrical work. In some cases my proposals deviate from those found in the OT 'sources'. I have not consulted all relevant items in the fast growing flow of OT-based papers that specifically deal with accent but there is no doubt in my mind that many of the ideas presented here are precedented by proposals in other people's work in progess, either on the drawing board or in unpublished manuscripts.

2 Foot typology

For the moment, I will assume that it is correct to classify accent systems according to the type of foot they use and how the feet are organized in prosodic words. I also will assume that there is a more or less agreed upon accentual typology that metrical theory has been designed to characterize and I will start out with a standard parameter-style characterization of this typology:

(1) a. Foot type
- i. weight-sensitive/weight-insensitive
- ii. left-headed/right-headed (trochee/iamb)
- iii. bounded/unbounded

b. Prosodic word
- i. feet are left-edge/right edge oriented (i.e. direction)
- ii. left-headed/right-headed (i.e. edge for primary accent)

OT replaces this parametric approach by a constraint-based approach. Two questions must be addressed: what are the relevant constraints and how do different rankings of these lead to the relevant types in the accentual typology.

A difference between standard metrical approaches and OT is that the former aimed at characterizing a fixed set of foot types. Thus many discussions can be found with respect to questions regarding the foot inventory. Classical versions of metrical theory propose a set of parameters that 'generate' a pool of foot types. This pool contained, for example, so called quantity sensitive foot types consisting maximally of a heavy syllable and a light syllable. In subsequent literature it was then suggested that such trimoraic feet can be dispensed with in favor of bimoraic feet. A proposal of this kind made the pool of foot types asymmetric and thus no longer characterizable in terms of a set of parameters. Thus, Hayes (1985, forthc.) proposes to replace the parametric approach by a 'list' approach; the foot types are listed in the form of templates. In OT, it would seem, less emphasis is put on the extensionof the pool of possible foot. Specific foot types are the result of the ranking of those constraints that bear on foot form. If it turns out that old style quantity-sensitive foot types are only marginally used this will fall out from certain preferred rankings of constraints that bear on foot shape. In this sense, then, OT is symmetric like the standard theory.

Since at present there is no theory of preferred rankings, asymmetries that appear to exist are not theoretically explained, unless in the form of brute force constraints that make specific reference to the relative markedness of foot types.

A question arises with respect to foot types that are totally unwanted, such as for example headless feet. These could be ruled out by not allowing GEN to assign them in the first place, but given the constraint-based approach this is not necessary. In fact, GEN, need not rule out anything. The complete absence of the headless foot could fall out from the fact that there is a constraint which requires constituents to have heads, whereas there is no constraint that will ever favor them. In short, GEN, could be allowed to assign any type of structure (and content, unless this is ruled out; cf. supra). In practice, it seems more productive to attribute inviolable properties of languages to GEN. I will assume here that so called universally top-ranked constraints are part of the generator, or, to put it differently, of the theory that specifies the form of phonological representations.

OT shifts the attention from questions of representations to questions of selecting outputs. This does not mean that questions of representations cease to be of interest. For every accentual system that one wishes to analyze, it must first be decided HOW one wishes to represent the preferred output before one can design a set of constraints that will (in a given order) prefer this representation over its alternatives.

2.1 Bounded systems

Consider the following array of attested weight-insensitive systems:

(2)	Left		Right		
	initial	postinitial	final	prefinal	preprefinal
	Czech	Dakota	Turkish	Polish	Macedonian
	Finnish		French		

In a typologically impressionistic survey, Hyman (1997) attests prefinal more often than initial, final coming on the third place. Postinitial and preprefinal are rare. OT, like standard metrical theory is not concerned with quantities, but with possibilities, so there must be a relatively simple way to represent all these types in terms of constraint ranking.

In the standard version of metrical theory, we generate this array in terms of several parameter settings. Leaving aside preprefinal for the moment, initial and prefinal make use of a trocheic foot (x.), whereas postinitial and final employ an iamb (.x). The parameters edge-orientation and word-headedness do the rest.

Given the descriptive options of metrical theory, all patterns can be represented differently. Initial and final accent could be represented with unbounded left- and right-headed trees (in which case the distinction between a foot and word level is neutralized). This option could be ruled out only if there is clear evidence for an alternating pattern. Postinitial accent could be represented as if it is initial accent (thus in two ways), assuming that the initial syllable is invisible (extrametrical). Final accent can be represented in terms of a trochee constructed over the final syllable and an extra 'silent' syllable, called a catalectic syllable in Kiparsky (1992).

One would assume that most ambiguities can in principle be resolved on the basis of language-internal facts, but in those cases where this is not so, a problem arises for the standard theory.Such options also exist for OT. The question which structure fits which pattern therefore remains, and one would assume that unique choices will arise from the formulation and ranking of constraint that bear on prosodic organization.

In OT the parameter foot-headedness is replaced by two constraints: **RhythmType=Iamb** and **RhythmType=Trochee**. Every language has both, but the one that is ranked highest in a language determines the preferred foot type of that language.

Now suppose the preferred rhythm type is iambic, but for some reason final accent is disprefered, due to a constraint **NoFinalAccent**. One might think that to satisfy this constraint, RT=Iamb will be violated (at least ones) and that the effect of the lower ranked constraint Trochee now becomes visible:

```
(3)   a. 5-syllable input

         σ σ σ σ σ      NoFinal >> Iamb >> Trochee

  =>   (.  x)(.   x) .       ok         ok        **
        σ  σ  σ  σ  σ

       (x  .) (x  .) .       ok         **        ok

        σ  σ  σ  σ  σ

      b. 4-syllable input

         σ σ σ σ          NoFinal >> Iamb >> Trochee
  =>   (.  x)(x  .)          ok          *         *
        σ  σ  σ  σ

       (.  x)(.  x)           *          ok        **
        σ  σ  σ  σ
```

Prince and Smolensky 1993 (henceforth P&S) present a case of this type.

(We cannot derive the same result within OT by using a 'parametric constraint': RhythmType=Trochee/Iamb. In that case we would need to assume as a matter of convention that (whatever the value setting of this constraint), if the result of a setting is dispreferred the other possibility takes over.)

Note that if we allow that constraints are opposites we can simply switch from a standard parametric approach to an OT approach by replacing every parameter by two constraints. The two possible rankings of such opposite constraints produce the same effect that value setting of a binary parameter does. Surely, the case against a parametric approach gets stronger if it can be shown that all constraints are independent. Another general point is that for the case at hand one could argue that NoFinalAccent is a parameter and assume that if switched on, this parameter universally dominates the rhythm type parameter. I return to a more detailed discussion of this point in section 3, where I will consider the possibility of a theory that combines old style parameters with a set of universally top-ranked constraints.

The typical argument in favor of avoiding parameters altogether or avoiding parametrized constraints is that the theory is simpler if just one device is used, viz. constraint ranking.

We will deal with edge-orientation, iterativity and word-headedness in systems as in (2) later. Let's now first turn to bounded systems in which the location of primary accent is determined in part by properties of the syllables that lie on the relevant edge.

In such weight-sensitive systems a distinction must be made between heavy and light syllables. How can syllable weight be connected to foot location? The basic idea is very simple: weight sensitivity arises whenever certain syllables (i.e. those that are 'heavy') refuse to occupy the dependent position in the foot with the result that they always end up as heads of feet. We will visualize the constraint that leads to weight-sensitivity as follows:

(4) **Weight**

```
.
|
=
|
h
```

The constraint Weight exercises a pressure to keep heavy syllables away from the dependent foot position, but to give in to this pressure implies admitting a form of non-uniformity in foot structure. We will assume that there is a constraint that we will call **(Foot)Uniformity** (a relative of the uniformity parameter mentioned in the pre-OT Prince and McCarthy 1986) which favors parsing into uniform bisyllabic (therefore weight-insensitive) feet. Clearly, if (4) is given its way, a sequence of two heavy syllables will interrupt a regular binary patterning. Weight and FootUniformity are thus potentially conflicting and whether an accent system is weight-sensitive or not depends on which constraint dominates over the other.

An alternative to FootUniformity would be a constraint that has been suggested in Hung (1993): **Rhythm**. This constraint says that after every accented syllable there must be an unaccented syllable. Later we will see that this constraint can be put to use for other purposes as well. It will be clear that the OT approach gets more interesting when the number of constraints gets smaller. This alternative, then, must be examined seriously and we will return to it later. For the time being we will appeal to Uniformity.

Suppose now that we rank Weight over Uniformity in a right-edge trochaic system with a right-headed prosodic word. We have four cases to consider:

```
(5)      h l ]    l h ]    h h ]   l l ]
```

The first and fourth case present no problem since we can simply have a binary trochaic foot without violating the condition; cf. (6). It is important to bear in mind that the condition, as stated in (4), bans heavy syllables from dependent position. It does not ban light syllable from head position:

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

The problem lies in the two medial cases. Clearly, if condition (4) is to be met, we cannot have a trochaic foot over the two word final syllables here, because then a heavy syllable would end up in the weak position of the foot. What we can do, however, is have a monosyllabic foot on the final syllable only:

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

In the two medial cases the heavy syllable by itself forms a foot. Further footing would incorporate the syllable preceding the heavy, but we are only concerned here with the rightmost foot.

With a right-headed word tree we arrive at the following (partial) accentual patterns:

```
(8)     Rotuman : final in case of σh], prefinal otherwise
         x  )        x)        x)    x  )
        (x  .)      (x)       (x)   (x  .)
         h  l ]    l  h ]   h  h ]  l  l ]
```

The structures in (8) are appropriate for a system which has primary accent on the final syllable if this is heavy and on the prefinal syllable otherwise, i.e. the type attested for *Rotuman*.

In *Yapese*, another right-edge weight-sensitive system, primary accent differs from what we find in Rotuman in the case of l l] were we find final accent, as opposed to prefinal accent in Rotuman. How do we deal with a system of this type?

The simplest option appears to be to take an iambic, rather than a trocheic foot:

```
(9)     Yapese  : prefinal in case of hl], final otherwise
         x)          x)        x)      x)
        (x)        (.  x)     (x)   (.  x)
```

```
h l ]    l h ]    h h ]   l l ]
```

The first case deserves our special attention. It would appear that in this case we could have assigned a foot to the final light syllable only. What we have done instead, however, is skip the final light syllable.

(In Vergnaud and Halle (1978) and Hayes (1980/81) systems like Yapese were analyzed in terms of a special foot type, the so called **obligatory branching foot**. Given the skipping option, however, such a special foot type is simple unnecessary.)

So, skipping gives us the correct result, but the question is how skipping of the final light syllable can be achieved? In accordance with current practice let us refer to a foot that consists of a single ABU (Accent Bearing Unit) as **degenerate**. I will assume that there is a constraint **NoDegen** which disfavors such feet. Paying respect to this constraint means leaving 'trapped' syllables unparsed. If we assume that not parsing syllables into feet also violates a constraint, viz. **Parse**, we can say that Yapese has the following ranking: NoDegen >> Parse. I.e. avoiding degenerate (or unary) feet is more important than parsing exhaustively.

Mirror images of Rotuman and Yapese occur, i.e. in *Ossetic* and *Malayalam*, respectively:

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

```
(x       (  x     (x     (  x
(x)      (. x)    (x)    (. x)   (iambic)
[h  l    [l  h    [h  h  [l  l
```

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

```
(x        (x     (x     (x
(x  .)    (x)    (x)    (x  .)   (trochaic)
[h  l    [l  h   [h  h  [l  l
```

Instead of NoDegen, P&S introduce a constraint which requires feet to be binary. Below, I will discuss the intended difference between NoDegen and FootBinarity.

In recent versions of metrical theory feet type that combine a heavy and light syllable (so called unbalanced feet) are partially (Hayes, forthc.) or completely (Kager 1993) abandoned. The idea of the latter, more radical position (which is in the spirit of Prince 1983) changes our conception of weight sensitivity: in weight-sensitive systems heavy syllables make up the entire foot. This excludes (hl) feet in trochaic systems and (lh) feet in iambic systems.

Let us consider an analysis of the systems seen so far without unbalanced feet. Assuming, as before, that unary feet are disallowed and skipping is possible, we derive the appropriate patterns for the four systems that we have discussed in the following manner:

(11) a. Rotuman : final in case of σh], prefinal otherwise

```
 x)       x)      x)    x   )
(x)      (x)     (x)   (x  .)   (trochaic)
```

h l]   l h]   h h]   l l]
===

b. Yapese : prefinal in case of hl], final otherwise
x)   x)   x)   x)
(x)   (x)   (x)   (. x)   (iambic)
h l]   l h]   h h]   l l]
        ===

c. Ossetic: initial in case of [hσ, postinitial otherwise
(x   (x   (x   (x
(x)   (x)   (x)   (. x)   (iambic)
[h l   [l h   [h h   [l l
        ===

d. Malayalam: postinitial in case of [lh], initial otherwise
(x   (x   (x   (x
(x)   (x)   (x)   (x .)   (trochaic)
[h l   [l h   [h h   [l l
===

The cases that come out differently in terms of foot structure (not in terms of accentual pattern) are underlined. As we notice, skipping plays a more important role in this approach.

The theory that allows unbalanced feet makes different predictions when we consider assigning foot structure throughout the word, i.e. iterative footing. These predictions are correct for trochaic systems and perhaps problematical for right-to-left iambic systems, but we will not go into the fine details of that issue here (cf. Kager 1993, van der Hulst 1991) and I will henceforth assume that Kager's binary foot theory is correct, also (contra Hayes 1995) in iambic systems. In the resulting theory, weight-insensitive feet consist of maximally two syllables, whereas in weight-sensitive system a maximum of two moras applies. The appropriate generalization would be that a foot is composed of maximally two accent-bearing units (ABUs). Below in section 2.4 we will suggest that the upper bound of either two moras or two syllables results from paying respect to a constraint that disallows lapses, i.e. sequences of two unaccented ABUs, **NoLapse**.

Accepting, then, the analyses in (11), in which we have the ranking Parse >> Degen, let us ask what kind of system would be produced if Degen is outranked by Parse? First of all, initial and final light syllables which are adjacent to a heavy syllable would form (degenerate) feet by themselves and be expected to have an accent. This could lead to systems that are weight-sensitive but that nonetheless have a fixed peripheral primary accent location. In addition such systems would have accents not only on all heavy syllables but also on light syllables that either form the head of a binary or by itself a unary foot:

(12)   . .   . . .   …… x)
(x)(x .)(x)(x)(x .)(x)(x)   (assuming right-edge orientation
...h l l h l l l h l   i.e. right-to-left direction)

There are systems which come close to this pattern in that primary accent is completely fixed on a peripheral syllable (final or initial), while elsewhere in the word weight-sensitivity is applicable.

What such cases do not seem to support is non-primary accents on unary feet. This follows if one says, as we will do in section 2.5, that unary feet are *not* maintained in situations of clash, unless, as in (12) they get 'support' from the primary level accent mark.

It may be argued that the ..hl pattern does not contain a clash if it is assumed that the heavy syllable is accented on its initial mora; cf. Kager (1993) on this line of argumentation. We would then expect not to find the mirror image case of (12). Unary feet could then be said to be impossible in case of clash only, i.e. in case of two accented light syllables, and no appeal need be made to the 'support' of primary accent.

In section 2.4 and 2.5 we return to the issue of canonical foot size and consider deviations from the binary pattern, i.e. unary and ternary feet, respectively. In 2.5 we further discuss the idea alluded to above that the distinction between allowing or disallowing unary feet lies in giving low or high priority to Parse. In 2.4 we will argue that [hl] and [lh] feet are possible after all, but only in systems that respect the constraint that head of feet must be branching. We will show that this constraint (**HeadBranch**) produces ternary systems, or, if another constraint **HeadIntegrity** applies, to old-style unbalanced feet. In section 2.6 we consider the issue of unbounded feet.

2.2 Extrametricality

In some systems accent falls on the third syllable from the end, a kind of ternary pattern. In section 2.4 we will see that there are languages which have a ternary rhythm throughout the word. Here I focus on cases that have the ternary pattern on the right edge only, i.e. cases that used to be dealt with in terms of **extrametricality**.

The idea is originally due to Liberman (1976). Liberman proposed that sometimes a peripheral syllable can be left 'unconsidered'. Such a syllable is extrametrical. Extrametricality, if applied to word accentual patterns, offers a means of placing an accent three-from-the-edge. The extrametrical syllable is put between angled brackets:

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

If extrametricality was symmetrical we would expect to find languages that have postpostinitial accent. Apparently there are no such clear cases. At this point one might go in two directions. One is to stipulate that extrametricality only applies to the right edge. The other is to say that since post-initial accent is so rare to begin with, finding a combination of left-edged iamb and extrametricality is highly unlikely.

Implicit in the above account of preprefinal accent is the idea that extrametricality must only apply to the edges of accentual domains, so that we do not allow ourselves to randomly make syllables extrametrical. This has been called the **Peripherality Condition** (on extrametricality). To acknowledge the fact that extrametricality is limited to the right edge, we could express this condition more straightforwardly in terms of a 'positive' constraint which states that feet do not wish to be final. This means that if a language shows the extrametricality effect it actually meets this constraint. Following Prince and Smolensky (1993), we will call this constraint **NonFinality**. For the time being let us interpret NonFinality in such a way that final feet are avoided. (It seems likely that the pressure that NonFinality exercises is stronger in case of iambic footing than in case of trochaic footing.)

If a particular language shows no extrametricality effect this is because other constraints overrule NonFinality. Such a constraint could be Parse. In a language in which Parse outranks NonFinality (Parse >> NonFinality), extrametricality does not apply.

It is well-known that the extrametricality effect will not show up if the word contain less than three ABU's. In standard approaches it is said that extrametricality is suppressed if the result would be that a word ends up having no foot at all. (This presupposes that the foot must be binary.) It is fair to say, then, that the standard theory makes use of ranked constraints: there is a constraint which says that a word must have a foot. The constraint is universally top-ranked and its effect is visible in case a certain parameter setting happens to lead to a violation. Realizing this, one can go two ways. One can either say that the standard approach (involving parameters and universally top-ranked constraints) is perfectly coherent or one can follow the OT path and move away from the constraint/parameter mix in favor of a constraint-only theory. The point I wish to make here is that the "Do Something Unless" syndrome is not necessarily problematic for a standard approach and that a mixed theory must perhaps be taken more seriously than is currently the case. I return to this issue in section 3.

2.3 Edge-orientation (directionality)

This section focuses on the issue of directionality. In (14) we have represented four types of binary accent systems cross-classifying the parameters foot headedness (weight-insensitive) and directionality of foot assignment:

```
(14)  a. Word Tree: left-headed        (x     .     . )
         Foot: left-headed (trochee)   (x .)(x .)(x .)
                                       σ σ  σ σ  σ σ

      b. Word Tree: right-headed       (.     .     x )
         Foot: left-headed (trochee)   (x .)(x .)(x .)
                                       σ σ  σ σ  σ σ

      c. Word Tree: left-headed        ( x     .     .)
         Foot: right-headed (iamb)     (. x)(. x)(. x)
                                       σ σ  σ σ  σ σ

      d. Word Tree: right-headed       ( .     .     x)
         Foot: right-headed (iamb)     (. x)(. x)(. x)
                                       σ σ  σ σ  σ σ
```

Since the number of syllables in (14) is even in all cases, we managed to avoid a particular issue which comes up if we also consider strings composed of an odd number of syllables. We take (14a) to demonstrate this in (15):

```
(15)   Word Tree: left-headed          a.   (x     .     . )
       Foot: left-headed (trochee)          (x .) (x .) (x .)
                                            σσ  σσ  σσ  σ

                                       b.      (x     .     . )
                                               (x .) (x .) (x .)
                                            σ  σ σσ   σσ σ
```

For the present purposes we may or may not assume that the 'left-over' syllables in (15a) and (15b) form a unary foot by themselves. The relevant point to observe is that a system consistent with the parameter settings in (14a) may have either of the two patterns in (15). In (15a) primary accent would be fixed on the initial syllable in both even and odd words (i.e. we have the pattern in 16a), but with (15b) the language would have the rule for primary accent which is verbally stated in (16b):

(16) a. Primary accent falls on the initial syllable

b. Primary accent falls on the initial syllable if the word is even-numbered, and on the second syllable otherwise (i.e. if odd-numbered)

Interestingly, systems like (16b) (which I refer to as **count systems** in van der Hulst 1992) have been attested. The difference between (16a) and (16b) can be stated in terms of directionality of foot assignment or, to put it non-procedurally, in terms of *edge preference* for feet (cf. Vergnaud 1978), i.e. we can say that (16a) obtains if feet are assigned from left-to-right or if feet prefer to lie at the left edge. Edge preference for feet will not only make sure that the first foot is on the left or right, but also that all subsequent feet are as left or right as possible. Thus, feet will be assigned to the whole string, as in (17a), if we assume that Parse is higher ranked than **FootEdge (L/R)**. If, however, FootEdge outranks Parse we expect to find so called *non-interative* footing, as in (17b):

```
(17)  a.   (x  .)(x  .)(x  .)          b.   (x  .)
           σ  σ  σ  σ  σ  σ                 σ  σ  σ  σ  σ  σ

           Parse >> FootEdge (L)           FootEdge (L) >> Parse
```

FootEdge (L/R) is a shorthand for **Align (Foot, L/R, PrW, L/R)**.

(The distinction in (17) is made by P&M in similar terms. Here and below I sometimes use different names for the relevant constraints.)

If a non-derivational approach in terms of edge preference is taken, the term directionality becomes metaphoric, or rather anachronistic. Since old habits are persistent I will still be using the derivational jargon.

There is a strong tendency (made explicit in van der Hulst 1984 and Hammond 1985) for some kind of agreement between directionality and primary accent location. In most cases, if feet are left-to-right directional, primary accent is on the left (i.e. on the first foot that got assigned), and vice versa. Thus count systems are rather rare.

To express the difference between 'normal' and count systems in terms of constraint ranking, let us assume that there is a constraint **HeadFootEdge** which fixes the location of primary accent. This constraint replaces the word-headedness parameter. The constraint prefers the head foot to be on the left or right edge of the domain. The agreement noted in van der Hulst (1984) implies that the value for FootEdge (i.e. the preference of all feet) and for HeadFootEdge (preference of the head foot) tends to 'harmonize'.

In case both preference constraints are set on the same edge there is no conflict and their ranking cannot be established. In case Footedge and HeadFootEdge are set differently a conflict arises when the number of syllables is odd. In fact, we then either get (19b=15b=16b), a count system, or a kind of system that we did not consider so far (in 19b):

```
(19)  a.   (x     .      .  )
           (x  .)(x  .) (x  .)
           σ  σ  σ  σ  σ  σ  σ
```

Parse >> FootEdge (R) >> HeadFootEdge (L)   (count system)

```
      b.   (x        .     .  )
           (x  .)  (x  .)(x  .)
           σ  σ  σ  σ  σ  σ  σ
```

HeadFootEdge (L), Parse >> FootEdge (R)   (**antipole system**)

HeadFootEdge is shorthand for Align (PrW, L/R, Foot, L/R).

The ranking in (19a) produces a count system, while that in (19b) produces a system in which primary accent is initially fixed, while the rhythmic foot structure comes from the opposite edge, i.e. the antipole. Such cases are, in fact, attested: (19b) captures the system of *Garawa*, for example.

All this is in accordance with M&P.

To characterize (19b) we could also involve FootEdge (L), assuming that in case of a 'parametrized' constraint like FootEdge, using FootEdge (R) does not exclude using FootEdge (L):

(19) c. HeadFootEdge (L), FootEdge (L) >> Parse >> FootEdge (R)

I will assume, however, that it is not the case that both instantiations of a 'parametrized' constraint are independent, until a more convincing case can be shown.

2.4 Ternary feet

In section 2.2, we have seen that the pre-prefinal accent does not necessarily lead to admitting ternary feet such as the one in (20):

(20) (x . .)
σ σ σ

Pre-prefinal accent can be achieved by appealing to the ranking of NonFinality over Parse.

In the 'early days' of metrical theory it was argued that ternary feet could be banned from the theory entirely. Hayes (1981), in favor of such a theory, noted that the pattern in *Cayuvava* (which we discuss immediately below) is problematic for it. Subsequently more and more languages with ternary rhythmic patterns throughout the word have come to the forefront. This necessitates a reconsideration of the ban on ternary feet.

In Cayuvava, primary accent lies on the preprefinal syllable and preceding that, we find a ternary rhythm:

(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-c). We return to this point below. Cayuvava does not have closed syllables. Since onsetless syllables are allowed, sequences of identical vowels may occur, but there appears to be no reason for treating these as long vowels. Hence the language is analyzed as having no length contrast. Thus Cayuvava is 'weight-incapable'.

Considering the logically possible patterns of uniform accent placement we find the following array of possibilities for rhythm:

(22) a. x x x x x x x x x x x x
σ σ σ σ σ σ σ σ σ σ σ σ 'unary' rhythm

b. x . x . x . x . x . x .
σ σ σ σ σ σ σ σ σ σ σ σ binary rhythm

c. x . . x . . x . . x . .
    σ σ σ σ σ σ σ σ σ σ σ σ ternary rhythm

d. x . . . x . . . x . . .
    σ σ σ σ σ σ σ σ σ σ σ σ quaternary rhythm

e. and so on

Pattern (22a) does not appear to exist. We can think of several constraints that it would violate, e.g. NoDegen or FootBIn, or NoClash. In any event there apparently is no constraint C such that the ranking C higher than whatever disprefers (22a) would force (22a) into existence. It appears that clashes can only occur unintendedly in specific cases if Parse (syllable) or constraints applying to higher prosodic levels take precedence. (22d) is also unattested. The idea is here that no ranking of constraints will ever favor the pattern in (22d). This pattern may violate parse or a constraint like **NoLapse** which rules out a sequence of two unaccented ABUs. Again there appears to be no competing constraint C such that C >> Parse/NoLapse, producing quaternary patterns.

This leaves us with the patterns in (22b) and (22c) which are attested. (22b) results if NoClash and NoLapse (formulated in (23)) are undominated by interferring constraints:

(23) a. NoClash   b. NoLapse
    x x   . .
    σ σ   σ σ

(Below, we will consider the possibility of these constraints applying at the moraic or the syllabic level.)

Hung (1993) replaces NoClash by a constraint Rhythm which subsumes NonFinality. We discuss this point later. Kager (1994) discusses ternary systems and decides on an analysis that is not unlike the one we will propose here.

Let us concentrate on the constraints and rankings that are relevant with respect to preferring ternary feet over binary ones.

With respect to languages having binary feet, we could assume either that a constraint like FootBin is sufficiently high-ranked, or that two other constraints are responsible, one referring to clashes (NoClash), the other dispreferring lapses (NoLapse).

We will now show that there is one constraint which, if higher ranked than FootBin/NoLapse, may lead to ternary patterns. This constraint, HeadBranch, requires heads of feet to be branching. We simply adopt here a proposal by Dresher & Lahiri (1991) and Rice (1991) who suggest that ternarity results if heads of feet must be branching. Head branching is a natural property since branching of heads enhances the asymmetry between heads and dependents. Such asymmetries are recurrent in metrical systems and it is thus not strange to have a constraint against the absence of head-dependent asymmetries.
Thus:

(xx)	Binary system:	FootBin >> HeadBranch
	Ternary system:	HeadBranch >> FootBin

This view entails that ternary feet look like (24a) and not like (24b):

(24)	a. hierarchical ternary feet	b. flat ternary feet
	((x .).)	(x . .)
	σ σ σ	σ σ σ

Given that the basic foot inventory is symmetrical (trochee and iamb) we expect two possibilities for ternary patterns (dactyl and anapest) and both should be possible with and without the weight constraint.

(25)	a. Dactyle	b. Anapest
	((x .).)	(.(. x))
	σ σ σ	σ σ σ

As far as weight-insensitive systems are concerned only the dactyl has been called upon so far (for Cayuvava). Dresher and Lahiri (1991) analyze Germanic in terms of a weight-sensitive dactyl. For other ternary weight-sensitive systems we need "amphibrach" feet (WSW) which we discuss below. No ternary pattern (either weight-sensitive or weight-insensitive) that makes use of the anapest in (25b) has been attested.

Let us now return to the observation we noted regarding the fact that no accents are placed on a span of two remaining syllables in Cayuvava (e.g 21b-c). Suppose that we would assign a foot in these cases. This would imply that the feet are non-uniform. We will assume, then, that FootUniformity in Cayuvava outranks Parse. This rules out (26):

(26) (x .) ((x .) .)((x .) .)
σ σ σ σ σ σ σ σ

Rice (1991) raises the question whether recursion must be restricted to adjunction at the 'dependent' side of a foot (as in 25). Rice suggests that the following ternary structure should also be regarded as admissible foot types:

(27)	a. ((. x).)	b. (.(x .))
	σ σ σ	σ σ σ

Such feet create an amphibrach pattern. I will refer to the as left-headed amphibrachs and right-headed-amphibrachs, respectively, although Rice does not use these terms. This proposal implies that HeadBranch is parametrized, just like FootType:

(28) a. FootType: Iamb/Trochee

b. HeadBranch: Iamb/Trochee

Rice makes a case for the need of the two amphibrach feet, using the structures in (27) for *Chugach* and *Sentani*, respectively. There is, so far, no evidence for the amphibrach foot from weight-insensitive systems. If we accept his proposal, the constraint NoLapse is only relevant if FootType and HeadBranch have opposite head locations.

The interesting aspect of weight-sensitive ternary systems is that the unbalanced foot types which we excluded from binary systems now make their come back:

(29)

Unbalanced Trochee	Unbalanced Iamb
((x) .) h l	(. (x)) l h

Binary systems, as we argued in section 2.2, only admit balanced feet composed of two light syllables or composed of two moras (leaving aside the possibility of unary feet).

The unbalanced foot types may occur along with trisyllabic feet in a ternary systems, where they latter arise if three light syllables happen to be in a sequence at the right point in the parse. Let us assume, however, that certain systems may exclude ternary feet, while admitting unbalanced, hence trimoraic feet. Such systems would, in fact, conform to the old-style QS patterns. We could enforce the bisyllabic character of feet if we say that FootBin in fact expresses two constraints, one applying to the level of syllables, the other to the level of moras. An old-style unbalanced system, then, would have the constraint ranking in (30a), while systems allowing ternary feet have that in (30b).

(30) a. FootBin (σ) >> HeadBranch >> FootBin (μ) ....
b. HeadBranch >> FootBin (σ), FootBin (μ) ....

Binary systems (i.e. those disallowing ternary feet and unbalanced feet, have FootBin (mora) at the top.

We now return briefly to the ternary "Germanic Foot". In Germanic we deal with the mora as the accentual unit. Dresher and Lahiri's (1991) analysis is particularly interesting because it points to a feature of accent systems that we have not seen thus far.

In our analysis of weight-sensitive systems we have learned that primary accent can be kept from being strictly peripheral by high ranking of the constraint Weight (over FootUniformity) and ranking NoDegen over Parse.

We have also seen how a system can be weight-sensitive and still have strict peripheral primary accent, i.e. if Parse >> NoDegen. For the left edge, a system of this type produces the following pattern:

(31) (x (x (x (x

```
 (x)        (x)(x)     (x)       (x  .)    (trocheic)
[ h  l      [ l   h      [ h  h    [ l  l
 ===
```

At first sight, *Germanic* falls in this category too. Primary accent is strictly initial, but footing is weight-sensitive. Dresher & Lahiri, however, make the additional claim that a post-light heavy syllable carries *no* secondary accent; it acts as light syllable and is incorporated into the foot that contains the preceding light syllable. This is what they call **resolution**. They further argue that a string [l h l l] contains only one foot, i.e. is parsed as in (32a) and not as in (32b):

```
(32)    a.    ((x  .) .) .          b.    (x  .)(x  .)
              [l  h  l  l]                [ l  h  l  l]
```

Hence Dresher and Lahiri say that Germanic has a ternary foot. The final initial light does not form a unary foot if we assume that NoDegen outranks Parse.

The question is now why (32a) is preferred over (33):

```
(33)           .((x) .) .)
              [l  h  l  l]
```

We must conclude that HeadFootEdge (L) outranks Weight, which effectively means that a weight-insensitive ternary foot is formed over the first two syllables. The following pairwise rankings, then, should account for the main features of the Germanic system:

(34)
a. HeadBranch >> FootBin (-> ternary)
b. NoDegen >> Parse (-> no unary feet)
c. HeadFootEdge (L) >> Weight (-> resolution)

In the following section we will focus on the issue of unary feet.

2.5 Unary feet

If unary feet are disallowed (i.e. if NoDegen >> Parse), two consequences must be detectable in the system. Firstly, in an uneven string there will be one 'stranded' ABU which has no accent. Secondly, a (major category) word must minimally consist of two ABUs. (The minimal word effect follows if we say that a morphological word must be a prosodic word, where a prosodic word can only exist if there is minimally one foot.)

Let us spell out what the consequences of this are for the four logical possibilities, taking the option ABU (σ):

```
(40)   a.  Foot: left-headed (trochee)        (x .)(x .)(x .)  .
                 Direction: left-to-right     σ σ  σ σ  σ σ  σ
```

b. Foot: left-headed (trochee) . (x .)(x .)(x .)
Direction: right-to-right σ σ σ σ σ σ σ

c. Foot: right-headed (iamb) (. x)(. x) (. x) .
Direction: left-to-right σ σ σ σ σ σ σ

d. Foot: right-headed (iamb) (. x) (. x)(. x) .
Direction: right-to-right σ σ σ σ σ σ σ

Hayes (forthc.) discusses a variety of cases which have the basic patterns in (40) and points out that not all of them avoid final non-primary accents:

(41) a. Foot: left-headed (trochee) (x .)(x .)(x .) /
Direction: left-to-right σ σ σ σ σ σ σ

b. Foot: right-headed (iamb) / (. x)(. x)(. x)
Direction: right-to-right σ σ σ σ σ σ σ

How can we deal with such systems if unary feet are banned? Hayes takes the following route. He maintains that unary feet are banned in such systems (cf. below for one situation in which he allows unary feet) and suggests that languages that would appear to have the relevant non-primary accent in actual fact have some kind of word **edge strengthening** process that is not foot-based. In one type of case another solution is available. Suppose that the language shows weight-insensitive foot assignment, but discriminates light from heavy syllables at the end of the parse, thus allowing a monosyllabic foot is the final syllable is heavy only:

(42) Foot: left-headed (trochee) (x .)(x .) (x .) (x)
Direction: left-to-right σ σ σ σ σ σ σ
m m

(x .)(x .)(x .) .
σ σ σ σ σ σ σ
m

To express that such a language has a weight-insensitive trochee with a slight weight-effect, Hayes refers to the relevant trochee as 'generalized'.

The second consequence of banning unary feet is that the language is predicted to lack words that consist of one ABU. Indeed such cases have been reported under the heading of 'minimal word effects', the idea being that in such cases words are minimally bisyllabic, or if the system is weight-sensitive, bimoraic.

Hayes argues that some systems allow unary feet under one condition only, viz. if they end up being the head foot of the word. We see the effect of this 'weak ban' in the following minimal pair:

(43) a. Preprefinal or prefinal

```
Word Tree: right-headed           (.     .     x  )
Foot: left-headed (trochee)       (x .)(x .)(x .)
Direction: left-to-right          σσ  σσ  σσ  σ
                                              ^
```

b. Prefinal or final

```
(.    .    .   x)
(x .)(x .) (x .)(x)
σσ  σσ  σσ  σ
               ^
```

Both systems are count systems and we find them in *Cairene Arabic* and *Auca*, respectively.

If "weak ban" applies, a unary foot under primary accent may even involve a clash. Hayes points out that this in fact occurs in English in words of the following type:

```
(44)  (x  .)
      (x)(x)
      m  mm
      Hittite
```

The following table summarizes the results we obtained so far:

(45)

Monosyllabic feet for:	Strong ban	Weak ban	Impossible	No ban
Non-Primary accent	No	No	Yes	Yes
Minimal word (i.e. primary accent)	No	Yes	No	Yes

P&S take a different route. They assume that the dispreference for unary feet follows from a constraint that they refer to as **FootBinarity** (FootBin). In the view of Prince and Smolensky FootBin fixes the size of feet on two ABUs, i.e. it rules out unary feet but also feet that are larger than two. This makes FootBin slightly different from our NoDegen. We return to the difference between these two constraints below.

P&S suggest that FootBin is top-ranked and thus never violated. So how do they deal with cases where unary feet (appear to) show up? They adopt a proposal made in Kiparsky (1992) for allowing binary feet to have an 'empty' dependent, i.e. a dependent that does not dominate a syllable.

```
(45)      (x .)(x .) (x .)  (x .)
          σσ  σσ  σσ   σ0
                           ===
```

This kind of 'overparsing' is the counterpart of leaving syllables unparsed. Kiparsky refers to overparsing as **catalexis**, which, then, is the oppositie of extrametricality.

We feel that allowing overparsing complicates the issue of monopodicity beyond control. The only 'gain' would be that FootBin can be regarded as an absolute requirement, rather than a constraint which may be violated. Cases such as in (45) can be dealt with straightforwardly if unary feet are allowed as a result of Parse outranking FootBin. In fact, this is the position we have assumed in previous sections. Instead of FootBin we have adopted NoDegen. We will keep the label NoDegen to emphasize that this constraint plays a different role in our system that FootBin in the view of P&S.

If Parse outranks NoDegen, unary feet will arise at least in the following case:

(46) Environments for unary feet:
at the end of the parse before a word boundary, provided no Clash is involved

We do not expect to find unary feet in (40b,c) if we assume that NoClash will always prefer a stranded ABU in these cases. A case like (44) arises just in case HeadFootEdge (L) outranks NoDegen (and NoClash). In other words the pattern of a word like *Hittite* results from a different set of constraints than what is assumed for the regular case in English. (This bears on the treatment of exceptions which we ignore in this paper.)

Finally, let us see how the generalized trochee pattern can be obtained. The system is largely weight-insensitive which means that FootUniformity outranks Weight. NoDegen outranks Parse which produces unparsed syllables. However, if we assume that Nodegen is outranked by FootBin (mora), a final heavy will produce a 'degenerate (albeit bimoraic) foot'.

(47) FootBin (syll) >> FootUniformity >> Weight >> FootBin (mora) >> NoDegen >> Parse

2.6 Secondary accent: the Hammock pattern

We have so far discussed representations which allow us to separate primary from non-primary accents. We must now consider the need for separating secondary from lower degree of accent.

The typical situation that calls for such a distinction is described as follows:

(60) a. Primary accent falls on the prefinal syllable
b. Secondary accent falls on the initial syllable
c. Lower degrees of accents fall on intermediate syllables

Clause (60c) could refer to two types of situation. In one, rhythmic accents echo away from the primary accent, while in the other they echo away from the secondary accent. To see the difference we need an odd number string of syllables:

```
(61)    a.                          b.
        (.      .    x  )           (.     .      x  )
        (x  .)  (x  .)(x  .)        (x  .)(x  .)  (x  .)
```

σ σ σ σ σ σ σ   σ σ σ σ σ σ σ

The representations in (61) do not formally acknowledge the fact that the non-primary accent that is on the initial syllable is in fact secondary, i.e. stronger than the medial accent. Let us first address the question whether we have to bother at all trying to find a representational basis for the secondary - lower degree distinction? The crucial question to ask is whether the phonology needs access to the distinction? After all, if there is no compelling phonological reason for identifying the secondary accent, we could argue that the distinction between degree 2 and lower is merely a matter of phonetic interpretation. One would then assume, for example, that accents which are on edges are realized with greater prominence, a kind of phonetic edge marking effect.

One of the prime reasons for providing secondary accent with a phonological (rather than a phonetic) basis lies in the fact that under certain circumstances secondary accents function as anchors for intonational tones. If anchoring is part of the phonology, then one might argue that a distinction must be made between primary and secondary accent on the one hand and lower degree accents on the other hand.

A second argument comes from circumstances known as 'rhythmic reversal'. A lot of evidence from a variety of languages has been put forward to show that secondary accents can 'become primary', while lower degree accents cannot.

One could argue, however, that even if anchoring intonational tones is part of the phonology, the appropriate generalization is they line up with peripheral accents only? With respect to rhythmic reversal it could likewise be said that primary accents must be peripheral so that medial feet cannot be upgraded to primary status. We believe, therefore, that a strong case for the phonological status of secondary accent is difficult to make.

Actually, I see no straightforward way of characterizing representations which differentiate between secondary and lower degree of accent and I would like to propose that as a matter of convention a foot which is located at the edge that is *opposite* to the primary accent foot is a secondary accent. This approach predicts that no system can exist in which a secondary accent location depends on counting from the primary accent.

2.7 Unbounded systems

The accent systems considered so far have been called **bounded**. Accent in these systems is located on a syllable near the left or right edge of the word. If extrametricality is restricted to occur on the right edge only (resulting from the constraint NonFinality), bounded systems have access to five locations:

(121) Possible accent locations in bounded systems

Initial postinitial .... preprefinal prefinal final

It is often stated that the window for (primary) accent is limited to the two (on the left) or three syllables.

There are also accent systems which do not seem to be subjected to such a window restriction. Such systems are called unbounded. Consider systems of the following type:

(122) Unbounded systems

RIGHT/LEFT
Primary Accent falls on the RIGHTmost heavy syllable,
Default: if there is no heavy syllable, primary accent falls on the LEFTmost syllable

LEFT/RIGHT
Primary Accent falls on the LEFTmost heavy syllable,
Default: if there is no heavy syllable, primary accent falls on the RIGHTmost syllable

RIGHT/RIGHT
Primary Accent falls on the RIGHTmost heavy syllable,
Default: if there is no heavy syllable, primary accent falls on the RIGHTmost syllable

LEFT/LEFT
Primary Accent falls on the LEFTmost heavy syllable,
Default: if there is no heavy syllable, primary accent falls on the LEFTmost syllable

In addition two other varieties have been reported:

(123) RIGHT
Primary accent falls on the last syllable
Secondary accents on all heavy syllables

LEFT
Primary accent falls on the first syllable
Secondary accents on all heavy syllables

The reader will notice that all examples involve weight-sensitivity. One can imagine what a weight-insensitive unbounded system will look like: each word will have exactly one foot which contains all the syllables of the domain. In effect, then, a weight-insensitive unbounded system makes no distinction between the foot and the word tree. Resulting systems have strict peripheral accent or, on the right edge, penultimate accent if NonFinality is dominant, and no rhythmic structure.

Initial, prefinal and final accent combined with the absence of rhythmic structure can also be dealt with in terms of a bounded foot which does not iterate. Hence we do not need (124a):

(124) a. (x)
σ σ σ σ σ

b.
```
(x  .)
σ σ σ σ σ
```

FootEdge (L) >> Parse

In (124b) we give a system that produces the same accent pattern as the unbounded foot in terms of non-iterative footing.

We now turn to a treatment of the weight-sensitive unbounded systems in (122). In all such systems we have Weight >> FootUniformity. The systems differ with respect to having trochaic or iambic feet and with respect to the edge where primary accent lies.

We propose that the relevant constraint is one that demands heads of feet to be heavy syllables. This constraint **HeavyHead** will help selecting "unbounded" systems if it outranks Parse. If a word has no heavy syllable HeavyHead must be violated in order to get at least one foot. Thus, having a foot that violates HeavyHead is better than having no foot at all.

(125) a. RIGHT/LEFT
```
(.              x   )      (x       )
. . . (x) . . . (x) . .    (x  .) . . .
l l l h l l l h l l        l l l l l
```

a. HeavyHead >> Parse
b. Weight >> FootUniformity
c. FootType (Trochee)
d. HeadFootEdge (R)

b. LEFT/RIGHT
```
(       x         .)       (          x)
 . . . (x) . . . (x)         . . . (.  x)
l l l h l l l h l l         l l l  l l
```

a. HeavyHead >> Parse
b. Weight >> FootUniformity
c. FootType (Iamb)
d. HeadFootEdge (L)

c. RIGHT/RIGHT
```
(       .         x)       (          x)
 . . . (x) . . . (x)         . . . (.  x)
l l l h l l l h l l          l l l l l
```

a. HeavyHead >> Parse
b. Weight >> FootUniformity
c. FootType (Iamb)
d. HeadFootEdge (R)

d. LEFT/LEFT

```
(x   .       .      )    (x        )
(x) . . . (x) . .        (x  .) . . .
l  l  l  h  l  l  l  h  l  l     l  l  l  l  l
```

a. HeavyHead >> Parse
b. Weight >> FootUniformity
c. FootType (Trochee)
d. HeadFootEdge (L)

Note that NoLapse is not relevant since lapses are computed foot-internally (Kager 1993).

We now must deal with the RIGHT and LEFT systems in (123). The idea is that here HeAdFootEdge outranks Parse so that the head foot must be strictly peripheral:

(126) c. RIGHT

```
(      .    .     x)    (        x)
. . . (x) . . . (x)(.  x)     . . . (.  x)
 l  l  l  h  l  l  l  h  l  l      l  l  l   l  l
```

a. HeadFootEdge (R) >> HeavyHead >> Parse
b. Weight >> FootUniformity
c. FootType (Iamb)

d. LEFT

```
(x      .        .    )    (x        )
(x  .) . (x) . . . (x) . .    (x  .) . . .
l  l  l  h  l  l  l  h  l  l     l  l  l  l  l
```

a. HeadFootEdge (L) >> HeavyHead >> Parse
b. Weight >> FootUniformity
c. FootType (Trochee)

The constraint HeavyHead comes close in spirit to the constraint HeadBranch. We could eliminate the overlap by replacing HeavyHead by another constraint which demands that the head moras form a single syllable: HeadIntegrity.

The following ranking will then produce an unbounded system:

(128) HeadBranch >> HeadInteg >> Parse

2.8 A summary of constraints

The following constraints bear on accentual patterns:

(136)
a. FootType (Trochee/Iamb)
b. Weight
c. FootUniformity
d. NoDegen
e. Parse
f. NonFinality
g. FootEdge (L/R)
h. HeadFootEdge
i. HeadBranch (Trochee/Iamb)
j. NoLapse
k. NoClash
l. HeavyHead/HeadIntegrity

We realize that some of our proposals are tentative at best. It is crucial to see, however, that the analyses suggested here for different accentual types are available in a standard parametric approach (given that certain theoretical choices are accepted) provided that we enrich the standard theory with a set of constraints that correct undesirable consequences of certain parameter setting.