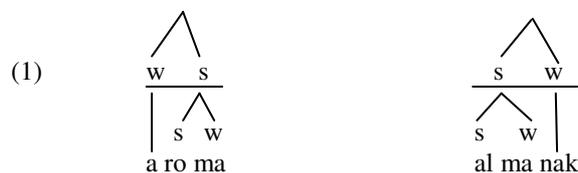


Branchingness in the stress system of Korlai

Ben Hermans and Leo Wetzels

1. Introduction

In 1989 Wim Zonneveld and Mieke Trommelen published a study on the phonology of stress systems, entitled *Klemtoon en metrische fonologie* (Stress and metrical phonology). One of the questions they try to answer in this book is to what extent extrametricality is necessary if the theory allows for conditions on branchingness, like the LCPR (the Lexical Category Prominence Rule), first proposed in Liberman and Prince (1977). In chapter 4 they show that, in principle, it is possible to get rid of extrametricality, at least in the analysis of Dutch. For this language the LCPR is sufficient, and extrametricality is superfluous. Consider the two words *aroma* and *almanak* 'almanac'. The first example has penult stress, because in Dutch a trochee is assigned at the right edge of the word. In *almanak*, however, stress is located on the antepenult syllable. Why is this? Trommelen and Zonneveld argue that in Dutch a heavy syllable is not allowed in the weak position of the trochee. This being the case, a monosyllabic foot is constructed over the final syllable. This monosyllabic (non-branching) foot is labeled as weak by the LCPR. On the other hand, in *aroma*, the final foot does branch, and it is therefore labeled as strong. We can see, then, that it is not necessary to mark a final heavy syllable as extrametrical in order to explain antepenult stress in words like *almanac*, where the final syllable is heavy and the penult syllable is light. In (1) we illustrate how the LCPR, formulated in (2) can account for the Dutch stress pattern in words with a penult light syllable.



- (2) LCPR (after Trommelen and Zonneveld 1989: 79)
In a configuration [A B], label B as strong if and only if it branches

Over the years conditions on branchingness were removed from the theory, so that extrametricality acquired an undisputed status. Since the advent of Optimality Theory (Prince & Smolensky 1993) it was replaced by the constraint family Non-finality. In Hyde (2007) it is shown that Non-finality can account for Trochaic and Iambic Lengthening and Stress-to-Weight, although it cannot explain Weight-to-Stress. Neither can it, according to Hyde (2001, 2012) explain antepenult stress, or post-penultimate stress, for that matter. For these two patterns a separate constraint is required, according to Hyde, called the Window Constraint.

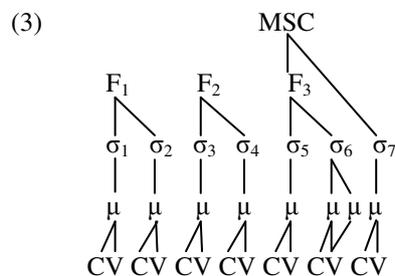
The theory, as it stands now, thus has the following constraints: 1) Non-finality, accounting for Iambic and Trochaic lengthening and Stress-to-Weight; 2) The Window Constraint, accounting for antepenult and post-penultimate stress; 3) some constraint accounting for Weight-to-Stress.

In this article we want to pay tribute to our colleague Wim Zonneveld by pursuing the idea he formulated with Mieke Trommelen, according to which conditions on branchingness are an important concept in metrical theory. We propose that there are two basic families of branchingness constraints: C-Head \wedge (the head of a constituent must branch) and C-Dependent \downarrow (the dependent of a constituent may not branch). These two families can explain not only Iambic, Trochaic lengthening and Stress-to-Weight, but also Weight-to-Stress and, in addition to that, antepenult and post-penultimate stress and C-extrametricality (or its equivalent in terms of Non-finality).

In the next section we formulate the basic ingredients of our framework. These are the branchingness constraints and the MSC (the Main Stress Constituent). In the third section we show how C-extrametricality (or its equivalent in terms of Non-finality) and the Window Constraint (or antepenult and post-penultimate stress) can be derived. In the fourth section we present an analysis of the stress system of Korlai. This case is particularly interesting, because Non-finality cannot account for the location of stress in this language; only conditions on branchingness can.

2. Conditions on Branchingness and the MSC

Concerning the hierarchical structure of phonological constituents we are going to work with the usual concepts; segments are dominated by moras (with the onset consonant occupying the dependent position in the mora); moras are dominated by syllables and syllables are dominated by feet. We add one constituent, however: the MSC, the main stress constituent. We claim that all constituents are maximally binary. The following representation is thus legitimate:



We furthermore propose two families of branchingness constraints: C-Head \wedge and C-Dependent \mid . The members of the two families are listed in (4).

- (4) Branchingness Constraints
- a. FootHead \wedge
A foot's head must branch
 - b. FootDependent \mid
A foot's dependent may not branch
 - c. MSCHead \wedge
A MSC's head must branch
 - d. MSCDependent \mid
A MSC's dependent may not branch

We assume that branchingness constraints apply locally. If, for instance, the MSC wants to have a branching head, it looks at the structure of its daughter head, not at any head at some lower level. Likewise, if the MSC looks at the structure of its dependent, it looks just at the immediate dependent, not at the dependent at some lower level. We also need the alignment constraints in (5).

- (5) Alignment Constraints
- a. HF-R
The right edge of the HeadFoot is aligned with the right edge of the word
 - b. HF-L
The left edge of the HeadFoot is aligned with the left edge of the word
 - c. MSC-R
The right edge of the MSC is aligned with the right edge of the word
 - d. MSC-L
The left edge of the MSC is aligned with the left edge of the word

In the representation in (3) there is no foot satisfying FootHead \wedge , because there is no foot containing a branching (syllable) head. Foot₃ violates FootDependent \mid , because its immediate, dependent (syllable) daughter branches. MSC satisfies MSCHead \wedge , because its head (the foot immediately dominated by MSC) branches. MSCDependent \mid is also satisfied, because its immediate dependent (σ_7) does not branch. We are now going to show that C-extrametricity (or its equivalent in terms of Non-finality) and the Window Constraint (or σ -extrametricity) can be derived with these branchingness constraints.

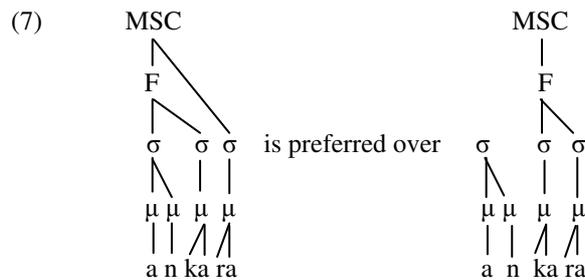
3. C- and σ -extrametricity

In many languages closed syllables count as heavy. In some of these languages, however, a closed syllable in final position behaves as light. An interesting example of such a system is the so called 'Sezer-stress' of Turkish. 'Sezer-stress' regulates the location of stress in place names; it is named after the Turkish linguist Engin Sezer, who first described the pattern in Sezer (1983). In Turkish place names which

contain heavy (closed) syllables, the last heavy syllable is stressed, unless it is the final syllable. In that case, the penult syllable is stressed. If all syllables are light, then the penult syllable is stressed, showing that a final heavy syllable behaves in the same way as a light syllable. A few examples are given in (6).

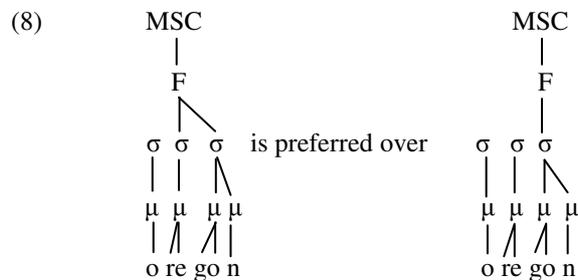
- (6) Edírne penult stress
 Ankara antepenult stress
 Orégon penult stress
 Adána penult stress

Penult stress can be explained if we postulate a trochee, which needs to be aligned to the right edge of the word. The fact that heavy syllables attract stress can be explained by the constraint FootHead \wedge , which requires that the head (syllable) of a foot branch. Evidently, FootHead \wedge must dominate HF-R.



In the representation on the left, the head of the foot branches, but the foot is not aligned with the right edge of the word. In the representation on the right, the foot's head does not branch, but the foot is right aligned with the word edge. Since FootHead \wedge dominates HF-R, the presentation on the left is preferred over the one on the right.

But how can we explain that heavy syllables in final position do not attract stress? We propose that this can be explained in terms of the constraint MSCHead \wedge : the head of the Main Stress Constituent, i.e. the foot immediately dominated by this MSC, must branch. Furthermore, we have to say that MSCHead \wedge dominates FootHead \wedge . We show this in (8).



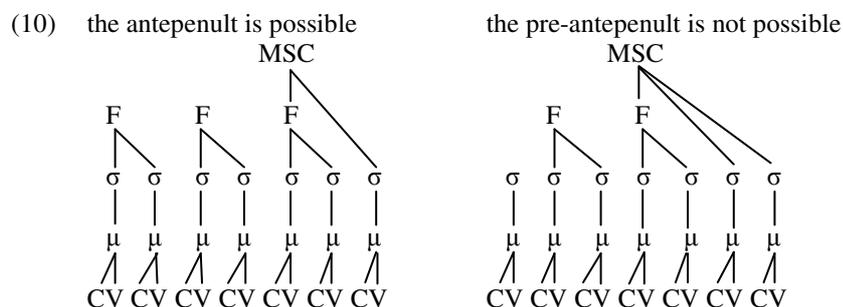
In the representation on the left, the main foot branches, thus satisfying MSCHead \wedge . FootHead \wedge , however, is violated. In the representation on the right the opposite situation obtains. Since in ‘Sezer-stress’ MSCHead \wedge dominates FootHead \wedge the representation on the left is preferred over the representation on the right. Normally, C-extrametricity (or its equivalent in terms of Non-finality) is invoked to account for the fact that a final C does not contribute to weight. Here we see that an alternative is available in terms of the interaction between several branchingness constraints.

Syllable extrametricality, or its equivalent in terms of the Window Constraint (or perhaps its equivalent in terms of some Non-finality constraint), is also frequently used in descriptions of stress systems. One well known case is Macedonian. In this language stress is assigned to the antepenult syllable (Comrie 1976; Hyde 2001, 2012).

- (9) The final window of Macedonian
- | | |
|--------------|-----------------|
| vodéničar | ‘miller’ |
| vodeničarot | ‘miller-DET’ |
| vodeničari | ‘miller-PL’ |
| vodeničarite | ‘miller-PL-DET’ |

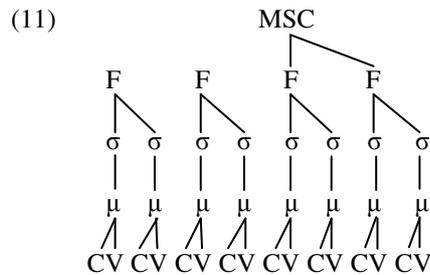
This position can be reached by a trochee, at the right side, but it is located in such a way that the trochee does not dominate the final syllable. This, again, is a consequence of extrametricality, or its equivalent in terms of Non-finality or the Window Constraint.

In our system we can reach the antepenult with two interacting constraints. One constraint is HF-L, the constraint that requires the head foot to be located as far to the left as is possible. The other constraint is MSC-R. This constraint requires that the Main Stress Constituent be aligned with the right edge of the word. In a language where MSC-R dominates HF-L, the effect is that the main foot will skip the final syllable. That it can skip one, and only one syllable follows from binarity. Like all metrical constituents, the MSC is binary. Therefore, next to the foot it can house only one other syllable. In a schematic form this is shown in (10).



In the representation on the right, the MSC violates binarity, which is not allowed. We point out that the pre-antepenult is only allowed if in a language MSCDependent

l is low ranked, lower in any case than HF-L. In such a language a representation like the following might be possible.



It seems that Palestinian Arabic is a language where the pre-antepenult syllable can be reached by the right-aligned MSC (Hayes 1995). If that is true, then in this language MSCDependent l must be low ranked.

In the tableau in (12) it is demonstrated with data from Macedonian that the antepenult is reached if HF-L is dominated by MSC-R. In tableaux the head foot is indicated by the inner brackets and the MSC by the outer brackets.

(12) MSC-R » HF-L

	MSC-R	HF-L
vode(niča)ri	*!	*
☞ vode((níča)ri)		**
vode(ní((čá)ri))		***!

The second candidate is optimal because it is the candidate where the head foot is maximally aligned with the left edge without creating a violation of MSC-R.

While Macedonian is a language with a so called ‘final window’, there are also languages with an initial window. These are languages where the post-peninitial syllable is stressed. Languages of this type are Azkoitia Basque (Hualde 1998) and Kashaya (Buckley 2009). In these languages the constraint MSC-L dominates HF-R and the feet in these languages must be iambic. In the next section we present a case study of Korlai. Certain properties of this language can only be accounted for by branchingness constraints, and not by extrametricality or any of its equivalents in terms of Non-finality.

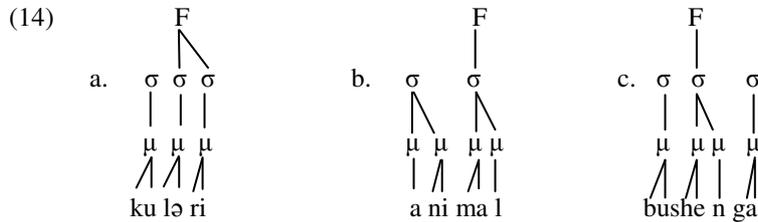
3. The stress system of Korlai

Korlai is a variant of the Gauro-Portuguese subgroup of Asian Portuguese-based Creoles. It is spoken by all of the inhabitants (760 in the year 1996) of the town of Korlai, some 100 kilometers south of Bombay, on the west coast of India. Our data are taken from Clements (1996).

- (13) bi-syllabic words
- | | |
|-----------------------------|-------------------------------|
| a. word-final open syllable | b. word-final closed syllable |
| ispí 'thorn' | butík 'shop' |
| aldé 'village' | venén 'poison' |
| angé 'someone' | pagmét 'payment' |
| fundá 'to sink' | paláb 'word' |
| paywó 'grandfather' | kawlón 'mare' |
| pisó 'person' | biskós 'man' |
| angú 'some' | según 'second' |
- tri-syllabic words
- | | |
|-----------------------------|-------------------------------|
| a. word-final open syllable | b. word-final closed syllable |
| konsárta 'to repair' | sugunfér 'Monday' |
| amósha 'new moon' | kelindór 'calender' |
| umbárka 'to embark' | animál 'animal' |
| kulári 'spoon' | alifāt 'elephant' |
| mædzúri 'labor' | kambilyāw 'chameleon' |
| bushénga 'peanut' | lagærtis 'gecko' |
| ispérme 'to squeeze out' | silipór 'slipper' |
- quadri-syllabic words¹
- | |
|------------------------------|
| mæðamáshi 'bumblebee' |
| mølmædzúri 'day labor' |
| bhajiwála 'vegetable vendor' |
| uskærésu 'clerk' |

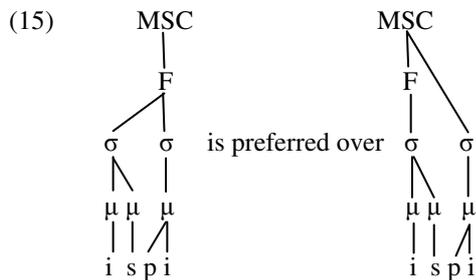
If we neglect bisyllabic words, then this system is easy. We postulate a moraic trochee at the right periphery. In words ending in a closed syllable the foot is monosyllabic, (14b); in words ending in a light syllable preceded by a penult light syllable the foot is bi-syllabic, (14a). If the final syllable is light and the prefinal heavy, then the foot is monosyllabic and the final syllable is outside of the domain of the foot, (14c).

¹ Clements (1996) does not discuss words that have more than three syllables, probably because their stress pattern is the same as that of tri-syllabic words. Above, the few words are listed that occur in Clements (1996) which contain more than three syllables. No examples of quadric-syllabic words were found that contain a word-final closed syllable.



The bisyllabic forms, however, show that an analysis based on (moraic) trochees is not possible. In a form like *piso* ‘person’, it is predicted, contrary to fact, that the penult syllable is stressed, rather than the final. Notice that we cannot explain this with a constraint belonging to the Non-finality family, because that excludes the final syllable from a foot. Here the initial syllable needs to be excluded from the foot. However, there is no constraint like Non-initiality. Arguments against Non-initiality (or initial extrametricality for that matter) are given in Hyde (2001, 2002). How, then, shall we proceed if we cannot analyze this system with trochees?

We propose that this language has iambs, not trochees. We also propose that MSCHead \wedge is high ranked; so high, in fact, that it dominates FootDependent \downarrow and FootHead \wedge . The resulting representation is given in (15). The required rankings are motivated in the tableaux in (16).



(16) a. MSCHead \wedge » FootDependent \downarrow

ispi	MSCHead \wedge	FtDept \downarrow
σ ((ispí))		*
((ís)pi)	*!	

b. MSCHead \wedge » FootHead \wedge

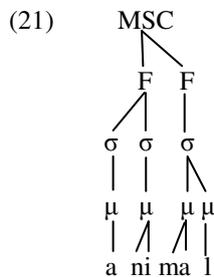
ispi	MSCHead \wedge	FtHead \wedge
σ ((ispí))		*
((ís)pi)	*!	

We now understand why we have final stress in bi-syllabic words; we explain it with high ranking MSCHead \wedge . Now, of course, the question is why in longer words the final iamb is shifted one syllable to the left, at least if the final syllable is light. Why,

(20) MSCDependent | » HF-L

animal	MSCDependent	HF-L
((aní)mal)	*!	
☞ a(nimál))		*

Recall that branchingness conditions are local in the sense that they only look at the structure of the immediately dominated constituents. Suppose now that a monosyllabic foot is built over the final heavy syllable. If that would happen in trisyllabic forms, there would be a way to satisfy both MSCDependent | and HF-L. This is shown in (21).



In the representation in (21) all the constraints that are high ranking in Korlai are satisfied. HF-L is satisfied, since the head foot touches the word's left edge. Furthermore, MSCDependent | is satisfied, since the foot occupying the dependent position of the MSC does not branch. Also, the head foot of the MSC does branch, so MSCHead \wedge is also satisfied. Yet, the representation in (21) is incorrect.

Obviously, we have overlooked one important aspect of the representation in (21). It contains a clash. The heads of the two foot are adjacent, with no syllable intervening. We are forced to assume, then, that in Korlai clashes are not allowed. We formulate NOCLASH in the following way:

(22) NOCLASH



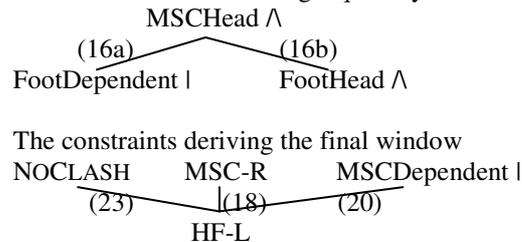
If NOCLASH is ranked above HF-L we avoid the construction of a monosyllabic foot in final position. This ranking is motivated in (23).

(23) NOCLASH » HF-L

animal	NOCLASH	HF-L
((aní)(mal))	*!	
☞ a(nimál))		*

We now have developed a complete analysis of the Korlai stress system. The crucial rankings are summarized in (24).

- (24) a. The constraints deriving a quantity insensitive iamb



A possible objection to our analysis is that it allows quantity insensitive iambs. Thus, in bi-syllabic form the final syllable is stressed, irrespective of the quantity of the two syllables dominated by the iamb. A dramatic example showing the quantity insensitivity of iambs in Korlai is the form *ispí* ‘thorn’, with a heavy syllable in the dependent position of the iamb and a light syllable in the iamb’s head position. This runs against the canonical structure of iambs, in which the head position should be heavy and the dependent position should be light (Hayes 1995).

We want to point out that, in our system, the branchingness constraints do not refer to iambic or trochaic structure. From our point of view there is nothing wrong with a quantity insensitive iamb, because there is nothing wrong with a quantity insensitive trochee. Both foot types are possible, and both are derived by the constraint MSCHead \wedge , dominating FootDependent l and FootHead \wedge , as in (24a).

We thus expect that quantity insensitive iambs do exist, in contradistinction to the claims made in Hayes (1995), among others. Interestingly, Daniel Altshuler has recently shown that quantity insensitive iambic systems do exist. A clear example of such a language is Osage (Altshuler undated). Altshuler shows that in this language iambs are constructed from left to right. The position of the iambs is not affected in any way by heavy syllables, not even if they have a long vowel. This is shown by the forms in (25).

- (25) *nã:xó* ‘break by foot’
a:lé: ‘I left’
ðy:^hkámã ‘to ring the bell’
ðakʔéðapé ‘be kind to’

Osage shows that quantity insensitivity is an option for iambs. We are therefore free to postulate quantity insensitive iambs in our analysis of Korlai.

Conclusion

In this article we have shown that Trommelen and Zonneveld’s intuition that extrametricality might be replaced by branchingness condition is entirely correct, not only in Dutch, but universally so. C-extrametricality, or its equivalent in terms of

Non-finality, can be replaced by MSCHead \wedge dominating FootDependent l, as in Turkish. FootHead \wedge can account for Iambic and Trochaic lengthening and also for Stress-to-Weight. FootDependent l accounts for Weight-to-Stress. σ -extrametricality, or its equivalent in terms of Non-finality, or Hyde's alternative in terms of the Window Constraint, can be replaced by HF-L/R interacting with MSC-L/R, with the latter dominating the former. We have shown that Korlai provides interesting evidence for this approach, because the stress pattern of this language can only be accounted for with branchingness constraints.

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