

Main Stress and Parallel Metrical Planes

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Main Stress and Parallel Metrical Planes*

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0. The Directionality-Dominance Hypothesis

In this paper I demonstrate that the position of main stress can be predicted in a large number of cases from the distribution of secondaries. That is, once a string of secondaries has been assigned to a span, it is possible to predict which will be elevated to primary.

The basic generalization to be defended is that if secondary stresses are assigned iteratively, then the first one assigned is elevated to primary. In terms of the metrical theory of stress,¹ left-to-right foot construction dictates a left-dominant word tree, and right-to-left foot construction dictates a right-dominant word tree. This generalization is given below.

(1) Directionality-Dominance Hypothesis (DDH)

The origin of iterative foot construction uniquely determines word tree dominance.

The following analyses of Lenakel nouns (Lynch, 1974, 1978) and Pintupi (Hansen & Hansen, 1969) show how the DDH limits the range of possible analyses in metrical theory.

1. Lenakel

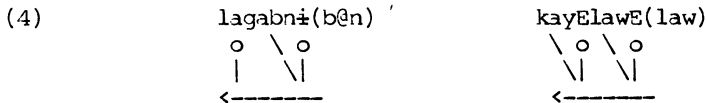
The data in (2) exemplify the basic nominal stress pattern of Lenakel.²

- | | | |
|-----|-----------------|------------------|
| (2) | n am | 'fish' |
| | sg fish | |
| | kOLEy | 'sweet potato' |
| | kavEvaw | 'hat' |
| | l agabnɪbɛn | 'in the morning' |
| | in morning | |
| | kayElaw Elaw | 'kind of dance' |
| | dance redup | |
| | lE dubʔlug alug | 'in the lungs' |
| | in lungs redup | |

Ignoring for the moment the distinction between primary and secondary, the stressed syllables are assigned from the right edge of the word. That is, even-numbered syllables are stressed counting from the right. In metrical terms:

- (3) a. Make the final syllable extrametrical.
- b. Build right-dominant binary feet from right to left.

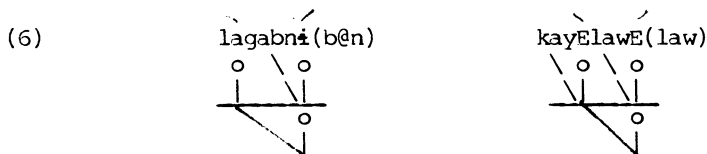
This produces the following partial derivations.



Since the right edge of the word is the origin of foot construction, the DDH predicts that the rightmost stress will be elevated to primary. That is, the word tree is right-dominant. This is borne out in (2). The primary is always the last stress. Therefore the full analysis of the data in (2) is as in (5), where (5c) is redundant.

- (5) a. Make the final syllable extrametrical.
- b. Build right-dominant binary feet from right to left.
- c. Build a right-dominant word tree.

This produces the representations in (6) for the partial derivations in (4).



Concluding this section on Lenakel nouns, we see that assigning stress from the right requires a right-dominant word tree. Other languages that work this way include English (Hayes, 1981) and Modern Hebrew (Boložky, 1982).

2. Pintupi

What about systems that assign stress from the left? The DDH predicts that such languages will put the primary on the left. This relationship is borne out in the following data from Pintupi, a Pama-Nyungan language of Australia.

- (7)
- | | |
|------------------|---|
| paṇa | 'earth' |
| tyutaya | 'many' |
| malawana | 'through (from) behind' |
| puliṅkalatju | 'we (sat) on the hill' |
| tjamulimpatjuṅku | 'our relation' |
| tiliriṅlampatju | 'the fire for our
benefit flared up' |

Here, odd-numbered syllables counting from the left are stressed. The final syllable is never stressed. In metrical terms:

- (8) a. Make the final syllable extrametrical.
b. Build left-dominant binary feet left to right.

The partial analysis in (8) invokes the DDH, which dictates a left-dominant word tree. The full analysis with the redundant word tree rule is given in (9) and some examples in (10).

- (9) a. Make the final syllable extrametrical.
b. Build left-dominant binary feet left to right.
c. Build a left-dominant word tree.

- (10)
- | | |
|--|--|
| | |
|--|--|

Pintupi is a mirror-image of Lenakel nouns, showing the symmetrical nature of the DDH. Other languages that work like Pintupi include Tunica (Hammond, 1984a) and Southern Paiute (Hayes, 1981).

3. Some Apparent Counterexamples

Pintupi and Lenakel exemplify only part of the typology of stress systems, and it is worthwhile to see how far the DDH goes toward the goal of completely eliminating the parameter of word tree dominance in metrical theory by trying it on other kinds of systems. The cases that remain are given in (11).

- (11) a. unbounded foot construction
b. noniterative foot construction
c. bidirectional foot construction

In this section, I argue that the cases in (11a) are outside the domain of the DDH; the cases of (11b) trivially satisfy the DDH; and (11c) follows naturally from the DDH.

3.1 Unbounded Feet: Koya

Consider first unbounded foot construction. Hayes (1981) uses this in his account of Koya (Tyler, 1969). The following data exemplify the basic pattern. All long vowels and the first vowel, long or short, are stressed.

(12)	$\overset{/}{\text{aaki}}$ $\overset{/}{\text{gInne}}$ $\overset{/}{\text{puungaari}}$ $\overset{/}{\text{kUUD@Baali}}$ $\overset{/}{\text{@ndooru}}$		'leaf' 'cup' 'flower' 'sickle' 'everyone'
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Since there is no count from the left or right, foot directionality is irrelevant. Since syllable weight is relevant, the feet constructed must be quantity-sensitive. That is, recessive nodes of feet cannot dominate long vowels. This enables long vowels to attract stress.³ To get stress on the initial syllable, feet must be left-dominant. This partial analysis is given in (13) and some partial derivations in (14).

(13) Build quantity-sensitive unbounded left-dominant feet.

(14)	$\overset{/}{\text{@ndooru}}$ $\overset{/}{\text{o}} \ \overset{/}{\text{o}}$ $ \ \ /$		$\overset{/}{\text{kUUD@Baali}}$ $\overset{/}{\text{o}} \ / \ \overset{/}{\text{o}}$ $ / \ \ /$
------	---	--	--

As noted above, no directionality need be stipulated since it makes no difference whether feet are assigned rightward (15) or leftward (16).

(15)	$\overset{/}{\text{@ndooru}} \rightarrow \overset{/}{\text{@ndooru}} \rightarrow \overset{/}{\text{@ndooru}}$ $\overset{/}{\text{o}} \ \overset{/}{\text{o}}$ $ \ \ /$ \rightarrow
------	--

(16)	$\overset{/}{\text{@ndooru}} \rightarrow \overset{/}{\text{@ndooru}} \rightarrow \overset{/}{\text{@ndooru}}$ $\overset{/}{\text{o}} \ / \ \overset{/}{\text{o}}$ $ / \ \ /$ \leftarrow
------	---

From the data in (12), it is clear that the analysis of Koya should include a left-dominant word tree. This insures that the initial syllable always receives main stress. However, since the DDH requires an origin of foot construction, no prediction is made. Languages like Koya are thus irrelevant for the DDH. The full analysis of Koya is given in (17).⁴

- (17) a. Build quantity-sensitive unbounded left-dominant feet.
b. Build a left-dominant word tree.

Diegueno (Langdon, 1970) has a similar analysis.

3.2 Noniterative Feet: Brazilian Portuguese

In the following section, I treat the basic stress pattern of Brazilian Portuguese (Lopez, 1979) to exemplify a noniterative system.⁵ Consider the following data.

- (18) $\acute{p}e$ 'foot' $\acute{p}ele$ 'skin'
 $\acute{a}ma$ 'he loves' $rec\acute{a}do$ 'message'
 $en\acute{c}on\grave{t}ro$ 'meeting' $redonde\acute{z}a$ 'roundness'
 $agon\acute{í}a$ 'agony'

Stress falls regularly on the penult. There are apparently no secondaries on such words. Since the count is from the right, that must be the origin of foot construction. However, there is no evidence that foot construction continues after the first foot is built. To account for this, let us assume that foot construction can be noniterative—that is, only one foot is built. The partial analysis is given in (19) with some partial derivations in (20).

- (19) Build one left-dominant binary foot on the right margin.

- (20) $\acute{a}ma$ $en\acute{c}on\grave{t}ro$
 $\circ /$ $\circ /$
 $| /$ $| /$

What of the word tree? It is not necessary to build one. There are only two degrees of stress -- stressed and unstressed -- and the distinction is already made by (19). If on theory-internal grounds one elected to build a word tree -- if, for example, the theory always required a word tree -- then the foot is always the head of it. This possibility is given as (21).

- (21) a. Build one left-dominant binary foot
on the right margin.
b. Build a right-dominant word tree.

If (21) is adopted, then the DDH makes (21b) redundant since the origin of foot construction is the right edge. However, since (19) is an adequate analysis, Brazilian Portuguese and languages like it are irrelevant for the DDH. Polish (Franks, 1985) has a similar analysis.

3.3 Bidirectional Feet: Lenakel Verbs

By bidirectional foot construction, I mean cases where some feet are built from the left and some are built from the right. Lenakel verbs exhibit bidirectional foot construction.

- (22) r Os 'he took it?'
3sg take
- ar Ow 'be blind (pl)'
pl blind
- y ag ya g@n 'we eat it'
lplex cur du eat
- n im aliwOk 'you walked'
2sg conj walk
- k @n am ar g@nim 'they have been pinching it'
3pl perf cont pl pinch
- t y ag am ar olgEygEy 'we will be liking it'
fut lplex cur cont pl like
- t in ag am ya sin@vin 'you will be copying it'
fut 2 cur cont du copy
- na d y ag am Edw adamnimpn
about-to fut 1 cur cont interr shake
- 'why am I about to be shaking?'

Let us consider the distribution of stresses independent of their degree. First, there is always a stress on the penult. As in Brazilian Portuguese, that stress must be built from the right. However, there are other stresses. The others appear to be built from the left; as in Pintupi, odd-numbered syllables counting from the left get stressed. Notice that the left-to-right iteration does not run up against the stress on the right margin. A partial analysis incorporating these observations is given as (23).

- (23) a. Make the final syllable extrametrical.
 b. Build one right-dominant binary foot on the right margin.
 c. Build left-dominant binary feet left to right.

A partial derivation is given in (24).

- (24) $\text{tinagamyasiŋ@vɪn} \rightarrow \text{tinagamyasiŋ@}(vɪn) \rightarrow$
 $\rightarrow \text{tinagamyasiŋ@}(vɪn) \rightarrow \text{tinagamyasiŋ@}(vɪn)$
- $$\begin{array}{c}
 \backslash \circ \\
 \backslash | \\
 \leftarrow
 \end{array}
 \qquad
 \begin{array}{c}
 \circ / \circ / \backslash \circ \\
 | / | / \backslash | \\
 \text{-----} \rightarrow
 \end{array}$$

Returning to (22), it is clear that the word tree is right-dominant. If the DDH is revised so that the first origin of foot construction is the relevant one, then this result is guaranteed. This revision is given as (25).

- (25) Directionality-Dominance Hypothesis (Revised)

The first origin of foot construction uniquely determines word tree dominance.

Since the first foot is constructed on the right edge of the word (23b), the right margin is the first origin of foot construction. Piro (Archangeli, personal communication) has a similar analysis.

In conclusion, languages like Koya are irrelevant for the DDH; languages like Brazilian Portuguese are ambiguous; and languages like Lenakel force a natural revision of it. We are now ready to consider more problematic cases.

4. Covert Iteration: Cairene Arabic

What prevented earlier researchers from maintaining a generalization like the DDH? There are languages like Cairene Arabic (McCarthy, 1979) that appear to counterexemplify it. In the following discussion of Cairene, I abstract away from the contribution of syllable weight, since it is irrelevant to the point made here. The data in (26) exemplify the basic pattern.

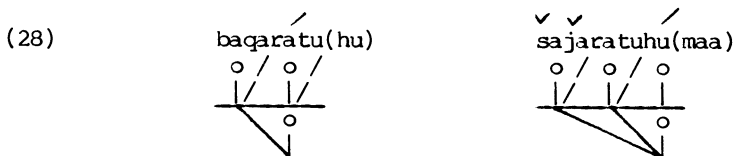
(26)	$\begin{array}{c} / \\ \text{buxala} \end{array}$	'misers'
	$\begin{array}{c} / \\ \text{kataba} \end{array}$	'he wrote'
	$\begin{array}{c} / \\ \text{katabitu} \end{array}$	'she wrote it'
	$\begin{array}{c} / \\ \text{fa9alatun} \end{array}$	'deed'
	$\begin{array}{c} / \\ \text{baqaratuhu} \end{array}$	'his cow'
	$\begin{array}{c} \vee \vee / \\ \text{sajaratuhu} \end{array}$	'his tree'
	$\begin{array}{c} \vee \vee / \\ \text{sajaratuhumaa} \end{array}$	'their tree'

The basic generalization here can be summarized as follows. Main stress falls on the last odd-numbered syllable counting from the left, except that it cannot fall on the ultima.

To get such a pattern, most researchers have assumed that iterative binary feet are constructed from left to right. Since main stress falls on the last one, the word tree is right-dominant. A partial analysis incorporating this insight is given as (27).

- (27)
- Make the final syllable extrametrical.
 - Build binary left-dominant feet from left to right.
 - Build a right-dominant word tree.

Some sample representations are given in (28).



Such an analysis is an obvious problem for the DDH. Left-to-right foot construction should dictate a left-dominant word tree.

Before rejecting the DDH though, note that this analysis is not as straightforward as it looks at first blush. There are no secondary stresses. The iterative feet should leave secondary stress to the left of the primary, yet McCarthy (1979) reports none.

- | | | |
|------|--|---|
| (29) | $\begin{array}{c} \backslash \quad / \\ * \text{baqaratuhu} \end{array}$ | $\begin{array}{c} \backslash \quad \vee \quad \backslash \quad / \\ * \text{sajaratuhumaa} \end{array}$ |
|------|--|---|

Possibly, this is an accidental correlation, but the other systems that might be counterexamples to the DDH -- Creek (Haas, 1977) and Macushi Carib (Hawkins, 1950) -- also have this property. They appear to violate the DDH and secondaries are covert.

Thus, while Cairene suggests that certain languages must be excluded from the domain of the DDH, their exemption is not ad hoc. The only cases of iterative foot construction that must be exempted from the DDH are those with covert iteration. This is given in (30).

- (30) Exception Clause for the DDH
- Languages with covert iteration
(no overt secondaries) are exempt
from the DDH.

To account for (30) formally, I extend an idea developed in Archangeli (1984) and Rappaport (1984). These authors propose that in addition to the metrical structure necessary to assign stress, languages may build metrical trees on another plane to account for syncope and reduction. Space limitations prevent me from motivating their proposals here.

What if the binary iteration in Cairene is accomplished via feet built on another plane? Such feet would not place secondary stresses, since the other plane is not relevant for stress. For such a procedure to work, the following assumptions must be accepted. First, nonheads on the parallel plane cannot be terminals on the stress plane.

- (31) Nonheads on the parallel plane cannot
 be terminals on the stress plane.

Second, the DDH cannot look at the parallel plane.

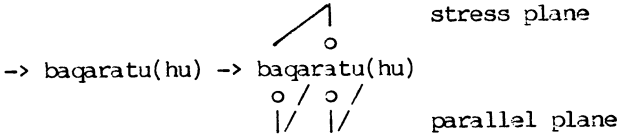
- (32) The origin of parallel plane foot
 construction is irrelevant to the DDH.

This permits us to reanalyze Cairene as follows.

- (33) a. Make the final syllable extrametrical
 on the parallel plane.
- b. Build left-dominant binary feet from
 left to right on the parallel plane.
- c. Build a right-dominant unbounded foot
 on the stress plane.

A sample derivation is given in (34).

(34) baqarahuhu -> baqaratu(hu) ->



Such a proposal obviously needs further investigation. However, it allows us to incorporate (30) in the theory by means of the natural assumptions (31) and (32) and the independently motivated parallel plane.

In conclusion, we have seen that it is possible to go a long way toward eliminating word tree dominance from metrical theory and predict the distribution of primary stress from the assignment of secondaries. Cases of iterative foot construction like Lenakel nouns and Pintupi are accounted for. With the revision of the DDH in (25), cases exhibiting bidirectional foot construction like Lenakel verbs also fall out. Unbounded cases like Koya are irrelevant since there is no origin of foot construction. Noniterative cases like Brazilian Portuguese are irrelevant since only one foot is built. Lastly, cases like Cairene are excluded by the exemption clause (30) as realized by the parallel plane formalism.

Lastly, the DDH is an empirical claim, because it says that certain stress configurations are impossible. As an example, compare the analysis of Lenakel nouns repeated here as (35) with the hypothetical facts in (36) with their analysis in (37)

- (35) a. Make the final syllable extrametrical
- b. Build right-dominant binary feet from right to left.
- c. Build a right-dominant word tree.



- (37) a. Make the final syllable extrametrical.
- b. Build right-dominant binary feet from right to left.
- c. Build a left-dominant word tree!

The DDH excludes (36) as a possible language because its analysis is in violation of the DDH.

Footnotes

*This paper has benefited much from comments and suggestions by D. Archangeli, D. Fritz, M. Gordon, B. Hayes, N. Hedberg, J. Levin, S. Miguel, and G. Sanders. An earlier form of this work was presented at the Minnesota Regional Conference on Language and Linguistics and at the University of Illinois at Urbana and benefited from comments on both occasions. All errors of data and analysis are the author's responsibility.

¹See Hammond (1984a) for the version of metrical theory assumed here. This theory differs from earlier theories (e.g. Hayes, 1981) in that rhythm and destressing rules are sharply constrained in form and function. See Magnus (1983) and Pesetsky (1979) for earlier attempts to deal with the relationship between primary and secondaries in metrical theory.

²Lenakel transcriptions in this paper use capital letters to indicate lax vowels. The symbol [ə] indicates schwa, a macron indicates labialization, and [v] is a central glide. Abbreviations in morpheme glosses for the verbs: cur: current, sg: singular, pl: plural, ex: exclusive, du: dual, conj: conjunctive, perf: perfective, cont: continuative, fut: future, interr: interrogative, 1: first person, 2: second person, 3: third person.

³See Hayes (1981) for the full theory of syllable-weight assumed here, and Halle & Vergnaud (in preparation) for a revision.

⁴Other principles may determine word tree dominance in languages like Koya. It appears as if word tree dominance always equals word tree dominance. However, there are not enough cases to establish this convincingly.

⁵Lopez (1979) adopts the metrical theory of Liberman & Prince (1977). See Miguel (1984) for a treatment taking advantage of more recent developments.

⁶See Hammond (1984b) for an analysis incorporating these.

⁷Garawa (Furby, 1974) can be analyzed in two ways. One analysis satisfies the DDH; and one does not. Unfortunately, the data available do not motivate a choice. Thanks to an anonymous journal reviewer for drawing this to my attention.

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