INTEGRATING SYNTAGMATIC AND PARADIGMATIC ASPECTS OF STRESS

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ABSTRACT

The purely syntagmatic analysis of stress assumed in metrical phonology is difficult to reconcile with the fact that words can in practice be classified as either stressed or unstressed. Various properties of stress (vowel reduction, nuclear stress, and the use of stress to signal focus and deaccenting) can be integrated into metrical phonology if we define three paradigmatic levels of stress in terms of the prosodic categories phrase and foot.[1]

1. A STRESS PARADOX

When linguists (and others) discuss the *function* of stress, they normally find it sufficient to indicate stress in any given sentence by capitalising or underlining stressed words. This notational convention implies that stress is a paradigmatic property that can apply to a word more or less independently of what happens to adjacent words. Moreover (though we may allow for the possibility of secondary stress), it strongly suggests that stress is a fairly categorical property: either a word is stressed, or it isn't.

When discussing the *phonological nature* of stress, however, linguists have been led to construct increasingly elaborate theories that emphasise its syntagmatic and non-categorical aspects. Metrical phonology (e.g. [3],[6]), in particular, emphasises that stress does not involve

paradigmatic features but only syntagmatic relations, of which the theory's central notational device, the weak-strong branching node, is emblematic. Nor do metrical trees define any sort of categorical distinction between stressed and unstressed (or even a three-way distinction among primary, secondary, and unstressed), because in theory there is no limit to the depth of stress subordination they can express.

How can the evidence for the syntagmatic or relational view be reconciled with the practical usefulness of the categorical capital-letter stress notation?

2. PROSODIC CATEGORIES

Despite the success of metrical phonology in expressing the syntagmatic aspects of stress, everyone acknowledges that, in some way, at least some properties of stress are not relational or syntagmatic at all. The most conspicuous problem in the description of English stress is vowel reduction, and the existence of minimal pairs like *raider* and *radar*. Both of these are strong-weak, but there's a further difference of prominence between the reduced weak syllable of *raider* and the unreduced weak syllable of *radar*. We also encounter the converse problem, namely structures in which the relational representation demands a difference in relative prominence, but in which the stresses in question appear to be equal. For example, Culicover and Rochemont [1] suggest that the "multiple primary stress[es]" in a sentence like

(1) John told BILL about SUSAN, and SAM about GEORGE

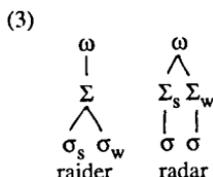have equal relative prominence. They propose (p. 127) that "in order to

accommodate [such] instances ..., [metrical] theory must be modified so as to allow prosodic nodes to dominate two s[trong] sisters..."

The "equal-primaries" case has never been given very much attention, but the problem of vowel reduction has been debated extensively. Liberman and Prince [3] (henceforth LP) treated such cases as *raider-radar* in terms of a feature [+/-stress] that could be applied to terminal elements of the stress tree - syllables - more or less without regard to their place in structure. Thus:

(2)

$$\bigwedge_{\substack{s\ w \\ \text{raider} \\ +\ -}} \qquad \bigwedge_{\substack{s\ w \\ \text{radar} \\ +\ +}}$$
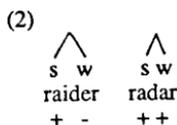
But in an early response to this analysis, Selkirk [6] proposed to get rid of the [+/-stress] feature by adding **prosodic categories** to the abstract relational structure posited by LP. Thus in place of (2) we will have

(3)

$$\begin{array}{cc} \omega & \omega \\ | & \bigwedge \\ \Sigma & \Sigma_s\ \Sigma_w \\ \bigwedge & |\ \ | \\ \sigma_s\ \sigma_w & \sigma\ \sigma \\ \text{raider} & \text{radar} \end{array}$$

In *raider*, the word (ω) consists of a single stress foot (Σ), within which there is a strong-weak relation between the two syllables (σ). In *radar*, on the other hand, the word consists of two stress feet between which there is a strong-weak relation, and each stress foot contains only a single syllable.

This provides a solution to the problem of non-syntagmatic properties, because prosodic categories, unlike the purely relational nodes in the LP metrical trees, can have intrinsic - paradigmatic or nonrelational - phonetic properties defined independently of their place in structure. In Selkirk's words, "a syllable which *is a* stress foot will never be interpreted as a weak [unstressed] syllable ... [B]eing a stress foot always implies some degree of prominence". In what follows I suggest that we might use judiciously selected prosodic categories to give formal definitions of the

(apparently) paradigmatic "levels of stress" that non-phonologists find so useful - and incidentally, resolve the equal-primaries problem as well.

3. DEACCENTING AND FOCUS

3.1. Syntagmatic...

First let's consider the apparently unrelated problem of **deaccenting** that I discussed in my thesis [2] - the use of reduced prominence to signal that an item is already in the discourse, given information, etc. Deaccenting is of interest because, superficially, it appears to support the paradigmatic, "capital-letter" view of stress, and yet, on the closer inspection I gave it in my thesis, it appeared to be analysable purely in syntagmatic terms.

An example of classic deaccenting is seen in (4):

(4) The only stuff written about this is in German, and I can't READ German, so I guess I'll work on something else.

Here *German* is deaccented because it's repeated in the discourse context; as I noted in my thesis, the stress is on *read* not for any "positive" reasons, such as focus or contrast, but specifically in order to deaccent *German*, which would otherwise be stressed. Ostensibly, the stress simply "shifts" from one word to another.

This stress-shift account is consistent with the non-relational view of stress (note the use of capital-letter notation in (4)!) But because the LP account of the phonology of stress seemed superior in other respects, I was concerned in my thesis to establish that deaccenting is phonologically syntagmatic or relational, and to get away from treating deaccenting data in terms of the presence or absence of stress on this word or that. Specifically, I showed that there are certain aspects of deaccenting that are puzzling under the commonsense account, but which can be readily explained if we treat deaccenting not as stress shift, but as a *reversal of relative strength in a metrical tree*.

The main such problem I dealt with was the case of *rightward shift* of stress. In the classic case of deaccenting - as in (4) - stress shifts to the *left* compared to the normal location. In some cases, however, deaccenting shifts stress to the

right:

(5a) ("normal")
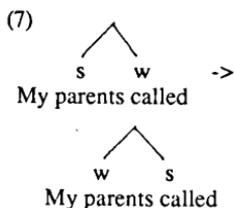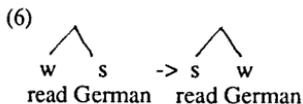A: Anything happen while I
was out?
B: My PARENTS called.

(5b) (*parents* deaccented)
A: Maybe we should call your
parents and tell them.
B: My parents CALLED - they
already know.

What I suggested in my thesis is that both leftward and rightward shift could be given a unified description in terms of reversed strong-weak nodes. So the trees (or relevant subtrees) in (4) and (5) will be modified as in (6) and (7) respectively:

(6)


```
    /\              /\
   w  s     ->    s  w
read German     read German
```

(7)


```
       /\
      s  w        ->
My parents called
```

```
      /\
     w  s
My parents called
```

This node-reversal analysis works for a wider range of cases than a straight leftward stress-shift rule.

3.2. ...or paradigmatic?

Nevertheless, there are cases that the analysis doesn't fit very comfortably. For example, there are sentences in which the semantic/pragmatic effects of deaccenting are acheived by the use of distinct pitch accent patterns on accented words. In my thesis I discussed the case of sentences like

(8a) The butcher charged me a thousand bucks!

With one type of pitch accent *butcher* may be interpreted as an epithet for "doctor", while with a different type of pitch accent *butcher* is interpreted literally. This is exactly the difference of interpretation produced by deaccenting or not deaccenting *butcher* in sentence-final position, as in

(8b) I'd like to strangle the butcher!

Unlike (8b), however, the difference in (8a) is not readily interpreted in terms of node reversal. In both readings there would seem to be a weak-strong relationship between *butcher* and *bucks*, and it is rather the different *paradigmatic* choice of pitch accent on *butcher* that conveys the intended interpretation.

Similar phenomena can be observed in the use of sentence stress to signal narrow focus or contrast, as seen in example (9). The context of this utterance was a discussion of somebody who used to be able to speak German well but had then spent a long time living in Sweden and now spoke good Swedish but had trouble with German. My contribution to the discussion was:

(9) That's what happened to MY FRENCH - it used to be good, but then I spent a year in Germany and ended up with good German, and now whenever I want to speak French I get German interference all over the place.

The relevant part of this discourse is the very beginning: *That's what happened to MY FRENCH.* There's clearly a double contrast or focus intended here: on the one hand, we're talking about *my* linguistic abilities rather than those of the person who lived in Sweden, and on the other hand, we're talking about knowledge of *French* getting lost rather than knowledge of German. If we didn't intend the extra focus or contrast on *my*, *my* would be unstressed; it would be somewhat shorter, possibly with a somewhat centralized vowel, and without any sort of pitch accent.

The problem for the reversed-nodes analysis is that the phonological modifications that signal the "deaccenting" of *butcher* or the "focusing" of *my* cannot be described in syntagmatic terms. Both effects are clearly prosodic, but do not involve reversed nodes. Both could, however, be described in terms of modifications of a "normal" or "expected" *level of stress*. In the case of the focus on *my*, *my* is still weak relative to its strong sister *French* (in its original context it clearly had "secondary stress") but we perceive it as focused because it is stronger or more prominent *than it would be in a non-focal context*. That is, it is stronger than some other *paradigmatic* possibility, namely complete lack of stress. Similarly, the pitch accent on *butcher* in the "epithet"

interpretation of (8a) is (in Pierrehumbert's terms [4]) a *prenuclear* **H*** - and hence arguably *secondary* stress - while that in the "literal" reading is a nuclear **H*** plus **L** phrase accent - and hence primary. The deaccenting is thus also signalled paradigmatically, by making *butcher* weaker or less prominent than it would be in a non-deaccenting context.
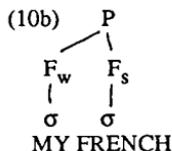
It thus seems that it was a mistake to try to reduce deaccenting to a matter of relative strength - i.e. to reversal of a syntagmatic strength relation. Instead, to a considerable extent, the signalling of focus and deaccenting is based on a neutral (unmarked, default) *degree* of prominence for any given part of speech. Based on that neutral level of prominence, focus (newness, contrast, etc.) is signalled by an increase in the degree of prominence, or **promotion**, while deaccenting (givenness, coreferentiality, etc.) is signalled by a decrease in the degree of prominence, or **demotion**. It seems to be a reasonable generalisation that pronouns, prepositions, and the like are normally unstressed; if they have stress (even secondary stress), it is interpreted - paradigmatically - as conveying some sort of focus. Nouns, on the other hand, normally have primary stress; if their stress is reduced (even to secondary stress), it is interpreted as deaccenting.

4. LEVELS OF STRESS

In order to make descriptive statements of the sort just made, we have to be able to treat the notions of primary stress, secondary stress, and unstressed as degrees of prominence that are statable independently of any given utterance context - i.e. paradigmatically. How can we integrate these notions into the metrical description of stress that we want for other reasons? I propose to do this by defining them in terms of prosodic categories.

Let us posit two prosodic categories, **foot** (F) and **phrase** (P). (For expository purposes I assume here that phrase is the next higher prosodic category above foot, though I'm well aware that this runs counter to the most recent work.) Foot has properties of the sort that Selkirk talked about - unreduced vowel quality and full syllable duration - and is equivalent to Selkirk's Σ. Phrase has primarily intonational correlates - it's the domain of an intonation contour. As

Selkirk suggested, the difference between stressed and unstressed is the difference between being a foot and not being a foot. Thus the difference between the two renditions of *my French* could be something like the following (assuming in (10a) the notion of structural extrametricality discussed in [5]):

(10a)
$$
\begin{array}{c}
P \\
\diagup | \\
\diagup \quad F \\
\diagup \quad | \\
\sigma \quad \sigma \\
\text{my FRENCH}
\end{array}
$$

(10b)
$$
\begin{array}{c}
\qquad P \\
\diagup \quad \diagdown \\
F_w \qquad F_s \\
| \qquad | \\
\sigma \qquad \sigma \\
\text{MY FRENCH}
\end{array}
$$

The difference between primary and secondary stress, meanwhile, is the difference between being the strong foot of a phrase and being a weak foot. Thus in (10b), the stress on *my* is secondary, while that on *French* is primary or nuclear.

This means we can define neutral prominence for a noun as

(11)
$$
\begin{array}{c}
P \\
| \\
F_s
\end{array}
$$

and "reduced" or "deaccented" prominence as

(12)
$$
\begin{array}{c}
P \\
| \\
F_w
\end{array}
$$

For a pronoun, etc., neutral prominence is

(13)
$$
\begin{array}{c}
F \\
| \\
\sigma_w
\end{array}
$$

which by definition cannot be deaccented or made less prominent, while increased prominence for focus, contrast, etc. is

(14)
$$
\begin{array}{c}
P \\
| \\
F
\end{array}
$$

The structure in (14), with only F instead of F_w or F_s, says that the very fact of being a foot is enough to signal increased

prominence on a function word. It doesn't matter whether the foot is weak or strong in the phrase (i.e. it doesn't matter whether it has primary or secondary stress). This is unlike the situation with nouns in (11) and (12), where the difference between weak and strong in the phrase is exactly what signals deaccenting.

Notice that this analysis subsumes the proposal in my thesis to treat deaccenting as syntagmatic strength reversal. The reason for this is that the strength reversal will happen automatically *assuming certain well-formedness conditions on trees*. Take the case of *My parents CALLED*. The neutral version of this (as in 5a) would be

(15)
$$\begin{array}{c} P \\ \diagup \diagdown \\ F_s \quad F_w \end{array}$$
My parents called

To deaccent the subject, we must give it secondary stress, i.e. put it in the configuration shown in (12). But we can't just do that in the tree as it stands, because that would yield the ill-formed structure

(16)
$$\begin{array}{c} P \\ \diagup \diagdown \\ F_w \quad F_w \end{array}$$
My parents called

It's therefore necessary to promote the verb, yielding the correct tree (as in 5b)

(17)
$$\begin{array}{c} P \\ \diagup \diagdown \\ F_w \quad F_s \end{array}$$
My parents called

In other words, the node reversal happens indirectly, as a consequence of reducing the prominence level on the subject and repairing the resulting violation of well-formedness conditions on metrical trees. The phonological essence of deaccenting is the paradigmatic demotion from primary to secondary stress, not node reversal itself.

5. CONCLUSION

The stress paradox with which we began can be resolved if we take primary stress, secondary stress, and unstressed to be paradigmatic categories, while treating fine differences of relative prominence to be a matter of syntagmatic structure.

Among other things, this makes it possible to reconcile the fundamental assumptions of metrical phonology with Culicover and Rochemont's view, discussed earlier, that the primary stresses in an utterance are equal. The way in which they are equal is *paradigmatic*: both are the primary stresses of their respective phrases. At the same time, there are good reasons to suggest that *syntagmatically* the two P nodes are in a weak-strong relationship, which justifies the traditional view that one fo the primaries is the nucleus of the whole sentence. The two claims need not be seen as incompatible.

6. REFERENCES

[1] Culicover, Peter W., and Michael Rochemont (1983). Stress and Focus in English. *Language* 59: 123-165.

[2] Ladd, D. Robert (1980). *The Structure of Intonational Meaning: Evidence from English*. Bloomington, Indiana University Press.

[3] Liberman, Mark; Prince, Alan (1977). On stress and linguistic rhythm. *Linguistic Inquiry* 8: 249-336.

[4] Pierrehumbert, Janet (1980). *The Phonology and Phonetics of English Intonation*. PhD Thesis, MIT.

[5] Pierrehumbert, Janet, and Mary Beckman (1988). *Japanese Tone Structure*. Cambridge, Mass., MIT Press.

[6] Selkirk, Elisabeth O. (1980). The Role of Prosodic Categories in English Word Stress. *Linguistic Inquiry* 11: 563-605.