



University of  
Massachusetts  
Amherst

## A Reanalysis of Obligatory "Comma Pause" in English

Item Type	article;article
Authors	Bing, Janet M.
Download date	2024-06-29 23:50:16
Link to Item	<a href="https://hdl.handle.net/20.500.14394/50164">https://hdl.handle.net/20.500.14394/50164</a>

## A REANALYSIS OF OBLIGATORY "COMMA PAUSE" IN ENGLISH

Janet M. Bing

The proposal of rules for assigning stress and the discussion of phrase boundaries and juncture have traditionally been treated as separate issues. I would like to propose that questions of prominence and questions of boundaries are closely related and that an independent theory of phrase boundaries will not be necessary, given an adequate theory of prominence.<sup>2</sup> If one assumes a relational theory of stress such as that proposed in Liberman (1975) and investigated further in Liberman and Prince (1977), it is possible to discuss the position of phrase boundaries in terms of the metrical tree, rather than assigning them as segments in the terminal string. This can be done with a relatively minor extension of relational theory which follows from conventions already assumed and which avoids the problems of previous attempts to assign phrase boundaries by rule.

Rotenberg (1978) offers very convincing arguments against treating boundaries as part of the terminal string. He shows that the idea of boundary as an "edge of domain", as used, for example, by Trubetzkoy (1939), is much different from the juncture phonemes of Trager and Smith (1951) and the boundaries proposed in Chomsky and Halle (1968). The first kind of boundary, which I shall henceforth refer to as boundary<sub>e</sub>, is not considered part of the terminal string, and cannot be added or deleted. The second type of boundary, which I shall call boundary<sub>s</sub>, can be found in Selkirk (1972), where boundaries are deleted, and in Downing (1970), where boundaries are assigned as part of the syntactic cycle.

In this paper I would like to reanalyze the idea of obligatory phrase boundaries within the framework of metrical theory. However the question "How does one assign obligatory phrase boundaries?" is sensible only if one is talking about boundaries<sub>s</sub>. The question for boundaries<sub>e</sub> must be restated as "Of what domain is a phrase boundary an edge and why are some phrase boundaries obligatory?"

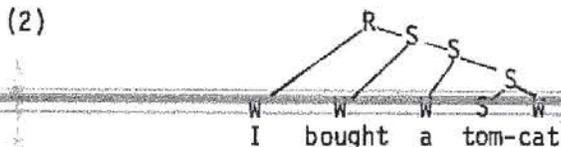
In section 1 I will give a greatly simplified summary of the conventions of relational theory as proposed by Liberman and Prince (1977). In section 2 I will summarize and discuss the theory of assigning obligatory phrase boundaries (or "comma-pause") proposed by Bruce Downing (1970) and will point out difficulties with Downing's hypotheses. In the third section I will show how phrase boundaries can be "defined" on the metrical tree, and how obligatory phrase boundaries can be accounted for by two constraints on metrical rules. The proposed extension of the metrical hypothesis captures the important insight of Downing's analysis while eliminating problems inherent in his hypotheses. In the final section I will discuss why phrase boundaries should be considered part of metrical structure, and how they are related to the "metrical grid" as well as to the "metrical tree."

### 1. The Relational Theory of Stress

The relational stress hypothesis as described in Liberman (1975) included two basic departures from what had become accepted ways of representing prosodic phenomena by American linguists. First, stress was no longer analyzed as a n-ary segmental feature with a numerical value of 0-4, but was essentially binary in value, with only the values strong and weak, values which are meaningful only in terms of each other. For example, the statement of the Nuclear Stress Rule and Compound Stress Rule (Chomsky and Halle 1968) in Liberman and Prince (1977:257) is:

- (1) In a configuration  $C[AB]_C$
- a. NSR: If C is a phrasal category, B is strong.
  - b. CSR: If C is a lexical category, B is strong iff it branches.

Assuming, as a working hypothesis, that these values can be assigned to a syntactic structure<sup>3</sup>, the rule would assign the values S(trong) and W(eak) to the following simple sentence as shown.



The first syllable of tom-cat is assigned the value strong by (1b), the metrical equivalent of the Compound Stress Rule, and by convention the sister node becomes weak. In all other cases in (2), prominence is assigned to the rightmost branch of the binary structures by (1a), the relational statement of the Nuclear Stress Rule. The initial node of the metrical structure is marked R(oot).

The second aspect of Liberman's hypothesis that differed from traditional analyses was the proposal of the "metrical grid." The metrical grid emphasized the idea that perceived differences in stress can be related to differences in timing. It is quite well documented<sup>4</sup> that





distinguished between variable phrase boundaries (such as those described for German by Bierwisch) and obligatory phrase boundaries, and he proposed a theory for assigning the latter. A summary of the main points of Downing's analysis may be found in Downing (1973) and (1975).

The term "phrase boundary" (PB) used by Downing, following Chomsky and Halle (1968) refers to the phenomenon sometimes referred to as pause, comma-pause, juncture, boundary, pause boundary, and comma intonation elsewhere in the literature. As Downing points out, the phrase boundary does not refer to "actual pause", but to "perceived pause." It "is realized phonetically in various ways, including pitch change and duration, and is sometimes accompanied by actual cessation of phonation."<sup>9</sup>

There is very little disagreement among native speakers about where obligatory phrase boundaries occur. A number of expressions are almost always separated from sentences by pause: vocatives, certain sentence adverbs, polite expressions (please and thank you), expletives, epithets, and quotative and epistemic verb phrases in certain positions (for example, I think, he said). In addition, nonrestrictive relative clauses and parenthetical expressions are always surrounded by obligatory phrase boundaries.

Phrase boundaries, as discussed by Downing and Bierwisch, are grammar-related and not the same as performance-related pauses. Obviously, one can pause at any point in a sentence, but intuitively, these pauses are not rule-governed. Thus, a good reader would never elect to phrase the following sentence (in which a phrase boundary is indicated by /) as:

(10) I told him about the/damage to his car.

Performance pauses and hesitations may be due to any number of factors. For example, if one is searching for a word, he might say:

(11) I told him about the--um--condensation problem in the fuel line.

These pauses do not mark phrase boundaries.<sup>10</sup>

Bruce Downing's theory of obligatory phrase boundary assignment consists of two different hypotheses, which I will refer to as the Root Sentence Hypothesis and the Root Node Hypothesis. His original hypothesis, the Root Sentence Hypothesis, to which most of the dissertation is devoted, is based on the generalization that phrase boundaries are obligatorily placed around root sentences. His definition of root sentence, which is somewhat different from that proposed by Emonds (1970), is the following:

(12) A root sentence is any sentence that is not commanded by a VP node.<sup>11</sup>

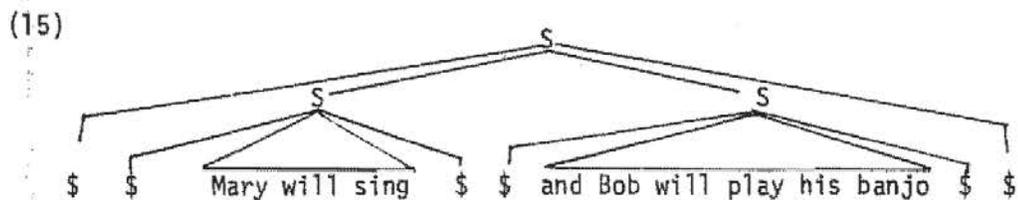
The notion of command is that of Langacker (1969):

(13) A node A commands a node B if neither A nor B dominates the other and the S node most immediately dominating A also dominates B.<sup>12</sup>

Given these definitions of root sentence and command, Downing states the convention of Obligatory Boundary Insertion (OBI):

- (14) Phonological phrase boundaries (PB's) are inserted as leftmost and rightmost immediate constituents of every root S node that appears in any postcyclic derived P-marker.<sup>13</sup>

The application of the OBI convention to a coordinate structure will produce the following derived structure, in which PB's are marked with the symbol \$.



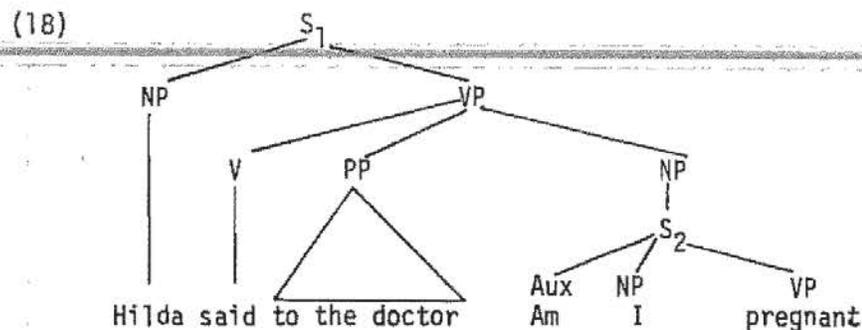
Downing illustrates the difference between the phrasing of root sentences and sentences which are not root sentences with the following examples:

- (16) a. Billy thought his father was a merchant, and his father was a secret agent.  
 b. Billy thought his father was a merchant and his mother was a secret agent.

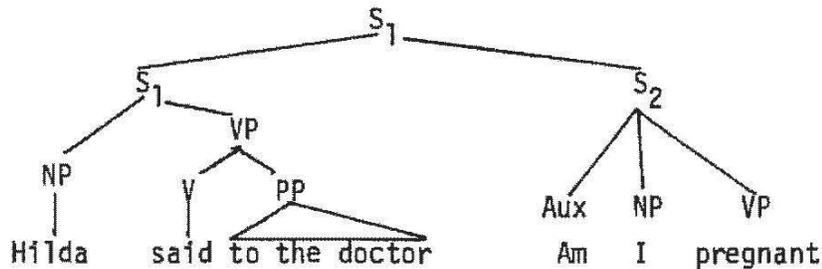
In Downing's Root Sentence Hypothesis, all embedded phrases or clauses that are set off by pause are derived by the parenthetical insertion of a root sentence into a matrix sentence. This means that every parenthetical must be, at some point in the derivation, a full sentence. For example, the derivation of the following sentence

- (17) "Am I," Hilda said to the doctor, "pregnant?"

includes the following steps. First, a transformation of Quote Detachment removes a quotation from (18) and Chomsky-adjoins it to the matrix sentence.

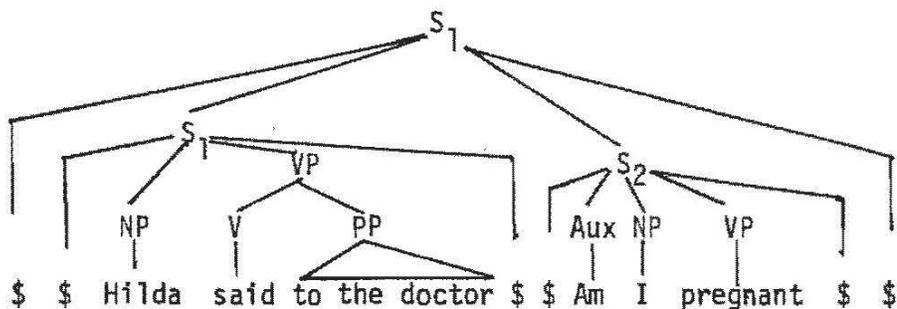


## (19) Quote Detachment (opt.)



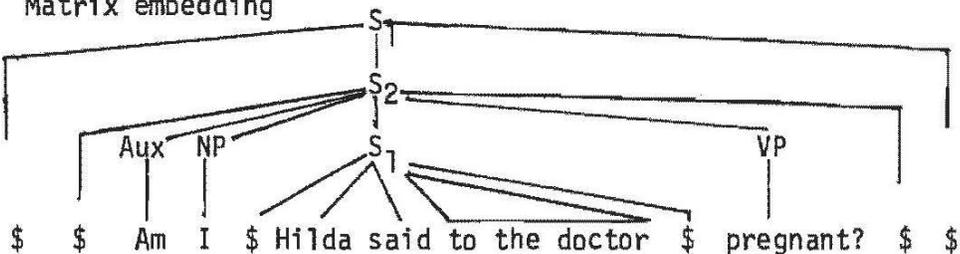
At this point, the Obligatory Boundary Insertion Rule places phrase boundaries around both of the root sentences.

## (20) OBI (oblig.)



The final step of the derivation preposes the matrix sentence in to the quotation and attaches it "as high as possible" in the structure.

## (21) Matrix embedding



One of the problems with Downing's Root Sentence Hypothesis is that he is forced to derive all sentence-medial parentheticals from underlying sentences, and much of the dissertation is devoted to showing how this can be done. More serious, however, as Downing readily admits, is the fact that there are a number of examples which cannot be derived from root sentences.

There remains, however a fairly sizeable class of parenthetical phrases which cannot be shown to derive from root sentences but apparently are derived by the parenthetical insertion into a root sentence of a previously extraposed phrase. Examples of such phrases are nonsentential adverbials (discussed in 4.3.2) and the parenthetical vocative (discussed in 4.4). So long as PB's are assigned to root sentences only, the parenthetical phrasing of such phrases cannot be explained.<sup>14</sup>

(22) I say to you / my friends, / that the time has come for action.<sup>15</sup>

(23) I learned, / to my dismay, / that the rain had washed out  
the only bridge.<sup>16</sup>

Because he cannot account for the parentheticals in (22) and (23), by a transformation deriving them from root sentences, Downing reluctantly revises his Root Sentence Hypothesis to a hypothesis which says that phrase boundaries are inserted as the right and left constituents of every "root node". A root node is not very precisely defined. Downing explains it:

The second alternative has already been suggested....This is to extend the definition of root element to any constituent not contained in a predicative root sentence so that extraposed NP's, for example, are root NP's. Then the OBI convention can be generalized as follows, i.e., simply by replacing "root S node" by "root node.":

(2) Phonological phrase boundaries (PB's) are inserted as leftmost and rightmost constituents of every root node that appears in any postcyclic derived P-marker.

Although Downing concludes that the Root Node Hypothesis can account for all the data, he clearly prefers the Root Sentence Hypothesis:

My reluctance to adopt (2) as the proper formulation of the OBI convention at the outset stems from a desire to preserve the generalization that "roots" are sentences and that obligatory PB's are essentially sentence boundaries. This intuitive feeling has been supported by the fact that in most cases separately phrased nominal or verbal phrases can be shown to result from the reduction of sentences.<sup>17</sup>

The derivation of the following sentence illustrates the differences between the original Root Sentence Hypothesis and the revised Root Node Hypothesis.

~~(24) He said, the manager, that you are fired.~~<sup>18</sup>

In his discussion of this example, Downing suggests that rather than derive the sentence by Right Dislocation, that it be derived from the underlying sentence (25).

(25) He said that you are fired, I mean the manager.

After phrase boundaries are assigned, the "afterthought" sentence is preposed and adjoined as high as possible in the matrix sentence, and then reduced to a noun phrase.

The same derivation would be possible if one assumed the Root Node Hypothesis, but a derivation by Right Dislocation would also be possible.

Thus, the underlying sentence might be:

(26) The manager said that you are fired.

After Right Dislocation, and derived sentence would be:

(27) He said that you are fired, the manager.

At this stage of the derivation, the manager is now a root node, and is assigned PB's by (2) in Downing's quotation. It is then preposed back into the matrix sentence and adjoined as high as possible to form (24).

Both the Root Sentence Hypothesis and the Root Node Hypothesis depend on an argument which comes close to being circular. Consider the following sentences:

(28) The box; empty, weighs five pounds.

(29) The empty box weighs five pounds.

For (28) the presence of obligatory phrase boundaries depends on the fact that at some stage of the derivation, empty has been a root node or root sentence, and has been assigned phrase boundaries. On the basis of the derivations given, I believe that Downing (154) would have proposed the source as:

(30) The box weighs five pounds and the box is empty.

Although empty in both (28) and (29) is derived from the second clause in (30), the rule which moves empty in (28) is stated so that the boundaries are moved, but the one moving empty in (29) refers only to the adjective, and leaves the boundaries behind to be pruned. A similar explanation is given for the presence or absence of phrase boundaries in adverbials (p. 125).

In its simplest form the argument is: An element which is a root node/sentence is assigned obligatory phrase boundaries. If the derived form includes obligatory phrase boundaries, this is because it was a root node/sentence at some point in the derivation. If the derived form does not have obligatory phrase boundaries, it is because it either was never a root node/sentence, or because the boundaries were not moved as part of the derivation. I believe that this statement of the argument demonstrates the danger of treating boundaries as if they were analogous to segments; the result is a very powerful grammar.

Even if boundaries could be "inserted" by rule, the fact that the obligatory boundary insertion rule, represented as one of a set of ordered rules, must appear in more than one component of the grammar weakens the argument, I believe. For example, Downing must propose that non-restrictive relative clauses derive from underlying conjoined sentences to account for the fact that non-restrictive relative clauses have obligatory phrase boundaries, while restrictive relative clauses have only one

optional phrase boundary. This transformation and the transformation of conjunct embedding would seem to be part of the syntactic cycle, and both must be preceded by Obligatory Boundary Insertion. Other transformations such as Right and Left Dislocation, prepositional phrase preposing, adverbial preposing, etc., seem to be largely stylistic; arguments (such as those given in Rochemont (1978)) have been made that these transformations occur after the syntactic cycle in a separate stylistic component of the grammar.<sup>18</sup> It seems that rules of Obligatory Boundary Insertion must be included in this component of the grammar as well, which suggests that some generalization is being lost.

Almost all of Downing's thesis is devoted to arguments for the generalization that root sentences have obligatory phrase boundaries, but within the framework in which he explored the hypothesis, he was unable to fully substantiate this hypothesis. However, the reformulation of Downing's hypothesis in relational theory suggests that the Root Sentence Hypothesis is, in fact, correct. In a relational framework, if this constraint is stated explicitly, the facts fall out naturally, and boundaries (in the sense of boundary<sub>e</sub>) can be defined on derived structures, with no reference to the transformational history of a derived structure.

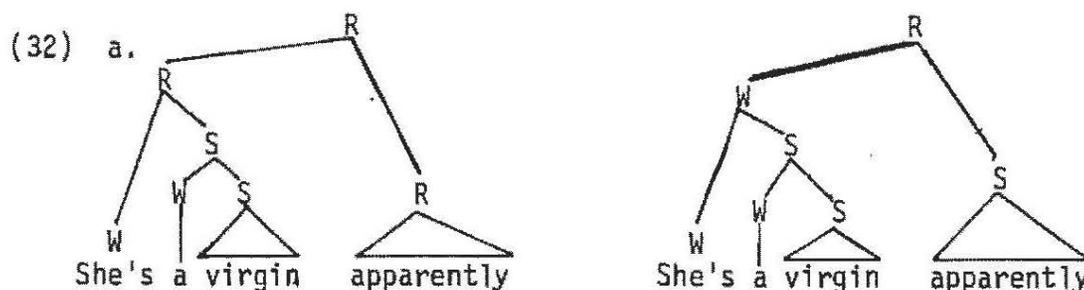
### 3. A Relational Theory of Phrase Boundaries

In relational theory a node may have one of three possible values. It may be strong, in which case it must have a sister node which is weak. It may be weak, in which case its obligatory sister must be strong, or it may be labelled root, a value which has been assigned only to initial nodes in the published literature. I know of no cases in which nodes are unlabelled, and I shall assume a constraint that all nodes must be given some value. If the theory were extended so that it were possible to assign the value (R)oot to any parts of the metrical structure, it would follow naturally that the values weak and strong could not be sisters of R, since those values have meaning only in terms of each other. This would mean that the only possible sister of R could be R, if all nodes must be labelled.

~~This extension of the node labelling hypothesis makes sense in terms of the prominence relationship between sentences and extra-sentential elements such as vocatives, epithets, sentence adverbs, etc., which seem to be neither stronger nor weaker than the sentence itself. For example, in the following sentence, the contour on apparently expresses some reservation by the speaker about the proposition stated in the sentence:~~

(31) She's a virgin, apparently,

Intuitively, there is no more prominence on apparently than on virgin or vice-versa. The representation (32a) represents this.

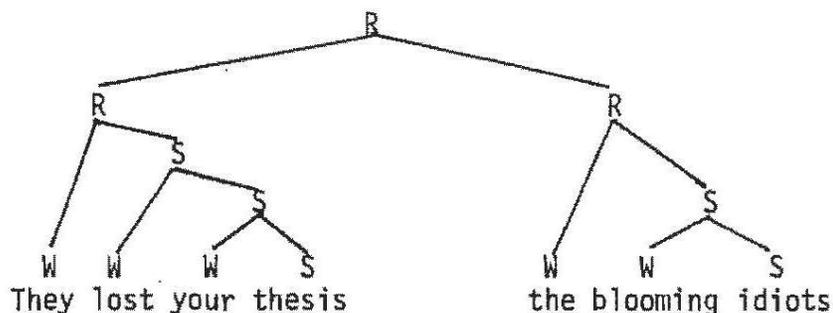


The representation in (32b) claims that apparently receives greater prominence than virgin, but there is no basis for claiming this. The contours on the two words are the same, prepausal lengthening occurs in both cases, and the word apparently is spoken no louder than the word virgin.

Similarly, I would propose that the best representation for (33) would be (34):

(33) They lost your thesis, the blooming idiots!

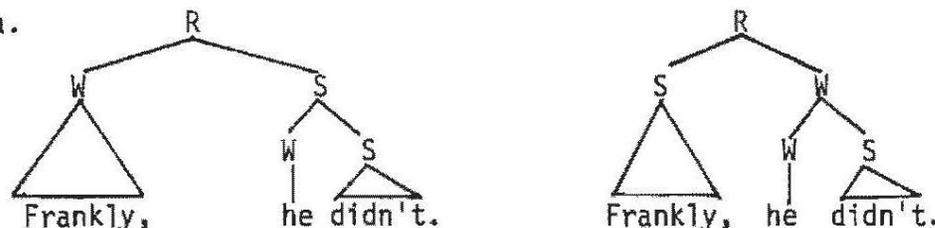
(34)



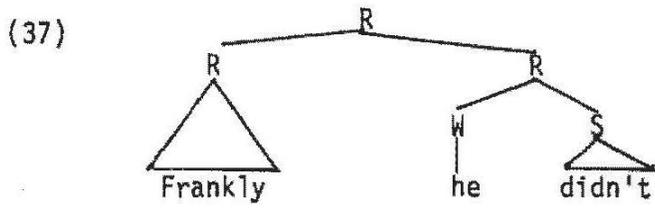
What the value R represents in these examples is a relationship in which neither sister is stronger or weaker than the other, and this seems to represent the facts. If one were forced to make a decision on the prominence relations in (35) between the underlying representation (36a) or (36b) the choice would be a hard one.

(35) Frankly, he didn't.

(36) a.



The phonetic facts would seem to indicate that (29a) would be the best choice, since the intensity is greater on frankly than on didn't.<sup>19</sup> However, if one were to rely on intuitive judgments and the Nuclear Stress Rule, the choice would seem to be (36b). The third choice, (37), claims that neither sister is stronger or weaker.



If one assumes this proposed extension of the use of the value R in metrical structure and assumes that some convention can be established for assigning the value R, it is now possible to define a phrase boundary on metrical structure.

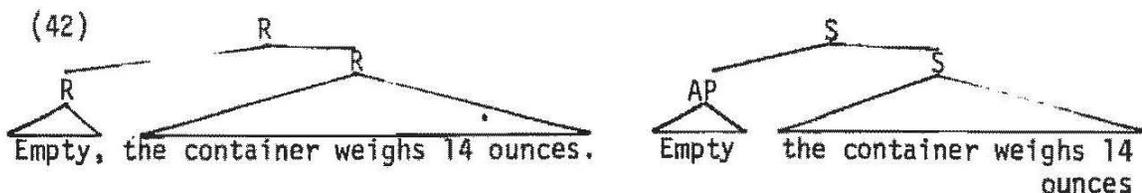
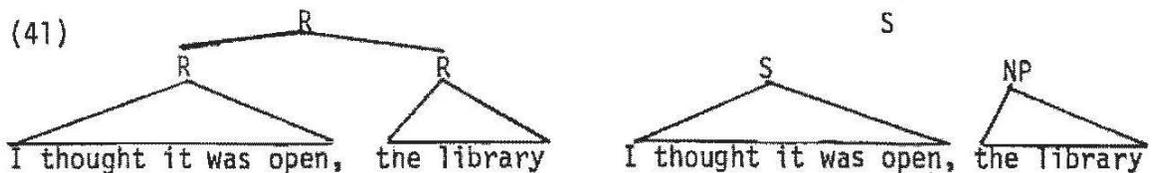
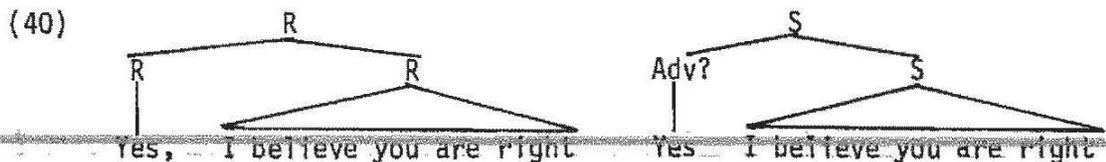
(38) A phrase boundary is defined as the point between two adjacent constituents, each dominated by R in metrical structure.

It should be pointed out that (38) does not assign phrase boundaries; it defines them in terms of metrical structure. Given the conception of phrase boundaries as edges, the assignment or deletion of boundaries makes no sense.

Having proposed that phrase boundaries can be defined in terms of structures dominated by the value R in metrical structure, the next question is that of assigning R to nodes in the metrical tree. Downing's Root Sentence Hypothesis suggests the following rule:

(39) Assign R to every node in the metrical tree which corresponds to the node S dominating a root sentence in syntactic structure.

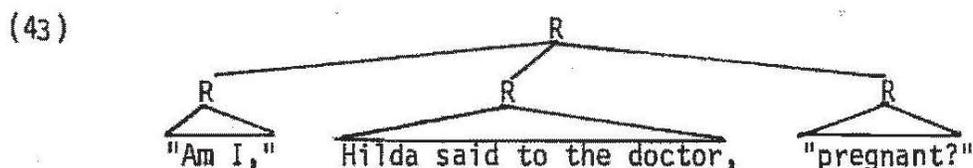
One can buy a lot with this rule, for not only will the root sentence be dominated by R, but its sisters, if any, will also be dominated by R. It is not necessary that the sister node be a root sentence in relational theory. The following examples are problematic in Downing's Root Sentence Hypothesis, but not in relational theory; only relevant parts of the metrical structure are specified.



All the sister nodes of root sentences are separated from the rest of the sentence by obligatory phrase boundaries not because they are derived from root sentences but because they are sisters of root sentences. This, however, does not account for sentence-medial obligatory phrase boundaries.

If one assumes that except for the initial node in metrical structure all other nodes are marked either weak or strong, there is good reason to assume that metrical structures must be binary. However, given the proposed extension of the hypothesis which would allow nodes other than the initial node to be labelled R, it is no longer necessary to specify that all branching nodes be binary. However, for structures which are not binary, the most restricted hypothesis would be that these non-binary structures can be dominated only by R.

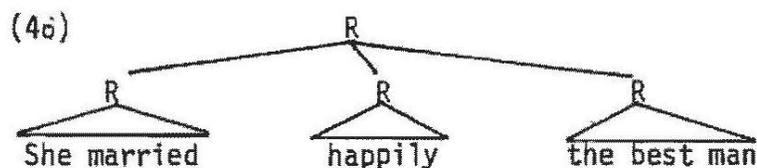
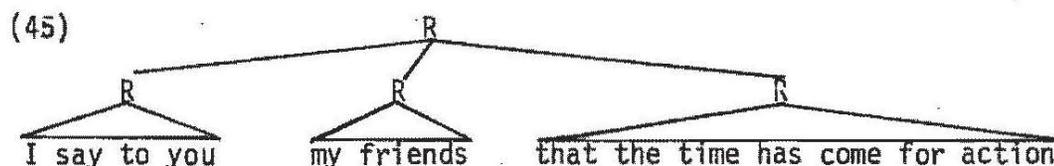
Consider the following simplified derived metrical structures for sentence (21).



This representation is relatively close to the derived structure proposed by Downing in (21) and the fact that the structure is not binary predicts the Obligatory Phrase Boundaries if one assumes a rule such as:

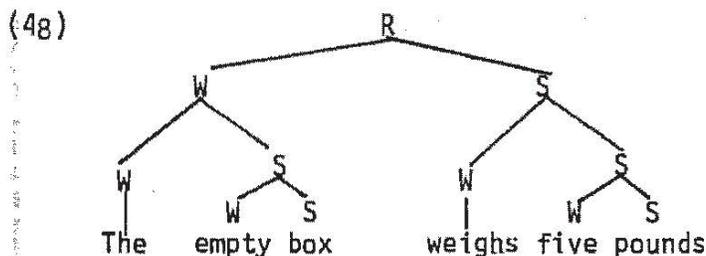
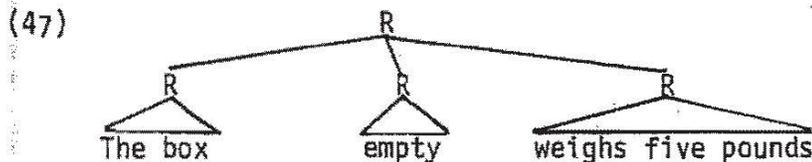
- (44) Assign R to every node in the metrical tree which has more than one sister.

This is an interesting hypothesis in the light of the fact that obligatory phrase boundaries occur around any sentence medial parenthetical in derived structure. These boundaries would be predicted, given (44), (38) and the structures proposed below:



If this hypothesis can be substantiated, the derivational history of these structures would be totally irrelevant. What would be important would be the derived structure, and the important aspect of the derived structure is that it is not binary.

At first glance, this argument seems as circular as that of Downing. That is, there are phrase boundaries around empty in (47) because of the ternary structure, but no obligatory boundaries around empty in (48) regardless of its transformational history since it is neither a root sentence nor part of a ternary structure.



However, even assuming that metrical structure is not the same as syntactic structure, as claimed in Selkirk (1978) there are ways to explore metrical structure. Ladd (1978: Chapter 3) discusses the well-known phenomenon of destressing old information in terms of Default Accent, and points out that when something which has already been referred to in a discourse is repeated, the "old information" is destressed, and something else receives stress by "default." For example:

(49) Did you bring an empty box? No, I brought a full box.

As Ladd points out, Default Accent can be accommodated easily in metrical theory, for the changing of the value S to W on the word box in the first phrase of (48) would automatically give prominence to empty, since a change of value in one sister results in an automatic change of value in the other sister. The use of Default Accent for exploring metrical structure looks very promising; in example (49) it indicates that empty and box are sister nodes, as they are claimed to be in syntactic structures.

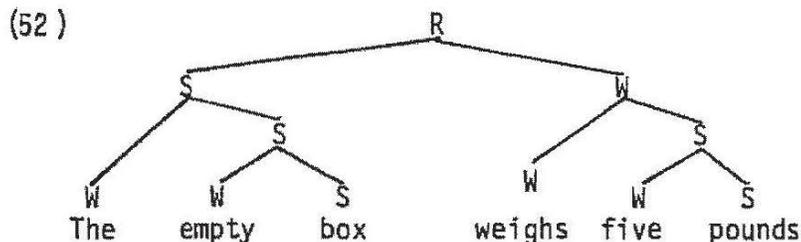
If one argues that (48) is the underlying structure for sentence (29) one can make certain predictions about which words will receive prominence if other parts of the sentence are deaccented because they are "old information". For example, in response to the question,

(50) Does each carton weigh 5 pounds?

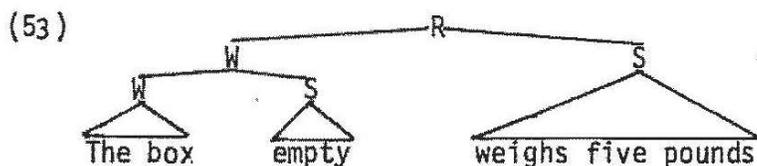
one would predict the response

(51) No, the empty box weighs five pounds.

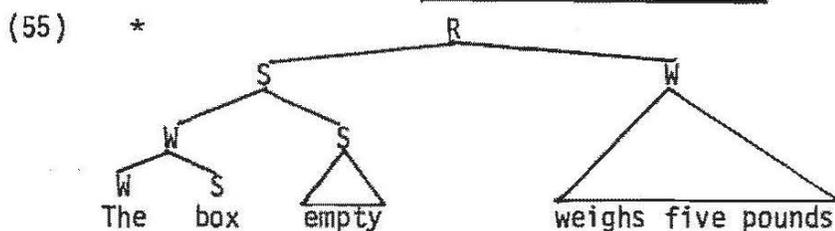
Sentence (51) would be represented as (52) because of Default Accent.



If, for the sake of argument, we proposed that the underlying structure for (28) were really (53), we could check this hypothesis by putting the sentence in a context which would destress the predicate.



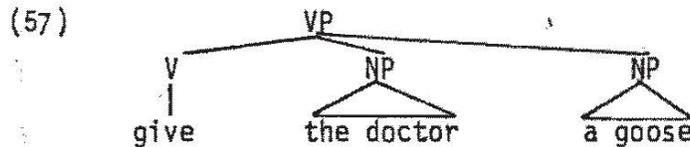
- (54) a. Does each carton weigh 5 pounds?  
 b. \*No, the box, empty, weighs five pounds.



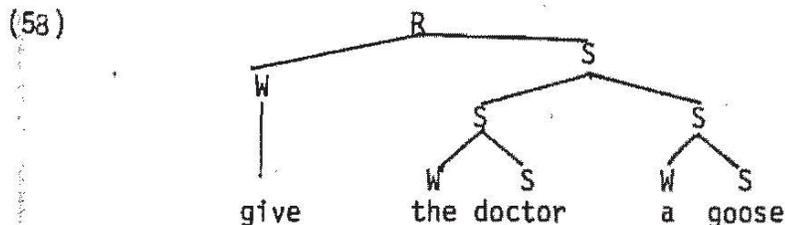
However, the proposed underlying representation, (47), could not be subject to Default Accent, since Default Accent affects only the values S and W. In fact, sentence (28) is subject to Default Accent only within the verb phrase.

There is not adequate space here to pursue this line of argument further, but I believe that the exploration of metrical structure can be done by careful attention to Default Accent. The relationship of the metrical tree to syntactic structure is still a relatively unexplored area, but one would hope that there are close correspondences between the two. However, if we assume this, there are some potential counter-examples to the hypothesis (44). For example, if the metrical structure for the verb phrase in (56) had a metrical structure corresponding to the syntactic structure indicated in (57), the prediction would be that obligatory phrase boundaries occur before and after each sister.

(56) Did Hilda give the doctor a goose?

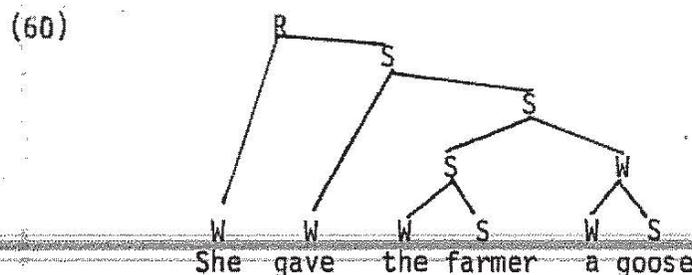


This is obviously the wrong prediction, since obligatory phrase boundaries do not occur in the predicate. However, in addition to the fact that this structure is represented differently in different grammars<sup>20</sup> the facts of Default Accent indicate that the underlying metrical structure for (56) is probably

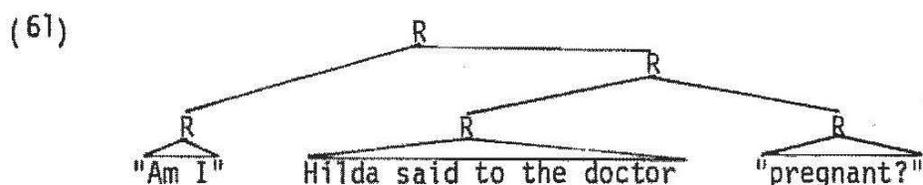


The motivation for this structure comes from what happens when the final NP becomes destressed; in this case, the stress falls on the doctor. For example, if (59) is a reply to (56), Default Accent falls on the farmer, as one would expect if the underlying structure were (58). The stress pattern which resulted from the destressing of a goose would predictably be (60).

(59) No, she gave the farmer a goose.



For the structures above, which I have claimed are necessarily ternary, it is never possible to have Default Accent. Like syntactic trees, metrical trees reflect relationships. The relationships indicated on (60) are clear, for in each case a node is either stronger or weaker than its sister. The phrases of those indicated in (40), it is claimed, have a different relationship which is neither stronger or weaker; it is merely linear. The three segments dominated by R occur sequentially with no dominance relationships claimed. It is equally possible to propose a structure like (61) and still define phrase boundaries on the metrical tree.



This structure implies a dominance relationship of some sort, and it is not clear what that relationship might be. Unless there were some reason for adopting (61), the representation proposed in (40) seems to be more intuitive and it makes no claims about relationships other than linear relationships.

If, then, there is a domain R which is identifiable, what is it a domain of? It is the domain of the intonation contour, sometimes called the "tone unit" or "breath group."<sup>21</sup> This is a domain which must be defined for independent reasons, and the fact that "tone units" are bounded by phrase boundaries, though not necessarily obligatory phrase boundaries, indicates that the claim of (38) is accurate. Ladd (1978:98) suggests a unit for sentences containing more than one intonation contour very similar to the domain dominated by R which has been proposed here. His suggestion is that metrical structure contain a domain T which defines the domain of an intonation tune of head + nuclear tone.<sup>22</sup>

I have proposed, then, that the fact that some phrase boundaries are obligatory is due to two reasons. The first reason is that root sentences in derived structure always correspond to R in the metrical tree, which necessarily entails that any sisters of the root sentence will also be dominated by R. In addition, any node which has more than one sister will necessarily be labelled R, as will its sister. Although little attempt was made to explore the relationship between syntactic structure and metrical structure, I suggested that one way to investigate metrical structure is with the use of Default Accent. I argued that structures which are not binary (and which necessarily are dominated by R) cannot have Default Accent.

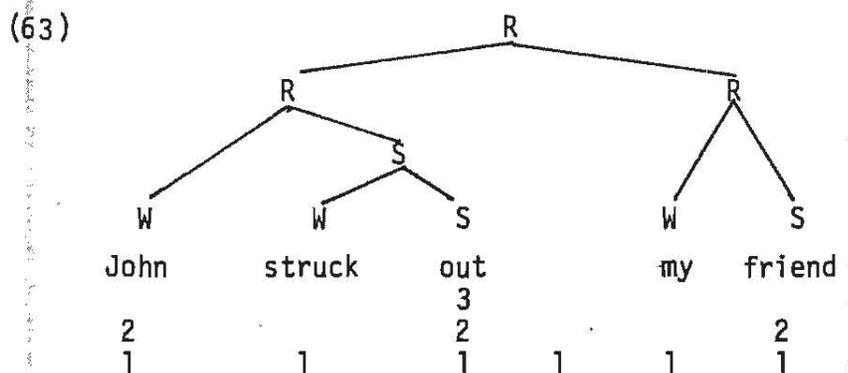
In this extension of relational theory it is not necessary to treat phonological boundaries as if they were parts of the segmental string. The boundary is a point at which two particular structures are adjacent, and it cannot be assigned or deleted independent of the structures with which it is associated. This means that boundaries can shed no light on the derivational history of sentences. It does not preclude the derivations proposed by Downing for various sentences, but it also does not preclude the possibility that sentences containing appositives or sentences thought to have undergone certain transformations such as Right and Left Dislocation may have been generated directly by phrase structure rules.

The conception of boundaries as edges does not fit into the idea of the metrical grid quite as easily as the conception of boundaries as segments. However, I think that the relationship can be spelled out. In Bing (1979) I argued that the Rhythm Rule for Dari cannot be stated

in terms of the metrical grid alone, but must be defined on the metrical tree as well. I feel that the same is true for the representation of boundaries.

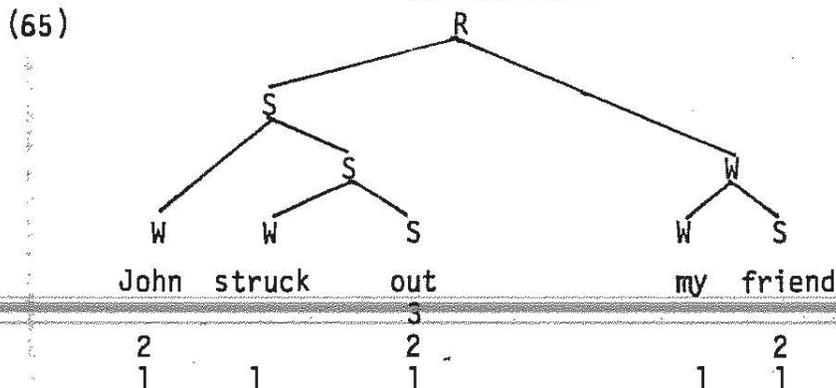
Consider the following two sentences. In (62) my friend is a vocative and would have the underlying representation indicated in (63). In (64) my friend is destressed because it is old information and out is stressed by Default Accent. The underlying representation would be (65).

(62) John struck out, my friend.



(64) a. What did John do to your friend?

b. John struck out my friend.



The metrical tree (63) is aligned with the metrical grid with the condition that a boundary must be aligned with the weakest value on the grid. Notice that this condition does not entail that the boundary be a segment in the sense of boundary<sub>s</sub>. The boundary cannot exist independent of the structures dominated by R. However, it is the alignment of the metrical tree with the metrical grid which accounts for the differences in timing between (62) and (64). The "extra beat" in (63) represents the prepausal lengthening as suggested by Liberman in the quotation above.

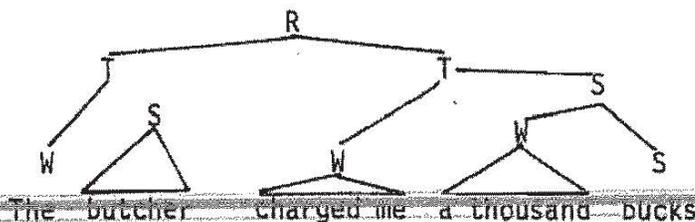
In exploring the problem of Obligatory Phrase Boundaries in English, I have suggested that a grammar which treats phrase boundaries as analogous to segments is too powerful, and I have attempted to show that phrase boundaries can be defined in terms of adjacent structures dominated by R in the metrical tree.<sup>23</sup> The domain R was identified as the domain of the intonation contour.<sup>23</sup> I claimed that obligatory phrase boundaries occur because root sentences are assigned the value R and because structures which are not binary must always be assigned the value R. Finally, I suggested that timing differences can be accounted for by the alignment of the metrical tree with the metrical grid.

### Footnotes

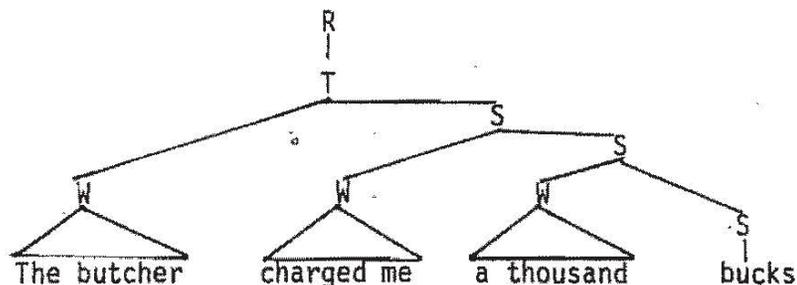
1. I would like to thank Mary Clark, Bruce Downing, Robert Ladd, Jr., and Deirdre Wheeler for helpful suggestions on an earlier version of this paper, many of which I heeded.
2. I use the term prominence in a slightly different sense than its traditional meaning. Jones (1932:228) distinguishes between stress and prominence; the latter refers to general degree of distinctness, this being the combined effect of the timbre, length, stress and intonation of a syllable; this is the sense in which the term is often used. I will use the term prominence to mean a system which includes stress and phrase boundaries but which excludes intonation.
3. This working hypothesis will be abandoned in section 3 for the reasons given there. Selkirk (1978) offers an alternative hypothesis.
4. See Lehiste (1970, Chapter 4) and Lea (1970) for reviews of the literature on this subject.
5. Arguments against the accent hypothesis for English may be found in Ladd (1978:66ff), Liberman (1975:Chapter 5) and Lehiste (1970:143ff).
6. The reason for the differences in prominence in examples (4) and (6) can be attributed to what Ladd (1978) calls "Default Accent" which is the result of destressing material which has already become part of the discourse. Default Accent is discussed in Section 3.
7. Liberman (1975:285).
8. A good summary of Bierwisch's hypothesis can be found in Downing (1974).
9. Downing (1970), p. 10.
10. For a more complete discussion of different types of pause, see Rotenberg (1978:40-42).
11. Downing (1970), p. 30.
12. Ibid., p. 197.

13. Ibid., p. 31.
14. Ibid., p. 201.
15. Ibid., p. 137.
16. Ibid., p. 135.
17. Ibid., p. 203-204.
18. Downing suggests that these transformations are post-cyclic.
19. Evidence for this can be found in Bing (forthcoming, Chapter 3). The  $F_0$  on both Frank and did goes up to approximately 300 hz. in Figure 4 of that chapter, and there is greater intensity shown on Frank than on did.
20. For example, in Montague Grammar, the syntactic rules result in a derived structure which is binary in the case of (53).
21. Tone unit is probably the most standard term used to describe the domain of the intonation contour. Each tone unit has one nuclear tone. Lieberman (1967) uses the term "breath group".
22. Ladd's proposal is the following:

However, a second and I think, more promising possibility for exemplifying the use of pretonic accent in terms of rhythmic structures is to assume that each nuclear tone is associated with a coordinate constituent (T) of a rhythmic structure. Thus:



(butcher used literally, with A-accent)



(butcher deaccented, with pretonic accent, used as epithet)

23. In Bing (forthcoming) I discuss the domain of the intonation contour at considerable length.

## Bibliography

- Bierwisch, Manfred. 1966. "Regeln für die Intonation deutscher Sätze." In Manfred Bierwisch, ed., Studia Grammatica VII: Untersuchungen über Akzent und Intonation im Deutschen. pp. 99-201. Berlin: Akademie-Verlag.
- Bing, Janet Mueller. 1979. Linguistic Rhythm and Grammatical Structure in Afghan Persian. Linguistic Inquiry. 11:1.
- \_\_\_\_\_. forthcoming. Aspects of English Prosody. University of Massachusetts, Amherst, dissertation.
- Chomsky, Noam and Morris Halle. 1968. The Sound Pattern of English. New York: Harper and Row.
- Downing, Bruce. 1970. Syntactic Structure and Phonological Phrasing in English. University of Texas dissertation.
- \_\_\_\_\_. 1973. Parenthesization Rules and Obligatory Phrasing. Papers in Linguistics 6. 108-28.
- \_\_\_\_\_. 1974. Does English have Word-Level Rules? General Linguistics, Vol. 14, No. 1. 1-14.
- \_\_\_\_\_. 1975. On Predicting Obligatory Comma-pause. Texas Linguistic Forum. Vol. 2, 1975.
- Emonds, J.E. 1976. A Transformational Approach to English Syntax: Root, Structure-preserving, and Local Transformations. Academic Press, New York.
- Jones, D. 1932. An Outline of English Phonetics, 3rd ed., Dutton, New York.
- Ladd, D. Robert, Jr. The Structure of Intonational Meaning. Cornell University dissertation to be published by Indiana University Press.
- Langacker, Ronald W. 1969. On Pronominalization and the Chain of Command. In Reibel and Schane (eds.) (1969) Modern Studies in English. pp. 160-186. Englewood Cliffs, N.J.: Prentice-Hall.
- Lehiste, Ilse. 1970. Suprasegmentals. Cambridge, Ma.: M.I.T. Press.
- Lieberman, Mark. 1975. The Intonational System of English. MIT dissertation.
- Lieberman, Mark and Alan Prince. 1977. On Stress and Linguistic Rhythm. Linguistic Inquiry 8.2.
- Lieberman, Philip. 1967. Intonation, Perception, and Language. Cambridge, Ma.: M.I.T. Press.
- Pope, Emily. 1971. Answers to Yes-No Questions. Linguistic Inquiry 2.1.
- Rochemont, Michael. 1978. A Theory of Stylistic Rules in English. University of Massachusetts, Amherst, dissertation.
- Rotenberg, Joel. 1978. The Syntax of Phonology. MIT dissertation.
- Selkirk, Elisabeth. 1978. On Prosodic Structure and its Relation to Syntactic Structure. Paper presented at Conference on the Mental Representation of Phonology, University of Massachusetts at Amherst, Nov. 18-19.
- Trubetzkoy, N.S. 1939. Grundzüge der Phonologie, Travaux du Cercle Linguistique de Prague 7.

