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Horne, Merle

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WHY DO SPEAKERS ACCENT ‘GIVEN’ INFORMATION?
MERLE HORNE

Dept. of Linguistics, University of Lund
Helgonabacken 12, S-223 62 Lund, SWEDEN

ABSTRACT. The accenting of contextually ‘given’ information constitutes a problem for analyses that regard accents as correlating only with ‘new’ information. It will be shown that the accenting of ‘given’ information is explainable as resulting from general metrical well-formedness conditions on prosodic constituents. Units higher than the word are seen to obey the same metrical constraints that are present at the word level.

KEY WORDS: ‘new information’, ‘given information’, accentual phrase, intermediate phrase, tone-unit, prosodic structure, metrical structure, deaccenting, rhythm.

1. INTRODUCTION: ACCENTING OF GIVEN INFORMATION

Current work on developing text-to-speech systems has emphasized the fact that it is important to take into consideration discourse-level information when generating intonation contours (Hirschberg 1990, House & Youd 1990). In particular, researchers are aware of the fact that the ‘new/given’ status of lexical words constitutes important information when writing rules to generate prosodic structures and intonation contours for a text. However, as has been shown, it is not the case that there is a simple correlation between ‘new’ and ‘accented’ and ‘given’ and ‘deaccented’, respectively. More specifically, although it is more or less the rule that new information is accented in neutral intonation, it is not the case that given information is deaccented (cf. Eady et al. 1986, Gusshoven 1985), e.g.:

(1) WHERE’S your PURSE_i? My PURSE_i is GONE!

where purse is accented in the second sentence even though it is given information. A related example is given by Hirschberg (1990:182), who notes that, despite the fact that Hennessy is given in (2c), it is nevertheless accented:

(2) (a) newsreader: In NINETEEN SEVENTY-SIX, DEMOCRATIC GOVERNOR MICHAEL DUKAKIS FULFILLED a CAMPAIGN promise to DEPOLITICIZE JUDICIAL APPOINTMENTS. (b) He NAMED REPUBLICAN Edward HENNESSY, to HEAD the STATE SUPREME JUDICIAL COURT. (c) For HENNESSY, it was ANOTHER STEP along a DISTINGUISHED CAREER THAT BEGAN as a TRIAL LAWYER, and LED to an APPOINTMENT AS ASSOCIATE Supreme Court Justice in nineteen seventy-ONE.

Nooteboom & Kruyt (1987), following Fuchs (1984), have suggested an explanation for this phenomenon in terms of the notion of ‘topic’, i.e. accenting given information signals thematicity. They note, however, that this is only possible when the theme is at the beginning of a constituent and not at the end. In order to illustrate this restriction, they cite an example from Berman & Szamosi (1972):

(3) The children didn’t want to go to bed, so
(3a) John SCOLDED the bastards.
(3b) The BASTARDS were SCOLDED.

Although bastards is the theme in both (3a and b), it is acceptable only in (3b). Thus, thematicity does not explain all cases of given information receiving accents.

We feel that a more satisfactory account of the phenomenon can be obtained if one sees the accenting of given information as resulting from general conditions of well-formedness as regards prosodic constituents: ‘accentual/intermediate
phrases' (Pierrehumbert & Beckman 1988) or ‘tone-units’ (Crystal 1969) in English. That is to say, it is not the case that a given accentable word can occur freely within an intermediate phrase. If it comes after a new, accented word, it will be deaccented (see (3a)). It is when given material precedes new accented words within an intermediate phrase that it is susceptible to be accented (see (3b)). As we will attempt to show below, the parallels between intermediate phrase structure and restrictions on the metrical well-formedness of words are, in fact, striking.

2. METRICAL RESTRICTIONS ON THE STRUCTURE OF WORDS

Words in English are subject to a number of restrictions on metrical/rhythmical well-formedness which can be seen to follow from the ‘foot-formation’ rules as formulated by e.g. Hayes (1981). As for the ‘formation’ rules required in the construction of accentual/intonational phrases, these have, not been formulated with the same precision; where attempts have been made to specify conditions for the generation of higher level prosodic constituents, these have been expressed in terms of syntactic structure (e.g. Nespor & Vogel (1986)). In this section, we will discuss some of the parallels that we feel can be drawn between the prosodic restrictions on the two levels. Perhaps the most relevant of the word-level restrictions for the discussion here is the one which regulates the ‘prenuclear’ part of words (ω): if there are more than one syllable before the final foot (Σ), these are seen to be structured into separate feet (4) whose strong heads are capable of bearing pitch accents (*) just as the nuclear stressed syllable is. Furthermore, a word can begin with at most one ‘extrametrical’ syllable (see (5)). After the last strong (accented) syllable, however, this restriction does not apply and extrametrical syllables are adjoined to the right of the strong foot head, (see (6)). Furthermore, lexical words with only one syllable are stressed on that syllable, i.e., they build a foot on their own.

(4) ω
   \[\Sigma_1 \cdot \Sigma_2 \cdot \Sigma_3\]
   \[s \quad w \quad w \quad s \quad w \quad w\]
   pa rapher na li a

(5) ω
   \[\Sigma_1 \cdot \Sigma_2\]
   \[s \quad w \quad s \quad w \quad w\]
   A me ri ca

(6) ω
   \[\Sigma_1 \cdot \Sigma_2\]
   \[s \quad w \quad w \quad w\]
   ca pi ta lize
2.1. METRICAL CONSTRAINTS ON THE STRUCTURE OF INTERMEDIATE PHRASES
On the level of the accentual/intermediate phrase, hierarchically structured above the word level, analogous constraints can be seen to apply if we assume the same sort of binary branching structures that e.g. Hayes (1981) assumes at the level of the word. For example, the initial (prenuclear) accented feet that are present at the word level are also present at the level of the ‘intermediate phrase’ (corresponds roughly to Selkirk’s (1984) and Nespor & Vogel’s (1986) ‘phonological phrase’). In an accentual phrase with only one accentable syllable, this syllable must be assigned a tone-accent if it occurs before the nuclear accent in an intermediate phrase. This explains the accenting of Hennessy in (2c) as well as bastards in (3b), which can be assigned a prosodic structure as in (7), where \( (\alpha) = \) accentual phrase, \( (\iota) = \) intermediate phrase, and \( (\upsilon) = \) utterance:

![Diagram](image)

\(\text{bas} \) is the first accentable syllable in the first accentual phrase and corresponds to what Palmer and Crystal term the ‘onset’ of the ‘head’ of the ‘tone-unit’. Note further how the lexically stressed syllable of a word (rightmost foot-head) can be seen as a parallel to the nuclear syllable of the intermediate phrase (the right-most [+new] information). The accentual phrases contain, moreover, no more than one extrametrical unit (unaccented words). Furthermore, the unstressed syllables following the lexically stressed syllable of a word correspond to the ‘tail’ of unaccented words in the intermediate phrase (cf. -pitalize in capitalize in (6)) vs the bastards in John SCOLDED the bastards (see (3a)) which can be assumed to have the prosodic structure in (8). Here, the ‘given’ ([−new]) material after the final [+new] accented lexical item is deaccented (* → Ø) and resembles the postnuclear syllables of a word (see (6)).

The ‘falling’ heads, characterized by ‘downstepping’ accents often create trochaic

2.1.1. PHRASAL VS RHYTHMICAL ACCENT PATTERNING WITHIN HIGHER-LEVEL PROSODIC PHRASES
After the initial accented syllable, it has been observed that different fundamental frequency patterns can occur in the intermediate phrase, corresponding, we feel, to different strategies used by the speaker when assigning accents on the phrasal level. The function of the rising patterns, associated with iambic-type patterning with right-head prominence can be interpreted as functioning to give salience to phrase boundaries (see Fo pattern on the subject The new milliner... in (9)).

The ‘falling’ heads, characterized by ‘downstepping’ accents often create trochaic patterns and can thus be thought of as being rhythmically motivated, since they result in
left-headed (accentual) feet, so characteristic of Germanic languages (see Fo pattern on subject in (10)). This case is accounted for in terms of a prosodic structure where the prominence relation between the first accentual phrase and the following one are reversed in relation to the situation in the rising phrasal pattern, i.e. s/w instead of w/s. The accentual pattern resulting from the rhythm rule is another typical example of this downstepping pattern (see Horne 1990b), where the phrase-initial word, being 'freed' from bearing the nuclear phrase accent on its lexically stressed syllable, can pattern its accented syllables so as to realize a trochaic rhythmic pattern. Both the patterns in (9) and (10) can be realized on both 'given' and 'new' lexical items. One pattern that can only be realized on given material, however, is that in (11) where the accent on milliner is deleted. This only happens when the feature [-new] is present and there is another accent realized earlier in the intermediate phrase (cf. (5)-(6)). This pattern was observed in data from British English speakers.

3. SCALING OF FO PEAKS/REGISTERS ON 'NEW' VS 'GIVEN' INFORMATION
If it is so that 'given' as well as 'new' information is assigned accents in prenuclear and nuclear positions within intermediate phrases, an interesting question that arises is then whether accented 'new' information is more prominent than accented 'given' information. In two previous studies (Horne
1990a, 1991), therefore, we conducted an investigation to ascertain whether British and American speakers use higher tops/wider registers on H* tones which realize the nuclear accents in a given sentence initial subject constituent. Test sentences such as those in (12) were used in the study:

(12) (a) According to the merchants, there is a shortage of shops. A new milliner ([+new]) will be very welcome.
(b) According to rumours, there will soon be a new milliner. The new milliner ([−new]) will be very welcome.

The results for the two American speakers tested showed that they did not differentiate between the categories ‘given’ and ‘new’ as far as peak height and register width are concerned. As for the British speakers, the results were not as uniform, since one of the two speakers studied showed differences in the size of the register on the subject head in the new vs given cases that were large enough to fall into perceptually distinct categories. Moreover, in 30% of the given cases, the British speakers deleted the accent on the subject head, which is directly explainable by recourse to the presence of the feature [−new] as in (11).

3.1. IMPLICATIONS FOR TEXT-TO-SPEECH SYSTEMS
The fact that American English speakers do not distinguish between ‘new’ and ‘given’ information in intermediate phrase prenuclear position means that the same rules that assign accentual prominence to new information can be extended to cover these given cases as well. This implies a simplification in the algorithm that we developed in Horne (1988), where a lower level of stress was assigned to the heads of prefocal (prenuclear) ‘given’ information. On the other hand, the fact that there is no absolute correlation between ‘given’ and ‘deaccented’ leads to a complication in rule systems that aim at modelling natural speech patterns. That is, one cannot write a rule that deaccents all ‘given’ information. More generally, one can say that it is only given information after the last ‘new’ word in an intermediate phrase that gets deaccented. This process, which applies iteratively from left to right within an intermediate phrase, can be formalized as in (13):

\[(13)^* \rightarrow \emptyset / [+new] \ldots]_t\]

Text-to-speech systems, must, further, have rules that assign a prosodic structure to a given input text in terms of accentual/intermediate phrases. In what follows, an attempt to formulate an adequate rule system that will account for the data at hand will be made.

4. INPUT TO PROSODIC COMPONENT
As has been pointed out, accents can be associated with a number of functions: 1) signalling new information, 2) signalling phrase boundaries, 3) creating accentual rhythm. The different rule components in a text-to-speech system should, therefore, attempt to reflect the contributions from the different functional components. In Horne (1988), a model was presented in which degrees of accentual prominence were assigned on the basis of a hierarchy of grammatical functions interacting with the ‘new/given’ parameter, so that the predicate complement was assigned more prominence than the subject and the subject more prominence than the predicate. In that model, however, only ‘new’ information was assigned accents by the algorithm. Now, however, on the basis of the results of the experiments in Horne (1990), Horne (1991), it would appear that it is more economical to extend the rules so as to assign accents to all phrasal heads and then to delete those that are located on ‘given’ information in post-focal or post-nuclear position in a phrase. As input to the prosodic component, therefore, we assume a syntactic representation in terms of functional categories with the [±new] status of lexical items marked. Accented syllables, determined on the basis of lexical phonological rules, are also assumed to be marked. The second sentence in (12b), for example, would have the structure in (14) (accented syllables marked with an asterisk (*)):

\[(14)\]

Degree of stress is determined on the basis of the hierarchy of grammatical functions in Horne (1988). These are marked in the tree by
subscripts on the Subject (W=.75), Predicate (W=.50), and Pred. Comp. (W=1) constituents, where W= mean width of the widest register used by a given speaker within a sentence and 1, 0.75, and 0.50 are fractions of this widest register.

5. GENERATING PROSODIC STRUCTURE
The syntactic structure in (13) is then transformed into a prosodic structure. As discussed in e.g. Nespor & Vogel (1986), syntactic structure is partially relevant in determining prosodic structure. However, as we have seen above, reference to the accentual structure of the words, their [±new] status, and conventions on metrical structure is also important information needed in accounting for the structuring of accentual phrases. In summary, the principles involved in accentual and intermediate phrase formation in English are presented in (15):

(15) Accentual phrase formation: All lexical words, together with preceding nonlexical words within the same syntactic phrasal category constitute an accentual phrase.

Intermediate phrase formation:
Accentual phrases are grouped into intermediate phrases according to the following constraints (following the metrical conventions assumed e.g. in Liberman & Prince (1977):

a) Accentual phrases are grouped together in binary-branching intermediate phrases.
b) An intermediate phrase can have at most one left-edge extrametrical accentual phrase. c) After the final [+new] item in a given intermediate phrase, delete the accents on the remaining accentual phrases. e) Metrical relations within an intermediate phrase:

Phrasal strategy: First accentual phrase is w in relation to second
Rhythmic strategy: First accentual phrase is s in relation to second

Principles such as these will lead to a prosodic structure such as those above in (9-11).

6. CONCLUSION
The accentuation of ‘given’ information has been shown to be explainable by recourse to well-formedness conditions on the structure of prosodic constituents higher than the word. The metrical restrictions on the structure of these constituents, moreover, has been seen to conform to those constraining the metrical structure of words.

7. REFERENCES