

Review

Bengt Altenberg: *Prosodic Patterns in Spoken English. Studies in the Correlation between Prosody and Grammar for Text-to-Speech Conversion.* (Lund Studies in English 76.) Lund: Lund University Press, 1987.

Janet Pierrehumbert, Rm. 2D-452, AT&T Bell Laboratories, 600 Mountain Avenue, Murray Hill, NJ 07974, USA

Prosody is of special interest in the study of linguistics, because it interacts with all the different levels of linguistic structure. It plays an important role in phonology and phonetics, because the speech segments are organized by the prosodic structure. It interacts with syntax, which helps to determine the division of the utterance into prosodic phrases and the placement of prosodic prominence. The lexical semantics, the discourse structure, and the speech style also play important roles in controlling these features, and so the study of prosody gives an important window into these very elusive aspects of language.

Prosodic Patterns in Spoken English, an important contribution in this area, examines the relation of phrasing, prominence, and nuclear contour to syntactic and semantic factors in selections from the London-Lund Corpus of Spoken English. The London-Lund Corpus is a large computerized database of transcribed speech from a variety of sources. Because the transcriptions include notations of the prominence levels, the division into tone units, and the contour type, it is the most important resource now available for empirical studies of how prosody is used. The aim of the work is to develop rules for segmenting speech into prosodic units which are sufficiently well-formulated and sufficiently broad in their coverage to be used in text-to-speech systems. This aim is of great practical importance, since despite much research, the prosody of synthetic speech still strikes most listeners as unnatural. For extended texts in particular, poor prosody makes it difficult for listeners to grasp how the information is organized, and this in turn can lead to difficulties with comprehension or retention. However, it is important not to underestimate the theoretical significance of the work. By developing rules for assigning phrasing and prominence, and evaluating their success statistically, Altenberg succeeds in identifying regularities in the use of prosody which have escaped attention in more anecdotal research. Thus the book will interest not only applied linguists and speech engineers, but also theoreticians working on prosody, parsing, and the interface of syntax and semantics.

Three issues are treated in the book. First, tone unit length and speech rate are surveyed in ten texts, representing various degrees of spontaneity and formality. The length of tone units in terms of words is found to be more stable than the length of tone units in seconds. That is, the speech rate varied considerably in the materials surveyed, but in faster speech there was only a moderate tendency for tone units to contain more words. This section is rather preliminary. It is hoped that future research will relate the prosodic differences observed in different speech styles to an analysis of the syntactic and semantic differences.

The second topic is the division of the text into tone units, in particular the predictability of this division from syntactic factors. The results are based on an

intensive study of a prepared monologue of about 5000 words. Statistics are presented on the occurrence of prosodic breaks at clause boundaries of various types and at various syntactic boundaries within the clause. The phrasing rules developed on the basis of these observations are, I would judge, the best to date. As in Crystal's (1975) approach, the rules operate hierarchically, first establishing which clause boundaries have prosodic breaks, and then examining potential breaking points within the clause. Altenberg discusses the many particulars in which they differ from Crystal's rules.

In reading these chapters, the linguist or psycholinguist will be particularly interested in the list of syntactic boundaries showing an extremely high or low probability of prosodic break. Such cases help to delimit the formal relationship between syntactic and phonological structure. They also suggest experiments on how prosody functions in the mental processing of the syntax of speech.

The third topic treated in the book is the assignment of prosodic features within the tone unit. The chief concern is the location, rather than the type, of the prosodic features. The section includes many revealing observations on the limitations of purely syntactic features in predicting prosody. For example, closed-class words were found to vary widely in their potential for prosodic prominence depending on their meaning and their functional role. This means that a strategy of prosodically reducing all closed-class items is not very successful. Indeed, particular groups of closed-class items are among the most reliably prominent.

The treatment of contextual factors in this section of the book is rather informal. Future research on this topic might benefit from a more rigorously grammatical approach; that is, the contextual factors might be elucidated by attempting to develop a syntax of spoken sentences which would specify well-formed combinations of both words and prosodic features, much as a standard syntax specifies well-formed combinations of words.

Overall, Altenberg has produced an extremely valuable empirical study of prosody in actual use. Many of the results should be immediately applicable in a text-to-speech system incorporating a good parser. Given the numerous observations on the role of extra-syntactic factors in determining prosody, applications to generation of speech from meaning are also suggested. The book should attract a diverse audience because the empirical results bear on many important issues in the study of language.

REFERENCE

- Crystal, D. 1975. *The English Tone of Voice. Essays in Intonation, Prosody and Paralanguage*. London: Edward Arnold.