



PERCEPTUAL SIGNIFICANCE OF FOCUS ACCENT IN SPOKEN SWEDISH

Robert Bannert

Department of Phonetics, University of Umeå, Sweden

ABSTRACT

An investigation was carried out aiming at establishing the certainty with which listeners can hear and identify focus accent in spoken Standard Swedish. A speech sample of two Stockholm speakers, one male and one female, was presented to a group of listeners who had to mark the most stressed word they heard in chunks of speech. In spite of a rather good agreement, the listeners showed a certain degree of variation. The acoustic correlates of the identified most stressed words were analysed.

Keywords: Focus accent, accentuation, perception, macro prosody, spoken Swedish

1. INTRODUCTION

Speech is characterized, among other things, by accentuation, i.e. word accent and focus accent respectively. In particular focus accent has two main functions: it indicates semantically important information, especially the theme/rheme or given/new information contrast (aspect) on sentence and discourse levels and it contributes greatly to the coherence of the (developing) discourse and dialogue. Focus accent seems to represent one of the most significant features of speech to be used in speech recognition.

2. FOCUS ACCENT

2.1 Focus accent in theory

Some time ago it was believed that focus or contrast - the terms are often used synonymously - had syntactic motivation only. It was syntax that decided which word in a sentence should carry focus accent. Thus it was assumed that all content words should be assigned focus accent, especially when this kind of word appeared towards the end of a sentence. Later on we learned that semantics, i.e. the semantic organization of a sentence into new and given information, into theme and rheme, maybe played a more important role in the distribution of focus accent, not only in sentences but in discourse as well.

The relevance of focus accent for communication from a syntactic point of view was studied by the Prague School

under the concepts of theme/rheme structure and topic/comment structure by Danes [1], Firbas [2], and others. The so-called question test is established as a general operational criterion for finding the topic or focus structure of a sentence. Formulating a question, however, is also a means of defining a context for focussing.

Another way of considering focus involves starting from presuppositions that are defined logically. Cullicover and Rochemont [3] distinguish several functions of focusing: (1) contrastive focus (paradigmatic use), (2) informative focus, (3) specifying focus, (4) introducing focus, (5) emphatic focus (expression of emotions and attitudes).

For very good phonetic reasons, this functional division of focus is probably not reflected in the speech signal by manifestations of Fo corresponding exactly to each function. Rather it has to be assumed that there may perhaps be a difference between contrastive and emphatic focus on the one hand (so-called narrow focus) where Fo-range could be larger ("pointed hat", according to the Dutch school of intonation), and the other types of focus on the other hand. In any case, one should ask whether there is a categorical difference between types of focus according to their functions or rather a gradual one. Maybe one should think of them as prototypes showing smooth transitions.

2.2 Focus accent in speech

The tonal aspects of focus accent in central Swedish seem to have been satisfactorily investigated by Bruce [4]. Important and basic contributions for the study of the distribution and prediction of focus accent in discourse in English and central Swedish are being made by Horne [5], Horne and Johansson [6]. They incorporate linguistic and pragmatic information in a comprehensive model that is also capable of generating the appropriate Fo-curve.

It may be maintained that focus accent is only one value on a dimension of prominence from unstressed syllable, secondary stressed (=lengthened) syllable, primary stressed (=word accentuated) syllable, sentence stressed (=focussed) word, emphasized (=extra stressed) word or phrase. The interrelationship of focus accent, accent for contrast, and phrase intonation (boundary tone) in German was explored in Bannert [7].

An attempt was made by Bannert [8] to model automatic recognition of focus accent in German. However, even in this case, the study was limited to sentences only, syntactically simple and complex ones. Of all the information in the speech signal, only the Fo-values were used.

Wells [9] made a very interesting perceptual investigation of focus in spoken British English. However, here too, the linguistic domain used was the sentence. Listeners had no difficulty in assigning focus in the sentences presented. Wells established 16 acoustic parameters to be able to describe the listeners' responses to focus. Five of them were features of pitch, three of loudness, two of pause, and six of duration and tempo. The results showed that not only Fo-maxima made listeners assign focus. The picture, though, is more complex, as different features work together. The feature Crescendo, for example, had a high co-occurrence with focus. Summarising his results, Wells could distinguish four different kinds of perceptually established focus: (1) contrastive (unique) focus, (2) main (primary) focus, (3) subsidiary (secondary and tertiary) focus, (4) zero (no) focus. Comparing cleft with non-cleft sentences, Wells also could demonstrate that syntactic structure is not crucially involved in the interpretation of focus in English.

Focus accent has attracted the interest of many researchers: general linguists dealing with syntax, semantics, and pragmatics, discourse (interaction) analysts, and phoneticians. Their first goal has been to discover rules in order to be able to predict the distribution of focus accent in sentences and discourses. Phoneticians have tried to find algorithms to generate the tonal manifestation of focus accent as part of the Fo-curve of a sentence. Thus one can state that research on focus accent has centred around the role of the speaker in the process of speech communication. Two assumptions are more or less implicit in this approach: (1) Focus accent is a binary feature or a prosodic category that exists on a given word (or phrase) or not, (2) Listeners are able to detect focus accent clearly and unambiguously. Both these assumptions will be questioned here and an approach starting from the bottom-up stream of perception will be presented.

In central Swedish, Bruce [4] found that, in its basic form, focus accent is manifested as a pitch rise following the word accent fall. It seems that the real use of focus accent, i.e. the habits of focussing by speakers in natural speech has not been investigated until now.

3. THE INVESTIGATION

An investigation was carried out that aimed at examining how Swedish listeners are able to hear and detect focus accent in spoken central Swedish. A male and a female speaker were recorded speaking spontaneously for about thirty minutes and reading a text after preparation. Ten listeners and two phoneticians were asked to mark the word or the words that they heard as most prominent/stressed compared to the surrounding word. In most cases the listeners agreed on which word in both types of text was most prominent. However, in about one third of the cases, listeners disagreed considerably.

All words marked by at least half of the listening group as being focussed were analysed acoustically. The following acoustic parameters were studied and measured: (1) fundamental frequency (Fo), (2) segment and word durations, (3) voice quality, (4) intensity (volume), (5) pauses surrounding the stressed word, and (6) spectral features of vowels and consonants (formant frequencies and speech envelopes) contained in the focussed word.

It is quite clear that a tonal rise following the word accent in the focussed word, for both speakers, is a certain indication of focus accent in this variety of Swedish. However, those words not unanimously heard as focussed are of special interest here. Analysing them carefully, it will be possible to approach the different cues or strategies that listeners might use in order to process prominence structuring of spontaneous speech.

It is hoped that it will not only be possible to learn more about the perceptual significance of focus accent in spoken Swedish. As a second goal we would like to deepen our understanding of the acoustic nature and the phonetic definitions of the speech chunks produced by the talker and processed by the listener. In this macro-prosodic structuring of the speech signal, focus accent, it is assumed, plays an important, if not the major role, in speech communication.

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