A PILOT INVESTIGATION OF THE F_0 PATTERN
IN AMERICAN ENGLISH

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Abstract

Fourteen declarative sentences were recorded by one native
speaker of American English. The F_0 pattern (the F_0 move-
ment within the stress group) was investigated, and a model
was proposed. This model was compared to one based on
identical material, but with a British speaker.

1. Introduction

In British English and "East Coast American English" the
stressed syllables have a higher fundamental frequency than the
unstressed ones (Fry, 1958, Lieberman, 1960). Bolinger (1970)
mentions, however, that in other types of American English a
pattern may be found in which the fundamental frequency is lower
in the stressed syllables than in the unstressed ones. The
purpose of the pilot experiment reported below was to examine
instrumentally this opposite F_0 pattern.

2. Procedure

The test material consisted of 14 declarative sentences,
each consisting of a test word (either a natural word or a non-
sense - but possible - word) embedded in a carrier phrase. To
avoid the influence of intrinsic F_0 differences among vowels,
the material was constructed in such a way that each test sen-
tence contained either low or high vowels throughout.

The test material contained the following stress combina-
tions: Stress on the first, second, third, and fourth syllable
in the test word, followed by zero, one, and two unstressed syl-
lables.

The material was recorded ten times by a twenty-two year
old American male speaker, born and raised in California.

Tracings of the F_0 movements were made, and superimposed
on one another. Average F_0 curves were drawn by hand. A quanti-
tative measure for the central tendency of the F_0 level in the
vowels was obtained by measuring the average F_0 curves at a
point two thirds from the vowel start, cf. Rossi (1971).

3. Results

It was found that in the natural words all the stressed syllables had a lower fundamental frequency than the unstressed ones. For the nonsense words the pattern was the opposite. This seemed to be due to the fact that the speaker, who had had no phonetic training, was unable to pronounce the nonsense words without emphasizing them. The change of pattern did not occur at the word boundary but at the stress group[1] boundary - i.e., the F_O pattern did not change before the stressed syllable in the nonsense word, even when the stressed syllable was the last one in that word. This seems to indicate that the F_O pattern is controlled, not by the word but by the stress group.

The results for the natural words can be described by the model shown in figure 1.

The model based on the data from the American speaker can be compared to one based on an identical test material, but with a British speaker, figure 2. It is evident that, apart from the opposite F_O pattern, a definite sentence nucleus (focus) is found only in the British model, which also has a greater F_O variation than the American model.

It must be pointed out that, considering the very restricted material, the present result should be viewed with care. A preliminary examination of data obtained for another American (Wisconsin) speaker, however, seems to be in good agreement with the tendencies outlined in the present paper.

References

Bolinger D.L. 1970. Relative Height. Intonation, 137-153.

Fry D.B. 1958. Experiments in the Perception of Stress. Language and Speech 1, 126-151.

Lieberman P. 1960. Some Acoustic Correlates of Word Stress in American English. JASA 32, 451-454.

Rossi M. 1971. Le seuil glissando ou seuil de perception des variations tonales pour les sons de la parole. Phonetica 23, 1-33.

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1) The stress group is defined as a stressed syllable plus the following unstressed ones.
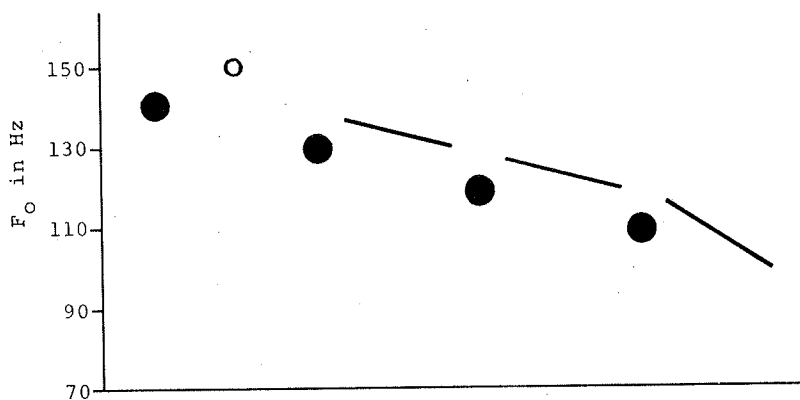
Figure 1. American model based on sentences with natural words. ● indicates stressed syllable, o unstressed syllable, ——— a series of unstressed syllables.
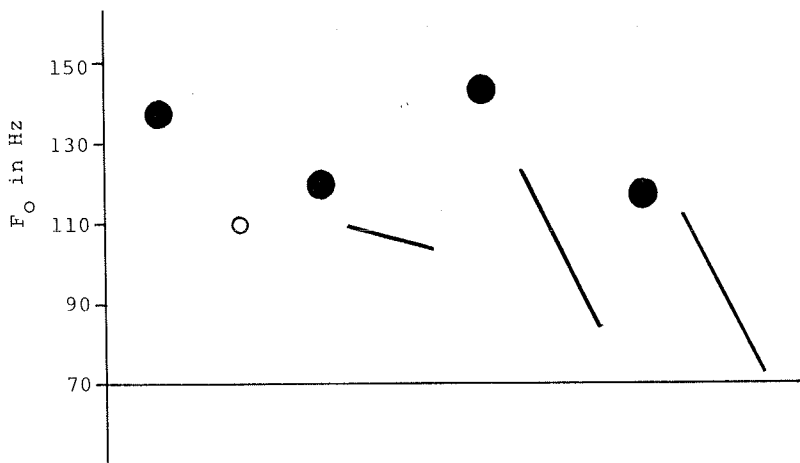

Figure 2. British model based on material identical with that of the American model. See further legend of figure 1.