

## OPTIMAL INTONATION CONTOURS FOR POLISH SPEECH SYNTHESIS

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This paper is focused on the selection of interrogative and declarative synthetic intonation contours which in the opinion of listeners provide the most naturally sounding statements and yes-no questions. In contrast to the previous studies (1, 2) that were utilized as a basis for the present investigation, the synthetic stimuli varied not only in the fundamental frequency but were generated by means of a set of rules which permitted a simultaneous control of pitch, intensity and duration.

#### Procedure

Synthetic stimuli were generated by rule on a computer simulated formant series synthesizer. The experimental material consisted of two phrases: CVCV ("jola") and VCVCV ("uleje"), on which different intonation contours were superposed. The fundamental frequency ( $F_0$ ) pattern was obtained from the glottal excitation amplitude ( $A_0$ ) pattern by means of the following rule:

$$F_0 = FO \frac{A_0 + a}{1 + a}$$

where FO is the  $F_0$  target value (Hz), and a is a numerical coefficient. A phrase intonation contour,  $F_{0c}$ , was obtained by multiplying  $F_0$  by the intonation function  $F_k$ , approximated by a linear function. The stimuli were tape-recorded, randomized and presented to a group of listeners who evaluated the stimuli for naturalness.

#### Conclusions

The results of the experiments permitted to establish the simple rules generating the intonation contours for interrogative and declarative short phrases of Polish synthetic speech. An important conclusion resulting from the experiments is that the realization of interrogative and declarative intonation takes place in a relatively short final segment of a phrase and because of that it is not necessary to calculate the intonation function for the total duration of a phrase.

#### References

1. Majewski, W. and R. Blasdel (1969): "Influence of fundamental frequency...", JASA 45, 450-457.
2. Studdert-Kennedy, M. and K. Hadding (1973): "Auditory and linguistic processes...", L&S 16, 293-313.