Studies of the voice source

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journal: STL-QPSR
volume: 2
number: 4
year: 1961
pages: 009-009

http://www.speech.kth.se/qpsr
II. SPEECH PRODUCTION

A. STUDIES OF THE VOICE SOURCE

A pilot study was performed in order to investigate the time variations in voice source spectra. The material consisted of /'afa/ and /'aga/ pronounced by the same Swedish speaker at normal voice effort.

To determine the spectral shape of the voice source a spectrum-matching technique was employed, i.e., with the aid of a graphical method it was possible to calculate the voice source spectrum on basis of the difference between the spectral envelope of a natural sound and that of a synthetic sound with the same formant frequencies, standard higher-pole correction, and standard source function (-12 dB/oct). The spectra were analyzed by means of a 62 c/s wide analyzing filter and an integration time of 10 msec (cf. STL-QPSR 2/1960, p. 8) providing harmonic spectra.

Fig. II-1 shows spectrograms and intensity curves of the two test words. The time locations of the samples (effective center of integration) are indicated.

The calculated source spectra, see Fig. II-2 and Fig. II-3, exhibit an average slope of -12 dB/oct. During the first /a/ the slope is somewhat steeper than in the second /a/. At the end of the word the largest deviations occur. At about 800 c/s there appears a zero which is typical of this and several other speakers. Another zero is sometimes found at 2000-2500 c/s especially in the final syllables.

The observed variations of source spectra in these examples are not very great. There is some indication of a relative level loss at higher frequencies at the end of a word.

This study will continue with variations in stress and other factors affecting the voice source.

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Fig. II-1. Oscillograms, intensity displays, and spectrograms of the nonsense words /"afa/ and /"aça/. The time locations of spectral sections taken are indicated by arrows.
Fig. E-1. Voice source spectra for /əfa/ corresponding to the sampling points indicated in Fig. E-1.
Fig. II-3. Voice source spectra for /aça/ corresponding to the sampling points indicated in Fig. II-1.