

## LARYNGEAL GESTURES FOR VOICELESS SOUNDS DURING SPEECH

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This paper reports some detailed observation of glottal opening and closing gestures for Japanese voiceless consonants and voiceless sound sequences during speech. Fiberscopic view of the larynx was analyzed in correspondence with simultaneously recorded EMG patterns of the laryngeal muscles.

Experimental Procedures

Twelve meaningful Japanese words containing voiceless sounds and sound sequences were pronounced, with a frame sentence, by 2 adult male speakers of the Tokyo dialect. The laryngeal view was filmed using a fiberscope with simultaneous recording of speech and EMG of the laryngeal adductor (INT) and abductor (PCA) muscles. The glottal aperture was measured, frame by frame, on the laryngeal films. A smoothed integrated EMG curve was made for each of the two muscles for each utterance sample.

Results and Comments

The results revealed that the glottal opening varied with different voiceless sounds and sound sequences both in grade and temporal pattern. The results also revealed, at least qualitatively, that the opening and closing of the glottis during speech were controlled by a reciprocal pattern of PCA and INT activity. It should be noted, however, that there was a subject to subject difference in the mode of the laryngeal control using the two muscles. In one subject, the glottal aperture was mainly represented by PCA activity. The time curve of the glottal width in this case could be interpreted as a kind of mechanically smoothed pattern of PCA activity. In the other subject, however, the activity of the INT appeared to actively contribute, in combination with the PCA, to the control of the glottal condition.

(Work supported by Grant-in-Aid for Scientific Research, Ministry of Education No. 349008, No. 239005)