COMPUTER MODELLING OF ARTICULATOR DYNAMICS

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A computer program which models a simple form of the final stages of speech production has been developed. Results obtained with only two articulators, the vocal folds and a single supra-glottal constriction, have shown complex acoustic structures arising from simple articulatory oppositions (Scully, 1975). The model is being extended to generate actual acoustic outputs and to allow interactions between articulators. The response of the vocal tract acoustic tube is being derived by the methods of Husband et al. (1977). The waveform is output in real time via a microprocessor. Each articulator has its own characteristic transition time, constant for large or small distances.

Articulatory gestures are defined by changes in cross-section area of a number of constrictions of the vocal tract. At each 5 msec time sample, the points defining the tongue body, jaw and lips are linked to give a total area function. After a sequence of tongue body shapes has been thus defined, modifications are superimposed; for example, a movement of the tongue tip towards and then away from the palate. Contact appropriate to a plosive will be achieved only if the tongue body position is suitable. Symmetrical or asymmetrical closures and releases may be generated. From individual simple transition functions quite complex total tongue shapes and movements are obtained. The graphs are in agreement with results reported in the literature and with some dynamic palatography data. Diphthong-like sounds have been created from tongue body transitions.

References

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