

On the Role of Formant Transitions in Vowel Recognition*

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An inventory of speech-like sounds was synthesized which displayed a systematic variation of the rate and direction of formant transitions. These sounds were specified by a set of vowel formant patterns that were selected along a continuum varying from [U] to [I] and assigned to isolated, steady-state vowels *V* and to the points of zero rate of formant frequency change in symmetrical CVC syllables. The time variations of formant frequencies were made convex and concave by the choice of two consonantal frames: [w-w] and [j-j]. The results obtained in a series of vowel identification experiments indicated that a listener's categorization of the continuum varied as a function of the environment and the duration of the vowel. In general, subjects adjusted their categorizations so as to compensate for the undershoot effects normally associated with vowel reduction (B. Lindblom, Spectrographic Study of Vowel Reduction, *J. Acoust. Soc. Amer.* 35, 1773 (1963)). In particular, the excursions of formants in the [w-w] syllables tended to be overestimated. These findings suggest that, in the recognition of monosyllabic

nonsense speech, the identity of a vowel is determined not solely by the formant frequency pattern at the point of closest approach to target but also by the direction and rate of adjacent formant transitions. The effects observed are discussed in terms of an active model of vowel recognition.

Footnotes

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