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Dynamic Aspects of Vowel Articulation**

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In an earlier study a compact description of formant frequency data was obtained for a set of Swedish vowels pronounced by a male talker under varying timing conditions in symmetrical consonantal contexts. The extent to which formant frequencies in the vowels reach their target values as a function of vowel segment duration was found to be determined by the consonantal environment and was described by an exponential function. The target of a vowel was specified by the asymptotic values of the first two formant frequencies and was independent of consonantal context and duration and thus an invariant attribute of the vowel. These results suggested the interpretation that an increase in the rate of utterance does not primarily involve an increase in the rate of articulation but rather in the degree of coarticulation.

This hypothesis has been put to further tests which are described in the present paper. Thus a cineradiographic study was made of a Swedish talker producing vowels embedded in a C–C context at various rates. The results of a series of measurements taken from individual profile tracings afford further evidence in favor of the interpretation suggested. It can be shown that as the time scale of an utterance is compressed there does not seem to be

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** The present research was supported in part by the Wenner-Gren Foundation for Anthropological Research, Research Institute of the National Swedish Defence, Swedish Technical Research Council, Telefonaktiebolaget LM Ericsson, Swedish Foundation for Scientific Research and Industrial Development, U. S. Air Force under Grant AF EOAR 63–55, U.S. Army under Contract DA–91–591–EUC–3080, National Institutes of Health under Research Grant NB–04003–01.

any marked increase in the speed at which articulatory components move and instead undershoot relative to the target positions for the vowel in question can be observed in the direction of the consonantal environment; the higher the rate of utterance the larger the amount of undershoot.

For the type of material considered so far it seems reasonable to conclude that the realization of a vowel phoneme is associated with a fixed articulatory target. The allophonic variation observed at the articulatory as well as acoustic levels appears to a large extent to be coarticulation effects attributable to the temporal overlap between neural events corresponding to consecutive phonemes and to the dynamic properties of the articulatory structures.

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