# TEMPORAL CHARACTERISTICS OF COARTICULATION BETWEEN CONSONANTS AND ADJACENT VOWELS - X-RAY MICROBEAM STUDY ON JAPANESE AND ENGLISH -

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Temporal patterns of coarticulation between consonants and adjacent vowels may vary depending on the phonetic types of the segments. Different languages may also exhibit different temporal characteristics. The present study is an attempt to investigate these problems by observing articulatory movements using the x-ray microbeam method (Kiritani et al, 1975) both on Japanese and American English.

## Method

Speech materials studied were $mV_1CV_2ae$ (C=m,t,k,s V=i,e,a,o,u) in Japanese, and pVp (V=ten English vowels) and selected CVC words in English. Three or four lead pellets were attached to the tongue and a single pellet was attached to the lower incisor and to the lower lip. Movements of the pellets were tracked by the x-ray microbeam at a rate of 130 frames per second. Pellet positions at selected moments of the consonantal events were sampled and the variations over different vowel contexts were analyzed.

## Results and Comments

It was observed that, in Japanese, perturbations of the consonant articulations by the post-consonantal vowels were generally greater than that by the pre-consonantal vowels. The degree of the temporal overlap of the consonant and vowel articulations appears to vary depending on the type of the vowel. Tongue movement for the vowel /i/ showed a greater overlap with consonant articulations than other vowels.

In English, perturbation of the consonants by the pre-consonantal vowels were greater than that by the post-consonantal vowels. The asymmetry between the carryover effect and the anticipatory effect was larger for the so-called tense vowels than for lax vowels.

Effects of prosodic factors such as the stress pattern in English are also being analyzed.

## Reference

Kiritani, S., K. Itoh and O.Fujimura (1975): "Tongue-pellet tracking by a computer-controlled x-ray microbeam system". JASA 57, 1516-1520.