MOUTH SHAPE IN THE PRODUCTION OF [w] AND [ɸ] SOUNDS IN JAPANESE

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The mouth of a speaker was illuminated by a stroboscopic
light source every 10 milliseconds, and pictures of both frontal
and lateral views of the mouth were taken utilizing a special
camera in which a long film was driven continuously. Changes in
the dimensions of various parts of the mouth were measured.

The up-and-down movements of the centers of the upper and
lower lips, and the lateral movements of the corners of the lips,
were also recorded by attaching small metal pellets to the lips
at these points and by illuminating them with the stroboscopic
lamp every 5 milliseconds. The frontal projections of the traces
of these points were displayed three-dimensionally by adding the
time axis. (This graph is called a "labiogram".)

The material used here comprised the traditional 100 Japanese
monosyllables and some additional syllables occurring in loan
words in modern Japanese. Some of the latter words consisted of
two, three or four syllables. The words were spoken by a female
adult.

On the basis of the stroboscopic observations and a spectro-
graphic analysis of the speech sounds, characteristics of the mouth
shape for each of the syllables and coarticulation effects were
analyzed.

Among the results, this paper will focus on the characteris-
tics of the sound [w] and the unvoiced bilabial fricative [ɸ],
which are pronounced frequently in loan words, as well as in the
traditional Japanese syllables /'wa/ and /hu/. (/'/ is the voiced
counterpart of /h/.)

The use of visual information on the mouth shape for these
sounds to improve lipreading of modern Japanese, will also be
discussed.