

DEVOICED SYLLABLES IN JAPANESE

- A Preliminary Study by Photoelectric Glottography -

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It is well known that high vowels between voiceless consonants are usually devoiced in many dialects of Japanese including the Tokyo dialect. The experimental techniques using the special flexible fiber optics system, as reported elsewhere,^{1, 2, 3)} have enabled the cinematographic recording of the laryngeal maneuver characteristic of this phonetically interesting phenomenon. This preliminary report presents some supplementary data on this subject obtained by photoelectric glottography.

Fig. 1 shows glottograms of the pronunciation by Subject F of selected Japanese words in the carrier sentence "Sore o _____ to yuu (That we call _____)." Each picture shows a microphone signal for the upper trace and a glottogram, approximately representing glottal area, for the lower trace. The words contain the same vowels in the same order, and are pronounced with the same accent pattern. In the uppermost row, the word in the left column has no consonant. The one in the middle column has /k/ in the first syllable and the word in the right column has /s/. In each item of the second row, a voiceless stop /t/ begins the second syllable, which is otherwise identical with the item of the upper row. In the third and the lowermost rows, /s/ and /h/ respectively occur in the place of /t/. In pronouncing these words, a cessation of voicing takes place for the interconsonantal vowel /i/, and the /CiC/ is pronounced as a sequence of voiceless sounds.*

From an examination of the glottograms, it is clear that the process of opening the glottis for the voiceless consonant of the first syllable is similar regardless of whether the following vowel is devoiced or not. Where the following vowel is devoiced the glottis remains wide open and seems to move immediately to a state appropriate to the following consonant.

* Consonants followed by devoiced /i/ are palatalized in the same way as those followed by voiced /i/.

The boundary between the two consonants can not be recognized in the glottogram except for the case of a fricative followed by another fricative. In this case, the glottogram seems to show a boundary between the two consonants, in the form of a slight depression in the curve, as shown by the traces in the two lower pictures of the right column.

The process of closing the glottis for the transition from consonant to vowel in the second syllable is also similar regardless of whether the preceding vowel is devoiced or not. In the case of /h/, when it is in intervocalic position, vocal fold vibration is observed throughout the duration of the /h/, while, when it follows a devoiced vowel, the vibration appears only for the closing movement of the glottis.

Fig. 2 shows glottograms of the same words as pronounced by another subject S. Here also we see the same pattern of the laryngeal maneuver for the devoiced vowel between voiceless consonants. For this speaker, the transition of the glottal opening from one consonant to the other is so smooth that no boundary is discernible even where both consonants are fricatives.

Fig. 3 shows glottograms of Subject F for another set of words. In this set, geminate consonants /Qt/ and /Qs/ are compared with /t/ and /s/. The interconsonantal /i/'s in these words are devoiced. Here also we see a wide opening of the glottis for the voiceless /i/. Glottograms for the words containing geminate consonants following voiceless /i/ show a glottal maneuver which may be interpreted as a sequence of the maneuvers inherent to each consonant.

Glottograms of the other subject S for the same set of words are shown in Fig. 4. In the case of this speaker, glottograms show that there is a tendency to smooth and simplify the laryngeal maneuver for /CVC/ with devoiced vowel, even when the second consonant is a geminate.

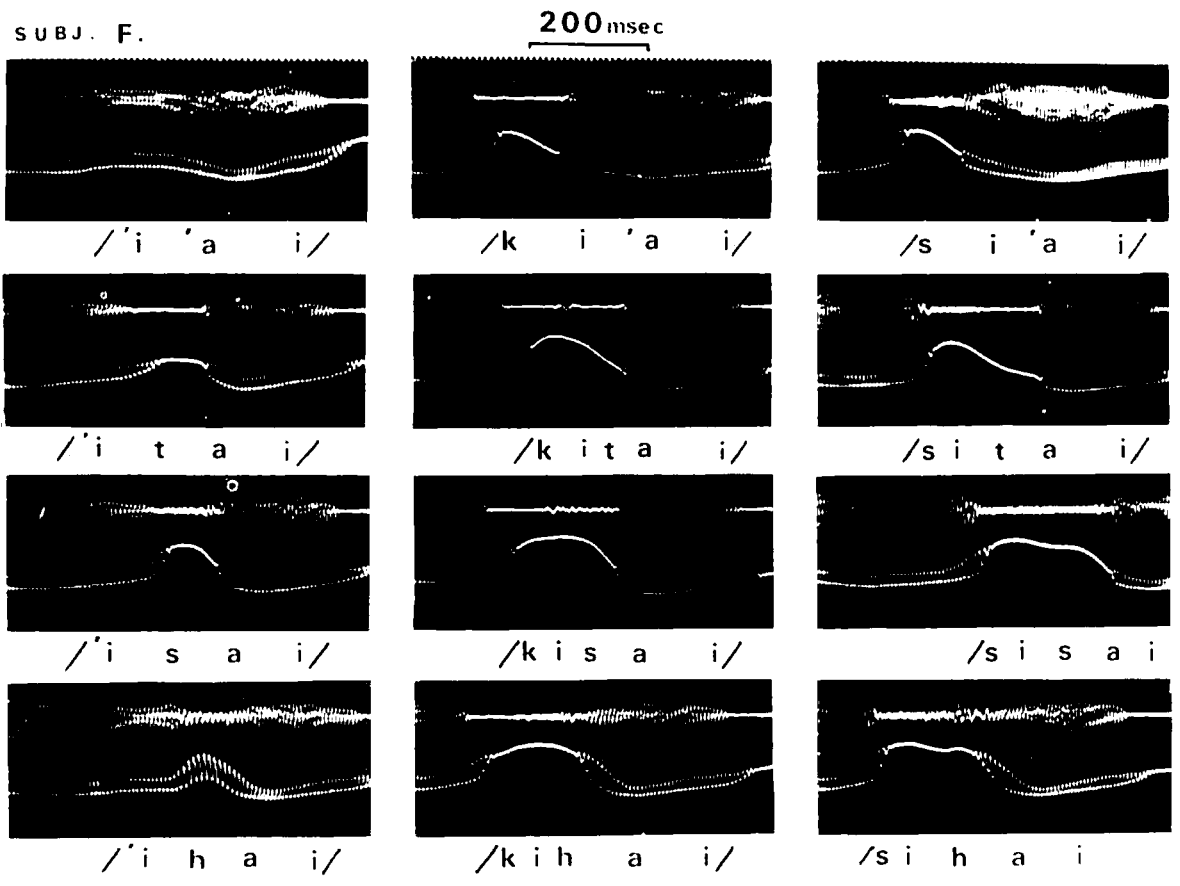


Fig. 1

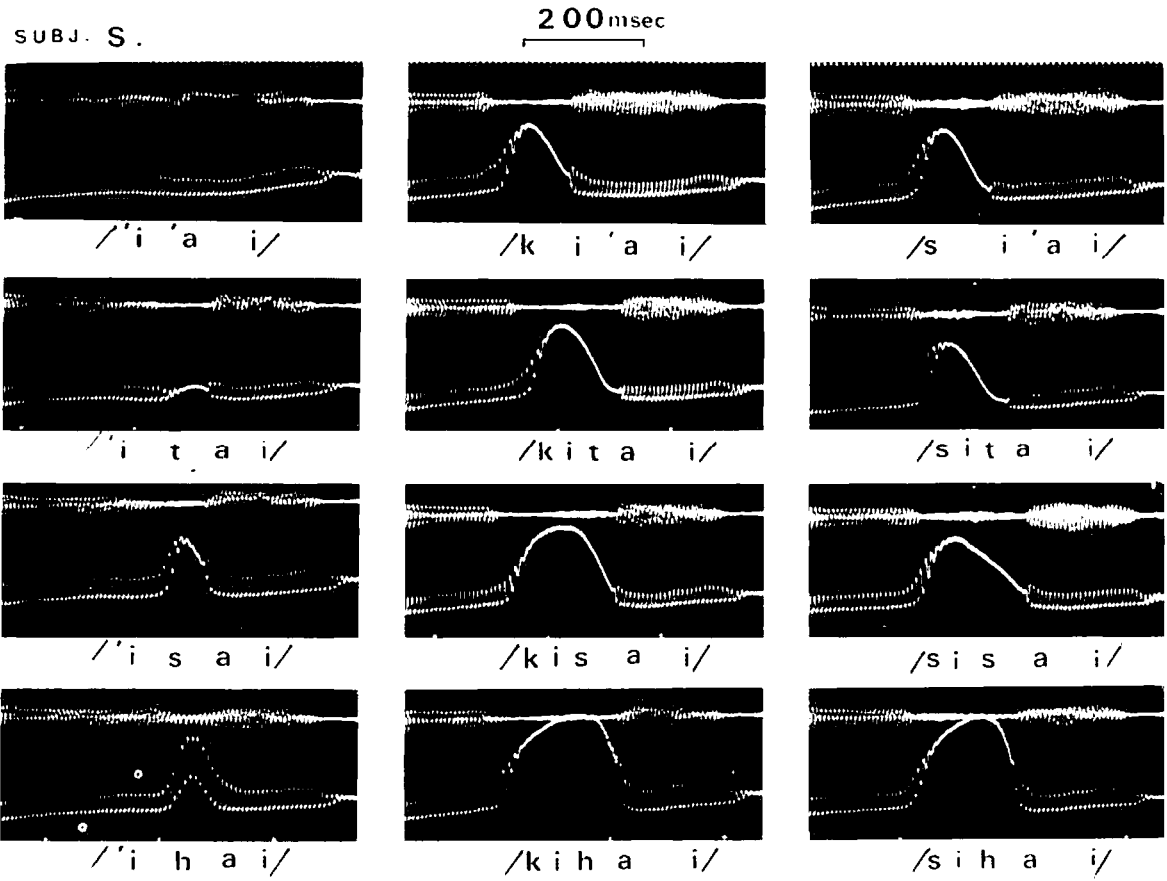


Fig. 2

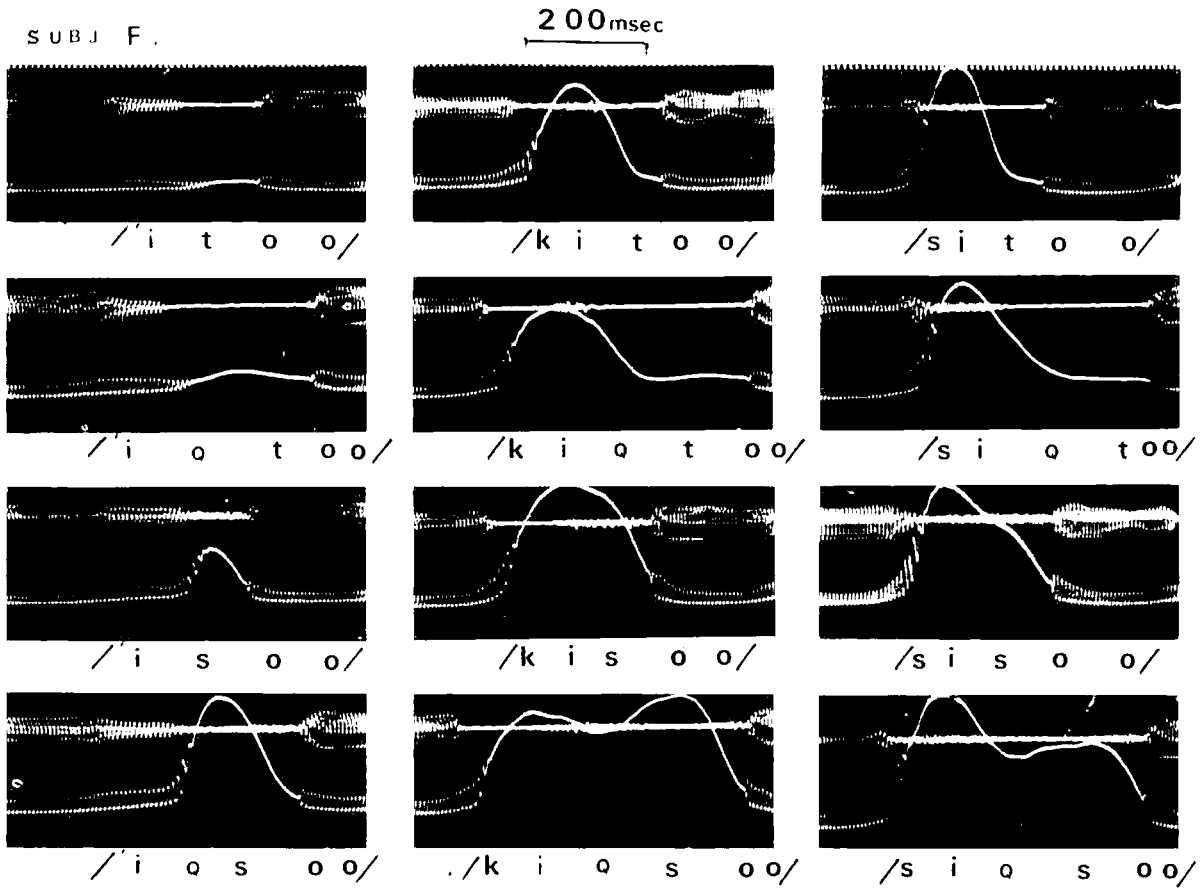


Fig. 3

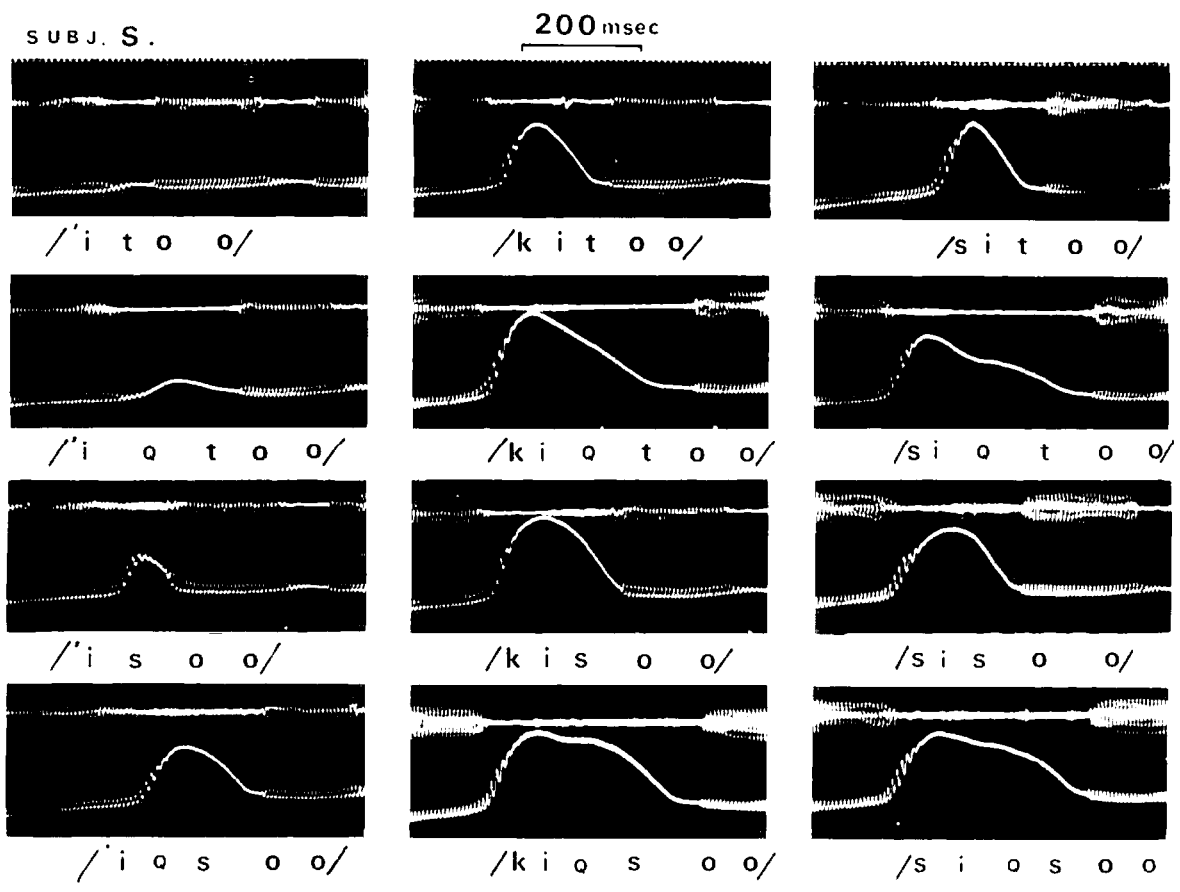


Fig. 4

References

- 1) Sawashima, M. and H. Hirose: "New Laryngoscopic Technique by Use of Fiber Optics." J. Acoust. Soc. Amer. 43, 168-169 (1968)
- 2) Sawashima, M. : "Movements of the Larynx in Articulation of Japanese Consonants," Annual Bulletin (Research Institute of Logopedics and Phoniatics, Univ. of Tokyo) No. 2, 11-20
- 3) Sawashima, M. : "Observation of the Glottal Movements," Preprints: Speech Symposium, Kyoto, C-2-1--C-2-7 (1968).