An Electro-palatographic Study of Palatalization in the Japanese Alveolar Nasal

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Abstract:

It is widely known that the Japanese alveolar nasal [n] is affected by adjacent vowels in most positions, that is, the variants of the alveolar [n] occur conditionally. The Japanese [n] is palatalized under the influence of vowel [i] or palatal [j]. In the articulation of [ni], for instance, the tip and sides of the tongue make wide contact with the palate. It is interesting to know how palatalization occurs and varies during the production in different contexts. In my presentation, the actual realization of the palatalized alveolar nasal in different contexts is examined and clarified by considering the Electro-palatographic data and examining the articulatory feeling and auditory impression. As a result, palatalized [ɲ] occurs either word-initially or inter-vocalically. [ɲ] in [ɲi] and [iɲi] has great palatality. When conditioned by [j], the [ɲ] in [ɲja], [ɲjo] and [ɲju] has full palatality. In each sound the average number of contacted electrodes of the Electro-palatograph at maximum tongue-palate contact is 63 or 100% of the total. To summarize the experimental data, articulatory feeling and auditory impression, it can be concluded that the [n] followed by or hemmed in [i], [j] is a palataliz ed nasal [ɲ].

Contents

1. Attitude

Regarding to the attitude of the study, speech sounds are clarified by (1) sense impression of auditory impression and articulatory feeling, and (2) physical evidence of palatographic analysis.

2. Survey

In regard to the Japanese nasals, there are five nasals: namely, [m], [n], [ɲ], [ŋ] and [ɴ], of which all occur in word-initial positions except [ŋ] and [ɴ]. Among these, inter-vocalically, [m], [n], [ɲ] and [ŋ] occur. In syllable-final positions, [ɴ] commonly occur.

The description of the articulatory manner of the Japanese [ɲ] has been suggested by Kanehiro (1932:202-206), Onishi (1936:144-149), Sakuma (1963:162-170) and Umeda (1980).

The uvular [ɴ] is similar to nasalized vowels (Hattori, 1970:123-124), but in the case of the nasalized vowel, the "vowelness" is the dominant feature of the sound, whereas the "nasality" is the secondary feature. In the case of the uvular [ɴ], the "nasality" is the dominant feature of the sound, and the "vowelness" is the secondary feature (Tsuzuki,1992). In case of [ɲ], [ɲ] has full "nasality" .

3. Purpose

The specific purpose of this paper is to examine and clarify the actual realization of Japanese [ɲ] in different contexts by considering the experimental data and examining the articulatory feeling and auditory impression. The specific questions which are addressed here are various articulatory movements of [ɲ] influenced by adjacent vowel qualities and the manner of palatalization which occurs and varies during the production in different positions.

4. Material

The following are the experimental materials which were used for this paper: (1) "に" [ni], (2) "いに" [ini], (3) "にゃ" [ɲja], (4) "にょ" [ɲjo], (5) "にゅ" [ɲju].

5. Methodology

As recent studies in phonetics or contrastive phonetics have been increasingly concerned with observing the physical attributes of speech sounds, special importance has been attached to the field of acoustic phonetics. Some of these studies were carried out using experimental apparatus such as oscilloscope, X-ray cinematograph, laryngoscope, electro-myograph, sound spectrograph,electro-palatograph and flow-nasalitygraph. The Rion's electro-palatograph is used in this paper. One well known investigation by electro-palatograph was done by Lee,H. (1980: 1-47) in which he studied Korean consonants such as plosive, affricate,

lateral and nasal. Retroflexion and palatalization in Korean sounds were reported in his paper. His was the first article published in Korea in which electro-palatographic data was featured. In that paper he showed nearly 90 intricate palatograms and clarified the actual realization of those consonants. His observations and data indicate, for example, that the degree of palatalization of [ɲ]in *nyon* "뇬" is greater than that of [ʎ] in *sallya* "살랴" (Lee,H.,1980:37).

6. Observation

In the case of [n] in [ni], the tip and sides of the tongue make wide contact with the palate. The [n] in [ni] has great palatality and is a palatalized nasal [ɲ]. The maximum tongue-palate contact in [ni] has 61 contacted electrodes or 96.825% of the total. Complete closure continues for a succession of 16 frames with a duration of 0.250 seconds. The average number of contacted electrodes of the three stages (at the first, the maximum and final complete closure) is 52 or 82.539% of the total. Palatalization occurs greatly in [ni].

In the case of [n] in [ini], the tip and sides of the tongue make wide contact with the palate. The [n] in [ini] has great palatality and is a palatalized nasal [ɲ]. The maximum tongue-palate contact in [ini] has 57 contacted electrodes or 90.476% of the total. Complete closure continues for a succession of 9 frames with a duration of 0.140 seconds. The average number of contacted electrodes of the three stages is 48 or 76.190% of the total. Palatalization occurs greatly in [n] conditioned by the adjacent vowel [i] which hems [n] in the combination of [ini].

In the production of [nja], [njo] and [nju], the front of the tongue is fully raised towards the hard palate, because of the influence of the following palatal [j]. At maximum tongue-palate contact, all parts of the palate are completely contacted. The [n] in [nja], [njo] and [nju] has full palatality. The succession of frames of complete tongue-palate closure is longer in [nju] than in [nja] or [njo]. The average of maximum tongue-palate contact of these three sounds is 63 contacted electrodes or 100% of the total. The average number of frames of maximum tongue-palate contact is 22 frames or 0.343 seconds. The three stages (the first, maximum and final complete closure) are seen.

7. Conclusion

Considering the experimental data (by Tsuzuki & others) and examining articulatory feeling and auditory impression, a palatalized nasal is clarified.

Word-initially the Japanese [n] in [ni] has great palatality. Intervocalically the [n] in [ini] has great palatality. The Japanese [ɲ] in [nja], [njo] and [nju] has full palatality.

In regard to palatalization, considering the experimental data, the

articulatory feeling and auditory impression, it can be said that palatalized [r] occurs either word-initially or inter-vocalically. The results which were obtained in this experiment generally agree with the accounts of Kanehiro (1932:202-206), Onishi (1936:144-149), Sakuma (1963: 162-170) and Tsuzuki (1979, 1987, 1987).

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