

Speech Tempo and Speaker Age as a Factor of the Realisation Type of the Mora Nasal in Osaka Japanese

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1. Introduction

The description of the pronunciation of the mora nasal varies considerably in the literature. Such variation can be found not only between different researchers but also in dependence on the phonetic context, in which the mora nasal can be found. In some studies the mora nasal is described as having an underlying phonetic place and modus of pronunciation, which is close to a velar nasal and which gets modified according to phonetic context and speaking style, but often leaves a trace of the original pronunciation. Others assume more context dependent realisations, not giving any information about some original pronunciation.

In the following, a more detailed outline on the various descriptions of the pronunciation of the mora nasal in specific context will be given to illustrate the motivation of the present investigation, which is to show the existence of a consonantal realisation of the mora nasal in intervocalic context in Osaka Japanese.

1.1 At the End of a Word or Utterance

In the case of its utterance final occurrence, some agreement exists, that the mora nasal should be produced with an unreleased oral closure. The description of the place of articulation varies from a velar nasal (Sakuma 1929) to a uvular nasal (Hattori 1930). Nakano (1969) presents us with two kinds of velar nasals in the phonetic description of the mora nasal, according to the immediate context. He gives an account for the occurrence of a velar nasal in case of a word final or intervocalic mora nasal, which is related in articulation to the utterance used to support the interlocutor to continue the performance. He shows an X-ray picture to demonstrate the articulatory settling of this nasal, which is a simultaneous closure at the rear part of the velum and the uvulum. Nakano expresses the possibility for this nasal to be produced simultaneously with lip-closure in that specific dialogue situation, which does not change the auditory impression due to the extensive closure at velum and uvulum.

Hattori (1930) and Arisaka (1940) describe the uvular closure as being weak, or lax. Contrasting results were shown in the following investigations: Aoki (1976) showed that oral airflow could be found during the production of the mora

nasal when kymograph recordings were made, whereas Sakuma (1929;1963) did not find any oral airflow with a much less elaborated experimental method. Bloch's description (1950) of the phonetic realisation of the mora nasal at the end of an utterance diverges from the descriptions above in that he claims the existence of a "voiced frictionless nasal ... spirant", which probably results - as Vance (1986) remarks quite convincingly - in an approximant articulation, in agreement with Catford (1977).

1.2 Preceding a Consonant

Before obstruents and sonorants, the mora nasal is expected to be assimilated in place of articulation to that of that consonant. (Vance 1986, Nakano 1969). Here, Nakano (1969) introduces a second velar nasal, which is represented by the IPA-symbol [ŋ] and occurs before a velar stop, due to assimilation.

Kawakami (1977) claims three types of mora nasal in such a position, depending on the speaking style and speech tempo. In the case of careful pronunciation, the greater part of the mora nasal is realised as a nasal consonant having the same place of articulation as the supportive particle in conversation, which has been mentioned above. However, towards the end of the mora nasal, the articulation changes due to the place of articulation of the following consonant. Regressive assimilation takes place, but affects only a small portion of the mora nasal. In more casual speech this assimilation is much stronger meaning, that the portion of the original pronunciation of the mora nasal, which is the same as in the supportive particle, occurs only within a short time span of the whole nasal. In fast speech, the assimilation affects the whole time span of the mora nasal, and therefore the place of articulation for the whole nasal is homorganic with the following consonant.

Where there is a following fricative, the mora nasal tends to be a nasalised vowel, which corresponds in the quality to the place of articulation of the following fricative in the front-back dimension and is therefore a front or back vowel. (Hattori 1930).

1.3 Preceding a Vowel or a Glide

Vowels and glides are also described as being preceded by the mora nasal, realised as a nasal vowel (Vance 1986, Arisaka 1940). These two authors agree in that there can never be a complete oral closure, which would result in a nasal consonant. Arisaka (1940) points out, that in case of a complete oral closure, a release would have to follow, to pronounce the following vowel. Such release would give a different auditory impression than it does in the way it is produced correctly. Nakano (1969) admits the occurrence of an oral closure of the type supportive type in dialogue in the case of careful pronunciation. However, in the

course towards a more colloquial speech style, the mora nasal is assimilated to its adjacent vowels and transforms into a vowel itself, spreading nasality onto the adjacent vowels at the same time.

1.4 Purpose of the Present Investigation

These descriptions of the realisation of the mora nasal represent the Tokyo and Standard variety of Japanese.

Having been exposed to Osaka Japanese for some time, the author felt the need to complement the illustrations above with the observation that complete oral closure in the realisation of the mora nasal can be found in the variety of Osaka Japanese in the case of intervocalic occurrence. One has to bear in mind that the phonological status of the mora nasal in Osaka Japanese differs from Tokyo Japanese, e.g. that it can bear accent. However, the consonantal version of the mora nasal, i.e. being articulated with complete oral closure, is not the only way of pronunciation, as a nasal vowel realisation can be found as well. The usage of either version varies according to the speaker being a member of a certain age group or generation. In addition, speech tempo is investigated as a factor on the choice of the variant of the mora nasal. As Kawakami (1977) observes from fast speech that the underlying quality of the mora nasal gets reduced and even deleted in consonantal context, this study will enquire such deletion in vocalic context. This study presents the results of a detailed acoustic analysis of the mora nasal in intervocalic position in Osaka Japanese with reference to variation in speaking rate and speakers' age group.

2. Investigation

2.1 Material, Subjects and Recording

The material for this investigation consists of read speech. It contains a list of 65 sentences of the type: "*A* yori wa, *B* to iu hoo ga ii"¹, where *A* is a compound word, enclosing a mora nasal (N) at a morpheme boundary in intervocalic position (VNV). The rest of the phrase was designed not to contain any kind of phonological nasal, including the meaningful word *B*, which stands in semantic relation with *A*. The text was presented in Japanese characters, where the words *A* and *B* were often presented in Kanji plus Furigana. However, for some more familiar cases, Kanji only was presented. Due to the requirement that the target word *A* should contain a mora nasal in intervocalic context, and all 5x5 possible contexts should be presented, it was not easy to find well-known words, that could be understood by all the subjects when presented in Kanji only. However, it was not possible to find suitable words in all 25 vowel contexts. There is a distinct

¹This means "in comparison to *A*, *B* is better".

lack of target words containing the combinations /uNu/, /oNu/, /iNo/ in the material. Some examples of the list of sentences including the target words in Japanese style presented to the subjects are given in the Appendix. The subjects were asked to read the sentences fluently, avoiding any kind of pausing.

The group of subjects consists of eight native speakers of the Kansai variety of Japanese. They have all lived in the city of Osaka all their lives and their parents are natives of the city or the Kansai area as well. Four of the subjects belong to a younger generation, aged between 15 and 20 years (genA), the other four subjects belong to an age group between 40 and 45 years of age (genB). For each generation, two of the subjects are female and two of them are male. They have completed high-school or - for the younger subjects - are high-school students. The two male subjects of the older generation have completed undergraduate studies at college. The two female subjects of the younger generation have very good comprehension of English.

The recordings were made mostly in the subjects' homes. A portable two-channel DAT-recorder was used for that purpose. In addition to the oral signal, a nasal signal was recorded with the help of an accelerator microphone attached to the nose as described in Tronnier (1995).

2.2 Analysis

The recorded data were analysed in the ESPS/Waves+ environment. With the help of spectrograms, the waveform and the possibility of auditory output of fractions of the speech signal, traditional labelling was undertaken. The information in the nasal signal obtained with the accelerometer was merely used for support and orientation to detect the beginning and the end of the velar opening in the vowels adjacent to the mora nasal.

In the case of age group behaviour, the number of consonantal realisations of the mora nasal out of the whole number of correct realisations per subject was calculated in percentage (%). The definition of "correct realisations" refers to realisations, where the target word was read in the expected way or without misreading. In some cases, kanji-compounds in Japanese can be read in two different ways. However, only the realisation matching the intended pronunciation including a mora nasal was added to the list of "correct realisations". The data was grouped for the different age groups (genA for the younger generation and genB for the older generation) and an unpaired t-test, assuming equal variance was applied to compare the two groups statistically.

In addition, the length of the portion "yori wa" of the carrier sentence was measured to estimate the speech tempo. This procedure was chosen prior to measuring the length of the VNV-sequence to avoid the problem of a preceding vowel representing a whole mora in contrast to just one part of a mora (*eNo* vs. *seNoo*), or a following vowel-occurrence counting as one mora in one case and

two morae in other cases, where either the quality is the same (*eNo* vs. *seNoo*), or where due to diphthongization two vowels are difficult to separate (*jiNai*). Only non-interrupted realisations up to the end of the particle "wa" were included in the data. Excluded realisations contained pauses, hesitations and audible tempo change (such as acceleration) within that phrase. One more reason for the exclusion of an utterance was in the case of a transposition of the two phonemes /yo/ of "yori wa", which resulted in the realisation of the sequence [oi]. Such transpositions occurred in some realisations for VNV-sequences ending in /o/. The evaluation of the suitability of an utterance was undertaken by the author in co-operation with a phonetically trained native speaker of Japanese in a rather informal way. Since the subjects were asked to read without interruption, making use of the "yori wa"-portion seemed to be sensible, because it is consistently present in the material.

For the investigation of the influence of speech tempo, the data was grouped for each subject as to whether the mora nasal in the VNV-sequence was realised as a consonant or a nasal vowel. For each subject an unpaired t-test, assuming equal variance was applied to compare the speech tempo of the two realisation types.

3 Results

3.1 Observations

In the recorded and analysed material consonantal realisations of the mora nasal in the specific context could be observed. In completion to the findings of Vance (1986) and Arisaka (1940), one can state, that this version does occur in the Osaka variety of Japanese. The influence of speaker age and speech tempo onto the realisation rate will be analysed in the following section.

3.2 Speaker Age

The number of realisations of the consonantal version of the mora nasal varied not only between the age groups, but also between the speakers. As can be seen in Table 1 and Figure 1, no speaker had a higher realisation rate of the consonantal version than 33%, when reading the sentence list containing the target words. The lowest occurrence rate, however, is 0% for two subjects. These two subjects are both members of the younger generation (genA). One further subject of the younger generation shows a very low occurrence of the consonantal realisation with only 3.2%.

Of the four subjects in the older generation (genB), three show a rather similar occurrence rate of the consonantal version, which varies from 25% to 33%. The really surprising results are obtained from subject *Mitsuyo* in genA and from

subject *Tomomura* in genB, where non-conformity with the rest of the subjects in the respective age group can be observed: subject *Mitsuyo* shows an untypically high amount of consonantal realisations for her age group (genA) with 21.7%. Subject *Tomomura* on the other hand shows an untypically low amount of consonantal realisations for her age group (genB, 8.7%). Due to the non-conforming behaviour of these two subjects, the difference between the two generations is not highly significant ($t=2.399284$, $df=6$, $p<0.1$). However, if we assume some personality characteristics of the two subjects with non-conforming results, which could be the ability to adapt to another age group in speaking style and therefore exclude these subjects, the differences between the two age groups would be highly significant ($t=10.87558$, $df=4$, $p<0.001$). The motivation for these two subjects to adapt to another age group could lie in the fact that the investigator the subjects were presented with belonged to neither of the age groups, but is older than the members of genA and younger than the age group genB.

The spontaneous reaction to subject *Jun's* utterances by a native Japanese of some variety of the Kansai dialect was, that she spoke in an extremely casual manner. However, that impression did not evolve in the case of subject *Saburoo*, who equally did not produce any consonantal realisation of the mora nasal in this investigation.

genA		genB	
<i>Mitsuyo</i>	21.7%	<i>Fuji</i>	25.0%
<i>Shoichi</i>	3.2%	<i>Tooru</i>	33.0%
<i>Jun</i>	0%	<i>Noriko</i>	31.0%
<i>Saburoo</i>	0%	<i>Tomomura</i>	8.7%

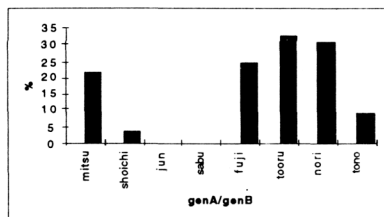


Table 1 and Figure 1. Occurrence rate of the consonantal realisation for each subject of the two generations in percentage (%).

3.3 Speech Tempo

Varied speech tempo is observable for all subjects when reading the list of sentences. Such variation occurs not only between the categories of the different realisation types - i.e. the consonantal and the vocalic realisation -, but also within each category. As can be seen in Table 2 and Figure 2, for all but one subject (*Mitsuyo*) there is a tendency for the reference segment "yori wa" to be spoken slower in a phrase where a consonantal version of the mora nasal in the target word was realised. However, due to the extreme variation within each category, this tendency is not significant for any of the subjects (for details see tables and figures in the Appendix). The only significant difference between the two categories is present for the subject *Mitsuyo*, who shows the reverse effect, where

the reference segment "yori wa" was spoken slower in a phrase with a vocalic version of the mora nasal in the target word ($t=2.59$, $df=44$, $p<0.05$).

The two subjects, who did not produce any consonantal version of the mora nasal, however, show fairly fast realisation of the reference segment "yori wa" on average, when compared with the other subjects.

	consonant	vowel
<i>Mitsuyo</i>	0.397	0.437
<i>Shoichi</i>	0.385	0.367
<i>Jun</i>	----	0.356
<i>Saburoo</i>	----	0.372
<i>Fuji</i>	0.393	0.365
<i>Tooru</i>	0.428	0.407
<i>Noriko</i>	0.402	0.401
<i>Tonomura</i>	0.449	0.391

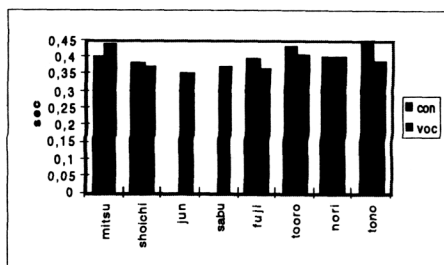


Table 2 and Figure 2. Average duration of the reference segment "yori wa" in seconds for each subject, grouped by the realization type of the mora nasal in the target word of that phrase.

4. Discussion

The present investigation shows that a consonantal realisation of the mora nasal is present in the Osaka variety of the Kansai dialect not only in consonantal context but even in purely vocalic context. This finding is complementary to earlier studies on that topic for the Standard and Tokyo variety of Japanese, where a consonantal realisation was accepted and assumed in specific consonantal context. With one exception (Nakano, 1969), a vocalic realisation was assumed in intervocalic position. However, Nakano (1969) claims, that the consonantal version only occurs in careful pronunciation. Arisaka's claim (1940), that a release of an oral closure would be audible cannot be agreed with. Due to the constant velar opening no air pressure behind the articulator is built up (which would otherwise result in some kind of burst noise when released). The release of the mora nasal in case of its realisation with oral closure would not differ in its auditory impression from the release of any other non-moraic nasal in Japanese and their release is hardly audible due to the lack of compressed air behind the articulator involved in the closure.

The data presented here showed that not all the speakers made use of the consonantal variety of the mora nasal, and those who have it in their repertoire still use the vocalic version more often. When looking at the distribution of the subjects who have a more frequent use of the consonantal version, it is obvious that three out of four subjects belong to an older generation group than those subjects, who hardly or never use the consonantal version. However, the reverse is also the case: of four subjects, the three, who rarely or never make use of the consonantal version of the mora nasal belong to a younger generation, an

adolescent generation. These results could be interpreted as showing either a) that in a time course of adaptation to an adult society's demands, such speech behaviour of the younger generation will change, or b) that in the course of language change the consonantal version of the mora nasal in intervocalic position will disappear from the Osaka dialect.

Speech tempo seems to be a parameter that can be dismissed as an important factor for the production of mora nasal with complete oral closure. The variation in speech tempo for each subject making use of the consonantal version at all is too large for both categories - i.e. the consonantal vs. the vocalic realisation, so that no significant influence is present. However, one speaker, who was informally rated as having very casual pronunciation, did not demonstrate any consonantal realisation and showed on average the fastest speech tempo. In contrast to Kawakami (1977), who observes the loss of the original pronunciation of the mora nasal due to a faster speech tempo in the case of a following consonantal context, which is described in more detail in the introductory section above, it seems sensible to follow Nakano (1969) when accounting for the existence of a consonantal version of the mora nasal with complete oral closure in Osaka Japanese. Nakano distinguishes between careful pronunciation on one end of the scale including a consonantal realisation of the mora nasal and a colloquial variant at the other end, where no consonantal realisation of the mora nasal can be observed, rather than regarding speech tempo as a differentiating factor.

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Appendix

あんい そじょう

安易よりは 訴状というほうが いい。

aNi yori wa, sojoo to iu hoo ga ii.

陰影よりは 太陽というほうが いい。

iNei yori wa, taiyoo to iu hoo ga ii.

暗影よりは 光というほうが いい。

aNei yori wa, hikari to iu hoo ga ii.

本位よりは 愚行というほうが いい。

hoNi yori wa, gukoo to iu hoo ga ii.

Table 3. Examples from the sentence list presented to the subjects and their transliteration.

	mitsucon	mitsuvoc	shocon	shovoc	juncon	junvoc	sabucon	sabuvoc
Mean	0,39749	0,436542	0,38515	0,367444		0,355822		0,372218
Variance	0,001492	0,001851	0,000836	0,001247		0,012724		0,005061
Observations	10	36	2	62	0	51	0	51
df	44		62					
t	-2,59139		0,699733					
P(T<=t) two-tail	0,012921		0,486711					

	fujicon	fujivoc	toorucon	tooruvoc	noricon	norivoc	tonocon	tonovoc
Mean	0,392573	0,364803	0,42764	0,40684	0,402056	0,40089	0,449275	0,390635
Variance	0,003512	0,003132	0,001552	0,000369	0,001948	0,001371	0,009642	0,004858
Observations	11	33	5	10	9	29	4	46
df	42		13		36		48	
t	1,405152		1,402446		0,078923		1,566467	
P(T<=t) two-tail	0,16733		0,184209		0,937531		0,123809	

Table 4. Detailed list of statistical values for each subject and realisation type of the mora nasal ("con" = consonantal version and "voc" = vocalic version).