Nasal consonants in Malayalam

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Abstract

Almost all the world's languages have at least one voiced nasal in their phonemic repertoire. Having more than three or four nasal consonants in a language, however, is uncommon. One such exception is Malayalam, a Dravidian language spoken predominantly in the southern state of Kerala in India. Malayalam has six or arguably, seven nasal phones in its inventory. In addition, the nasals in Malayalam are also characterized by singleton-geminate contrasts in the same intervocalic-medial position. Preliminary auditory and acoustic observations suggest that durational differences are important in distinguishing the geminate and singleton contrast. In addition, the nasals that form contrasting subgroups appear to be predominantly distinguished based on secondary articulation cues.

Keywords: nasals, Malayalam, duration, secondary articulation.

Introduction

Malayalam, a language of the Dravidian family predominantly spoken in Kerala, has a rich inventory of nasal consonants. While most scholars who have worked on Malayalam phonology (Chandrasekhar 1953, Krishnamurti 2003) agree that there are six nasal phones- bilabial /m/, dental [n̪], alveolar [n], retroflex /ɳ/, palatal /ɲ/ and velar /ŋ/, other scholars (Mohanan & Mohanan 1984, Namboothiripad, Garellek 2017, Khan 2019) identify a seventh place of articulation. The labels that appear in grammatical sketches about nasals in the language are mainly descriptive and are not based on an empirical analysis of all the nasals in the inventory.

Distribution of nasals in Malayalam

The scholars working on Malayalam phonology agree on the phonotactics of the bilabial, retroflex and velar nasals. The bilabial nasal occurs in all the word positions as singletons and intervocalically as geminates. The retroflex nasal occurs medially in intervocalic singletons and geminates; and in a nasal-plosive cluster. Palatal nasals are attested in Malayalam word initially as singletons and medially in a homorganic nasal-plosive cluster and in an intervocalic position.
Interestingly, the relation between the dental and alveolar nasals have been debated in the literature. While many scholars (Chandrasekhar 1953)opine that the dental-alveolar relationship is allophonic, other scholars (Mohanan, Mohanan 1984, Asher, Kumari 1997) suggest that along with the complementary

distribution, the relationship is also phonemic, where they are contrastive intervocalically as geminates.

Debates also exist with the seventh nasal, the palatovelar, whether it contrasts intervocalically as geminates (Mohanan, Monahan 1984, Namboodiripad, Garellek 2017) or are allophones of the velar nasal (Asher, Kumari 1997).

In addition to the rich nasal inventory in Malayalam, nasal geminates are attested intervocalically in all the places of articulation. The geminates have a phonemic relation with the singletons in the same word position (Local, Simpson 1999). An instance of this is in the minimal pair *kaɳːi* 'link' and *kaɳi* 'first vision.'

Given the distribution of Malayalam nasals, it is important to note that the seven-way contrast is not present across all the vowel contexts in Malayalam. Excluding the palatovelar nasal, the six-way contrast is only seen in one instance-(a_i). In other vowel contexts, they form subgroups of two/three contrastive pairs.

Methodology

Data was collected from 12 native Malayalam speakers (6 male and 6 female) from the districts of Calicut (north), Trivandrum (south) and Kottayam (south-central) in Kerala within the age group of 55 to 65 years.

A word list of 53 tokens, consisting of intervocalic nasal geminates and singletons, were displayed on the screen. Recordings were done using a Zoom H1n Handy Recorder and an Audio-Technica ATR3350xiS clip-on microphone.

The speech samples were annotated using PRAAT software. The statistical analysis was done using the R (R Core Team) lme4 package. Anova and pairwise analysis (emmeans) was carried out.

Results

The six-way contrast in the data set is confined to the a_i environment, and the acoustic analysis suggests that for geminate-singleton pairs duration is key; and for different nasal places of articulation, the second formant frequency (F2) of the preceding vowel appears to be instrumental in maintaining the contrasts.

Duration

Durational differences have been significant in maintaining the geminate-singleton contrast across various studies (Local & Simpson 1999). In this study, a similar pattern can be observed, where the duration of the geminates is more than twice the length as compared to the contrastive singleton counterparts in the a_i environment.

The alveolar and retroflex singletons were significantly shorter as compared to the geminates: Alveolar (estimate =-102.750, SE =9.091 t value=-11.302, p= <.001), Retroflex (estimate=-115.917, SE= 9.091, t value= -12.750, p= <.001).

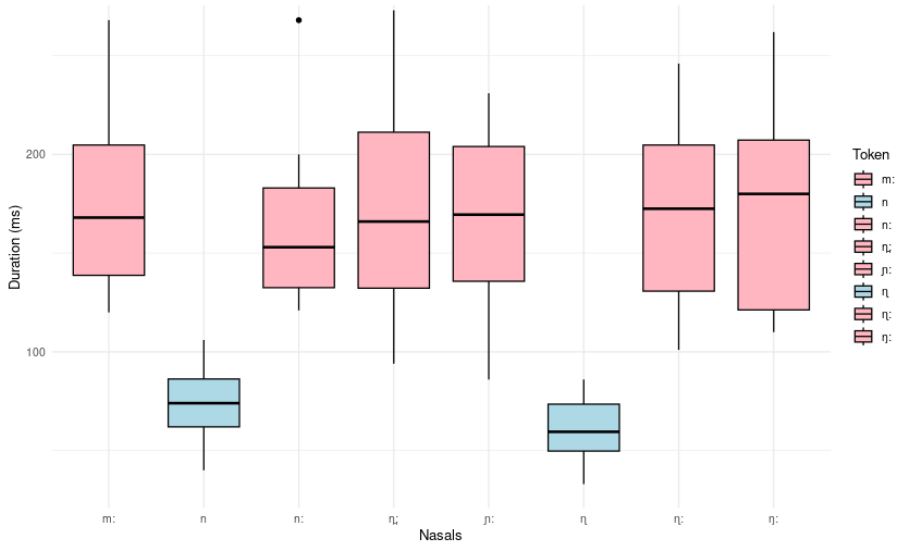

Figure 1. Duration of geminate and singleton nasals in a_i context.

Generally, durational differences among the nasal consonants, from bilabial to retroflex, go on a continuum from longer to shorter (Local, Simpson 1999). However, in the a_i context, that showed maximum nasal place contrast among the geminates, there was no significant pattern.

Formant frequencies

The adjacent vowels and their transition to and from the consonants have been shown to be important cues in identifying place differences among nasals (Khan 2019), and F2, that correlates to the frontness and backness of a vowel, particularly serves as an acoustic cue (Khan 2019). Therefore, the difference in F2 of the preceding and/or following vowel suggests coarticulatory and secondary articulation effects. In the current study, though the effects of the following vowel did not show any statistical significance, the effects of the preceding vowel showed significance. A pairwise comparison showed some pairs to be statistically significant:

Table 1. Statistically significant pairs of nasals in preceding vowel context.

Nasal	Estimate	SE	t-value	p
Alveolar-dental geminates	335.3	83.6	4.011	<0.05
Alveolar-bilabial geminates	-465.6	83.6	-5.572	<0.001
Palatal-dental geminates	-320.6	72.4	-4.428	<0.05
Alveolar-retroflex Singleton	281.7	59.1	4.764	<0.05

In each pair, the F2 value of the preceding vowel of both alveolar and palatal nasals (alveolar/palatal) was higher indicating frontness (palatalization); while the F2 value of bilabial, dental and retroflex nasals was lower indicating backness (velarization). Thus, in addition to the patterns of the alveolar-dental pair, as seen in Khan (2019), the nasals can be grouped into pairs and appear to maintain the distinction by using secondary articulation (palatalization and velarization) as cues.

Conclusion

Nasal duration is therefore significant in understanding the geminate-singleton difference among the speakers in Malayalam. The F2 of the preceding vowel was higher for some nasals when looking at them in terms of pairs, indicating secondary articulation as a potential cue. Analysis of other acoustic properties and a larger sample is required to understand more about how the nasals in Malayalam are maintained.

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