DOMAIN-INITIAL DENASALISATION IN BUSAN KOREAN: A CROSS-GENERATIONAL CASE STUDY

Kayeon Yoo

Phonetics Laboratory, Department of Theoretical and Applied Linguistics, University of Cambridge
ky259@cam.ac.uk

ABSTRACT

Korean domain-initial nasals have been reported to lose their nasality in Accentual Phrase-initial or higher prosodic domain-initial positions in the prosodic hierarchy. Researchers disagree about the exact nature of the phenomenon, and whether it should be called 'nasality weakening' instead. They also debate whether there is a proportional link between the degree of denasalisation and the relative position of the prosodic domain in which the nasal is initial. If there is, Korean denasalisation could be argued to be an interesting case of domain-initial strengthening, a phenomenon found in various languages.

The paper conducts preliminary acoustic and auditory analyses of the production of domain-initial nasals by four older and four younger speakers from Busan, Korea, with the focus on revealing any pattern found in the variation in the realisation of denasalisation among the speakers and its relationship with the prosodic position.

Keywords: denasalisation, Busan Korean, domain-initial strengthening, nasal fortition, sound change.

1. INTRODUCTION

A recent study [6] strongly suggests that denasalisation is a regular feature of spoken Korean, one whereby the nasals /m/ and /n/ lose their nasality word-initially to resemble the acoustic and auditory characteristics of the English lenis plosives /b/ and /d/. It is a curious phenomenon, given the existing crowded three-way system of initial stops in Korean, with the strongly aspirated stop (e.g. /t^h/), moderately aspirated lenis stop (e.g. /t/) and fortis stop (e.g. /t*/). Research on the topic of denasalisation in Korean is scarce, however, with only a handful of studies [3,6-9,11] which sometimes lead to different conclusions. For example, unlike the finding in [6] that denasalisation is a widely prevalent phenomenon in different dialects of Korean, [11] concludes that the phenomenon is better-captured by the term 'nasality weakening' instead of 'denasalisation', on the basis that the loss of nasality is not complete, although nasality decreases toward the boundary between the nasal and the following vowel.

Interestingly, some researchers have also claimed that the phenomenon of denasalisation is related to the position of the segments with respect to the prosodic hierarchy. The first study [11] that systematically looks into the prosodic conditioning of the phenomenon identifies three categories of prosodic context influencing the degree of denasalisation: (a) Utterance-initial (Ui) and Intonational phrase-initial (Ii), (b) Accentual phrase-initial (Ai) and Word-initial (Wi), and (c) Syllable-initial (Si) (segments that are Ui are of course also Ii, Ai and Si, assuming the Strict Layer Hypothesis in intonational phrasing [10]). The author of [11] reports a cumulative effect with relation to the position of the segment in the prosodic hierarchy – the higher the prosodic position, the greater the degree of denasalisation – with no denasalisation found for (c). However, [6] reports that denasalisation is only found at initial positions of stressed words (i.e. at Ai or higher) and denies that there is a cumulative effect.

In this paper, I conduct a cross-generational case study of four younger and four older speakers' production of domain-initial nasals at different prosodic levels. This study is unique in three aspects. First, acoustic analyses of the recordings are conducted with special attention to presence or absence of four acoustic characteristics that occur in different types of denasalisation (see 3.2). Second, none of the previous studies [3,6-9,11] of Korean denasalisation has conducted a cross-generational study or attempted to characterise the significant degree of variation that they find. Finally, it is the first to look into denasalisation in Busan Korean exclusively, a city in Kyungsang-Do which [11] argues to show weaker 'nasality weakening'.

2. EXPERIMENT

2.1. Test materials

Ten sentence minimal pairs were designed, with as far as possible identical segmental content, but differing in prosodic phrasing in a way which signals distinct meanings. In composing the sentences, I made use of the agglutinative nature of

and abundance of suffixes in Korean morphology. See the example sentence pair below, which is one of the ten pairs used in the experiment.

(a) /{imo} {**n**e} {kaŋadʑinɯn} {yeb*ʌyo}/
Auntie-Voc. my puppy-Top. Pretty-Decl.
'Auntie, my puppy is pretty.'
(b) /{imo-**n**e} {kaŋadʑinɯn} {yeb*ʌyo}/
Auntie-Poss. puppy-Top. Pretty-Decl.
'Auntie's puppy is pretty.'

Each sentence contains one token of domain-initial nasal. In each sentence pair, the string of phonemes in the two sentences is identical; but depending on whether the syllable containing the nasal is part of the previous or following word, the meaning of the sentence changes. ***ne*** in (a) is a word meaning 'my', and ***–ne*** in (b) is a possessive suffix - homophonic but distinct morphemes. I use five such words/suffixes that begin with a nasal phoneme.

The parenthesis {} indicates the AP boundaries that a Korean speaker is likely to have for the sentences. One might optionally put an IP boundary between /imo/ and /ne/. The nasal phoneme **n** in (a) is likely to be either Ii or Ai depending on how the speaker groups the sentence prosodically, partly determined by the rate of speech. The nasal in (b) is in Si position, inside an AP, and this is the case for all other type (b) sentences. Thus, I predict that no token in (b) will be denasalised.

Since there are studies which report that the place of articulation and height of the following vowel affect denasalisation [3,6,9], I included a balanced number of /m/s and /n/s followed by different close and open vowels [i, jʌ, ɛ, a].

2.2. Recording procedure

Twenty sentences were recorded in three repetitions. Subjects were told to read them from A4 sheets at a comfortable pace. Recordings were made in a quiet room with a Nagra ARES-M II digital recorder at a 44.1 khz sampling rate.

2.3. Speakers

A total of eight (four older, four younger) native speakers of Korean from Busan, South Korea participated in the recording. The older speakers and SHL had never lived outside of Kyungsang-Do, while JSL had lived in Seoul from two to five and for the previous two years for his university study. JHK moved to the USA, for high school but her Busan Korean remains fluent as her family speaks to her in Busan Korean at home. Both JSL and JHK's mothers speak Seoul dialect. SBK moved to New Zealand for high school and moved to the UK one year ago. The recording was made in Busan, a couple of weeks after JHK and SBK arrived there for winter holiday.

Speaker	Age	Gender	Speaker	Age	Gender
PYR	80	M	JSL	24	M
KJK	75	F	SBK	21	F
OSC	62	F	SHL	21	F
ISP	62	F	JHK	20	F

3. RESULTS

3.1. Generational differences

By far the clearest pattern that emerged from the data was the generational differences. The older speakers either never denasalised and always produced sonorant nasals, or had one token of denasalisation. The speakers who produced 100% sonorant nasals were the two oldest speakers. On the other hand, the young speakers had a lower percentage of sonorant nasals (55.0–93.3%), although the intra-group variation was greater than in the older group. All the denasalised nasals were found in Ai or higher positions, Wi and Si being the contexts in which no denasalisation is found. JSL denasalised all tokens in Ai and higher positions. The results thus support the finding [6] that denasalisation only occurs in Ai or higher positions.

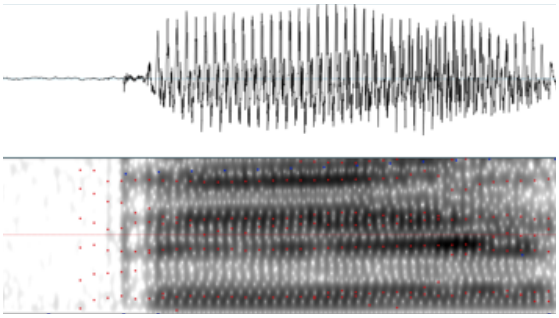
Interestingly, the intra-group variation in the younger group could be explained by the extent of contact with Seoul dialect speakers. SHL, who denasalised the least in the group, is the most local one, having lived in Busan for her entire life. JSL, who denasalises the most, had lived in Seoul for 5 years in total. From this, it might be postulated that denasalisation started in Seoul and is spreading in Busan, leaving older speakers' speech largely uninfluenced. It is also consistent with the report in [11] that nasality weakening is more advanced in the dialect spoken in Seoul.

3.2. The phonetic manifestation

The claim in [11] that denasalisation is not complete, that is, nasality does not cease completely but only decreases in the nasal consonant, is not supported. Admittedly, there are several instances where the nasals sounded like [n^d] or [m^b] and showed nasal formants dying away in the spectrogram – the kind that [9] describes as post-oralised nasals. However, most of the nasals examined show a clear case of denasalisation, with no nasality in the consonant part at all. Strongest evidence comes from those segments that are underlyingly nasal but show up with no nasality, no voicing, and a burst or aspiration (or both). **Fig. 1**, taken from JHK's data, shows one of many such instances. There is 15.5ms of aspiration with no voicing or nasality in the

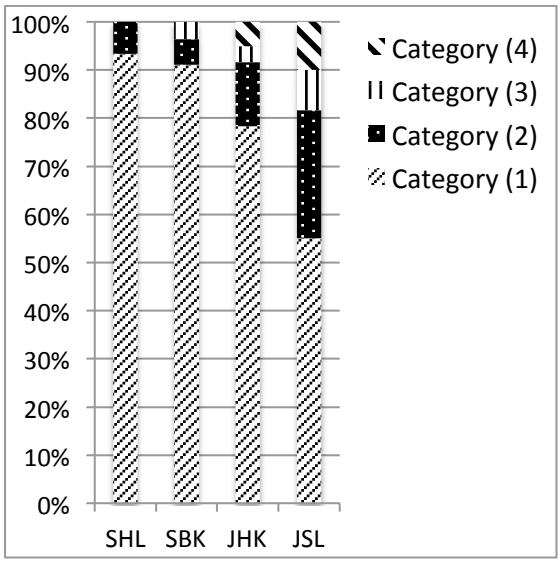
consonant. Given this result, it seems difficult to deny that there exist cases of complete denasalisation, with a complete lack of nasality.

Figure 1: Denasalised nasal with asp. in Ii position



To capture the variation in the phonetic realisation of denasalised nasals, I devised four categories, based on the presence (X) or absence (nX) of four acoustic characteristics – nasality (N), voicing (V), a release burst (B), and aspiration (A): (1) *sonorant nasals* (N+V+nB+nA); (2) *voiced non-nasals* (nN+V+(n)B+nA), which clearly lack nasal formants in the consonant part but with voicing that continues from the previous segment or prevoicing (negative VOT) if it follows a pause, (3) *voiceless non-nasals* (nN+nV+(n)B+nA), with no positive or negative VOT, (4) *voiceless non-nasals with aspiration* (positive VOT>10ms) (nN+nV+(n)B+A). These categories are in order of increasing degree of denasalisation. It also corresponds to the likely progression of the sonorant nasal to a fully denasalised nasal (e.g. /n/>/d/>/t/>/t/+burst>/t^h/). A burst is a characteristic found in plosives and, if found, supports the argument that Korean nasals are not like sonorants. However, its appearance was not consistent as it was found in any of the non-nasal categories (2)-(4) since, when the velum is raised, pressure does not escape through the nasal cavity but builds up in the oral cavity. In addition, it can be masked by aspiration or voicing and there was often a practical difficulty deciding whether there was a burst, so a separate category for non-nasals with a burst was not included. **Fig. 2** represents the breakdown of the younger speakers' domain-initial nasals in terms of these categories, arranged in order of increasing denasalisation, or decreasing percentage of Category (1) of sonorant nasals. Older speakers' data are not represented in the graph as they produced 100% or near 100% sonorant nasals.

Figure 2: The makeup of domain-initial nasals

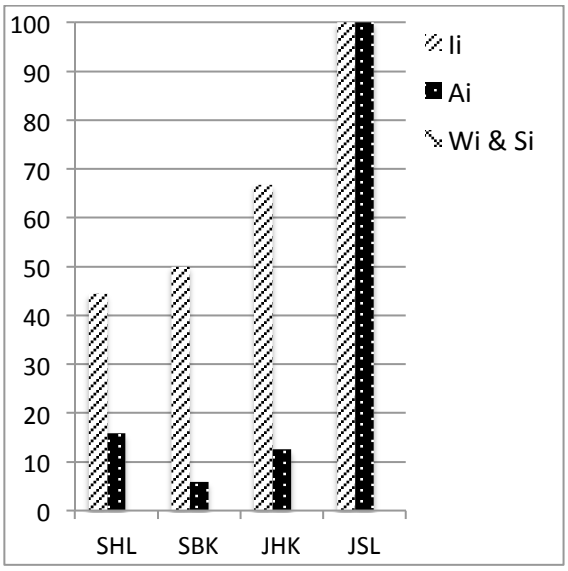


3.3. Prosodic context effects

It has been noted before that no denasalisation is found in Si or Wi. Another interesting question, then, is to look at if the domain of denasalisation is Ai or higher for all denasalising speakers, to parallel the finding [5] that the domain of the lenis stop (/p t k/) voicing rule in Korean is the AP. The percentage of denasalised nasals at different prosodic positions is represented in **Fig. 3**. KJK and PYR produced no denasalised token at any position, and OSC and ISP, 1 token each at Ii, so they are excluded. 0% of the tokens was denasalised in Wi and Si. 100% of JSL's nasals were denasalised in both Ii and Ai. However, JHK, SBK and SHL showed a different pattern from JSL and denasalised less than 20% of their nasals at Ai and less than 70% at Ii. Therefore, it seems as though the younger speakers might have different systems with regard to the domain of denasalisation: the lowest domain is most likely the AP for JSL, while others show a somewhat less clear pattern but a majority of their denasalised nasals are found in Ii.

Another important finding illustrated in **Fig. 3** is the correlation between the likelihood of denasalisation and the size of the prosodic unit. For all speakers who denasalise, the percentage of denasalised nasals at a given prosodic position is always higher than that at a position lower in the prosodic hierarchy. In other words, the result is compatible with the claim that the higher the prosodic position, the greater the likelihood of denasalisation [11].

Figure 3: The percentage of nasals denasalised in different prosodic positions (%)



4. DISCUSSION AND CONCLUSIONS

The strongest factor found to affect the degree of denasalisation is age. The older subjects showed effectively no denasalisation. However, there was variation within the younger age group; the young male speaker JSL consistently produced denasalisation in Ai and Ii position, while the other young speakers denasalised about 40-70% of the Ii nasals but appreciably fewer (5-20%) of their Ai nasals. This suggests that speakers might have different systems of denasalisation with regard to its prosodic conditioning. The young female speakers might represent the intermediate stage between the older speakers with no denasalisation and JSL with complete denasalisation in prosodic positions higher or equal to Ai positions. It is suggested that Korean denasalisation might be a recent sound change in Korea spreading among young people and that Busan is where the sound change is not as widespread as in some other cities; the frequency of denasalisation seems to be correlated with the amount of contact with Seoul dialect speakers.

Crucially, these results provide a clue to resolving some of the disagreements on the topic of Korean denasalisation in the literature. Regarding the nature of the phenomenon, the variation found in this study makes the disagreements seem not so surprising; although the many fully denasalised tokens support the claim in [6], there were also some tokens in the data which exhibited a weakening of nasality before release, exactly as [11] describes.

Another issue related to denasalisation that this study might help to shed light on is whether there is a proportional link between the degree of denasalisation and the prosodic position of the nasal. Again, the study allows an interpretation that accommodates the conflicting reports about the existence of such a proportional effect in [6] and [11]. JSL denasalised all nasals in Ai and Ii, but the other young speakers' denasalised nasals were mostly found in Ii position. In this case, JSL would represent the finding in [6] that the domain of denasalisation is Ai or higher, without any cumulative effect on the degree of denasalisation in higher positions. On the other hand, the young speakers' data is more compatible with the conclusion in [11], namely, the higher the domain, the higher the chance of denasalisation. However, the overall pattern in the results tends to support the latter claim more. In addition, the salience of the boundary of a prosodic unit is sometimes reflected in the degree of denasalisation, even within the same unit. For example, stronger denasalisation is found at a more salient AP boundary that has a clear tonal pattern characteristic of the AP in Korean, than at a less salient AP boundary.

Finally, the results confirm the suggestion that Korean denasalisation is yet another case of domain-initial strengthening [11]. It describes the phonetic phenomenon in which consonants are pronounced with longer and stronger closures (e.g. longer VOT, larger glottal gesture), in the initial position of certain prosodic domains [1,2,4]. The reported cases of domain-initial strengthening conformed to the pattern that the effect was cumulative. At first sight, denasalisation seems to be an odd case, in that 'strengthening' of a nasal results not in a stronger nasal but in a plosive-like segment. However, the commonly agreed characteristic of the domain-initial effects is to enhance the contrast between the initial segment and its neighbours, which are usually vowels in Korean [1]. Thus, denasalisation can be interpreted as emphasising the consonantality of the segment by means of more extreme oral constriction, voicelessness, bursts and aspiration. One study [4] also finds for French that nasal airflow of /n/ was smaller domain-initially. According to the present study, the strengthening of nasals in Korean seems to be more than just loss of nasality, involving many other non-nasal-like features. Further research is needed to test the claim that Korean denasalisation is a case of domain-initial strengthening, and to explore the role of denasalisation in perception.

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