Japanese in the Typology of Nasal Assimilation: Electropalatographic Evidence

Previous phonological research on the typology of nasal assimilation has established cross-linguistically variable application of the process before stops and fricatives (Padgett 1995; Baković 2007). Specifically, some languages exhibit nasal place assimilation before stops, while blocking it before fricatives (1a). Languages that allow assimilation before fricatives do it in two different ways: Some assimilate the nasal to the following fricative in place but not in stricture (continuancy) (1b), presumably avoiding the marked nasal fricative output (NoNASFRIC: Baković 2007). Others assimilate the nasal simultaneously in place and stricture (1c), presumably avoiding an articulatorily complex gesture configuration with identical place but different stricture parameters (STRICTURE/PLACE). The latter pattern has been instrumentally confirmed for Spanish, where the pre-fricative nasal was found to lack a closure, and, in the case of lingual gestures, to exhibit a fricative-like central channel (Honorof 1999; Kochetov & Colantoni 2011).

Impressionistic observations suggest that the assimilation of Japanese moraic nasal /N/ (which is variably realized as [ŋʰ], [n], or [u̯] utterance-finally) belongs to the latter type. Vance (1987: 37), citing Hattori (1930) and Maeda (1971), notes that the assimilated nasal appears to lack a closure before fricatives, being possibly realized as a nasalized high vowel or a fricative (e.g. /N+s/ → [is] or [zs]). These phonetic observations are consistent with phonological accounts of the moraic nasal as being underspecified for place and continuancy (Kuroda 1979; Yip 1991; Itô 1986). The putative phonetic outcomes of the process, however, have not been verified instrumentally, and thus the place of Japanese in the typology of nasal assimilation remains to be determined.

In this study we investigate Japanese nasal place/stricture assimilation before stops and fricatives of various places. A WinEPG system (Wrench et al. 2002) with custom-made 62-electrode artificial palates was employed to collect simultaneous articulatory and acoustic data from 5 female native speakers of Japanese. To ensure that assimilation patterns represent an active process (rather than being lexicalized), we employed a language game based on a reversing argot (Zuuja-go: Itô et al. 1996). Specifically, the speakers were asked to read an utterance and then reverse morae within each word of the utterance, as illustrated in (2a). The resulting target words included /N/ followed by (palato-)alveolar affricates [ʃ] and [ʦ] (allophones of /t/), velar/palatal stops [k] and [k j] (allophones of /k/), and palatal/bilabial fricatives [ç] and [ɸ] (allophones of /h/) before high vowels /iː/ and /uː/ (2b). 8 repetitions of each utterance were elicited in 2 separate sessions, producing 320 tokens in total. The analysis involved qualitative and quantitative measurements of assimilation in constriction location and degree taken at the midpoint of the acoustically determined nasal interval.

The results revealed consistent patterns of place assimilation: for all 5 speakers, the nasal was distinctly alveolar before [ʦ] and [s], palato-alveolar before [ʃ] and [ʃ], palatal before [k] and [ç], and velar before [k] and [ɸ] (Figure 1). Importantly, context-specific constriction location differences were accompanied by constriction degree differences: the nasal had a stop-like closure before affricates and stops, and a fricative-like central channel before fricatives, also consistently for all speakers. While largely categorical, these place and stricture assimilation patterns showed some gradient effects, with constriction degree and location being somewhat less peripheral and less occluded than for the following consonants. This observation lends credit to Kuroda’s (1979) observation that the Japanese nasal is realized as a continuous transition from the preceding vowel to the following consonant (cf. Hattori 1930). Overall, the results of the study contribute to the typology of nasal assimilation patterns, demonstrating that the Japanese process, similarly to Spanish, ‘respects’ the place/stricture dependency (1c), producing a nasal-obstruent cluster that shares both [Place] and [±continuant] features.
(1) Typological patterns of nasal assimilation and corresponding rankings (Baković 2007).

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<tr>
<th>Assimilation pattern</th>
<th>Constraint ranking</th>
<th>Language</th>
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<tr>
<td>a. Blocking before fricatives</td>
<td>/n+f/ → [nf]; *[mf],[ṿf]; /n+p/ → [mp]; *[np]</td>
<td>NoNASFRIC, STRUCTURE/PLACE &gt;&gt; AGREE(Place) &gt;&gt; IDENT(F)</td>
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<tr>
<td>b. ‘Respecting markedness’</td>
<td>/n+f/ → *[m(p)f]; *[mf],[ṿf]</td>
<td>AGREE(Place), NOFASFRIC &gt;&gt; STRUCTURE/PLACE, IDENT(F)</td>
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<tr>
<td>c. ‘Respecting dependency’</td>
<td>/n+f/ → [ṿf]; *[nf],[mf]</td>
<td>AGREE(Place), STRUCTURE/PLACE &gt;&gt; NOFASFRIC, IDENT(F)</td>
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(2) a. /heN.te.ko na ki:ţfaN no ma.ne.:dʒa:/ → /te.ko.heN na ţfaN.ki: no dʒa:.ma.ne:/ ‘Kichan’s weird boss’

b. _i: [ţfaN+i], [ţfaN+k+i], [ţfaN+çi], [ţfaN+çi]
_u: [ţfaN+ts'_u], [ţfaN+ku], [ţfaN+su], [ţfaN+ɸu]

Figure 1. Sample average linguopalatal contact profiles for /N/ in 8 contexts, speakers JF1 and JF3; the cells represent 62 built-in electrodes; black: the electrode was contacted in all tokens, white: the electrode was not contacted in any of the tokens.

References


