

Opacity in Standard Chinese Nasal Rhymes

---Phonology and Phonetics

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[Abstract] Standard Mandarin Chinese (SC) features two types of nasal rhymes underlyingly: the coronal nasal rhymes /Vn/ and the velar nasal rhyme /Vŋ/, which are contrastive in distribution. The two types of nasal rhymes will undergo two phonological processes in the citation form and speech-finally: vowel nasalization and V/N backness agreement, which can be captured by the following two rules:

(1) vowel nasalization: $V \rightarrow \tilde{V} / _N\#$

V/N backness agreement: $V \rightarrow V_{[\alpha\text{back}]} / _N_{[\alpha\text{back}]\#}$

However, in speech-medial position, the nasal coda will undergo place assimilation process triggered by the immediately-following syllable initial. Specifically, when the nasal rhyme is followed by the consonantal initial, the place feature of the nasal coda will assimilate to the following consonantal initial, whereas when it is followed by the vowel initial, the place feature of the nasal coda will be deleted, and thus becomes a nasal glide. The following rules capture the place assimilation process in each case respectively:

(2) place assimilation in VN.CV case: $N \rightarrow N_{[\alpha\text{ place}]} / _ \# \# C_{[\alpha\text{ place}]}$

place assimilation in VN.GV case: $N \rightarrow N_{[0\text{ place}]} / V_ \# \# V$

place assimilation in VN.V case: $N \rightarrow N_{[0\text{ place}]} / V_ \# \# GV$

The interaction between rules in (1) and (2) results in opacity in Chinese nasal rhymes, because the environment for V/N backness agreement is destroyed by place assimilation of the nasal coda, and thus non-surface-apparent. This opacity problem can be solved both by OT-CC and by IDENT-O(utput)O(utput) constraint.

A crucial problem here is: why does the V/N backness agreement process NOT happen cyclically to the nasal rhymes in speech-final position?

Phonetic experiment results show that there is place assimilation between the nasal coda and the immediately following consonantal initial, but the

assimilation is complete only in the $N.C_{[+coronal]}$ case; whereas in all other cases, the assimilation is partial. This paper proposes that the fundamental reason is PERCEPTUAL, that is, the need for perceptually distinctive contrast between nasalized vowels in the SC nasal rhymes requires that nasalized vowels keep the backness feature acquired from /n-ŋ/ codas, which further prevents the nasal coda to be completely assimilated to the following consonantal initial. We will capture this proposal by formalizing a MINDIST(F2) constraint on the nasalized vowels.

In the end, this paper shows that the perceptually-based analysis is superior to the OT-CC and the IDENT-OO analysis in that it is explanatorily more adequate.

[Key words] opacity, Chinese nasal rhymes, OT-CC, IDENT-OO, MINDIST