

Nasals and Nasalization in Xiangxiang Chinese

It is usually assumed among phoneticians and universalists that the historical development of distinctive vowel nasalization consists of two ordered processes, i.e. *vowel nasalization* and *nasal deletion*. However, no much work has been done to reconsider or to provide phonetic evidence for or against this two-step account. In particular, the manner and motivation of the process of *nasal deletion*, which is generally assumed as a simple and one-step change, has not been studied in any detail. In this study we examine the aerodynamic characteristics of vowel nasalization in Xiangxiang Chinese, a representative of the Old Xiang Dialects of Chinese, which has a rich set of nasals, nasalized and nasal vowels. The airflow data from six native speakers were collected by using Scicon PCquirer, and the test words include a set of meaningful monosyllabic words with oral and nasal vowels carried in various oral and nasal environments, i.e. (C)V, (C)VN, NVN, (C) \tilde{v} , N \tilde{v} . Based on the results emerging from this study, as well as those from studies on vowel nasalization in other languages, five processes involved in the historical development of nasal vowels are proposed: **process Ω** : /VN/ \rightarrow [\tilde{v} N] (contextual vowel nasalization); **process 2**: [\tilde{v} N] \rightarrow [$\tilde{v}\eta$] (syllable-final nasal merger); **process 3a**: [$\tilde{v}\eta$] \rightarrow [\tilde{v}^{η}] (lenition of the velar nasal ending); **process 3b**: [\tilde{v}^{η}] \rightarrow [\tilde{v}] (complete drop of the nasal ending); **process 4**: [\tilde{v}] \rightarrow / \tilde{v} / (phonologization of contextual nasalization). Firstly, following Ohala (1975) and Ohala (1992), process Ω is *not* considered as a *change* but a constant, mechanical and physically-caused process: vowels are always nasalized before a nasal consonant for the velum can not move from a closed to open position instantaneously. We therefore used the symbol “ Ω ” to indicate the *constantness* of this process. Secondly, it is found that the nasal vowels in Xiangxiang Chinese are optionally followed by a *weak* velar nasal closure ([\tilde{v}^{η}]). In other words, there are two variants observed for the nasal vowels or diphthongs in Xiangxiang Chinese: [\tilde{v}] \approx [\tilde{v}^{η}]. Based on this observation, as well as various similar examples observed in other languages, we propose two consecutive processes **2** ([\tilde{v} N] \rightarrow [$\tilde{v}\eta$]) and **3a** ([$\tilde{v}\eta$] \rightarrow [\tilde{v}^{η}]): during process **2** the places of articulation of the nasal endings all merged to velar ([η]); during process **3a** the final [η] became shorter and shorter, whereas the preceding vowel became longer and longer (due to compensatory lengthening) and more and more nasalized (i.e. the nasalized portion of the preceding vowel became longer and longer, as evidenced by the different temporal structure between [$\tilde{v}\eta$] and [\tilde{v}^{η}] rhymes in Xiangxiang Chinese) until process **3b** ([\tilde{v}^{η}] \rightarrow [\tilde{v}]) took place where the nasal ending dropped completely and the preceding vowel became lengthened and fully nasalized. Thirdly, the nasal-deletion process (**3a+3b**: [$\tilde{v}\eta$] \rightarrow [\tilde{v}^{η}] \rightarrow [\tilde{v}]) follows from the phonetic characteristics of the velar nasal distinctive from those of the nasals with more front places of articulation. According to Ohala (1975) and Ohala & Ohala (1993), two of the principal cues for consonantality, acoustic and perceptual, are weakened for a velar nasal. In addition, it is found in this study and Ling (2005) that the [η] in “[V η]” rhymes sometimes shows a certain amount of oral airflow, indicating an incomplete oral closure during its production; however, no oral airflow is found for the [η] in “[V η]” rhymes. In other words, the syllable-final velar nasal is phonetically like a homorganic “nasal approximant” or “nasal glide”, symbolized in IPA as “[\tilde{u}]”. This feature of [η] is taken as an indication of a weakening of consonantality from an aerodynamic point of view. Based on the above explanations, the weak consonantality or lenition of a velar nasal may make it more prone to delete or to alternate with nasalized vowels or glides, or may make [V η] (or [V η]) perceptually more similar with [\tilde{v}] than [Vm] or [Vn].