THE PARTIALLY DENASALIZED BILABIAL PLOSIVE IN SOUTHERN MIN: COMPARISON TO [mb] IN AMDO TIBETAN

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ABSTRACT

This pilot study focuses on the biphasic plosive [^{m}b] in Southern Min. Acoustic analysis suggests that its nasal portion tends to be weak in nasality (nasal flow) but tighter in integrity (not readily separable from the plosive portion) in comparison with prenasalized plosives described in the literature. On the other hand, the [mb] in Amdo Tibetan is similar to known prenasalized plosives in other languages, which allows a preliminary comparison of [^{m}b] in Southern Min with the prenasalized plosive [mb] in Amdo.

Keywords: partial denasalization, prenasalized stops, Southern Min, Amdo Tibetan

1. INTRODUCTION

As a biphasic stop (with a change in the velar lowering gesture in the course of articulation), the prenasalized plosive occurs in many parts of the world, e.g. Africa, Amazon, China and Southeast Asia (see [4, 8, 11]). Chan [1] reports that many Chinese topolects have turned a plain nasal into a biphasic stop, viz. post-stopped (i.e. orally-released) nasals and prenasalized plosives. Hu [5] considers this a process of denasalization (see [6] for a similar sound change in Northern Athabaskan languages). From Mandarin (barring Northeastern) dialects in the north to Cantonese dialects such as Taishan in the south, orally-released nasals are distributed widely in China; their acoustic studies are conducted in [2] and [5]. Partially denasalized plosives occur mainly in Southern Min and they are examined in brief in [1] and [5].

This pilot instrumental study will focus on the partially denasalized bilabial stop [^{m}b] in Southern Min. It will be compared with the prenasalized stop [mb] in Amdo Tibetan.

2. NASALS IN SOUTHERN MIN

Figure 1 presents a sketch of Southeastern China, the homeland of Southern Min. As a Chinese topolect, Southern Min (also known as Hokkien) has the status of language in linguistics terms ([3, 9]), and it can be divided into a variety of (sub) dialects even just within Fujian province.

Figure 1: The major speaking areas of Southern Min (Adapted from Wikipedia).

2.1. Allophones of nasals

Southern Min has three nasals at the syllable coda: /m/, /n/ and /ŋ/ (Chaozhou has merged /n/ into /ŋ/.) In most dialects they take the form of [^{m}b], [l] and [^{ŋ}g], respectively, at syllable initial when followed by an oral vowel; the full nasality is retained only when followed by a nasal vowel (see [7]). For example, [^{m}bi^{22}] 'taste' vs. [mĩ^{22}] 'noodle'.

2.2. Dialectal variation

According to [1], Southern Min dialects differ in the conditions for retaining full nasality of the nasals. Some varieties render a plain nasal when the syllable is closed with a nasal, i.e. NVN, while others do not, i.e. ^{N}PVN. Nonetheless, they are consistent in taking a biphasic nasal with an oral vowel in an open syllable, e.g. /m/ → [^{m}b]/_V#.

3. METHODOLOGY

This study investigates the partially denasalized plosive [^{m}b] in Southern Min, based on acoustic comparison of the sound with [p] within a single dialect, comparison with [m] in Mandarin produced by the same speakers, and comparison with [^{m}b] in Amdo Tibetan. The use of Mandarin for indirect comparison has the advantage of rendering the historical sound change—partial denasalization—involved transparent.

3.1. Internal comparison of bilabials

General works on Southern Min such as [7] often present its phonological system with a set of three

bilabials: /p^h/, /p/ and /b/. However, Southern Min lacks voiced obstruents like most Chinese languages. The phoneme /b/ is meant for /m/. To establish a solid phonetic contrast between [^{m}b] and a plain bilabial stop in present-day Southern Min, the following words are targeted in the study.

Table 1: Some target bilabials (with tones omitted).

Meaning	Southern Min	Mandarin
'mother'	^{m}bu	mu
'raw rice'	^{m}bi	mi
'hat'	^{m}bo	maw
'compare'	pi	pi
'thin'	po	paw

They are embedded in sentences written in Chinese characters. Southern Min data were recorded separately from three native speakers of Hui'an, Quanzhou: A (f. 20+), B (m. 40+) and C (f. 60+). As B and C are related to each other, the data represent two varieties of the dialect. A and B did the recording in a sound-proof booth, while C did the recording in a quiet room. The speakers were simply instructed to utter the sentences in Southern Min for recording. They read the sentences once and some selected words from the sentences twice. Speakers A and B further performed the task in Mandarin, immediately after Southern Min. Although some minor variations are found across the speakers, comparable data are obtained successfully.

3.2. Cross-language comparison of bilabials

Amdo Tibetan has a few prenasalized consonants, including [mb], which show similar behavior to prenasalized plosives described in the literature such as [8]. Its inclusion is intended for a direct comparison of [mb] with the [^{m}b] in Southern Min. The Amdo data used in this study is spoken in Southern Gansu.

4. ACOUSTIC ANALYSIS

Acoustic analysis is performed with the latest version (5.2.16) of Praat. A diagram typically consists of a waveform and a spectrogram.

4.1. [^{m}b] and [p] in Southern Min

The major difference of words between citation form and connected speech lies in the speaking rate. There is no significant phonetic change on the segments. Therefore, acoustic data are only based on citation form. Diagrams shown in Figures 2 to 4 are some examples produced by the three speakers.

The target word [^{m}bu] 'mother' is situated in a disyllabic compound 'parents'; all the others are monosyllabic words. The highlighted part in the diagrams corresponds to the nasal element before the plosive. The length of this nasal element ranges approximately from 30 ms to 145 ms among 26 valid tokens, with a mean of about 70 ms. Great variation is observed in association with different vowels in the syllables: the nasal duration is about 50 ms with a front vowel, 60 ms with a low vowel, and 95 ms with a back vowel. To a lesser extent, inter-speaker variation also exists, while intra-speaker variation (with a difference greater than 10 ms) is found occasionally.

Figure 2: [^{m}bu] 'mother' in Southern Min by Speaker A.

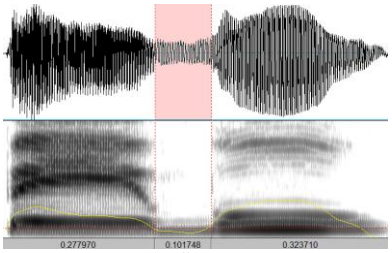


Figure 3: [^{m}bi] 'raw rice' in Southern Min by Speaker B.

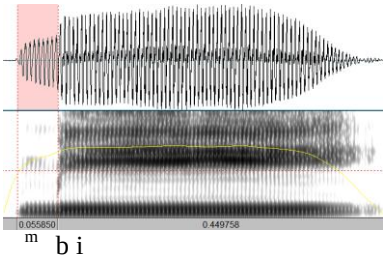


Figure 4: [^{m}bo] 'hat' in Southern Min by Speaker C.

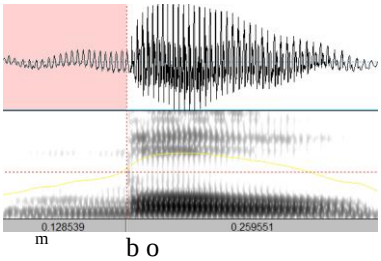
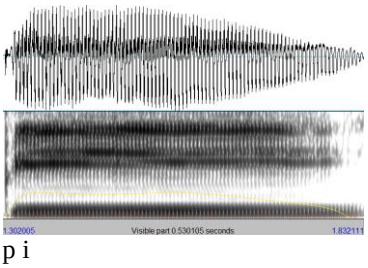


Figure 5: [pi] 'compare' in Southern Min by Speaker B.



The minimal pair in Figures 3 and 5 shows a similar overall duration of about 550 ms. Although the nasal portion is brief, its presence characterizes the plosive in Figure 3 with a distinct feature, which differs clearly from a plain voiced plosive.

4.2. [m] in Mandarin

The duration of [m] has a mean of about 105 ms, based on 15 valid Mandarin tokens from Speakers A and B. Length variation is still discernible but not as obvious as in the case of Southern Min. The vowel effect on the nasal length does not hold, either. Figure 6 shows one of the nasal tokens. Due to tone effect, the word (710 ms) is significantly longer than its counterpart (550 ms) in Southern Min. This lengthening affects the vowel rather than the nasal at the syllable onset, however.

Figure 6: [mi] 'raw rice' in Mandarin by Speaker B.

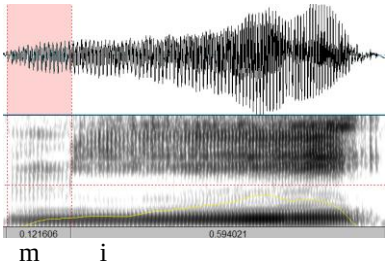
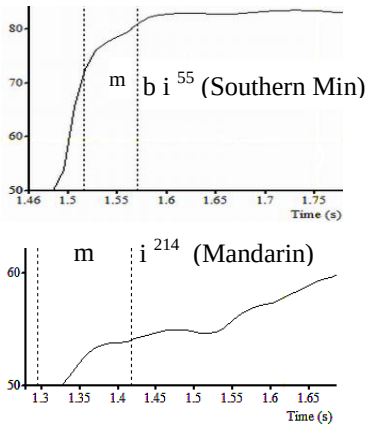


Figure 7: A comparison of amplitude change.



Following [1] and [2], I take a look at the amplitude change of the biphasic stop and compare it with that of a plain nasal. The comparison based on the word 'raw rice' is provided in Figure 7. The amplitude rises differently under the different tone of the words. In Southern Min the word, carrying a high tone, sees a rapid soaring (to 80 dB), whereas the amplitude of the Mandarin word increases slowly along a slope (to 60 dB).

4.3. [mb] in Amdo Tibetan

Amdo has several prenasalized plosives, including [mb]; see Figure 8. When it occurs medially in a polysyllabic word, its nasal part fuses with the preceding vowel, as shown in Figure 10. From these diagrams we can also observe a slight lapse between the nasal and the plosive, which gives rise to a drop of amplitude between them, depicted in Figure 9. With about 133 ms (based on 10 tokens), the mean duration of [m] in the prenasalization context in Amdo is essentially identical to that of the ordinary one, about 137 ms (16 tokens).

Figure 8: The word 'to burn' in Amdo.

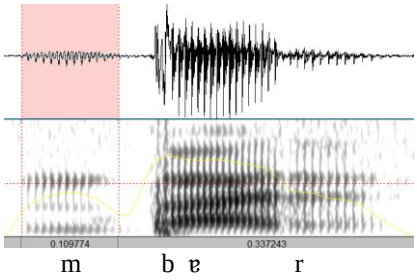


Figure 9: A drop of amplitude in [mb] in Amdo.

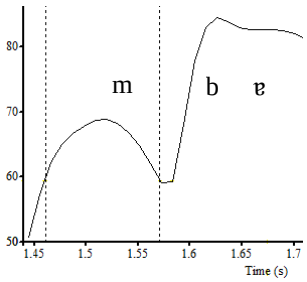
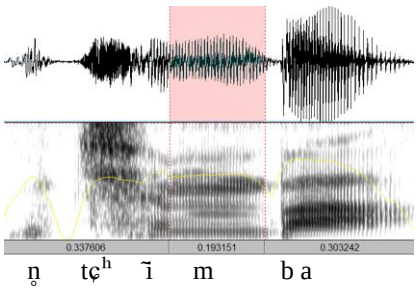


Figure 10: The word 'liver' in Amdo.



5. DISCUSSION

Hu [5] reports that the nasal flow in [^{m}b] in Southern Min is smaller than that of [m^{b}] in other Chinese topolects. This concurs with the current finding that [^{m}b] in Southern Min tends to be shorter in duration, compared with [m] produced by the same speakers in Mandarin. Note that the lighter nasal formants in the spectrograms of Southern Min data, compared with those of Amdo,

point to weak intensity of the nasal portion. The weak nasality is clearly a direct consequence of insufficient nasal flow. As the volume of nasal flow is controlled by the velic aperture, only a limited amount of air can reach the nasal cavity given the brief opening of the nasal passage. The shorter nasal duration in [ᵐb] is attributed to the unusual velocity of velic closure after a swift opening, and consequently, the nasality decreases.

As noted in [2], the transition between the nasal and oral portions in a prenasalized stop may cause a slight drop in amplitude due to the closure phase involved in transition from the nasal to the oral. Such a change of amplitude is observed in the Amdo data, but in none of the Southern Min data. This suggests a higher degree of integrity of [ᵐb] in Southern Min, where the closure phase of the two bilabials overlaps and the biphasic stop takes a simultaneous nasal-cum-oral release.

Another piece of evidence for the tighter bond between the two parts in [ᵐb] can be observed when the biphasic consonant appears word-medially. Although the phonotactics of Southern Min permits a syllable to close in [m], the prefixed nasal in [ᵐb] remains intact in Figure 2. On the other hand, it is quite common for the nasal portion of a prenasalized plosive to relocate to the coda of its preceding syllable, e.g. Gwich'in (see [6]). This is also observed in Amdo. From the waveform in Figure 9 we can see that the intersyllabic [m] has regained its full intensity.

The overall comparison of the biphasic stops in Southern Min and Amdo suggests that the partially denasalized stop [ᵐb] is quite different from the prenasalized plosive [m͡b]. The latter does not necessarily consist of a consonant cluster, but its nasal portion is rather similar to a plain nasal in terms of duration and nasality. It is easily perceived as a nasal and it can split and restore its full segmental status at the coda of a preceding syllable in a word. The [m͡b] in Amdo demonstrates all these properties, largely in accordance with the description of prenasalized plosives in the literature (cf. [8]). In contrast, the [ᵐb] in Southern Min shows none of these.

Finally, it is worth mentioning the unexpected seeming effect of vowels to the duration of the nasal element in Southern Min. This awaits a full scale of investigation in the future.

6. CONCLUSION

Ohala & Ohala [10] consider desynchronization of the velic closure in articulation of nasal to be responsible for the emergence of a biphasic nasal. In terms of timing, the partially denasalized plosive [ᵐb] in Southern Min can be construed as resulting from an abrupt closure of the nasal passage at the start of nasal articulation. The curtailed duration of the nasal articulation is also characterized with a simultaneous nasal-cum-oral release and weak nasal intensity. This underlying/erstwhile nasal is phonetically realized as a plosive led by barely appreciable nasality. Given its clear origin and phonetic characteristics, the biphasic stop [ᵐb] in Southern Min can be regarded as different from prenasalized stops in languages such as Amdo Tibetan.

7. REFERENCES

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