

**Denasalization, Vocalic Nasalization and Related Issues in Southern  
Min:  
A Dialectal and Comparative Perspective**

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Abstract

The paper will be mainly concerned with issues related to denasalization of initials and vocalic nasalization in Southern Min. In particular, we will address the issues of chronology of phonological rules involving these two historical processes. A dialectal and comparative perspective will be adopted to tackle the complicated problems involved. It appears that denasalization goes hand in hand with vocalic nasalization in that there are patterns of interaction between initial and final specifically the coda in the syllable structure. Albeit diachronical processes they are very much alive in the intuition of native speakers as manifested in their set behavior in coping with the learning of a foreign or second language. There is evidence in support of transfer of rules involving source language agentivity. We then examine the interaction between segmentals in a syllable in conjunction with stratum distinction. In terms of tripartite distinction of finals a much clearer picture emerges and it now becomes possible to solve some puzzling and seemingly paradoxical problems about stratum distinction of phonological processes. Next we discuss in some detail patterns of denasalization in the subgrouping of Southern Min. Xiamen and Chaozhou as two important subgroup dialects are compared and it is found that the former is the leader in the denasalization of initials and the latter is the lagger or rather beginner of such a development. It has become quite obvious that denasalization of initials and vocalic nasalization can be used as diagnostic tests to establish Xiamen and Chaozhou together as a distinct and separate group of Min dialects as well as the subgroup distinction between them.

Key words:

vocalic nasalization, denasalization, co-occurrence restriction, initial and coda, transfer of rules, dialectal subgrouping, interaction, Southern Min, chronology, stratum distinction

# Denasalization, Vocalic Nasalization and Related Issues in Southern Min: A Dialectal and Comparative perspective\*

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## 1. Chronology of Phonological Rules

Denasalization and vocalic nasalization in Southern Min reveal a fairly complicated picture. Tung et al (1967: 7) make some insightful remarks about the relative chronology of denasalization of nasal initials and vocalic nasalization summarized as follows:

(1) There were first of all only b-, l-, g-, but no m, n, and there were no nasalized vowels, either.

(2) Then the yang-sheng finals underwent nasalization of vowels changing the non-nasal initials b-, l-, g- to nasal initials m-, n-. The distinction between the two series (viz., syllables with nasal initials and those with non-nasal initials) is manifested in finals.

(3) Later on nasalized elements were occasionally lost due to dissimilation, and there is no phonemic difference between vowels that experienced the loss of nasalized elements and those that kept them.

(4) The finals that take m-, n- initials are nasalized vowels or syllabic nasals. They are distinguished from the finals that take b-, l-, g-, solely in terms of initials.

(5) After the genesis of m-, n-, the words with m-, n- initials were borrowed into Southern Min. The loan words will or will not undergo nasalization by analogy with the native Southern Min words with m-, n- initials. Take the surname 馬. It has two pronunciations: (1) b<sup>2</sup>, and m<sup>n2</sup>. The first one is a native Southern Min word or an earlier loan, and the second one is a later loan.

Let us first consider the relative chronology of the two phonological rules as follows:

a. The devoicing of MC voiced obstruents

b. The denasalization of MC nasal initials

Rule a. should occur before Rule b. Otherwise, if the order is reversed, all the MC nasal initials will merge with the MC voiced stops. Take MC \*b- and \*m-. If \*m- had been denasalized as b-, the secondary b- would have merged with the primary \*b-, before the latter was devoiced as p- or p'-. In other words, all the reflexes of MC nasal initials would emerge as modern voiceless stops. However, modern reflexes in Southern Min are incompatible with such an end result. M/b, n/l and g as reflexes are still in existence attesting to the fact that devoicing of MC voiced stops must have occurred before the denasalization of initials took place. The situation becomes more complicated when the following two rules enter the picture:

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c. The nasalization of vowels in yang-sheng finals (regressive assimilation)

d. The nasalization of vowels in yin-sheng finals (progressive assimilation)

Only Southern Min dialects underwent Rules c and d, but they shared with other Min dialects such as Fuzhou, an Eastern Min dialect, a common colloquial stratum dating back to the Han dynasty, and furthermore, Fuzhou does not experience nasalization. This shared innovation argues against the possibility that northern Chinese ancestral to proto-Min had developed nasalized vowels before it migrated to the Min region.<sup>1</sup>

What would be the relative order of Rule b and Rule c? Since the common stage of Min in the colloquial stratum had not experienced Rule c, viz., the nasalization of vowels, it is tempting to assume that the nasal initials m-, n-, of yang-sheng finals were first denasalized as b-, l (<d-) and g-, and then after nasalization of vowels underwent a retrograde change back to m-, n- and n̄-. The problem with this hypothesis is that there is no evidence that there exist modern reflexes of yang-sheng finals with denasalized initials.

Historical linguists of Chinese phonology have turned up solid evidence that Tang standard dialect experienced denasalization of nasal initials. (Mizutani 1957) Sino-Japanese Kan-on has also this trait. Could it be that denasalization in Southern Min is related to this particular development of Tang standard dialect? This possibility should also be ruled out, since given a shared innovation of Southern Min and not all southern Min dialects share this development to an equal extent, it is quite doubtful that the particular phonological trait was taken from the north. It must have been an internal development in Southern Min.<sup>2</sup>

## 2. Loan Phonology and Transfer of Rules

It is interesting to note that though a historical process as well as a diachronic rule denasalization is very much alive in the intuition of the native speakers of Southern Min. The phonological structure of the source language exerts its influence on the target language, and it consists of a set of constraints. For Southern Min in question the following three constraints have been formed following a series of fruitful discussions.<sup>3</sup>

### Constraint 1

The initial and coda cannot be both labial. Thus the following combinations, for example, are not well-formed.<sup>4</sup>

\*bVm

\*pVm

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<sup>1</sup> See Lass (1997: 123-139) for the importance of shared innovation dubbed as apomorphic derivation as a diagnostic test for linguistic subgrouping.

<sup>2</sup> Ong (1987: 217-218) conjectures, however, that denasalized initials in the colloquial stratum have their precursors in Tang Chang'an koine.

<sup>3</sup> For relevant literature see Chiu (1931), Luo (1930), Tung (1957, 1959) Tung et al (1967), Van der Loon (1966-67), Ong (1968, published as 1987), Bodman (1982, 1985), Yang (1982), Lin (1989), Li (1992), Tung (1992), Wang (1995), Chung (1996) and Hong (1996b) among others. To my knowledge Tung (1959) (cf. Ong 1987: 215) is the first work that explicitly addresses the issue of the interaction between initial and final and/or coda. The insight is formulated as constraints in later works.

<sup>4</sup> See Luo (1930: 40) as well as Lin (1989: 250).

### Constraint 2

If the coda of a close syllable is nasal (viz. -m, -n, oN) or stop (viz., -p, -t, -k) excluding the glottal stop, the initial cannot be a nasal (viz. m-, n-, N-). In other words, under such a phonotactic condition it is obligatory for nasal initials (viz. m-, n-, or N-) to be denasalized, yielding b-, l- (<d-) and g-. This is a rule of denasalization that is obligatory given such a condition and it is only applicable to a subgroup of Southern Min including Xiamen, Zhangzhou and Quanzhou but excluding Chaozhou, and Swatow.

### Constraint 3

If the vowel in the final is not nasalized<sup>5</sup> then the initial has to be denasalized.

Needless to say, Constraint 2 and Constraint 3 can be collapsed into a general constraint to the effect that the nasal initial has to be denasalized when the final is not nasalized. However, the tricky thing is that there are two possibilities for the CV syllable with no coda: (1) in the case in which V is nasalized, the initial C will have to be a nasal if the original sound is sonorant including nasals and lateral, and (2) when V is an oral vowel, the original nasal initial has to be denasalized as b-, l- or g-. A complementary view to Constraint 3 is that the initial has to be nasalized when the final is nasalized. Thus, there is an agreement between initial and final in terms of the feature of nasalization.

For the sake of easy exposition let us take Xiamen as representative of the Southern Min variety to which the rule of denasalization applies obligatorily. As documented in Kimura (1937) and Saitoo (1943), there is a host of interesting examples of Taiwanese speakers' mispronunciation of Japanese as shown in the following tables.

	correct pronunciation	mispronunciation	gloss
(1a)	m →	b	
	mannaka	bannaka	center
	minna	binna	everybody
	mendori	bendori	hen
	miwake	biwake	identify
(1b)	b →	m	
	tobikomu	tomikomu	jump in
	ichiba	ichima	market
	tsubame	tsumame	swallow
	konban	konman	tonight
	sanban	sanman	no 3
	bin	min <sup>6</sup>	vase

<sup>5</sup> There are two types of nasalization: (1) due to physiological constraints in our speech organ nasalization inevitably takes place when a vowel is followed by a nasal coda, (2) the nasalization of vowels with the loss of nasal codas. Nasalization of Type 1 is universal and phonetic, whereas nasalization of Type 2 is language-specific and phonemic. Here nasalization under discussion is phonemic and therefore belongs in Type 2. However, Cohn (1990) shows the language-specific nature of phonetics.

	correct pronunciation	mispronunciation	gloss
(2a)	n →	d	
	minarenai	midadenai	unfamiliar
	nandaka	dandaka	what
(2b)	d →	n	
	dame	name	bad
	danshi	nanshi	man
	damatte	namatte	silent
	nadakai	nanakai	famous

	correct pronunciation	mispronunciation	gloss
(3a)	n →	r	
	tainan	Tairan	Tainan
	sakunen	sakuren	last year
	kunin	kurin	nine persons
	hanete	harete	hop
(3b)	r →	n	
	noranai	nonanai	does not ride
	naranai	nananai	not become
	marinage	maninage	throw ball
	narimasen	nanimasen	not become

Most of the examples in (1a), (2a) & (3a) involve the transfer of the rule of denasalization from Xiamen to Japanese.<sup>7</sup> Such a rule of denasalization is a natural consequence of Constraint 2. That is, the co-presence of nasal in the initial (viz.  $\zeta$ ) and the final (viz.  $\zeta$ ) position in the syllable structure of  $\zeta VC_2$  violates Constraint 2. A strategy to overcome this obstacle is to change the value of  $\zeta_1 \zeta$  namely denasalize it. For example, *men*, an evident violation of Constraint 2 in *mendori* changes to *ben* as a way out of the dilemma. Patterns of denasalization such as  $m \rightarrow b$ ,  $n \rightarrow d$ ,  $n \rightarrow r$  can be explained in terms of the violation of Constraint<sup>8</sup>.

The ambiguous status of the syllable structure CV as to whether both C and V can be nasalized or remain oral can be relied on for explaining why CV can have an output of nasal C + V or an output of denasalized (viz. oral) C + V. Except for the cases of nasalization through assimilation as exemplified by a change *konban* to *konman* examples in (1b), (2b) & (3b) in particular those bearing the CV skeleton seem to be amenable to the thorough nasalization, a nasalization spreading all over the syllable.

<sup>6</sup> *Bin* does not violate Constraint 2 and yet the initial *b-* is nasalized in Taiwanese mispronunciation. A partial explanation is that Taiwanese speakers reinterpret the final *-in* as a nasalized vowel, and the initial *b-* therefore has to undergo obligatory nasalization in terms of the constraint of nasality agreement..

<sup>7</sup> Transfer of rules takes place when a phonological rule in a native system that is carried over to a foreign language the speaker of the source language speaks (Lehiste 1988: 3-4). Compare Van Coetsem (1988) proposal regarding transfer types of language contact one of which is imposition involving source language agentivity as opposed to borrowing involving recipient language agentivity.

<sup>8</sup> Takashima (personal communication) suggests that suprasegmental elements (pitch accent in the source language) may have a role in transfer error, since most examples involved share a common pitch accent.

Note that only the b → m, r → n and d → n alternations are observed. In other words, voiceless obstruent initials can be followed by nasalized vowels without being nasalized.

Not only learning Japanese but also learning Mandarin Chinese involves the transfer of rules as discussed above. Native speakers of Southern Min learning to speak Peking Mandarin tend to denasalize the initials in the target language. The following tables that are gleaned from Huang (1958) show that denasalization takes place in the mispronunciation of Mandarin by Southern Min speakers, specifically the denasalization of m- to b-, and that of n- to l-:

	correct pronunciation	mispronunciation	gloss
(5)	m →	b	
	mei-man 美滿	bei-ban	happy
	mian-mau 面貌	bian-bau	face
	maN mu 盲目	baN-bu	blind
	mai-mo 埋沒	bai-bo	bury

	correct pronunciation	mispronunciation	gloss
(6)	n →	l	
	nan 男	lan (=藍 blue)	man
	niaN 娘	liaN (=良 good)	mother
	niu 牛	liu (=流 flow)	cattle
	nau 惱	lau (=老 old)	upset

I have personally observed in the speech sound of native speakers of Southern Min the neutralization of n-, ½ and l- to l- resulting in a triplet of homophones in corrupt Mandarin, as 濃/容/龍 indiscriminately pronounced as ㄌ and 暖/軟/卵 indiscriminately pronounced as luan, as shown below:

	correct pronunciation	gloss		mispronunciation	gloss
	n →			l	
(7a)	noN 濃	thick	(7c)	loN (=龍)	dragon
(8a)	nuan 暖	warm	(8c)	luan (=卵)	egg
	½ →			l	
(7b)	roN 容	to hold	(7c)	loN (=龍)	dragon
(8b)	ruan 軟	soft	(8c)	luan (=卵)	egg

### 3. The Interaction between Segmentals and the Stratum Distinction

In terms of traditional phonology a syllable in Chinese falls into three parts: (1) initial, (2) final, and (3) tone. Tone is the suprasegmental superimposed on the segmental (viz., initial and final). Aside from other series of initials there is a series of sonorants including nasals (viz. mi 哩 \*m-, ni 泥 \*n-, niang 娘 \*ɲ-, ri 日 \*nZ-, yi 疑 \*N- and lateral 來 \*l-<sup>9</sup> in Middle Chinese (MC for short) epitomized in the book of rime Qieyun (601 AD) that are relevant to our discussion. In terms of the characteristics of the coda there are three types of finals in MC: (1) yin-sheng finals,

<sup>9</sup> The reconstructed values of MC initials given here are based on Li (1971) with some modification to avoid the use of diacritics.

the finals with no nasal or stop coda<sup>10</sup>, (2) yang-sheng finals, the finals with nasal codas (viz. \*-m, \*-n, \*N), and (3) ru-sheng finals, the finals with stop codas (viz. \*-p, \*-t, \*-k). The nasal and stop codas are homorganic since they share the place of articulation but differ in the manner of articulation. Let C and V stand for consonant and vowel respectively. The three types of finals can boil down in terms of the CV skeleton to (1) CV, an opened syllable, (2) VC<sub>2</sub>, a close syllable, where C<sub>2</sub> is occupied by - \*m, \*n & \*N and (3) C<sub>1</sub>VC<sub>2</sub>, a close syllable, where C<sub>1</sub> is occupied by \*-p, \*-t, & \*-k. In all the three CV skeletons C<sub>1</sub> is claimed by \*m-, \*n-, \*N- and \*N-.

Physiologically nasalization can be defined in oversimplified terms as taking place when with the lowering of soft palate air stream escapes through both nasal and oral cavities at once (Ohala and Ohala 1993). Nasalization of vowels can be taken phonetically or phonologically. As a universal phenomenon constrained by our speech mechanism phonetic nasalization can take place in the vicinity of nasal consonants. Only when the conditioning factor of nasalized vowels is lost (viz. the disappearance of nasal codas) do the nasalized elements become phonemic or contrastive. In sum, there are two types of nasalization: (1) phonetic nasalization, and (2) phonemic nasalization. For Southern Min under discussion there are two sources of vocalic nasalization: (1) nasal coda, and (2) nasal initial. Nasal coda is responsible for vocalic nasalization through regressive assimilation in yang-sheng finals, whereas nasal initial is the seed of vocalic nasalization through progressive assimilation in yin-sheng finals. For ru-sheng finals only after stop codas (viz. -p, -t, -k) are neutralized does vocalic nasalization take place through progressive assimilation.

For the yang-sheng finals with nasal initials, VC<sub>2</sub> is the skeleton where V is flanked on both sides by nasal consonants. In purely logical terms vocalic nasalization may occur through progressive or regressive nasalization. However, one can surmise that regressive (rather than progressive) assimilation takes place in that the coda that contributes nasality to the vowel have been lost.

It is claimed in Tung et al (1967) that nasal initials were first denasalized as b-, d- and g- presumably when the vowels had not been nasalized and then later on they underwent a retrograde change in which they changed back to nasals under a regressive assimilatory influence of the following nasalized vowels. Denasalization of nasal initials precedes vocalic nasalization through regressive assimilation on this assumption. The problem with this scenario is that Southern Min shares with other Min groups such as the Eastern Min dialect Fuzhou a common colloquial stratum and it is the colloquial stratum in Southern Min that underwent vocalic nasalization. However, the Fuzhou dialect has neither denasalized initials nor vocalic nasalization. Had denasalization occurred before vocalic nasalization, it would have hit Fuzhou dialect as well since Southern Min and Eastern Min would have a common stage with shared innovation before they broke up into separate groups. A more plausible hypothesis would be that both denasalization and vocalic nasalization took place after Southern Min and Eastern Min parted company. A solution to this thorny problem is to consider the interaction between the two phonological processes in conjunction with stratum

<sup>10</sup> The yin sheng finals have voiced stop codas in Li (1972) reconstruction.

<sup>11</sup> However, Hajek (1997: 82) argues that nasal deletion is not necessarily a precondition for vocalic nasalization to become phonological.

distinction. First take a look at the following chart where the co-occurrence restriction between initials and finals with respect to stratum distinction<sup>12</sup> is encapsulated:

	MC types of initials	modern initials	MC types of finals	modern vowels	coda	stratum distinction
1a	MC nasals	b-, l-, g- m-, n-, N- h-	yin-sheng finals	V	-0	colloquial
1b				V <sup>n</sup>	-0	literary
1c				V <sup>(n)</sup>	-0	colloquial
1d				MC obstruents		V
2a	MC nasals	b-, l-, g- m-, n-, N-	yang-sheng finals	V	-m, -n, -N	literary
2b				V <sup>n</sup> /N	-0	colloquial
2c	MC latetral	l- n-		V	-m, -n, -N	literary
2d				V <sup>n</sup>	-0	colloquial
2e	MC obstruents			V <sup>n</sup>	-0	colloquial
2f				V	-m, -n, -N	
3a	MC nasals	b-, l-, g- b-, l-, g- m-, n-, N-	ru-sheng finals	V	-p, -t, -k	literary
3b				V	-/	colloquial
3c				V <sup>n</sup>	-/	colloquial
3d	MC obstruents			V	-p, -t, -k, - /	

For yang-sheng finals the nasalized vowels belong to the colloquial stratum, as in (2b) & (2d), and denasalization of initials apply only to the words in the literary stratum, as in (2a). There is an additional colloquial stratum where the nasal initial underwent spirantization yielding the glottal fricative h- and nasal is either incorporated into the vowel or simply lost, as in (1c) exemplified by words such as <sup>7</sup>nia 'rtimesia', hm<sup>5</sup> 'atchmaker' and hi<sup>(n)7</sup> 'ar'.<sup>13</sup> As stratum distinction is coterminous with distinction in temporal dimension, colloquial and literary strata represent different chronological profiles, and their paths have never crossed. For yin-sheng finals nasalized vowels through progressive assimilation belong to the literary stratum, as in (1b), and denasalization of initials occurred in the words in the colloquial stratum, as in (1a). Yet it should be cautioned that in some sporadic cases it is the vowel quality that shows the stratum distinction, as in the contrast between <sup>5</sup>ē(col.) and gā<sup>5</sup> (lit.) 牙 'ooth, tusk'. Gā<sup>5</sup> might well be derived from its earlier form <sup>7</sup>na by analogy with the colloquial form <sup>5</sup>ē. For ru-sheng finals the glottalized vowels, whether or not they are nasalized, definitely belong in the colloquial stratum, as in (3b) & (3c), whereas the finals with stop codas where denasalization of initials inevitably occur are found to be in the literary stratum, as in (3a). It should be noted that for some words in this category the stratum distinction depends on the vowel quality, as shown in the contrast between 木bak<sup>8</sup> (col.) and bok<sup>8</sup> (lit.). It is quite striking that for ru-sheng finals progressive vocalic nasalization takes place only after neutralization of the stop codas or rather glottalization of vowels. In other words, -V<sup>n</sup>p, -V<sup>n</sup>t and -V<sup>n</sup>k are impossible, since vocalic nasalization as a colloquial form and -p, -t or -k as a literary form are not

<sup>12</sup> Stratum distinction is established in terms of a contrast of phonological categories reflecting chronological strata.

<sup>13</sup> There are some minor cases where the stratum distinction is indicated by the vowel quality rather than vocalic nasalization, as in the contrast between bang<sup>7</sup> (col.) and bong<sup>2</sup> (lit.) 網.

compatible. Sound change has a life cycle of its own and is temporarily constrained. Phonological processes belonging to different chronological strata seem to be set apart from each other. However, as advocated in thesis of bidirectional diffusion (Wang and Lien 1993) chronologically distinct strata may begin to interact with each other after a long period of coexistence.

#### 4. Patterns of Denasalization in Subgroups of Southern Min

There are two subgroups of Southern Min: (1) Quanzhou and Zhangzhou group, and (2) Chaozhou and Shantou (viz. Swatow) group. One of the criteria by which they can be distinguished is the development of nasal and lateral initials. Here let us take Xiamen (formerly known as Amoy) and Chaozhou as a representative of each group respectively. There are features of their development that we can detect from the following two charts:

The co-occurrence restriction of initials and finals in Xiameñ<sup>14</sup>:

	b-	m-	dz-	l-	n-	g-	N-	finals
①	✓	✓ <sup>15</sup>	✓	✓	✓	✓	✓	-V
②	✓	✓	✓	✓	✓	✓	✓	-V <sup>l</sup>
③	×	✓	×	×	✓	×	✓	-V <sup>n</sup>
④	×	×	✓	✓	×	✓	×	-Vm
⑤	×	×	✓	✓	×	✓	×	-Vp
⑥	✓	×	✓	✓	×	✓	×	-VN
⑦	✓	×	✓	✓	×	✓	×	-Vk
⑧	✓	×	✓	✓	×	✓	×	-Vn
⑨	✓	×	✓	✓	×	✓	×	-Vt

The co-occurrence restriction of initials and finals in Chaozhōu<sup>16</sup>:

	b-	m-	dz-	l-	n-	g-	N-	finals
①	✓	✓	✓	✓	✓	✓	✓	-V
②	✓	✓	✓	✓	✓	✓	✓	-V <sup>l</sup>
③	×	✓	×	×	✓	×	✓	-V <sup>n</sup>
④	×	×	✓	✓	✓	×	✓	-Vm
⑤	×	×	✓	✓	✓	×	✓	-Vp

<sup>14</sup> The data are based on Douglas (1873).

<sup>15</sup> As recorded in Douglas (1873) the nasals m-, n-N-, viz., those in rows ① & ②, can also be followed by non-nasal finals in sporadic cases. In the introduction (Ibid.: xii) he observes that vowels are not distinctively nasalized in some words. Tung (1957), Tung et al (1967), Bodman (1955: 182-184) and Beijingdaxue Zhongguo Yuyan Wenzhi Yanjiuxi & Yuyanxue Jiaoyanshi 1989: 35) claim that m-/b-, n-/l- & N/g- are in complementary distribution respectively. However, the evidence presented here seems to indicate that van der Loon (1966-17: 116-117) is on the right track in taking them as overlapping. This treatment is anticipated by Luo (1930: 52) where he cautiously sets up each pair as separate elements. It should be mentioned, however, that the traditional local rime book *Sip Ngo*.<sup>n2</sup>-im<sup>1</sup> 十五音 (for a recent study of a variety of rime books in question see Hong (1996a)) has only a series for stop and nasal initials and it is the finals that make the distinction. But such an arrangement does not necessarily imply that each pair of sounds can be collapsed into a phoneme.

<sup>16</sup> The data in this chart are gleaned from Lin et al (1996).

⑥	✓	✓	✓	✓	✓	×	✓	-VN
⑦	✓	✓	✓	✓	✓	✓	✓	-Vk

If we take nasalization and postvocalic glottal stop not as a coda but an integral feature of vowel<sup>17</sup>, we can say that the finals ① ② ③ and ④⑤⑥⑦⑧⑨ are opened and close syllables respectively in Xiamen, Likewise, the finals ② ③ and ④⑤⑥⑦ are opened and close syllables respectively in Chaozhou. For opened syllables in both Xiamen and Chaoshou the nasal initials m-, n-N- and their denasalized counterparts b-, l- (<d-), g- are not wholly in complementary distribution. However, for close syllables these two groups of initials are in complementary distribution in Xiamen. In short, nasal initials cannot occur in close syllables, whereas the denasalized initials can.<sup>18</sup> In contrast, Chaozhou does not have such a prohibition against the occurrence of nasal initials in close syllables. Since the coda -n and -t are lost in Chaozhou, there are only velar and labial left. As shown below, m- is evidently more restricted in its combination possibilities than n- and N.

m	n	N	Coda
✓	✓	✓	-N
✓	✓	✓	-k
×	✓	✓	-m
×	✓	✓	-p

The evidence of such rare minimal pairs as bak<sup>8</sup> 𣎵 and mak<sup>8</sup> 𣎵 in Chaoshou (Beijingdaxue Zhongguo Yuyan Wenzhi Yanjiuxi & Yuyanxue Jiaoyanshi 1989: 103) prompts us to take a fresh look at our perceived notion of phoneme as a categorical element with no fuzzy area. For opened syllables derived from earlier ying-sheng rimes m/b- as well as n/l- and N/g- are not wholly in complementary distribution. In particular, nasal initials are not necessarily followed by nasalized vowels; vocalic nasalization varies with words.

There is another point of difference between Xiamen and Chaozhou partially as a natural consequence of the co-occurrence restriction between initial and final we have just discussed. Although both dialectal groups experienced denasalization of initials, Chaozhou is a lagger whereas Xiamen is a leader. The nasalization turns m-, N-, to b-, d-, g-. Since d- and l- are quite close in phonetic character, they merge into l-. In terms of co-occurrence restriction between initial and coda Xiamen does not tolerate a combination of n-V-m, n-VN, n-V-n. The nasal initial n- has to be denasalized as -d, which in turn merges with l- to overcome such a violation yielding words like lam<sup>5</sup> 'ale', la N<sup>5</sup> 'us' and lien<sup>5</sup> 'ear'. Thus, words with the initial l- in Xiamen are derived from two sources: (1) those with the primary \*l- and (2) those with the denasalized n-. In contrast, words with the initial l- in Chaozhou are derived from those with primary \*l-, not the secondary l- as a result of the merger of the primary l and denasalized n-, since the dialect allows the combination of n-V-m and nVN and

<sup>17</sup> Ogawa et al (1931-32) Japanese transliteration of Taiwanese reflects such a tendency in that postvocalic glottal stop and nasalization are treated as a tonal feature. See also Tung (1961) and Li (1992).

<sup>18</sup> As specified in Constraint 1, b- can not co-occur with -m or -p for the prohibition against the co-presence of bilabials in initial and coda in a syllable. It is interesting that velar does not have such a constraint.

it is not necessary for the initial to be denasalized. In spite of the difference between them there is a commonality worth mentioning: when the MC initial \*l- is followed by a nasalized vowel, it will be nasalized as n- through regressive assimilation, as in *na orest'* (cf. the literary reading *lim*<sup>5</sup>). Both dialect subgroups share the merger of l- to n- in this respect..

Denasalization of initials and vocalic nasalization are two important features that set Southern Min off against other Min dialects<sup>19</sup>. In its historical development the Putian dialect seems to have once shared these two features. The base on which this dialect is built on may be Southern Min<sup>20</sup>. Yet it is commonly held that Putian is a transitional dialect between Eastern Min and Southern Min. On the one hand, morphophonemic alternation rich in Fuzhou is also quite common in Putian. On the other, its denasalization of nasal initials is reminiscent of Southern Min dialects. Yet Putian is a further development of denasalized initials uniquely found in Southern Min in that it shares with Xiamen and Chaozhou the denasalization of initials but further devoiced the derived stops leading to the genesis of voiceless stops as exemplified by the following scenario:

m→b	→p
n→d	→t
nZ→dz	→ts
N→g	→k

The co-occurrence restriction of initials and finals in Putian is shown in the following chart:<sup>21</sup>

	m→b →p	m	nZ→dz →ts	n→d →t	n	N→g →k	N	final
①	✓	✓	✓	✓	✓	✓	✓	-V
②	✓	✓			✓	✓	✓	-V'
③		✓			✓		✓	-VN
④				✓				-Vk

The voiceless unaspirated affricates as reflexes of MC nasal series will eventually coalesce with their counterparts in the primary MC *quanqing* series. Aside from this unique independent development Putian also underwent the denasalization of nasalized vowels.<sup>22</sup> It shares this further development with Suixi and Hainan dialects in Guangdong province.<sup>23</sup>

To summarise, Southern Min as a dialectal group (viz. Xiamen and Chaozhou) as well as some other closely related dialects (viz. Putian, Suixi and Hainan) seems to

<sup>19</sup> It is tempting to conjecture that there is a correlation between denasalization of initials and vocalic nasalization. However, the Yong'an dialect as reported in Norman (1980) in contrast to the one given in Zhou and Lin (1992) has nasalized vowels but the initials are not denasalized.

<sup>20</sup> However, Norman is of the opinion (personal communication) that Putian is closer to Fuzhou in its substratum.

<sup>21</sup> The data in the chart are distilled from my own field work (Lien 1993).

<sup>22</sup> Nakajima (1979), Chen and Li (1982), Li and Chen (1985) and my data (Lien 1993) provide evidence for such an observation. However, Chang (1972) and Li (1985) still show the existence of nasalized vowels.

<sup>23</sup> For Suixi dialect see Yue-Hashimoto (1985) and for Hainan dialect see Yun (1987).

share some common phonological innovations such as the denasalization of initials and vocalic nasalization, and loss of nasalized elements can be counted as a further development. They are the two important features that set Southern Min apart from other Min dialects such as Longdu, Taishun and Fuzhou as shown below:

Dialects	Reflexes of MC nasal initials	Nasalization of vowels	loss of nasalized elements
Xiamen	m, n, N/b, l, g	✓	×
Chaozhou	m, n, N/b, l, g	✓	×
Putian	m, n, N/p, t, k	✓	✓ % <sup>24</sup>
Suixi	m, n, N/b, l, g	✓	✓
Hainan	m, n, N/ b, l, g	✓	✓
Longdu <sup>25</sup>	mb, nd, Ng	×	×
Taishun	m, n, N	×	×
Fuzhou	m, n, N	×	×

## 5. Closing Remarks

In this paper we have offered some thoughts about issues related to the chronology of phonological rules in particular with respect to the denasalization of initials and vocalic nasalization in Southern Min. Close attention is given to the interaction or rather co-occurrence restriction between initial and final specifically the coda. A range of pretty engaging points has emerged as a result of our preliminary investigation. For example, a marked contrast can be observed between two important subgroups of Southern Min, namely Xiamen and Chaoshou, with respect to the extent of denasalization of initials. Although the difference can be defined in purely structural terms and independent of lexical perspective for close syllables, the problem does not seem to be amenable to such a purely phonological treatment in the case of opened syllables. There emerges a more complicated picture in which alternation between oral and nasal initials may be accounted for in terms of consideration of rich chronological strata or it may well have to do with a lexical basis explainable in terms of lexical diffusion.<sup>26</sup> These fascinating problems are worth our future endeavor.

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<sup>24</sup> The percent sign indicates that dialectal data do not agree on the presence of denasalization of vowels.

<sup>25</sup> For the data on Longdu, Taishun and Fuzhou see Egerod (1956), Walton (1986) and Beijing Daxue (1989) respectively.

<sup>26</sup> In line with the thesis of lexical diffusion (Wang 1969), Kiparsky (1988, 1994, 1995), Harris (1989) and McMahon (1991) explore the lexical aspect of sound change. In tackling the issue of denasalization and vocalic nasalization we come up with evidence of the lexical aspect of sound change in opened syllables derived from earlier ying-sheng rimes. That is, there is no hard and fast rule without reference to lexicon that can be applied across the board to determine when vowels undergo nasalization.

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