VOT Contrasts in Zhongshan Min

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Abstract

Zhongshan Min is a Northern Min variety spoken in and around the city of Zhongshan in Guangdong province. This paper deals with the phonetic properties of oral stops in Zhongshan Min. Egerod (1956) reports the existence of prenasalized voiced stops [ᵐb, ⁿd, ᵑg], but our VOT analysis based on our fieldwork data (5 speakers, 346 syllables) shows that the oral stop element [b, d, g] is optional; these stops are commonly realized as plain nasals.

Keywords

Northern Min, stops, voice onset time, prenasalized stops

1. Introduction

In this paper, we investigate the Voice-Onset-Time (VOT) contrast in stops (both nasal and oral) in Zhongshan Min, with special focus on prenasalized stops. Min languages are known for their three-way contrast in stops although only a few Min dialects have been the subject of detailed phonetic study (Shen 2012, Donohue 2013).

This paper assesses the status of this three-way contrast in stops in Longdu, a dialect of Zhongshan Min spoken in Guangdong.

The Min speaking people started migrating from Fujian (福建) to Zhongshan in the Northern Song period (1023-1031) (Chong 2010). That means Zhongshan Min has developed independently of the other Min varieties for about 1000 years. Zhongshan Min, as of now, is a mixture of the Min dialects brought by immigrants as well as a result of language contact with the surrounding Cantonese, in particular the Cantonese in Shiqi (石岐), an urban district in the centre of Zhongshan (Egerod 1956, Gao 2000). As reported in Bodman (1982), many words related to government, education and modern technology in Zhongshan Min were borrowed from the Shiqi dialect.

Zhongshan Min has three main dialects: Longdu (隆都話), Nanlang (南朗話) and Sanxiang (三鄉話) (Gao 2000). This study focuses on the Longdu dialect spoken in Dachong village

(大涌) (population: 74276, 2010 Chinese census). Using regular sound correspondences, Bodman (1982, 1985) classifies both Longdu and Nanlang as Northeastern Min, a branch with which Fuzhou is the prestige variety. The Sanxiang dialect differs from the other two and belongs to the Southern Min branch (Bodman 1982).

Longdu makes up about 15% of the Zhongshan County. Zhongshan is a famous *qiaoxiang* (僑鄉) [home town of overseas Chinese] from where a lot of people emigrated to various Pacific ports including Sydney, Hawaii and San Francisco. It is difficult to estimate the proportions of village members going overseas partly due to the lack of reliable statistics. It was, however, one of the few places that have immigrates large enough to organize their own associations in the aforementioned three Pacific Ports (Williams 2004).

The only available grammatical description of the Longdu variety is Egerod (1956). Egerod reports the existence of prenasalized voiced stops [^{m}b, ^{n}d, ^{ŋ}g], but our data show that the oral stop element [b, d, g] is optional; these stops are commonly realized as plain nasals. It is conceivable that such change is due to phonological convergence with Cantonese, which has voiced nasal, and plain and aspirated voiceless oral stops. The contact-induced change is likely to have taken place within the last 60 years.

Voicing contrast is found only in some Sinitic languages and it is typically restricted to fricatives (Maddieson 2013a). With respect to stops, distinction in voicing is quite common cross-linguistically: Maddieson (2013b) reports that about 45% of his sample (567 languages) maintain a systematic voiced~voiceless opposition in stops. However, about 17% of the sample has no voiced stops at all. Many of these languages are found in Southeast Asia.

Many Min languages typically display a three-way phonemic contrast in oral stops (Lien 2015: 160-161). This contrast originates from a reconstructed six-way Proto-Min system where voiced and voiceless stops show a three-way contrast between plain (p/b), aspirated (p^{h}/b^{h}) and so-called 'softened' stops (Handel 2010a). Norman (1986) suggests that the 'softened' initials were prenasalized (i.e. ^{m}p/^{m}b). In various Min branches the old voiced obstruents have had different fate: voiced obstruents devoiced and nasals generally denasalized (except in Northern and Eastern Min), resulting in the complementary distribution and no phonemic contrast between homorganic stops (m/b, etc.) (Lien 2015: 160).

In Southern Min, the original three-way contrast was lost when the voiced obstruents were devoiced; the present-day voiced obstruents come from voiced nasals (Lien 2015: 160). Handel (2010a) shows that in all Northern Min dialects, the reconstructed 'softened' initials occur in syllables that show pitch depression. This seems logical, because clusters containing

nasals can act as ‘pitch depressors’. This process is well known from Bantu, whereas in the Southeast Asian context, it is usually referred to with the term ‘register’ (Miller 2012: 274).

The mapping of the modern day Zhongshan Min on the Proto-Min system is a topic for a separate paper, but the above is to illustrate the complexity of the inherited system of stops, in which the 3-way contrast is inherited, despite its permutations through time. The phonology of the Longdu dialect of Zhongshan Min is described in detail in Egerod (1956). The stop inventory (Egerod 1956: 27-28) has a three-way contrast, characterized by the following phonetic features:

(1) p bilabial, unvoiced, unaspirated, unnasalized, unmodified stop
pʰ bilabial, unvoiced, aspirated, unnasalized, unmodified stop
ᵐb bilabial, voiced, unaspirated, prenasalized, unmodified stop
(2) t alveolar, unvoiced, unaspirated, unnasalized, unmodified stop
tʰ alveolar, unvoiced, aspirated, unnasalized, unmodified stop
ⁿd alveolar, voiced, unaspirated, prenasalized, unmodified stop
(3) k velar, unvoiced, unaspirated, unnasalized, unmodified stop
kʰ velar, unvoiced, aspirated, unnasalized, unmodified stop
ᵑg velar, voiced, unaspirated, prenasalized, unmodified stop

Egerod (1956: 37) notes that the prenasalized stops [ᵐb], [ⁿd], and [ᵑg] may be considered on the phonological level either as (i) clusters (nasal + homorganic stop), (ii) stops, or (iii) nasals. In his syllable type inventory, Egerod treats them as clusters (Table XI, p.38-40), and as nasals in the Syllabary (p.83-117). Similar facts are reported for the Nanlang dialect in Bodman (1982: 4).

In the production of stops, the phonetic feature that corresponds to both voicing and aspiration contrast is voice-onset time (VOT) (Lisker and Abramson 1964). It is the interval between the burst of the release of the stop closure and the onset of quasi-periodicity that reflects laryngeal vibration (Lisker and Abramson 1964: 422). Voice-onset time is usually thought of as highly effective in separating phonemic categories in initial stops, although languages differ in their number and features. Lisker and Abramson (1964) propose three categories: lead, short and long lag. Their number has been expanded since, for example, Cho and Ladefoged (1999) distinguish four types of lag.

More complex stop systems are usually distinguished in production by a voicing lead (negative VOT) and short and long lag (low and high VOT), as reported on Taiwanese Southern Min

(Iwata, Sawashima, Hirose and Niimi 1979). The VOT ranges characterizing each category are discrete, although VOT varies with place of articulation and is known to be higher for velars (Cho and Ladefoged 1999: 201). Rarely, a three-way opposition exists among voiceless stops, as in Korean, but has been shown to also correlate with laryngeal states (Lee and Jongman 2012).

Finally, nasals and prenasalized stops are generally characterized by abrupt spectral change from nasal murmur into vowel formants. Nasal murmur is understood as acoustic consequence of the sound radiation through the nasal cavity, manifested in the spectrogram by the 'hole' in the spectrum in the mid-frequency ranges (Harrington 1994, Chen 2000). Instances and distribution of nasal murmur in Zhongshan Min will be discussed in section 3.

2. Methodology

In our data collection, we follow the recommendation, as outlined in Handel (2010b: 40-41), to elicit as many words as possible, including everyday colloquial words regardless if there exists Chinese characters to record them. Our data are elicited using Cantonese or words occurring in texts, which were recorded as isolated syllable afterwards. Their cognacy with a written character is determined post-hoc and where none could be established, we only include an English gloss. The words examined are listed in the appendix.

In this paper we report the VOT values of Zhongshan Min stops among five speakers (four female: F1-F4, one male: M1), using elicited isolated syllables. Morris, McCrea and Herring (2008) have shown that there are no significant male-female differences in VOT in English, although they did find a trend among women to have a slightly longer VOT in voiceless stops. We therefore do not consider the gender bias among our participants to be problematic.

The richest data source is F4, who has moved as an adolescent first to Macau and later to Hong Kong and is married to a Cantonese speaker who does not speak Zhongshan Min. If phonological convergence with Cantonese occurs, it is likely to be the most advanced in her case.

The recording is done in several quiet venues in Hong Kong and Zhongshan, including the Hong Kong Baptist University Phonology Laboratory. The isolated syllables were usually repeated 2 or 3 times and were followed by an improvised example sentence (frame sentences proved unpractical for older speakers).

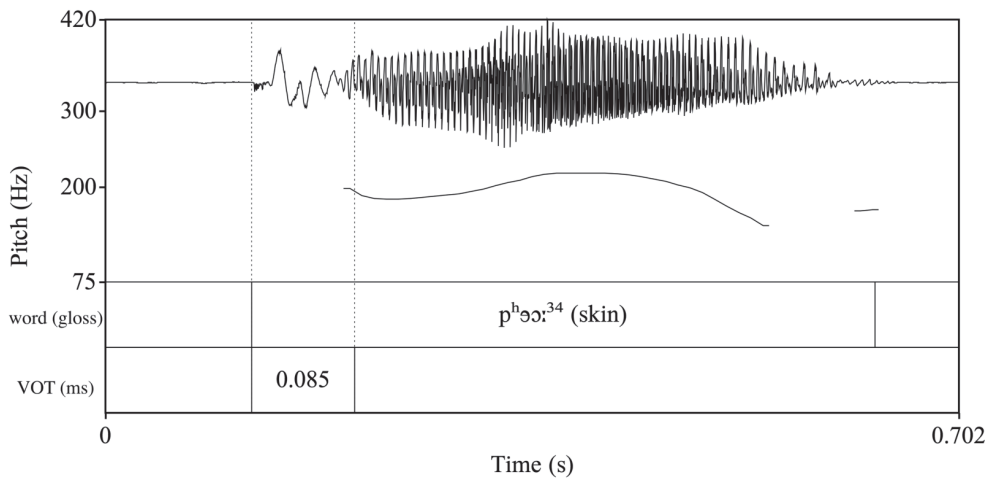
An example of the word and a carrier sentence by F2 is given below in (4) and (5) respectively:

(4) hɪː[35], hɪː[35]
open.market, open.market

(5) hɔ[33] nɔɪ[33] dʊː[55] mɔ[33] kʰɘɔ[21] kɘɔɪ[21] hɪː[35] lɔ[42]
very long.time PART not.have go ASP open.market SFP
'(I) haven't been to the market for a long time.
(我) 很久沒去過墟啦 ' [20130600ZSMP.1003]

In such environment, the VOT is expected to remain unchanged, but for both long lag and pre-voiced categories, the duration is expected to be longer and the categories are expected to be discrete (Kessinger and Blumstein 1997). We compared only the measurements on the isolated syllables, errors and self-corrections were discarded. The measurements were done manually using Praat (Boersma and Weenink 2013). In Figure 1, we show an example of the word pʰɘɔː[34] skin, 皮 , as pronounced by F1. The dotted lines show the duration of the aspirated labial stop /pʰ/, whose duration is recorded in milliseconds.

Figure 1. Measurement of the aspirated stop release in pʰɘɔː[34] skin, 皮 (F1)



We measured a total of 346 syllables, unevenly distributed across speakers and syllable types (open and closed, with different F0, and vowel height). An overview of the contribution of the individual speakers is given in the table below. The uneven distribution is a consequence several factors: (i) distribution of the individual sounds in the language is not uniform, (ii) we have not used a standardized list for all 5 speakers, but rather mined an existing corpus of their speech for the contrasts, and (iii) made additional recordings only to address the least represented sounds (in particular the pre-nasalised stops).

Table 1 Different contributions of stop types by our informants

	ᵐ(b)	p	pʰ	ⁿ(d)	t	tʰ	ᵑ(g)	k	kʰ	total
M1	4	0	4	2	12	5	0	8	2	37
F1	8	27	7	8	3	4	18	2	7	84
F2	6	8	8	2	6	2	0	8	2	42
F3	0	0	0	0	8	10	0	2	0	20
F4	0	35	3	0	68	3	0	30	24	163
total	18	70	22	12	97	24	18	50	35	**346**

Our measurements are restricted to monosyllabic words, because of the voice assimilation process affecting longer words. It appears that voiceless stops in word-medial positions in Zhongshan Min become voiced. A similar process is reported for Shibei Min (Shen 2012: 51). It is yet to be established whether the voiced consonant has any depressor effect on the pitch in such environment.

3. Results

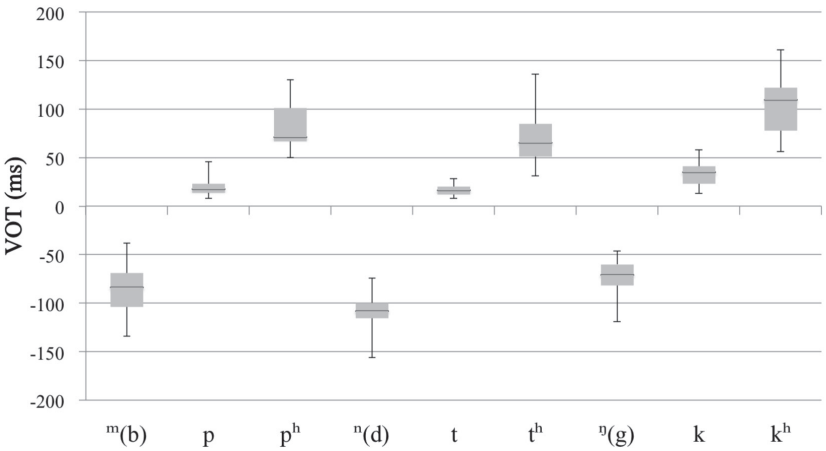
VOT values for Zhongshan Min stops follow the cross-linguistically common pattern, where the values for velars are somewhat higher than for the labial and alveolar stops. The median and mean values for all speakers combined are listed in in Table 2:

Table 2 Summary of the measurements (median, mean, and standard deviation)

	ᵐ(b)	p	pʰ	ⁿ(d)	t	tʰ	ᵑ(g)	k	kʰ
median	-84	17	70	-108	16	65	-71	35	109
mean	-85.9	19.8	81	-113.5	16.4	69	-73.2	33.5	103
St.Dev	24.6	8.9	23.2	22.8	5.1	27.2	20	11.1	25.8

Note that there is no inter-quadrille overlap between the categories, with the exception of a small overlap in the voiceless and voiceless aspirated velar. The medial values are well separated. According to Cho and Ladefoged's typology (1999: 223), the contrast in voiceless stops is realized as: (i) unaspirated (mean below 30ms) (ii) aspirated (mean of 90ms) and (iii) highly aspirated (mean over 90ms).

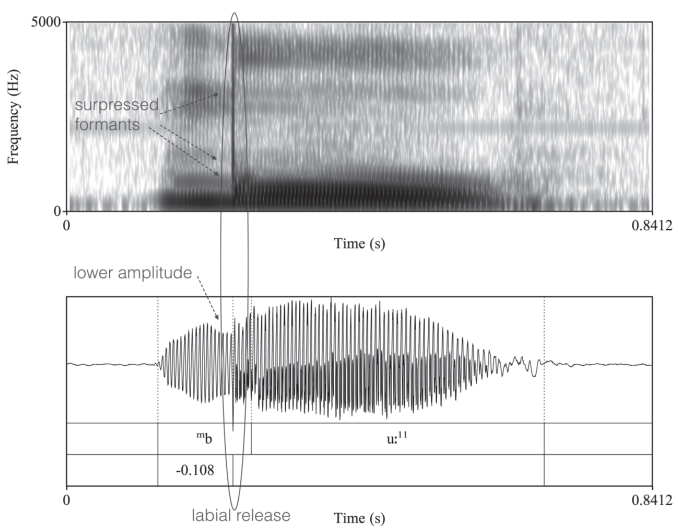
Figure 2 VOT distribution of Zhongshan Min (all speakers)



The horizontal line in each box represents the median value. The vertical bars indicate the VOT range for each category

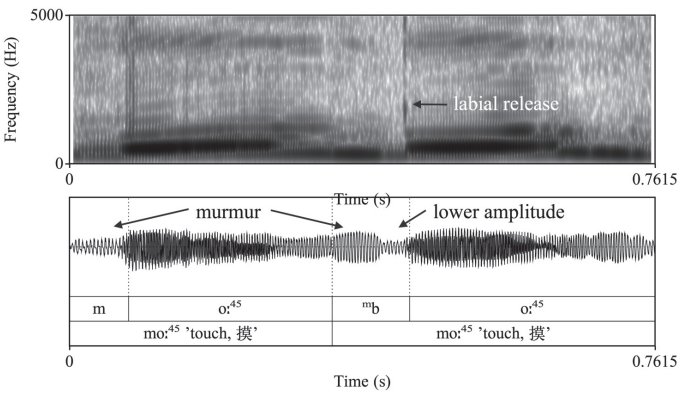
We have found no instances of constant prenasalized onsets. Several listed tokens of the same initial may vary in whether or not the stop release is detectable. An example of a prenasalized stop is given in Figure 3. The dark vertical line in the spectrogram, timed at about 100ms into the nasal, represents the noisy labial release following the nasal murmur, which is visualized by the dark band in the lower frequency. Tokens with oral release typically show also a drop in amplitude in the period immediately preceding the release.

Figure 3 Prenasalized stop release in ᵐbu:¹¹ 'mist, 霧 ' (F1)



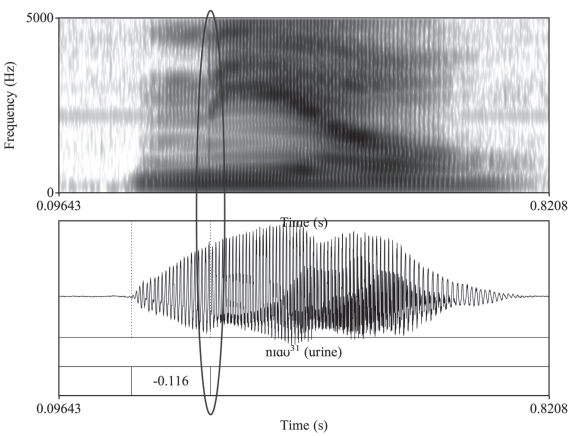
A single item can be realized with both the oral release following the murmur and without it, as shown in Figure 4 below. The spectrogram shows nasal murmur in both cases, but the transition into vowel is smooth, without lowering the amplitude, which only happens when the labial muscles are more tense and a tensed release generates a burst of air, visible in the black band running through all frequencies of the spectrum in the second item.

Figure 4 Variable labial release in mo:^{45} 'touch, 摸 ' (F2)



The nasal murmur is the only constant feature shared by all tokens: it is visible in the dark band at the bottom of the spectrogram, representing the energy concentrated in the lower frequencies. The tension building up on the lips suppresses the resonance of the oral cavity and corresponds to the drop in amplitude and suppressed formants prior to the stop release, as shown in Figure 5.

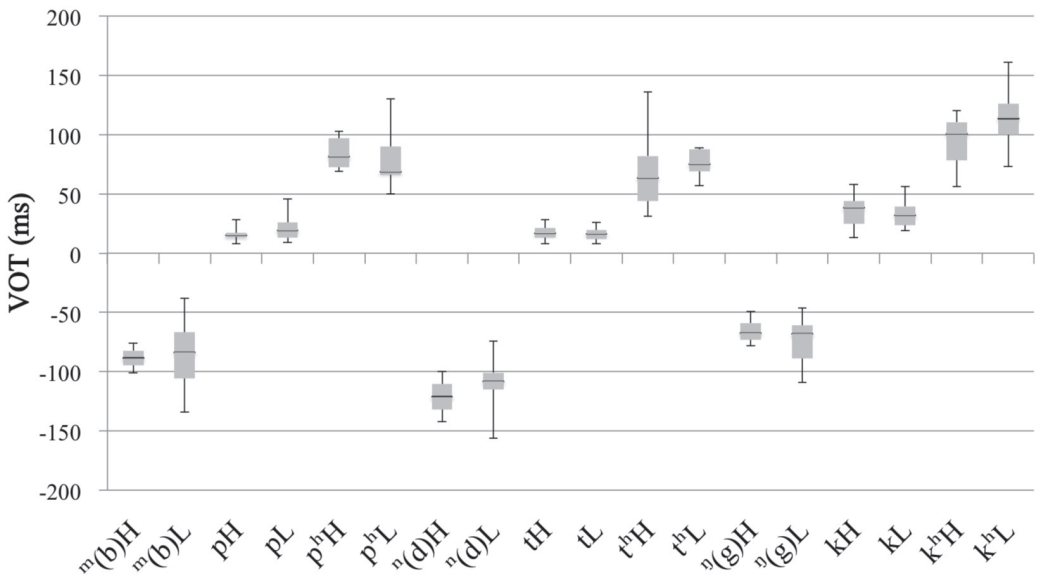
Figure 5 Alveolar stop release in niɑʊ^{31} 'urine, 尿 ' (F1)



Egerod observes (1956: 37) that the voiced stops in Longdu are prenasalized. The Zhongshan Min prenasalized stops regularly correspond to voiced stops in Southern Min, where in some dialects these are realized as voiced stops, giving rise to a three-way distinction in VOT (Iwata, Sawashima, Hirose and Niimi 1979). As shown above, in our data, the nasality is the obligatory feature, while the oral release is optional.

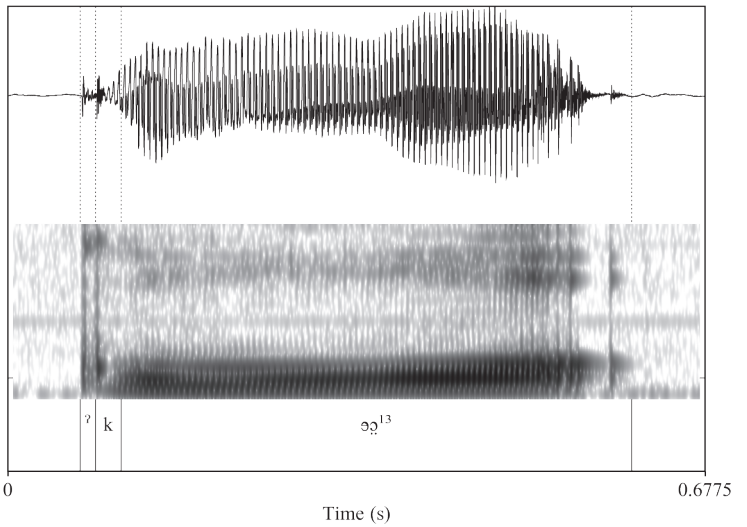
We found no significant interaction between tone or vowel quality on one hand and VOT on the other. The measurements are visualized in Figure 6, where the capital L and H following the stop indicate the high or low tones on the vowel. If there are differences in the VOT range, they can be attributed to the sample size, rather than to the pitch level of the tone-bearing unit.

Figure 6 VOT distribution of Zhongshan Min (all speakers) compared on tone (median and range indicated as in Figure 1)



Finally, we found that some stops are realized as preglottalized and usually co-occur with creaky voice elsewhere in the syllable. It is illustrated in Figure 7, where the creakiness occurs at the end of the second vowel. Presently, we do not have sufficient number of examples from all speakers to determine its phonological value. Egerod (1956) does not report this feature. The main question is whether the creakiness is associated with segments, or with larger units, and this requires further investigation.

Figure 7 Realization of the pre-glottalized velar stop [ʔk] in ʔkəɔ̰¹³ 'fruit; 果'



According to Kingston (2011: 2313), creaky voice can be associated with both low and high F0, resulting from the glottal constriction using thyroarytenoid muscle alone (low F0) or together with the cricothyroid muscle (high F0). This could mean that an entire syllable may have glottal articulation, but it is yet unclear, whether it is justified to speak of different types of phonation, as it is in for example Fuzhou Min (Donohue 2013), or Vietnamese (Nguyen and Edmondson 1998).

4. Discussion

Zhongshan Min has a robust VOT distinction in stops. We have found that the prenasalized stops reported by Egerod (1956) are frequently realized as nasals with no audible oral burst, even within the same list of three tokens. It is presently unclear whether there is any correlation between the optionality of the oral stop feature and any other phonological feature, such as tone (cf. Shen 2012: 43).

It is fair to say that many speakers of Zhongshan Min are either unaware or have only recently become aware that their 'dialect' is a Min variety instead of yet another dialect of Cantonese. The Zhongshan Min speaking area has developed rapidly over the last two decades with a concentration of textile and furniture industries. Such rapid societal change could further weaken a typical feature, standing out in the dialect context of Cantonese, as suggested by Egerod (1956: 210). Longdu has therefore become more similar to the neighboring Nanlang dialect, which Norman (1981: 4) describes as having nasal stops with optional clusters of

nasals and homorganic voiced stops. While in Nanlang such clusters are prominent only before /i/, no such bias can be detected in our data.

Further research will concentrate on the role of phonation and its interaction with realization of stops and tones, described for Fuzhou and Shibei Min, which are both closely related (Donohue 2012, 2013, Shen 2012). The VOT measurements establish firmly the presence of a three-way contrast. Whether the ambiguous nature of the nasal and prenasalized stops is due to the internal development of this variety or result of language shift remains to be established, although the idea of phonological convergence with Cantonese due to more intense contacts and bilingualism of the modern era certainly remains a plausible explanation.

Wordlist

ka:ʊ^{13} 'dog; 狗'
kɛ:^{31} 'general.classifier; 個'
kəɔ^{13} 'fruit; 果'
kəɔ^{h45} 'melon; 瓜'
k^{h}a:u^{45} 'cross, intersect (in ma:^{55}k^{h}a:u^{45} 'argue'); 交'

k^{h}ɪɛ^{31} 'to stand; 企'
k^{h}oʔ^{31} 'itchy throat'
k^{h}u:^{13} 'bitter; 苦'
kɪɛ^{11} 'to calculate; 計'
kɪɛh^{45} 'chicken; 雞'
ko:^{31} 'sue (v.); 告'
kɔ:^{45} 'older.brother; 哥'
kʊɪ^{31} 'closet; 櫃'
kʊɔɪ^{13} 'to worship, pray'
mɑ:^{13} 'horse; 馬'
m(b)əɔ^{13} 'grind, whet; 磨'
m(b)u^{11} 'mist; 霧'
mɛ:^{h13} 'near; 埋'
me:ŋ^{31} 'pull.out; 搵 '
mɪ:^{31} 'tiny, 微'
mɔ:^{13} 'hair; 毛'
mo:^{45} 'touch; 摸'
mʊ:^{13} 'dance (v.); 舞'

k^{h}ɑʊ^{34} 'hard, solid (in ŋɑŋ^{33}k^{h}ɑʊ^{33}k^{h}ɑʊ^{34}); 舊'
k^{h}e^{45} 'to touch; 揩'
k^{h}ɛh^{11} 'quickly; 快'
k^{h}əɔ^{11} 'go; 去'
k^{h}i:^{11} 'movie; 戲'
k^{h}in^{45} 'light, not heavy; 輕'
pəə^{55} 'sow (a field); 播'
pəə^{45} 'watch, n.; 錶'
p^{h}əɔ^{31} 'shop (n.); 舖'
p^{h}ɛ:^{45} 'peel; 批'
p^{h}əɔ:^{34} 'skin; 皮'
p^{h}i:^{11} 'nose; 鼻'
p^{h}əɔ:^{13} 'support; 扶'
pɪt̚^{31} 'pen, pencil; 筆'
pɔ:^{34} 'grandmother, old lady; 婆'
pɔɑ̯^{13} 'patch up, mend; 補'
pɔ:^{45} 'to cook; 煲'
pɔk̚^{31} 'hail; 雹'
pəɔ:^{11} 'cloth; 布'
pʊɔn^{11} 'half; 半'
tɑ:^{34} 'tea; 茶'
tɑ:m^{34} 'wet; 濕'
tɑ:m^{45} 'to carry on shoulder; 擔'
tɑ:n^{34} 'flick (shoot a marble); 彈'

nɑː^{45} ‘scar; 疤’
n(d)ɪʊ^{13} ‘button; 鈕 ‘
n(d)ɪɑʊ^{31} ‘urine; 尿’
nɪː^{13} ‘girl; 女’
nɪɛ^{33} ‘thing; 嘢’
ŋɑŋ^{31} ‘hard, solid (ŋɑŋ^{33}kʰɑʊ^{33}kʰɑʊ^{342})’
ŋɪɛh^{41} ‘ant; 蟻’
ŋɪɛ^{33} ‘in-laws; 外’
ŋɪt̄^{33} ‘moon; 月’
ŋɔː^{34} ‘goose; 鵝’
ŋɔː^{31} ‘hungry; 餓’
pɑː^{34} ‘to crawl; 爬’
pɑː^{55} ‘hit (storm); 打’
pɑ̤ːk̚^{31} ‘white; 白’
pɑːŋ^{31} ‘sick, disease; 病’
pɑn^{34} ‘stupid; 笨’
pɑʊ^{45} ‘bun; 包’
pəɔ^{13} ‘patch up, mend; 補’
pəɔ^{31} ‘step (n.); 步’
pɛh^{13} ‘playing.cards; 煲’
pɛn^{11} ‘plank; 板’
pəɵ^{45} ‘watch, n.; 錶’
tʊʔ^{31} ‘degree; 度’
tɑːʊ^{31} ‘bean; 豆’
tɑp̄^{31} ‘take transportation; 搭’
təɔː^{11} ‘pour away; 倒’
tɛŋ^{11} ‘cold; 凍’
tɛŋ^{34} ‘bronze; 銅’
tɛŋ^{45} ‘east; 東’
təɔː^{11} ‘bring along; 帶’
təɔ^{31} ‘wear (glasses, ring); 戴’
təɔ^{31} ‘big; 大’
tʰɑɪ^{55} ‘sun (tʰɑɪ^{55}jəɔŋ^{342}); 太(陽)’
tʰəɔ^{45} ‘to pull, hold hand; 拖’
tʰɪɛn^{45} ‘sky; 天’
tɪː^{34} ‘late; 遲’
tɪɛp̄^{55} ‘plate; 碟’
tɪʊ^{31} ‘to live; 住’
tɔːi^{11} ‘place; 度’
tɔːɪ^{13} ‘short; 短’
tɔɪ^{45} ‘CL (lump); 堆’
tɔʊ^{45} ‘knife; 刀’
tuː^{45} ‘also; 都’
tuh^{45} ‘also; 都’
tʊː^{31} ‘tummy; 肚’
ʔpʊɐn^{31} ‘rice; 飯’

Regular sound correspondences with OC and Proto-Min

In the historical reconstruction part of his description, Egerod links the modern Longdu with Ancient Chinese and other Min languages (1956: 208-211). He notes that the voiced stops were lost under the influence of the surrounding Zhongshan Cantonese phonology, which does not possess these sounds (1956: 210). It is unclear whether Egerod means here the Proto-Min voiced stops or assumes the existence of voiced stops in an earlier stage of Zhongshan Min.

Egerod further shows that the reflexes of the Ancient Chinese voiced stops *b, *d, and *g correspond to their voiceless or voiceless aspirated counterparts in Longdu. Reconstructed voiced (Old Chinese and Proto-Min) stops devoice in Zhongshan Min (see the correspondence

table given in the appendix). Proto-Min 'softened' initials (marked with a 'minus' sign in front of the consonant) become voiceless. Voiceless stops (regardless of aspiration) and nasals remain unaltered, but some words are phonetically realized as prenasalized stops.

The table below summarizes regular correspondences between the reconstructed Old Chinese forms (Baxter and Sagart 2014), the Proto-Min initials (using Norman 1973, 1974, 1986, 1988 and 2006), the colloquial Lungtu forms collected by Egerod (1956) and our own data (last column). Egerod's data is given in his original transcription followed by the form in brackets with tone letters suggested in Egerod (1956: 31).

GLOSS		B&S2014	PROTO-MIN	E1956	OUR DATA
rice	飯	*bo[n]ʔ-s	*b	pûan (puan^{42})	ʔpʊɐn^{31}
white	白	*bˁrak	*b	pàaʔ (paːʔ^{11})	pɑ̤ːk̚^{31}
nose	鼻	*m-bi[t]-s	*bh	phì (pʰi^{11})	pʰiː^{11}
buy	買	*mˁrajʔ	*m	mě (me^{24})	mɛː^{13}
sell	賣	*mˁrajʔ-s	*m	mê (me^{42})	mɛː^{31}
grind	磨	*mˁaj	*m		ᵐbəɔ^{13}
mist	霧	*kə.m(r)[o]k-s	*m		ᵐbu^{11}
dance	舞	*k.m(r)aʔ			ᵐbʊː^{13} ~ mʊː^{13}
ask	問	*C.mu[n]-s	*mh	mùn (mun^{11})	mʊˑn^{11}
scold	罵	*C.mˁra-s	*mh	màa (maː^{11})	mɑː^{11}
half	半	*pˁan-s	*p		pʊɔn^{11}
plank	板	*C.pˁranʔ	*p		pɛn^{13}
hit	拍	*mə-pʰˁrak	*ph		pʰɑː^{31}
boil	沸	*Nə.p[u][t]-s	*-p		pɔː^{45}
fly	飛	*Cə.pə[r]	*-p		pʊɔɪ^{45}
tea	茶		*d		tɑ̤ː^{34}
bean	豆	*[N.t]ˁo-s	*d		tɑːʊ^{31}
button	紐	*n<r>uʔ		nǐw (niu^{24})	nɪʊ^{13}
urine	尿	*kə.nˁewk-s			nɪɑʊ^{31}
south	南	*nˁ[ə]m	*nəm^{A}	naam (naːm^{33})	naːm^{33}
big	大	*lˁa[t]-s		tûa (tua^{42})	təɤə^{31}
lightning	電	*lˁi[n]-s		tîan (tian^{42})	
sky	天	*l̥ˁi[n]	*th		tʰɪɛn^{45}
carry	擔	*mə-tˁam	*-t		tɑːm^{45}
come	來	*mə.rˁək	*l		liʔ^{34}
thunder	雷	*C.rˁuj	*lh	laaj (laːi^{33})	lɑːɪ^{13}
goose	鵝	*ŋˁa[r]	*ŋ		ŋɔː^{34}
moon	月	*[ŋ]ʷat	*ŋ	qúat (ŋuat^{55}); qit (ŋit^{33})	ŋɪt̚^{33}

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中山閩語的響音起始點數值對比

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提要

中山閩語為閩北語系，在廣東省中山市境內及週邊通行。本文討論中山閩語塞音的語音特徵。易家樂（1956）指出中山閩語有鼻冠塞音（[ᵐb, ⁿd, ᵑg]），但據我們最新收集的中山閩語語料（五名發音人，共 346 音節）在響音起始點的數值分析，我們發現口腔塞音部分（[b, d, g]）有被省略的可能，鼻冠塞音經常完全變成鼻音。

關鍵詞

閩北語，塞音，響音起始點，鼻冠塞音

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