Glottal stop and the emergence of Tone 8 in Zhangzhou

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https://doi.org/10.36505/ExLing-2023/14/0012/000606

Abstract

Contradicting to a seven-tonal system in all prior auditory-based work, this study proposes an eight-way tonal contrast and explores what mechanism has triggered the emergence of a new tone in Zhangzhou Southern Min, a Sinitic dialect spoken in southern Fujian province in China. The exploration also questions the conventional way of relying on the preservation of Middle Chinese tonal categories and citation context to calculate the totality of tonal contrast in Sinitic languages. It advances our knowledge of tonal phonetics and phonology in this Sinitic language while contributing a new profile to the typology of tonogenesis in the world's tonal languages.

Keywords: new tone, tonogenesis, glottal stop, eight tones, Zhangzhou, Southern Min

Introduction

Zhangzhou Southern Min, a Sinitic dialect spoken in the southern part of Fujian province along the southeast coast of China, has received extensive documentation on its monosyllabic tonal system. Prior studies before Huang 's (2018, 2020) preliminary work documented seven lexical tones, largely based on auditory impressions, with inconsistent transcriptions (e.g., Dong 1949; FJG 1998; Lin 1992; Ma 1994; Yang 2008; Huang et al., 2016). Contradicting this convention, Huang (2018, 2020) posited an eight-way tonal contrast. As an extension to explore the nature of Zhangzhou tones, this study aims to explore in detail the mechanism that triggered the emergence of a new tone in the synchronic speech of Zhangzhou Southern Min and how this can be justified using scientific patterns. This discovery will supersede existing inconsistencies and inadequacies in prior studies, advancing our knowledge of tonal phonetics and phonology in this Sinitic language. It also contributes a new profile to the typology of tonogenesis in the world's tonal languages.

Methodology

The corpora involved approximately 160 monosyllabic tokens, as illustrated in Table 1, and 588 disyllabic tokens, as illustrated in Table 2. They were elicited in praat from 21 native speakers (nine males and 12 females) in the urban area of Zhangzhou City in 2015. Tonal F0 and duration values were extracted using

a script at ten equidistant sampling points and separately normalized using the formula (1) $Z_i=(X_i-m)/s$ and (2) $D_{norm}=(D/D_{mean})*100$ (Huang 2018).

Table 1. Examples of Zhangzhou citation tones.

Tone		Pitch	Duration	Example1	Example 2
1	Yinping	[35]	extra long	/kɔ/ 'mushroom'	/tɐŋ/ 'east'
2	Yangping	[22]	extra long	/kɔ/ 'glue'	/tɐŋ/ 'copper'
3	Shang	[51]	medium	/kɔ/ 'drum'	/tɐŋ/ 'to wait'
4	Yinqu	[41]	medium	/kɔ/ 'look after'	/tɐŋ/ 'frozen'
5	Yangqu	[33]	extra long	/ɦɔ/ 'rain'	/tɐŋ/ 'heavy'
6	Yinru	[41]	short	/kɔk/ 'country'	/tɐp/ 'answer'
7	Yangru	[221]	long	/tɔk/ 'poison'	/tsɐp/ 'ten'
8	Yangru	[22]	extra long	/kɔ□/ 'snore'	/tsi/ 'tongue'

Table 2. Examples of tone 8 in phrase-initial and phrase-final contexts.

8+X	Example	X+2	Example
8+1	/pɛ8.kim1/ 'white gold'	1+8	/ɗiŋ1.pɛ8/ 'milk-white'
8+2	/pɛ8.ʄin2/ 'white silver'	2+8	/sun2.pɛ8/ 'pure white'
8+3	/pɛ8.ɓɛ3/ 'white horse'	3+8	/ɓi3.pɛ8/ 'rice white'
8+4	/pɛ8.tʰɔ4/ 'white rabbit'	4+8	/pʰjɵ4.pɛ8/ 'whiten'
8+5	/pɛ8.ʔwɐ5/'empty promise'	5+8	/ʔɗwĩ5.pɛ8/ 'egg white'
8+6	/pɛ8.sik6/ 'white'	6+8	/kɔk6.ʔjɵ8/ 'national medicine'
8+7	/pɛ8.tit7/ 'straightforward'	7+8	/ɗik7.pɛ8/ 'green in white'
8+8	/pɛ8.pɛ8/ 'very white'	8+8	/pɛ8.pɛ8/ 'very white'

Zhangzhou citation tones

Zhangzhou possesses eight tones rather than seven (Huang 2018). The eighth tone emerges from syllables that are conventionally transcribed with a glottal stop coda and assigned in Yangru tone (Tone 7 in this study) in terms of the Middle Chinese tonal category. However, synchronically, the glottal stop coda is discovered to be undergoing deletion, leading its associated syllables to become open and giving rise to a new tonal category (tone 8). This is illustrated in Fig. 1. Tone 8 presents a levelling tendency across the main portion of the tonal duration. On the contrary, tone 7 (Yangru) presents a falling trend, with a shorter duration, which is considered resulting from a depressing effect of laryngalisation induced by the non-realisation of obstruent codas in the

utterance-final context (Huang 2018; 2020; 2023). Thus, Tones 7 and 8 behave phonetically differently in this context.

What needs a special attention is that Tone 8 appears to have a similar F0 contour as Tone 2 in citation What needs a special attention is that Tone 8 appears to have a similar F0 contour as Tone 2 in citation, because both present a low levelling trend with a long duration. A question can thus be raised as to why Tone 8 is not assigned to Tone 2 and why they are considered two phonemic tones. The reason for this resides in the fact that they behave categorically differently in non-rightmost positions, referred to as the sandhi context in Zhangzhou's tone sandhi system.

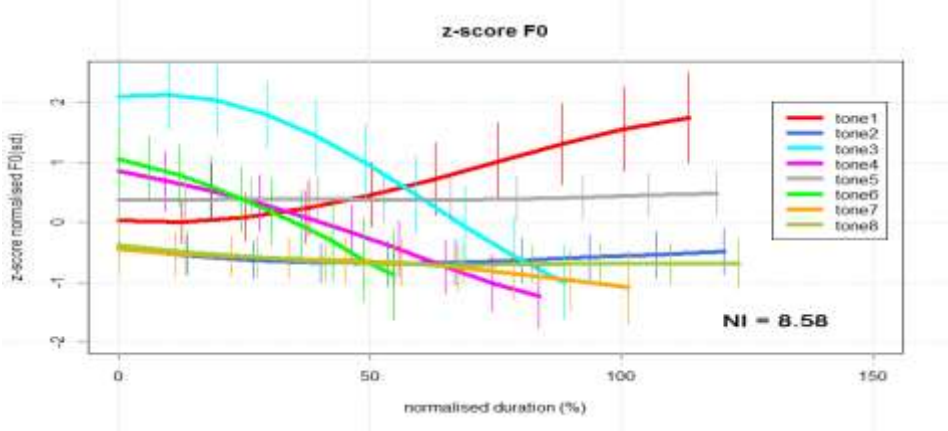

Figure 1. F0 pattern of Zhangzhou citation tones from 21 native speakers.

Zhangzhou Tones in Sandhi Context

Zhangzhou has a right-dominant-tone sandhi system. Tones at the non-rightmost position change their realization phonologically but maintain the realization categorically similar to their citation forms. As plotted in Figure 2, Tone 7 presents a mid-falling contour with an extra short duration, whereas Tone 8 shows a mid-falling contour with a longer duration, further justifying their different phonetic profiles.

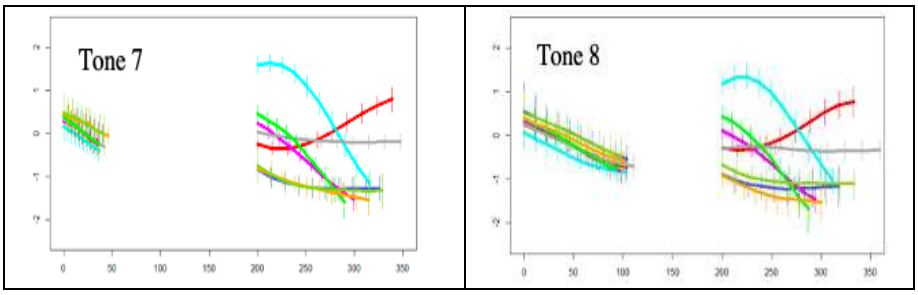

Figure 2. F0 pattern of Zhangzhou Tone 7 and Tone 8 in sandhi context.

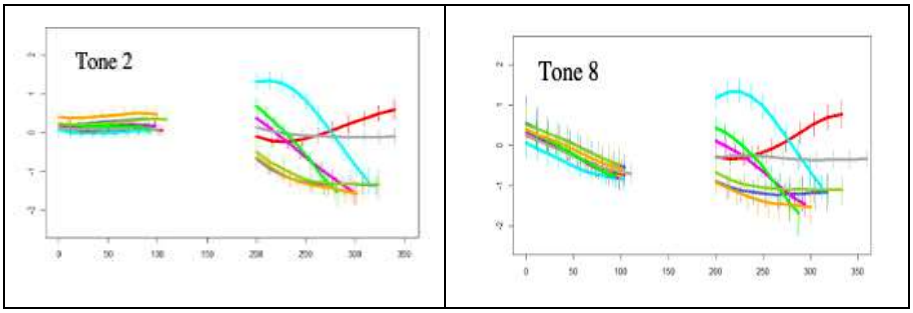

Figure 3. F0 pattern of Zhangzhou Tone 2 and Tone 8 in sandhi context.

In addition, as plotted in Figure 3, Tone 2 presents a mid-levelling contour that is categorically different from Tone 8 with a mid-falling contour. Thus, although they behave similarly in the citation context, they are distinguishable in the sandhi context, which indicates that the two tones should be treated as phonemically different. This also questions the conventional way of relying on the preservation of MC tonal categories and citation context to construct the totality of tonal contrast in Sinitic languages.

Conclusion

This study explores the mechanism that triggered the emergence of a new tone in Zhangzhou Southern Min and how this can be justified using scientific patterns. This discovery supersedes existing inconsistencies and inadequacies in prior studies. It advances the knowledge of tonal phonetics and phonology in this language, while contributing a new profile to the typology of tonogenesis in the world's tonal languages.

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