

Experimental Research on the Monosyllabic Tones of Hong Gu Dialect

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Abstract: This paper uses the method of experimental phonetics to analyze the tones of Tianshui dialect. Finally, it is found that the tone of Hong Gu dialect is very special and there are only two tones, PingQu (24 and Shang (51. Its tone evolution is very simple. Ping, the voiced of Shang, Qu and Ru are merged into a rising tone. The voiceless and secondary voiced of Shang merged into a falling tone.

1. Introduction

Hong Gu is located in the middle of Gansu province and belongs to the city of Lanzhou. “Hong Gu Dialect” refers to the small dialect represented by the Hong Gu area. This paper takes the dialect of Hai Shiwan town in Hong Gu as the research object. Hong Gu dialect is part of the Jincheng film of Lanyin Mandarin. In A Study of Chinese Mandarin Dialects Qian pointed out that the basic characteristics of the phonetic feature of Lanyin Mandarin is QingRu and CizhuoRu in the middle ancient times now is Qu and QuanzhuoRu are changed into Yangping. In addition, he also said the most notable feature of Hong Gu dialect is Yangping and Ru merged into Qu, Yinping, Yangping and Qu have merged, Qu is independent as a tone.

Due to the special characteristics of Hong Gu dialect, there are many linguists have studied it. The first study was Luo Peng, he pointed out in A Chinese dialect of only two tones(1999 that there are thirty-one vowels, twenty-five consonants and two monosyllabic tones in Hong Gu dialect, they are PingQu (13 and Shang (55. Zhang Wenxuan and Deng Wenjing by field research generalized that there are twenty-three consonants, thirty-two vowels and two monosyllabic tones. The tones are PingQu (13 and Shang (53 and it has three free variants. Ran Qibing conducted an acoustic experiment on the tones of Hong Gu dialect. Through the study of pitch curve and clustering analysis of pitch data, the tones of Hong Gu dialect are processed into PingQu (24 and Shang (53. Mo Chao said there are two monosyllabic (13 and 55 and three sandhi (44, 442 and 53 in Hong Gu dialect, he pointed out that the two tones evolved from three tones.

This paper will use the research method of experimental phonetics to make quantitative analysis of

monosyllabic tones of Hong Gu dialect. Through the analysis of pitch data, the actual tone of this dialect can be described objectively and it can provide reference for further research.

2. Experimental Explanation

2.1 Pronunciation table

This paper mainly studies the evolution of monosyllabic tones of the Hong Gu dialect from the middle ancient times to the present by using experimental phonetics. The pronunciation list is designed according to *Guang Yun* and *Dialect Survey Character List*.

Table 1 Pronunciation List

Ancient tone	Ancient sound	Cases of words	Ancient tone	Ancient sound	Cases of words
Ping	Voiceless	东、该、灯、风歌、过、沙、租	Qu	Voiceless	冻、怪、半、四个、布、数、句
	Asperational voiceless	通、开、天、春车、铺、开、亏		Asperational voiceless	痛、快、寸、去课、菜、器、副
	Secondary voiced	门、龙、牛、油牙、爷、泥、犁		Secondary voiced	卖、路、硬、乱夜、外、验、右
	Voiced	铜、皮、糖、红坟、纯、红、松		Voiced	洞、地、饭、树步、害、败、鼻
Shang	Voiceless	懂、古、鬼、九早、比、几、喜	Ru	Voiceless	谷、百、搭、节急、鸽、集、吸
	Asperational voiceless	统、苦、讨、草土、取、肯、口		Asperational voiceless	哭、拍、塔、切刻、切、铁、出
	Secondary voiced	买、老、五、有米、李、耳、脑		Secondary voiced	六、麦、叶、月立、入、月、力
	Voiced	动、罪、近、后户、父、弟、犯		Voiced	毒、白、盒、罚十、活、学、笛

2.2 Informant

The informant of this experiment was born and lived in Hong Gu area for a long time and rarely go out. He has no oral disease. He can accurately identify all the words in the pronunciation list and read them out in standard Hong Gu dialect.

2.3 Sound recording

The hardware used in recording includes clip microphone, mixer, sound card and notebook computer. The software used for recording is Audition 3.0, sampling frequency is 44100Hz, single channel recording with a sampling precision of 16. When recording, the informant must read every word in the pronunciation list with natural intonation and speed. Each case is read three times and saved as a wav format

2.4 Data processing

When processing data, processing all sounds with Praat5.0. Remove all the recordings of the elbow and tail and keep its complete tuning section. Then extract the fundamental frequency of all word segments and save the data.

In order to accurately determine the monosyllabic tone of Hong Gu dialect, this paper uses the T value method proposed by Shi Feng in the study of Tianjin dialect. Quantitative analysis the tone of Hong Gu dialect and finally determine its tone number, tone shape and tone value.

$$T = [(lgF0 - lgmin) / (lgmax - lgmin)] * 5$$

F0 is the average fundamental frequency of the observation point, min is the minimum fundamental frequency value, max is the maximum fundamental frequency value, T is the normal result. The value of the T value calculated in this way is in the range of 0-5. The correspondence between the T and the fifth values is: T value in the 0-1 interval, the corresponding five degrees is 1; T value between 1-2, the corresponding five degrees is 2; T value between 2-3, the corresponding five degrees is 3; T value between 3-4, the corresponding five degrees is 4; T value between 4-5, the corresponding five degrees is 5.

3. Fundamental Frequency Analysis

The fundamental frequency of all recordings is extracted and normalized. The four tones of "Ping", "Shang", "Qu" and "Ru" are divided into four groups: voiceless, aspirational voiceless, secondary voiced and voiced. Listed all values of the starting point, midpoint, end piont, maximum, minimum and domain width of each group (Table 3. Figures 1, 2, 3 and 4 are the fundamental pitch curves of four tones, we can learn the range of each tone and summary the evolution of monosyllabic tones of Hong Gu dialect.

3.1 Ping

In most dialect, Ping is divided into Yinping and Yangping, the voiceless of Ping changed into Yinping and the voiced changed into Yangping. Figure 1 is the basic frequency curve of Ping in Hong Gu dialect. In Hong Gu dialect, the Ping does not differentiate and all of it is a rising tone. The maximum and minimum values of fundamental frequency are 182.9Hz and 97.6Hz respectively, its domain width is 85.3Hz.

3.2 Shang

Figure 2 is a fundamental mean curve of the Shang in Hong Gu dialect. The Shang in Hong Gu dialect divided into two tones. Voiceless, aspirational voiceless and secondary voiced of Shang are changed into a falling tone and the voiced changed into a rising tone. Combining with basic frequency data, the fundamental frequency ranges of voiceless is the widest and the voiced is narrowest. The maximum and minimum values of the falling tone are 187.3Hz and 77.6Hz respectively, its domain width is 109.7Hz.

3.3 Qu

Figure 3 is a fundamental mean curve of the Qu in Hong Gu dialect. Qu in Hong Gu dialect has not divided from the middle ancient to now. There is only one tone and it is a rising tone. Combining with the fundamental frequency data, the domain of aspirational voiceless is widest and the voiced is

narrowest. The fundamental frequency range of Qu is 100.3Hz-184.6Hz and its domain is 84.3Hz.

3.4 Ru

Figure 4 is a fundamental mean curve of the Ru in Hong Gu dialect. Qu in Hong Gu dialect has not divided from the middle ancient to now. There is only one tone and it is a rising tone. Combining with the fundamental frequency data, the fundamental frequency range of the aspirational voiceless is narrowest and its value is 48.4Hz. The fundamental frequency range of secondary voiced is widest and its value is 58.6Hz. The maximum and minimum values of fundamental frequency are 166Hz and 104.7Hz respectively, its domain width is 61.3Hz.

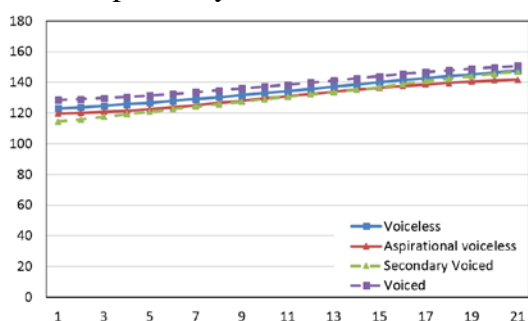


Fig.1 Fundamental frequency curve of Ping

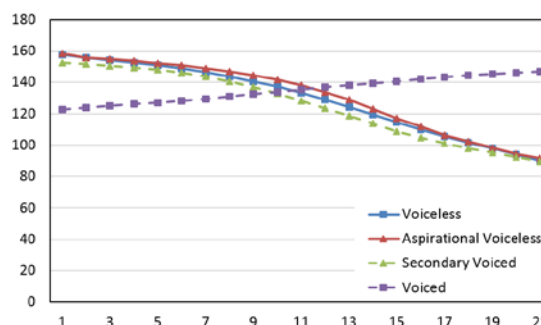


Fig.2 Fundamental frequency curve of Shang

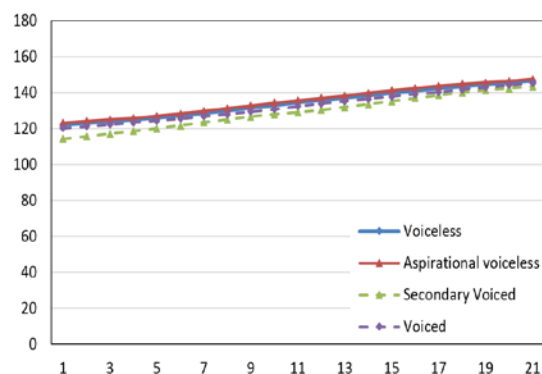


Fig.3 Fundamental frequency curve of Qu

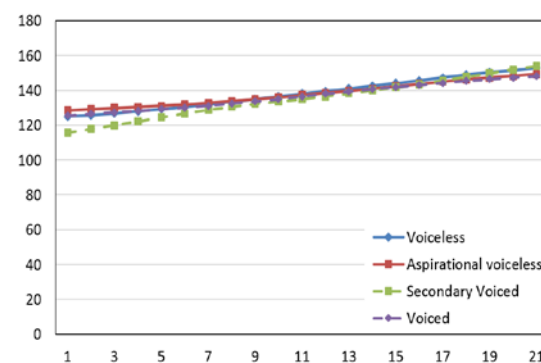


Fig.4 Fundamental frequency curve of Ru

Through the analysis above, there are only two monosyllabic tones in the Hong Gu dialect. Ping, Qu, Ru and voiced of Shang are rising tone and the voiceless, aspirational voiceless and secondary voiced are falling tone. The domain width of falling tone is bigger than the rising tone. Finally, we can judge that there are two monosyllabic tones in Hong Gu dialect. Figure 3 is the fundamental frequency data. F0 represents the fundamental frequency. In this figure, we list six data: average fundamental frequency of starting point (SF0, average fundamental frequency of midpoint (MF0, average fundamental frequency of endpoint (EF0, maximum fundamental frequency (max F0, minimum fundamental frequency (min F0 and domain width (DW).

4. Five Degree Calculation

According to the T value method, the fundamental values of 21 points of each word extracted from this experiment are substituted into F0 respectively. Then put the calculated data into the Excel and draw the T value curves for four tones in Hong Gu dialect. The abscissa is the number of tones and the ordinate is the value of T.

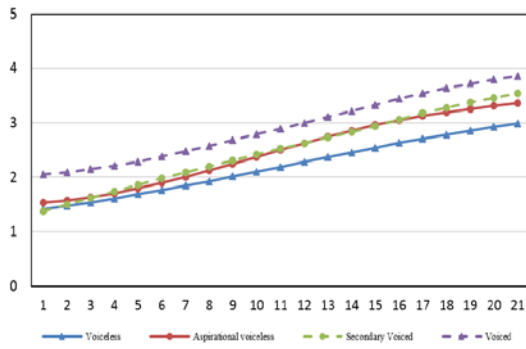


Fig.5 The T - value Curve of Ping

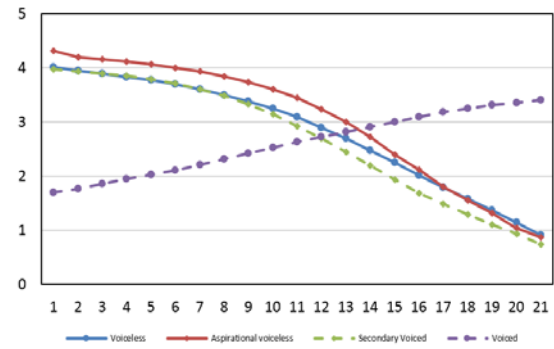


Fig.6 The T - value Curve of Shang

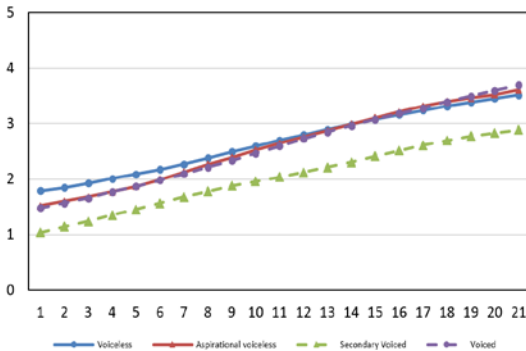


Fig.7 The T - value Curve of Qu

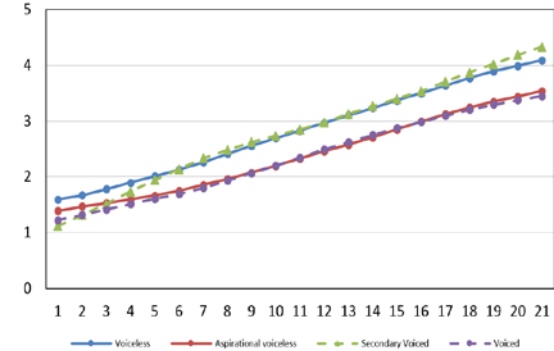


Fig.8 The T - value Curve of Ru

It can be seen from the T curve of four tones, the Ping, voiced of Shang, Qu and Ru are rising tone and their value are 24. The voiceless and secondary voiced are falling tone and their value are 51. So we can make sure that there are only two monosyllabic tones in Hong Gu dialect. We use the name given by other linguists, the rising tone is PingQu and the falling tone is Shang.

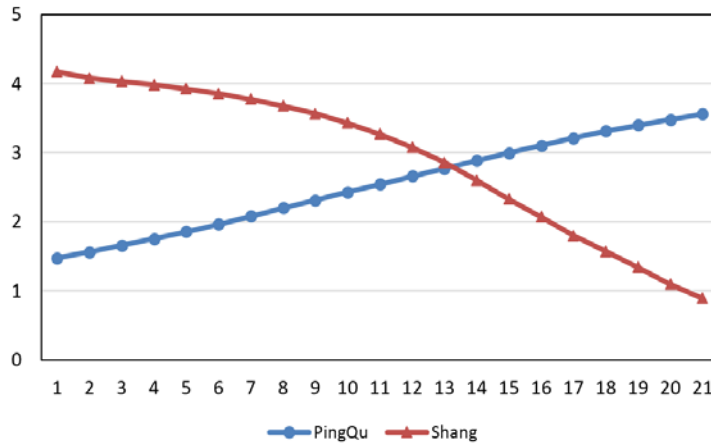


Fig.9 The T - value Curve of single tone of Honggu Dialect

5. Summary

The quantitative analysis of monosyllabic tones in Hong Gu dialect is carried out by means of experimental phonetics. This paper sums up the tone system of the Hong Gu dialect and the range of its tones. It is concluded that there are only two monosyllabic tones in the Hong Gu dialect, they are PingQu (24 and Shang (51. The evolution of tones in Hong Gu dialect is very special. Ping, voiced of

Shang, Qu and Ru are merged into a rising tone, the voiceless and secondary voiced of Shang merged into a falling tone.

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