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Study on Acoustic Characteristics of Plug in Taijinaar Dialect of Qinghai Province

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Abstract This paper is based on "Qinghai Taijinaar words voice acoustic parameter database", according to the Chinese academy of social sciences nation national language experimental research team developed the Chinese minority language speech acoustics parameters of unified platform, the principle of using the theory and method of experimental phonetics, mainly explores the plosive pattern of acoustic characteristic; The following conclusions are drawn: in the acoustic pattern with VOT- GAP as the two-dimensional coordinate, the seychelles of Qinghai Taijinaar dialect can form a relatively stable "triangular pattern", which are: (1) the tip of the tongue /t/, the root of the tongue /k/ gather in one side, and the position in the pattern is more to the left; (2) the tip of the tongue plosive/t^h/ tonguebase, plosive/k/gathered on one side, the positions of the pattern in figure than unaspirated sound/t/, /k/ relative right; (3) lips plosive/p/ and /p^h/ together in one place. Contrast with the tip of the tongue, tongue root plosive, /p/ and /p^h/ consonant position right; The aspirated consonant is located to the right of the unaspirated consonant. Therefore, it can be shown that the silent GAP (GAP for short) of the plug is correlated with the location of the sound, and the distribution in the acoustic pattern has a certain stability and regularity.

1. INTRODUCTION

In 1637, the western Mongol chieftain, turubai-gush khan, moved from Xinjiang to Qinghai, defeated khatun khan of the karkha ministry, and entered Tibet in 1642 to establish the khatuta khanate. During his reign as king of Tibet, his elder brother HanakTushitu and his followers lived on the land of Taijinaar. In 1725, the government of the Qing dynasty sealed the HanakTushitu descendant zelinnamzala as the first Taiji, and designated the area as the "west right middle flag of the Qinghai right-wing league" (the Taijinaar banner) after the lukuzdan incident. Also known as "Taijinaar zasak", which means there are many flags. From 1637 to present, the Mongol minority in Taiji has lived here for more than 370 years.

The Mongolians of Taijinaar in Qinghai now live mainly in Haixi, which is known as Geermu city, golmud town, Wurtumuren town and Gas town of Mangya town in Haixi Mongol Tibetan autonomous prefecture. Among the Mongolian tribes (banners) of Qinghai, the Mongolian people of Taijinaar (banners) all retain their unique characteristics in aspects of folk custom, language and culture. In view of the good ecological environment around Geermu city, and less contact with the outside world, from this, in the relatively closed life, they retained a large number of their own traditional culture; For example, according to the use of Mongolian language in Qinghai province, most of them are concentrated in Haixi Mongol Tibetan autonomous prefecture, while half or more of the Mongolians



in Haixi are located in and around Geermu city. However, this is where the Mongolians of Taijinaar live.

2. EXPERIMENT

A. Recording devices and speakers

The speech acoustic parameter database of Qinghai Taijinaar dialect is composed of four sub-libraries. They are: index library, acoustic reference library, annotation library, acoustic reference library. The pronouncer is a man and a woman (no. F is female, no. M is male), a native of wurtumuren township of Geermu, a subordinate professional teacher. They have a clear pronunciation and sound.

The recording device is an IBM R51 laptop with SONY ECM 44B. Matching stereospecificity Microphone SONY Electrets Condenser Microphone ECM - 44 b (Made in Japan); Recording in radio room of Wurtumuren town, golmud city, Qinghai province. The recording sampling rate is 22050Hz, 16Bits, the storage format is *.Wav, single channel recording, s/n is not less than 45db. When recording, we chose natural pronunciation and sound pronunciation as our final sample.

B. Analysis software and data collection

Praat, a speech analysis software developed by Paul Boersma and David Weenink of the University of Amsterdam, was used to carry out voice annotation on sound files, and an annotation library was established on this basis. This marking is a code system using the universal SAMPA (Speech Assessment Methods Phonetic Alphabet, a combination of Latin letters, Numbers and keyboard symbols to replace the international phonetic symbols). Note that the file name and sound file name are related, with the extension *.TextGrid; In the parameter library, 606 monosyllabic words, 1390 disyllabic words, 216 three-syllable words and 18 multi-syllable words were selected, and a total of 4460 (two speakers) words were taken as samples for data collection.

3. DISCUSSION OF EXPERIMENTAL RESULTS

A. Analysis of the distribution pattern of the serrated resonance peaks in Taijinaar dialect

Below for Qinghai Taijinaar dialect words first /t^h/ consonants 1-3 formant distribution (M); Is depending on the CF /t^h/ consonants mapped the male pronunciation resonance peak. Can learn from the table, the word first /t^h/ consonants three formant frequency range respectively: CF1 = 500~1000 Hz; CF2 = 1200~2400 Hz; CF3 = 2500~3500 Hz.

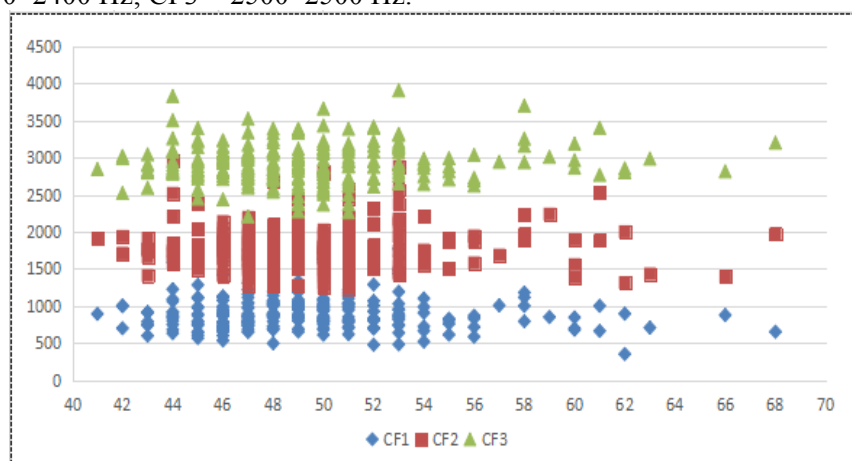


Figure 1 word first /t^h/ consonants 1-3 formant distribution (M)

Fig.2 shows the distribution of 1-3 resonance peaks (M) of the word head /k/ consonant in Taijinaar dialect, Qinghai. It can be seen that the three resonant peak frequencies of the word head /k/ consonant are: CF1= 500~1000Hz; CF2 = 1000~2000 Hz; CF3 = 2000~3500 Hz; The consonant CF3 frequency floating a little significant and CF1 range of frequencies similar to /t^h/ consonants.

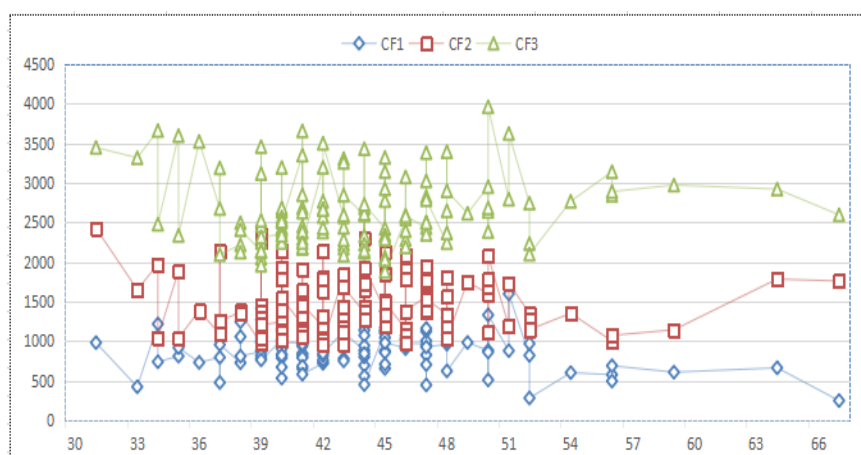


Figure 2 word first /k/ consonants 1-3 formant distribution (M)

In accordance with the above method (figure omitted), it also analyzed /t/,/p/ two consonants. The results are as follows:

/t/consonant: word head /t/ consonant first resonance peak (M) CF1= 500~1200Hz; The second resonance peak CF2= 1500~2300Hz; The third resonance peak CF3 = 2500~3500Hz.

/p/consonant: the frequency range of the 1-3 resonant peaks of the male pronouncer /p/ consonant is as follows. CF1 = 500~1000 Hz; CF2 = 1500~2200 Hz; CF3 = 2500~3300 Hz; The frequency range of the female pronouncer is roughly the same as that of the male pronator.

B. VOT length analysis of the first stop of Taijinaar dialect

Figure3 is the VOT length comparison diagram (M).Figure4 shows the VOT duration comparison diagram (F) of the initial consonant.As shown in the following figure:

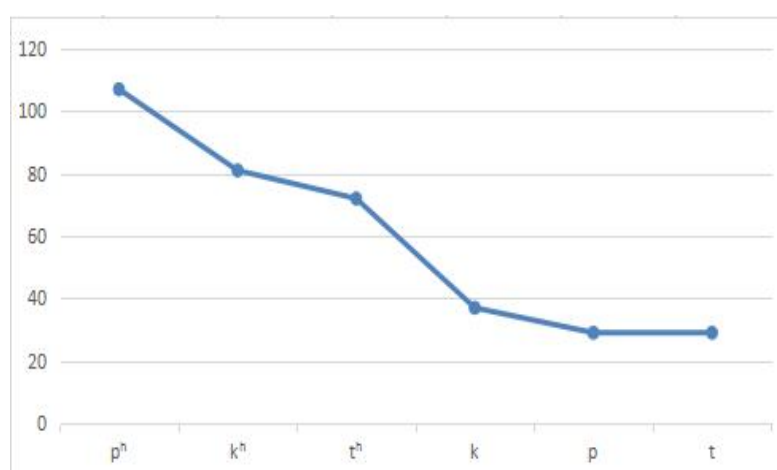


Figure 3 VOT length comparison diagram (M) Unit: ms

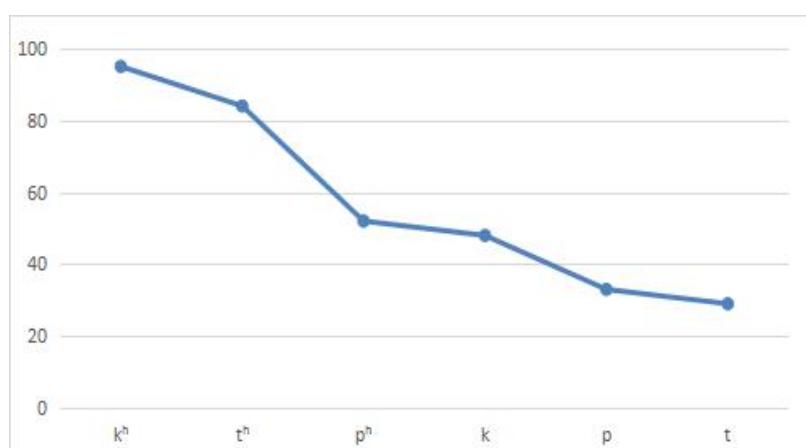


Figure 4 VOT length comparison diagram (F) Unit: ms

From the comparison of figure 3 and figure 4, it can be seen that the average VOT length of the two speakers in the first syllable of the word is different, but their common features are the VOT time length of the unaspirated tone, and the VOT time length of the aspirated tone (compared to the unaspirated tone). Male pronunciation (M) the word first plosive VOT length from long to short in the order: /p^h/ > /k^h/ > /t^h/ > /k/ > /p/ > /t/; And female pronunciation (F) the word first plosive VOT length from long to short, sort of: /k^h/ > /t^h/ > /p^h/ > /k/ > /p/ > /t/; The VOT duration of aspirated note and unaspirated note varies, because it is mainly shown in the following two aspects: It indicates that the VOT length of aspirated consonant is longer than that of non-aspirated consonant.

C. Analysis of consonant acoustic pattern in Taijinaar dialect

Based on the "Qinghai Taijinaar dialect phonetic acoustic parameter database", the actual data of two speakers, male and female, was selected and the VOT and GAP duration of the consonant in the words were calculated. As shown in figure 5 and 6, in the two-dimensional coordinates of VOT-GAP; According to the data, the VOT coordinate range of male pronouncer is 0-75ms and the GAP coordinate range is 0-150ms. The VOT coordinate range of female pronouncer is 0-80ms, and the GAP coordinate range is 0-90ms. Draw the acoustic pattern of the position of the consonant in the word.

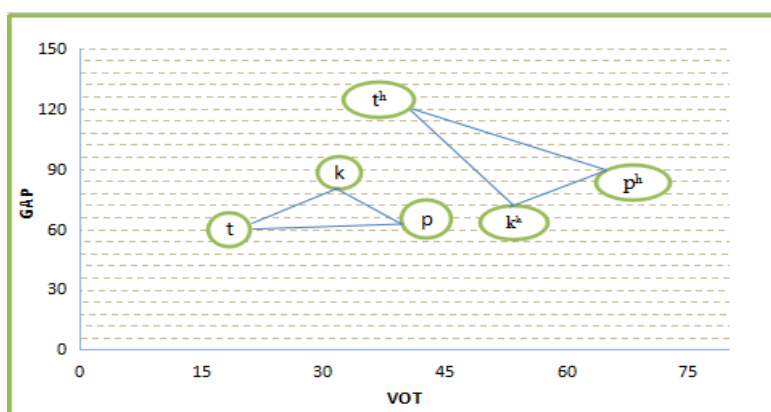


Figure 5 acoustic pattern of a word (M) Unit: ms

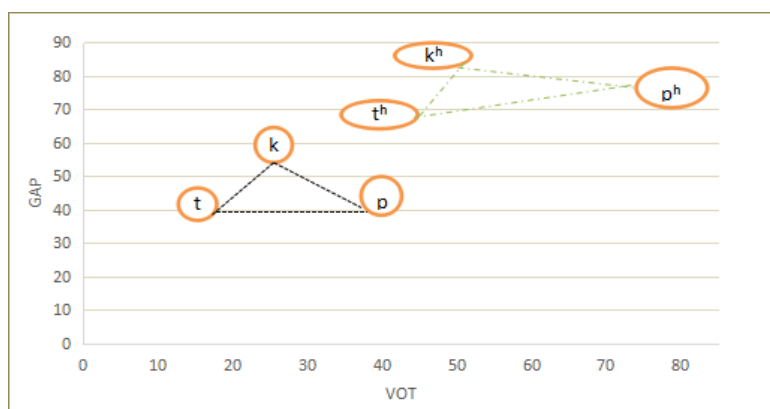


Figure 6 acoustic pattern of a word (F) Unit: ms

Can see from figure 5, the word syllable /t/, /t^h/, /k/, /k^h/, /p/, /p^h/consonants, such as the abscissa, GAP is a VOT value as the ordinate (hereinafter referred to as VOT - GAP 2 d coordinates) of the acoustic structure diagram, always with three kinds of distribution mode, constitute a "triangle pattern";The overall pattern is as follows:

- 1) The tip of the tongue /t/, and the root of the tongue /k/ gather in one side, and the position in the pattern is more to the left.
- 2) The tip of the tongue plosive /t^h/, /k^h/ tonguebase, plosive /k/ gathered on one side, the positions of the pattern in figure than unaspirated sound /t/, /k/ relative right.
- 3) In the pattern of acoustic figure, lips plosive/p/and /p^h/ together in one place. Contrast with the tip of the tongue, tongue root plosive, /p/ and /p^h/ consonant position right; Therefore, /t/, /k/, /p/ consonant /t^h/, /k^h/, /p^h/ consonants and form a pattern of "triangle".

From the comparison between figure 5 and figure 6, it can be seen that:

- 1) In the figure of acoustic pattern of male speakers, the aspirated sound was in a higher position, while the non-aspirated sound was in a lower position.
- 2) In the acoustical pattern of the female speaker, the aspirated sound is in the upper right position, while the non-aspirated sound is in the lower left position. It illustrates the /t/, /t^h/ consonant is a kind of sound, as the tip of the tongue plosive, /k/, /k^h/ consonant is a kind of sound, to put the plosive; Above analysis proves the /t/,

/t^h/, /k/, /k^h/, /p/, /p^h/ plosive location and relationship, have stability and regularity in structure diagram.

4. CONCLUSION

The following conclusions are drawn from the paper:

First, Qinghai in Taijinaar words /t/, /t^h/, /k/, /k^h/, /p/, /p^h/ 6 plosive; The VOT length of the aspirated consonant is longer than that of the unaspirated consonant.

Secondly, Qinghai Taijinaar dialect words plosive sound pattern in the graph, you can see /t/, /t^h/, /k/, /k^h/, /p/, /p^h/ consonants have gathered characteristics; Mainly distributed in three regions:

- 1) The tip of the tongue /t/, and the root of the tongue /k/ are clustered together in a position to the left.
- 2) The tip of the tongue plosive /t^h/ tonguebase, plosive/k^h/ polymerization in one place, and its location than unaspirated sound /t/, /k/ a little.
- 3) Lips plosive /p/, /p^h/ gather together; Compared to the tip of the tongue tonguebase plosive and plosive /p^h/ consonant position right; Form "triangle pattern".

Third, the three consonants are in a relatively stable position, and the aspirated consonants are slightly higher than the non-aspirated consonants. On the one hand, it reveals the general regularity of the consonant distribution in Taijinaar dialect. On the other hand, it also shows that the pattern we drew reflects the acoustic features of the Taijinaar dialect.

5. Acknowledgement

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6. References:

- [1] Bayisihali ,Carendundebu ,Suyalatu. Mongolian dialect dictionary of Qinghai [M]. Hohhot: Inner Mongolia University Press, 1998.
- [2] Huhe, Mongolia speech experimental study, Liaoning Nationalities Publishing House , 2009.
- [3] Wuying. Study of Mongolian dialect in Qinghai [M]. Hohhot: Inner Mongolia People's Publishing House, 2009.
- [4] Chaganhada, Phonetic features of Mongolian dialect of Qinghai. National language. 1985, (4).
- [5] Bao lihong, Phonemic system in Mongolian dialect of Qinghai. Northwest Minzu University.2007, (5).
- [6] Wang yulan, Comparative study on the acoustics of Mongolian and Weilate dialects and Alashan dialects in Qinghai. Inner Mongolia University.2008, (4).
- [7] Meili, Analysis of acoustic consonants in Mongolian dialect of Qinghai. Inner Mongolia University.2014, (5).
- [8] Cairenbali, Taijinaar qi zhi [M]. Hohhot: published and issued by Inner Mongolia Education Press, 1995.
- [9] Jia xi ru, The evolution of the black figure beauty benevolence dialect K consonant. Qinghai Social Science. 1980, (2).