Tonal Patterns of Linyi Dialects

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Abstract

This paper investigates the tonal pattern of mono-syllabic and the tone sandhi pattern of disyllable of Linyi dialect through the method of experimental phonetics. Previous studies provided the five-scale value of four citation tones and some of the features of tone sandhi of Linyi dialect. Further experimental data is needed to confirm these results, and to verify the tone sandhi patterns. First of all， this paper gets the pitch contour of mono-syllabic of Linyi dialect, and compares the results in the form of five-scale value with the results of previous tonal pattern investigation of Linyi dialect. Slight differences have been observed between them. Then this study explored the tone sandhi pattern within disyllable. Most of the tone sandhi occurs to the initial tone of the two syllables.

Index Terms: Linyi Dialect, tone sandhi, tone pattern, Mandarin

1. Introduction

Linyi is located in the south of Shandong Province, as shown in Figure 1. Linyi Dialect is in the border zone of the Jiao Liao Mandarin and the Zhongyuan Mandarin in terms of the whole Mandarin division. Since Qian [2][3] divides Shandong dialect into four sub-parts according to articulatory regularities in Shandong dialect, i.e., Donglai, Dongwei, Xilu and Xiqi. For the dialects of Shandong area, Linyi dialect belongs across the Dongwei and Xilu dialects. Linyi city is composed of a total of 12 districts. They got their own features that distinguish from other dialects of Shandong dialect. The present study mainly discussed the dialect that belongs to the Xilu dialect.

Figure 1: *Geographical location of Linyi in Shandong Province.*

Previous research about Linyi dialect has come to some conclusions. Tian[5] analyzes the phonology system of Feixian County (a district from Linyi, belonging to Xilu Dialect) in detail. She proposed that the four citation tones are Yinping(tone1) as 213, Yangping(tone2) as 53, Shangsheng(tone3) as 55, Qusheng(tone4) as 312(31). The comparison of tone was also made on the Feixian Dialect and Mandarin and the ancient phonetics system. Another paper [6] offers a systematic study of the sound system of Lanshan dialect (also a district from Linyi), a full record of its initials and finals of syllables, tone, sound and the rules of allophone. The four tones in this study are tone1 as 214, tone2 as 53, tone3 as 55, and tone4 as 31 or 312. Besides the descriptive study, Liu [7] analyzes the tone sandhi phenomenon and makes a contrast with Xuzhou dialect and Pizhou dialect (locates in the north of Jiangsu Province), through the knowledge of language contact and Synchronic analysis. Previous study has demonstrated that Linyi has four citation tones, specifically, the tonal values is Yinping(tone1) 214(213), Yangping (tone2) 53, Shangsheng (tone3) 55, Qusheng (tone4) 312(31)(Qian [3], Ma[4]).

This study compares tonal patterns with that of previous studies. Only few studies on Linyi dialect tone used experimental methodology, and they were mainly based on empirical way [8]. In the current study, we adopt experimental means to investigate the patterns of tone; especially it focuses on the mono-syllabic and disyllabic tonal patterns. Through the examination, the study endeavors to provide the empirical data for theoretical analysis and explore the great intrinsic differences in Linyi dialect. In order to supply better support for language engineering, experimental phonetics approach to quantitative analysis of tone is necessary.

2. Methodology

2.1. Subjects

Four speakers participated in the experiment. Each speaker was recorded reading a list of 100 mono-syllabic words (25 different words × 4 tones) and 100 disyllabic words (20 different tone combinations × 5 words). All of these four speakers, two male speakers and two female speakers are post-graduate students in Shandong University of Science and Technology. They were born and brown up in Linyi before university.

2.2. Materials

The mono-syllabic segment was selected from Qian [3], whichcovers twenty-five samples for Yinping (tone1), Yangping (tone2), Shangsheng(tone3), and Qusheng (tone4), respectively. Therefore, the study obtained 100 samples for the analysis of citation tone. In regard with the disyllabic constituents, the study selected five samples for each tonal composition. Thus, it got 100 samples for acoustic analysis. All the selected constituents are the commonly used items in Shandong dialect.

2.3. Recording procedure and data labeling

All the above tokens were randomly listed in the recording software. Recording was conducted in the quiet room. The source files were obtained from recording software with sampling as 44kHz. All the source files were saved as WAV forms.

Then these WAV files were labeled in Praat. 'Textgrid' files and 'Pitchtier' files were further checked by hand to ensure the accuracy of data. Because of the vowel is the segment that produces the tone, we reserve the vowel except the initial elbow and the final tail.

2.4. Data collecting

The present study adopts the relatively normalized T-value calculation. We all know that the tone is represented by the F0 contour. The F0 data was extracted by the praat script with one syllable being selected ten points. Since we've got four speakers' data with four tones with 100 mono-syllabic words respectively, we've got totally 4*4*100*10 values. All the F0 values then were transformed to the LOG values. The MAX and MIN pitch values were selected respectively by male and female. Then the LOG values were calculated by the formula below:

$$T = [(\lg x - \lg b)/(\lg a - \lg b)] \times 5$$

Among this expression, $\lg x$ means the measure values, a means the MAX value and b means the MIN value of the pitch measurement range, T stands for the five-scale value.

3. Discussion

3.1. Tonal pattern of mono-syllabic

The present sub-part is adopted to examine the citation tones of Linyi dialect. But because of the limitation of the following graph is the normalized value of the citation tone of Linyi dialect. The Y-axis is the five scale values and the bottom part of the X-axis illustrates the content of the graph.

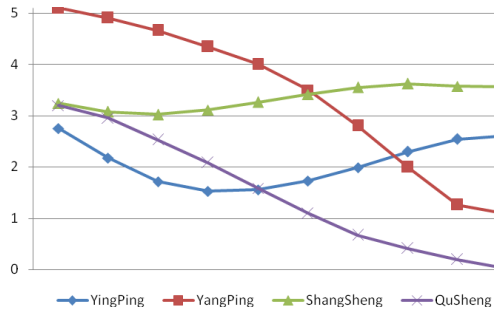

Figure2 *the tonal pattern of female from Linyi Dialect*

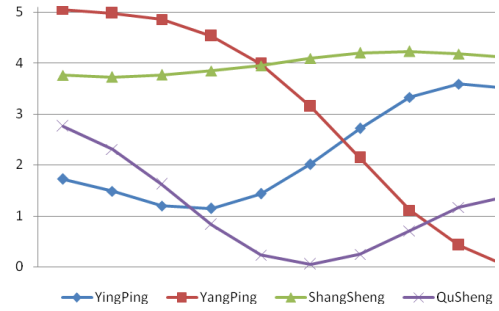

Figure3 *the tonal pattern of male from Linyi Dialect*

From the above figure, the five-scale for each tone can be seen clearly, for Tone 1, it performs as '312' by female speakers and as '213' by male speakers, Tone2 as '51', Tone3 as '44', and Tone4 as '41' by female speakers and '312' by male speakers. Therefore, results of the acoustic data demonstrate that there are one level tone, one falling tone and two devious rising tones in Linyi dialect. In comparison with Qian[3]'s description, as shown in the Table 1, the difference lies in the following aspects: i) the present study specified the gender difference on tone1 and tone4; ii) specific tonal values of tone2 and tone3 exhibit different value in the present study.

Table 1. *The comparison of tonal pattern.*

Tone	Previous	This paper	Mandarin
YinPing(T1)	213(214)	213(312)	55
YangPing(T2)	53	51	35
ShangSheng(T3)	55	44	214
QuSheng(T4)	312(31)	312(41)	51

We can see from Table 1, the present results are kinder of similar to that of former research on tonal patterns, even subtle differences have been found. The previous conclusions about tonal pattern are reliable to some extent. If we want to get the exact citation tones to serve the speech engineering, the former way doesn't work at all. The effect way is to apply the experimental methodology.

Linyi dialect has the same four classes of tones as Mandarin. The differences mainly exist in the citation tone. Tone1 is the level tone in Mandarin while it's a low-rise tone in Linyi dialect. The opposite case happens to Tone3, i.e.Tone3 in Mandarin as 214 and as 44 in Linyi dialect. Yangping(Tone2) belongs to the falling tone in Linyi dialect instead of a rising tone in Mandarin.

3.2. Tone sandhi patterns

In this sub-part, it systematically examines the disyllabic tone sandhi patterns of Linyi dialect. Previous study from Ma [4] has demonstrated that among the sixteen tonal combinations, Linyi dialect exhibits tone sandhi patterns as shown below.

- There is no tone sandhi with the final syllable of the disyllable, except that tone4 shows as 31.
- The tone1 shows as 24 before the tone1 and the tone 4
- The tone3 shows as 53 before tone3
- The tone4 shows as 31 before tone1, tone2, tone3

The present study adopts acoustic means to further compare the sandhi results from present study with Ma [4].

3.2.1. Tonal combinations with the same initial tone

The following Figures 4-7 are the tonal patterns of all sixteen tonal combinations, each of them having the same initial tone.

These descriptions are listed in the bottom part of X-axis. Tone1, Tone2, Tone3 and Tone4 are shown as T1, T2, T3 and T4. The Y-axis illustrates the five-scale values.

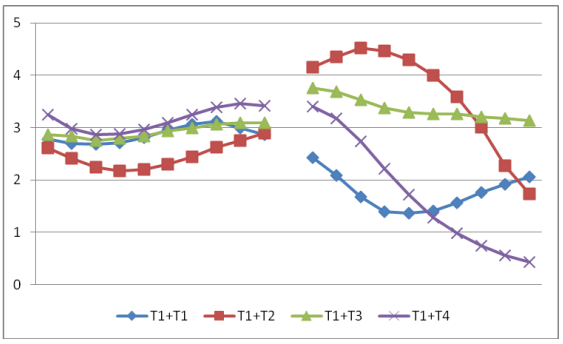

Figure4 *tone sandhi pattern with the same initial tone1*

Figure4 shows four combinations of all which have the same initial tone, i.e., Tone1. For T1+T1 and T1+T3, the initial T1 performs as '34' or something more like a level tone as '44'. Another situation is T1+T2 and T1+T4, where T1 performs as '323' not the citation tone as '213'. Although there's a little difference here, we can't say that it's a kind of tone sandhi for they have the same tone contour.

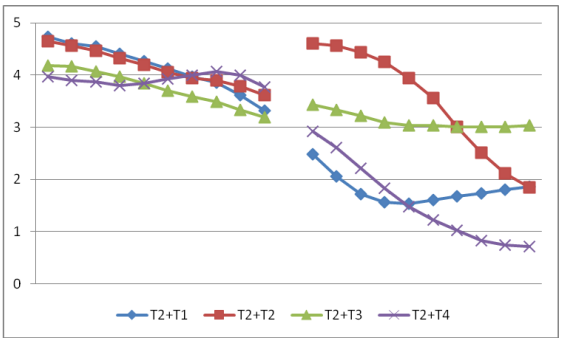

Figure5 *tone sandhi pattern with the same initial tone2*

Figure5 shows four combinations of all which have the same initial tone, i.e., Tone2. For T2+T1, T2+T2 and T2+T3, the initial T2 performs as '54' just similar with its citation tone as '53'. This is consistent with the result of the Ma[4]. It has been proposed in part 3.1 that tone2 is a falling tone in citation form and it performs as a level tone when it locates before tone4 in the above figure. Therefore, when tone2 is assigned before tone4, it is changed to tone3, i.e., T2+T4→ T3+T4.

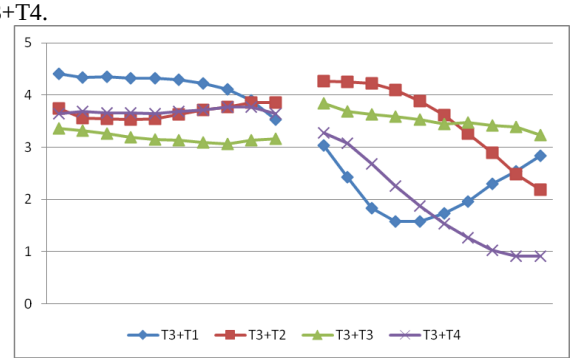

Figure6 *tone sandhi pattern with the same initial tone3*

Figure6 illustrates four combinations with the same initial tone, i.e., Tone3. When tone4 is assigned before all the four tones, it is nearly changed nothing at all, i.e., T4 performs as '44' or '55'. There's only a little falling contour observed when it is before T1 and T3.

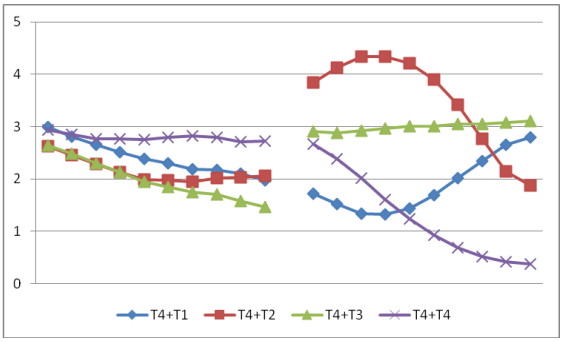

Figure7 *tone sandhi pattern with the same initial tone4*

Discussions about the above figure show that tone sandhi pattern with the same initial tone4. For T4+T1, T4+T2 and T4+T3, the initial T4 performs as '32'differ from its citation tone as '312'. T4 performs as a falling-rising tone changed to falling tone before T1,T2 and T3. We also see that it changes to level tone before T4.

3.2.2. Tonal combinations with the same final tone

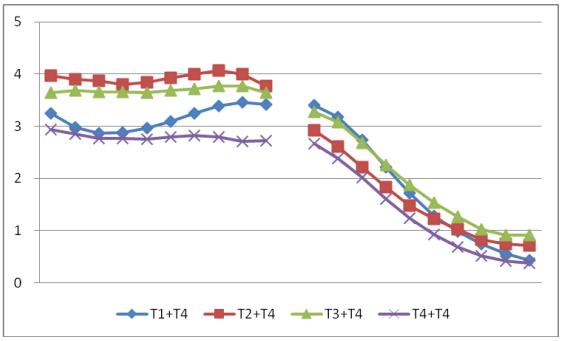

Figure8 *tone sandhi pattern with the same final tone4*

When the second syllable is the time T4, T4 changes, behind the four tones in syllables, 41 were T4, will be turned into a falling tone. Three other cases, when the second syllable is T1,T2,T3, and there had been no tone sandhi observed.

3.2.3. Tonal combinations with the same final voiceless syllable tone

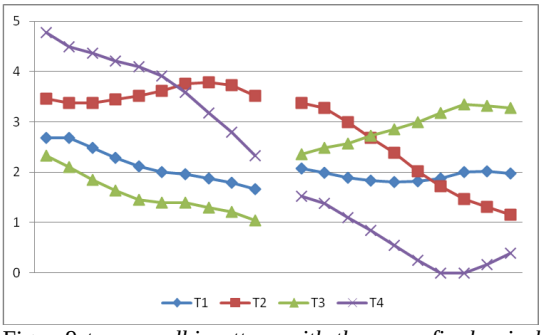

Figure9 *tone sandhi pattern with the same final voiceless tone*

The above figure displays patterns that when the four tones followed by a voiceless tone. T1 shows as '32', T2 as '44', T3 as '31', T4 as '53'. While in Ma[4]'s research, T1 shows as '31', T2 as '55', T3 as '214', T4 as '53'.

4. Conclusions

The present study gives a detailed tonal pattern of Linyi dialect which belongs to Shandong Dialect. The purpose of this paper is try to use the experimental method of phonetics to summarize the tonal pattern of more dialects of China. Results of citation tones are YingPing(Tone1) shows as 213(312), YangPing(Tone2) as 51, Shangsheng(Tone3) as 44, Qusheng(Tone4) as 312(41). We can conclude that the results of former research are reliable. What we got in this paper is that slight differences can be seen from the initial part and the final part. This may be proved with more perception experiment. Another view is that tonal pattern of male differs from that of female.

The discussion of tone sandhi of Linyi dialect found more subtle differences according to the results of former research. As can be seen from Table 2, the obvious tone sandhi is T2+T4→T3+T4 and T4+T4→T3+T4. When Tone4 is before other tones, it changes from low-falling tone to falling tone. The similar phenomenon happens to Tone1, it changes from low-rising tone to rising tone as the initial tone.

The tone sandhi occurs here is the type of former Variant, i.e., the former tone changes because of the sandhi of the final tone. Another theory that suitable to this study is that in the disyllable case, the initial tone is always higher than the final tone. As shown from T2+T1,T2+T2,T2+T3, T2 performs as '51' to '54'. The contour range is narrower than before.

Table 2. *The comparison of tone sandhi.*

	Former Research	The Present Study
T1+T1	214+214→ 24+214	213+213→34+323
T1+T2	214+ 53→214+ 53	213+ 51→34+52
T1+T3	214+ 55→214+ 55	213+ 44→34+44
T1+T4	214+312→214+ 31˜312	213+312→34+41
T1+T5	214+ 00→ 31+ 24	213+ 00→32+33
T2+T1	53+214→ 53+214	51+213→54+32
T2+T2	53+ 53→ 53+ 53	51+ 51→54+52
T2+T3	53+ 55→ 53+ 55	51+ 44→54+44
T2+T4	53+312→ 53+ 31˜312	***51+312→44+31***
T2+T5	53+ 00→ 55+ 2	51+ 00→44+42
T3+T1	55+214→ 55+214	44+213→55+323
T3+T2	55+ 53→ 55+ 53	44+ 51→44+53
T3+T3	55+ 55→ 53+ 55	44+ 44→44+44
T3+T4	55+312→ 55+ 31˜312	44+312→44+41
T3+T5	55+ 00→214+ 5	44+ 00→32+34
T4+T1	312+214→ 31+214	312+213→43+213
T4+T2	312+ 53→ 31+ 53	312+ 51→43+52
T4+T3	312+ 55→ 31+ 55	312+ 44→42+44
T4+T4	312+312→ 35+ 31˜312	***312+312→33+31***
T4+T5	312+ 00→ 53+ 2	312+ 00→53+21

5. Acknowledgements

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6. References

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