Prosodic focus in three northern Wu dialects: Wuxi, Suzhou and Ningbo

Bei Wang[1], Yuanyuan Zhang[2], Yi Xu[3], Hongwei Ding[2]

[1]Institute of Chinese Minority Languages and Literature, Minzu University of China
[2]Institute of Cross Language Processing Center, Shanghai Jiao Tong University
[3]Department of Speech, Hearing and Phonetic Sciences, University College London

Abstract

The present study investigated three northern Wu dialects: Wuxi, Suzhou, and Ningbo. It is found that, in all three dialects, focus is encoded by increasing the maximum F_0 and duration of focused words, and lowering and compressing the F_0 and pitch range of post-focus words. These results are consistent with previous findings about Wu dialect in Shanghai. Northern Wu dialects therefore seem to encode focus in a similar way to Beijing Mandarin, but different from many languages/dialects spoken in southern China. This finding, together with evidence from gene studies and migration history of Wu areas, provide further support for the *inheritance hypothesis* of PFC, according to which all languages with PFC are descendants of a common proto-language in the Middle East.

Key words: Wu dialect, prosody, focus, post-focus-compression (PFC)

Introduction

Focus is the highlighting of part of a sentence against the rest of the sentence, motivated by discourse context. A focused word is generally realized with increased F_0, duration and intensity. Xu et al. (2012) found that, for the post-focus part, two different patterns have been reported across languages: with post-focus lowering and compression of F_0 and intensity (PFC), or without PFC. PFC has been found that in many languages/dialects spoken in northern and middle China, e.g., Uygur, Ando Tibetan, Lasha Tibetan, Beijing Mandarin, Nanchang dialect, etc., but is absent in many southern languages/dialects, e.g., Taiwanese , Deang, Yi and Wa, etc, as summarized in Xu et al. (2012). They proposed an *inheritance hypothesis*, according to which PFC is inherited from a common proto-language shared by all languages with the feature.

Wu area in China is especially interesting for testing the *inheritance hypothesis* because (1) there are contrary results on the presence of PFC in Wu dialects; (2) the formation of Wu dialects involves influences from both PFC and non-PFC languages in its history. According to Pan (2009), among many others, although Wu dialects are heavily influenced by Kam-Tai languages back to Chunqiu Dynasties (770-476 B.C.), modern Wu dialects (possibly formed in Sunwu era (220-280)) are mainly spoken by people who

immigrated from the north. Wen et al. (2004) showed that the contribution of Y chromosome and mitochondrial DNA (mtDNA) from northern Han is about 80% in the Wu population (Jiangsu and Shanghai). Thus, the *inheritance hypothesis* would predict that Wu languages have PFC just like most northern Mandarin dialects. The current study is an investigation of prosodic focus in the Wu dialects of Wuxi, Suzhou, and Ningbo.

Method

Corrective focus was elicited by a preceding sentence, in a structure as "It is not my brother. My sister poured noodle soup". In each dialect, two declarative sentences were constructed to examine focus in four conditions: initial (IF), medial (MF), final (FF) and neutral (NF).

There were 6 Wuxi speakers (4 F, 2 M, age 24-52), 8 Suzhou speakers (4F, 4M, age 45-63), and 8 Ningbo speakers (5F, 3M, age 24-45).

The recording was digitized into a computer (Lenovo Z475) by 16Bit/44.1k using audio sound (Yamaha Steinberg CI2) and a condenser microphone (SHUER Beta 53). Each speaker recorded all the 8 sentences three times in separately randomized blocks.

The data extraction was done with the Praat script ProsodyPro (Xu, 2013), which generated 10 normalized F0 points, maximum F0, and duration for each manually segmented syllable. The F0 values were converted from Hz to semitones (st) using the following formula:

$$f_{st} = 12 \quad \log_2(F_0)$$

Results

F_0

Fig. 1 displays the time-normalized F_0 contours of one sentence in each dialect, with four focus conditions overlaid in one figure. The other sentences showed the same pattern.

It can be seen from Fig. 1 that, in all three dialects, focus raises the maximum F_0 of the on-focus word, and compresses the maximum F_0 of the post-focus part as compared to the neutral focus condition, but leaves the pre-focus part largely intact.

Table 1 shows mean maximum F0 of the three target words averaged across the two sentences in the three dialects, broken down by the four focus conditions. Two-way repeated measures ANOVA with word position and focus condition as the independent variables were carried out for each dialect. Focus has significant effects in all the three dialects (Wuxi: $F(3, 15)=6.45^*$, Suzhou: $F(3, 21)=14.73^{**}$, Ningbo: $F(3, 21)=14.31^{***}$).
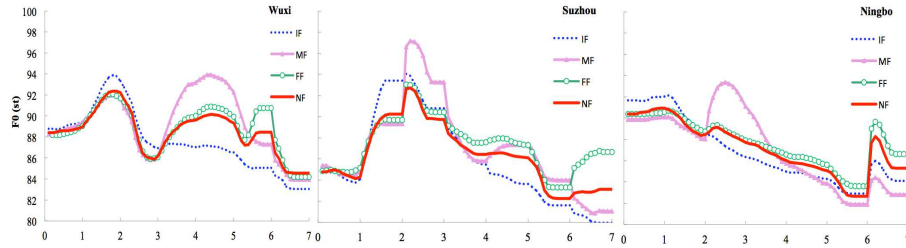
Figure 1. F_0 contours of one sentence in the three Wu dialects.

	Word	IF	MF	FF	NF
Wuxi	W1	94.5	92.6	92.3	92.7
	W2	92.1	92.7	91.5	91.7
	W3	86.6	91.3	90.3	89.2
Suzhou	W1	95.2	94.4	92.5	92.9
	W2	91.1	95.3	92.2	91.3
	W3	83.6	86.8	90.7	87.1
Ningbo	W1	93.9	92.0	92.5	92.6
	W2	87.7	92.6	89.8	89.7
	W3	85.9	85.6	89.8	88.4

Table 1. The Maximum F_0 (st) of the three target words.

Word Duration

Table 2 shows mean duration of the three target words under different focus conditions in each dialect, averaged across three repetitions of the two sentences by all speakers.

	Word	IF	MF	FF	NF
Wuxi	W1	417	375	369	368
	W2	412	492	432	431
	W3	440	444	546	485
Suzhou	W1	528	482	451	468
	W2	390	484	416	416
	W3	436	450	549	495
Ningbo	W1	337	314	304	310
	W2	340	374	366	355
	W3	456	450	496	484

Table 2. The word duration (ms) of the three target words.

It can be seen in Table 2 that on-focus words are lengthened in all three dialects. Pre- and post-focus words do not differ much from the neutral focus words. Two-way repeated measures ANOVAs with focus and word position as two independent variables show that focus has main effect in all the dialects (Wuxi: $F_{(3, 15)}=4.7*$; Suzhou: $F_{(3,21)}=3.46***$; Ningbo: $F_{(3, 21)}=3.16*$).

Discussion and Conclusions

This study investigated focus encoding in Wuxi, Suzhou, and Ningbo. It is found that, in all these dialects, focus not only raises the maximum F0 and lengthens the duration of the on-focus word, but also compresses and lowers the F0 of the post-focus words. Prosodic focus in these Wu dialects thus shows a similar pattern to Shanghai (Chen, 2008; Selkirk & Shen, 1990). Scholtz (2012) has studied a southern Wu dialect (Wenzhou) and showed PFC applied in the initial focus condition. Overall, the results are consistent with the prediction by the *inheritance hypothesis* of PFC. Nevertheless, more languages/dialects need to be studied, especially southern Wu dialects.

Acknowledgements

References

Pan, W.Y. 2009. The Historical Background of the Formation of Wu Dialects（吴语形成的历史背景）. Dialect（方言), 3, 193-203.

Selkirk, E., Shen, T. 1990. Prosodic domains in Shanghai Chinese. In *The Phonology-Syntax Connection*. S. Inkelas and D. Zec. Chicago: University of Chicago Press pp. 313-37.

Wen, B., Shi, H., Ren, L., Xi, H., Li, K., Zhang, W., . . . Xiao, C. 2004. The origin of Mosuo people as revealed by mtDNA and Y chromosome variation. Science in China Series C: Life Sciences, 47(1), 1-10.

Xu, Y. 2013. ProsodyPro — A tool for large-scale systematic prosody analysis. In *Proceedings of Tools and Resources for the Analysis of Speech Prosody (TRASP 2013)*, Aix-en-Provence, France: 7-10.

Xu, Y., Chen, S.-w., Wang, B. 2012. Prosodic focus with and without post-focus compression (PFC): A typological divide within the same language family? The Linguistic Review, 29, 131-147.

Scholtz, F. 2012. Tone sandhi, prosodic phrasing, and focus marking in Wenzhou Chinese. Ph.D. thesis, Leiden University, the Netherlands.