

POST-FOCUS COMPRESSION IN ENGLISH BY MANDARIN LEARNERS

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ABSTRACT

This study examines the phonetic realization of focus in L2 English by L1 Beijing Mandarin learners for insight into the effect of language experience on the acquisition of L2 prosody. Compared to American speakers' production, experienced Beijing Mandarin learners of English were able to produce native-like duration change and in-focus expansion of intensity but not in-focus expansion of F0 and post-focus compression (PFC) of F0 and intensity in English. These results confirm the previous finding that PFC does not easily transfer from one language to another [4, 19, 21]. However, the Chinese college seniors, who had been residing in the US longer, produced more PFC in English than the Chinese college freshmen in the current study, suggesting PFC can be learned given sufficient L2 experience.

Keywords: Prosodic focus, PFC, L2 English, LOR

1. INTRODUCTION

The phonetic realization of focus has been examined by looking at prosodic differences between focused constituents and no-focus constituents in sentences. In addition to an increase of duration, F0 and intensity in focused constituents, many languages, including American English [5, 6, 24] and Beijing Mandarin [15, 20, 23], also display post-focus compression (PFC), a decrease of F0 and intensity in the constituents after the focused ones. PFC has been found not easily transferred from a PFC language to a non-PFC language in bilingualism [4, 19, 21]. This study aims at the acquisition of prosodic focus in English by Beijing learners, whose L1 and L2 are both PFC languages.

The effects of language experience on L2 prosody have been investigated mainly in the degree of foreign accent, pitch accent, speech rate, etc [9, 12, 14]. Only a few studies have examined prosodic focus in L2 production and the subjects in those studies were normally grouped by assessment of L2 spoken proficiency [13, 16]. This study examines the effect of length of residence (LOR) in the L2-speaking environment on the phonetic realization of focus in L2 English of L1 Beijing Mandarin. The effect of LOR has been found controversial on L2 speech acquisition. For example, it predicted the

acquisition of English vowels by Italian immigrants [10] but contributed little to the degree of foreign accent in English sentences produced by Italian immigrants [11]. The latter result is consistent with the majority of studies that report no significant influence of LOR on L2 pronunciation when examining degree of L2 foreign accents [17, 18].

Three research questions are explored in the current study: (1) Can Beijing Mandarin learners of English produce prosodic focus in L2 English with a native-like pattern of in-focus expansion of duration, F0 and intensity? (2) Can they also produce post-focus compression (PFC) of F0 and intensity in L2 English? (3) Does LOR affect the acquisition of prosodic focus in L2 English by Beijing Mandarin learners?

2. METHODS

2.1. Participants

Two groups of Beijing Mandarin learners of English, who were respectively freshmen and seniors at the University of Oregon (UO), were paid to participate in the experiment. A control group of native American English speakers was also included. There were five male and five female speakers in each group. Participants in the learner groups were all from north China and spoke Beijing Mandarin as their L1. They were all experienced learners of English, having passed the TOEFL test required to be admitted to the university. Since one group was freshman students and the other senior students at the time of test, the learners' LOR differed. The freshman group had an LOR from 3 to 7 months and the senior group from 3.5 to 4.5 years.

2.2. Stimuli

The stimuli are listed in Table 1. The neutral focus prompt question was the same for all three focus locations—initial, medial and final—and was used to elicit a default no-focus production of each sentence. Sentences with contrastive focus in the three different focus locations were elicited using different prompt questions. The in-focus words also varied in five types of lexical stress. There were thirty target sentences in total (fifteen sentences each in the no-focus and focused conditions).

Table 1: Prompt questions and answers for eliciting foci in the stimuli.

Neutral Focus	Question	What's the news?
	Answer	<i>See initial, medial, and final focus sentences below.</i>
Initial Focus	Question	Who may marry Ray?
	Answer	Leigh / Nina / Melanie / Marie / Ramona may marry Ray.
Medial Focus	Question	What may Leigh do to Norman?
	Answer	Leigh may leave / marry / nominate / remind / remember Norman.
Final Focus	Question	Who may Ray marry?
	Answer	Ray may marry Leigh / Nina / Melanie / Marie / Ramona.

2.3. Recording

Recording took place in the sound-attenuated booth at the UO Linguistics Department. Target sentences were presented in PowerPoint. Participants clicked through the slides to play the prompt questions and answered the questions with the target sentences. The stimuli were presented in three pre-determined pseudorandom orders. A Marantz professional solid state recorder PMD670 and a Shure professional unidirectional head-worn dynamic microphone were used. Target sentences were directly recorded into a computer SD card with a sampling rate of 44,100Hz.

2.4. Analyses

According to the convention of analyzing L2 speech production, acoustic measures were made on the second repetition of a sentence unless this was disrupted, in which case the third repetition was used. Data were analyzed by Praat version 5.3.65 [3] and ProsodyPro version 5.5.2 [22]. Time-normalized F0 was collected at ten points in each syllable. To examine the prosodic changes associated with in-focus productions, F0, intensity and duration of each stressed syllable produced in the default no-focus condition was subtracted from that of each stressed syllable produced in the contrastive focus condition. Thus, in-focus change was based on stressed syllable differential values in the three focus locations (initial, medial and final). Pre-focus change was based on the overall differential values for "Leigh may" in the medial focus condition and "Ray may marry" in the final focus condition. Post-focus change was based on the overall differential values of "may marry Ray" in the initial focus condition and "Norman" in the medial focus condition. Data on the magnitude of F0, intensity and duration changes from in-focus to pre-focus locations and from in-focus to post-focus locations are not included in this paper.

3. RESULTS

3.1. The overall F0 contours in no-focus and focused conditions

Time-normalized F0 contours of the stimulus sentences were first plotted by focus location and subject group. In Figures 1-3, each curve represents an average of the ten speakers' production. Solid curves represent the no-focus condition and dashed curves represent the focused condition. Syllable boundaries are marked with vertical dashed lines. Due to the different number of syllables in the in-focus words and same number of syllables in the pre-focus and post-focus words, the F0 contours for initial focus and medial focus were right aligned and those for final focus were left-aligned.

Figure 1 indicates that American English (AE) speakers produced in-focus expansion of F0 range on stressed syllables in sentence-initial position and distinct PFC of F0. If there was an unstressed syllable in the in-focus word linked to the post-focus constituents, PFC started on that syllable; for example, the *na* of *Nina*, the *la* of *MELanie*, and the *na* of *RaMOna*. Compared to AE speakers, the Senior Chinese (SC) learners of English produced less in-focus expansion and PFC, but they started PFC from the unstressed syllable that followed the focused syllable as AE speakers did. The Freshman Chinese (FC) learners of English produced in-focus expansion but little PFC, and PFC did not start until the first syllable of the post-focus constituents.

Figure 2 indicates that AE speakers produced in-focus expansion of F0 range on stressed syllables in sentence-medial position, very clear PFC and very little pre-focus compression. The SC learners again produced less in-focus expansion and PFC than AE speakers, and almost no pre-focus F0 change. The FC learners produced clear in-focus expansion but little PFC and pre-focus compression.

Figure 3 indicates that none of the groups produced F0 change on pre-focus constituents when the final word in the sentence was focused; however, they all produced in-focus expansion of F0 on the in-focus words. The FC group appeared to have more in-focus expansion than the SC group, which can be also seen in Figures 1 and 2.

3.2. The changes of mean F0, intensity and duration by sentence location relative to focus item

The pre-focus and post-focus constituents were the same items in the same sentence locations relative to the focus item for each of the different in-focus words. The focused words varied in lexical stress pattern so the in-focus variable was calculated on the stressed syllable to examine the overall prosodic

Figure 1: Time-normalized F0 contours (Hz) with initial focus by word stress and speaker group.

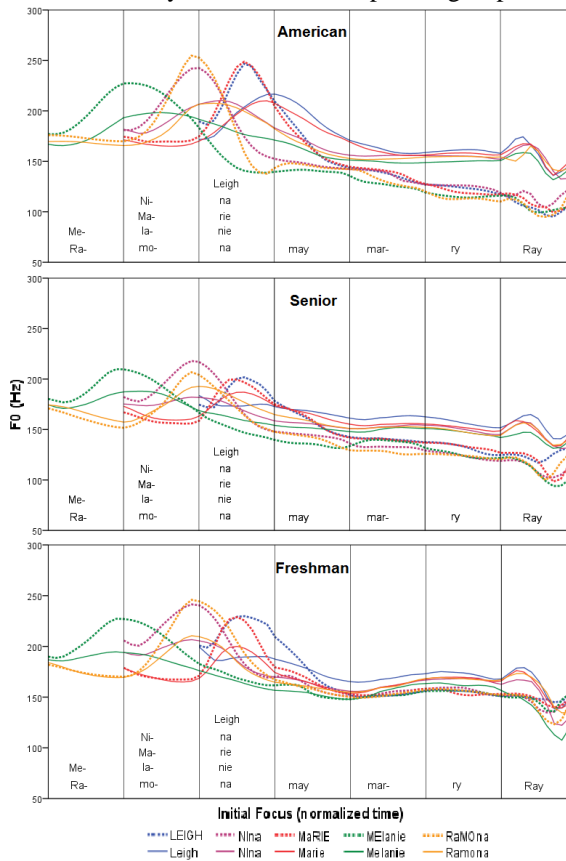


Figure 2: Time-normalized F0 contours (Hz) with medial focus by word stress and speaker group.

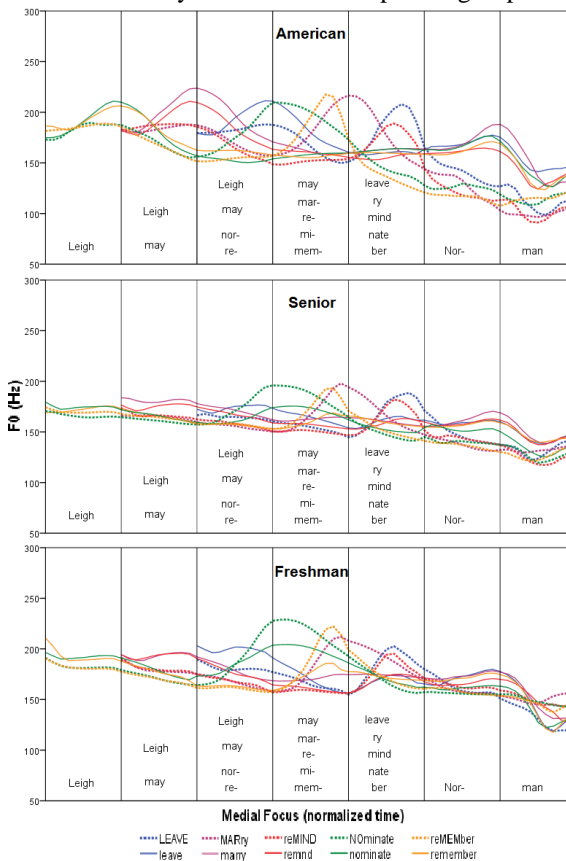
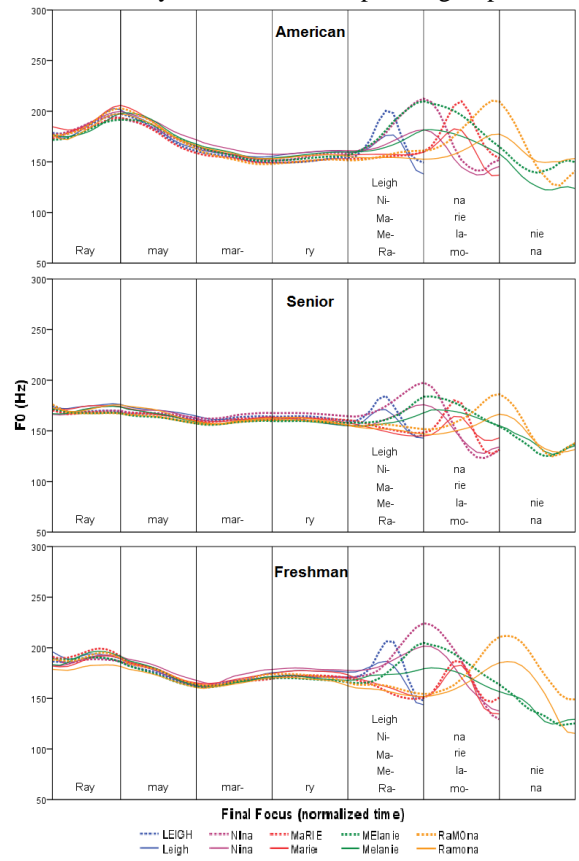


Figure 3: Time-normalized F0 contours (Hz) with final focus by word stress and speaker group.



change from no-focus to focused conditions. To statistically verify the F0 change over three focus locations across the three groups as seen in Figures 1-3, mean F0 differences were converted from Hz to semitone and compared in a repeated measures ANOVA with two factors—sentence location relative to focus item (pre-focus, in-focus, post-focus) as a within-subjects factor and subject group (native AE speakers, SC learners of English, FC learners of English) as a between-subjects factor.

The results of F0 change showed a two-way interaction between location and group ($F(4,54) = 9.726, p < 0.001$). The main effects of location ($F(2,54) = 79.378, p < 0.001$) and group ($F(2,27) = 5.92, p = 0.007$) were both highly significant. Post-hoc independent samples t-tests showed significant differences of mean F0 for in-focus change between the AE and the SC groups ($t(18) = 2.378, p = 0.036$) and a near significant difference between the AE and the FC groups ($t(18) = 1.954, p = 0.066$). Significant differences for post-focus change were also found between the AE and SC groups ($t(18) = -2.324, p = 0.032$), between the AE and FC groups ($t(18) = -4.401, p < 0.001$), and between the SC and FC groups ($t(18) = -3.526, p = 0.003$).

A repeated measures ANOVA on mean intensity change showed a two-way interaction between sentence location and speaker group ($F(4,54) =$

10.687, $p < 0.001$). The main effects of location ($F(2,54) = 187.211, p < 0.001$) and group ($F(2,27) = 21.668, p < 0.001$) were also both highly significant. Post-hoc independent samples t-tests showed a significant difference of mean intensity in the post-focus change between the AE and SC groups ($t(18) = -2.378, p = 0.018$), between the AE and FC groups ($t(18) = -5.576, p < 0.001$), and between the SC and FC groups ($t(18) = -5.279, p < 0.001$).

A final repeated measures ANOVA on duration change showed no interaction between sentence location and speaker group and also no main effect of group. The main effect of location was highly significant ($F(2,54) = 124.735, p < 0.001$).

Figures 4-6 display the means and standard errors of the changes in F0, intensity and duration according to sentence locations and speaker groups.

Figure 4: Mean F0 change (semitone) by sentence location relative to focus item and speaker group.

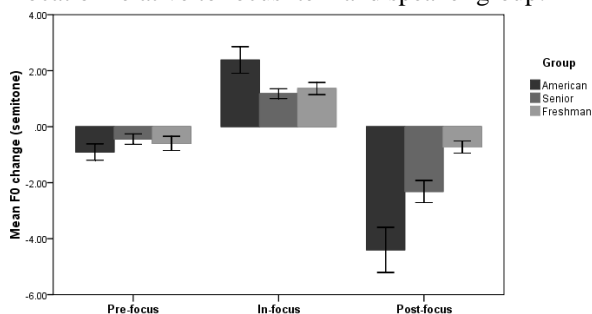


Figure 5: Mean intensity change (dB) by sentence location relative to focus item and speaker group.

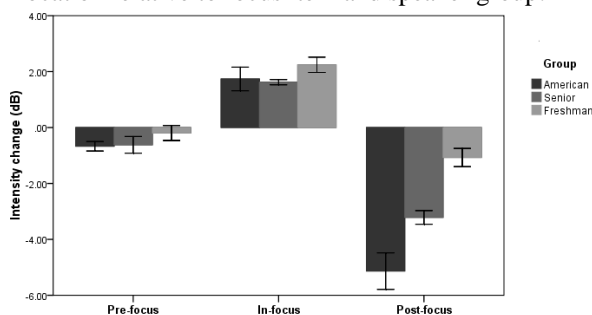
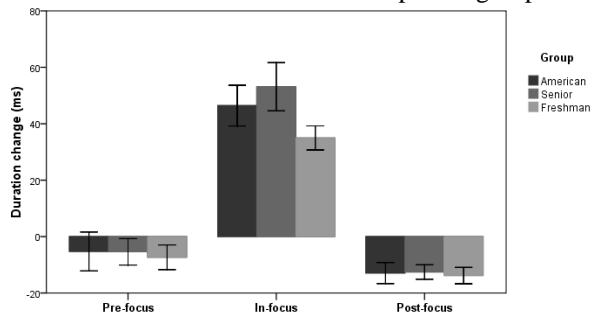


Figure 6: Mean duration change (ms) by sentence location relative to focus item and speaker group.



4. DISCUSSION

The results address the 1st and 2nd research questions regarding in-focus prosodic change and PFC, in particular, giving partial support for the expectation that Mandarin learners would not have difficulties in producing both in-focus expansion and post-focus compression in English since these patterns also exist in Mandarin. However, the results reveal that that PFC in English is not easy for Chinese learners to acquire even though there is PFC in Beijing Mandarin. This finding confirms that PFC does not easily transfer from one language to another [4, 19].

To consider these findings under an L2 speech framework, such as the Perceptual Assimilation Model [1, 2] and the Speech Learning Model [7, 8], the similarities in phonetically realizing focus in Beijing Mandarin and English may result in difficulties discerning and thus acquiring prosodic focus, particularly PFC, in English by Beijing learners. One explanation for the poor acquisition of prosodic focus across the two languages may be that Mandarin learners focused unduly on the local word stress that does not exist in their L1, which blocked their sensitivity to the global prosody and thus the successful acquisition of prosodic focus in their L2 English, including the important feature of PFC.

The results also address the 3rd research question about the effect of LOR on the acquisition of L2 prosodic focus. Although the SC group did not produce native-like PFC of mean F0 and intensity, their patterns were significantly more native-like than those produced by the FC group. In other words, long LOR learners show an intermediate pattern of PFC between the native English speakers and the short LOR learners. As suggested in [17] and [18], the contradictory results on the effect of LOR on L2 speech in the previous studies might be explained if additional years of L2 experience lead to a decrease of L2 foreign accent in the early phases of L2 learning but asymptote in proficient L2 speakers. This study reveals a positive effect of LOR on prosodic focus in the L2 speech production, suggesting that the full phonetic realization of focus can be acquired given sufficient L2 experience.

5. FUTURE DIRECTIONS

In addition to prosodic focus at the sentential level, this study was also designed to investigate the acquisition of word stress in no-focus and focused conditions in L2 English by Beijing Mandarin learners. More acoustic measurements and statistical analysis will be conducted to further interpret the acquisition of L2 English prosody by Mandarin learners and its correlation to language experience.

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