PRODUCTION OF ENGLISH LEXICAL STRESS BY INEXPERIENCED AND EXPERIENCED LEARNERS OF ENGLISH

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1. INTRODUCTION

Misplacing stress might change the lexical categories of English words. For example, the noun 'record' is stressed on the first syllable and the verb 'record' is stressed on the second syllable. Misproduced stress patterns may cause a delay of understanding by native speakers of English (Wiltshire & Moon, 2003). Therefore, in order to produce an English word in a native way, placing stress accurately is a key step for second language speakers to master.

Furthermore, Mandarin Chinese is a syllable-timed tonal language, whereas American English is a stress-timed nontonal language. Mandarin speakers might use different phonetic cues to place English stress. This study was conducted to see whether the placement of stress and its phonetic cues show significant differences between American speakers and Mandarin speakers. In addition, the study tested whether learning experience improves English learners' ability to signal English lexical stress.

2. METHOD

2.1 Participants

Sixteen native Mandarin speakers from Northern China participated in a production experiment which involved two tasks: English real-word reading and English-like non real-word reading. Among the sixteen participants, eight were inexperienced learners of English who were college students in China, and the other eight were experienced learners of English who had studied at a University in the USA for at least three years. Six native English speakers in USA were chosen as a control group.

2.2 Stimuli

Two-syllable words were chosen for the present study: 22 real English words differing only in stress pattern, such as *subject*, and 22 non real English words with *N/i/N/i/+obstruent* syllable structure, such as *mimit*. The stressed syllable is underlined to attract the speaker's attention. 4 Mandarin Chinese words were designed with a tonal combination: either high flat tone + neutral tone, such as *mīmi* or dipping tone + falling tone, such as *mǐmì*.

2.3 Procedure

Each participant read two sets of English words. Each set was divided into two blocks. Between each block, the participant was required to rest for one minute. In addition, the 22 stimuli were preceded by a practice section. The speaker was required to read each word loudly. The words were randomly presented. All Mandarin speakers read the Chinese words as well.

2.4 Acoustic Analysis

With the aid of a script, PRAAT took three kinds of measurement of each vowel: loudness, duration and pitch:
Loudness: mean amplitude
Duration: onset to offset of vowel.
Pitch: initial: 5% of vowel duration
medial: 50% of vowel duration
final: 95% of vowel duration

3. RESULTS

3.1 Error rate

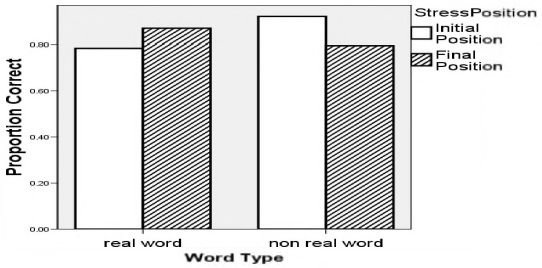

Fig. 1. Proportion correct production of stress

Shown in Fig 1, Mandarin speakers misplaced stress nearly significantly more on final-stressed non real words (p=0.056). However, Mandarin speakers nearly significantly misplace stress more on initial-stressed real words (p= 0.065).

3.2 Acoustic analysis

In the following sections, all data were from the production of non real English words by three groups and Chinese words by two Chinese groups. IE represents the acoustic cues produced by inexperienced learners, EE by experienced learners, AE represents by American speakers, MC_1 represents high flat tone + neutral tone and MC_2 represents dipping tone + falling tone.

Amplitude

Table 1. Ratio of Stressed Vowel/Unstressed Vowel Amplitude Measures on the initial stressed words

	IE	EE	AE	MC_1
Avg	1.1061	1.1027	1.1032	1.0998
StDev	0.04221	0.07444	0.05194	0.03881

A one-way ANOVA showed that there is no significant main effect of group [$F(2,276) = 0.943$, $p > 0.05$].

Table 2. Ratio of Stressed Vowel/Unstressed Vowel Amplitude Measures on the final stressed words

	IE	EE	AE	MC_2
Avg	1.0176	1.0155	1.5186	1.0216
StDev	0.03769	0.04540	0.06816	0.05195

A one-way ANOVA showed that there is a significant main effect of group [$F(3,234) = 0.000$, $p < 0.001$]. *Post hoc* analyses (Tukey HSD) showed that there is no significant different among IE between EE. However, there is a significant different between Mandarin speakers and English speakers. The ratio of amplitude made by American speaker is significant larger than ratios made Mandarin speakers.

Duration

Table 3. Ratio of Stressed Vowel/Unstressed Vowel Duration on the initial stressed words

	IE	EE	AE	MC_1
Avg	0.8077	0.9749	1.0950	1.2237
StDev	0.19597	0.23424	0.43683	0.40031

A one-way ANOVA showed that there is a significant main effect of group [$F(3,276) = 0.000$, $p < 0.001$]. *Post hoc* analyses (Tukey HSD) showed that the ratio of AE is not significantly larger than EE, but is significantly larger than IE.

Table 4. Ratio of S Table stressed Vowel/Unstressed Vowel Duration on the final stressed words

	IE	EE	AE	MC_2
Avg	1.9370	2.1503	2.4081	1.3782
StDev	0.50766	069986	1.10357	0.40696

A one-way ANOVA showed that there is a significant main effect of group [$F(3,234) = 0.000$, $p < 0.001$]. *Post hoc* analyses (Tukey HSD) showed that there is no significant difference between EE and AE, However, there is significant difference between IE and AE.

Pitch

Table 5. Ratio of Stressed Vowel/Unstressed Vowel F_0 on the initial stressed words.

p-initial	IE	EE	AE	MC_1
Avg	1.1302	1.1248	1.1707	1.0745
StDev	0.16240	0.27526	0.26774	0.19183
p-medial	IE	EE	AE	MC_1
Avg	1.1917	1.3244	1.3054	1.3980
StDev	0.19104	0.37418	0.38964	0.29895
p-final	IE	EE	AE	MC_1
Avg	1.4975	1.4797	1.2824	1.5483
StDev	0.84079	0.47419	0.46150	0.55694

Table 6. Ratio of Stressed Vowel/Unstressed Vowel F_0 on the final stressed words.

p-initial	IE	EE	AE	MC_2
Avg	1.2995	1.1307	1.1454	1.3620
StDev	0.63843	0.20072	0.27173	0.76671
p-medial	IE	EE	AE	MC_2
Avg	1.2625	1.0950	1.1627	1.2839
StDev	0.60969	0.19725	0.28771	0.45788
p-final	IE	EE	AE	MC_2
Avg	0.9375	0.9119	1.0590	1.0115
StDev	0.30417	0.12501	0.23910	0.34561

A one-way ANOVA showed that there is no significant main effect of group on the ratio of F_0 on each taken points.

4. DISCUSSION

Fig 1 indicates that Mandarin speakers have a phonetic preference for placing stress on the initial position of English disyllabic words. However, Mandarin speakers' learning experience may change their phonetic preference since most of real words in the study were taught as a verb with the stress in the second syllable during their English education in China,

Table 1 and Table 2 show that regardless of language experience, Mandarin speakers performed better at using amplitude cues to place stress on initial stressed words than on final stressed words. It is probably due to transferring the ratio of amplitude of the two tonal combinations in their native language, which show similar phonological pitch patterns.

Table 3 and Table 4 reveal that language experience did help Mandarin speakers to make a more native-like acoustic cue, larger ratios of duration, to stress English words. However, the ratios are still smaller than English native norms. To produce the duration of initial stressed English words, we assume that the final obstruent in the tested syllable structure might trigger Chinese participants to lengthen the second vowel even when they did not tend to stress the syllable.

The tone combination of high flat tone + neutral tone presents the high+low pitch pattern which is similar to the pitch pattern of initial stressed English disyllabic words and the tone combination of low dipping tone+ falling tone presents the low + high pitch pattern which is similar as the pitch pattern of final stressed English disyllabic words. Therefore, Mandarin speakers may easily detect the pitch difference between stressed and unstressed syllables and have no difficulty in producing pitch patterns of English disyllabic words.

REFERENCE:

Wiltshire, C & Moon, R.(2003). Phonetic Stress in Indian English vs. American English, *World Englishes* 22.3: 291-303.