Mirroring, Shadowing, and Gesture Alignment in Interlanguage English Speech

Noriko Yamane, Masahiro Shinya, Brian Teaman, and Atsushi Fujimori

1. Introduction

There has been a recent interest in shadowing and mirroring practice. Shadowing means listening to a target second language imitating the sounds as quickly as possible (Kadota 2019, Mori, 2011, Hamada, 2018). Mirroring, on the other hand, is watching a model speaker and imitating not only sounds but also the gestures the speaker uses (Acton, 1984, Tarone & Meyers, 2018). However, there is no research comparing these two instructional methods for teaching prosody. Furthermore, L1 English speakers often use manual 'beat' gestures that temporally coordinate with intonation peaks (Shattuck-Hufnagel, et al. 2016; Shattuck-Hufnagel & Ren, 2018), and tactile stimuli should enhance speech perception (Gick et al. 2008), but it remains unanswered how mirroring those gestures can help EFL speakers to gain performance improvements in their prosodic output. The focus of the study here is the learners' pitch range and duration contrast between stressed and unstressed syllables. This paper presents the acoustic results of EFL learners speech during shadowing practice and mirroring practice. Furthermore, we looked more closely at gesture and speech mis-alignment that appear in the learner data.

2. Methods

Japanese college students (N=23) participated in three 20 minute per week training sessions over a three week period. They were divided into an experimental group mimicking 'beat' gestures and speech of a TED Talk speaker (Smith 2017), and a comparison group shadowing only the audio of the same speaker. In pre- and post-training sessions, students came to a classroom individually, and stood in front of a screen that has a speaking script, and were told to read it aloud as if they were speaking to an audience of 20-30 people. Novel sentences were also included in the script to evaluate whether the learners successfully applied their trained skills to untrained sentences as well (hereafter, generalization). The speech sounds were recorded using Praat, while the gestures were recorded using Kinect One. The acoustic measurements were made for pitch range and duration contrast between stressed and unstressed syllables. The kinematic measurement was done for the velocity of beats of each hand. The temporal spans of the velocity peaks and prosodic peaks were compared using the Timeline feature in MatLab.

3. Results

The experimental group expanded the pitch range (maximum pitch values minus minimum pitch values) and duration contrast (duration of the stressed syllables divided by duration of unstressed syllables), suggesting that using beat gestures facilitate an English-like rhythm.

Figure 1

A two-way repeated measures ANOVA (training: Pre/Post, and group: Mirroring/Shadowing) was performed to test the differences in pitch range data (Figure 1). A significant main effect of training was observed ($F(1, 12) = 15.3$, $p = 0.002$, $\eta^2 = 0.43$). Importantly, a significant interaction was observed ($F(1, 12) = 8.0$, $p = 0.015$, $\eta^2 = 0.23$), which indicates that the effect of Mirroring training on the pitch range was larger than that of Shadowing training. To test the skill
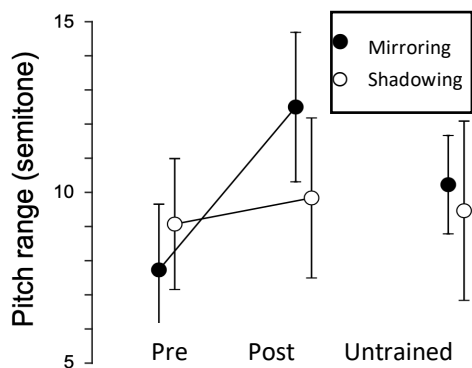
generalization of the pitch range expansion, another two-way repeated measures ANOVA (training: Pre/Transfer, and group: Mirroring/Shadowing) was performed. The skill generalization was on the border of significance ($F(1, 12) = 4.2$, $p = 0.063$, $\eta^2 = 0.17$).

Another two-way repeated ANOVA (time: Pre/Post/Untrained, and group: Mirroring/Shadowing) was performed to test the differences in duration contrast (Figure 2). A significant main effect of training was observed ($F(1, 12) = 28.807$, $p < 0.001$, $\eta^2 = 0.596$), however, there was no significant difference between groups ($F(1, 12) = 0.651$, $p < .425$, $\eta^2 = 0.007$) and no significant interaction was observed ($F(1, 12) = 1.181$, $p = 0.319$, $\eta^2 = 0.024$).
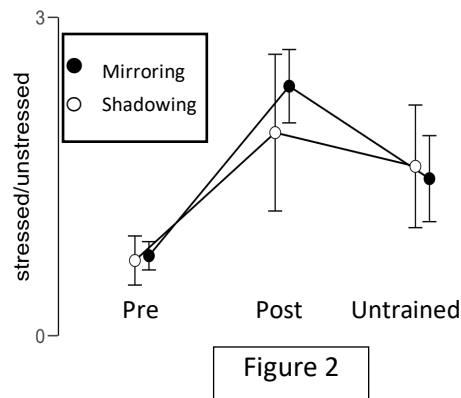
Notably, some beat gestures show temporal lags of about 0.1-0.4 sec. (A further experiment is in progress, and the finding will be reported in the presentation.)

Figure 2

4. Discussion and Conclusion

Mirroring facilitated L2 English learners to increase pitch range and duration contrast more than shadowing practice. The effect of beats is compatible with previous studies suggesting a close coupling between manual motor actions and the prominence of oral gestures based on L1 English speech data (Parell et al. 2014, Krahmer & Swerts 2007, Krivokapić et al. 2017). Thus it would be reasonable to employ mirroring instruction, so that EFL learners' flat intonation can be shifted to a more dynamic one. However, beat gestures of EFL learners show temporal lags relative to stressed syllables, which has never been attested in L1 English. We suspect that such asynchronous patterns can be ascribed to L1 transfer from a low gesture culture (So 2010) or L1 gestural tendency to coordinate with phrase-final (Ishi et al. 2014). This study illuminates language-specific gestural manifestations of prosodic marking, which contributes to raising phonological awareness in terms of speech-gesture coupling in L2 speech studies.

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