1. Introduction

The pitch level of speech may vary with physiological, socio-cultural, and linguistic factors that can interact with each other (Dolson 1994, Honorof and Whalen 2005, Xue et al. 2002; Hollien and Jackson 1973, Hanley et al., 1966, Yamazawa and Hollien 1992). Previous cross-linguistic studies have reached a relatively wide agreement upon pitch level differences between tonal and non-tonal languages. In particular, several studies on the Chinese varieties and American English have claimed that speakers of tonal languages tend to produce more dynamic pitch movement and wider pitch range. For instance, Chen, G. (1972), one of the earliest experimental studies on this issue, argues that the pitch range for Mandarin speakers is 183% to 250% wider than that of American English speakers. Eady (1982) also finds that the speech of male Mandarin speakers...
displays a greater average rate of F0 change and more F0 fluctuations than that of male American English speakers. He argues that this can be attributed to the language difference; the pitch patterns of Mandarin (i.e., a tonal language) are determined by the tonal contours of all lexical items in a sentence, whereas the pitch patterns of American English (i.e., a stress language) are determined by the placement of primary stress on only a few of the lexical items in a sentence. Yuan and Liberman’s recent study on broadcast news speech in English and Mandarin finds that Mandarin has steeper declination as well as wider pitch range and more F0 fluctuations (Yuan and Liberman 2014). It further suggests that F0 declination is not a mere by-product of the physics and physiology of talking but is linguistically controlled. Comparing three languages – Mandarin, Min Chinese, and American English, Chen, S. (2005) finds that Mandarin and Min speakers produce a greater maximum range of pitch and intensity than American English speakers.

Another line of research on cross-linguistic pitch level differences involves non-native prosody. While an increasing body of evidence indicates that various prosodic features (e.g., stress, intonation, speaking rate) play a role in the judgment of non-native accent, pitch is found to be crucial in such a way that the wider the pitch range, the less accented the native speakers perceive the speaker to be (Van els and de Bot 1987, Anderson-Hsieh 1992, Flege et al. 1995, Trofimovich and Baker 2007, Munro 1995, Jilka 2000, Kang 2010; Kang 2014, Xue and Lee 2014). In particular, Mandarin produced as a second language (L2 henceforth) by non-tonal language speakers is often characterized by lowered and compressed pitch range (e.g., Guo and Tao 2008, Lee 2011). In the view that tonal languages are generally produced with more dynamic pitch fluctuations and wider pitch range, this L2 prosodic characteristic is attributed to the influence of a native language (L1 henceforth). That is, since non-tonal languages tend to be produced with relatively low pitch level and narrow pitch range, these global pitch features are transferred to L2 Mandarin (Guo and Tao 2008 for a review of Chen, G. 1974, White 1981, Shen 1989, Chen, Q. 1997 etc.; Lee 2011).

Nonetheless, the seemingly reasonable assumption on the association between pitch production and language typology (i.e., tonal vs. non-tonal languages) has been challenged by counterevidence on cross-linguistic pitch differences. For instance, Keating and Kuo (2012) compare the speaking fundamental frequency (F0) profiles of English and Mandarin and find that the physiological F0 ranges of the speakers do not differ between the two languages, indicating that the English and Mandarin speakers’ pitch levels are comparable. More specifically, English and Mandarin are similar in reading longer prose passages, Mandarin being higher only in the mean F0 but not in the F0 maximums and ranges. Mandarin is found to be produced with higher F0 maximums and means, and larger ranges only in single-word utterances.\(^1\) Deutsch et al.’s study on the pitch levels of female speech in two Mandarin-speaking communities (i.e., Jiuying in Chongqing and Taoyuan...