# The Effect of L1 Tones and L2 Pitch Accent on Lexical Access

Yusheng Mu[1]

[1]*Shanghai International Studies University (China)*
muyusheng@shisu.edu.cn

For bilingual speakers, acoustic features of words in L1 can influence how their translations are perceived in L2 [1, 2]. Few previous studies have explored the effect that suprasegmental information may have on L2 lexical processing. Shook and Marian (2016) found that Mandarin/English bilinguals performing a translation task would look toward the translation shu4 on the screen more quickly if they heard the English word tree spoken with a falling pitch (matching shu4) than if the pitch mismatches the tone [2]. But their study did not analyse words with different tones separately. The present study investigates whether suprasegmental information has a positive effect on lexical access of all four tones, or only some of them.

To examine whether suprasegmental information in Chinese affects lexical access in English, 80 monosyllabic English words are chosen as materials, whose Chinese meaning can be expressed in one character. These are evenly divided into 4 groups according to the tones of the characters (i.e., 20 English-Chinese pairs under each tone group). All the English words are recorded by a male Mandarin–English bilingual with one of the four lexical tones in Mandarin. Each word is recorded twice, with the tone contour matching or mismatching the tone of corresponding Chinese character. The recordings are then played to 27 native Chinese speakers (15 males and 12 females), who are asked to choose a corresponding Chinese character each time they hear an English word. The target character for each word is presented together with a distractor, a segmentally and suprasegmentally different Chinese character, which has a different meaning. They appear at equal distances from the left and right sides of the screen. Participants' response time is defined as the time lapse between the end of the audio and the identification of the target character and is measured in milliseconds.

The results are analysed separately for each of the four tone groups. As Figure 1 shows, the average response time for Tone 1 and Tone 4 in matching trials is shorter than that in mismatching trials, but the same cannot be seen for Tone 2 and Tone 3. Results of Tones 1 and 4 reveal that suprasegmental information has a facilitatory effect of lexical access. Compared with the result of Shook and Marian (2016), when tones are discussed separately, Tones 2 and 3 show different results. The difference in the results between groups 1, 4 and 2, 3 needs further investigation [2].

A conjecture is put forward that it is not the four tones in Mandarin that promotes the lexical access, but the pitch accent of the English spoken by native speakers of Mandarin [3]. This is explored in a follow-up experiment in which 8 Chinese learners of English are asked to read an English passage of 820 words. The syllables on which the pitch accents are located are selected for analysis, in which F0 contours of the accents are fitted into linear models which can be expressed by the equation $y = kx + b$. For each pitch accent, the data for parameters $k$ and $b$ are plotted in a scatter plot and clustered into 4 categories using Agglomerative Clustering algorithm, as shown in Figure 2.

The cluster in purple has the most points, followed by the yellow, the blue, and the green one. This reveals that high level tones ($k$ close to 0 and high $b$) and falling tones (negative $k$) appear more frequently than the others in the pitch accent of the English spoken by native speakers of Mandarin, thus providing evidence that it is the pitch accent in the English spoken by native Chinese speakers that promotes the lexical access, not the four tones in Mandarin per se.

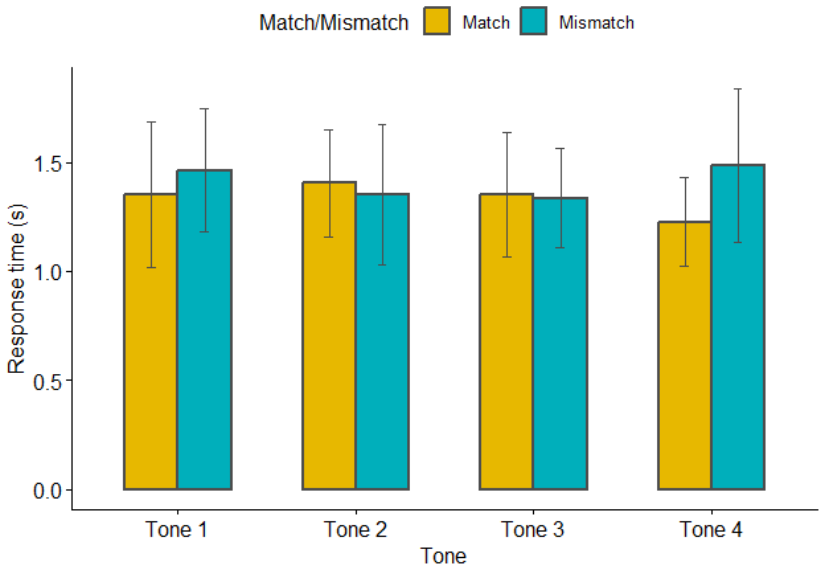


**Fig.1** Average response time under match/mismatch conditions in each tone group

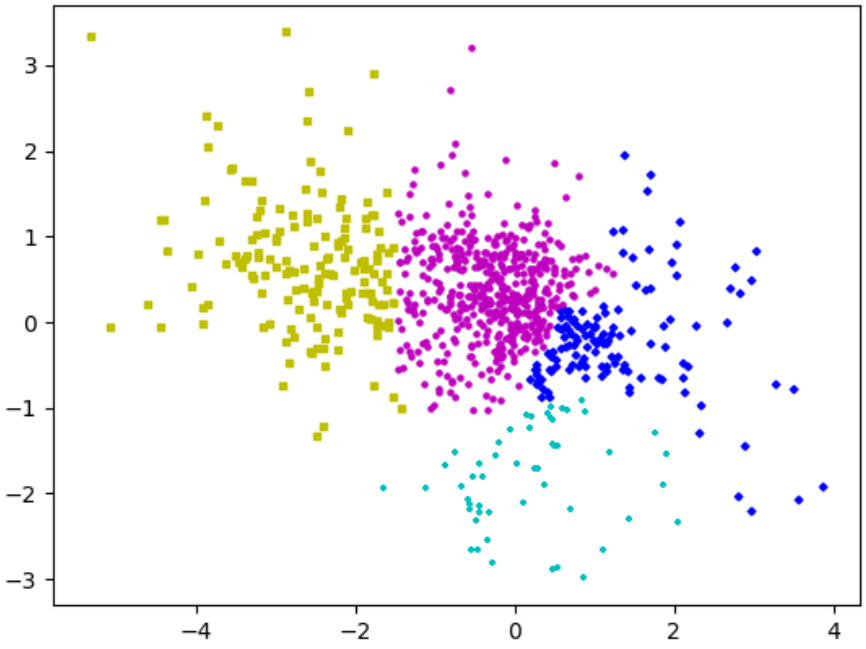


**Fig.2** Clustering scatter plot of pitch accents

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