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A book review: 'Perception and Production of Mandarin Tones by Native Speakers and L2 Learners'

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The book, entitled 'Perception and Production of Mandarin Tones by Native Speakers and L2 Learners', lays the groundwork for a model of Mandarin tones based on native and non-native speakers' perceptions and production of tones. It shows that non-native speakers' tone production variesand the perceptual boundaries between native speakers and non-native speakers differ.

Four experiments are discussed in the book. Experiment 1 usedthe production data of native speakers from a published speech database to explore the features of native speakers' tone production. Inter-speaker normalisation was used to analyse the data. Experiment 2 synthesised 81 tones carried byfour sentences to measure native and non-native speakers' perceptions. Intra-speaker and inter-speaker normalisation was used to investigate the perceptual space of T1, T2, T3 and T4. The researcher also explored the salient features that distinguish native and non-native speakers' perceptions of the four principal tones. Experiment 3 usedthe synthesised tones and natural tones carried by the four sentences to explore how pitch values of tones create overlapping areas in a perceptual map. Finally, Experiment 4 examined non-native speakers' tone production to identify the differences between native speakers'

perceptions and non-native speakers' production and the differences between non-native speakers' perceptions and their production of tones.

The results of the perception and production experiments with native speakers showed perceptual boundaries and tonal categories in a perceptual and a production space. The differencesamong native speakers' perceptions and production revealed the perceptual cues for perception. Additionally, the similarities in native speakers' perceptions and production revealed the acoustic cues, including register and contour, used in tone perception and production. The results of the perception experiments with non-native speakers indicated that there were no clear boundaries and that tones overlap in the perceptual space. Register plays an important role in non-native speakers' perceptions of tone. The results of non-native speakers' production also revealed overlapping tones in the acoustic space. Conversely, non-native speakers' production appeared to be determined by the contour of the tones; that is, both the contour and register determined the tonal categories of native speakers.

The book is divided into eight chapters. Chapter 1 introduces Mandarin tones as they are produced in context. The acoustic properties of tones change across different contexts; however, citation tones and neutral tonesbelong to tone categories (i.e., T0, T1, T2, T3 or T4).

The literature review in Chapter 2 considered: (a) tonal studies in phonetics and phonology; (b) studies onthe general difficulties faced bysecond language (L2) learners when acquiring suprasegmental features; and (c) studies about the tonal acquisition of Mandarin as a L2. The review of the literature on linguistic and second acquisition studies of tones revealed that two issues require further exploration: (i) the complete tonal system of Mandarin Chinese; and (ii) the gap between acoustic features and perceptual results.

Chapter 3 describes the variables used in this study, introduces how pitch can be normalised and explains why five tonal categories were defined. It also extracts the neutral part of a tone and normalises the F0 values. Pitch values can be used to analyse and compare the data of individuals. This method avoids the variables that arise due to context or individual differences.

Chapters 4–7 present the four experiments that were designed to answer each of the four research questions. Experiment 1 sought to answer Research Question 1 byexploring the features of tonal production by native speakers. Experiment 2 sought to answer Research Question 2 by determining the perceptual space of pitch values for T1, T2, T3 and T4 and exploring the salient features that distinguish native and non-native speakers' perceptions of the four principal tones. Experiment 3 sought to answer Research Question 3 by determining how pitch values of tones create overlapping areas in a perceptual map. Finally, Experiment 4 sought to answer Research Question 4 by examining tonal production by non-native speakers, to identify the differences between native speakers' perceptions and non-native speakers' production and the differences between non-native speakers' perceptions and their production of tones.

Chapter 8 lays the groundwork for a model of Mandarin tones based on both the perceptions and production ofnative speakers. It details the pitch range of productions in the acoustic space and the perceptual boundaries and tonal categories in non-native speakers' perceptual space. Both spaces can be divided into separate tones with separate boundary areas. The positions of the four tonal categories are the same in the perceptual space as in the production space. Chapter 8 also sought to answer four research questions: (i) What is the production space for native speakers? (ii) Are tones perceived categorically by native speakers and non-native speakers and, if so, how can we describe these tones? (iii) How

do pitch values of tone create overlapping areas? and (iv) What are the features of non-native speakers' tone production? What are the differences between non-native speakers' production features and native speakers' perception features?

The results of the studies showed that native and non-native Mandarin speakers have different patterns for the perception and production of Mandarin tones. For native speakers acquiring Mandarin as first language (L1), tonal pattern is an integral part of each word they learn, but such functional association between segmental structure and F0 contour is non-existent in non-tonal speakers' linguistic behaviours. The source of difficulty in tone acquisition has often been attributed to non-native speakers' lack of sensitivity to tonal categories; for example, unlike Chinese speakers, Dutch and English speakers have a greater spread in the location of the perceptual category crossover (Leather 2005).

A second factor is that non-native speakers' lack experience in processing the various phonetic features that characterise Mandarin tones. Non-native speakers may weigh various acoustic cues differently (Gandour 2006) or have fewer perceptual resources left to attend to contextual information (Jongman & Moore 2010). Consequently, the source of difficulty in learning tones has generally been attributed to interference from L1 features; for example, knowledge of the function of pitch in the English stress and intonation systems has been found to highly influence American listeners' perceptions of Mandarin tones (Broselow Hurtig & Ringen 1999; White 1999).

Studies of hemispheric processing have consistently demonstrated that native and non-native speakers process Mandarin tones differently. In relation to native speakers, the neural substrate underlying the ability to identify Mandarin tones is predominantly lateralised in the left hemisphere; however, this hemispheric specialisation for lexical tone is not characteristic in non-native speakers of Mandarin (Hsieh et al. 2011; Klein et al. 2011, Wang Jongman & Sereno 2011).

Native and non-native speakers process Mandarin tones differently. Further, non-native learners' ability to identify tones can be significantly improved after a short period of perceptual training in the laboratory (Wang et al. 1999). This improvement appears to be generalisable to new contexts, transferable to the production domain and stored in learners' long-term memory (Wang,Jongman & Sereno 2003). Improvements in Mandarin tone perceptions and production as the result of intensive training hasalso been shown to be accompanied by changes in cortical representations in the native-like direction (Wang et al. 2003). Thus, it appears that the adult production and perceptual systems still demonstrate plasticity and cortical representations can be continuously modified as learners gain more experience with Mandarin.

To date, the majority of research has investigated either naïve non-native speakers of Mandarin or beginner learners. Thus, the question arises: As learners acquire a high level of proficiency in Mandarin can the processing of Mandarin tones by advanced learners become authentically native-like? Studies in the segmental domain have consistently shown that age of L2 exposure and fluency are important determinants of L2 acquisition and processing (Flege 1997). Studies of cortical representations have demonstrated that these two factors are the determinants of cerebral functions in bilingual individuals(Kim 1997). Accordingly, future research should systematically investigate the learning of Mandarin tones as a function of proficiency and in relation to the age of acquisition to better understand the mechanisms underlying the dynamic process of language learning at the suprasegmental level.

REFERENCES

1. Broselow, E, Hurtig, RR & Ringen, C 1999, 'The perception of second language prosody', in G Ioup & SH Weinberger (eds.), *Inter-language phonology, the acquisition of second language sound system*. Newbury House Publishers, Cambridge, pp. 350–361.
2. Flege, JE 1997, 'The role of phonetic category formation in second-language speech learning', in J Leather & A James (eds.), *New Sounds. Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech.* University of Amsterdam, Amsterdam, pp. 79–88.
3. Gandour, JT 2006, 'Tone perception in far Eastern languages', *Journal of Phonetics*, vol. 11, pp. 149–175.
4. Hsieh, L, Gandour, J, Wong, D & Hutchins, GD 2011, 'Functional heterogeneity of inferior frontal gyrus is shaped by linguistic experience, *Brain and Language*, vol. 76, pp. 227–252.
5. Jongman, A & Moore, C 2010, 'The role of language experience in speaker and rate normalization processes', paper presented at the *Proceedings of the Sixth International conference on Spoken Language Processing*, I, pp. 62–65.
6. Kim, KHS, Relkin, NR, Lee, KM & Hirsch, J 1997, 'Distinct cortical areas associated with native and second languages', *Nature*, vol. 388, pp. 171–174. Kiriloff.
7. Klein, D, Zatorre, RJ, Milner, B & Zhao, V 2011, 'A cross-linguistic PET study of tone perception in Mandarin Chinese and English speakers', *NeuroImage*, vol. 13, pp. 646–653.