Cross-linguistic mapping of large to small inventory: The case of nonnative Mandarin consonants

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Keywords: perceptual similarity, phonetic assimilation, Mandarin, obstruents, context effects

Models of nonnative speech perception make predictions about perceptual mappings of nonnative phones to the closest counterpart in the native phonetic space (Best, 1995; Best & Tyler, 2007; Flege, 1995; Flege & Bohn, 2021). The obvious constraints of a smaller native inventory tasked with organizing a large number of distinct L2(+) sounds result in many-to-one mappings that are known to be problematic for learners, leading to equivalence classification (SLM) or Single-Category/Category-Goodness assimilation (PAM-L2). Cross-language perception of Mandarin Chinese consonants presents an interesting case for studying a group of distinct L2 phones. Mandarin Chinese offers a densely populated inventory of alveolar and postalveolar obstruents and has contrasts that are typologically rare across languages of the world (Ladefoged & Maddieson, 1996). Danish, on the other hand, has a small set of obstruents, and the cross-linguistic mapping is not straightforward. This research explores how native Danish listeners perceive the full set of 11 Mandarin initial coronal obstruents in a series of experiments comparing assimilation patterns with results from discrimination and identification tasks.

In the first experiment, cross-linguistic assimilation mapping patterns were examined in different vowel conditions, and the effect of following vowel was most notable for assimilation of the three palatal onsets ([tɕ, tɕʰ, ɕ]), for which modal response categories were the Danish palatalized onset clusters /dj, tj, sj/ when preceding [a] and [y], but /d, t, s/ before [i]. With reference to PAM-L2 (Best & Tyler, 2007) results from the first experiment led to the prediction that nine Mandarin consonant pairs would be challenging for native Danish listeners to discriminate.

These predictions were tested in a Same/Different discrimination task by listeners differing in their experience with Mandarin Chinese. In accordance with predictions derived from the PAM, participants were the least accurate in discriminating dental fricative and affricate [s] – [ts]. Consonant pairs contrastive in place of articulation were also among the least discriminable contrasts, i.e. the palatal vs. retroflex unaspirated affricates [tɕ]-[tʂ], and the aspirated obstruents [tʰ] – [tɕʰ]. Importantly, only [s] and [ts] share their phonetic environments consistently, while there are predictable alternations between the vowels that follow the unique consonants in the two latter contrasts due to phonological restrictions. It is therefore suggested that L2 (or indeed L3) Mandarin learners may also rely on adjacent vowel quality and phonotactics as well as cross-linguistic perceptual similarity in the perception of Mandarin initial consonants.

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