On the Interaction between L1 Transfer and Universal Constraints–
Evidence from the Acquisition of Mandarin Tones by French Speakers

This study probes the interaction between L1 language background and universal constraints, investigating how the rhythmic patterns of French influence learners' acquisition of Mandarin tones.

Typological divergence between Mandarin and French: While both Mandarin and French are syllable-timed languages, Mandarin is a tone language. Tone production thus causes troubles to French speakers. Rising tones, among others, are especially difficult. Phonetically, the laryngeal rising requires more biological effort (Moisik *et al*., 2014). Sundberg (1973; 1979) also notes it takes longer to implement a pitch rise than a fall with the same excursion. Evidence from the typological distribution of tones and research on Mandarin L1 acquisition lend support to the relative *phonetic complexity* of a rising tone (Zhang, 2001; Clumeck, 1980). However, little focus has been put onto the role of prosodic rhythmic pattern. While pitch has no lexical function in French, the final syllable of a French prosodic phrase (PP) is typically realized with a *rising* pitch movement (Jun & Fougeron, 2002). A rising tone should therefore be easier for French speakers in a PP-final position.

Universal final lengthening & tonal stability: Typologically, final lengthening and downstep in declarative sentences or other smaller semantic-prosodic units (e.g., PPs) are observed in Mandarin, English, Dutch and French (Xu & Wang, 2009; Tyler & Cutler, 2009, for IPs; Cao, 2002, for PPs). Likewise, Jun & Fougeron (2002) find that French PPs, though rising in the end, also have longer final-syllable durations. Meanwhile, a close relationship between duration and information processing in L1 acquisition can be observed (Cutler & Mehler, 1993). It should thus be easier for French speakers to produce Mandarin tones in PP-final positions, given the longer durations.

Predictions: Since in both languages, the final syllables of PPs and IPs are lengthened, we contend such lengthening would be preserved in interlanguage. As for tone production, we hypothesize such final lengthening in PPs promotes tonal stability. Nevertheless, given that in French, the final syllable of a PP is rising, we predict that T2, a phonetically complicated tone, would be easier to produce than T4. T3 and T5 located at the final syllable of PPs may also pose problems to French speakers given their low pitch. In phrase-medial positions, T1 and T4, typologically unmarked, would be easier.

Procedure: Beginner level French speakers and native Mandarin speakers (3 males & 3 females each) were asked to read a 2-minute text in Mandarin. Syllables were then auto-labelled and checked.

Results and further implications: Fig. 1 shows syllable durations at different positions. A two-way ANOVA showed significance for group, position, and their interaction. PP-final and IP-final syllables were significantly longer than in other positions for both groups. Our predictions were borne out: French speakers' tone production accuracy was influenced by its prosodic position. Our results therefore show the position of a tone in a sentence and the rhythmic pattern of L2 learners plays a role in the L2 learning of Mandarin tones. The importance of prosodic patterns on the acquisition of tone deserves more research attention.

Figure 1. Duration of syllables by position (*pp_i*: PP-initial; *pp_m*: PP-medial; *pp_f*: PP-final; *ip_i*: IP-initial; *ip_f*: IP-final)

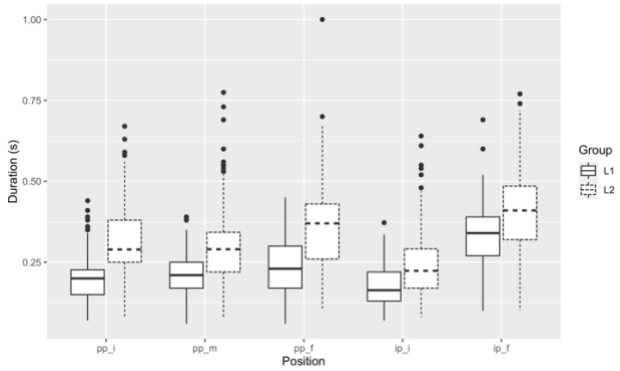

Table 1. Accuracy results.

Ranking of accuracies				
Predicted ranking	1	2	3	4
	T1/T2 in PP final	T1/T4 in PP non-final	T2/T3 in PP non-final	T3 /T4 /T5 in PP final
Observed accuracies	86.5%	87.6%	80.1%	81.9%

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