

## Semantic and Familiarity Effects on Tone Three Sandhi Productivity

Chin-Ting Liu, *R.O.C. Naval Academy*

**1. Background & Issue:** Tone Three Sandhi (T3S) in Mandarin Chinese is a phenomenon where the first Tone 3 (T3, a falling-rising tone) syllable becomes a rising pitch when it is followed by another T3 syllable. Although many experimental studies agreed that T3S was psychologically real and productive (Cheng, 1968; Xu, 1991, 1997; Zhang & Lai, 2010; Zhang & Peng, 2013), detailed acoustical analyses revealed that T3S was incompletely applied among pseudo words (Zhang & Lai, 2010; Zhang & Peng, 2013). However, the fact that those pseudo words were presented without associating appreciate meanings to them might be an issue in Zhang and Lai (2010) and Zhang and Peng's (2013) study. It is agreed that tone sandhi is sensitive to morphosyntactic and/or prosodic constituency (Chen, 2000; Duanmu, 2007; Liu & Chen, 2018; Wee, 2019). When the semantic contents are absent, the morphosyntactic and/or prosodic structure cannot be properly processed (c.f. Hsieh, 1975; Wang, 1993; Wee, 2019).

**2. Current Study:** The purpose of the study is to re-examine the psychological reality of T3S by using *meaningful* pseudo words. **Participants:** Thirty adult native speakers of Mandarin Chinese (with balanced gender) were included. **Materials & Designs:** Three monosyllabic, accidentally gapped words were coined, including a new color *zǎ*, a new type of container *sǔ*, and a new object *wǎi*. Four conditions were created based on the types of each syllable, including Actual Occurring (AO) syllables and syllables that were Accidental Gap (AG). Examples of the four conditions are shown in **Table 1**. **Procedures:** The monosyllabic words were inserted into the phrase *X sè de Y* 'Y in the color of X', accompanied by a picture without any written characters. The participants were invited to recite the full phrase, silently chanted the abbreviation of the phrase 'XY' for three seconds, and recited the abbreviated form afterwards. For instance, the participants saw **Figure 1** and were asked to recite the phrase *zǐ sè de sǎn* 'purple umbrella'. Next, they silently chanted the abbreviated form *zǐ-sǎn* 'purple umbrella' in mind for three seconds before they articulated the abbreviated form. The rhyme of the  $\sigma_1$  was extracted and evenly segmented into ten portions, giving rise to 11 time points, from which the  $f_0$  values were extracted and z-scored based on conditions.

**3. Results & Discussion:** Pitch contours of the four conditions are shown in **Figure 2**. A two-way repeated-measures ANOVA and post-hoc tests using one-way repeated-measures ANOVAs revealed that the pitch contours of the  $\sigma_1$  in AO-AO and AO-AG conditions were similar and the pitch contours of the  $\sigma_1$  in AG-AO and AG-AG were different from those of AO-AO. These results could be accounted for based on Zhang and Peng's (2013) view that the incomplete application of T3S could be attributed to physiological/articulatory constraints. That is, T3S is productive and psychologically real for both real and novel words. The covert contrasts observed in acoustical studies could be reduced to performance factors and lexical familiarity effects. Future studies using pseudo words in the experiments should provide concrete semantic contents for them in order for the conditions of using pseudo words to be met.

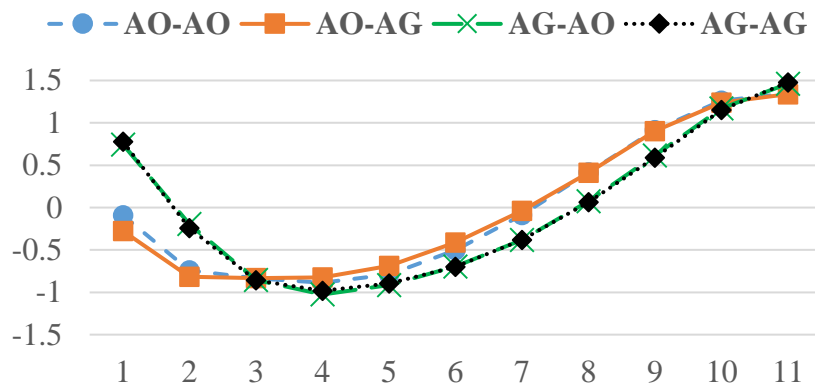
#### 4. Table & Figures:

**Table 1:** Exemplar stimuli of the four conditions

Conditions	Gloss	Meaning
AO-AO	<i>zǐ-sǎn</i>	‘purple umbrella’
AO-AG	<i>zǐ- sǔ</i>	‘purple container’
AG-AO	<i>zǎ- sǎn</i>	‘umbrella in the created color’
AG-AG	<i>zǎ-wǎi</i>	‘a created object in the created color’



**Figure 1.** An experimental item used in the study



**Figure 2.** Time-normalized F0 contours of four conditions (X axis: Time points; Y axis: Z-scores)

#### 5. References:

- Chen, M. Y.** (2000). *Tone Sandhi: Patterns across Chinese dialects*. Cambridge: Cambridge University Press. **Cheng, C. C.** (1968). English stresses and Chinese tones in Chinese sentences. *Phonetica*, 18(2), 77-88. **Duanmu, S.** (2007). *The phonology of standard Chinese* (2<sup>nd</sup> ed.). Oxford: Oxford University Press. **Hsieh, H.-I.** (1975). How generative is phonology? In Koerner, E. F. K. (Ed), *The transformational-generative paradigm and modern linguistic theory*. Amsterdam: John Benjamins. **Liu, C.-T. & Chen, L.-M.** (2018). Testing the applicability of Third Tone Sandhi at intonation boundary: The case of the monosyllabic topic. *Language and Linguistics*. **Wang, H. S.** (1993). On the psychological status of the tone sandhi phenomena in Taiwanese. *Tsing Hua Journal of Chinese Studies*, 23(2), 175-192. **Wee, L.-H.** (2019). *Phonological tone*. Cambridge: Cambridge University Press. **Xu, Y.** (1991). Depth of phonological recoding in short-term memory. *Memory & Cognition*, 19(3), 263-273. **Xu, Y.** (1997). Contextual tonal variations in Mandarin. *Journal of phonetics*, 25(1), 61-83. **Zhang, J., & Lai, Y.** (2010). Testing the role of phonetic knowledge in Mandarin tone sandhi. *Phonology*, 27(1), 153-201. **Zhang, C. & Peng, G.** (2013). Productivity of Mandarin third tone sandhi: A wug test. In Peng, G. & Shi, F. (Eds.), *Eastward flows the great river: Festschrift in honor of Prof. William S-Y. Wang on his 80th birthday* (pp. 256-282). Hong Kong: City University of Hong Kong Press.