Cantonese Spoken Word Retention by Speakers with and without Congenital Amusia

Xiao Wang[1], *Gang Peng*[2, 3]

1. The Chinese University of Hong Kong 2. The Hong Kong Polytechnic University 3. Shenzhen Institutes of Advanced Technology

w.joycewang.x@gmail.com, gpengjack@gmail.com

Phonological basis of word retention

❖ Similarity effect

- ❑ Similar-sounding words harder to recall in the order of presentation than dissimilar words (Baddeley, 1966).
  - Error rate: "cow day bar" < "cap cad mat" < "sip rip pip"
- ❑ Confusion of rehearsible, categorical information (Crowder & Morton, 1969)
  - — Lexicality (e.g., reversal of rhyming effect; Lian et al., 2001)
  - — Phoneme position (e.g., rhyming (_VC) is more harmful than the sharing of consonants (C_C); Nimmo & Roodenrys, 2004)

❖ Cognitive load effect

- ❑ Robustly detrimental (phonological strategy adopted; Campoy & Baddeley, 2008).

Cross-linguistic variations (Lexical tone)

➢ **Facilitation of Cantonese lexical tone similarity** (Yip, 2014)

- — Inconsistent with **Mandarin** data (Xu, 1991)
- — At odds with the direction of **segmental** similarity effects

Research questions

➢ Can cross-linguistic variations be explained by

- — Differential processing of **tones and segments**?
- — Influence of phonological inventories (**Mandarin vs. Cantonese**)?

Method

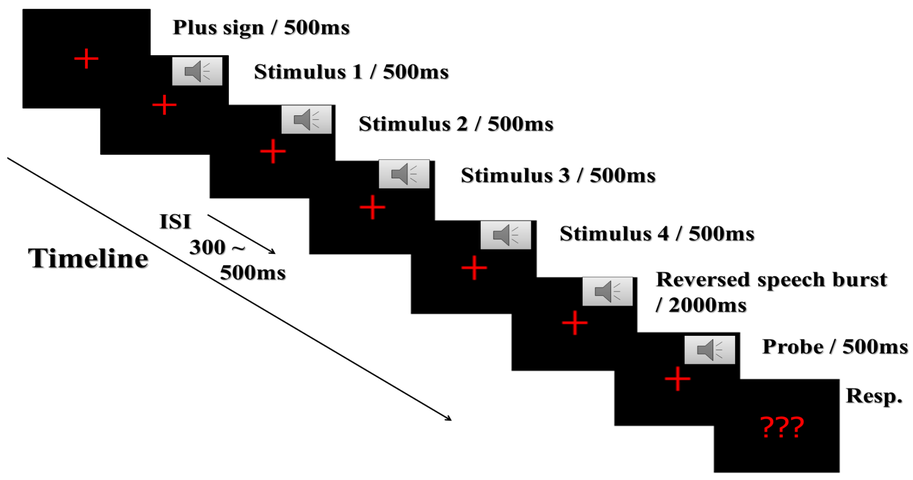

Figure 1. Procedures of Cantonese word order recall task (low cognitive load condition).

Table 1. Demographic characteristics of Cantonese subjects

Group	Age	MBEA	Threshold in semitones	Working memory (complex span task)
Control (n = 21)	23.51	87.71	24.95	131.14
Amusic (n = 13)	23.35	70.08	57.32	131.15
P (Mann-Whitney U)	0.448	< 0.001	< 0.001	0.503

❑ ***Lexicality*** (real, pseudo, reversed) × ***Group*** (amusic, control) × ***Similarity*** (high, medium, low) × ***Load*** (low, high) mixed factorial design

Results: Recall accuracy

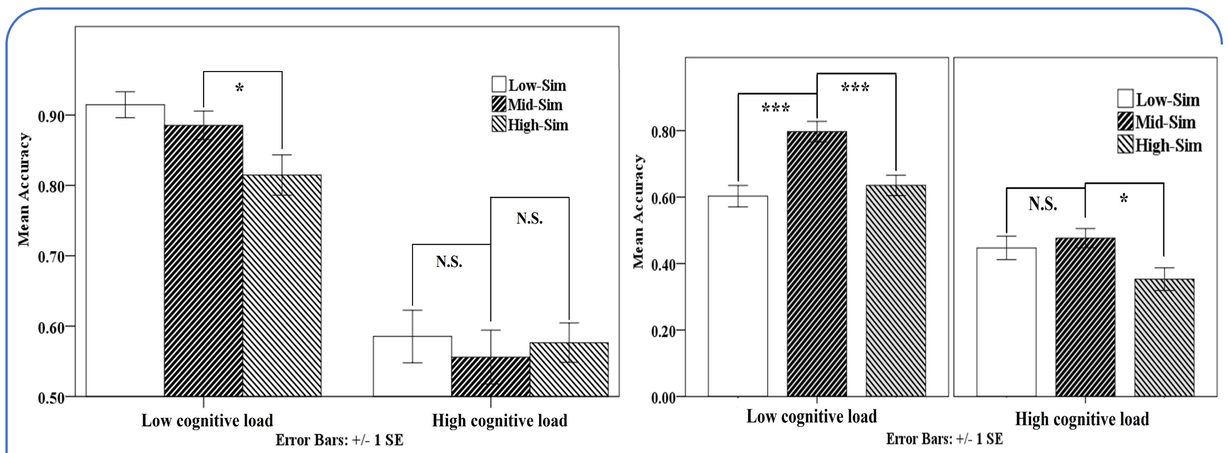

Figure 2. Recall of real (left) and pseudo (right) speech words as a function of *(phonological) Similarity* and *Load*. *: p < .05, ***: p < .001, N.S.: non-significant.

❑ Significant *Cognitive load* effects across all contexts (*ps* < *.05*); *Group*: N.S.

❑ **Real**: *Similarity* × *Load (p<.05)*

❑ **Pseudo**: Rhyming advantage

❑ **Reversed**: Non-significant interactions; no rhyming advantage.

Results: Recall speed

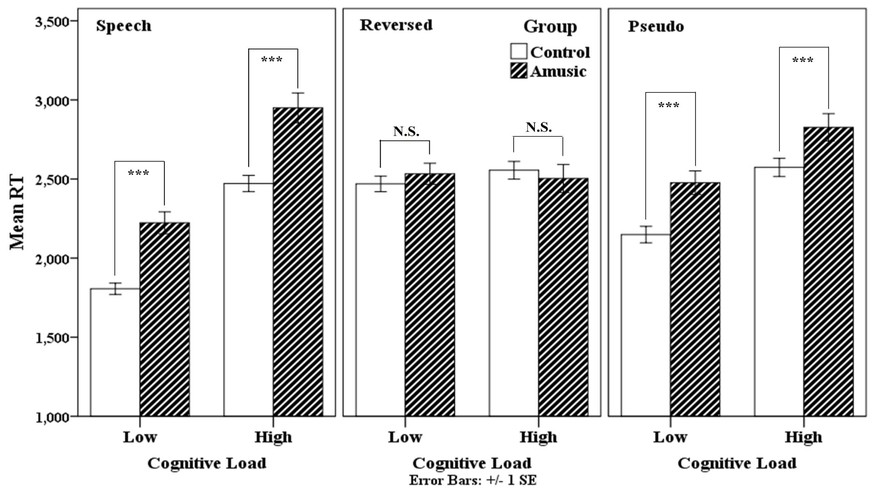

Figure 3. Recall speed as a function of group, context, and cognitive load. ***: p < .001, N.S.: non-significant.

Discussion

❖ Chinese spoken word retention

- **Rhyming effect is reversible across contexts**
  - Holistic encoding alters the detectability of speech regularities.
- **Tonal similarity is persistently detrimental**
  - Consistent with Mandarin (Xu, 1991)
  - Ruling out the role of phonological inventories
- **The robustness of tonal similarity effect**
  1. Persisted under high cognitive load
  2. Unaffected by lexicality variations
  3. Abolished rhyming advantage (pseudo context)
- ❑ **Differential mechanisms for tones and segments**

❖ Nature of phonological processing deficit

- **Degraded representations *vs.* Access impairment**

Open Q.: Cause of similarity effect (habituation vs. lexical competition)

References

Baddeley, A. D. (1966). Short-term memory for word sequences as a function of acoustic, semantic and formal similarity. *The Quarterly Journal of Experimental Psychology*, 18(4), 362-365.

Campoy, G., and Baddeley, A. (2008). Phonological and semantic strategies in immediate serial recall. *Memory*, 16(4), 329-340.

Crowder, R. G., & Morton, J. (1969). Precategorical acoustic storage (PAS).*Perception & Psychophysics*, 5(6), 365-373.

Lian, A., Karlsen, P. J., & Winsvold, B. (2001). A re-evaluation of the phonological similarity effect in adults' short-term memory of words and nonwords. *Memory*, 9(4-6), 281-299.

Neath, I., & Nairne, J. S. (1995). Word-length effects in immediate memory: Overwriting trace decay theory. *Psychonomic Bulletin & Review*, 2(4), 429-441.

Nimmo, L. M., and Roodenrys, S. (2004). Investigating the phonological similarity effect: Syllable structure and the position of common phonemes. *Journal of Memory and Language*, 50(3), 245-258.

Tzeng, O. J., Hung, D. L., and Wang, W. S. (1977). Speech recoding in reading Chinese characters. *Journal of Experimental Psychology: Human Learning and Memory*, 3(6), 621.

Visscher, K. M., Kaplan, E., Kahana, M. J., & Sekuler, R. (2007). Auditory short-term memory behaves like visual short-term memory. *PLoS Biol*, 5(3), e56.

Xu, Y. (1991). Depth of phonological recoding in short-term memory. *Memory & Cognition*, 19(3), 263-273.

Yip, M. C. (2014). What is the role of tone in the phonological similarity effect? *The Psychological Record*, 64(1), 115-122.