Distinguishing grammar from analogy in Mandarin wordlikeness judgments

James Myers & Jane Tsay
National Chung Cheng University
Lngmyers@ccu.edu.tw
Lngtsay@ccu.edu.tw

46th Annual Meeting of the Societas Linguistica Europaea, 18-21 September 2013, Split, Croatia

Phonotactic probability

- Grammar-like:
  Analytical, lexicon-independent
- Quantification used here:
  Mean of observed bigram frequencies divided by the frequencies expected by chance (Frisch & Zawaydeh, 2001)
- Improves wordlikeness (e.g., Bailey & Hahn, 2001)
- Segmentation may be less important in Mandarin (e.g., O'Seaghdha et al., 2010)

Neighborhood density

- Analogy-like:
  Holistic, lexicon-dependent
- Quantification used here:
  Number of lexical items differing from target by one segment (Luce & Large, 2001)
- Improves wordlikeness (e.g., Bailey & Hahn, 2001)
- Syllables may be treated more as wholes in Mandarin (e.g., O'Seaghdha et al., 2010)
  Neighbor effect may be stronger?

Predictions

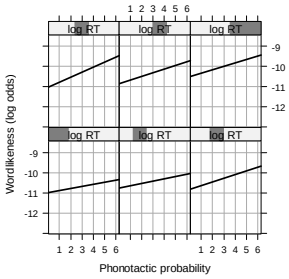
1. Neighborhood effects **later** than phonotactic effects (cf. MEG: Stockall et al., 2004)
2. Neighborhood effects **not lateralized** to the left cerebral hemisphere (cf. MEG: Stockall et al., 2004)
3. Neighborhood effects require **memory** resources, due to lexical access (not previously tested)

New behavioral tests

1. Time course & reaction time:
   - Slower responses reflect later process (e.g., Yap et al., 2009)
2. Lateralization & handedness:
   - Right-handers more left-lateralized (Knecht et al., 2000)
   - Quantification: Oldfield (1971)
3. Working memory capacity:
   - Individual variation affects language processing (Kane et al., 2004)

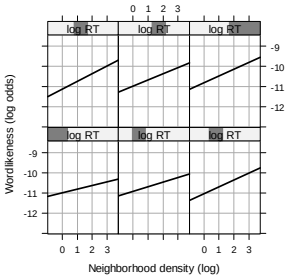
Procedure

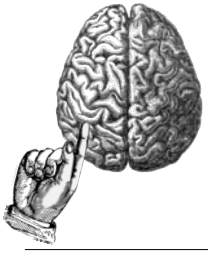
- Megastudy approach (Balota et al., 2012)
  - 110 Mandarin speakers
  - 3274 nonlexical syllables
- Task
  - Binary wordlikeness (yes/no)
  - Reaction times also recorded
- Analysis
  - Mixed-effects logistic regression

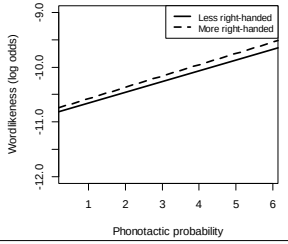


Reaction time

- **Phonotactic probability:**
  Slower responses show stronger phonotactic effect
- **Neighborhood density:**
  Slower responses show stronger neighborhood effect; interaction is stronger than for phonotactics
- **Prediction 1 (partly) confirmed**

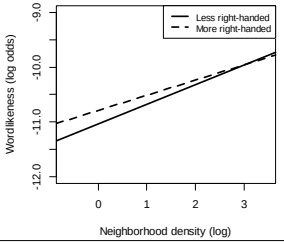


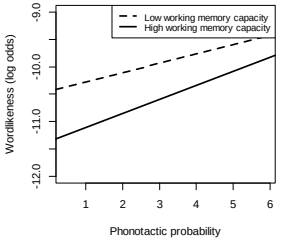




Handedness

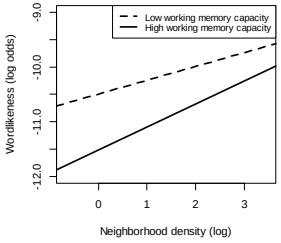
- **Phonotactic probability:**
  No significant interaction
- **Neighborhood density:**
  The less right-handed (less left-lateralized), the stronger the neighborhood effect; interaction is stronger than for phonotactics
- **Prediction 2 confirmed**





Working memory

- **Phonotactic probability:**
  No significant interaction
- **Neighborhood density:**
  The greater the working memory capacity, the stronger the neighborhood effect; interaction is stronger than for phonotactics
- **Prediction 3 confirmed**



References

Bailey, T. M., & Hahn, U. (2001). Determinants of wordlikeness: Phonotactics or lexical neighborhoods? *Journal of Memory & Language, 44*, 569-591.

Balota, D. A., Yap, M. J., Hutchison, K.A., & Cortese, M. J. (2012). Megastudies: What do millions (or so) of trials tell us about lexical processing? In J. S. Adelman (Ed). *Visual word recognition, Vol. 1* (pp. 90-115). London: Psychology Press Psychology Press.

Frisch, S. A., & Zawaydeh, B. A. (2001). The psychological reality of OCP-Place in Arabic. *Language, 77* (1), 91-106.

Kane, M. J., Hambrick, D. Z., Tuholski, S. W., Wilhelm, O., Payne, T. W., & Engle, R. W. (2004). The generality of working memory capacity: A latent-variable approach to verbal and visuospatial memory span and reasoning. *Journal of Experimental Psychology: General, 133* (2), 189-217.

Knecht, S., Dräger, B., Deppe, M., Bobe, L., Lohmann, H., Flöel, A., Ringelstein, E.-B., & Henningsen, H. (2000). Handedness and hemispheric language dominance in healthy humans. *Brain, 123*, 2512-8.

Luce, P. A., & Large, N. R. (2001). Phonotactics, density, and entropy in spoken word recognition. *Language & Cognitive Processes, 16* (5/6), 565-581.

Oldfield, R. C. (1971). The assessment and analysis of handedness: The Edinburgh inventory. *Neuropsychologia, 9*, 97-113.

O'Seaghdha, P. G., Chen, J.-Y., & Chen, T.-M. (2010). Proximate units in word production: Phonological encoding begins with syllables in Mandarin Chinese but with segments in English. *Cognition, 115*, 282-302.

Stockall, L., Stringfellow, A., & Marantz, A. (2004). The precise time course of lexical activation: MEG measurements of the effects of frequency, probability, and density in lexical decision. *Brain & Language, 90*, 88-94.

Yap, M. J., Tse, C.-S., & Balota, D. A. (2009). Individual differences in the joint effects of semantic priming and word frequency revealed by RT distributional analyses: The role of lexical integrity. *Journal of Memory and Language, 61*, 303-325.

Acknowledgments

Thanks to: Experimental participants, research assistants (especially Chia-Wen Lo & Chen-Tsung Yang), National Science Council (Taiwan) grant NSC 100-2410-H-194-109-MY3. All images copyright-free (hare: Malene Thyssen; tortoise: Yotcmdr; disk: Peter Astbury; memory card: Bengt Nyman)