5aSC10: Effects of reading ability on lexically-informed perceptual learning

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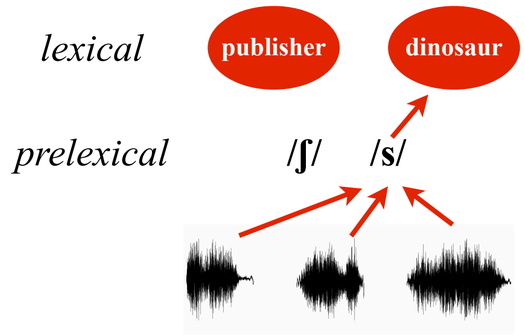
INTRODUCTION

- **Spoken language processing requires listeners to map the acoustic speech signal on to higher linguistic units.**
- **How does the listener achieve stable mapping given rampant acoustic variability?**
- **Previous research has shown that:**

  Listeners can use lexical information to resolve ambiguity, and this learning results in long-lasting changes in the mapping to prelexical representations [3, 5].

  Lexically-informed perceptual learning is a domain general learning mechanism; it is observed for both speech and print [4].



- **This mechanism has been widely studied at the prelexical level; however, it is unknown how varying degrees of lexical recruitment influence this learning mechanism.**
- **The *Lexical Quality Hypothesis* suggests that reading ability reflects lexical recruitment, such that skilled readers have more reliable access to richer lexical representations than average or impaired readers [1, 7].**
- **Here we ask, does reading ability influence lexically-informed perceptual learning?**

  If lexical quality influences lexically-informed perceptual learning, then perceptual learning will be stronger for advanced compared to average readers.

  If lexical quality does not mediate this type of learning mechanism, then we will observe no differences between advanced and average readers.

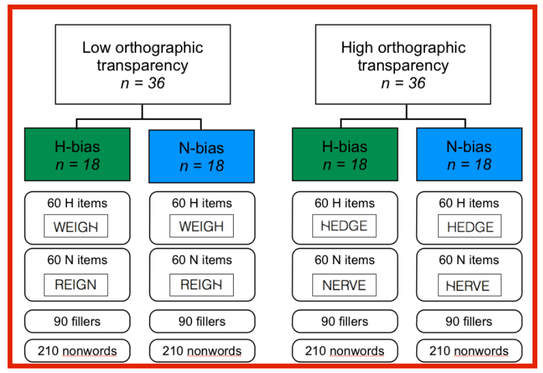
METHODS

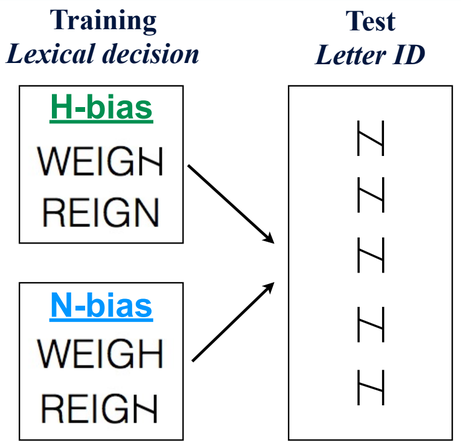
Participants

- **72 monolingual, English speaking adults (18 - 35 years).**
- **First assigned to orthographic transparency condition (low vs. high), then assigned to biasing condition (H vs. N).**
- **Participants were further split into either the average reading group (mean = 78, SD = 5) or advanced reading group (mean = 61, SD = 9) based on median split of composite reading score, defined as mean percentile on reading assessment battery.**

Procedure

- ***Training*: Lexical decisions to 420 printed items; critical items differed between the H and N biased groups.**
- ***Test*: 2AFC letter identifications ("H" vs. "N") for 6 randomizations of the 5-step test continuum.**





RESULTS

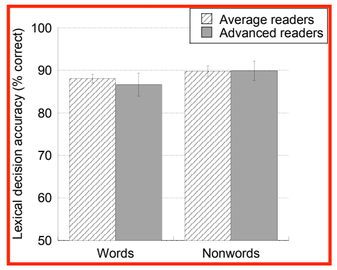
Training: Accuracy (% correct)

- ✗ No main effect of reading ability
- ✓ Main effect of item type
- ✗ No interaction between reading ability and item type

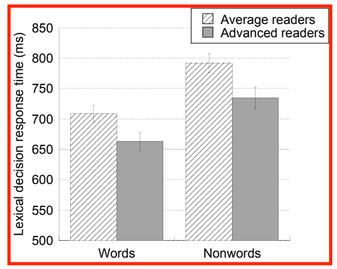
Training: Response time (ms)

- ✓ Main effect of reading ability
- ✓ Main effect of item type
- ✗ No interaction between language and reading ability

Training: Accuracy



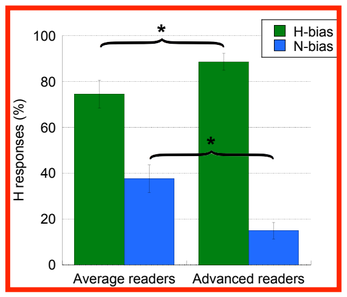
Training: Response time



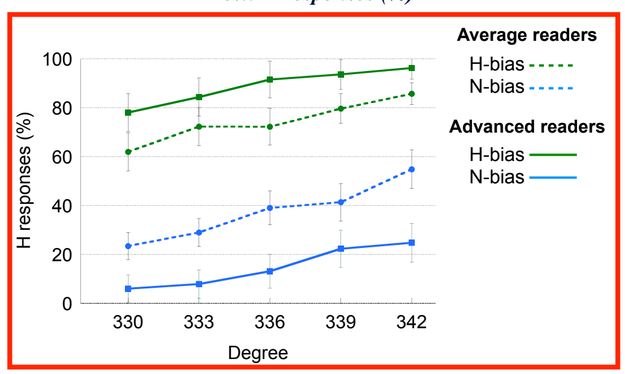
Test: H responses (%)

- ✗ No main effect of orthographic transparency, nor any interaction with orthographic transparency; all figures show data collapsed across the two orthographic transparency conditions
- ✓ Main effect of degree
- ✓ Main effect of bias
- ✓ **Interaction between reading group and bias**
- ✗ No other main effect or interaction was reliable

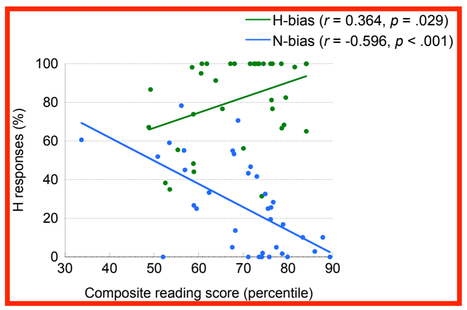
Reading group X training bias



Test: H responses (%)



Gradient effect of reading ability on learning



SUMMARY AND CONCLUSIONS

- **Compared to average readers, advanced readers made faster lexical decisions during training, consistent with the *Lexical Quality Hypothesis*.**
- **Both reading groups showed the lexically-informed perceptual learning effect at test, but the learning effect was more robust for advanced readers compared to average readers.**
- **These results suggest that reading ability mediates lexically-informed perceptual learning.**
- **Ongoing research is examining:**

  Does lexical quality exert a gradient influence on lexically-informed learning for speech sounds?

  Do the current patterns reflect differences in top-down feedback or bottom-up mapping processes?

  How do graded influences on lexically-informed learning constrain changes to the prelexical level of representation?

References and Acknowledgements

1. Braze, D., Tabor, W., Shankweiler, D. P., & Mencl, W. E. (2007). Speaking up for vocabulary reading skill differences in young adults. *Journal of Learning Disabilities, 40,* 226 - 243.
2. Eisner, F. & McQueen, J.M. (2005). The specificity of perceptual learning in speech processing. *Perception & Psychophysics, 67,* 224 - 238.
3. Ganong, W. F. (1980). Phonetic categorization in auditory word perception. *Journal of Experimental Psychology: Human Perception and Performance, 6,* 110 - 125.
4. Kraljic, T., Samuel, A.G. (2006). Generalization in perceptual learning for speech. *Psychonomic Bulletin & Review, 13,* 262 - 268.
5. Norris, D., McQueen, J.M., Cutler, A. (2003). Perceptual learning in speech. *Cognitive Psychology, 47,* 204 - 238.
6. Norris, D., Butterfield, S., McQueen, J.M., Cutler, A. (2006) Lexically guided retuning of letter perception. *The Quarterly Journal of Experimental Psychology, 59,* 1505 - 1515.
7. Perfetti, C. A., & Hart, L. (2002). The lexical quality hypothesis. *Precursors of Functional Literacy, 11,* 67-86.

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