4pSC16: Effects of reading ability on native and nonnative talker recognition

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Background

- The acoustic signal of speech contains information about *who* is talking and *what* is being said; moreover, research shows that these aspects are intertwined in spoken language processing.
- Experience with a talker's voice facilitates language comprehension [3].
- Research suggests that phonological competence influences voice recognition:
  - Voice recognition is better in the native compared to a nonnative language [5].
  - Age of second language acquisition has a gradient effect on the native language benefit for voice recognition [2].
  - Adults with dyslexia show impaired voice recognition in the native language [4].
- Does reading ability exert a gradient influence on talker identification among unimpaired readers?

Methods

Participants

- Participants (n = 34) were monolingual English speakers with no history of speech, language, or hearing disorders.
- All participants completed a diagnostic battery of reading and reading sub-skills.
- A composite reading score was calculated for each participant, defined as the *mean percentile* across the assessments.
- Participants were assigned to either the <u>average</u> reading group (mean = 64, SD = 10) or the <u>advanced</u> reading group (mean = 80, SD = 6) based on a *median split* of the composite reading score.

Stimuli

- 12 English sentences X 4 English talkers
- 12 French sentences X 4 French talkers
- 8 cartoon faces (4 talkers X 2 languages)
- All sentences were matched for (1) duration, (2) number of syllables, and (3) acoustic similarity across talkers.

Procedure

- For each language, participants completed *familiarization*, *training*, and *test* phases; language order was counter-balanced across participants.

<u>Familiarization</u>

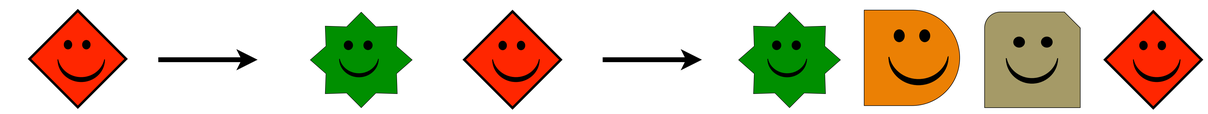
- 2 spoken sentences from each talker
- Participants were directed to listen to each sentence and try to learn which face matched each voice
- No responses were collected

<u>Training: 2AFC</u>

- 5 spoken sentences from each talker
- Participants selected which face matched each sentence; feedback was provided
- Blocks consisted of 60 items (5 sentences X 4 talkers X 3 repetitions)
- Training ended when subject met criterion (85% correct within a block or completion of 8 blocks)

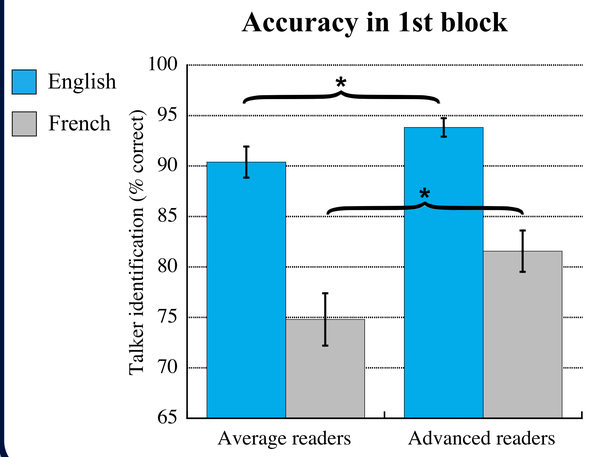
<u>Test: 4AFC</u>

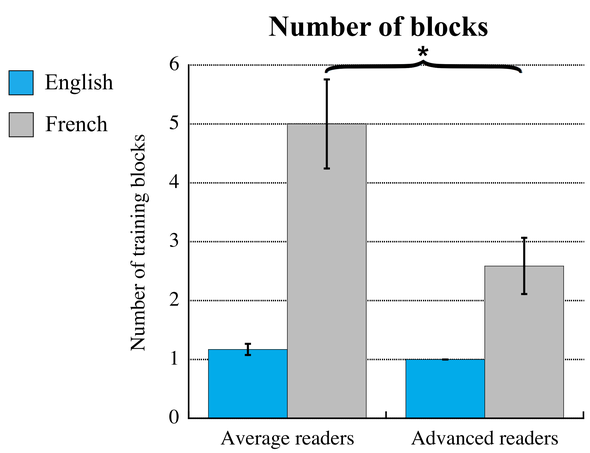
- 3 blocks of 10 spoken sentences from each talker; half were <u>trained</u> sentences and half were <u>novel</u> sentences
- Participants were directed to select which face matched each sentence; no feedback was provided



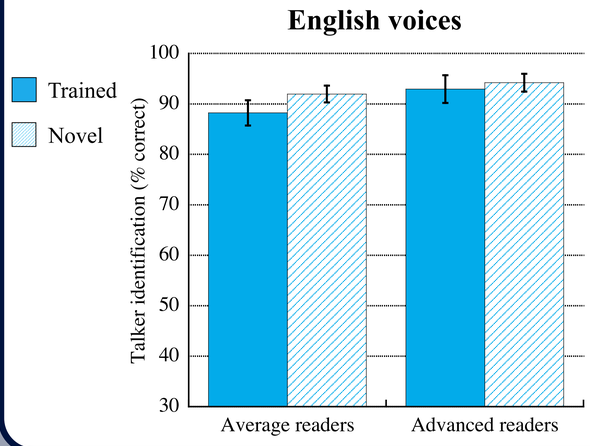
Passive learning → *2AFC <u>with</u> feedback* → *4AFC <u>without</u> feedback*

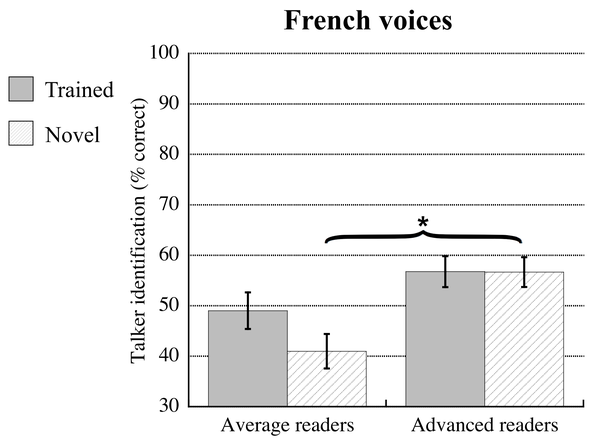
Results: Training





Results: Test





Analyses

Training: Accuracy in 1st block

- ✓ Main effect of language
- ✓ Main effect of reading group
- ✗ No interaction between language and reading group

Training: Number of blocks

- ✓ Main effect of language
- ✓ Main effect of reading group
- ✓ Interaction between language and reading group

Test: Percent correct talker ID

- ✓ Main effect of language; main effect of reading group
- ✗ No main effect of item type
- ✓ Interaction between language and reading group
- ✓ Interaction between language and item type
- ✗ No interaction between reading group and item type
- ✓ Interaction between language, reading group, and item type

Summary and Conclusions

- Reading ability influenced talker identification for both native and nonnative voices:
  - In training, advanced readers showed better talker identification for both native and nonnative talkers, compared to average readers.
  - At test, advanced readers showed better talker identification for nonnative talkers, compared to average readers.
- Ongoing work is aimed at addressing:
  - What aspects of language processing constrain talker identification?
  - Is there an underlying cognitive or auditory mechanism that drives reading ability and voice recognition, such as poor perceptual anchors [1] or reduced access to pitch information [6]?

References and Acknowledgments

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This research was funded by the College of Liberal Arts and Sciences at the University of Connecticut (R. M. Theodore), the NSERC (A. J. Orena), and the SSHRC (L. Polka).

Presented at the 169th meeting of the Acoustical Society of America (Pittsburgh, Pennsylvania)