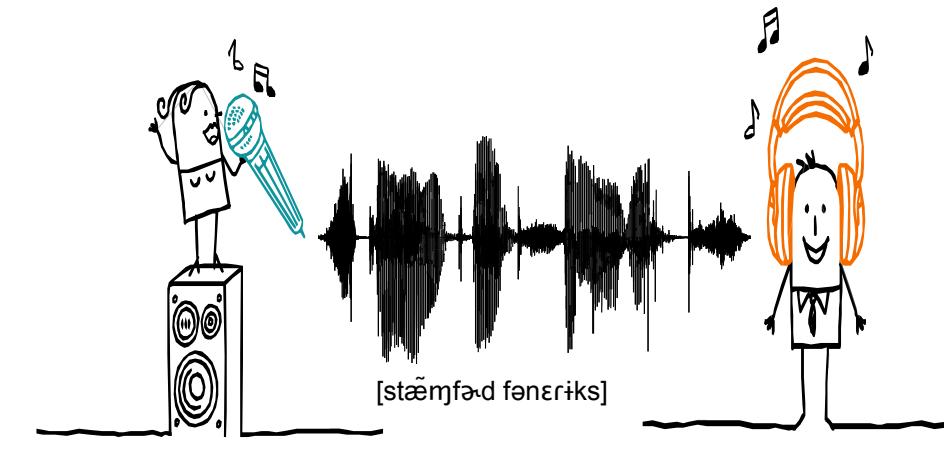


Children Use Phonetically-Cued Talker Information to Infer Speaker Meaning

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Can children use talker-specific acoustic information (e.g., about gender) to help them interpret ambiguous references?

Background

Do children use phonetically-cued talker information to infer speaker meaning?

By adulthood, listeners use talker information to make social inferences about a talker's likely behavior (Van Berkum et al., 2008), especially when they expect talker identity to be useful or find it to be a reliable cue (Creel, Aslin, & Tanenhaus, 2008).

Recent work suggests that children use acoustic cues to talker identity to constrain comprehension of spoken language (Creel, 2012), **though the way in which children learn to integrate social knowledge with information from talker voice remains poorly understood.**

Hypothesis

Children should get better at using talker information in voice as a predictor of speaker meaning as they get older

Method

- 3-, 4-, 5-year old preschool boys and girls interact with slides on an iPad (N=50).
- Subjects hear speakers in two blocks, one male and one female.
- Subjects are asked by speaker to *find my _____*.
- To the right are examples of the four types of trials a subject will experience.

Experiment 1: Forced Choice

Find my car. Male Competitor



Find my boot. Male Non-Competitor



Find my belt. Female Competitor

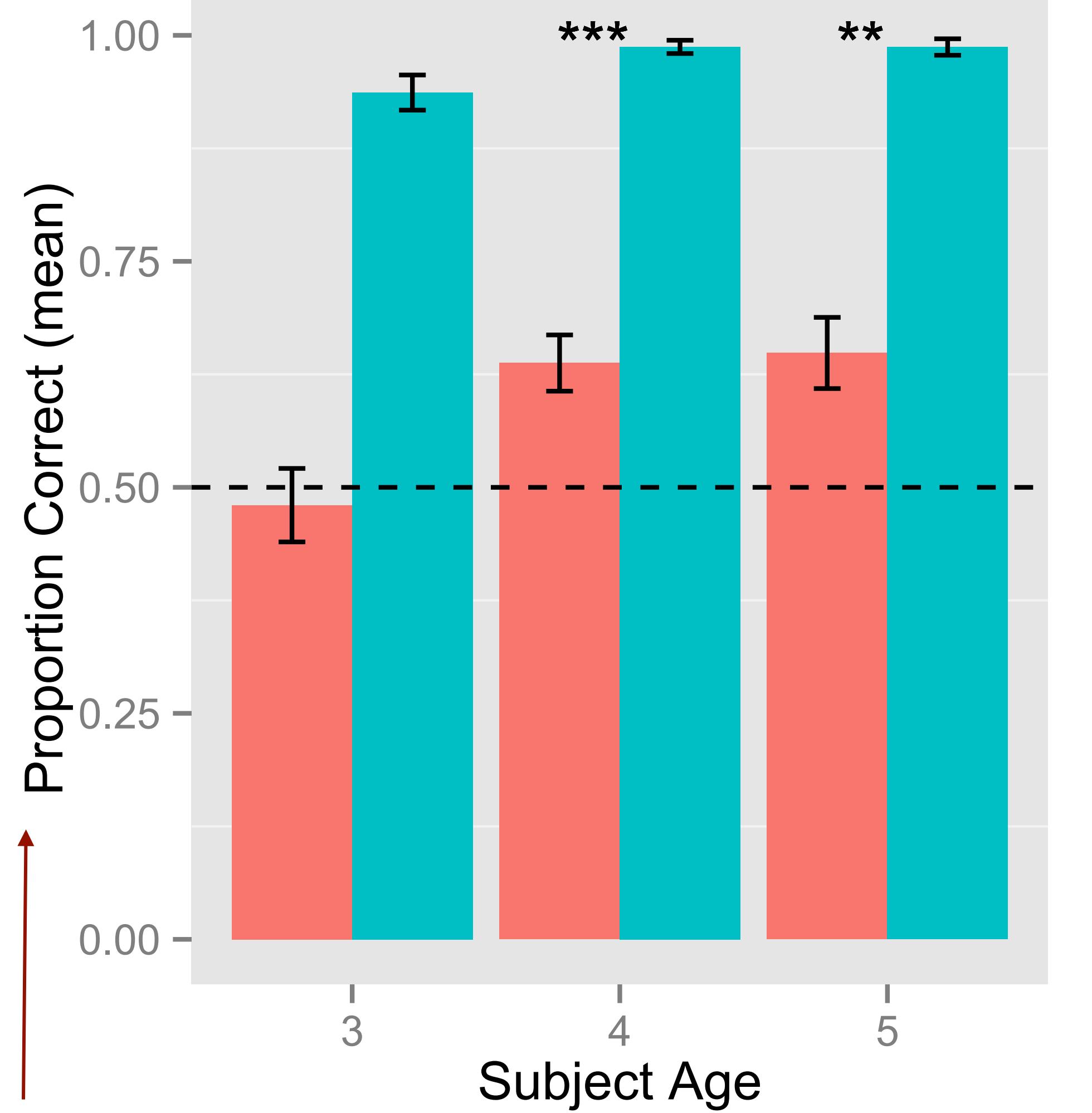


Find my bike. Female Non-Competitor



Results: Experiment 1

Proportion Correct by Trial Type and Age

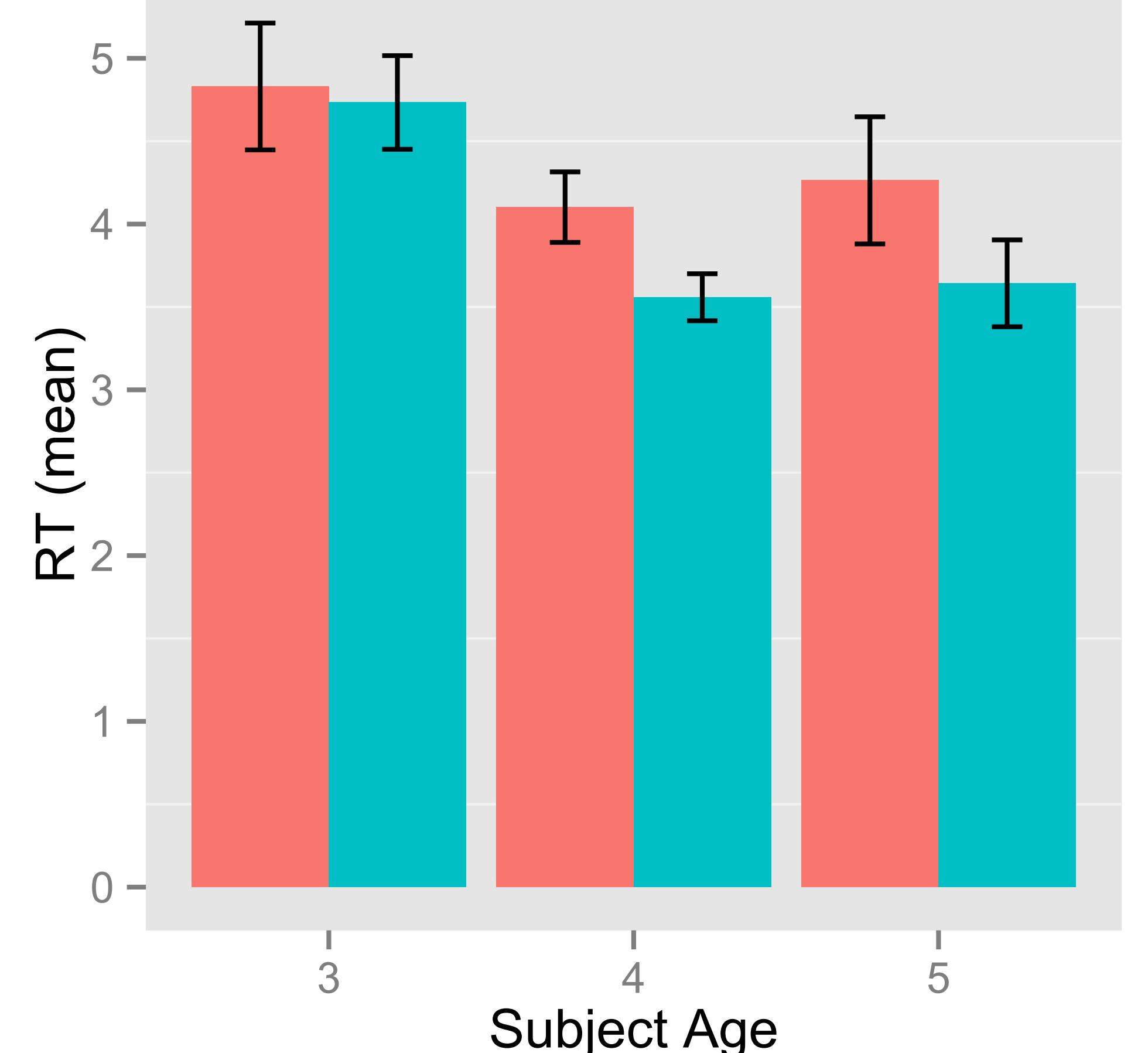


From ages 3 to 5, the ability to disambiguate increases significantly. By the age of 5, children regularly integrate phonetically –cued talker information with their social knowledge of speaker characteristics (4 year olds: $\beta=0.84$, $SE=0.24$, $z=3.453$, $p < 0.001$; 5 year olds: $\beta=.86$, $SE=0.27$, $z=3.158$, $p < 0.01$). (N=50)

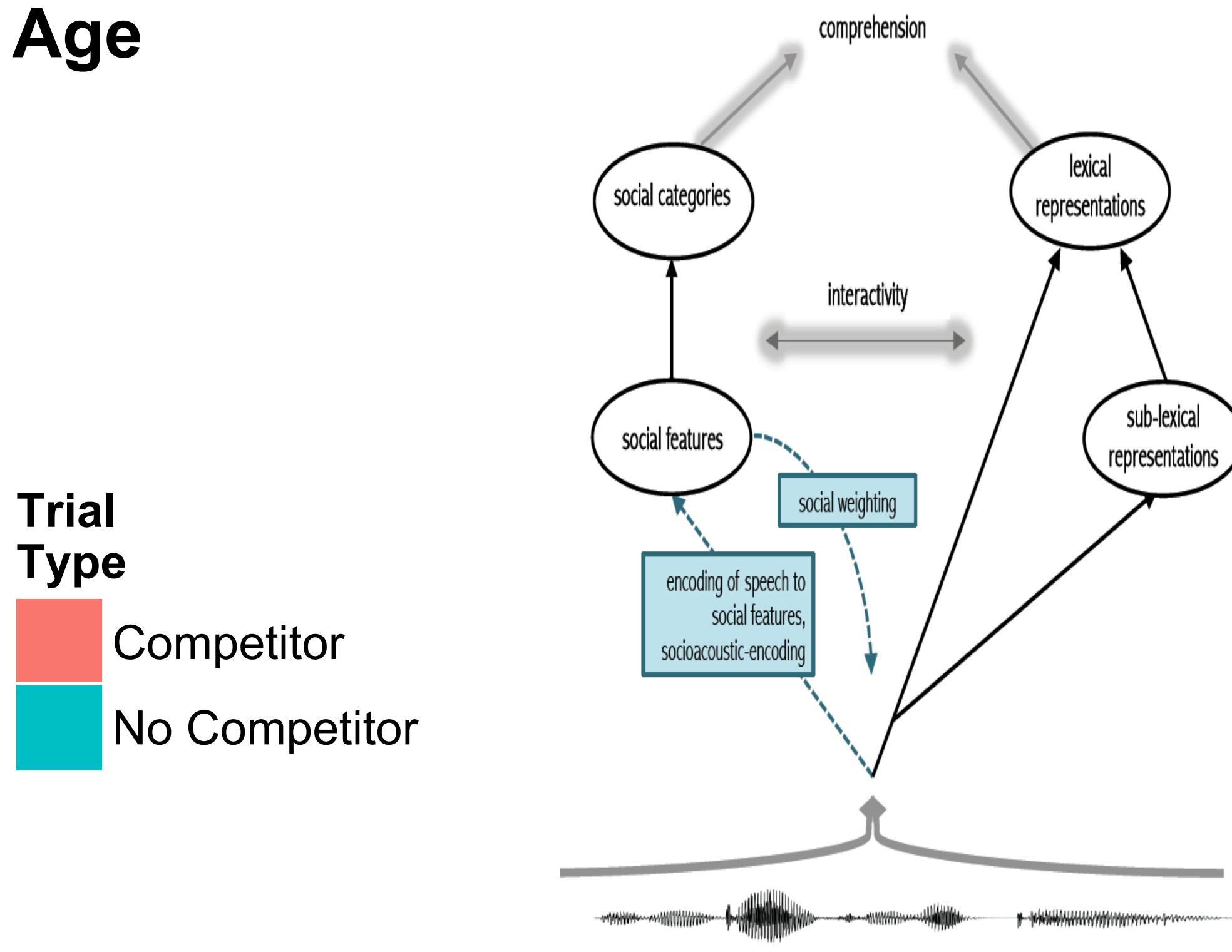
Female participants are significantly better at the task than male participants ($\beta=0.5.7$, $SE=0.21$, $z=2.762$, $p < 0.01$). (N=50)

The data suggest children were always faster to select during non-competitor trials than during competitor trials ($\beta=-0.45$, $SE=0.20$, $t=-2.225$, $p<0.05$). (N=50)

Reaction Time by Trial Type and Age



Model



Discussion

- Strong use of talker information to facilitate comprehension
- In competitor trials, **as age increases, children are more accurate** in disambiguating the voice cues.
- Interestingly, **girls are more accurate** in disambiguating the voice cues than boys in this experiment.
- These preliminary results suggest that children make use of socially-nuanced talker-specific acoustic information by a young age, and that children's use of talker-specific acoustic information pertaining to gender may differ between boys and girls.

References

- Creel, S. C., Aslin, R. N., & Tanenhaus, M. K. (2008). Heeding the voice of experience: The role of talker variation in lexical access. *Cognition*, 108, 633-664.
 Creel, S. C. (2012). Preschoolers' Use of Talker Information in On-Line Comprehension. *Child development*, 83, 2042-2056.
 Jaeger, T. F. (2008). Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models. *Journal of memory and language*, 59(4), 434-446.
 Johnson, K. (2006). Resonance in an exemplar-based lexicon: The emergence of social identity and phonology. *Journal of phonetics*, 34, 485-499.
 Sumner, M., Kim, S. K., King, E., & McGowan, K. B. (2013). The socially weighted encoding of spoken words: a dual-route approach to speech perception. *Frontiers in psychology*, 4.
 Van Berkum, J. J., van den Brink, D., Tesink, C. M., Kos, M., & Hagoort, P. (2008). The neural integration of speaker and message. *Journal of Cognitive Neuroscience*, 20, 580-591.