The Linguistic Transmission of Maladaptive Beliefs About Science

Kathryn Yee[1], Sarah-Jane Leslie[2], & Marjorie Rhodes[1]

[1]New York University, Department of Psychology; [2]Princeton University, Department of Philosophy

Introduction

- Generic language can transmit essentialist beliefs about *scientists* by suggesting that scientists are a distinct kind of person with innate talent.[1]
- Girls who believe success requires innate talent are less likely to persist after a setback than those who view success as determined by effort.[2, 3]
- Girls who hear generic language about "scientists" persist less than boys on a science task. Girls and boys who hear non-generic language about "doing science" persist equally. This interactive effect increases in children older than 5-years-old.[4]

Do younger children, who are still developing beliefs about the social world and perhaps are not yet aware of gender stereotypes, show the same interactive effect of language and gender that we see in older children?

Methods

N = 167 (male *n* = 82; female *n* = 85)

Condition Training

4- and 5-year-old children hear one of two introductions to a science game using generic or non-generic language.

Generic

Scientists *explore the world and discover new things.*

Non-generic

When people ***do science,*** *they explore the world and discover new things.*

Persistence Measure

- Task was a science game where children guessed what kind of food different animals eat.
- The first two trials elicited one correct and one incorrect response and experimenter provided feedback.

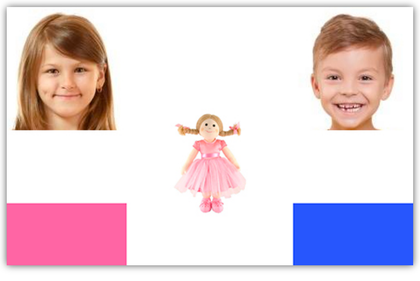
- After each critical trial (up to 10 total), children were asked if they wanted to keep playing or do something else.
- Persistence was measured by number of trials completed.

N = 88 (male: *n* = 44; female: *n* = 44)

Implicit Stereotype Measure

An Implicit Association Task[5] was used to assess how much children associate girls and boys with gender-stereotypical toys.

D score = $\frac{\text{reaction time for girl/pink} - \text{reaction time for boy/pink}}{\text{standard deviation}}$

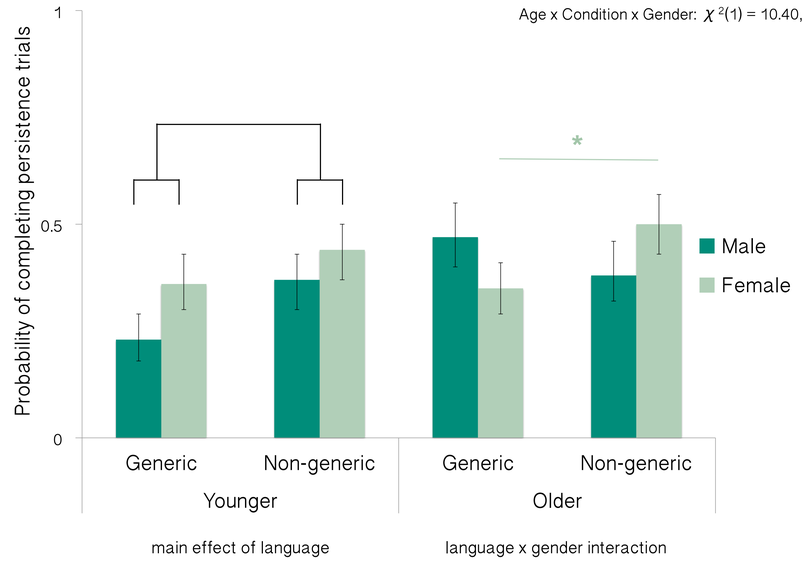


Results

Younger children: All benefit from non-generic language.

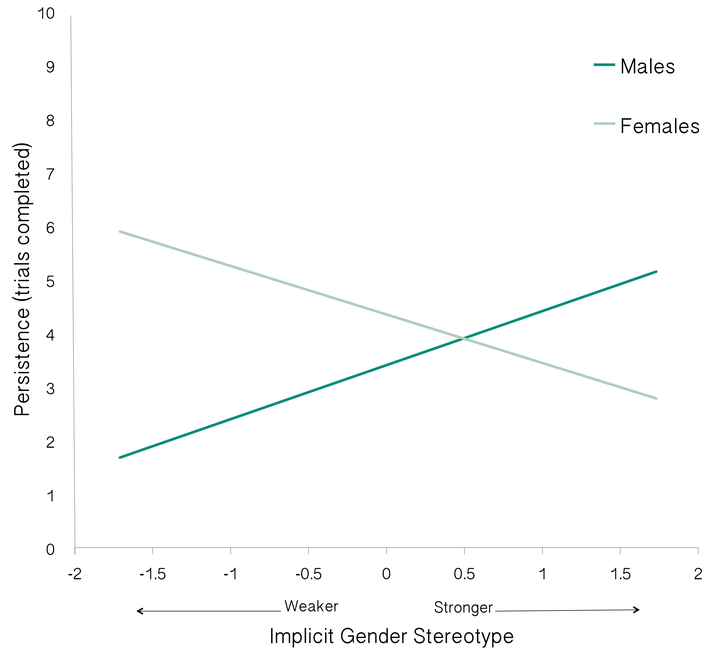
Older children: Girls benefit most from non-generic language

Age x Condition x Gender: $\chi^2(1) = 10.40$, $p = .001$



*Indicates younger or older than/at the mean age (4.76)

Gender x IAT D score: $\chi^2(1) = 4.87$, $p = .027$



Boys with stronger gender stereotypes persist more.

Girls with stronger gender stereotypes persist less.

Conclusions

- Younger boys and older girls benefit most from non-generic language.
- Gender stereotypes have opposite effects for boys and girls, suggesting that stereotypes contribute to children's behavior.

Future Directions

- Can age-related changes be explained by increased stereotype endorsement?
- What kinds of stereotypes affect children's persistence?

References & Acknowledgments

1. Rhodes, M., Leslie, S. J., & Tworek, C. M. (2012). Cultural transmission of essentialist beliefs. *Proceedings of the National Academy of Sciences*, 109, 13526-13531.
2. Cain, K. M., & Dweck, C. S. (1995). The relation between motivational patterns and achievement cognitions through the elementary school years. *Merrill-Palmer Quarterly*, 41, 25-52.
3. Smiley, P. A., & Dweck, C. S. (1994). Individual differences in achievement goals among young children. *Child Development*, 65, 1723-1743.
4. Rhodes, M., & Bushara, L. (2015). Learning about science and self: A partnership between the Children's Museum of Manhattan and the Psychology Department at New York University. Chapter to appear in D. Sobel & J. Jipson (Eds.), *Fostering cognitive development in children's museums*. New York: Psychology Press.
5. Greenwald, A.G., McGhee, D.E. & Schwartz, J.K.L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464-1480.

This research was funded by the National Institutes of Health, R01-HD087672.

National Institutes of Health

Many thanks to the Children's Museum of Manhattan and the NYC public schools and families that participated in this research!