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Are Robots Animate or Inanimate? Children's pronoun use provides insight to categorization challenge

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Are robots animate or inanimate?

Children's pronoun use provides insight into categorization challenge



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Introduction

- Children have been shown to attribute a unique constellation of animate and inanimate characteristics to robots [1-5].
- In this study we measured children's pronoun use to assess their implicit understanding robots (e.g. new ontological category [5]).

Predictions:

1. **Children will use more gendered pronouns (particularly male) with the robot** compared to the puppet.
2. **Researcher's pronoun use will influence participant's pronoun use** more for the robot than the puppet.

Method

Participants (N=90)

- 5 years (N=30, M=5.5 SD=.28; 50% girls)
- 7 years (N=30, M=7.4 SD=.32; 50% girls)
- 9 years (N=30, M=9.4 SD=.24; 50% girls)

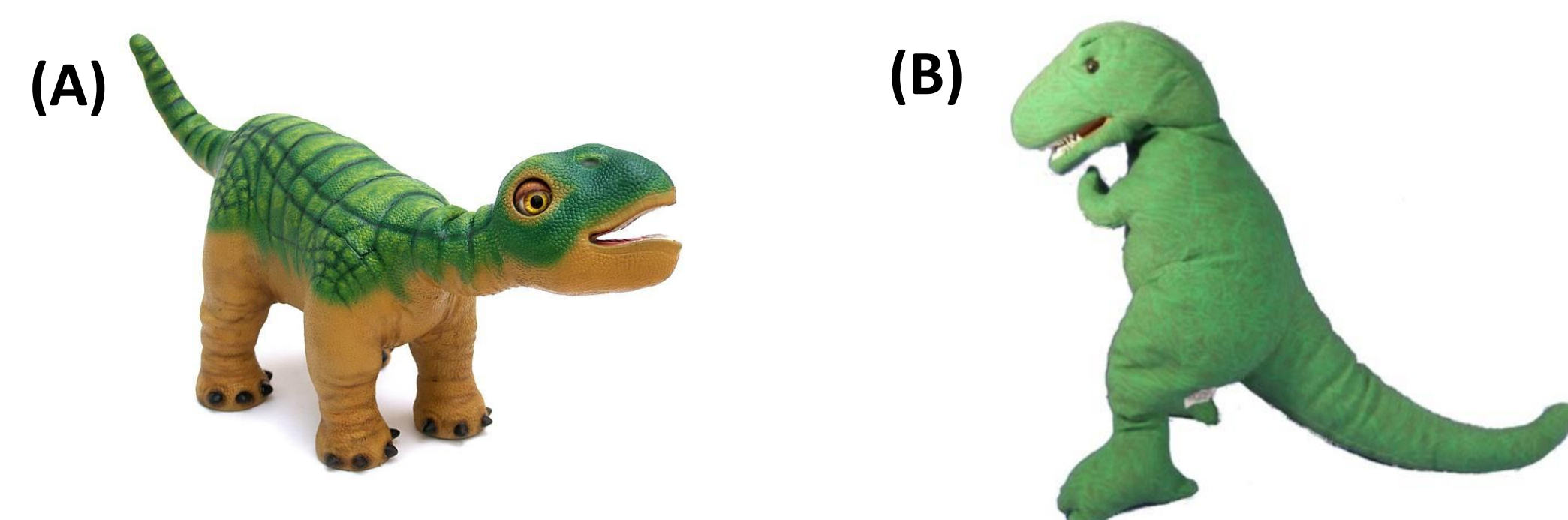


Figure 1. Robot (A) and Puppet (B).

Procedure

Participants were presented with an autonomous robot ("Pleo"; www.pleoworld.com) and a stuffed animal puppet ("Kasey") in a counterbalanced order (Figure 1). The procedure included, in order:

- **Familiarization Period.** Participants were familiarized through five introductory activities with the entity (e.g., feeding with a leaf, petting, playing tug-o-war).
- **Free Play.** Participants played on their own with the entity for up to 5 minutes.
- **Attribution Interview.** Assessed participant's attributions to the entity (17 randomly-ordered questions)

The procedure was then repeated for the other entity.

Measure

- **Pronoun Use.** We coded gendered (he/him, she/her) and neuter (it) pronoun use by the *participant* and *researcher* during the Familiarization phase and Attribution Interview.

Results

Prediction 1:

- **Children used proportionately more gendered pronouns for both entities.**
 - Robot (M=.82, SD=.25, t(89)=12.180, p<.001)
 - Puppet (M=.79, SD=.28, t(88)=9.974, p<.001).
- **Children used significantly more male-gendered pronouns with the robot, t(88)=8.210, p<.001.**
- **Children used significantly more female-gendered pronouns with the puppet, t(88)=-8.399, p<.001.**

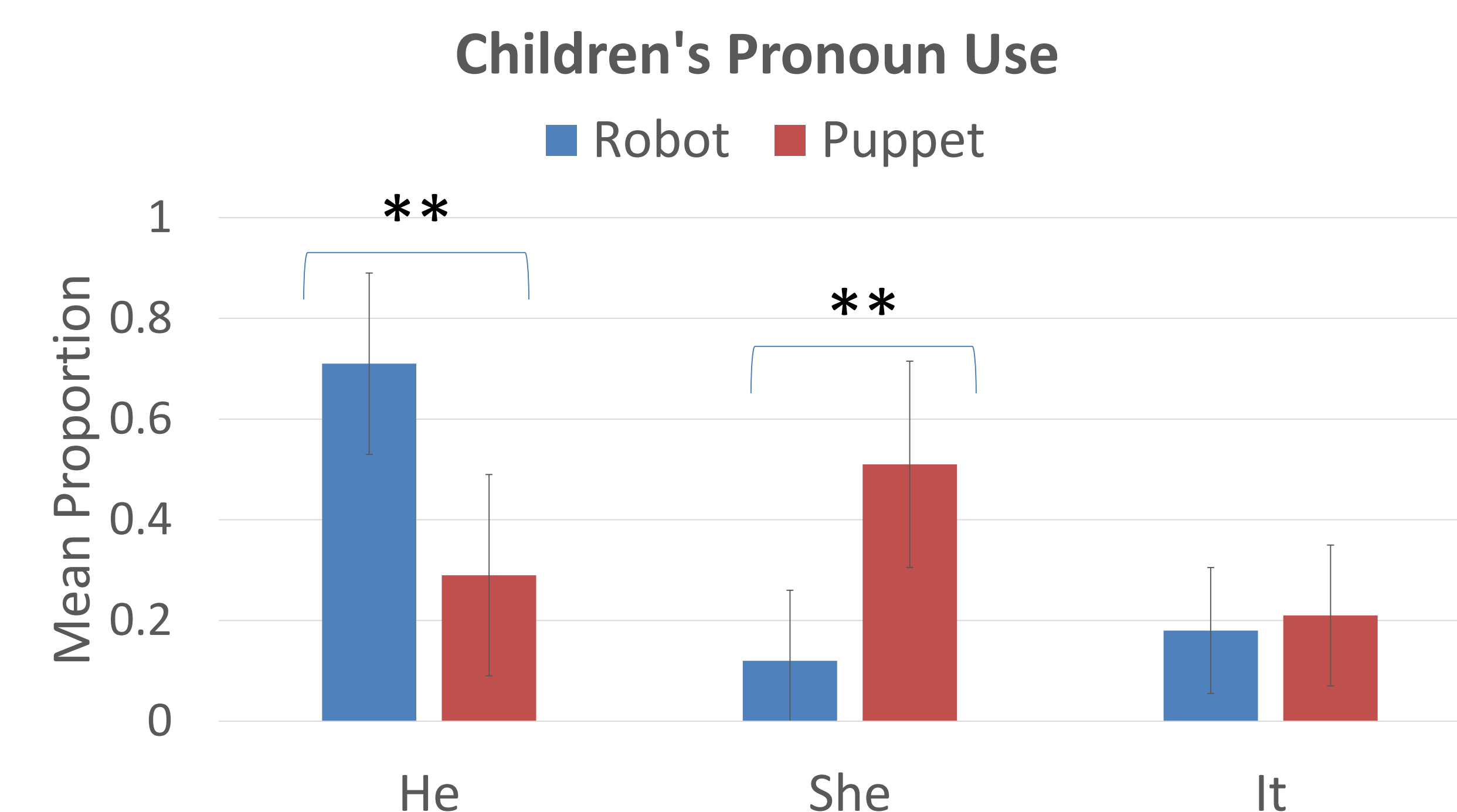


Figure 2. Children's Pronoun Use with Robot and Puppet. **p<.001

Prediction 2:

- **Robot:** Researcher's female-gendered pronoun use positively predicted children's female-gendered pronoun use ($\beta=.40, t=4.096, p<.001$).
- **Puppet:** Male- and female-gendered pronoun use were each positively predictive of children's gendered pronoun use.
 - Male pronouns: $\beta=.33, t=3.279, p=.001$
 - Female pronouns: $\beta=.35, t=3.505, p=.001$
- Researcher used more neuter pronouns for both entities, $ps<.001$ (Figure 3).

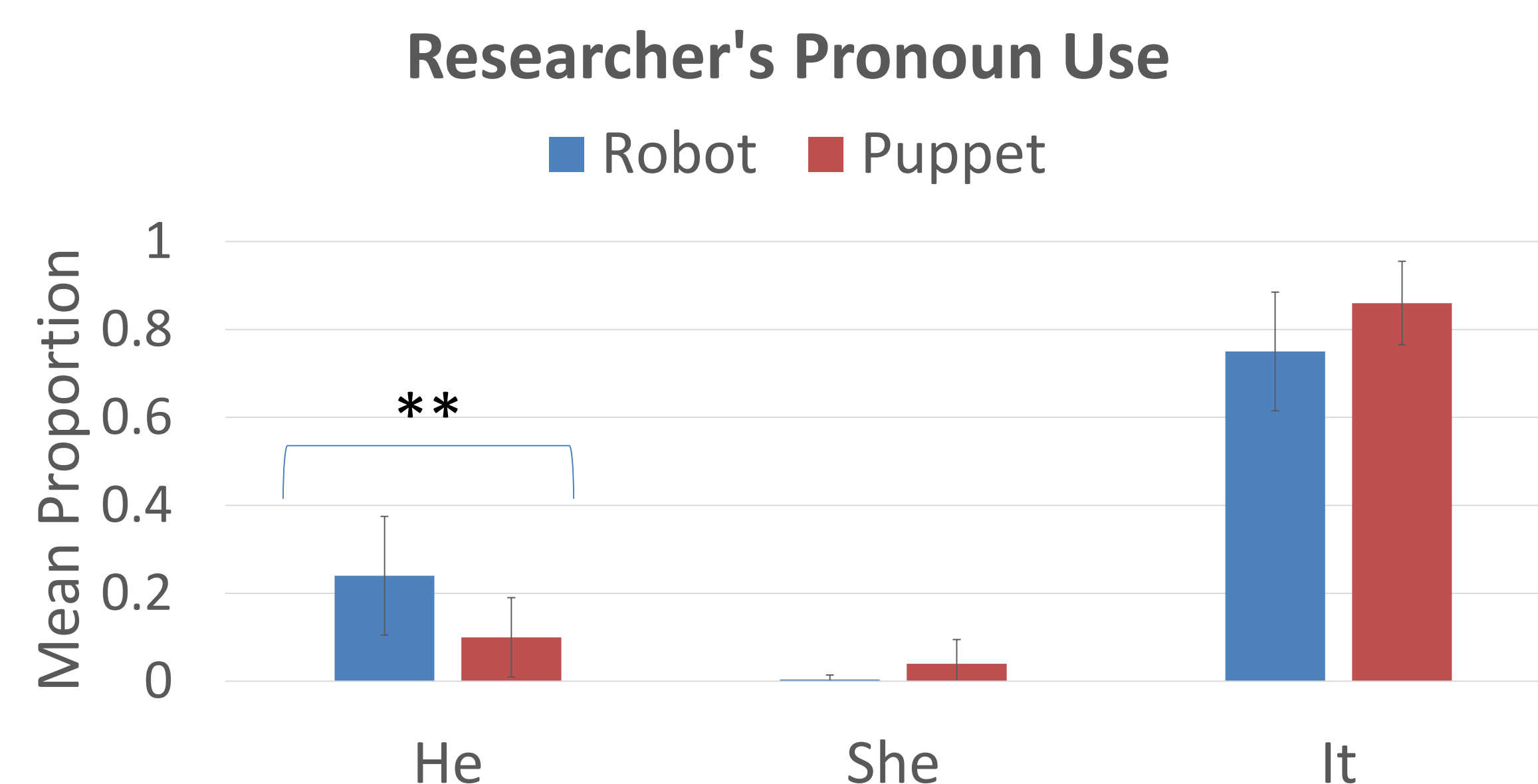


Figure 3. Researcher Pronoun Use with Robot and Puppet. **p<.001

- **No age differences** in children's pronoun use ($ps>.32$).
- **Gender differences:** Girls used neuter pronoun ("it") more.
 - Robot: girls (M=.23, SD=.30) vs. boys (M=.12, SD=.19), t(88)=-1.971, p=.05.
 - Puppet: girls (M=.28, SD=.31) vs. boys (M=.14, SD=.22), t(88)=-2.319, p=.02.

Conclusions

- Children **implicitly conceptualize the robot and puppet in gendered-terms** (robot as male, puppet as female), which is **remarkable given that both entities are objects**.
- **Children took a cue from the researcher in interpreting the puppet in gendered terms**, as both male- and female-gendered pronoun use positively predicted male- and female-gendered pronoun use in children.
- **For the robot, children only showed sensitivity to the researcher's female-pronoun use**, perhaps because it was inconsistent with their conceptions of the robot as male.
- Using an implicit measure (pronoun use), this research provides important insight on how children conceive of personified robots as a new ontological category – that is, in-between animate and inanimate.

References

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