

Mentalizing beyond humans: Theory of mind accuracy is unrelated to anthropomorphism



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Introduction

Humans' tendency to infer others' mental states is thought to be vital to social cognition. Yet, people mentalize broadly, attributing mental states to humans, as well as animals, nature, and technology – what has been referred to as *anthropomorphism*.

We are only beginning to understand how our mentalizing tendency might be related across these various entities. For example, mentalizing animals, technology, and inanimate nature is positively related to having an invisible companion [1, 2], and watching animated shapes activates the theory of mind neural network [3].

In two studies, we explored the relation between accuracy in mentalizing humans and the tendency to mentalize animals, nature, and technology. We focused on assessing the relation between *anthropomorphism* and accuracy in *social understanding* (e.g., beliefs, knowledge, intentions) (Study 1) and accuracy in *emotion understanding* (Study 2).

Study 1: Is social understanding related to anthropomorphism?

N = 126 children 3-10 years ($M = 5.77$ years, $SD = 1.67$; 48% female)

Measures

- **Individual Differences in Anthropomorphism Questionnaire – Child Form (IDAQ-CF)** [4]
A 12-item measure of individuals' tendency to attribute intentions, thoughts, and emotions to animals, technology, and inanimate nature [4]. Responses were coded on 4-point scale: 'No' (0), 'Yes, a little bit' (1), 'Yes, a medium amount' (2), or 'Yes, a lot' (3). Average scores were computed for the animal and technology-nature subscales.
- **Children's Social Understanding Scale (CSUS) – Brief** [5]
An 18-item parent-report measure of children's social cognitive understanding. Parents rated their child on a 4-point scale: 'Definitely Untrue' (1), 'Somewhat Untrue' (2), 'Somewhat True' (3), or 'Definitely True' (4). Average scores were computed.

Results

Although accuracy in social understanding was negatively related to anthropomorphism of technology and inanimate nature, this relation was accounted for by age-related changes.

Figure 1. Mean scores

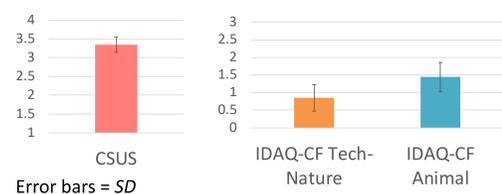
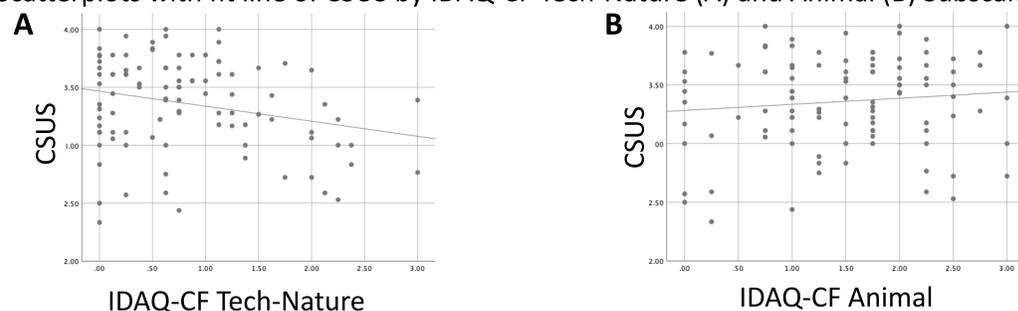


Table 1. Correlations (partial correlations controlling for age).

	Age	IDAQ-CF Tech-Nat	IDAQ-CF Animal
CSUS	.52***	-.25* (-.01)	.11 (.10)
IDAQ-CF Tech-Nat	-.48***		.44** (.52***)
IDAQ-CF Animal	.05		* $p < .05$, ** $p < .01$, *** $p < .001$

Figure 2. Scatterplots with fit line of CSUS by IDAQ-CF Tech-Nature (A) and Animal (B) Subscales



Study 2: Is emotion understanding related to anthropomorphism?

N = 50 Children 3-6 years ($M = 4.37$ years, $SD = 1.08$; 36% female)

Measures

- **Individual Differences in Anthropomorphism Questionnaire – Child Form (IDAQ-CF)** [4]
- **The Reading the Mind in the Eyes Task** [6]
A 28-item measure of accuracy in emotion recognition from pictures of eyes, a correlate of the human mentalizing system.

Results

Accuracy in emotional understanding was unrelated to anthropomorphism.

Figure 3. Mean scores

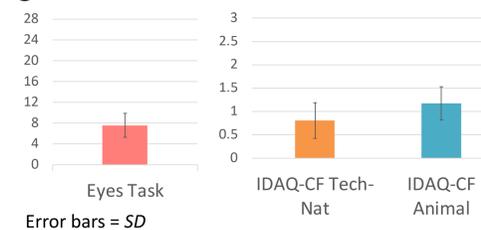
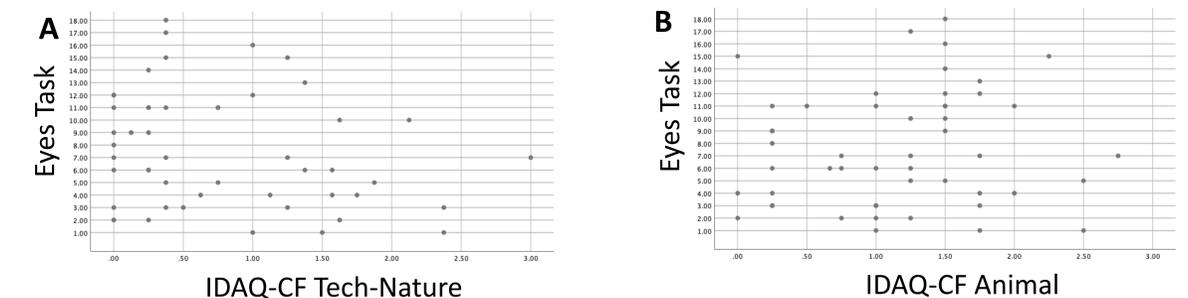


Table 2. Correlations (partial correlations controlling for age).

	Age	IDAQ-CF Tech-Nat	IDAQ-CF Animal
Eyes Task	.63***	-.23 (.03)	.11 (.09)
IDAQ-CF Tech-Nat	-.38**		.47*** (.56***)
IDAQ-CF Animal	.05		* $p < .05$, ** $p < .01$, *** $p < .001$

Figure 4. Scatterplots of Eyes Task by IDAQ-CF Tech-Nature (A) and Animal (B) Subscales



Discussion

The critical question of these studies was whether accuracy in mentalizing humans was related to the tendency to mentalize non-human others (e.g., animals, technology, inanimate nature). Although accuracy in social understanding was negatively related to anthropomorphism of technology and inanimate nature, this relation was accounted for by age-related changes. No other significant relations were found. **Thus, when controlling for age, anthropomorphism is unrelated to accuracy in mentalizing humans.**

However, anthropomorphism may be associated with motivation to mentalize. Indeed, in prior work, social interest (akin to motivation) was positively related to anthropomorphism [2]. In a new study, we are exploring whether the motivation to imagine others' minds is related to anthropomorphism. This will serve as a step in understanding whether the proclivity to imagine others' minds drives both the mentalization of humans and non-humans.

References

1. Severson & Woodard, 2018, *Frontiers in Psychology*
2. Tahiroglu & Taylor, 2018, *British J. of Developmental Psychology*
3. Castelli et al., 2000, *Neuroimage*
4. Severson & Lemm, 2016, *Journal of Cognition & Development*
5. Tahiroglu et al., 2014, *Developmental Psychology*
6. Baron-Cohen et al, 2001, *J. Child Psychol. Psychiatry*

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