Extending Perspective Taking to Non-Human Groups

Ali Ladak[1], Matti Wilks[2], Jacy Reese Anthis[3, 1]

[1]Sentience Institute

[2]Department of Psychology, Yale University

[3]Department of Sociology, University of Chicago

Author Note: Correspondence concerning this article should be addressed to Ali Ladak at ali@sentienceinstitute.org. All data, code, and experimental materials are available for download at: https://osf.io/srxgm. Supplemental Materials can be found here.

Abstract

Perspective taking, the active consideration of another individual's mental states, such as their thoughts and feelings, can have positive effects in a range of human intergroup contexts. However, little is known about its effects in the context of human relations with non-human groups. In two experiments, we tested whether taking the perspective of non-human entities affects moral attitudes towards the entities' groups as a whole, the mechanisms through which these effects occur, and how broadly or narrowly the effects generalize to groups that include the entities. Estimation of mediation models revealed no evidence of total effects of either taking the perspective of a farmed pig (Study 1, $N = 271$) or an artificial entity (Study 2, $N = 273$) on moral attitudes, compared to instructions to stay objective or a neutral control condition. However, in both studies, we found evidence of indirect effects of perspective taking on moral attitudes via empathic concern and self-other overlap, confirming two mechanisms well-established in the perspective taking literature. Moreover, these indirect effects generalized to all non-human animals in Study 1 and all artificial entities in Study 2. The lack of total effects was partly explained by competitive mediation: in both studies, after accounting for the significant indirect paths, we found positive effects of staying objective on moral attitudes. This is the opposite effect typically found in human intergroup contexts and suggests an important difference with perspective taking in the context of non-human groups.

Keywords: Perspective taking; morality; attitudes; human-animal relations; artificial intelligence

Extending Perspective Taking to Non-Human Groups

Perspective taking, the active consideration of another individual's mental states, such as their thoughts and feelings, can have positive effects in a range of intergroup contexts, including race (Dovidio et al., 2004; Finlay & Stephan, 2000; Shih et al., 2009; Todd et al., 2011; Vescio et al., 2003), gender (Simon et al., 2019), the elderly (Galinsky & Moskowitz, 2000), disability (Clore & Jeffery, 1972), people with AIDS, homeless people, and convicted murderers (Batson, Polycarpou, et al., 1997).

While these effects have been found in a wide range of situations, little is known about whether they extend to non-human groups. Some studies have tested perspective taking in the context of non-humans, encouraging participants to take the perspective of entities such as polar bears, birds, and even trees, but these have been concerned with environmental attitudes and behaviors rather than attitudes towards the non-human entities themselves (Berenguer, 2007, 2010; Schultz, 2000; Sevillano et al., 2007; Swim & Bloodhart, 2015).

In the present study, we addressed this gap in the literature by testing the effect of perspective taking on attitudes towards two non-human groups: animals and artificial entities. There is growing interest in studying both of these groups from an intergroup relations perspective. With respect to non-human animals, there is now a well-established literature on the topic (see Amiot & Bastian, 2015; Dhont et al., 2019 for reviews). Researchers have shown that the same ideologies underlying prejudice towards human outgroups are involved in the case of non-human animals (Dhont et al., 2014, 2016), and have found that psychological mechanisms associated with intergroup attitudes towards humans also apply to animals, such as solidarity (Amiot & Bastian, 2017) and intergroup anxiety (Auger & Amiot, 2019a).

Vanman and Kappas (2019) make a strong case for studying human-robot interaction from an intergroup relations perspective, citing features that could make group-level conflict in the future likely, such as the perceived threats of artificial intelligence to human jobs, identity, and even existence. In support of this approach, studies have found, for example, that the extent to which

people discriminate against robots depends on whether they are framed as ingroup versus outgroup members (Eyssel & Kuchenbrandt, 2012; Fraune, 2020), and that perceived threat from artificial intelligence can negatively affect attitudes towards human outgroups (Gamez-Djokic & Waytz, 2020), though the direction of this effect is not yet fully understood (Jackson et al., 2020).

By studying perspective taking in the context of non-human animals and artificial entities, the present study sheds light on whether and how perspective taking extends beyond the human intergroup context, providing insights into the generalizability and boundaries of the human capacity for perspective taking and its associated benefits. We explored three overarching questions: (1) whether perspective taking affects moral attitudes overall in the context of non-human animals and artificial entities, including whether these effects are due to its encouragement or if the benefits arise naturally (see McAuliffe et al., 2020); (2) the mechanisms through which perspective taking affects attitudes; and (3), how broadly or narrowly the effects generalize to groups that include the perspective taking targets. We discuss each of these goals in more detail below.

The Effectiveness of Perspective Taking

Perspective taking is typically manipulated in experimental studies by encouraging a treatment group to take the perspective of another individual, and a control group to stay objective (Todd & Galinsky, 2014). Researchers then compare the two groups on outcomes such as attitudes and helping behavior, attributing the differences to the effects of perspective taking. However, this experimental design means that differences in outcomes between the two conditions could be driven by the negative effects of the instructions to stay objective, rather than the positive effects of the perspective taking instructions. A meta-analysis by McAuliffe et al. (2020) found that the effect of perspective taking on empathic concern is largely driven by instructions to stay objective, indicating that people are empathizing less in the stay objective condition, rather than more in the perspective taking condition. This suggests that encouraging perspective taking may be less effective at improving intergroup relations than is currently believed.

Importantly, in the context of the present study, McAuliffe et al. (2020) only included studies that used human perspective taking targets. They suggested that perspective taking may be more effective when directed at targets who do not usually elicit empathy. Given that the perspective taking targets in the present study, non-human animals and artificial entities, are more distant than those considered in McAuliffe et al. (2020), humans likely have a weaker natural empathic response to them (Krebs, 1975; Miralles et al., 2019). We expected, then, that encouraging perspective taking would be more effective in the present study, that there would be a positive effect of encouraging it. On the other hand, we also considered it possible that the psychological distance from humans to non-humans would be too large for perspective taking to occur. In this case, we would not find an effect of perspective taking, even compared to an objective condition. To test these hypotheses, we compared perspective taking to two conditions: a neutral condition and a condition that encouraged objectivity.

Perspective Taking Mechanisms

What are the mechanisms through which perspective taking positively affects intergroup attitudes? Several accounts have been proposed in the literature. Batson and colleagues (1997) proposed a model whereby taking the perspective of an individual generates empathic concern, a form of other-focused empathy characterized by emotions such as compassion, warmth and tenderness, which, in turn, increases the value the perspective taker places on that person's welfare. If the individual's group membership is salient, the positive effect generalizes to their whole group. A competing account is that perspective taking increases self-other overlap, a measure of psychological closeness that reflects how much another entity is mentally represented as part of oneself, by increasing the extent to which the other person is considered "self-like," (Davis et al., 1996; Cialdini et al., 1997, Galinsky and Moskowitz, 2000). Other accounts emphasize anger and indignation (Finlay and Stephen, 2000; Dovidio et al., 2004), personal distress (Batson, Early, et al., 1997), and situational attributions (Vescio et al., 2003).

Some studies have attempted to adjudicate between the different mediators (Batson, Sager, et al., 1997; Cialdini et al., 1997; Maner et al., 2002), while others have evaluated the circumstances under which different mediators play a role. Batson, Early, et al. (1997) found that "imagine-other" perspective taking, that is, imagining the experience of another person, results in other-focused emotions such as empathic concern, whereas "imagine-self" perspective taking, such as imagining oneself in the situation of another person, results in both empathic concern and self-focused emotions such as personal distress. Consistent with this, Myers et al. (2014) found that imagine-self perspective taking resulted in both self-other overlap and empathic concern, whereas imagine-other perspective taking triggered only empathic concern. In the present study, we limited our attention to imagine-other perspective taking and therefore expected to find an effect via empathic concern. Given its prominence in the literature, we also hypothesized an effect through self-other overlap. We did not expect to find an effect via personal distress because we did not test "imagine-self" perspective taking; however, we collected data on it and included it as part of sensitivity analyses testing alternative models.

Scope of Generalization

The present study also considered the scope of the generalization effects—how broadly or narrowly do attitudes generalize when taking the perspective of an individual non-human entity? Several studies have tested whether the benefits of perspective taking spill over to adjacent outgroups (e.g., Todd et al., 2011; Vescio et al., 2003). In the present study we addressed a related, less studied question, termed "superordinate generalization" by Auger and Amiot (2019b). This asks whether the effects generalize to the broader categories that include the perspective taking target. For example, if asked to take the perspective of a farmed pig, the anticipated positive effects may generalize to all farmed pigs, but could also generalize to broader categories, such as all farmed animals, all mammals, and so on. This effect likely depends on the extent to which the perspective taking target is representative of the broader group (Brown & Hewstone, 2005). To test this, in the present study we included multiple dependent variables capturing moral attitudes towards

increasingly broad groups. These dependent variables included a Substratism Scale measuring attitudes towards artificial entities, which we adapted from the Speciesism Scale (Caviola et al., 2019) in an effort to connect our understanding of perspective taking in the contexts of artificial entities and non-human animals.

Overview of Present Research

In two experiments, we tested the effects of perspective taking on moral attitudes towards two non-human groups: animals and artificial entities. Each study included three conditions: one that encouraged perspective taking, one that encouraged objectivity, and a neutral condition. In summary, we hypothesized that perspective taking would be associated with more positive moral attitudes towards animals and artificial entities compared to (H1) staying objective and (H2) a neutral condition, and that the positive effects would be mediated by (H3) empathic concern and (H4) self-other overlap. To understand the scope of the effects, we measured moral attitudes towards multiple, increasingly broad groups. The specific dependent measures we tested are reported in the relevant sections for each study.

Open Science. Note, the hypotheses listed above are summarized versions of the full hypotheses. The preregistered hypotheses, study design, data collection and analysis plan can be found for Study 1 here: https://osf.io/mhgba and for Study 2 here: https://osf.io/d6fgb. The datasets, experimental materials, and code to run the analyses, can be found here: https://osf.io/srxgm.

Study 1

Study 1 looked at the effect of taking the perspective of a farmed pig on moral attitudes towards animals. We chose a pig as the target because their perceived status as food animals means they are typically assigned lower moral concern (Bratanova et al., 2011), making them an interesting and important group in the context of the present study which seeks to understand effects on moral attitudes. Pigs have also been considered in psychological studies on human-animal relations before (e.g., Caviola & Capraro, 2020; Wilks et al., 2021).

Study 1 tested H1–H4. We tested the impact on moral attitudes towards three groups: all farmed pigs, all farmed animals, and all animals.

Method

Participants

We recruited participants from the United States from Prolific. *A priori* power analysis in G*Power ($\alpha = 0.05$, $\beta = 0.80$) indicated that a sample size of 250 would enable us to detect small to medium effects ($f^2 = 0.05$) in a linear regression model with four predictors (the largest number of predictors in all the models we ran). To account for data exclusions, we recruited 275 participants. Four participants were excluded because they failed at least one of two attention checks, leaving a final sample of 271 (50.7% female, 48.5% male, 0.7% other; $M_{age} = 35.2$, $SD_{age} = 12.3$).

Procedure

Participants were randomly assigned into one of three conditions: "perspective taking," "stay-objective," and "no-instructions." All participants were told that they would read an article about a farmed pig and were encouraged to take their time and read the article carefully. They were given additional instructions to manipulate perspective taking based on the condition they were in, following the standard approach in the literature (Todd & Galinsky, 2014). Participants in the perspective taking condition were given the following additional instructions: "While reading the article, please try and take the perspective of the pig, imagining how it feels about its situation and how its experiences have affected its life. Try to feel the full impact of what the pig has been through and how it feels as a result." Participants in the stay-objective condition were told: "While reading the article, please try and be as objective as possible about the situation of the pig and how its experiences have affected its life. Try not to get caught up in how the pig feels; instead try and remain objective and detached." Participants in the no-instructions condition were not given any additional instructions.

Participants in all conditions then read an article that described the life of a farmed pig. The article described the pig's confinement in a crowded indoor space, the negative physical and psychological impacts of this confinement, and the pig's eventual slaughter.

Measures

Manipulation checks. In line with the standard approach in the literature (e.g., Batson, Polycarpou, et al., 1997; Todd et al., 2011), participants were asked to report the extent to which they focused on the feelings of the farmed pig while reading the article, and the extent to which they stayed objective about the pig's situation. These were measured on five-point scales (1 = *not at all*, 5 = *extremely*). Participants were also asked how believable they found the article (1 = *not at all*, 5 = *extremely*), and, depending on the condition they were in, how easy or difficult they found taking the perspective of the pig or staying objective while reading the article (1 = *very easy*, 5 = *very difficult*).

Empathic concern. Participants were asked to respond, on a seven-point scale (1 = *not at all*, 7 = *extremely*), the extent to which they felt 14 emotions while reading the article. The list of emotions included six items which, following the standard approach in the literature (e.g., Batson, Polycarpou, et al., 1997), were averaged to create a measure of empathic concern: compassionate, sympathetic, tender, warm, moved, and soft-hearted ($\alpha = 0.88$).

Personal distress. Following Dovidio et al. (2004), the list of 14 emotions also included four items that were averaged to create a measure of personal distress: distressed, disturbed, upset, grieved ($\alpha = 0.91$). This measure was not included in the main models; it was tested as part of sensitivity analysis.

Self-other overlap. This was measured using the Inclusion of Other in the Self Scale (Aron et al., 1991), a one-item scale that involves asking participants to choose one of seven increasingly overlapping circles that best represents their relationship with another entity. In this case, participants were asked to indicate the pair of circles that best reflected the extent to which they felt connected to the pig after reading the article.

Moral concern. Following a brief introduction to the concept of "moral concern," participants were asked to report their degree of moral concern, on a seven-point scale (1 = *none at all*, 7 = *a great deal*), for seven groups. Embedded in the list of seven groups were two groups used as dependent measures in the study: farmed pigs and farmed animals in general. The responses for the other five groups (dogs, other people, rocks, trees, and family) were averaged to create a measure of general moral concern that was used in the sensitivity analysis in this study.

Speciesism. Moral attitudes towards all animals was measuring using the Speciesism Scale (Caviola et al., 2019). The scale asks participants to report the extent to which they agree, on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*), with six statements relating to animals, such as "Morally, animals always count for less than humans," and "Humans have the right to use animals however they want to." The mean score of the six items (with one item reverse scored) was calculated to give an overall score with higher scores reflecting greater speciesism (α = 0.86).

Results

Descriptive statistics

Means, standard deviations, and bivariate Pearson correlations for the dependent variables and mediators used in the main analysis are presented in Table 1.

Table 1

Study 1 Means, Standard Deviations, and Pearson Correlations

	Perspective taking		No-instructions		Stay-objective		1	2	3	4
	Mean	*SD*	Mean	*SD*	Mean	*SD*	–	–	–	–
1. Pigs moral concern	5.12	1.39	4.72	1.68	4.93	1.55				
2. Animals moral concern	5.13	1.42	4.89	1.56	5.00	1.47	0.91**			
3. Speciesism	2.98	1.33	3.27	1.42	2.86	1.12	-0.62**	-0.62**		
4. Empathic concern	4.71	1.20	4.35	1.39	4.03	1.43	0.54**	0.54**	-0.31**	
5. Self-other overlap	3.86	1.63	3.35	1.79	2.93	1.55	0.49**	0.54**	-0.35**	0.60**

*Note: * $p < 0.05$, ** $p < 0.01$.*

Manipulation checks

In line with our expectations, we found that participants in the perspective taking condition reported greater focus on the pig's feelings (M = 4.17, SD = 0.85) than participants in the stay-objective condition (M = 2.73, SD = 1.17) and participants in the no-instructions condition (M = 3.44, SD = 1.09), both $p < 0.001$. The difference between the no-instructions and the stay-objective condition was also significant and in the expected direction, $p < 0.001$. We also found that participants in the perspective taking condition reported less focus on staying objective (M = 3.02, SD = 1.32) than participants in the stay-objective condition (M = 3.64, SD = 0.91), $p = 0.001$. However, we did not find significant differences in this between participants in the stay-objective condition and participants in the no-instructions condition (M = 3.23, SD = 1.15), $p = 0.098$, or between participants in the perspective taking condition and participants in the no-instructions condition, $p = 0.252$.

Overall, these results suggest that the manipulation had the intended effects, though the perspective taking instructions were more effective than the stay-objective instructions. This may be explained by the greater reported difficulty of staying objective while reading the article (M = 3.45, SD = 1.10) than taking the perspective of the pig (M = 2.06, SD = 0.95).

Finally, participants found the vignette believable; the mean across the whole sample was 4.32 (SD = 0.80) on a five-point scale.

Mediation analysis

To test our hypotheses, we estimated three separate mediation models for each of the dependent variables using the "mediate" function in the R "Psych" package (Revelle, 2020). We built our models following the methods set out in Hayes and Preacher (2014) for models with multicategorical independent variables and Preacher and Hayes (2008) for models with multiple mediators. Each model included two dummy-coded independent variables: one for the stay-objective condition (1 = stay-objective, 0 = otherwise) and one for the no-instructions condition (1 = no-instructions, 0 = otherwise), allowing us to interpret their effects relative to the perspective

taking condition. The two mediators, empathic concern and self-other overlap, were included simultaneously in all the models. Statistical significance of the "indirect effects"—the effects of the independent variables on the dependent variables via the mediators (H3 and H4)—was inferred based on 95% confidence intervals constructed from 10,000 bootstrap samples. Our models estimated the "total indirect effects" via both mediators together, as well as the "specific indirect effects" via each mediator individually while controlling for the effect via the other mediator. We also estimated the effects of the independent variables on the outcome variables without controlling for the mediators (the "total effects", H1 and H2), and the effects of the independent variables on the outcome variables controlling for the mediators (the "direct effects"). All reported effects of the mediation models are standardized.

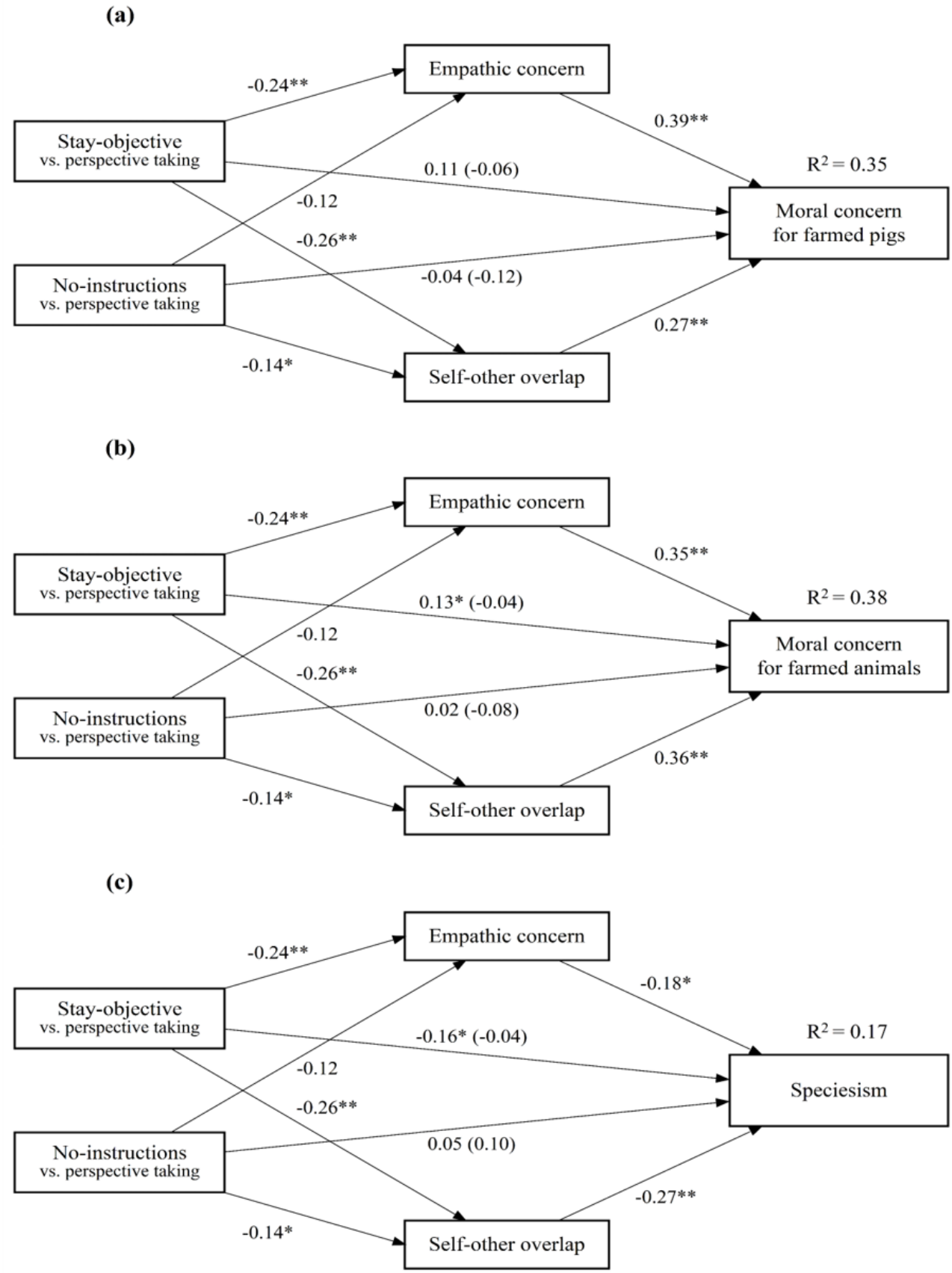

Figure 1. Study 1 mediation models of perspective taking via empathic concern and self-other overlap on (a) moral concern for farmed pigs, (b) moral concern for all farmed animals, and (c) speciesism. All reported effects are standardized. Total effects are reported in parentheses. R^2 values refer to regressions estimating direct effects. * $p < 0.05$, ** $p < 0.01$.

Table 2

Study 1 Indirect Effects of Independent Variables via Mediators

	Moral concern for farmed pigs				Moral concern for farmed animals				Speciesism			
			95% CI				95% CI				95% CI	
	β	*SE*	LL	UL	*β*	*SE*	LL	UL	*β*	*SE*	LL	UL
Empathic concern												
Stay-objective	-0.09	0.03	-0.15	-0.04	-0.08	0.03	-0.14	-0.03	0.04	0.02	0.01	0.09
No-instructions	-0.05	0.03	-0.11	0.003	-0.04	0.03	-0.10	0.002	0.02	0.02	-0.001	0.06
Self-other overlap												
Stay-objective	-0.07	0.03	-0.13	-0.03	-0.09	0.03	-0.15	-0.04	0.07	0.03	0.02	0.13
No-instructions	-0.04	0.02	-0.09	0.0003	-0.05	0.03	-0.11	-0.001	0.04	0.02	0.001	0.09
Total indirect effects												
Stay-objective	-0.16	0.04	-0.24	-0.08	-0.18	0.04	-0.26	-0.09	0.11	0.03	0.06	0.17
No-instructions	-0.09	0.04	-0.17	-0.01	-0.09	0.04	-0.18	-0.01	0.06	0.03	0.01	0.12

Note: Reference group in each case is perspective taking condition. Standardized effects reported. LL = confidence interval lower limit; UL = confidence interval upper limit. Statistical significance inferred from 95% CI not containing zero.

Moral concern for farmed pigs. We first looked at the total effects of perspective taking on moral concern for farmed pigs. We did not find evidence of a total effect of either the stay-objective condition (β = -0.06, *SE* = 0.07, p = 0.414) or the no-instructions condition (β = -0.12, *SE* = 0.07, p = 0.082). That is, against our hypotheses, there were no differences in moral concern for farmed pigs between either of these conditions and the perspective taking condition. However, significant total effects are not necessary for mediation (Hayes, 2009). Therefore, we estimated the indirect effects.

Consistent with our mediation hypotheses, the total indirect effect of being in the stay-objective condition compared to the perspective taking condition via both of the mediators was statistically significant (β = -0.16, *SE* = 0.04, 95% CI [-0.24; -0.08]). For the stay-objective condition, we found that there were indirect effects via both empathic concern (β = -0.09, *SE* = 0.03, 95% CI [-0.15; -0.04]) and self-other overlap (β = -0.07, *SE* = 0.03, 95% CI [-0.13; -0.03]). The total indirect effect via both mediators for the no-instructions condition was also significant (β = -0.09, *SE* = 0.04, 95% CI [-0.17; -0.01]). However, we did not find specific indirect effects for the

no-instructions condition via either empathic concern (β = -0.05, *SE* = 0.03, 95% CI [-0.11; 0.003]) or self-other overlap independently (β = -0.04, *SE* = 0.02, 95% CI [-0.09; 0.0003]).

After accounting for the effects of the mediators, the direct effects were insignificant for both the stay-objective condition (β = 0.11, *SE* = 0.06, p = 0.075) and the no-instructions condition (β = -0.04, *SE* = 0.06, p = 0.532).

Moral concern for all farmed animals. The pattern of results in this model was similar to that of the first model. Estimates of the total effects showed no significant differences in moral concern for farmed animals between either the stay-objective condition (β = -0.04, *SE* = 0.07, p = 0.545) or the no-instructions condition (β = -0.08, *SE* = 0.07, p = 0.269) and the perspective taking condition.

However, we did find evidence of indirect effects through our hypothesized mediators. There was a significant total indirect effect of being in the stay-objective condition relative to the perspective taking condition via both mediators (β = -0.18, *SE* = 0.04, 95% CI [-0.26; -0.09]). The indirect effects of being in the stay-objective condition via empathic concern was statistically significant (β = -0.08, *SE* = 0.03, 95% CI [-0.14; -0.03]), as was the indirect effect via self-other overlap (β = -0.09, *SE* = 0.03, 95% CI [-0.15; -0.04]). The total indirect effect via both mediators of being in the no-instructions condition relative to the perspective taking condition was significant (β = -0.09, *SE* = 0.04, 95% CI [-0.18; -0.01]). For this condition, we did not find a specific indirect effect via empathic concern (β = -0.04, *SE* = 0.03, 95% CI [-0.10; 0.002]), though we did find an effect via self-other overlap (β = -0.05, *SE* = 0.03, 95% CI [-0.11; -0.001]).

In this model, after accounting for the effect of the mediators, there was a significant positive effect of the stay-objective instructions on moral concern for farmed animals (β = 0.13, *SE* = 0.06, p = 0.022). We did not find this effect in the case of the no-instructions condition (β = 0.02, *SE* = 0.06, p = 0.784). The significant direct effect for the stay-objective condition suggests competitive mediation: there may be positive effects of staying objective on moral concern for farmed animals that the model does not capture (Zhao et al., 2010).

Speciesism. As in the previous two models, we did not find total effects for either the stay-objective condition (β = -0.04, *SE* = 0.07, p = 0.541) or the no-instructions condition (β = 0.10, *SE* = 0.07, p = 0.137) on speciesism.

We found a significant total indirect effect of the stay-objective condition on speciesism via both mediators (β = 0.11, *SE* = 0.03, 95% CI [0.06; 0.17]). The indirect effects of the stay-objective condition via both empathic concern (β = 0.04, *SE* = 0.02, 95% CI [0.01; 0.09]) and self-other overlap (β = 0.07, *SE* = 0.03, 95% CI [0.02; 0.13]) were also significant. For the no-instructions condition, the total indirect effect via both mediators was also statistically significant (β = 0.06, *SE* = 0.03, 95% CI [0.01; 0.12]). We did not find evidence of an indirect effect via empathic concern (β = 0.02, *SE* = 0.02, 95% CI [-0.001; 0.06]), though indirect effect via self-other overlap was significant (β = 0.04, *SE* = 0.02, 95% CI [0.001; 0.09]).

As with the case for all farmed animals, after accounting for the effect of the mediators included in the model, we found a significant direct effect of the stay-objective condition on speciesism (β = -0.16, *SE* = 0.07, p = 0.021), but not for the no-instructions condition (β = 0.05, *SE* = 0.07, p = 0.494), suggesting that there are positive effects of staying objective that are not captured by the model.

Sensitivity Analysis

We ran three sets of additional models as part of sensitivity analyses. The key findings are reported here; full results can be found in the Supplemental Materials. First, we ran each of the main models with a control variable for general moral concern. This shed light on whether the effects we found on attitudes towards animals via the mediators were incidental, driven by a general increase in moral concern across all groups, or whether the effects applied specifically to the animal groups studied. Overall, we found that the adjusted effects were in the same direction as those of the main models, with the effect sizes smaller by roughly one-third, rendering some effects which had smaller effects in the main models statistically insignificant. This suggests part of the effect is due to a general increase in moral concern and part of the effect is specific to nonhuman animals.

Second, we estimated models with personal distress as a third mediator alongside empathic concern and self-other overlap. Because of the other-oriented nature of our perspective taking manipulation, we did not expect to find an effect via personal distress. The sensitivity analysis allowed us to test this. As expected, we did not find that our manipulation affected personal distress, and we did not find any significant indirect effects via this path.

Finally, while we developed our models on the basis of a large body of existing literature, it is theoretically possible that the causal order between the mediators and dependent variables in our models is incorrect because of the correlational nature of the estimated relationships between them. We estimated "reverse mediation" models with self-other overlap and empathic concern as the dependent variables and the three measures of moral attitudes towards animals as the mediators to test whether this alternative provided a better explanation of the data (Hayes, 2017). We found no significant indirect effects in these alternative models, providing evidence in favor of our original models. Note, however, that reverse mediation models cannot provide conclusive evidence against these or other alternative models (Lemmer & Gollwitzer, 2017).

Discussion

Contrary to expectations from prior literature, we did not find evidence in support of our hypotheses that moral attitudes towards animals would be more positive in the perspective taking condition compared to either the stay-objective condition (H1) or the no-instructions condition (H2).

We found evidence supporting our mediation hypotheses via both empathic concern (H3) and self-other overlap (H4). These indirect effects generalized to each of the dependent variables we tested: all farmed pigs, all farmed animals, and all animals. We found evidence of these indirect effects of perspective taking relative to both the stay-objective and the no-instructions conditions, suggesting that they were at least partly driven by the instructions encouraging perspective taking. Sensitivity analysis showed that the results largely persisted after accounting for effects on general moral concern.

In two of the three models, we found evidence of competitive mediation for the stay-objective condition: after accounting for the effect of the mediators included in the model, we found a positive effect of staying objective. This provides an explanation for the apparent inconsistency in support for H1–H2 and H3–H4. Further possible explanations of these findings are explored in the General Discussion.

Study 2

Study 2 tested whether perspective taking extends to another non-human group: intelligent artificial entities. We presented participants with a hypothetical future scenario involving a technology called "whole brain emulation," where human-level artificial intelligences are created by scanning the structure of human brains in very close detail and creating software models of them (Hanson, 2016; Sandberg, 2013). In the scenario presented to participants, the artificial entities ("emulations") were described as being used by humans as workers. The unfamiliar nature of the scenario in this study was intended to give us insights into the boundaries of the effects of perspective taking on moral attitudes, as well as providing insights into human relations with a group (artificial entities) that are becoming increasingly prevalent in society. It also served as a partial replication of Study 1 in a different context.

As with Study 1, Study 2 tested hypotheses H1–H4 with a different non-human group. We tested the effects on two dependent variables: emulations as a group, and all artificial beings.

Method

Participants

We recruited participants living in the United States from the online platform Prolific. *A priori* power analysis in G*Power ($\alpha = 0.05$, $\beta = 0.80$) indicated that we would need a sample of 250 to detect small to medium effects ($f^2 = 0.05$) in a linear regression model with four predictors (the largest number of predictors of the estimated models in this study). We aimed to recruit 275 to account for data exclusions. After excluding two participants who failed at least one of two attention

checks, we had a final sample of 273 (52.6% female, 46.7% male, 0.7% other; M_{age} = 36.1, SD_{age} = 12.5).

Procedure

The survey closely followed the procedure of Study 1. However, in this study, before being assigned to the experimental groups, participants read background information describing the future scenario. This was necessary due to the unfamiliar technology and scenario being discussed. Participants were then randomly assigned into either a perspective taking, stay-objective, or no-instructions condition, and read the same additional instructions (or lack thereof) as in Study 1. Participants in all three groups then read an article describing the life of an emulation created by humans as a worker in a modern-day factory. The article described the unpleasant working conditions the emulation faced, the negative psychological impacts of these conditions, and the emulation's eventual shutting down due to obsolescence.

Measures

The manipulation checks, and measures of empathic concern (α = 0.92), personal distress (α = 0.92), and self-other overlap were the same as in Study 1.

Moral concern. As with Study 1, we asked participants how much moral concern, on a seven-point scale (1 = *none at all*, 7 = *a great deal*) they think they should show seven groups. Embedded in the list of seven groups was the item "Emulations such as those described in the articles." This was used as the dependent measure for moral concern for emulations. The scores for the other six groups (dogs, other people, farmed pigs, rocks, trees, and family) were averaged to create a measure of general moral concern. There was no measure of concern for a category analogous to "farmed pigs" because such groups are not well-established (e.g., artificial entities, but only those who work in factories and not elsewhere).

Substratism. Paralleling speciesism, we define "substratism" as prejudice against an entity because of the substrate in which its mind is instantiated. We devised a Substratism Scale to measure moral attitudes towards artificial beings as a group. The survey first defined "artificial

beings," and then asked participants to report the extent to which they agree with six items relating to artificial beings on a seven-point scale (1 = *strongly disagree*, 7 = *strongly agree*). These six items closely followed the wording of the Speciesism Scale (Caviola et al., 2019). Examples of items used are "Morally, artificial beings always count for less than humans." and "Humans have the right to use artificial beings however they want to." The mean score of the six items (with one item reverse scored) was calculated to give an overall score with higher scores reflecting greater substratism ($\alpha = 0.92$).

Results

Descriptive statistics

Table 3 reports means, standard deviations, and bivariate Pearson correlations for the dependent variables and mediators in the study.

Table 3

Study 2 Means, Standard Deviations, and Pearson Correlations

	Perspective taking		No-instructions		Stay-objective		1	2	3
	Mean	*SD*	Mean	*SD*	Mean	*SD*	–	–	–
1. Emulations moral concern	3.95	1.80	4.05	1.95	4.04	1.80			
2. Substratism	3.96	1.38	4.14	1.51	4.16	1.41	-0.67**		
3. Empathic concern	4.16	1.45	3.95	1.50	3.64	1.40	0.61**	-0.46**	
4. Self-other overlap	3.13	1.69	3.05	1.73	2.62	1.57	0.57**	-0.49**	0.64**

*Note: * $p < 0.05$, ** $p < 0.01$.*

Manipulation checks

In line with our expectations, participants in the perspective taking condition reported greater focus on the feelings of the emulation ($M = 3.80$, $SD = 1.04$) than participants in the stay-objective condition ($M = 2.71$, $SD = 1.10$), $p < 0.001$, and participants in the no-instructions condition ($M = 3.40$, $SD = 1.01$), $p = 0.030$. As expected, the difference in focus on the feelings of the emulation between participants in the no-instructions and stay-objective condition was also significant and in the expected direction, $p < 0.001$. Participants in the perspective taking condition reported less focus on staying objective ($M = 3.39$, $SD = 1.17$) than participants in the stay-

objective condition (M = 3.72, SD = 0.90), as expected, though the difference was not statistically significant, p = 0.086. Participants in the no-instructions condition reported less focus on staying objective than participants in the stay-objective condition (M = 3.33, SD = 1.08), p = 0.038. There was not a significant difference between participants in the perspective taking condition and the no-instructions condition, p = 0.942.

As with Study 1, these results suggest that the perspective taking manipulation was more effective than the stay-objective manipulation, plausibly due to the greater difficulty participants had in staying objective (M = 3.16, SD = 1.03) than taking the perspective of the emulation (M = 2.33, SD = 1.15).

Mean believability of the vignette was lower than in Study 1 (M = 2.51, SD = 1.08). However, this is not surprising due to the hypothetical nature of the scenario described in Study 2.

Mediation Analysis

We estimated separate mediation models for the two dependent variables following the same procedure as in Study 1.

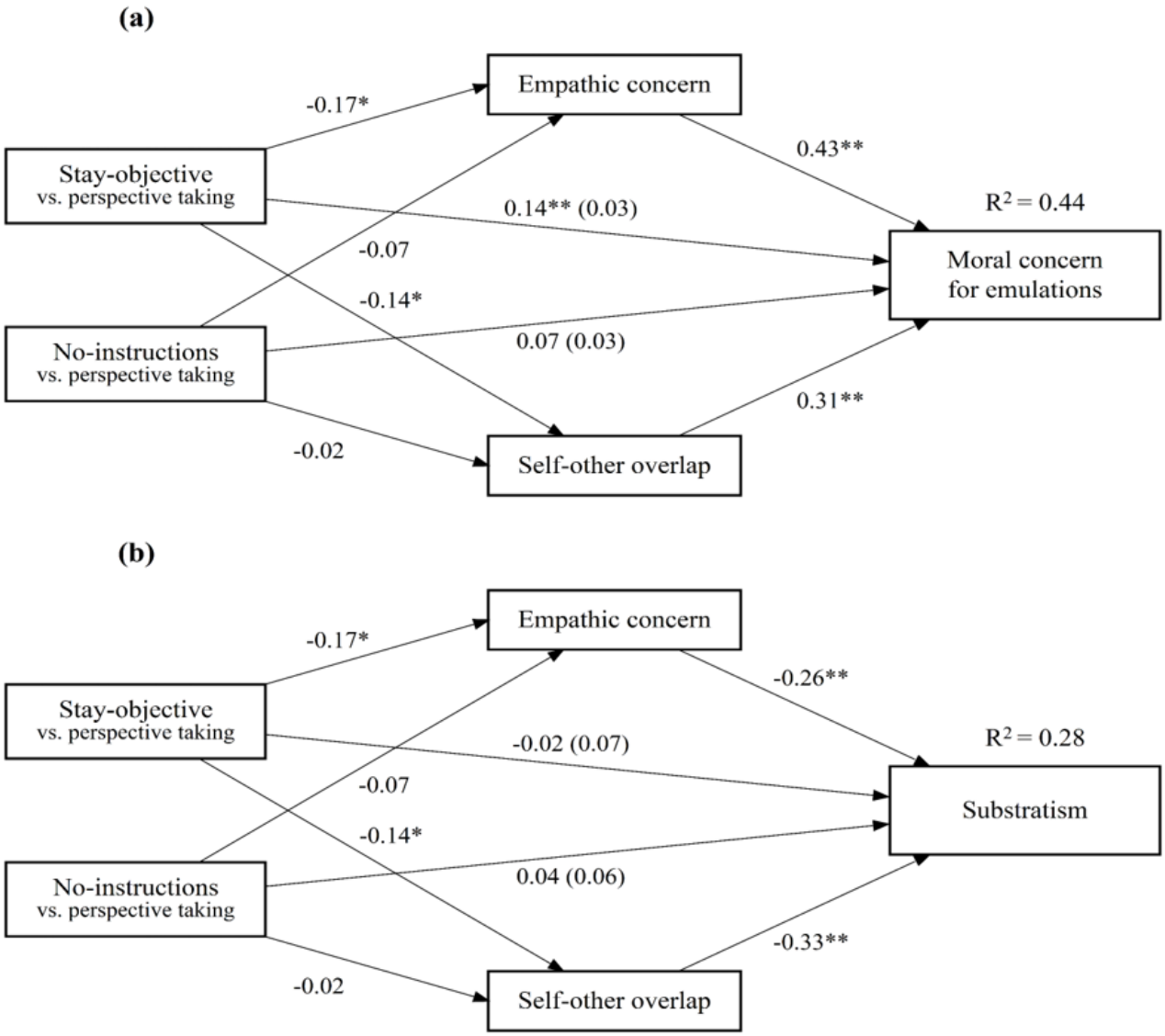

Figure 2. Study 2 mediation models of perspective taking via empathic concern and self-other overlap on (a) moral concern emulations and (b) substratism. All reported effects are standardized. Total effects are reported in parentheses. R^2 values refer to regressions estimating direct effects. * $p < 0.05$, ** $p < 0.01$.

Table 4

Study 2 Indirect Effects of Independent Variables via Mediators

	Moral concern for emulations				Substratism			
			95% CI				95% CI	
	β	*SE*	LL	UL	*β*	*SE*	LL	UL
Empathic concern								
Stay-objective	-0.07	0.03	-0.14	-0.01	0.04	0.02	0.01	0.09
No-instructions	-0.03	0.03	-0.09	0.03	0.02	0.02	-0.02	0.06
Self-other overlap								
Stay-objective	-0.05	0.02	-0.09	-0.003	0.05	0.02	0.003	0.10
No-instructions	-0.01	0.02	-0.05	0.04	0.01	0.02	-0.04	0.05
Total indirect effect								
Stay-objective	-0.12	0.05	-0.21	-0.03	0.09	0.04	0.02	0.17
No-instructions	-0.04	0.05	-0.13	0.06	0.03	0.04	-0.05	0.10

Note: Reference group in each case is perspective taking condition. Standardized effects reported. LL = confidence interval lower limit; UL = confidence interval upper limit. Statistical significance inferred from 95% CI not containing zero.

Moral concern for emulations. Consistent with the findings from Study 1, we did not find significant total effects on moral concern for emulations for either the stay-objective condition (β = 0.03, *SE* = 0.07 p = 0.718) or the no-instructions condition (β = 0.03, *SE* = 0.07, p = 0.691) compared to the perspective taking condition.

We found a significant total indirect effect of being in the stay-objective condition relative to the perspective taking condition (β = -0.12, *SE* = 0.05, 95% CI [-0.21; -0.03]). The specific indirect effects of being in the stay-objective condition via both empathic concern (β = -0.07, *SE* = 0.03, 95% CI [-0.14; -0.01]) and self-other overlap (β = -0.05, *SE* = 0.02, 95% CI [-0.09; -0.003]) were also significant. The total indirect effect of the no-instructions condition was insignificant (β = -0.04, *SE* = 0.05, 95% CI [-0.13; 0.06]), as were the indirect effects via empathic concern (β = -0.03, *SE* = 0.03, 95% CI [-0.09; 0.03]) and self-other overlap (β = -0.01, *SE* = 0.02, 95% CI [-0.05; 0.04]).

After accounting for the effect of the mediators, we found a positive direct effect of the stay-objective instructions on moral concern for emulations (β = 0.14, *SE* = 0.05, p = 0.008). We did not

find this effect in the case of the no-instructions condition (β = 0.07, SE = 0.05, p = 0.223). As with Study 1, this suggests competitive mediation in the case of the stay-objective condition that the model does not capture.

Substratism. We did not find significant total effects of either the stay-objective condition (β = 0.07, SE = 0.07, p = 0.339) or the no-instructions condition (β = 0.06, SE = 0.07, p = 0.392) on substratism.

The the total indirect effect of being in the stay-objective condition relative to the perspective taking condition was statistically significant (β = 0.09, SE = 0.04, 95% CI [0.02; 0.17]). The indirect effects of being in the stay-objective condition via empathic concern was also significant (β = 0.04, SE = 0.02, 95% CI [0.01; 0.09]), as was the indirect effect via self-other overlap (β = 0.05, SE = 0.02, 95% CI [0.003; 0.10]). For the no-instructions condition, the total indirect effect via both mediators was not significant (β = 0.03, SE = 0.04, 95% CI [-0.05; 0.10]). There was no indirect effect for this condition via empathic concern (β = 0.02, SE = 0.02, 95% CI [-0.02; 0.06]) or self-other overlap (β = 0.01, SE = 0.02, 95% CI [-0.04; 0.05]).

After accounting for the mediators, neither the objective condition (β = -0.02, SE = 0.06, p = 0.702) nor the control condition (β = 0.04, SE = 0.06, p = 0.558) were significantly associated with substratism.

Sensitivity Analysis

As with Study 1, we ran three sets of additional models, one with a control variable for general moral concern, one with personal distress as a mediator, and a series of reverse mediation models. The inclusion of general moral concern did not materially change any of the coefficients, suggesting that the effects of taking the perspective of the emulation via our mediators generalizes to moral concern for artificial entities, but it does not result in a broader increase in moral concern. As with Study 1, we did not find a significant effect of the manipulation on personal distress, nor did we find any significant mediation paths. Finally, the reverse mediation models showed no significant indirect effects, suggesting the original models are a better fit to the data (though the

same caveats from Study 1 apply; see Lemmer & Gollwitzer, 2017). The full results of the sensitivity analysis can be found in the Supplemental Materials.

Discussion

Consistent with Study 1, we did not find evidence in support of our hypotheses that moral attitudes towards artificial entities would be more positive in the perspective taking condition compared to the stay-objective condition (H1) and the no-instructions condition (H2).

However, as in Study 1, we did find support for our hypothesized mediation paths of perspective taking on attitudes via both empathic concern (H3) and self-other overlap (H4). This finding was supported for both dependent variables we tested; moral concern for emulations and substratism. In contrast to Study 1, we only found these indirect effects via the stay-objective condition, not the no-instructions condition. That is, we did not find evidence that the indirect effects were driven by positive effects of the perspective taking instructions on empathic concern and self-other overlap. The findings reported here were not affected by the inclusion of a control variable for general moral concern, suggesting these indirect effects were specific for artificial entities.

As in Study 1, we found evidence of positive direct effects for the stay-objective condition in one of the models, partly explaining the overall insignificant difference in moral attitudes between perspective taking and the stay-objective condition. Possible explanations for these findings are discussed in the next section.

General Discussion

This research investigated the effects of perspective taking on attitudes towards two non-human groups: animals and artificial entities. We compared the role of perspective taking to remaining objective and a neutral condition. This allowed us to test whether there is a general effect of perspective taking, and whether these are driven by positive effects of perspective taking rather than negative effects of remaining objective. We estimated mediation models of the relationships

via empathic concern and self-other overlap. To test the scope of the effects, we included multiple dependent variables in each study, capturing moral attitudes towards increasingly broad groups.

We did not find evidence of total effects of our independent variables on the outcome variables in either experiment. That is, overall, there were no significant differences in moral attitudes towards animals or artificial entities between the perspective taking condition and either the stay-objective or the no-instructions conditions. This finding raises questions about the overall efficacy of perspective taking on moral attitudes in the contexts studied in this paper. However, we did find indirect effects in both studies.

In Study 1, we found evidence of indirect effects of taking the perspective of an individual farmed pig on moral attitudes towards animals via both empathic concern and self-other overlap, and in Study 2, we found evidence of indirect effects of taking the perspective of a "whole brain emulation" on moral attitudes towards artificial entities via the same mediators. These findings show the general effects of perspective taking via empathic concern and self-other overlap, even in the unfamiliar contexts explored in this study.

That we consistently found indirect paths through both empathic concern and self-other overlap simultaneously is in contrast to studies that have found an effect of only one of these mediators (Batson, Sager, et al., 1997; Cialdini et al., 1997; Maner et al., 2002; McAuliffe et al., 2018), or those that have suggested that imagine-other perspective taking is associated with only empathic concern (e.g., Myers et al., 2014). However, this may be partly due to the differing contexts—the cited studies were concerned with interactions between humans only. Further research should explore whether this finding is the result of subtle differences in the mechanisms of perspective taking in the context of non-human groups. Consistent with existing theory (Batson, Early, et al., 1997), sensitivity analysis showed that the manipulation in the present study had no effect on personal distress, nor was there a significant indirect effect via this variable.

In both experiments, we found that the positive indirect effects via the mediators generalized to the broadest groups that we tested: in Study 1, to all animals, measured by speciesism, and in

Study 2, to all artificial beings, measured by substratism. These findings suggest that the individual entities considered in each experiment—the farmed pig in Study 1 and the brain emulation in Study 2—were sufficiently representative of the broader superordinate groups to enable attitude generalization at these higher levels.

We carried out sensitivity analyses to test whether the results could be explained by general increases in moral concern, rather than increases in moral concern specifically towards animals and artificial entities. In both experiments, after controlling for general moral concern, the positive effects via the mediation paths persisted. In Study 1, we found the effects were smaller by roughly one-third, suggesting that taking the perspective of a farmed pig also increased general moral concern, but this did not fully explain the effects on attitudes towards non-human animals. In Study 2, including general moral concern as a control variable had no effect on the results, suggesting the effects did not generalize beyond artificial beings. This may be because artificial entities represent a distinct category from all other entities included in the general moral concern measure.

A key question we aimed to address in this study was the extent to which the results could be attributed to encouraging perspective taking rather than reducing it through the stay-objective instructions, a possibility raised by McAuliffe et al. (2020). In Study 1, we found evidence of indirect effects of perspective taking relative to the no-instructions condition. This suggests that, in contrast to McAuliffe et al. (2020), there was an effect driven by the perspective taking instructions. However, consistent with McAuliffe et al. (2020), we did not find significant indirect effects via empathic concern alone, which is the measure they focused on. In Study 2, we did not find evidence of positive indirect effects relative to the no-instructions condition. This difference may be partly due to the overall smaller effect size of the manipulation on the mediators in Study 2. However, we argue that this does not entirely account for our results, as the effects of the no-instructions condition were also *proportionally* smaller than in Study 1. One speculative explanation, consistent with the findings of this study and McAuliffe et al. (2020), is that there is a non-linear relationship between encouraging perspective taking and psychological distance. At very low levels of

psychological distance, such as with in-group targets, perspective taking encouragement is not necessary because it is our natural response. At moderate levels of distance, such as in the case of the farmed pig, our natural response weakens, and encouraging perspective taking becomes important. However, when psychological distance is very high, perspective taking is so unnatural that the instructions are no longer effective in generating the desired responses in the perspective takers. Because the emulations were distant on multiple dimensions—socially, temporary, and probabilistically (Liberman et al., 2007)—it is possible that the manipulation did not significantly increase empathic concern or self-other overlap from their baseline levels.

What explains the combination of the lack of significant total effects and the significant indirect effects in the present study? This outcome can arise due to differential power to detect the effects, which may explain why we did not find a difference between the perspective taking and no-instructions conditions (Rucker et al., 2011). The lack of a significant total effect of perspective taking relative to the stay-objective condition likely has a different explanation. In three out of five models, we found evidence of competitive mediation: after controlling for the mediators included in the models, we found positive direct effects of staying objective. This suggests that in simple regressions of our dependent variables on perspective taking relative to staying objective, the positive effects of perspective taking and staying objective cancelled each other out, rendering the total effects insignificant (Hayes, 2009).

This, of course, raises the further question: what explains the positive effects of staying objective on moral concern? One possibility concerns the fact that we asked participants about their moral values towards entities that they have likely spent relatively little time reflecting on before. Perhaps by staying objective, participants were able to consider their values more carefully and reason their way to the conclusion that species or substrate is not relevant for moral consideration. This theory is consistent with the evidence that suggests moral reasoning can enable us to override our intuitive moral judgments (e.g., Paxton et al., 2012; Paxton & Greene, 2010). If correct, it also implies that encouraging objectivity in human-animal relationships may yield different results than

objectivity in human-human relationships. We encourage more research into this possible explanation.

Limitations and Future Directions

Our study has several important limitations. First, as the finding of competitive mediation shows, our proposed models are not complete. Aside from the positive effect of staying objective, there may be other channels through which perspective taking affects moral attitudes towards non-human groups that are not captured by our models. Possible candidates for this include anger and indignation (Dovidio et al., 2004; Finlay & Stephan, 2000), intergroup anxiety (Pettigrew & Tropp, 2008), threat (Riek et al., 2006), and, of particular relevance to non-human entities, perceived capacity for suffering (Bratanova et al., 2011; Gray et al., 2007; Loughnan et al., 2010).

A second limitation is the correlational nature of the estimated relationships between the mediators and the dependent variables in our models. While we relied on a large body of literature to inform the hypothesized causal order between these sets of variables, the results are theoretically consistent with alternative models. We estimated models that reversed the order of the mediators and dependent variables and found no evidence of indirect effects, suggesting our original models better explained the data. However, reverse mediation analysis cannot provide conclusive evidence against such alternative models (Lemmer & Gollwitzer, 2017).

A third limitation of this research is our measurement of moral attitudes towards artificial entities. We adapted the existing Speciesism Scale (Caviola et al., 2019) for our Substratism Scale and found evidence of its statistical reliability and correlation with various measures in theoretically plausible directions. However, more research is needed to further develop, validate, and understand this and related constructs to enable future research on human relations with artificial entities to be carried out in a robust and consistent manner.

This is, as far as we are aware, the first study looking at the effects of perspective taking on attitudes towards non-human groups, and there are many remaining questions that need to be answered to fully understand how it extends to these contexts. In addition to the directions above,

these include understanding how perspective taking extends to other non-human entities, whether and the extent to which attitude changes persists over time, whether perspective taking in these contexts affects behavior, and for whom the effects are more or less pronounced.

Conclusions

In conclusion, while we did not find evidence of total effects of perspective taking on moral attitudes towards non-human animals and artificial entities, we did find evidence of positive effects via empathic concern and self-other overlap, that these positive effects generalized to wider groups including the perspective taking targets, and, in the case of non-human animals, that the effects were driven by the positive impact of encouraging perspective taking. Interestingly, the lack of total effects was partly explained by positive effects of objectivity, highlighting a potentially important difference in human interactions with non-humans compared to other human groups. Our findings suggests that, in a context where society is increasingly concerned with whether and how to take into account the interests of distant non-human groups (e.g., Gunkel, 2018), both greater objectivity and perspective taking may provide support for expanding the circle of moral concern.

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