

Do storybooks with anthropomorphized animal characters promote prosocial behaviors in young children?

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Abstract

For millennia, adults have told children stories not only to entertain but also to impart important moral lessons to promote prosocial behaviors. Many such stories contain anthropomorphized animals because it is believed that children learn from anthropomorphic stories as effectively, if not better than, from stories with human characters, and thus are more inclined to act according to the moral lessons of the stories. Here we experimentally tested this belief by reading preschoolers a sharing story with either human characters or anthropomorphized animal characters. Reading the human story significantly increased preschoolers' altruistic giving but reading the anthropomorphic story or a control story decreased it. Thus, contrary to the common belief, realistic stories, not anthropomorphic ones, are better for promoting young children's prosocial behavior.

RESEARCH HIGHLIGHTS

- Children ages 4 to 6 read either a book about sharing with human characters, a book about sharing with anthropomorphic animal characters, or a control book about seeds.
- Reading the human story significantly increased preschoolers' altruistic giving but reading the anthropomorphic story or the control story decreased it.
- Children in the anthropomorphic condition who were more likely to categorize the animal characters as humans than as animals were more likely to share at post-test.
- Storybooks with human characters can better promote children's prosocial behaviors.

1 | INTRODUCTION

Story-telling has been an integral part of children's lives everywhere for millennia. Adults tell children stories not only to entertain but also to teach important life and moral lessons. Many stories for young children contain animal characters who are anthropomorphized: a fox that connives, a puppet who lies and gets into all sort of trouble, a rabbit who is conceited, and a turtle who perseveres. Indeed, in a review of about 1000 children's books (Marriott, 2002), more

than half of the books featured animals or their habitats, of which less than 2% depicted animals realistically. Instead, most anthropomorphized animals. One argument in favor of this portrayal of animals in children's stories is that children are naturally attracted to animals and, thus, by using anthropomorphized animal characters, a story becomes more captivating and its lessons more accessible to the young mind (Melson, 2001). Consequently, young children may be more inclined to act in accordance with the morals of the story in real-life situations.

Surprisingly, no direct study has ever tested the validity of this belief. In fact, recent, albeit indirect, evidence suggests that the opposite may be true. For example, 3- to 5-year-olds are less likely to learn causal knowledge from a fantastical story than a realistic story (Walker, Gopnik, & Ganea, 2015). They learn fewer facts about real animals from stories that anthropomorphize animals than stories that depict animals realistically (Ganea, Canfield, Simons-Ghafari, Chou, 2014). They are also less likely to transfer knowledge about how to solve a social problem (e.g., how to avoid being seen by another or how to join a playgroup) to the real-world situation if such knowledge is learned with fantastical characters than human ones (Richert, Shawber, Hoffman, & Taylor, 2009; Richert & Smith, 2011). Further, reading the story Pinocchio, in which the main moral voice is an anthropomorphized cricket, failed to promote children's honesty (Lee et al., 2014). In addition, recent research suggests that children like realistic stories



at least as much as adults, and may in fact prefer them to fantastical stories (Barnes, Bernstein, & Bloom, 2015).

Such existing evidence, however, does not necessarily suggest that stories with anthropomorphized characters do not promote prosocial moral behaviors. The Pinocchio story fails to promote honesty not because it uses anthropomorphized story characters, but because it conveys only negative messages that may scare children from behaving morally (Lee et al., 2014). It is also possible that children may not treat all kinds of knowledge learned from storybooks in the same way. For example, children may consider physical and social problems encountered in the fantasy world to be different from those in the real world. Consequently, they are reluctant to transfer knowledge learned from the fantasy stories to the real world. However, they may consider moral rules to be universal and to transcend all worlds, fantastic and real. As a result, they may readily apply the moral lessons learned from fantasy stories to real-world situations. To the best of our knowledge, no study has examined this intriguing possibility. It is entirely unclear as to whether young children can learn prosocial moral lessons from stories with anthropomorphized animal characters and act accordingly.

The present study aimed to bridge this important gap in knowledge. We tested whether reading the same moral story in which either anthropomorphized animal or realistic human characters behave morally would facilitate children to behave morally in real-life situations. We randomly assigned children between the ages of 4 and 6 to one of three conditions: an *Animal* condition where we read a story to children about anthropomorphized animal characters who behave generously to others, a *Human* condition where we read the same story to children except that the story characters were human, and a *Control* condition where we read a story that did not depict generous characters.

Before hearing the stories, the children chose 10 stickers to take home for agreeing to participate in the story reading activity (Benenson, Pascoe, & Radmore, 2007; Decety et al., 2015; Li, Li, Decety, & Lee, 2013). They were also told that an anonymous same-aged peer was not chosen to participate in the study and therefore would not have any nice stickers to take home. The experimenter suggested to the children that they could share some of their own stickers with an anonymous peer by putting the shared stickers in an envelope when the experimenter was not looking. Existing studies with the same paradigm show that before age 6 children share hardly any stickers with their friends, and even after age 6, children still keep most of the stickers for themselves (Benenson et al., 2007; Decety et al., 2015; Li et al., 2013). Thus, this task offers a lot of room for children to change their sharing behavior after reading the story, whereas a task in which they were predisposed to share in the pre-test would not. After reading the story, the children chose another 10 stickers as a token of thank you for participating in the story reading activity and were asked again to donate some of their favorite stickers to an anonymous peer.

We measured the differences in sticker donation before and after story reading. We used this measure to examine whether reading storybooks with a sharing theme emphasizing these morals would significantly increase children's generous giving relative to reading the control story. More importantly, we examined whether

the story in the *Animal* condition with anthropomorphized animal characters and the story in the *Human* condition with real human characters would have differential effects in promoting generosity in young children.

Further, before reading the story, children were also asked to complete a categorization task, in which they were shown pictures of humans, realistic animals, and anthropomorphic animals. For each picture, children were asked questions about both human and animal behaviors. This task assessed the degree to which children were associating anthropomorphic characters with either human or animal behaviors. Recent research has shown developmental changes in the tendency to anthropomorphize animals, with older children showing higher levels of anthropomorphic beliefs about animals than younger children (Herrmann, Waxman, & Medin, 2010; Severson & Lemm, 2016). Anthropomorphism has been attributed to both informal language and media exposure to anthropomorphic depictions of nonhuman others (Ganea et al., 2014; Herrmann et al., 2010; Severson & Lemm, 2016), and to individual dispositional differences (Waytz, Cacioppo, & Epley, 2010). Such individual differences may affect how children react to stories with anthropomorphized animals and the moral and social lessons that the stories intend to impart. Thus, if children view the anthropomorphic story characters as being more similar to themselves, they will be more likely to translate the lesson of the story into their own lives and actions. On the other hand, children with lower levels of anthropomorphism will associate the anthropomorphic characters more with animal than human characteristics, which in turn will lead to less transfer of the story lesson to their own lives. We tested this hypothesis in the *Animal* condition. More specifically, we examined whether children's sharing behavior in the *Animal* condition was affected by how much they associate anthropomorphized animals with human vs. animal characteristics.

Finally, at the end of their session, children in the *Control* condition were also asked to choose between reading either the book about human characters or the book about animal characters. This question was asked to determine whether children would prefer to read the animal book or the human book when given a choice. If the argument that using anthropomorphized animal characters makes a story more captivating to young children is correct, then children should be more likely to choose the book about animal characters.

2 | METHOD

2.1 | Participants

Ninety-six children from 4 to 6 years of age participated ($M = 5.34$, range: 4.02 to 6.98 years, 46 boys). Equal numbers of children (32) were randomly assigned to one of three book conditions: the *Human* condition, a prosocial book with a human main character; the *Animal* condition, the same prosocial book with an anthropomorphic animal character; and the *Control* condition, a control book about seeds. Sample sizes were chosen to be comparable to prior studies that used the same sticker sharing task described below (e.g., Benenson et al., 2007; Li et al., 2013). We aimed to test 30 children per condition who did not meet the following exclusion criteria: inattention to the tasks,



low comprehension of the story (for details see below), and/or children who were not fluent in English. We terminated the study when the following conditions were met: (1) all conditions reached the same number of participants, and (2) we had tested all children whose parents had already agreed to their children's participation.

Participants were recruited from a database of children maintained by the lab ($N = 28$) and from a Science Centre ($N = 68$). These children were distributed evenly across conditions.

Most of the children were white (49%), but the sample also included Asian (27%), Latin American (2%), Arab (1%), Black (1%), and Mixed Race (13%). An additional 7% of families declined to disclose ethnicity information. All children spoke English fluently. The majority of children came from middle- and upper-class families, and the mode parental education level was a Bachelor's degree.

Seventeen additional children were excluded due to inattention ($N = 2$), low comprehension of the story ($N = 4$), low English language skills ($N = 6$) or unwillingness to participate in the sticker sharing task ($N=5$).

2.2 | Materials

The book stimuli for the study included three books: *Human*, *Animal*, and *Control*. The *Animal* Book was a published book called *Little Raccoon Learns to Share* written by Mary Pacard. We selected this book because it had a sharing theme and moral (i.e., sharing makes you feel good) with anthropomorphic animals as main characters. The *Human* Book was created by scanning the images from the animal book and using Photoshop to replace the illustrations of animal characters with human characters in the same layout.

The rest of the illustrations and the text remained the same as in the original book. Both books were reprinted so that they looked identical. The *Control* book was a popular narrative story by Eric Carle about seeds with no significant human interaction.

Color drawings of humans, realistic animals, and anthropomorphic animals were also used to probe children's understanding of anthropomorphism.

The research materials also consisted of stickers with a wide variety of appealing designs, which were used for the sharing task.

2.3 | Procedure

2.3.1 | Language assessment

To ensure that children had the vocabulary to understand the books, we administered the Toolbox Picture Vocabulary Test (TPVT). The TPVT is a receptive vocabulary measure administered in a computerized adaptive format (National Institutes of Health, 2015).

2.3.2 | Sharing task

Children were seen individually by the experimenter in a quiet room at either the university lab or at the Science Centre. Children first selected their 10 most favorite stickers from among 100 stickers. Then

children were told that there was a child of their age who was not able to play the game and would therefore not receive any stickers. They were told that they could share some of their stickers with this child by putting them in an envelope. When the child was deciding how many stickers to share, the experimenter turned away with her eyes closed and covered to assure the children that she did not know how many stickers they shared. The child then sealed the envelope and put it in a mailbox. Unbeknownst to the child, the experimenter later unsealed the envelope and counted the number of stickers donated. This task was done twice, both before and after the book reading, as a pre-test and post-test measure. After the study was finished, the child was debriefed and all the shared stickers that children had selected to give away during their participation in the study were distributed to kindergarten children from an inner city school.

2.3.3 | Categorization task

After the first sticker task, children performed the categorization task. This task was used to determine whether children were associating anthropomorphic characters with human behaviors or with realistic animal behaviors. Children were shown color drawings of humans, realistic animals, and anthropomorphically depicted animals. The pictures were divided into four sets, with one of each type of picture shown in three separate panels on a strip of paper. Due to copyright issues we cannot display the images used in the study. Appendix B provides a description of the four sets of pictures used.

For each picture that children were shown, they were asked to indicate whether or not the human or animal in the picture would perform a certain behavior. For each picture, children were asked a total of four questions: two questions about Human Behaviors (e.g., Does this one sleep in a house?) and two questions about Animal Behaviors (e.g., Does this one sleep in a barn?). Children could answer "yes" or "no" to each of the four questions for each picture. All children saw the same pictures in counterbalanced order. The order of the pictures and questions was randomized.

To score, for each of the *Human* pictures, if children responded "yes" to the question about Human Behaviors, they received one *Human-with-Human-Behavior Score*. In total, children were shown four pictures of humans, and asked two Human Behavior questions about each picture. Thus, they could have a total of 8 possible points for their *Human-with-Human-Behavior Score*. Similarly, children were asked two Animal Behavior questions about each *Human* picture. If they responded "yes" to the question about Animal Behaviors, they received one *Human-with-Animal-Behavior Score*, for a total of 8 possible points. Then, to obtain a *Final Human Score* we subtracted the *Human-with-Animal-Behavior Scores* (incorrect responses) from the *Human-with-Human-Behavior Scores* (correct responses). This score indicated the extent to which children correctly attributed human characteristics to humans, and did not attribute animal characteristics to them. A *Final Human Score* closer to +8 indicated that a child associated human characters with human characteristics. Thus, the more positive the score, the more correctly children associated human characteristics with humans.



This same scoring procedure was followed for the *Realistic Animal* pictures. Children received points for each Human Behavior question to which they answered “yes”, which generated a *Realistic-Animal-with-Human-Behavior Score*, for a total of 8 possible points. They also received points for each Animal Behavior question to which they answered “yes”, which generated a *Realistic-Animal-with-Animal-Behavior Score*, for an additional 8 possible points. To obtain a *Final Animal Score*, we subtracted the *Realistic-Animal-with-Animal-Behavior Scores* (correct responses) from the *Realistic-Animal-with-Human-Behavior Scores* (incorrect responses). This score indicated the extent to which children correctly attributed animal characteristics to realistic animals and did not attribute human characteristics to them. A *Final Animal Score* closer to -8 indicated that a child correctly associated animal pictures with animal characteristics. In other words, the more negative the score, the more correctly children associated animal characteristics with animals.

Again, this scoring procedure was followed for the *Anthropomorphic Animal* pictures. Children saw four *Anthropomorphic Animal* pictures, and were asked two Human Behavior questions and two Animal Behavior questions about each picture. For each Human Behavior question to which children answered “yes” they received one *Anthropomorphic-Animal-with-Human-Behavior Score*, and for each Animal Behavior question to which children answered “yes” they received one *Anthropomorphic-Animal-with-Animal-Behavior Score*, each for a total of 8 possible points.

Finally, we subtracted the *Anthropomorphic-Animal-with-Animal-Behavior Scores* from the *Anthropomorphic-Animal-with-Human-Behavior Scores* to obtain the crucial *Final Anthropomorphic Score*. A *Final Anthropomorphic Score* closer to $+8$ indicated that children were more inclined to associate anthropomorphic animals with human characteristics, whereas a score closer to -8 indicated that children were more inclined to associate anthropomorphic animals with animal characteristics. As a group measure, this *Final Anthropomorphic Score* could then be compared against the *Final Human Score* and the *Final Animal Score*, which provided a baseline for how often children associated human pictures with human behaviors and realistic animal pictures with animal behaviors. It also provided a measure that could be used to analyze individual differences in children’s anthropomorphizing and would then allow for analysis of whether their scores on this measure correlated with their sharing behavior.

For the complete list of questions asked and descriptions of all the picture sets, see Appendix B.

2.3.4 | Book reading

The experimenter read children the animal book, the human book, or the control book. The control book was read to ensure that any change in sticker sharing between the pre-test and post-test was due to the book reading and not to the repetition of the task or the additional interaction time spent with the experimenter. The experimenter read the book straight through to the child. Children who interrupted to comment or ask questions were answered neutrally and redirected to the story (“Let’s see what happens next”). After reading the book, the

sharing task was administered again with a new set of stickers. After completing the post-test sharing task, children were asked two comprehension questions to ensure that they understood the story. One was a fact-checking question in which children had to recall a specific event in the story (i.e., “What did [character] do when she was at home with her mother?”), and the other tested children’s understanding of the moral of the story (i.e., “How did [character] feel at the end when she shared?”). A list of the questions asked in both the experimental and control conditions can be found in Appendix A. Four children who were not able to answer either of the comprehension questions and did not mention any accurate events from the story were excluded from the analysis. Two additional children were unable to recall the specific event asked about in the fact test question, but were able to name several other events accurately from the story when subsequently asked what else happened to the characters in the story and answered the moral question correctly. These children were retained. The other 94 children answered both questions with 100% accuracy.

2.3.5 | Book preference

To determine which of the books children would prefer if given a choice, after all tasks were completed, children in the *Control* book condition were told that they could choose either the human or the animal book to read and asked which one they would prefer. This task was only done with children in the *Control* book condition because these children had not read either of these books during their testing. Children in the other conditions did not complete this task because they had already read either the animal book or the human book.

2.4 | Coding

All of the above tasks were live coded by the experimenter. (In the case of the sticker-sharing task, stickers were counted at the end of the session.) In addition, the sessions were video-taped and another person coded 94% of the sticker sharing tasks (six videos cut out or were not filmed successfully), and 20% of the categorization task and comprehension questions. There was near perfect agreement between the two coders. The agreement from the coders on the pre-test for the sticker sharing task, the categorization task, and the comprehension questions was 100%, $\kappa = 1$, $p < .001$. The agreement on the post-test sticker sharing task was 99%, $\kappa = .99$, $p < .001$. The TPVT scores were calculated automatically by the software used to administer the test.

3 | RESULTS

Preliminary analyses show that in all conditions children’s difference in sharing behavior was not affected by age in months or by gender or the location where the data were collected.

On the TPVT, the mean standard score was 107.84 ($SD = 9.26$) for the *Human* condition, 112.45 ($SD = 8.80$) for the *Animal* condition, and 108.86 ($SD = 8.54$) for the *Control* condition. An ANOVA showed

that there was no condition effect on the TPVT scores, $F(2, 92) = 2.32$, $p = .11$, $\eta^2_{\text{partial}} = 0.05$. The TPVT scores were also not correlated significantly with the scores on the sticker sharing task in the pre- and post-tests (*Human, Pre-Test: $r = -.04$, $p = .81$, Post-Test: $r = -.04$, $p = .82$; Animal, Pre-test: $r = .16$, $p = .40$, Post-Test: $r = .30$, $p = .10$; Control, Pre-Test: $r = .15$, $p = .44$, Post-Test: $r = .19$, $p = .31$).*

Table 1 shows the means and standard deviations of the number of stickers shared by children in the pre- and post-tests in each condition.

To examine the effect of book reading on children's sticker sharing behavior, we first computed the difference scores by subtracting the pre-test sticker sharing scores from the post-test sticker sharing scores (see Figure 1). Then, we ran a one-way ANOVA with the difference scores as the dependent variable and the book condition as the independent variable. We found a significant condition effect, $F(2, 93) = 7.41$, $p = .001$, $\eta^2_{\text{partial}} = 0.14$. A priori contrasts with the *Human* condition as the reference revealed that the mean difference scores in the *Human* condition were significantly different from those of the *Animal* condition, $p = .001$, 95% CI = $-2.35, -.65$, and the *Control* condition $p = .002$, 95% CI = $-2.19, -.49$. Thus, relative to the *Animal* and *Control* conditions, children in the *Human* condition significantly increased their donations of stickers after hearing the sharing story involving human characters. In contrast, post-hoc analysis (LSD) revealed that the mean difference scores for the *Animal* condition was not significantly different from that of the *Control* condition, $p = .716$, 95% CI = $-.69, 1.01$.

One sample t tests were performed to compare the mean difference score in each condition to zero (i.e., no change in sticker sharing). We found that children in the *Human* condition significantly increased their sharing after the book reading compared to zero, $t(31) = 2.81$, $p = .037$, 95% CI = $.06, 1.69$. In contrast, children in the *Animal* and *Control* conditions shared significantly less after the book reading: *Animal: $t(31) = -2.43$, $p = .021$, 95% CI = $-1.15, -.10$; Control: $t(31) = -2.13$, $p = .041$, 95% CI = $-.92, -.02$.*

Thus, reading a book about sharing had an immediate effect on children's sharing behavior: children who read the book with human characters became more generous. In contrast, there was no difference in generosity between children who read the book with anthropomorphized animal characters and the control book; both groups showed a decrease in sharing behavior.

Regarding children's responses in the categorization task, we ran a 3 (Condition: Human, Animal, Control) \times 3 (Final Categorization Score Type: Human, Animal, Anthropomorphic) repeated measures ANOVA with the score type as the repeated measure. We tested whether there

TABLE 1 Pre-test and post-test sharing scores by condition

	Pre-test scores	Post-test scores
<i>Human</i> condition	$M = 2.03$, $SD = 2.00$	$M = 2.91$, $SD = 2.37$
<i>Animal</i> condition	$M = 2.31$, $SD = 2.18$	$M = 1.69$, $SD = 1.73$
<i>Control</i> condition	$M = 2.00$, $SD = 2.14$	$M = 1.53$, $SD = 1.98$

was any significant relationship between the condition and the way in which children categorized humans, real animals, and anthropomorphic animals. The condition effect was not significant. The only significant effect was the final categorization score type, $F(2, 186) = 1116.51$, $p < .001$, $\eta^2_{\text{partial}} = 0.92$ (Figure 2). A priori contrasts with the *Human* scores as the reference revealed that there was a significant difference in how children categorized human pictures and realistic animal pictures, $p < .001$, as well as how they categorized human pictures and anthropomorphic animal pictures, $p < .001$. Further, post-hoc (LSD) comparison between the *Final Animal Score* and the *Final Anthropomorphic Score* showed a significant difference in how children categorized the realistic animal pictures and the anthropomorphic animal pictures, $p < .001$, 95% CI = $1.05, 2.10$. One sample t tests were performed to compare the mean final categorization scores to zero (i.e., no association with either human or animal behavior). We found that children significantly associated human pictures with human behavior, $t(95) = 51.98$, $p < .001$, 95% CI = $6.76, 7.30$. In contrast, children significantly associated both realistic animal pictures and anthropomorphic animal pictures with animal behavior; realistic animals: $t(95) = -30.68$, $p < .001$, 95% CI = $-5.96, -5.23$; anthropomorphic animals: $t(95) = -15.40$, $p < .001$, 95% CI = $-4.54, -3.50$.

Mean Difference Scores in Sticker Sharing Between Pre- and Post- Tests

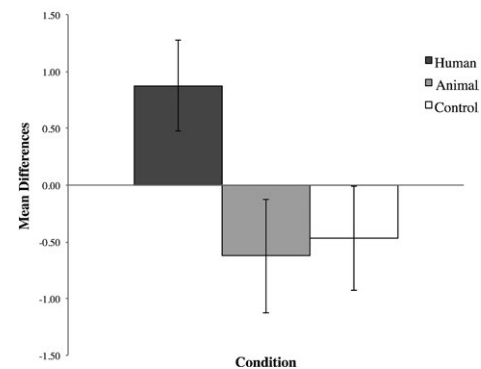


FIGURE 1 Mean difference scores of stickers shared between the pre- and post-tests across conditions. Standard error bars are shown for each test in each condition

Categorization Task Scores

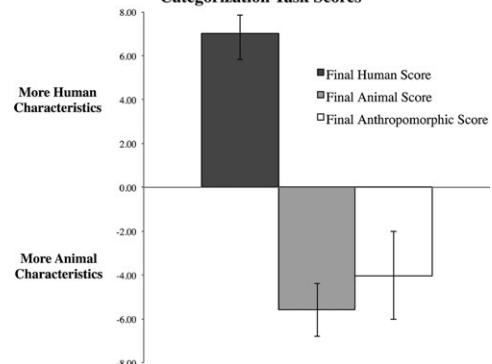


FIGURE 2 Mean final scores for categorization task. Standard error bars are shown for each mean final score



Thus, children were more inclined to associate human behaviors with humans than with realistic animals and anthropomorphic animals, and associate animal behaviors with realistic animals and anthropomorphic animals than humans. Further, they were able to distinguish the anthropomorphic animals from the realistic animals as they were significantly more inclined to associate animal characteristics with realistically drawn animals than anthropomorphic animals. Nevertheless, as demonstrated in the one sample t tests, children were still significantly more inclined to associate anthropomorphic animals with animal characteristics than with human characteristics (Figure 2).

We then performed Pearson correlational analyses to examine the relations between Final Scores on the categorization task and the number of stickers shared at pre-test and post-test, respectively. These correlations were conducted separately for each book condition. Only the crucial correlation in the *Animal* condition was significant, $r(30) = .36$, $p = .042$. For the children in the *Animal* condition, the more they associated the anthropomorphic pictures with human characteristics, the more they shared at post-test. The correlations in the other two conditions were not significant, $r_s < .29$, $p_s > .11$. This suggests that individual differences in children's tendencies to anthropomorphize characters are linked to whether the use of anthropomorphized animals in a storybook could impact their actual sharing behavior. Thus, while anthropomorphizing animal characters is a common feature of children's storybooks, individual differences in children's ability to associate animal characters with human characteristics affects how they view these types of stories.

Finally, in the *Control* condition, at the end of the experiment, children were given the opportunity to choose between the books with either human or anthropomorphized animal characters to be read to them. Two children refused to choose between the two books, but the other 30 did. Among them, they chose the books equally (15 each), $\chi^2(1, N = 30) < .001$, $p = 1.00$.

4 | DISCUSSION

The present study examined whether storybooks with human or anthropomorphized animal characters behaving prosocially would promote actual prosocial behaviors in young children. We found that such book reading indeed had an immediate effect on children's prosocial behavior. However, the type of story characters significantly affected whether children became more or less inclined to behave prosocially. After hearing the story containing real human characters, young children became more generous. In contrast, after hearing the same story but with anthropomorphized animals or a control story, children became more selfish.

This book type effect was not due to differences in young children's ability to remember the story content or to comprehend the story content. This is because in all three conditions only children who correctly answered the comprehension and memory check questions were included in the study. The effect also could not be due to group differences in language abilities or verbal IQ because we only included children who were fluent in English and children's scores on the TPVT

were not significantly different between conditions. Also, it is unlikely that children were biased to prefer the human stories because when children in the *Control* condition were given an opportunity to choose a book to read, they chose between the human and animal books equally.

The current findings suggest that we can use storybooks to teach young children to behave prosocially. However, we must be cognizant of the type of story characters depicted in children's storybooks. To ensure that the moral of a story will be translated into children's action, the story should contain human characters, not anthropomorphized animal characters. This is perhaps due to the fact that young children may relate more to human characters than anthropomorphized animals and thus transfer what they have learned from the human characters to real-life situations. For stories with anthropomorphized animal characters, many children may find them not to be relatable and thus not act according to the moral of the story.

The results of the categorization task support this possibility. We found that children overall attributed animal characteristics to anthropomorphized characters far more often than they attributed human characteristics to the same characters. Thus, one of the reasons that children were unable to learn from the anthropomorphic book might be because they treated anthropomorphic characters more as animals than humans. These results suggest that children may not interpret the anthropomorphic characters as being similar to themselves and as a result may not translate the lesson of the story into their own lives and actions.

This suggestion was further supported by the significant correlation between children's attributions of human characteristics to the anthropomorphic animals and their prosocial behavior in the post-test but not in the pre-test in the *Animal* Condition. Indeed, in this condition, the more the children attributed human characteristics to the anthropomorphic animals, the more they shared their stickers after reading the anthropomorphic animal book, much like the children in the *Human* condition. Therefore, children who could relate these characters to humans and human behaviors were able to act according to the moral of the story. However, as evidenced by children's responses to the categorization task, most children in the present study tended to categorize anthropomorphized animals more as animals than humans.

We also found that children became significantly less generous after reading the animal story. However, this finding should not be taken as reflecting the fact that such stories not only do not promote prosocial behavior but also induce selfishness in young children. This conclusion is drawn from the fact that the children in the *Control* condition also showed a significant decrease in sharing. Thus, it was likely that the significant reduction in prosocial giving in the *Animal* condition was due to the fact that children might be generally less inclined to give prosocially again in the post-test after having already done so in the pre-test. Considering children's tendency to reduce significantly prosocial giving when asked to donate the second time in the *Animal and Control* conditions, the children's behavior in the *Human* condition was all the more remarkable. That is, the human story clearly helped the children not only to overcome this general tendency to decrease prosocial giving the second time, but also to increase it significantly after having given prosocially once already.



Previous studies found that children transfer more information from realistic stories than fantastical stories in the areas of social and physical solutions (Richert et al., 2009; Richert & Smith, 2011), causal knowledge (Walker et al., 2015), and factual information (Ganea et al., 2014). Our findings suggest that children treat moral lessons from fantastical stories in the same way that they treat other types of information. For children, transfer of information from picture books seems to be governed by the same rules of transfer, possibly having to do with children's understanding of how closely the fictional world resembles reality (Walker et al., 2015). In other words, if children perceive the fantasy world similar to their knowledge of reality, they are more likely to interpret information encountered in the story world as relevant and transferrable to their own lives. As suggested by the current results, children's selective learning from anthropomorphic stories may also be mediated by their own anthropomorphic interpretations.

As the present study is the first of its kind, additional systematic research is needed to advance our scientific knowledge about how to use storybooks to effectively and optimally promote prosocial behavior in children. For example, future research should examine whether the book type effect found here can be extended to other prosocial behaviors such as helping and truth-telling. In addition, future research should determine if anthropomorphism in books has the same effect on older children as on younger children (Geerdt, 2016). Recent work has shown that older children show higher levels of anthropomorphism than younger children (Herrmann et al., 2010; Severson & Lemm, 2016), possibly as a result of increased exposure to anthropomorphic media. It is entirely unknown how this developmental change in the tendency to anthropomorphize animals would influence learning from anthropomorphic stories in older children.

Further, we do not yet know if children can learn from anthropomorphic characters if adults provide scaffolds during story-telling to help children relate these characters to their own lives. Scaffolds in conjunction with picture book reading have been shown to be effective tools for teaching social skills (Alvord & O'Leary, 1985; Bhavnagri & Samuels, 1996; Riordan & Wilson, 1989; Shepherd & Koberstein, 1989). It is possible that providing scaffolding to children will eliminate the negative effect of the use of anthropomorphic characters in storybooks. Recent research has also shown that prompting children to explain key events of the story facilitates young children's ability to extract the moral of the story (Walker & Lombrozo, 2016). Whether this ability also transfers to children's own social behavior after reading a book with anthropomorphic characters is an interesting question for future research. One possibility as to why explanation prompts help children extract the moral of a story is that when prompted to explain an event (why a character in the story is sad) children must recruit prior knowledge about possible causes to what makes someone sad. As a result, they may be able to formulate an explanation that applies broadly and is not restricted to the story context (Walker & Lombrozo, 2016). An interesting question for future research is whether the process of identifying a generalized explanatory principle is affected by how the characters are portrayed in the story or more generally by how close the story is to the real world.

In conclusion, the present study revealed that books with prosocial themes have immediate effects in promoting children's real-world prosocial behaviors as long as the story characters are humans or can be construed as humans. Further, our study adds to the growing body of research on how picture books can best support children's learning. Our findings are consistent with past studies that show that children are more likely to transfer knowledge learned from realistic stories to the real world than from fantastic stories (Ganea et al., 2014; Richert et al., 2009; Richert & Smith, 2011; Walker et al., 2015). This is not to say that fantastical books are not useful for learning. Certainly, children may find such books enjoyable and entertaining, and thus hearing such types of stories can instill the love of literature in them. Further, engaging children's imagination is important for their socio-cognitive development, and children clearly enjoy immersing themselves in hypothetical worlds early in development (Harris, 2000). However, the findings from our study and existing studies taken together suggest that for children at a very young age fantastical stories may not be as effective for teaching real-world knowledge or real-life social behaviors as realistic ones.

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APPENDIX A: Comprehension Questions

Human book and Animal book:

1. What did [character] do when she was at home with her mother?
2. What are some other things that happened to [character] and her friends in the story?
3. How did [character] feel at the end when she shared?

Control book:

1. What did the bird and the mouse eat in the story?
2. What are some other things that happened to the tiny seed and the other seeds in this story?
3. How tall did the flower grow at the end of the story?

APPENDIX B: Categorization Task

Questions and descriptions of picture sets 1 and 2

1. Does this one eat with a spoon and fork?
2. Does this one use its mouth to clean itself?
3. Does this one sleep in a barn?
4. Does this one sing songs?

Set 1 description

Left panel: A realistic looking cow standing on its four legs.

Center panel: A man standing in a beige suit with blue shirt and a red tie holding a brown briefcase. The man is shown wearing glasses and a hat that matches his suit. He has black and white shoes.

Right panel: An anthropomorphic pig standing on two legs wearing yellow pants, a blue striped shirt with a white collar, and a brown jacket. The pig is shown holding a cane with one hand and a shopping bag under the other arm. It has no shoes.

Set 2 description

Left panel: A young girl in a pink dress with shoulder-length black hair with a pink ribbon in it. She is kneeling on the floor in front of a small stool which has a pot and a spoon on it. She is holding the spoon stirring water in the pot. She has a stuffed animal under her other arm.

Center panel: An anthropomorphic bull with ice skates on his feet. The bull is shown standing on all four legs and it does not have any clothes on besides the skates.

Right panel: A realistic looking hen standing on its two legs.

Questions and descriptions of picture sets 3 and 4



1. Does this one sleep in a house?
2. Does this one take baths and showers in a tub?
3. Does this one eat food off the ground, using just its mouth?
4. Is this one not able to talk?

Set 3 description

Left panel: An anthropomorphic bear in a full tuxedo suit, with brown pants, a green jacket, a yellow vest, and a red tie. The bear has brown shoes on and is standing on its two hind legs. The bear is holding a red bowl with a spoon in it.

Center panel: A realistic looking pig standing on its four legs.

Right panel: A woman with long brown hair, standing wearing a grey skirt, with a green long-sleeved shirt and green high-heel shoes. She is carrying a brown bag.

Set 4 description

Left panel: An anthropomorphic red hen standing on its two legs. The hen is shown carrying a rake and a gardening hoe with one wing and a green watering can in the other wing. The hen is wearing a white bonnet hat.

Center panel: A young boy standing with black hair, dressed in grey running shoes, blue jeans, and a long-sleeved, zipped-up red jacket.

Right panel: A realistic looking bear standing on its hind two legs.