Preschoolers recognize that losses loom larger than gains.

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Abstract

People often over value their current property. For example, even young children will choose to keep their current property over trading it for property of similar utility (Hartley & Fisher, 2018). In two experiments (N = 180), we examined how children aged 3 and 4 weigh the potential loss of existing property against the gain of property in their reasoning about others' actions. We found that by 4-years-old, children expect others to prioritize the retention of existing property over the acquisition of new property. We suggest that this expectation reflects an understanding that people often value what they already own more than what they can potentially gain. We discuss the implications of our findings for competing theories of ownership reasoning, and for children's reasoning about loss aversion.

Keywords: ownership, human action, conceptual development

Introduction

People often value what they already own more than what they can potentially gain. For example, research on the endowment effect shows that sellers expect to receive more money to relinquish their property than buyers are willing to spend to acquire it (Kahneman, Knetsch, & Thaler, 1991). Research with children similarly shows that those who have been given an object typically choose to retain it, instead of trading it for a similar object (Hartley & Fisher, 2018). Greater valuations of current than potential possessions may also be evident in non-human animals (see Stake, 2004). For example, capuchin monkeys, and western lowland gorillas are reluctant to trade food items in their current possession for new preferred food items (Drayton, Brosnan, Carrigan, & Stoinski, 2013; Lakshminaryanan, Chen, & Santos, 2008). Together, these examples suggest that the recognition that humans' (and perhaps other animals') actions are often driven by the maintenance of property may be an important part of understanding behavior.

In this paper, we investigate whether young children expect people to prioritize the retention of existing property over the acquisition of new property. Specifically, we investigate whether they anticipate that people will put more effort into retrieving their own lost property than into attempting to obtain new property. If children have this understanding it might suggest they are aware of loss aversion or of the endowment effect, key drivers of human decision-making.

This investigation can also advance knowledge of how young children reason about ownership. Preschoolers' understanding of ownership may reflect a naive theory (Nancekivell, Friedman & Gelman, 2019). A core component of naïve theories is that they help people interpret, explain, and predict others' actions. We know a great deal about how naïve theories in other domains, like psychology, facilitate action understanding (e.g., Gopnik & Wellman, 1994; Jara-Ettinger, Gweon, Schulz, & Tenenbaum, 2016; Wellman & Gelman, 1992). But relatively little is known about the ways that preschoolers consider ownership when reasoning about human action. For example, only two prior studies have investigated whether young children consider ownership when predicting others' actions (in any context). The first study found that by age 5, children predict that agents will opt to use their own property even when they prefer someone else's (Pesowski, & Friedman, 2018). The second study showed that, all else being equal, 6- to 8-year-olds judge that owners as compared to non-owners will fight longer over a resource and work harder to find it when lost (Pietraszewski & Shaw, 2014). These two papers establish that young children consider who owns a resource when predicting actions. The present investigation goes further by investigating how children weigh the competing goals of retaining existing property and acquiring new property in their reasoning about others' actions.

The Present Study

We conducted two experiments with 3- and 4-year-olds. We focused on 3- and 4-year-old children as these are the ages at which children first show competence in reasoning about ownership across a variety of tasks (Blake, Ganea, & Harris, 2012; Eisenberg-Berg, Haake, Hand, & Sandalla, 1979; Marsh, Kanngiesser, & Hood, 2018; Rossano, Rakoczy, & Tomasello, 2011). For example, it is at 3-year-old that children show respect for others' ownership rights by protesting when those rights are violated (Kanngiesser & Hood, 2014; Rossano et al., 2011).

In our experiments, children saw stories where a boy could look for one of two frogs that hopped away from him—his pet frog and a wild frog he wanted as a pet. We wanted to see if children would expect the boy to prioritize avoiding loss over making new gains.

Experiment 1

Method

Participants Our final sample included 60 3- and 4-year-olds (M_{age} = 46.38 months, range = 36 to 59 months, 35 girls), with 30 children at each age in years. Five additional children were tested but excluded from our study: Three children failed to answer any test questions; one child failed to answer the second test question only; and a final child's daycare provider reported that she did not speak English and she did not respond to any questions. Children were tested individually at their daycare center or at a local museum/science center in the Region of Waterloo in Ontario, Canada. Although demographic information was not formally collected, the region is predominantly middle-class, with approximately 81% of residents being Caucasian. Chinese and South Asians are the most visible minorities (Statistics Canada, 2017).

Materials and Procedure In both experiments, children watched a story presented on a laptop computer and narrated by the experimenter. The story was about a boy and two frogs; Figure 1 displays a sample story script and images. One frog belonged to the boy and was his pet, while the other frog was wild and did not belong to anyone and thus could be acquired by the boy (presentation order of the frogs counterbalanced across children).

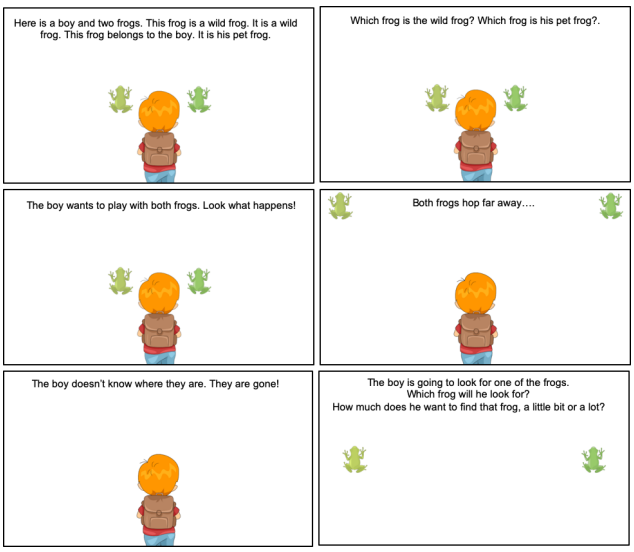

Figure 1: Sample story script and images for Experiment 1.

After the story, the children were told that the boy was going to look for one of the frogs. They were then asked the two test questions: "Which frog will he look for?" and "How much does he want to find that frog, a little bit or a lot?". If children did not answer a question on the first try, it was repeated up to two more times. While children responded to the test questions, the frogs remained on the screen so children could respond to the first question by pointing. Children's responses were recorded into a scale ranging from 4 (pet frog, a lot more) to 1 (wild frog, a lot more) with higher scores representing a greater motivation to retain the property (i.e., pet).

As shown in Figure 1, the story also included comprehension check questions to ensure that children attended to the critical ownership information in the story (i.e., "Which frog is the wild frog?" and "Which frog is his pet frog?"). If children incorrectly answered these questions, the experimenter corrected the child (e.g., "I think this frog is the wild frog. It is the wild one.") and continued. This occurred for 6 children.

We centered the story on frogs because they can be kept as pets (and young children appear to understand this, e.g., Danovitch & Keil, 2007; Leslie, Knobe, & Cohen, 2006), but are typically non-owned. This made it likely that children would understand that the boy could acquire the wild frog, but without also assuming that it already belonged to someone else.

Results and Discussion

We entered children's ratings into an ordinal logistic generalized linear mixed model (GLMM) to assess how responses changed with children's age in months (centered, entered as covariate) and presentation order of the pet and wild frog (See Figure 2). Children's responses did not vary by age, Wald $\chi^2 = .56$, $p = .454$, or order, Wald $\chi^2 = 2.22$, $p = .136$, and age and order did not interact, Wald $\chi^2 = 3.66$, $p = .056$.

To examine if children thought the boy would favor retrieving his original property over gaining new property, we collapsed across age and conducted a one-sample t-test against the midpoint of 2.5 on our scale. Children's responses were above midpoint, $M_{score} = 3.15$, $t(59) = 4.09$, $p < .001$.

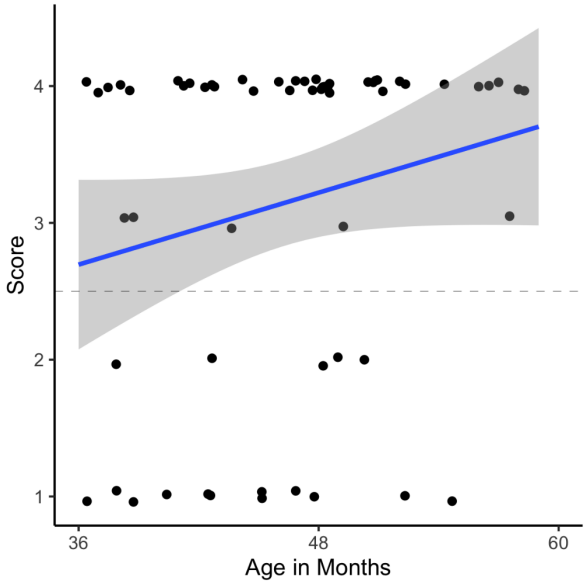

Figure 2: Scatterplot with trendline depicting children's scores by age. Band shows 95% confidence intervals; points are jittered to avoid over-plotting.

Our findings show that children predicted that the agent would be more motivated to retain their property, than to acquire new property. However, one concern is that rather than considering ownership per se, children might have instead chosen the pet frog simply because it was connected with the boy in some way, whereas the wild frog was not. In the next experiment, we addressed this concern by adding a comparison condition, and using a revised story script that more explicitly mentions the boy's desire for the wild frog.

Experiment 2

Method

Participants Our final sample included 120 3- and 4-year-olds (M_{age} = 47.40 months, range = 36 to 59 months, 56 girls). This sample sizes reflects a stopping rule of 30 children per age per between-subject condition. Four additional children were tested, but excluded because they did not answer the second test question. All children were tested individually at their daycare center or at a local museum/science center.

Materials and procedure Children again heard a story about a boy and two frogs. As before, one frog belonged to the boy, and the other one was wild. In this experiment, the boy's frog was always introduced first, and the script clearly specified that the boy was directly related to the wild frog (i.e., "He would like it to be his pet too."). Figure 3 shows the story script and images.

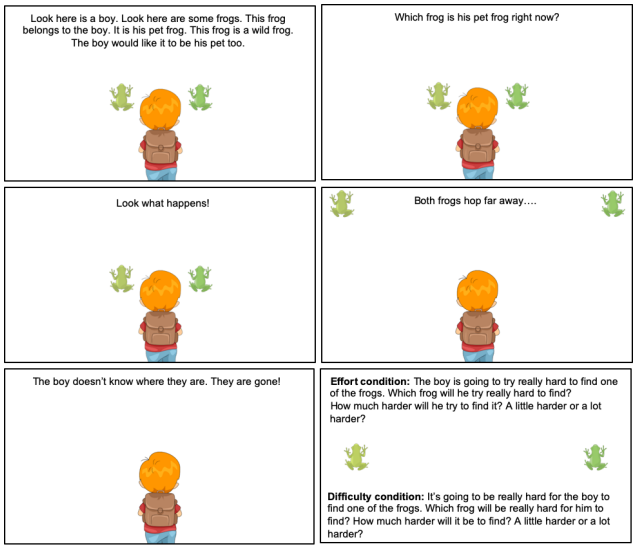

Figure 3: Sample story script and images for Experiment 2.

After the story, children were asked a test question in one of two between-subjects conditions. In the effort condition, children were told that: "The boy is going to try really hard to find one of the frogs", then asked, "Which frog will he try really hard to find?" and "How much harder will he try to find it? A little harder or a lot harder?". In the difficulty condition, children were told that: "It's going to be really hard for the boy to find one of the frogs", then asked, "Which frog will be really hard for him to find?[1]" and "How much harder will it be to find? A little harder or a lot harder?". If children did not answer a test question on the first try, it was repeated up to two more times. Children's responses were recorded into a scale ranging from 4 (pet frog, a lot more) to 1 (wild frog, a lot more), with higher scores representing stronger predictions towards the pet frog.

Midway through the story, children were asked a comprehension question (i.e., "Which frog is his pet frog right now?"). If children incorrectly answered this question, the story was repeated and the question was asked again. If children answered incorrectly on the second try, the experimenter corrected them (e.g., "I think this frog is the pet frog. It is the pet one.") and continued. This occurred for 10 children.

Results and Discussion

We entered children's ratings into an ordinal logistic GLMM to assess how children's responses changed with their age in months (centered, entered as a covariate), and condition (between subjects, effort vs. difficulty). There was no main effect of age, Wald χ^2= .30, p = .585, but there was a main effect of condition, Wald χ^2 = 7.65, p = .006, and an interaction between condition and age with children showing

[1] Four children were asked a slight variant of this question: "Which frog will be really hard to find?".

a greater sensitivity to condition with age, Wald $\chi^2 = 5.53$, $p = .019$ (see Figure 4).

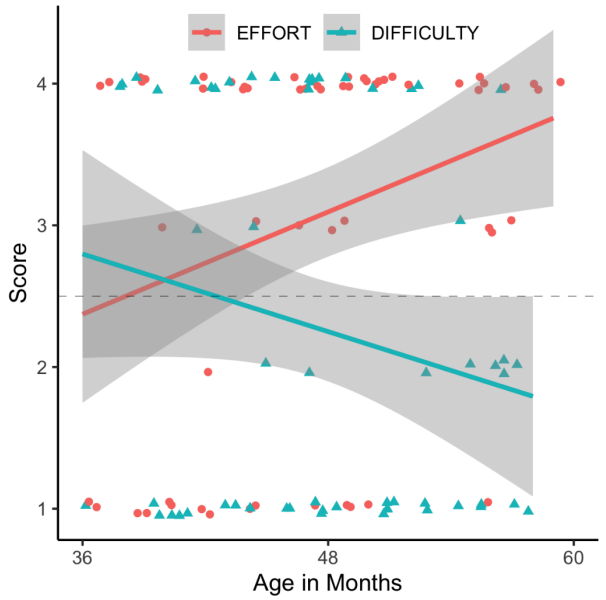

Figure 4: Scatterplot with trendline depicting children's scores by age and condition. Band shows 95% confidence intervals; points are jittered to avoid over-plotting.

To follow-up on the interaction, we conducted two ordinal logistic GLMMs examining the effects of age within each condition (age was centered and entered as a covariate). These analyses revealed an effect of age in the effort condition, Wald $\chi^2 = 4.02$, $p = .045$, but not in the difficulty condition, Wald $\chi^2 = 1.43$, $p = .232$.

Finally, to examine if children thought the boy would favor retrieving his original property over gaining new property, we next conducted a series of one-sample t-tests against the midpoint of 2.5 on our scale. Due to significant effects of age in the effort condition, separate t-tests were conducted for each of the 3- and 4-year-old age groups. In the effort condition, 3-year-olds' ($M_{age} = 41.97$) responses did not differ from the midpoint, $t(29) = 1.02$, $M_{effort} = 2.77$, $p = .316$. In contrast, 4-year-olds' ($M_{age} = 52.83$) responses were significantly above it, $t(29) = 4.59$, $M_{effort} = 3.37$, $p < .001$. Due to null effects of age in the difficulty condition, we collapsed across age for this condition and found that children's responses did not differ from the midpoint, $t(59) = 1.23$, $M_{difficulty} = 2.28$, $p = .224$.

Because all excluded children in this experiment responded to the first test question, we also conducted a further analysis that included them. To do this, we conservatively scored children's responses by assigning the response "a little" on the second test question. This analysis yielded identical findings: No main effect of age, (Wald $\chi^2 = .47$, $p = .495$), a main effect of condition (Wald $\chi^2 = 8.63$, $p = .003$), and an interaction between condition and age (Wald $\chi^2 = 6.09$, $p = .014$). Tests against the midpoint revealed significance from the midpoint in the difficulty condition in all children ($t(62) = 1.27$, $p > .208$), but a significant difference from the midpoint among 4-year-old children in the effort condition ($t(29) = 4.59$, $p < .001$).

In sum, 4-year-olds, but not 3-year-olds, judged that the boy would try harder to find his own frog than a wild frog he wanted. In contrast, children thought both frogs were equally difficult to find. This pattern of findings suggest that 4-year-olds appreciated that the boy would be more motivated to retain his property than gain new property.

General Discussion

In two experiments, we examined how ownership affects young children's reasoning about others' actions towards property. We found that by 4-years-old, children view others' actions as more likely to be motivated by the loss of property than the gains of new property. We suggest that this expectation likely reflects an appreciation that people often value what they already own more than what they can potentially gain.

The findings contribute to an ongoing debate about the nature of ownership reasoning. Some have argued that ownership mainly functions to resolve issues related to the coordination of resources (e.g., I use/take mine. You use/take yours; Kanngiesser, Rossano, Zeidler, & Tomasello, 2019; Kim & Kalish, 2009; Rossano et al., 2011). But, others have argued that young children's understanding of ownership is better explained by a naïve theory, which allows people to interpret, explain, and predict human behavior (both normative and non-normative; Nancekivell et al., 2019). A strict normative stance is unlikely to explain the present findings. In our study it was similarly acceptable for the agent to pursue either entity (unless children perhaps anticipated that the story character might get in trouble for losing his property). Instead, our findings provide support for a naïve theory account. They are some of the first to show that children under 5-years-old use ownership in any context to predict others' actions (but see Pesowski, & Friedman, 2018).

These findings also hint that young children might have an awareness of loss aversion. Loss aversion occurs when people view the gains associated with acquiring new property as less valuable than the losses associated with relinquishing current property (Kahneman et al., 1991; Novemsky, & Kahneman, 2005). Preschoolers own behavior sometimes reflects a sensitivity to loss aversion. For example, by 3-years-old, children who are primed to think about the self will display classic endowment effects (Hood, Weltzien, Marsh, & Kanngiesser, 2016), which are posited to be driven by loss aversion (Kahneman et al., 1991). However, our findings suggest that by 4-years-old, children also likely recognize loss aversion in others. For example, children in our study recognized that the boy would be motivated to avoid the loss of his property, despite the opportunity to gain new (similar) property.

Future work should follow-up on our findings by exploring the boundary conditions of the present effect. For example, it should examine how increasing the costs or effort associated

with searching for the owned frog will affect children's predictions that the boy will search for it. Such studies would offer important insights into *when* children believe that costs outweigh the benefits of retaining property. They would also offer a way to measure how much children believe that the agent values their resource more than the resource they could potentially gain.

Limitations

The present study only asked children to make judgments involving pets. This is a concern because people have special regard for their pets, and so children might expect them to be especially motivated to avoid losses in this domain. Related to this, existing work shows that children value attachment objects (Hood & Bloom, 2008) and other objects likely to be held in special regard (Gelman & Davidson, 2016) over new replacements. In ongoing work, we are investigating whether children show a similar pattern of behavior when the agent's property is less unique. For example, we are investigating whether children make similar kinds of judgments about agents who lose flowers. The results from this ongoing work will be vital for understanding whether our findings are generalizable beyond cases involving unique property like pets.

Even if our findings are specific to unique property, they may still have interesting implications for our understanding of ownership. Recent work has shown an interest in how children track the non-obvious history of property (Gelman & Davidson, 2016; Pesowski & Friedman, 2019). For example, young children appreciate that an owner's unique history with their property can shape its personal value (Gelman & Davidson, 2016). Under this account, these findings would be some of the first to show that children appreciate the ways in which the personal value that owners place on some kinds of property influence their actions.

Conclusion

In sum, the present study sheds light on an understudied ability in early childhood: how children use ownership to reason about others' behavior. The present findings suggest that by 4-years-old children expect others to prioritize the retention of existing property over the acquisition of new property. Follow-up experiments will be necessary to rule out alternative accounts.

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