

Children consider costs to owners when reasoning about ownership transgressions

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Abstract

Ownership affords different rights and privileges to owners than non-owners. We investigated whether children view transgressions that impose a large or permanent cost to the owner as less acceptable than (1) actions that impose small or temporary costs, and (2) actions that do not impose any costs to owners. Children aged three to eight years ($N=72$) and adults ($N=72$) were shown vignettes in which an agent interacts with someone else's property without permission. Both adults and children judged actions that imposed severe costs to owners as less acceptable than minor transgressions that imposed temporary costs and actions that did not involve physical contact. These findings reveal that children and adults consider the costs imposed on owners when judging the acceptability of people's interactions with others' property. Critically, these findings also provide preliminary evidence that children's concept of ownership may be embedded into their broader social cognitive framework of intuitive psychology.

Keywords: social cognition; cognitive development; ownership; naïve utility calculus; intuitive psychology; children; resources

Introduction

The acceptability of people's actions with objects depends on ownership. This is because owners and non-owners have separate and distinct rights. Typically, owners have the exclusive right to use their property, decide who can interact with their property, and can transfer their ownership of objects to other people; non-owners, however, do not have these rights (Merrill, 1998; Snare, 1972). This means that we would likely believe that it is acceptable for a person to take a backpack, look inside of it, move it, donate it, or decorate it if they were the owner, but we would likely view these actions as unacceptable if we learned that the person did not own the bag.

From a young age, children demonstrate an understanding of others' ownership rights. For instance, by age 3, children protest and intervene when a non-owner attempts to interact

with someone else's property (Kanngiesser & Hood, 2014; Riedl, Jensen, Call, & Tomasello, 2015; Rossano, Rakoczy, & Tomasello, 2011; also see Vaish, Missana, & Tomasello, 2011). At this age, children also defend and uphold owners' entitlements to make decisions about their property (Schmidt et al., 2013), and in some cases, uphold owners' rights more than adults (e.g., they believe that an owner should have access to their property even if others need the owned object; Neary & Friedman, 2014).

Children's understanding of ownership rights is further reflected in their predictions and judgments of people's actions with objects. By preschool ages, children expect owners to take and use their own property, even when they prefer objects belonging to others (Pesowski & Friedman, 2018). They also increasingly refer to ownership spontaneously to explain why it is acceptable or unacceptable for someone to use an object (Nancekivell & Friedman, 2017) and they frequently offer limitations (i.e., what someone is *not* allowed to do) when asked to discuss what a non-owner can do with someone else's property (Nancekivell & Friedman, 2014).

A few theories have been proposed to capture and explain the psychological nature of ownership and the rights it confers. One prominent theory posits that owners have rights because their objects are viewed as extensions of themselves – that is, owners are able to control and have access to their objects in the same way as their body (e.g., Belk, 1988; Diesendruck & Perez, 2015; Rochat, 2010). Support for this account includes findings showing that children reason similarly about people's bodies and property. For instance, children believe permission is needed in order to interact with someone else's body and objects (e.g., touching someone's foot and pencil both require permission; Van de Vondervoort, Meinz, & Friedman, 2017).

A second theory argues that ownership has a normative structure and involves a set of rights, permissions, and

obligations (Kalish & Anderson, 2011), where ownership rights are viewed as cultural conventions and learned social norms (e.g., Kalish, 2005; Rakoczy & Schmidt, 2013). Evidence supporting this account involves findings showing that there are differences in how children across cultures behave towards owned property in the owner's absence (Kanngiesser et al., 2019).

Lastly, it has been proposed that ownership is a distinct domain of reasoning, and that people have a naïve theory of ownership (Nancekivell, Friedman, & Gelman, 2019). Naïve theories are frameworks that organize information in specific areas or domains. They are believed to develop at young ages and are revised and extended over time with experience (e.g., Carey, 1985; Gelman & Noles, 2011). According to this theory, people understand that ownership creates an unobservable connection between the owner and object, which allows them to identify owned property, and can use the causal-explanatory framework of a naïve theory of ownership to anticipate and interpret others' emotions and actions towards objects (Nancekivell et al., 2019). Importantly, the argument has been made that this theory is separate from other naïve theories, including the naïve theory of psychology (also called *intuitive psychology*) – which involves a causal framework of people's actions and mental states (e.g., beliefs, goals, desires; e.g., Wellman & Gelman, 1992), whereby people expect others to act efficiently in ways that align with their mental states (e.g., Gergely, Nádasdy, Csibra, & Bíró, 1995; Jara-Ettinger, Floyd, Tenenbaum, & Schulz, 2017; Liu, Ullman, Tenenbaum, & Spelke, 2017). Support for this claim comes from findings showing that children reason about ownership and mental states separately. For instance, children understand that people can own objects they do not like (Noles & Gelman, 2014).

Although prior research provides some support for these theories, there are other findings that are not fully explained by these accounts. For instance, recent research shows that children do not always believe that interacting with others' property is unacceptable, but rather they consider whether the owner benefits from the interaction. Specifically, both children and adults believe it is acceptable for non-owners to repair or replace someone's broken property without their knowledge or permission (Stonehouse & Friedman, 2021). Other findings suggest that children do not view ownership as strictly binary or categorical, but rather they consider the degree or strength of ownership claims. This was evidenced by children's greater likelihood of taking objects belonging to others when the objects were found rather than when they were made by the owner (Davoodi, Nelson, & Blake, 2020). Together, these particular findings suggest that children make *nuanced* judgments regarding owned property and ownership rights, which may not be entirely captured by the above theories. For instance, if children believe that owned objects are extensions of the owners, then all types of interactions with others' property should be viewed as unacceptable because ownership transgressions are equivalent to violations of bodily rights.

To account for these findings, a recent proposal theorized that children's understanding of ownership might be understood within the broader framework of naïve psychology (Pesowski & Powell, 2023), and more specifically the computational model that formalizes this theory which is referred to as "naïve utility calculus" (Jara-Ettinger et al., 2016; Jara-Ettinger et al., 2020; also see Baker et al., 2009; Baker et al., 2017):

$$U(p,o) = R(o) - C(p)$$

In this model, $U(p,o)$ represents the overall utility (U) of a plan, p expected to result in outcome o , as a function of the reward of the outcome, $R(o)$, and the cost of the plan to the agent, $C(p)$ (Jara-Ettinger et al., 2016; Jara-Ettinger et al., 2020). Notably, this model assumes that rewards and costs are agent-specific, and that people will act in a way that maximizes utility by selecting the action plan that would generate the greatest reward outcome given the costs of the plan. This model also supports inverse reasoning about someone's mental states from the action they chose. For example, observing that someone went to a coffee shop that is much further away than the one around the corner leads to the inference that they prefer the distant shop given the added cost of travel time/effort to get there.

Under this proposal, children might reason about ownership in terms of costs and benefits, much like they use utility to reason about people's actions and mental states. Specifically, it suggests that children's concept of ownership can be conceived of as an exclusive link between an owner and the expected rewards of their property, whereby only the owners' plans involving the object will be expected to have greater utility. This would also mean that the costs associated with the loss, damage, or use of an object by a non-owner would accrue specifically to the owner.

Using the cost-reward framework to reason about ownership could help to explain why children and adults view some actions of non-owners with property as acceptable, as has been shown in prior work (e.g., Stonehouse & Friedman, 2021). This is because in situations where a broken object is replaced, for example, the rewards or benefits to the owner outweigh the costs of the non-owners' interaction, thereby increasing the owner's utility.

The current experiment tests this recent theory by asking whether children and adults consider the costs imposed on owners when reasoning about ownership transgressions – that is, the acceptability of non-owners' actions with property. If children consider the costs endured by owners, then they should make nuanced judgments: They should view actions of non-owners that impose severe and permanent costs on owners as less acceptable than actions that do not impose costs or that impose minor or temporary ones. Notably, prior theories of ownership—such as the extended-self view, norm-based accounts, or the naïve theory of ownership—could also accommodate some gradation in judgments. For example, they might allow that actions like taking or destroying property are seen as more serious than touching or observing. However, these theories do not clearly predict that such gradation should track the cost to the owner

in a systematic way. In contrast, the privileged utility account explicitly predicts that the magnitude of utility loss to the owner will guide children’s judgments. Thus, while all theories may anticipate some difference between actions, our study tests whether cost itself is the key mechanism driving these evaluations.

In sum, the goal of the current work is not to refute other accounts, but rather to test whether children’s judgments are sensitive to costs to owners, as predicted by a utility-based model embedded within intuitive psychology. Demonstrating cost sensitivity would provide evidence for a particular mechanistic framework underlying ownership judgments – one that may extend and help unify aspects of prior accounts.

Experiment 1

Methods

Participants. Seventy-two 3- to 8-year-olds participated ($M_{age} = 5.5$ years; range = 3.1 to 8.8 years; 31 females; 41 males). Children were recruited from and tested at local preschools and schools, and from a database of families interested in research. An additional 4 children were tested but excluded from analyses because they did not complete the task (1), failed the warm-up trials (2), and did not understand English (1).

Seventy-two adults also participated ($M_{age} = 21.5$ years, range = 18 to 44 years, 21 men, 51 women). Adults were recruited from an undergraduate student population and were tested online. They received course credit in exchange for participation. An additional 5 participants were excluded because they failed at least one of two attention check questions.

Materials and Procedure. *Warm up.* Children first completed a warm-up phase. During this phase, they were shown an image of a “thumbs up” icon and “thumbs down” icon presented simultaneously on a laminated piece of paper. They were then asked to indicate which thumb they thought means “good”, and which thumb they thought means “bad”. Next, children were shown two other warm-up sheets each involving two thumb icons where one icon in each pair was significantly smaller than the other. The first one involved two “thumbs up” icons and the second one involved two “thumbs down” icons. During the presentation of each, children were asked to point to the thumb they thought means “a little [good/bad]” and the thumb they thought means “very [good/bad]”, respectively. These questions were always presented in this fixed order. See Figure 1 for the images and script used in the warm-up task.

Children responded to these questions by pointing to the images. Children who did not provide an answer, provided an incorrect answer, or provided an alternative response than those offered in the scale (e.g., “Okay”, “I don’t know”, etc.) were prompted a second time before the procedure continued. Children who did not provide an answer or provided an

incorrect or alternative response after the second prompt were excluded from the analyses.

Test Trials. Following the warm-up phase, children were shown six stories on a laptop computer using PowerPoint. Each story involved two characters and an object. Children were told that the object belonged to one of the characters and that the other character (i.e., the non-owner) performed an action involving the owned object. In some scenarios, this action did not violate the owner’s ownership rights as the character did not physically interact with the owned property. Instead, the character *looked* at or *thought* about the object (e.g., “Robin looked at Dylan’s ball”, “Cameron thought about Blake’s teddy bear”). These scenarios are henceforth referred to as “no transgression” trials. In other scenarios however, these actions involved physical interactions with the object and therefore violated the owner’s rights. Some scenarios involved a temporary or minor transgression, wherein the non-owner *touched* or *drew* on the object (e.g., “Charlie touched Avery’s crayons”, “Kaci drew on Quinn’s notebook”). These scenarios are henceforth referred to as “minor transgression” trials. Lastly, other scenarios involved permanent or severe transgressions whereby the character *took* or *ate* the owned item (e.g., “Noah took Jamie’s water bottle home”, “Kris ate Bailey’s cookie”). These scenarios are henceforth referred to as “severe transgression” trials. See Figure 2 for sample images and scripts.

After hearing about the non-owner’s action in each story, children were shown the two-point scale involving the thumbs up and thumbs down icons and were asked to judge whether the action was good or bad (e.g., “Was it good or bad that Cameron thought about Blake’s teddy bear?”). After making this judgment, they were then shown a second scale involving the appropriate small and large thumbs and were asked to indicate how good or bad the action was (e.g., “Was it a little good or very good that Cameron thought about Blake’s teddy bear?” or “Was it a little bad or very bad that Cameron thought about Blake’s teddy bear?”).




	<p>Here are some thumbs!</p> <p>Can you point to the one that you think means good?</p> <p>Can you point to the one that you think means bad?</p>
	<p>Here are some thumbs!</p> <p>Can you point to the one that you think means a little good?</p> <p>Can you point to the one that you think means very good?</p>
	<p>Here are some thumbs!</p> <p>Can you point to the one that you think means a little bad?</p> <p>Can you point to the one that you think means very bad?</p>

Figure 1: Images and scripts used in the warm-up phase. The 2-point scales and related questions were always presented in this fixed order.

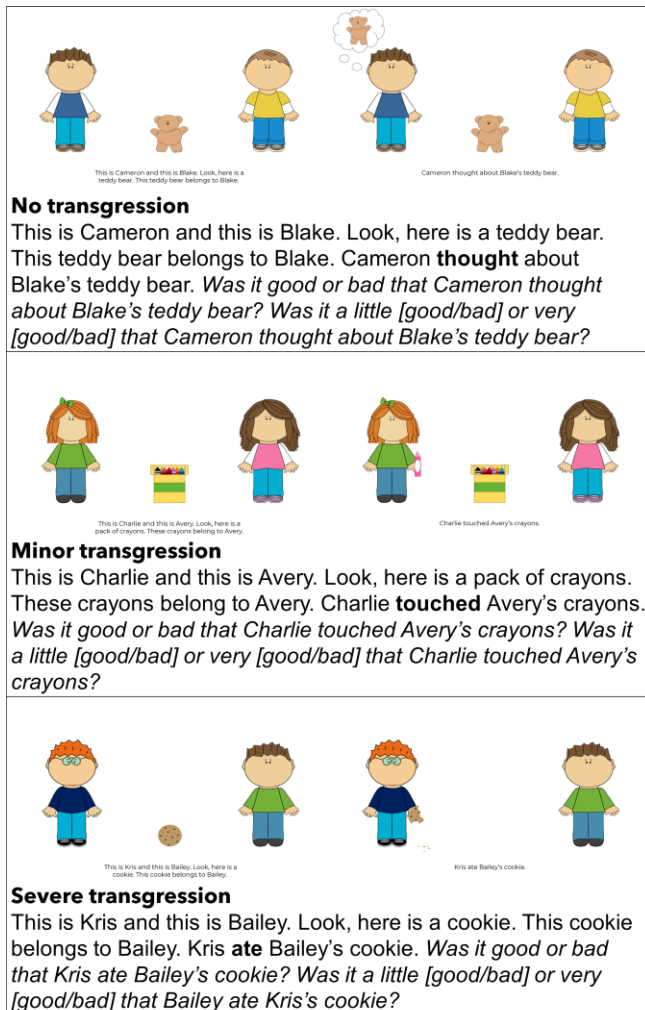


Figure 2: Sample images and scripts used in the test trials.

Children who did not respond to the questions by pointing to an icon image or by providing a verbal response were prompted a second time before the experimenter continued with the task. Children who did not provide an answer or who provided a response aside from the options in the scales after the second prompt for any story were excluded from the question's analysis.

Adults. Adults completed an online version of this task using the same script and scenario pictures that were shown to children. Each story was displayed on a different screen of the online survey and the test questions asking about the non-owner's action in each scenario appeared below the images. Similar to the procedure used with children, adult participants were first asked to judge whether the non-owner's action was good or bad using the 2-point thumb scale, with text under each icon explicitly labeling them (i.e., "good", "bad"). After this, adults were asked the same follow-up questions as children wherein they indicated how good or bad the action was, again with labels appearing below the icons (e.g., "little good", "very good").

Following the presentation of the scenarios, adult participants were asked two 4-option multiple choice comprehension questions to ensure that they had sufficiently attended to the task. A final screen then asked participants to provide demographic information.

Design and Logic. Each participant heard two scenarios of each trial type (no transgression, minor transgression, severe transgression). The order of the trials was counterbalanced across participants, such that the first three and last three trials involved a scenario of each trial type. The characters in a story were of the same gender. Participants heard three stories about boy characters and three stories about girl characters. The characters' gender was counterbalanced across participants. To ensure that participants' judgments were not dependent on visual cues, the characters' faces did not involve mouths.

This experiment was preregistered. To adhere to open science practices, the pre-registration, data, and analysis code are available at: https://osf.io/wgfcn/?view_only=5b4fa9317af04782883e917794b332af.

If children consider ownership as privileged utility and view ownership violations as unacceptable because they negatively impact the owner's utility, then they should judge transgressions that impose high costs to owners (i.e., when the non-owner's action causes a permanent or severe cost) as less acceptable than those that impose a small cost or no cost. Put differently, children's evaluations of the non-owners' actions should grow increasingly less positive as the transgression becomes more severe or costly to the owner. However, if children do not use the cost-reward framework to reason about ownership, then their responses may not vary across transgression types. In particular, they may view the actions as equally unacceptable given that they all involve interactions with others' property.

Results

Child Sample. Children's judgements of the non-owners' actions in each of the trial types (no, minor, severe transgression) were given scores ranging from 1 to 4, with 1 indicating "very good" and 4 indicating "very bad."

To analyze children's judgements, we conducted preregistered comparisons of mixed effects linear models. Severity (none, minor, vs. severe), character gender (girl vs. boy), and their interaction were included as predictor variables. Fixed effects were dummy coded and mean-centered. Subject was included as a random effect. The full model was as follows: judgement ~ severity + character gender + severity:character gender + (1 | subject).

The contribution of each factor to explaining variance in participants' ownership transgression judgements was determined via nested model comparisons between the full model and redacted model without the factor under consideration.

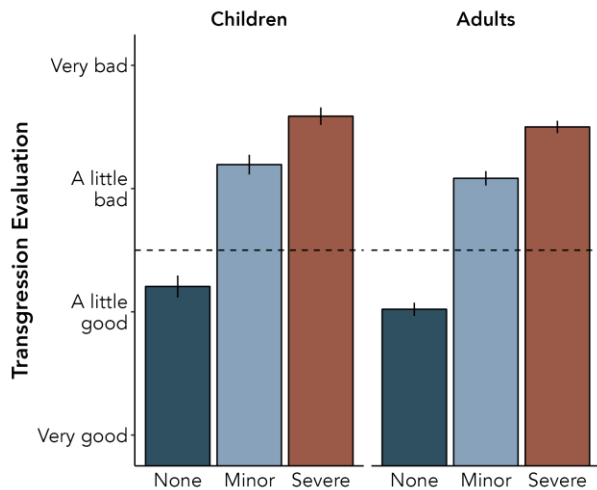


Figure 3: Results. The dashed line represents the mid-point of the scale (2.5). Error bars represent +/- 1 SEM.

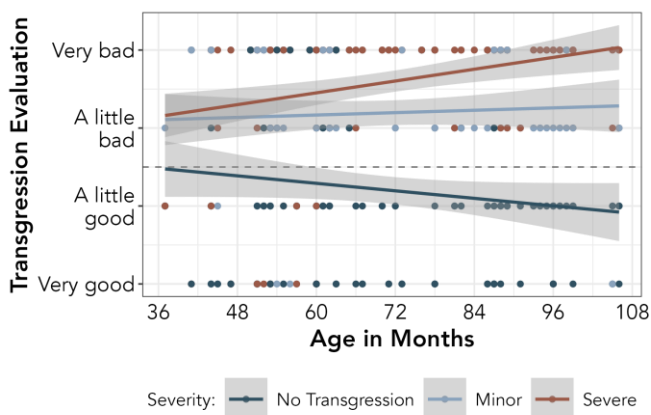


Figure 4: Children's evaluations by age. Each dot represents individual children's responses to each story. The grey shaded area represents 95% confidence intervals.

There was a main effect of severity, $\chi^2(1) = 142.772, p < .001$ (Figure 3). To follow-up on this effect, we used post-hoc paired sample *t*-tests with Bonferroni adjustments ($\alpha = .017, .05$ divided by 3 tests). In line with our predictions, children rated actions that did not involve a transgression as less bad ($M = 2.206, SEM = 0.089$) than actions that involved a minor transgression ($M = 3.194, SEM = 0.080$), $t(353) = -9.562, p < .001, 95\% CI [-1.190, -0.784], d = -1.134$, and a severe transgression ($M = 3.587, SEM = 0.071$), $t(352) = -13.371, p < .001, [-1.585, -1.179], d = -1.588$). Children also rated minor transgressions as less bad than severe transgressions ($t(351) = -3.839, p < .001, [-0.597, -0.192], d = -0.453$).

Determined by preregistered one-sample *t*-tests, children's negative evaluations of minor and severe transgressions were significantly above chance (2.5), while their evaluations of non-transgressions were significantly

below chance — none: $t(70) = -2.708, p = .009$; minor: $t(71) = 9.176, p < .001$; severe: $t(71) = 14.194, p < .001$.

There was no main effect of character gender, $\chi^2(1) = 1.404, p = .236$, or interaction between character gender and severity, $\chi^2(1) = 0.658, p = .417$. Character gender was included as a factor to ensure that potential gender-based expectations about ownership or transgressions did not sway judgments. By age 4, children start to show beliefs in prescriptive gender stereotypes (Blakemore, 2003), which may have led to differences in their responses based on the character's gender (i.e., rating violations committed by girls as worse than those committed by boys).

To determine whether age explained additional variance in children's response, we conducted another set of preregistered nested model comparisons including age as a continuous predictor in the full model along with its two- and three-way interactions with severity and character gender. The main effect of severity was retained, $\chi^2(1) = 150.120, p < .001$, however, there was also an interaction between severity and participant age, $\chi^2(1) = 14.473, p < .001$ (Figure 4). Post-hoc analyses showed that children's negative evaluations of severe transgressions increased with age ($b = 0.013, t(203) = 2.756, p = .006$), while their evaluations of minor transgressions stayed the same across age ($b = 0.003, t(202) = 0.55, p = .581$), as did evaluations of non-transgressions ($b = -0.008, t(204) = -1.735, p = .084$). Post-hoc pairwise comparisons with Bonferroni adjustments ($\alpha = .017, .05$ divided by 3 tests) revealed that the difference in children's evaluations of non-transgressions compared to severe transgressions increased with age, $estimate_{diff} = -0.021, t(346) = -3.863, p < .001, [-0.031, -0.010], d = -1.625$ —that is, with age, children's evaluations of non-transgressions became more positive and their evaluations of severe transgressions became more negative. There were no other significant comparisons, $t_s < 1.898, p_s > .059$.

Adult Sample. To understand how these expectations may further shift with age, we also collected a sample of adult participants. We analyzed adults' judgements using the same full model as the child sample. However, there was a convergence error in the full model when subject number was included due to low variance, and thus we removed the random effect of participant.

Replicating our findings from the child sample, there was a main effect of severity, $F(2, 426) = 351.472, p < .001$ (Figure 3). Adults rated actions that did not involve a transgression as less bad ($M = 2.021, SEM = 0.053$) than actions that involved a minor transgression ($M = 3.083, SEM = 0.059$), $t(426) = -13.882, p < .001, 95\% CI [-1.243, -0.882], d = -1.636$, and a severe transgression ($M = 3.500, SEM = 0.050$), $t(426) = -19.326, p < .001, [-1.630, -1.329], d = -2.278$). Adults also rated minor transgressions as less bad than severe transgressions ($t(426) = -5.444, p < .001, [-0.567, -0.266], d = -0.642$).

Determined by preregistered one-sample *t*-tests, adults' negative evaluations of minor and severe transgressions were significantly above chance (2.5), while their

evaluations of non-transgressions were significantly below chance — none: $t(71) = -8.026, p < .001$; minor: $t(71) = 9.326, p < .001$; severe: $t(71) = 16.852, p < .001$.

There was no main effect of character gender, $F(1, 426) = 0.253, p = .615$, or interaction between character gender and severity, $F(1, 426) = 0.008, p = .930$.

Discussion

In this experiment, we found that children and adults consider the costs imposed on owners when judging the acceptability of non-owners' actions with property. That is, they do not judge that all actions involving owned property are unacceptable, but rather 3- to 8-year-olds and adults view actions that impose greater costs to owners as less acceptable than those that do not impose any costs. Notably, children do not consider all actions that impose costs as equally unacceptable – their judgments depend on the magnitude of the cost to the owner: They view actions that impose temporary or minimal costs on owners as less bad than actions that impose permanent or large ones. We also found developmental differences in children's judgments: With age, children's evaluations of non-transgressions became more positive, and their evaluations of severe transgressions became more negative. Together, our findings provide preliminary support for the idea that ownership judgments are guided by cost-based reasoning consistent with intuitive psychology and the naïve utility calculus. While this does not rule out other theories of ownership, it suggests that cost to the owner plays a central and quantifiable role in how children and adults evaluate ownership violations.

One potential explanation for these age differences could be the development of executive function, such that older children were better at controlling their attention and processing the information during the task than younger children (e.g., Anderson, 2002). A second, and more interesting, potential explanation for these age differences is the development in counterfactual thinking and the ability to represent multiple possibilities (Beck et al., 2006). For instance, this would mean that older children may have viewed non-transgressions more positively than younger children because they are representing a neutral outcome *and* the possibility that it could have been a negative outcome instead.

Importantly, these findings provide preliminary support for the theory that ownership may be understood within the broader social cognitive framework of naïve or intuitive psychology (e.g., Gelman & Noles, 2011; Wellman & Gelman, 1992). In particular, they show that by age 3, children use the cost-reward framework of the naïve utility calculus (e.g., Jara-Ettinger et al., 2016) to decide whether a non-owner's action involving others' property is acceptable.

One concern could be that children's judgments in the current experiment were based on the outcome of the events or the physical state of the objects, rather than the potential cost the actions were imposing on the owner. For instance, children might believe that drawing on a notebook or eating a cookie is "bad", regardless of whether it was the non-owner

or owner engaging in the action. Preliminary data in a follow-up experiment suggests that this possibility is unlikely. In this ongoing study, children are shown similar scenarios to the ones presented in the current study, except that the agent engaging in the actions is manipulated. This means that in some scenarios it is a non-owner engaging in the actions causing non-transgressions, minor transgressions, and severe transgressions. Whereas in other scenarios the owner is engaging in the actions, thereby not imposing any costs on themselves. So far, 3- to 8-year-old children ($N = 22$) in this follow-up work believe it is more acceptable for an owner to engage in the actions compared with a non-owner (severe: $M = 1.86$ vs. 3.48 ; minor: $M = 2.27$ vs. 2.77 ; none: $M = 1.73$ vs. 2.36 , respectively). As such, this data so far suggests that children's judgments in the current experiment depended on the cost to the owner rather than the outcome or act itself.

The current experiment examined whether children consider the costs to owners when reasoning about ownership violations. However, the methods used here represent only one way to operationalize costs and did not examine whether or how children also consider rewards or benefits when reasoning about people's actions with property. Future research could explore if children's judgments depend on whether the owned object has high or low personal importance to the owner (i.e., another operationalization of cost) and whether the non-owner would obtain rewards or benefits for engaging in the action. Though, it is important to note that prior work has shown that preschool aged children think it is permissible for a non-owner to use others' property when the object is needed to prevent harm, regardless of the owner's wishes (Neary & Friedman, 2014). Examining the scope of children's use of cost-reward framework would provide greater insight into how ownership is understood and the cognitive processes that underlie ownership reasoning.

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