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Young Children Infer Feelings of Ownership from Habitual Use

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Please see <https://osf.io/j8xpf/> for the data from all experiments.

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Abstract

People sometimes feel as if they own items that do not actually belong to them. These feelings of ownership affect people in diverse contexts, and provide a striking example of how feelings can conflict with reality. Across six experiments, we investigated young children's ($N = 614$) and adults' ($N = 243$) understanding of these feelings. In Experiment 1, children aged 4 to 7 inferred that an agent who habitually used a publicly owned item would have feelings of ownership for it, and children distinguished these feelings from actual ownership. Experiments 2 and 3 replicated these findings, and also found that children were less likely to attribute feelings of ownership when the agent used the item non-habitually. Experiments 4 and 5 further found that children and adults also distinguish feelings of ownership from false beliefs of ownership. Finally, in Experiment 6, even younger children showed signs of understanding feelings of ownership. Children aged 3 and 4 predicted that an agent who habitually used an item would be upset to discover someone else using it. Together, these findings suggest that young children are aware of the psychological component of ownership. The findings are also informative about their understanding of habits and repeated actions, and the potential for feelings to conflict with beliefs, knowledge, and reality.

Young Children Infer Feelings of Ownership from Habitual Use

People often feel as if they own objects and locations that are not theirs. For example, if you habitually sit in the same spot each time you visit a coffee shop, park, or meeting room, you may feel as though it is yours. You may also be irked if you show up to find someone else in it. Such feelings of ownership can arise for many kind of items, ranging from physical objects to jobs and roles to neighborhoods and entire countries (e.g., Brown & Robinson, 2011; Kamleitner & Feuchtl, 2015; Kirk, Peck, & Swain, 2018; Verkuyten & Martinovic, 2017). These feelings can develop in many ways, and even can arise from merely touching or naming an object (e.g., Peck & Shu, 2009; Stoner, Loken, & Stadler Blank, 2018). In general, people are widely believed to develop feelings of ownership for items they control, intimately know, and invest effort in, regardless of whether these items truly belong to them (Pierce Kostova, & Dirks, 2003).¹

Feelings of ownership affect people in diverse contexts. They affect economic decision-making and consumer behavior. For example, they contribute to the endowment effect, wherein merchandise is valued more by sellers than by buyers (Morewedge & Giblin, 2015; Reb & Connolly, 2007; Shu & Peck, 2011), and they may underlie many manipulations that influence people's monetary valuations of goods (e.g., Peck & Shu, 2009; Shu & Peck, 2011). These feelings likewise affect people's feelings and actions in their jobs (for a review see Dawkins, Tian, Newman & Martin, 2017). For example, employees' feelings of ownership for their companies predict their willingness to go beyond job requirements in benefiting their companies (Van Dyne & Pierce, 2004), but is also associated with unethical behavior relating to the job and other negative outcomes (e.g., Brown, Crossley, & Robinson, 2014; Brown & Zhu, 2016; Wang, Law, Zhang, Li, & Liang, 2018). Feelings of ownership may also contribute to sexual jealousy (Wilson & Daly, 1992) and to negative attitudes towards immigrants (Brylka, Mähönen, & Jasinskaja-Lahti, 2015; Martinovic & Verkuyten, 2013).

In the present paper, we investigate whether young children understand that people can feel ownership for items they do not own, and infer these feelings from habitual use of a non-owned item. Some researchers have suggested that young children may experience these feelings (e.g., Furby, 1980; Hood, Weltzien, Marsh, & Kanngiesser, 2016; Pierce et al., 2003; Verkuyten, Sierksma, & Thijs, 2015). But it is unknown whether children are aware that other people can have these feelings. As we detail next, investigating this question can advance knowledge of how children understand emotions and feelings, and knowledge of how they understand ownership.

Conflicts with Reality and Beliefs

If children are aware of feelings of ownership, this would suggest they view feelings as capable of misrepresenting reality. Feelings of ownership can misrepresent reality by making people feel as though they own items that are not actually theirs. We know that young children are aware of many ways in which minds can misrepresent the world. For example, toddlers comprehend pretend play where the identities and properties of objects are intentionally misrepresented (e.g., Leslie, 1987, 1994; Rakoczy, Tomasello, & Striano, 2004), and 4-year-olds understand that people's beliefs are sometimes false (e.g., Wellman, Cross, & Watson, 2011).

¹ Feelings of ownership are sometimes referred to as "psychological ownership" or "perceived ownership" (e.g., Peck & Shu, Pierce et al., 2003). Regardless of the term, the main idea is that the emotional attachment you feel towards your possessions can sometimes arise for items you do not actually own.

However, it is unknown whether children recognize that feelings can also mislead and misrepresent.

Awareness of feelings of ownership may also show that children have some understanding of *alief*, a mental state proposed to underlie feelings and actions that conflict with beliefs and knowledge (Gendler, 2008a, 2008b). For example, you may alieve that a high bridge is dangerous (and hence feel uneasy while standing on it) even though you know it is safe. Feelings of ownership may depend on alief because they regularly involve such conflicts between feelings and belief. You can feel as if you own your favorite spot in a coffee shop without believing it is actually yours. Hence, if children distinguish feelings of ownership from (false) beliefs of ownership this might suggest they have some grasp of alief.

Understanding Ownership

If children are aware of feelings of ownership, this will also be informative about their understanding of ownership. By 3 or 4 years, children recognize owners' rights and distinguish between legitimate and illegitimate ways of acquiring and transferring ownership (e.g., Blake & Harris, 2009; Kanngiesser, Gjersoe, & Hood, 2010; Rossano, Rakoczy, & Tomasello, 2011). For example, they understand that owners are entitled to use their property and to permit others to use it (e.g., Schmidt, Rakoczy, & Tomasello, 2013; Van de Vondervoort, Meinz, & Friedman, 2017), and that theft is impermissible (e.g., Blake & Harris, 2009; McDermott & Noles, 2018). These understandings could reflect children's possession of a naïve theory of ownership (Nancekivell, Friedman, & Gelman, 2019) or could instead result from knowledge of social norms specifying that some actions are correct and appropriate, and that others actions are incorrect and open to criticism (e.g., Rakoczy & Schmidt, 2013).

Awareness of feelings of ownership is relevant to this issue. Some aspects of children's understanding of ownership are unlikely to reflect social norms. For example, children predict that owners will be upset if their property is lost (Pesowski & Friedman, 2015), even though it is doubtful that a social norm dictates how owners should react in this situation. In general, the social norms account does not readily explain children's awareness of the psychological consequences of ownership, including their abilities to use it to predict actions and knowledge (e.g., Banerjee, Kominsky, Fernando, & Keil, 2015; Pesowski & Friedman, 2018; Pietraszewski & Shaw, 2015). Even so, awareness of feelings of ownership would provide stronger evidence that children's conceptions of ownership do not entirely reflect mastery of cultural norms. It is especially unlikely that a social norm dictates that it is correct for people to feel as if they own items that are not theirs. If anything, this is the wrong way for people to feel about such items.

The Current Experiments

We conducted six experiments. Five investigate children's understanding of feelings of ownership, and one investigates adults. In each experiment, participants saw stories in which the protagonist used a publicly owned item (e.g., a swing at a park). We anticipated that most children would understand the protagonist does not actually own these items, making the items useful for testing their recognition that people sometimes feel as though they own items that are not actually theirs (see Rossano, Fiedler, & Tomasello, 2015 for previous work on public property).

Experiments 1 to 4 examined whether children distinguish feelings of ownership from actual ownership and from false beliefs about ownership, and whether children are more likely to attribute these feelings when items are used habitually. In these experiments, we focused on children aged 4 years and older. We did not test 3-year-olds because the distinction between feelings of ownership and actual ownership is akin to the appearance-reality distinction, and

children only reliably pass verbal tests of that distinction at age 4 (e.g., Flavell, Green, & Flavell, 1986). In Experiment 5 we then tested adults. Finally, in Experiment 6 we examined whether children anticipate that a person who habitually uses an object will be upset when it is used by someone else. This experiment did include 3-year-olds, as it did not require children to verbally distinguish between feelings and reality.

Experiment 1

Methods

Participants. We tested 124 4-7-year-olds ($M = 5;11$ [years;months], range = 4;3-7;11, 69 girls).² In all experiments, we aimed to test 30 children at each age in each between-subjects condition. However, because of occasional errors, the actual numbers departed slightly in some experiments. Children were tested at daycares, preschools, and elementary schools, with different children tested in each experiment. The studies were approved by the Office of Research Ethics at the University of Waterloo (Project 30395, *Social Understanding in Children*).

Procedure. Children were told stories with accompanying pictures shown on a laptop. Tasks were conveyed this way in all experiments; see Figure 1 for sample scripts from all experiments; see <https://osf.io/j8xpf/> for a version that also includes sample slides.

In this experiment, children heard two stories. Each story was about a child who habitually uses the same publicly owned item from a set of identical-looking items. In Story 1, a girl used the same swing at a park every day; in Story 2, a boy used the same chair at a library every day. After each story, children were asked whether the agent felt like they owned the habitually-used item (e.g., “Does the girl *feel* like the swing belongs to her?”) and whether the agent did own this item (e.g., “Does the swing belong to the girl?”); question-order was counterbalanced across children, and the experimenter pointed at the appropriate item when referring to it.

² In this experiment, we also tested 30 3-year-olds. However, their responses suggested the task was not suitable for them—with each successive question they became more likely to repeat their previous response (80% of responses to second to fourth questions were identical to the response to the previous question).

Experiment 1. Look this is a park. And see, it has four swings. And here is a girl. She comes to this park every day. And every day she uses the same swing. So I have some questions for you: *Does the swing belong to the girl? Does the girl feel like the swing belongs to her?*

Experiment 2. Look, this is a park. And see, it has four swings. Here is a girl. She comes to this park every day. And every day she uses [the same/a different] swing. She uses [the same/a different] swing each time she comes to the park. *Does this swing belong to the girl? Does the girl feel like this swing belongs to her.*

Experiment 3. Look, this is a park! And see, it has four swings. Here is a girl. She has never come to this park before. Today is her first time using this swing, she is using this swing for the first time. *Does this swing belong to the girl? Does the girl feel like this swing belongs to her?*

Experiment 4. Look, this is a park. And see, it has four swings. And here is a girl. She comes to this park every day. And every day she uses the same swing. She uses this swing each time she comes to the park. So I have some questions for you. *Does the swing belong to the girl? Does the girl feel like the swing belongs to her? Would the girl say the swing belongs to her?*

Experiment 5. Look this is a park. And see, it has four swings. And here is a girl. She comes to this park every day, and every day she uses the same swing. She uses this swing each time she comes to the park. *Does the swing belong to the girl? Does the girl feel like the swing belongs to her? [Would the girl say the swing belongs to her? / Does the girl think the swing belongs to her?]*

Experiment 6. Look this is a park! And see, it has four swings. Here is a girl. She comes to this park every day, and every day she uses the same swing. She uses this swing each time she comes to this park. This is a park swing, it does not belong to the girl. *So, does this swing belong to the girl?* One day she comes to the park and guess what? She sees a kid and he's using this swing. *How does she feel about that?*

Figure 1. Sample scripts from all experiments. Square brackets indicate text manipulated across-between subjects conditions.

The feeling of ownership question was based on Peck & Shu's (2009) questions for assessing feelings of ownership for non-owned goods (e.g., "I feel like this is my Slinky/Mug"; "I feel like I own this Slinky/Mug"). The wording of this question is also reminiscent of test questions used to probe children's understanding of the appearance-reality distinction (e.g., Flavell et al., 1986; Rice, Koinis, Sullivan, Tager-Flusberg, & Winner, 1997). The question about actual ownership has been used in previous studies on children's ownership judgments (e.g., Noles & Gelman, 2014). In this experiment and those subsequent, children occasionally did not answer a test question or said "I don't know". This happened no more than three times per experiment. In these rare instances, the experimenter prompted children by asking "What do you think?" If this did not yield a response, the experimenter repeated the story and accompanying questions. If children still did not give a specific answer, no response was recorded.

Results and Discussion

The main analyses of Experiments 1 to 5 used generalized estimating equations models (binary logistic), and Experiment 6 used a generalized linear mixed model (ordinal logistic). Table 1 provides an overview of factors entered into each model. In each experiment (except Experiment 5), age-in-months was mean-centered and entered as a covariate. The table lists all significant and marginal effects, though we only discuss significant effects. In the Online Supplemental Materials, we also test for order effects, and show findings from Experiment 1 to 4

split across question presentation orders. The complete data from all experiments is available online via this [link to OSF](#).

Table 1

Factors and effects from each analysis.

Experiment	Factors	Effects	Wald χ^2	df	<i>p</i>
1	judgment: feeling of ownership, ownership	judgment	72.94	1	<.001
		judgment*age	13.25	1	<.001
2	condition: same item, different item judgment: feeling of ownership, ownership	judgment	76.63	1	<.001
		condition*judgment	20.28	1	<.001
		judgment*age	10.30	1	.001
		condition*judgment*age	3.56	1	.059
3	condition: same item, first use judgment: feeling of ownership, ownership	judgment	145.27	1	<.001
		condition*judgment	32.33	1	<.001
		condition*age	6.46	1	.011
		judgment*age	26.43	1	<.001
4	judgment: feeling of ownership, belief, ownership	judgment	70.85	2	<.001
		judgment*age	13.84	2	.001
5	judgment: feeling of ownership, belief, ownership condition: say, think	judgment	184.36	2	<.001
		Judgment*condition	7.10	2	.029
6	item: used, non-used	item	10.75	1	.001

Children were more likely to affirm the agent felt like they owned the habitually-used item than to claim the agent actually owned it, Wald $\chi^2(1) = 72.94$, $p < .001$; see Figure 2. This main effect was qualified by an interaction with age, Wald $\chi^2(1) = 13.25$, $p < .001$. With age, children were increasingly likely to affirm the agent felt like they owned the item, Wald $\chi^2(1) = 29.42$, $p < .001$, but marginally less likely to affirm the agent actually owned the item, Wald $\chi^2(1) = 3.85$, $p = .050$.

Figure 2. Proportion of “yes” responses in Experiment 1. Colored bands show 95% confidence intervals based on averages across the two trials; points are jittered to avoid over-plotting.

These findings suggest that children distinguish feelings of ownership from actual ownership, and that children infer feelings of ownership from habitual use. But perhaps children would have responded similarly even if the agent had not used the item habitually. The next experiment examined this possibility. Because older 6-year-olds’ performance approached ceiling in the present experiment, we did not test 7-year-olds in the subsequent experiments.

Experiment 2

Methods

Participants. We tested 180 4-6-year-olds (range = 4;1-6;11, $M_{age} = 5;6$, 85 girls).

Procedure. Children again heard two stories. In Story 1, a girl visited a park every day; in Story 2, a boy visited a library every day. The stories varied slightly across two between-subjects conditions. In the same item condition, the agent was shown using one item, and was described as using it every day (as in the first experiment). In the different item condition, the agent was also shown using one item, but was described as using a different one every day. After each story, children were asked whether the agent felt like they owned the item they had been shown using, and whether the agent did own this item; question-order was counterbalanced across children.

Results and Discussion

Children were overall more likely to affirm the agent had feelings of ownership than actual ownership, Wald $\chi^2(1) = 76.63$, $p < .001$, but this effect was qualified by 2-way interactions with condition (same item, different item), Wald $\chi^2(1) = 20.28$, $p < .001$, and with age (in months), Wald $\chi^2(1) = 10.30$, $p = .001$; see Figure 3.

The interaction between question and condition resulted because ascriptions of feelings of ownership were more common in the same item ($M = .72$) than different item ($M = .52$)

condition, $p = .011$ (Bonferonni corrected) while ascriptions of actual ownership were lower in the same item ($M = .08$) than different item condition ($M = .26$), $p = .002$. Even so, children in both conditions were more likely to ascribe feelings of ownership than actual ownership, $ps < .001$. The interaction between question and age resulted because ascriptions of actual ownership were less frequent in older children, Wald $\chi^2(1) = 6.33$, $p = .012$, while ascriptions of feelings of ownership did not vary between younger and older children, Wald $\chi^2(1) = 1.89$, $p = .170$.

These findings again show that children differentiate feelings of ownership from actual ownership. Moreover, children were more likely to ascribe these feelings when the agent habitually used an item compared with when the agent did not. One unexpected finding was that the opposite pattern occurred in children's ascriptions of actual ownership. We suspected this resulted because some children felt compelled to say "yes" to at least one question, as this pressure would have been greater in the different item condition, where ascriptions of feeling of ownership were less common. However, examination of order effects (see Online Supplementary Materials) provided weak support for this conjecture. An alternative possibility is that this difference simply resulted from sampling error.³

In this experiment, children were less likely to ascribe feelings of ownership for a particular item (e.g., one of the swings) when the agent switched which item they used over time. However, it is possible that ratings were only lower in this condition because children felt the agent had feelings of ownership for the whole swing set, and so it felt wrong to affirm the feeling for just one swing. To address this concern, we next examined children's judgments about an agent who uses just one swing, but uses it once only (i.e., rather than habitually).

³ Participants vary in how likely they are to affirm that public property belongs to someone who recently used it. Even with random assignment, sampling error could lead one condition to inadvertently end up with more participants who are unusually likely to affirm (or deny) ownership for such objects. In Experiment 5, we observe a similar difference even more likely to have resulted from sampling error.

Figure 3. Proportion of “yes” responses in the same and different item conditions (Experiment 2) and the first use condition (Experiment 3). Colored bands show 95% confidence intervals based on averages across the two trials; points are jittered to avoid over-plotting.

Experiment 3

Methods

Participants. We tested 90 4-6-year-olds (range = 4;0-6;11, $M_{age} = 5;5$, 48 girls).

Procedure. Children again saw stories about a girl who uses a swing at a park, and about a boy who uses a chair in a library. However, each story was about *first use* of an item—the agent had never visited the location before and was using the item for the first time (e.g., “She has never come to this park before. Today is her first time using this swing. She is using this swing for the first time.”). After each story, children were asked whether the agent felt like they owned the item they had been shown using, and whether they did own this item (question-order counterbalanced across children).

Results and Discussion

We compared responses in this experiment with those from the same item condition of Experiment 2. Children were again overall more likely to judge that the agent had feelings of ownership than actual ownership, Wald $\chi^2(1) = 145.27$, $p < .001$. However, this effect of question (feeling of ownership, ownership) was qualified by 2-way interactions with condition (same item, first use), Wald $\chi^2(1) = 32.33$, $p < .001$, and with age (in months), Wald $\chi^2(1) = 26.43$, $p < .001$.

The interaction between question and condition resulted because ascriptions of feelings of ownership were more common in the same item ($M = .72$) than first use ($M = .52$) condition, $p = .010$ (Bonferroni corrected) while ascriptions of actual ownership were lower in the same item ($M = .08$) than different item condition ($M = .30$), $p < .001$. The interaction between question and age resulted because ascriptions of feelings of ownership were greater in older than younger

children, Wald $\chi^2(1) = 5.59, p = .018$, while ascriptions of actual ownership were less frequent in older than younger children, Wald $\chi^2(1) = 15.22, p < .001$.

We also observed a 2-way interaction between condition and age, Wald $\chi^2(1) = 6.46, p = .011$. It resulted because of marginally significant tendencies for affirmative responses (irrespective of question) to be less frequent in older than younger children in the first use condition, Wald $\chi^2(1) = 3.70, p = .054$, but for this responses to be more frequent in older than younger children in the same item condition, Wald $\chi^2(1) = 2.86, p = .091$.

In sum, children were more likely to ascribe feelings of ownership to an agent who habitually uses an item (data from Experiment 2) than to an agent who uses the item for the first time (data from present experiment). As in the previous experiment, we observed the opposite response pattern for judgments of actual ownership. In this case, analysis of order effects (see Online Supplementary Materials) provided no support for the conjecture that children in the “first use” condition feeling compelled to say “yes” to at least one question. As noted above, we believe the effect could have resulted from sampling error (see Footnote 3).

The findings so far suggest that children understand that people can feel like they own items they do not actually own. Such feelings differ, though, from false beliefs of ownership. When you feel like you own a certain table in a restaurant where you regularly eat, you do not actually believe it is yours, and would not say that you actually own it. In the next experiment, we examined whether children draw this distinction by comparing their judgments about feelings of ownership with their judgments about whether an agent (falsely) believes they own an item they habitually use.

Experiment 4

Methods

Participants. We tested 90 4-6-year-olds (range = 4;3-6;11, $M_{age} = 5;7$, 50 girls).

Procedure. Children saw a story about a girl who uses a swing at a park, and a story about a boy who uses a chair in a library. Each agent visited the location (park, library) every day and used the same item on each visit. After hearing each story, children were first asked whether the agent actually owns the item (“Does the swing belong to the girl?”). They were then asked two further questions about whether the agent feels like they own it (“Does the girl feel like the swing belongs to her?”) and whether the agent would say they own it (“Would the girl say the swing belongs to her?”); the order of these two questions was counterbalanced across children. The question about whether the agent would say they own the item was used to assess attributions of (false) beliefs of ownership to the agent. Many false belief tasks have asked children about what agents will say or do, instead of directly asking about what an agent “thinks” (e.g., Hogrefe, Wimmer, & Perner, 1986; Perner, Frith, Leslie, & Leekam, 1989; Ruffman, Slade, & Crowe, 2002), and these questions all yield comparable results (Wellman et al., 2001, pp. 664-665).

Results and Discussion

Children’s responses varied across the three questions (ownership, feeling of ownership, belief of ownership), Wald $\chi^2(1) = 70.85, p < .001$, though this effect was qualified by an interaction with age, Wald $\chi^2(1) = 13.84, p = .001$; see Figure 4. Overall, children were more likely to attribute feelings than beliefs of ownership, and more likely to attribute beliefs of ownership than to judge the agent actually owned the item, all $ps < .001$ (Bonferroni corrected). The interaction with age resulted because compared with younger children, older children were more likely to attribute feelings of ownership, $p = .045$, and less likely to attribute actual ownership, $p = .004$, while attributions of beliefs of ownership did not differ between older and younger children, $p = .497$.

These findings show that children differentiate feelings of ownership from (false) beliefs of ownership, and understand them as distinctive mental states. However, a potential concern is that children’s responses might differ using a more direct question about beliefs of ownership, such as a question about whether the agent *thinks* they own the habitually used item. As noted above, previous findings suggest that children response equivalently to these two kinds of questions when responding to false belief tasks. But perhaps findings would differ in our task.

Figure 4. Proportion of “yes” responses in Experiment 4. Colored bands show 95% confidence intervals based on averages across the two trials; points are jittered to avoid over-plotting.

To explore this possibility, we next conducted a version of this experiment on adult participants. Across participants, we manipulated the question about beliefs of ownership to either concern what the agent would say or what the agent thinks. If both questions yield comparable results, this provides some assurance that children intended the question as intended.

Experiment 5

This study was preregistered at <https://aspredicted.org/qx5sk.pdf>. The preregistration covered the number of participants, design, and analysis plan.

Methods

Participants. The experiment was successfully completed by 243 adults (range = 20-77 years, $M_{age} = 34$ years, 148 males, 94 females, 1 reporting “other or prefer not to disclose”) recruited using Amazon Mechanical Turk. Based on our preregistration, we excluded participants who failed at least one of our two comprehension check questions ($N = 60$).

Procedure. Participants were tested online, and saw the scenario about the girl and the swings. We only showed adults one scenario, because we worried they would find it overly repetitive to see two very similar scenarios, and to reduce the cost of running the experiment (i.e., adult participants are given more compensation for longer experiments).

On the first screen, participants saw a picture of the girl sitting on the left-most swing, with the accompanying text explaining that the girl comes to the park every day, and always uses

the same swing. The next screen showed a picture of the girl standing in front of the swing set, with the main questions underneath.

The experiment used a 3X2 design. Within-subjects, each participant answered three yes/no questions. The first question asked about actual ownership (“Does the swing belong to the girl?”) The second and third questions (order counterbalanced across participants) asked about feelings of ownership (“Does the girl *feel like* the swing belongs to her?”) and about false beliefs of ownership. The wording of the question about beliefs of ownership was manipulated between-subjects (random-assignment to condition), and either concerned what the girl would say (“Would the girl *say* the swing belongs to her?”) or what she would think (“Does the girl *think* the swing belongs to her?”).

The next screen posed two comprehension questions, included to ensure that participants had read the scenario. Each question offered four response options, and so the chance of passing both by guessing were 1 in 16. The final screen asked participants for their age and gender.

Results and Discussion

Adult’s responses varied across the three questions (ownership, feeling of ownership, belief of ownership), Wald $\chi^2(1) = 184.36, p < .001$, though this effect was qualified by an interaction with condition, Wald $\chi^2(1) = 7.10, p = .029$; see Figure 5. Overall, adults were more likely to attribute feelings than beliefs of ownership, and more likely to attribute beliefs of ownership than to judge the agent actually owned the item, all $ps < .001$ (Bonferroni corrected). This is the same general pattern of responses observed with children in Experiment 4.

The interaction with condition resulted because although responses to the questions about feelings of ownership and beliefs of ownership did not vary across condition, $ps \geq .550$, adults were more likely to judge that the girl actually owned the swing in the think condition than in the say condition, $p = .030$. Crucially, the question about actual ownership was identical across both conditions and was the *first* question listed (i.e., it was listed before the question about beliefs of ownership, which did vary across conditions). As such, we do not believe this difference, though significant, is meaningful. Instead, we suspect it resulted from sampling error. Moreover, as inspection of Figure 5 reveals, the difference does not affect interpretation of the findings. In both conditions, almost all participants denied the swing belonged to the girl.

In sum, adults showed the same overall pattern of findings as children in Experiment 4. Both groups attributed feelings of ownership more than beliefs of ownership, and attributed these beliefs more than actual ownership. Furthermore, adults’ responses to the question about beliefs of ownership did not vary depending on whether it was phrased in terms of what the girl would say or think (again, see Wellman et al., 2001 for broadly consistent meta-analytic results with children). It would be inappropriate to statistically compare adults’ responses with those of the children from Experiment 4 because the experiments used somewhat different designs (e.g., adults saw just one scenario, while children saw two). Yet, it is worth noting that the overall rates of “yes” responses were almost identical between adults and children. (i.e., feelings of ownership 84% and 82%; beliefs of ownership 58% and 61%; actual ownership 12% and 17%).

Figure 5. Proportion of “yes” responses in Experiment 5. The “say” and “think” conditions only varied in the wording of the question used to ask about beliefs of ownership.

In our final experiment, we again investigated children. The experiments so far show that children (and adults) differentiate feelings of ownership from both false beliefs of ownership, and from actual ownership. However, in the final experiment we investigated children’s understanding of mental states that are linked with feelings of ownership. Specifically, we investigate whether children anticipate people’s negative emotional reactions when someone else uses an item they feel as if they own (Kirk et al., 2018; also see Pierce et al., 2003, p. 101). In this experiment, we targeted children aged 3-4, a younger age range than in the earlier experiments. We thought children as young as age 3 might succeed because the test questions did not use the challenging wording needed to ask about feelings of ownership, and because previous findings show that even children aged 2 understand that actual owners are upset if their property is taken or used without permission (Pesowski & Friedman, 2015).

Experiment 6

Methods

Participants. We tested 130 3-4-year-olds (range = 3;0-4;11, $M_{age} = 3;11$, 59 girls).

Procedure. Children saw a single story about a girl who visits a park every day, and always uses the same swing. Children were explicitly told that the swing does not belong to the girl, and were asked a question confirming they understood this (“This is a park swing, it does not belong to the girl. So, does this swing belong to the girl?”); 95% of children passed this question. Children then learned that on one visit to the park, the girl sees another child using one of the swings. Children then rated how the girl felt about this, and responded on a scale showing five faces ranging from very happy to very sad; responses were recoded as values ranging from 2 to -2. Crucially, the swing occupied by the other child varied across two between-subject conditions. Children either saw a version of the story where the occupied swing was the one regularly used by the girl, or a version where it was a different swing.

Results and Discussion

Children judged the girl would feel more negatively when another person occupied the swing she habitually used compared with when they occupied another swing, Wald $\chi^2(1) = 10.75$, $p = .001$; see Figure 6. This suggests that young children understand that habitual use of a non-owned item can lead to negative emotional reactions when others use it.

Figure 6. Children's emotion ratings in Experiment 6 ranging from 2 (very happy) to -2 (very sad). Colored bands show 95% confidence intervals; points are jittered to avoid over-plotting.

General Discussion

We found that young children attribute feelings of ownership. Children aged 4 to 7 judged that an agent who habitually used an item would feel as if they owned it, and were less likely to attribute these feelings when items were not used habitually. Children at these ages (and adults) also distinguished feelings of ownership from actual ownership, and from false beliefs about ownership. We also found that at younger ages, children connect habitual use with emotional reactions. Children aged 3 and 4 inferred that an agent who habitually uses an item will be upset to find someone else using it.

These findings suggest that young children understand that ownership has a psychological side and that people can feel as though they own items they do not actually own. These findings are broadly consistent with claims that young children experience feelings of ownership (e.g., Furby, 1980; Hood et al., 2016; Pierce et al., 2003; Verkuyten et al., 2015). Although we did not ask children about their own feelings, their ability to distinguish feelings of ownership from actual ownership could be founded on first-hand experience with these feelings. If so, our findings may provide a conservative test of children's awareness of feelings of ownership, as children may recognize these feelings in themselves before being able to attribute these feelings to others.

Children also appeared to recognize that feelings can *misrepresent* reality. The important finding here is that children consistently distinguished feelings of ownership from actual ownership. This finding extends previous work showing that children recognize that desires and

preferences for objects can conflict with ownership (Noles & Gelman, 2014). This finding also suggests that previous research on theory of mind has overlooked feelings as an avenue for investigating the understanding that mental states can misrepresent. Feelings provide an interesting contrast with beliefs—while we can never know which of our current beliefs is inaccurate, we can recognize that specific feelings are misleading. Research does show that from age 6, children understand that misleading facial expressions can mask true emotions (e.g., Harris, Donnelly, Guz, & Pitt-Watson, 1986; Wellman & Liu, 2004). But this does not involve understanding that feelings can misrepresent. When facial expressions mislead, the feelings themselves are real.

Relatedly, the present findings suggest that children may be aware of one form of alief, the mental state proposed to underlie instances where feelings and reactions conflict with knowledge and beliefs (Gendler, 2008a, 2008b). The key finding here is that children distinguished feelings of ownership from false beliefs of ownership. Some previous studies suggest young children could also be aware of aliefs leading to fear. In these studies, children understood that pictures and imaginary creatures (e.g., ghosts) can be scary (Samuels & Taylor, 1994; Sayfan & Lagattuta, 2008, 2009), though the studies did not directly contrast judgments about scariness and harmlessness.⁴

Our findings also suggest that children have some understanding of habits and repeated actions, another topic neglected in research on theory of mind (for discussion and an exception see Gershman, Gerstenberg, Baker, & Cushman, 2016). We found that children infer feelings of ownership from habitual use. How do children make these inferences? One possibility is that children see habitual use as the cause of feelings of ownership. The idea that habitual use leads to feelings of ownership is broadly consistent with claims that these feelings stem from intimately knowing an item, or investing effort in it (Pierce Kostova, & Dirks, 2003). So perhaps future research could investigate children's understanding of other causes of feelings of ownership. It would likewise be useful to investigate whether children understand these feelings can also extend to items besides publicly owned locations. For instance, they might understand that feelings of ownership could extend to discrete items that belong to other people (e.g., a ball borrowed from a friend).

Children's inferences between feelings of ownership and habitual use could also have run the other way. Rather than viewing habitual use as the cause of feelings of ownership, they could instead have view feelings of ownership as causing habitual use. For example, children may have asked themselves why the girl always used the same swing when others were available, and then identified feelings of ownership as a plausible cause. Crucially, these accounts are not mutually exclusive. Even in reality, habitual use may cause feelings of ownership, and these feelings may strengthen the habit; feelings of ownership may make repeated use a self-reinforcing habit.

The findings are also informative about children's understanding of publicly property. Previous work shows that 5-year-olds understand temporary claims on publicly owned objects, and recognize (and communicate) these claims based on the way the objects are physically arranged (Rossano et al., 2015). For example, 5-year-olds understand that publicly owned objects

⁴ Although children may be aware of certain kinds of alief, they probably do not conceive of alief as a type of mental state. Adults may not either—they may not view different instances of alief as stemming from the same type of mental state.

stacked in a pile may be temporarily off limits. Our findings suggest that children could be aware of feelings that could underlie attempts to claim public property. We do not yet know, though, if children understand that feelings of ownership can underlie temporary claims on public property.

Finally, considered alongside previous research, our findings show that young children are aware of numerous ways in which objects can be valued. Previous research shows that besides understanding desires and preferences for objects (e.g., Fawcett & Markson, 2010; Kushnir, Xu, & Wellman, 2010; Wellman & Woolley, 1990), young children are also aware that objects can differ in their monetary values (Gelman, Frazier, Noles, Manczak, & Stilwell, 2015), museum-worthiness (Frazier & Gelman, 2009), and specialness (Pesowski & Friedman, in press). In showing that young children attribute feelings of ownership, the present experiments reveal that they are aware of another form of regard for objects.

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