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Determining who owns what: Do children infer ownership from first possession?

Ori Friedman *, Karen R. Neary

Department of Psychology, University of Waterloo, 200 University Avenue West, Waterloo, Ont., Canada N2L 3G1

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Abstract

A basic problem of daily life is determining who owns what. One way that people may solve this problem is by relying on a 'first possession' heuristic, according to which the first person who possesses an object is its owner, even if others subsequently possess the object. We investigated preschoolers' use of this heuristic in five experiments. In Experiments 1 and 2, 3- and 4-year-olds inferred that an object was owned by the character who possessed it first, even though another character subsequently possessed it. Two-year-olds also showed this bias, but only when the object was placed between the characters when children were asked about ownership. Experiment 3 ruled out the possibility that children's bias to select the first possessor results from a tendency to select the character first associated with the object. Experiment 4 showed that 3- and 4-year-olds have difficulty disregarding the first possession heuristic, even when provided with evidence that the character who first possessed an object is not its owner. But Experiment 5 found that children can disregard the heuristic in at least some situations. These five experiments suggest that the first possession heuristic guides children's ownership inferences. The findings provide the first evidence that preschoolers can infer who owns what, when not explicitly told, and when not reasoning about objects with which they are personally acquainted.

Keywords: Ownership; Property; Possession; Proprietary behavior; Cognitive development; Heuristics; Social cognition; Abstract reasoning

* Corresponding author. Tel.: +1 519 888 4567x33054.
E-mail address: friedman@uwaterloo.ca (O. Friedman).

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1. Introduction

Ownership of property is a human universal found in all known cultures (Brown, 1991; Murdock, 1945). It is an important part of life, involved when we buy, sell, trade, donate, find, lose, share, borrow, lend, beg, and steal. Ownership figures in moral judgments about theft, property damage, and responsibility incurred when one's property causes others harm (Elkind & Dabek, 1977; Hook, 1993). It influences how much we value objects (Beggan, 1992; Irwin & Gebhard, 1946; Kahneman, Knetsch, & Thaler, 1990; Thaler, 1980), and we typically prefer owned objects over similar objects that we do not own (Beggan, 1992; Irwin & Gebhard, 1946). What we own, and how much of it, is a determinant of socioeconomic status. And ownership may be closely linked to the self concept and personal identity (Dittmar, 1992; James, 1890).[1]

Children can reason about ownership, as distinct from physical possession, from age two (Fasig, 2000; Ross, 1996; Ross, Tesla, Kenyon, & Lollis, 1990), and perhaps earlier (Tomasello, 1998). Beyond this, little is known about children's reasoning about ownership, and few studies have specifically investigated the topic. This lack of research is puzzling because this topic provides us with an opportunity to better understand the development of abstract thought and social cognition.

Ownership is abstract because it cannot be perceived via the senses or inferred from sensory information. For example, we may see that a friend possesses a ball and is holding it, but we cannot see whether our friend owns the ball. The abstractness of ownership is also evident because attempts to explicate the rules of ownership make use of equally abstract concepts, such as rights, consent, and use (Snare, 1972; also see Miller & Johnson-Laird, 1976).

Ownership is social because we not only think about what we own, but routinely reason about what others own. Doing so allows us to avoid the social conflicts that would arise if we treated others' property as our own or in other inappropriate ways, and is therefore essential for normal social interaction. This social aspect of ownership is recognized in property law, which holds that ownership involves relationships between people in regards to things (e.g., Sprankling, 2000). Moreover, ownership is important for social development because most of young children's social conflicts concern the possession and use of objects (Shantz, 1987), and these conflicts often involve reasoning about ownership (Ross, 1996; Ross et al., 1990).

1.1. Determining who owns what

Our focus here is on how children solve a basic problem of daily life, determining who owns what. Judgments about who owns what influence our behaviour toward objects and have major social consequences. For example, suppose you are at a park

[1] Ownership can be construed quite broadly, and so our property may include objects, ideas, family members, our bodies, and our actions. A common notion of ownership might underlie all of these examples, but perhaps not. To avoid the possibility of muddling disparate notions of ownership, we focus on ownership of physical objects that can be transferred from one individual to another.

and a soccer ball is nearby. Whether you take the ball home, kick it, or ignore it, will likely depend on whether the ball belongs to you, a friend, or a complete stranger. Thus, how we behave in relation to a given object depends not just on its physical properties and function, but also on who owns it. The problem of determining who owns what would be trivial if ownership was perceptible and we could simply see who owns what. Instead, ownership is abstract and invisible.

The few existing studies of children's reasoning about ownership say little about how children determine who owns what. In some studies, children were not required to reason about who owns what (Flavell, Mumme, Green, & Flavell, 1992; Furby, 1978, 1980). For example, Furby (1978, 1980) interviewed children and adults about their beliefs about ownership, asking them questions such as "What does it mean that something is yours, that it belongs to you?"

In other studies, children were explicitly told who owns what (e.g., "That's Mike's", "This is for you") (Canale, 1977; Eisenberg-Berg, Haake, & Bartlett, 1981; Eisenberg-Berg, Haake, Hand, & Sadalla, 1979; Elkind & Dabek, 1977; Fasig, 2000, Block task; Irwin & Gebhard, 1946; Kalish, Weissman, & Bernstein, 2000; Moessinger, 1975; Parke, 1974; Staub & Noerenberg, 1981). Although explicit telling is an important way that we can discover who owns what, it requires someone else to have already solved the problem of determining who owns what. It is also of limited use when contradictory claims are made about who owns what.

In still another group of studies, children reasoned about objects with which they were personally acquainted, such as their own toys and those belonging to siblings (Allen, 1995; Fasig, 2000; Ross, 1996; Ross et al., 1990). These studies revealed precocious reasoning about ownership in children aged two, and sometimes younger. Because familiar items were used, these studies do not tell us how children infer who owns what. For example, children may have relied on memories of having been explicitly told who owns what.

To our knowledge, only four published studies have investigated children's ability to *infer* who owns what. In two studies, children aged four and older were interviewed about the ownership of large-scale items, including a local factory (Berti, Bombi, & Lis, 1982), and public buses (Cram & Ng, 1994). In the third study, children five and older were asked about whether a character would be allowed to keep various objects in a series of 11 scenarios, each featuring different legitimate (e.g., purchasing) or illegitimate (e.g., stealing) bases for owning an object (Cram & Ng, 1989). And in the fourth experiment, children four years and older rated the badness of characters involved in scenarios involving ownership, and in some instances these ratings depended on judging who owns what (Hook, 1993).

Findings across these four studies were quite similar: in all the youngest children tested (4- and 5-year-olds) performed poorly. Moreover, these studies tell us little about how children come to infer ownership successfully. Without going into a detailed critique of the studies, we believe that they underestimate children's ability to infer who owns what. For example, difficulty reasoning about the ownership of large-scale items might have resulted because children were simply unfamiliar with the actual owners.

1.2. The first possession heuristic

One way that people may determine who owns what is by following a 'first possession' heuristic, according to which the person who first possessed an object (to one's knowledge) is its owner.[2] For example, suppose you are playing soccer with several friends. Following this heuristic will lead you to assume that the soccer ball is owned by whichever friend had it first, even if another friend has the ball now. This heuristic may be related to the 'first possession' rules found in many legal systems, including Western, African, and Islamic systems (Lueck, 1995).

Friedman (in press) provides evidence that adults infer ownership from first possession. In two experiments, undergraduates selected a character who first played with a toy (over a character who later played with it) when judging who owns the toy, but not when judging which character likes it more. In a third experiment, undergraduates selected a character who first captured and possessed an animal as its owner, over another character who had pursued it earlier.

Because possession can be perceived (but see Rose, 1985), and first possession remembered, the first possession heuristic may allow young children to infer the abstract and invisible property of ownership from perceptual experience. Some evidence suggests that young children connect first (or earlier) possession with entitlement to objects. In possession disputes, 2-year-olds cite first possession when justifying current entitlement (e.g., "I was sitting on it first"; Ross, 1996). And among 12- to 24-month-olds, a toddler who currently possesses a toy is more likely to lose it to another toddler, if the taker had recent prior possession of the toy (Bakeman & Brownlee, 1982). However, these findings stop short of providing evidence for young children's use of the first possession heuristic, because the findings concern rights to current possession, but not ownership.

We investigate young children's use of the first possession heuristic in five experiments. Experiments 1 to 3 provide evidence that the first possession heuristic guides children's ownership inferences. Experiments 4 and 5 then investigate whether children can override use of the heuristic when provided with strong evidence that the first character to possess an object does not own it.

2. Experiment 1

Children, aged two to four, were told two very simple stories, each about a boy, a girl, and a toy. In each story, one character plays with the toy and then the other character plays with it. Participants were asked which character owns the toy (Own-

[2] In proposing this heuristic we do not imply that people are destined to be irrational when inferring ownership, nor that they ignore or overlook evidence conflicting with the heuristic. The only implication is that ownership inferences are often guided by a rule that can be applied with relatively little effort or awareness, and which allows ownership to be inferred when there is little other information by which this inference might be drawn.

ership question). This question has no correct answer because either character (or both or neither) might be the owner. We predicted that children would be biased to select the character who played with the toy first (the first possessor), as would be expected if they follow the first possession heuristic.

We expected that the first possession bias would be stronger if the toy were placed between the characters when the Ownership question was asked, than if it remained with the second character. For example, children might be distracted from applying the first possession heuristic by seeing the toy with the second character, and younger children might be especially prone to such distraction. To test this intuition, children either received tasks in which the toy remained with the second possessor during questioning (possessed-at-end) or tasks with the toy placed between the characters during questioning (middle-at-end).

2.1. Method

2.1.1. Subjects

Seventy-nine children participated: 17 2-year-olds (range = 2;1 to 2;11, mean = 2;8, SD = 3.13 months); 36 3-year-olds (range = 3;0 to 3;11, mean = 3;5, SD = 3.35 months); and 26 4-year-olds (4;0 to 4;11, mean = 4;6, SD = 2.93). Another 12 children were seen but not tested (2;1 to 3;2, mean = 2;7): five failed a screening task, and seven passed the screening task but refused to cooperate further.

Children were randomly assigned to either the possessed-at-end condition or middle-at-end condition. Because we did not consider age in random assignment, unequal numbers of children at each age received the different task versions: possessed-at-end tasks were received by 5 of the 17 2-year-olds, 21 of the 36 3-year-olds, and 10 of the 26 4-year-olds; the remaining children at each age received middle-at-end tasks.

2.1.2. Materials and procedure

Testing began with a screening task (after Fasig, 2000), administered to ensure that children had the basic language ability and skills necessary to understand and participate in the ownership tasks. In the screening task, children were shown a paper with drawings of four animals (horse, monkey, rabbit, and snake) and were asked to point to each animal (e.g., "Can you point to the monkey?"). To pass children had to point correctly for all four requests.

The ownership tasks were enacted on a foam board stage using small toy replicas of children, a soccer ball, and a teddy bear. Children were told two similar stories, each about a boy, a girl, and a toy. See Appendix 1 for a sample story script. Different dolls and toys were used in the two stories.

In each task, the characters remain side-by-side, a few inches apart. One character plays with the toy, and then the other character plays with it. The toy then remains with the second character or is placed between the characters, and children are asked an Ownership question, "Whose [toy name] is it?" We used this wording, rather than

"Who owns the ball?" or "Who does the ball belong to?", because Fasig (2000) showed successful reasoning about ownership in 2-year-olds using similar "Whose..." questions. Occasionally children said "I don't know" or did not respond to the Ownership question. In these instances, the experimenter retold the story and asked the Ownership question again.

The ball was always the toy in the first story, and the teddy bear was always used in the second story. Within each task version, two factors were fully counterbalanced between subjects: 1. Whether boy characters were on the right side in both stories and girl characters on left, or the reverse. 2. Whether a boy was the first possessor in the first story and a girl the first possessor in the second story, or the reverse.

2.2. Results

Children were scored 1 for each selection of the first possessor, and 0 for all other answers (maximum score = 2). Children not selecting the first possessor selected the second possessor, except: 4 children said "I do not know" to at least one Ownership question; 3 children in the middle-at-end version pointed at the toy for each Ownership question, instead of selecting a character; 1 child answered one of the Ownership questions by saying that both characters own the toy.

Fig. 1 shows the mean scores for the possessed-at-end and middle-at-end conditions by age group. Children's scores are not normally distributed, violating the assumptions of ANOVA. We therefore used ordinal logistic regression to determine whether scores were predicted by condition (possessed-at-end, middle-at-end), age (2-years-old, 3-years-old, 4-years-old), or the interaction of these factors.[3] There were no main effects (condition, Wald = 0.36, df = 1, $p > 0.5$, all tests two-tailed; age, Wald = 0.03, df = 1, $p > 0.5$) and no interaction (Wald = 0.30, $p > 0.5$).

We sought to discover whether children were biased to select the first possessor as owner. Children's responses were analyzed with one-sample *t*-tests comparing against a chance score of 1. Because the ordinal logistic regression showed no effect of condition, we collapsed across this factor. As a group, children selected the first possessor more than would be expected by chance (mean = 1.51, $t(78) = 5.50$, $p < 0.0001$, $d = 0.62$), and this was also true at each age (2-year-olds: mean = 1.59, $t(16) = 3.05$, $p < 0.01$, $d = 0.74$; 3-year-olds: mean = 1.42, $t(35) = 2.98$, $p < .01$, $d = 0.84$; 4-year-olds: mean = 1.58, $t(25) = 3.63$, $p < 0.01$, $d = 0.72$).

Children's preference for the first possessor was also found using binomial sign tests comparing the number of children scoring 0 and 2, while excluding children who scored 1. Overall, 16 children scored 0, and 56 scored 2 (7 scored 1): $N = 72$, $x = 16$, $p < 0.0001$, $g = 0.28$. At age 2, 3 children scored 0, and 13 scored 1 (1 scored

[3] Ordinal logistic regression is also used in place of ANOVA in Experiments 3, 4, and 5. We also conducted the ANOVAs, which revealed the same pattern of effects as the ordinal logistic regression.

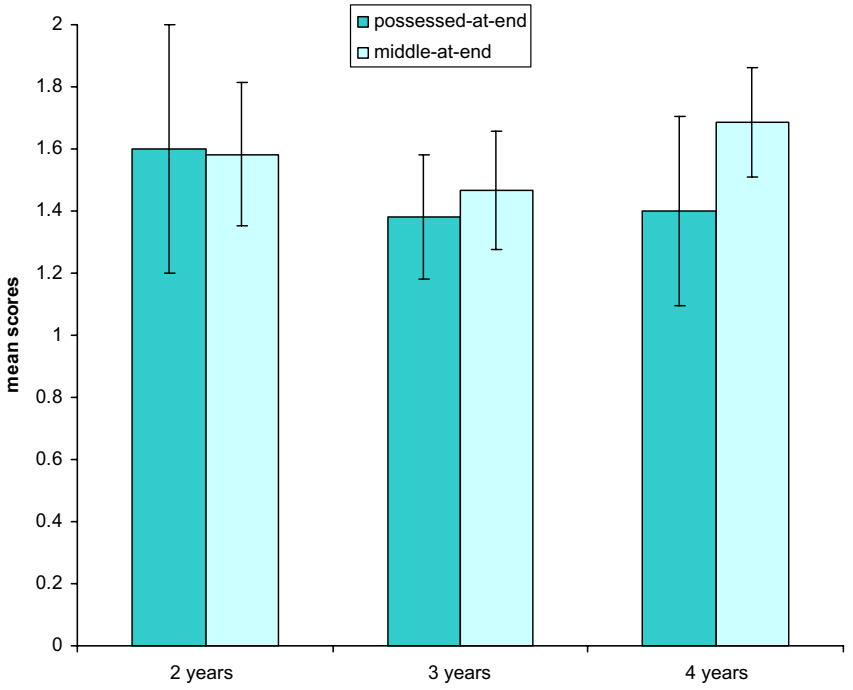

Fig. 1. Mean times the first possessor was selected as the owner (maximum = 2) in the possessed-at-end and middle-at-end conditions in each age group; vertical lines depict the standard errors of the means.

1): $N = 16$, $x = 3$, $p = 0.02$, $g = 0.31$. At age 3, 8 children scored 0, and 23 scored 2 (5 scored 1): $N = 31$, $x = 8$, $p = 0.01$, $g = 0.24$. At age 4, 5 children scored 0, and 20 scored 2 (1 scored 1): $N = 25$, $x = 5$, $p < 0.01$, $g = 0.30$.

2.3. Discussion

In reasoning about which of two characters owns an object, children aged two to four selected the character who first possessed it, even though either character might have been the owner. This bias was predicted by the view that the first possession heuristic guides children's ownership inferences.

Contrary to expectations, the bias to select the first possessor was not stronger when the toy was placed between the characters during questioning. However, caution is necessary on this point because few 2-year-olds received tasks where the toy remained with the second possessor, and these young children seemed likeliest to be swayed by the location of the object during questioning. To better determine whether location during questioning affects the first possession bias, Experiment 2 compared the possessed-at-end and middle-at-end task versions in a within-subjects design.

3. Experiment 2

3.1. Method

3.1.1. Subjects

Sixty-seven children participated: 35 2-year-olds (range = 2;0 to 2;11, mean = 2;7, SD = 3.18 months) and 32 3-year-olds (range = 3;0 to 4;0, mean = 3;5, SD = 3.03 months). Another four children (2;2 to 2;11, mean = 2;7) were seen but not tested because they did not cooperate after passing the screening task.

3.1.2. Materials and procedure

These were identical to Experiment 1 except each child received one possessed-at-end task and one middle-at-end task, with order of presentation counterbalanced across subjects.

3.2. Results

Most children selected the first or second possessor, though seven 2-year-olds and one 3-year-old gave other answers (e.g., "I do not know"). These children were included in all analyses.

Table 1 shows the contingency between selection of the first possessor in the two task versions, by age group. At age two, children were likelier to select the first possessor when the toy was between the characters during questioning than when it remained with the second character: 16 selected the first possessor in the middle-at-end task but not in the possessed-at-end version and only 6 showed the reverse pattern, McNemar binomial, $N = 22$, $x = 6$, $p = 0.05$, $g = 0.23$. We therefore conducted separate analyses on responses in each task version. In possessed-at-end tasks, 2-year-olds were not biased to select the first possessor, and only 14 of 35 (40%) did so (binomial test, $N = 35$, $x = 14$, n.s.). However, the bias was found in middle-at-end tasks, where 24 of the 35 (69%) 2-year-olds selected the first possessor (binomial test, $N = 35$, $x = 11$, $p = 0.04$, $g = 0.19$).

Three-year-olds selected the first possessor equally in both task versions: 9 selected the first possessor in the middle-at-end task but not in the possessed-at-end version and 6 showed the reverse pattern (McNemar binomial, $N = 15$, $x = 6$,

Table 1
Contingency between selection of the first possessor in the possessed-at-end and middle-at-end tasks, by age group

Tasks with first possessor selected	Age	
	2-year-olds	3-year-olds
Both	8	15
Possessed-at-end only	6	6
Middle-at-end only	16	9
Neither	5	2

n.s.). We therefore collapsed across task version in investigating whether 3-year-olds were biased to select the first possessor. Children were scored 1 for each selection of the first possessor (maximum score = 2), and a one-sample *t*-test showed that 3-year-olds were biased to select the first possessor as owner (mean = 1.41, $t(31) = 3.73$, $p > 0.001$, $d = 0.67$). The same was found with a binomial sign test comparing the number of children scoring 0 and 2, while excluding children who scored 1, $N = 17$, $x = 2$, $p > 0.001$, $g = 0.38$.

3.3. Discussion

In reasoning about who owns a toy, children selected the character who possessed it first, except for 2-year-olds in tasks where the toy remained with the character who possessed it second. These findings support the view that children infer ownership via the first possession heuristic.

Two-year-olds' performance confirmed our original prediction that the first possessor would be selected more in middle-at-end than possessed-at-end tasks. As discussed above, seeing the toy with the second character (i.e., in possessed-at-end tasks) may have distracted 2-year-olds from applying the first possession heuristic. We consider more detailed explanations for this distraction in Section 7.

3.4. A rival explanation

In Experiments 1 and 2, children inferring who owns a toy were biased to select the character who first possessed it over another character who subsequently possessed it. This bias was predicted by our proposal that the first possession heuristic guides children's ownership inferences. However, the bias might have a more general cause: When inferring ownership, children might be biased to select the character first *associated* with the object, and possession might be irrelevant. Such a first association bias might explain the findings from Experiments 1 and 2 because in both experiments the first possessor was also always the character first associated with the object.

A third experiment investigated this rival explanation using a new 'serial association' task, in which two characters are associated with an object in turn, without either possessing it: Children are told first that one character (first associate) likes the toy and then that the other character (second associate) likes it. If children infer ownership from first association then they should be biased to select the first associate over the second associate. However, this bias is not predicted if children infer ownership from first possession, because neither character ever possesses the toy.

4. Experiment 3

Children received either two 'serial possession' tasks (i.e., tasks like those in the previous experiments) or two serial association tasks. We used middle-at-end

serial possession tasks to minimize differences from the serial association tasks, and to prevent the toy's location during questioning from biasing children's responses.

4.1. Method

4.1.1. Subjects

Forty-six children participated: 24 3-year-olds (range = 3;0 to 3;11, mean = 3;5, SD = 3.92 months) and 22 4-year-olds (range = 4;0 to 4;11, mean = 4;5, SD = 3.57 months). Within each age group, children were randomly assigned to either the serial possession or serial association condition.

4.1.2. Materials and procedure

The materials and procedures for the serial possession condition were identical to those in the middle-at-end condition in Experiment 1. The serial association condition used the same materials and counterbalancing scheme, but different task protocols. In serial association tasks, the toy begins and remains between the two characters. The experimenter indicates one character, says that the character likes the toy (e.g., "The girl likes the ball"), does the same for the other character, and then asks the Ownership question (e.g., "Whose ball is it?").

4.2. Results

Children were scored 1 for each selection of the first character (i.e., first possessor or first associate) and 0 for all other responses. Children not selecting the first character selected the second character, except 6 children (5 of these were in the serial association condition).

We used ordinal logistic regression to determine whether children's scores were predicted by condition (possessed-at-end, middle-at-end) or age (three, four). There was a main effect of condition (Wald = 6.02, df = 1, $p = 0.01$, Cliff's delta = 0.39), indicating that the first character was selected more in serial possession than serial association tasks. There was no effect of age (Wald = 0.03, df = 1, $p > 0.5$) and no interaction (Wald = 0.88, df = 1, $p = .35$).

Fig. 2 shows the mean scores for the serial possession and serial association conditions. Children's responses were analyzed with one-sample t-tests comparing against a chance score of 1. In the serial possession condition, children were biased to select the first possessor (mean = 1.50, $t(23) = 3.15$, $p < 0.01$, $d = 0.64$); in the serial association condition, children were not biased to select the first associate (mean = 0.86, $t(21) = -0.72$, n.s.).

Results were the same when scores were analyzed using binomial sign tests comparing the number of children scoring 0 and 2, while excluding children who scored 1. In the serial possession condition, 4 children scored 0, and 16 scored 2 (4 scored 1): $N = 20$, $x = 4$, $p = 0.01$, $g = 0.30$; in the serial association condition, 10 children scored 0, and 7 scored 2 (5 scored 1): $N = 17$, $x = 7$, n.s.

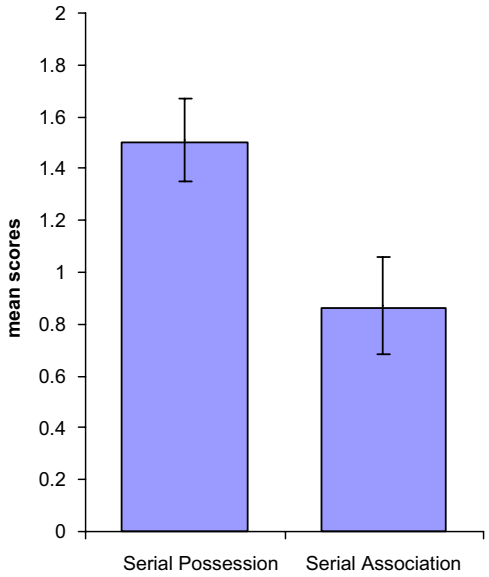

Fig. 2. Mean times the first character was selected as owner (maximum = 2) in the serial possession and serial association conditions; vertical lines depict standard errors of the means.

4.3. Discussion

Children in the serial possession condition were biased to select the first possessor as owner, replicating the findings from Experiments 1 and 2. In the serial association condition, children were not biased to select the character first associated with the toy. These findings show that children do not infer ownership from first association; the findings instead support the proposal that the first possession heuristic guides children's ownership inferences.

4.4. Inferring ownership when the first possessor is not the owner

The first possession heuristic may be useful for inferring ownership when the first possessor of an object really is its owner. But we are often provided with evidence that the first possessor of a particular object is not its owner. Examples include situations where the object is given as a gift, sold, traded, or abandoned. In these situations, rigid adherence to the first possession heuristic will lead to incorrect inferences regarding ownership. Success instead requires disregarding the heuristic, or supplementing it with other principles for inferring ownership. Can children disregard the first possession heuristic?

We investigated this question with 'gift' tasks, which were devised by slightly modifying our previous tasks. In gift tasks, one character plays with the toy, and then gives it to the second character "as a present". The second character plays with the toy, and children are asked which character owns the toy. The

correct answer is the second possessor.[4] However, if children cannot disregard the first possession heuristic then they will incorrectly select the first possessor as owner.

Such failure might be expected if the first possession heuristic is prepotent, because young children often have difficulty inhibiting prepotent tendencies (e.g., Gerstadt, Hong, & Diamond, 1994). However, there are three reasons to hesitate before predicting failure in the gift task. First, young children are well acquainted with gift-giving and may have extensive practice acknowledging that the recipient of a gift is its owner, even though the gift-giver possessed it first (see Goldfield & Snow, 1992 for a report about one preschooler). This practice might remove the difficulty of inhibiting the heuristic. Second, failure to inhibit prepotent tendencies is believed to occur in tasks posing substantial memory demands (e.g., Gerstadt et al., 1994), and the gift task might not make sufficient demands. Third, the first possession heuristic might not be prepotent. For example, the heuristic might only be triggered in the absence of strong evidence regarding ownership. If so, the heuristic will not even operate in the gift task and will not need to be disregarded.

5. Experiment 4

Children received either two 'serial possession' tasks (i.e., tasks like those in the previous experiments) or two gift tasks. Middle-at-end procedures were used to prevent the toy's location during questioning from biasing children's responses.

5.1. Method

5.1.1. Subjects

Forty-eight children participated: 24 3-year-olds (range = 3;1 to 3;11, mean = 3;7, SD = 3.03 months) and 24 4-year-olds (range = 4;0 to 4;11, mean = 4;5, SD = 3.84 months). Children were randomly assigned to either the serial possession or gift condition, with the constraint that equal numbers of children at each age were assigned to each condition.

5.1.2. Materials and procedure

In the serial possession condition, the materials and procedure were identical to those in the middle-at-end condition in Experiment 1. These were also identical for the gift condition, except one sentence was added to the stories. This sentence was uttered after the first possessor plays with the toy but before the second character has it, and expresses that the toy was transferred as a gift (e.g., "The girl gives the ball to the boy *as a present.*")

[4] The claim that the gift condition has a correct answer may depend on the tacit assumption that the first possessor owned the object first, and therefore had the right to give the object as a present.

5.2. Results

Children were scored 1 for each selection of the first possessor, and 0 for each selection of the second possessor; other responses were omitted from the analysis (maximum score = 2).[5] We therefore omitted responses from two children: one 4-year-old in the serial possession condition responded in both tasks that both characters own the toy; one 4-year-old in the gift condition responded in both tasks that neither character owns the toy.

We used ordinal logistic regression to determine whether children's scores were predicted by condition (serial possession, gift) or age (3-years-olds, 4-years-old). There were no main effects (condition, Wald = 1.54, df = 1, $p = 0.21$; age, Wald = 0.08, df = 1, $p > 0.5$) and no interaction (Wald = 0.14, df = 1, $p > 0.5$).

Fig. 3 shows the mean scores for the serial possession and gift conditions, collapsing across age. Though performance did not differ across conditions, we analyzed scores from each condition separately. In the serial possession condition, children selected the first possessor more than the second possessor (mean = 1.65, $t(22) = 4.83$, $p < 0.0001$, $d = 1.00$). In the gift condition, children's selection of the first and second possessors did not differ from chance (mean = 1.30, $t(22) = 1.58$, $p = 0.13$). Results were the same when scores were reanalyzed using binomial sign tests comparing the number of children scoring 0 and 2, while excluding children who scored 1. In the serial possession condition, 2 children scored 0, and 17 scored 2 (4 scored 1): $N = 19$, $x = 2$, $p < 0.01$, $g = 0.39$. In the gift condition, 7 children scored 0, and 14 scored 2 (2 scored 1): $N = 21$, $x = 7$, n.s.

5.3. Discussion

Findings from the serial possession condition replicated those from Experiments 1 to 3: When told a story in which one character plays with a toy and then another plays with it, children selected the first possessor as owner.

In the gift condition, the second character receives the toy as a gift and therefore owns it. However, when asked whose toy it is, children were as likely to incorrectly select the first possessor (and this response occurred more). Children's failure might be explained by the prepotency of the first possession heuristic – children might have failed to inhibit the heuristic leading them to incorrectly select the first possessor.

However, children might have found our gift scenarios unusual: Gifts are typically wrapped, given on special occasions, and not played with (or used) before being given. The gifts in our scenarios violated these norms. We wondered whether children might succeed in selecting the second possessor as owner if told scenarios with typical gifts. This was investigated in a fifth experiment, which also sought to replicate children's difficulty reasoning about atypical gifts.

[5] This scoring scheme differs slightly from the previous experiments, where other responses were not omitted but instead scored 0. This change was necessary because in the gift condition the Ownership question has a correct answer (the second possessor) and so providing scores of 0 for other responses would inflate performance.

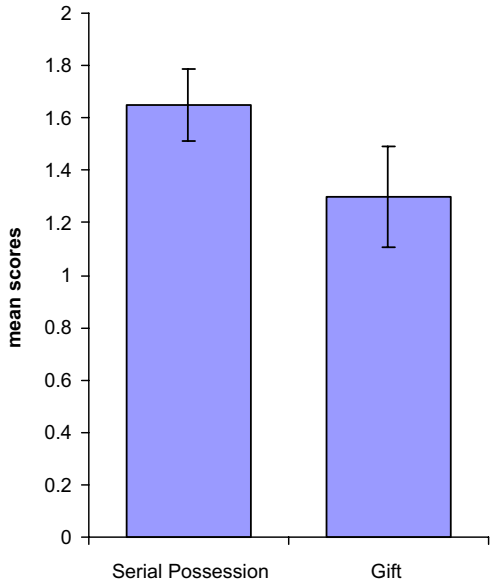

Fig. 3. Mean times the first possessor was selected as the owner (maximum = 2) in the serial possession and gift conditions; vertical lines depict the standard errors of the means.

6. Experiment 5

Children received either two typical gift tasks or two atypical gift tasks. In typical gift tasks, one character has a wrapped present and gives it to another character as a birthday present. We expected children to correctly select the gift recipient as owner in these tasks. In atypical gift tasks, one character has a toy and then gives it to the other character as a present. The atypical gift story is almost identical to the gift story in Experiment 4 because the gift is not wrapped, and the giving not warranted by a special occasion. However, in contrast to Experiment 4, neither character plays with the toy. Playing was eliminated to make the atypical gift stories more similar to the typical gift stories. Based on the findings from Experiment 4, we expected that children would fail to select the gift recipient as owner in atypical gift tasks.

6.1. Method

6.1.1. Subjects

Forty-seven children participated: 23 3-year-olds (range = 3;1 to 3;11, mean = 3;8, SD = 3.39 months) and 24 4-year-olds (range = 4;0 to 4;11, mean = 4;6, SD = 3.63 months). One other child (3;11) was seen but failed the screen task. Children were randomly assigned to either the typical gift or atypical gift condition, with the constraint that equal numbers of children at each age were assigned to each condition.

6.1.2. Materials and procedure

The same materials were used as in the previous experiments, except the typical gift condition used miniature replicas of wrapped gifts instead of the soccer ball and teddy bear. Basic procedural details and counterbalancing were the same as those in the middle-at-end condition of Experiment 1. However new scripts were used (see Appendix 2 for samples): In the atypical gift stories, one character has a toy (soccer ball or teddy bear) and then gives it to another character as a present; in the typical condition stories, one character has a wrapped present and gives it to the other character because it is the second character's birthday.

6.2. Results

Children were scored 1 for each selection of the first possessor, and 0 for each selection of the second possessor (maximum score = 2). Two children in the atypical condition gave other responses and were omitted from the analysis: one 3-year-old said (in both tasks) that nobody owns the toy; one 4-year-old said (in both tasks) that both characters own the toy.

We used ordinal logistic regression to determine whether children's scores were predicted by condition (typical gift, atypical gift) or age (3-years-olds, 4-years-old). There was a main effect of condition (Wald = 11.95, df = 1, $p = 0.001$, Cliff's delta = 0.55) indicating that more children correctly selected the second possessor in the typical gift condition than in the atypical gift condition. There was no effect of age (Wald = 2.85, df = 1, $p = 0.09$). The interaction could not be tested because of quasi-complete separation of the data, which probably resulted because almost all children in the typical gift condition scored 0.[6]

Fig. 4 shows the mean scores for the typical gift and atypical gift condition. Children's responses were analyzed with one-sample *t*-tests comparing against a chance score of 1. Collapsing across age, children correctly selected the second possessor more than the first possessor in the typical gifts condition (mean = 0.29, $t(23) = -5.02$, $p < 0.0001$, $d = 1.03$), but not in the atypical gifts condition (mean = 1.29, $t(20) = 1.45$, $p = 0.16$, n.s.). The same was found when scored were reanalyzed using binomial sign tests comparing the number of children scoring 0 and 2, while excluding children who scored 1. In the typical gifts condition, 20 children scored 0, and 3 scored 2 (1 scored 1): $N = 23$, $x = 3$, $p < 0.001$, $g = 0.37$; in the atypical gifts condition, 6 children scored 0, and 12 scored 2 (3 scored 1): $N = 18$, $x = 6$, n.s.

6.3. Discussion

As predicted, children in the typical gift tasks correctly selected the gift recipient (second possessor) as owner. This finding demonstrates that 3- and 4-year-olds can disregard the first possession heuristic, at least in some situations. Children in the atypical gift condition failed, selecting between the first and second possessor at

[6] An ANOVA conducted on these scores showed no interaction.

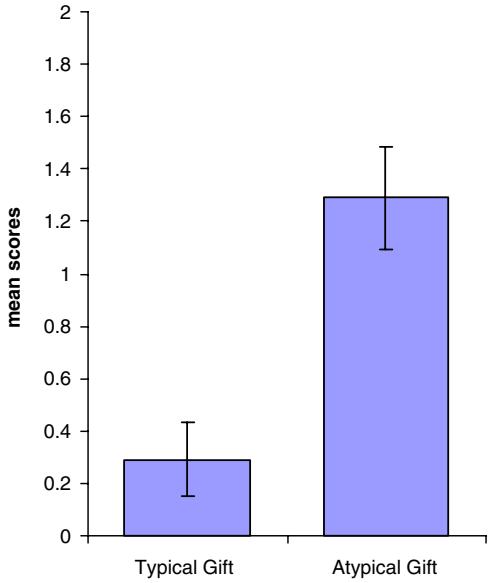

Fig. 4. Mean times the first possessor was selected as the owner (maximum = 2) in the typical gift and atypical gift conditions; vertical lines depict the standard errors of the means.

chance; this was expected given findings from the (atypical) gift condition of Experiment 4.

7. General discussion

Five experiments investigated preschoolers' use of the first possession heuristic when inferring who owns what. To our knowledge, these are the first experiments to demonstrate that preschoolers can infer who owns what, when not explicitly told and when not reasoning about familiar objects (i.e., objects with which they are personally acquainted). Whereas, 4- and 5-year-olds had difficulty with such inferences in previous studies (Berti et al., 1982; Cram & Ng, 1989, 1994; Hook, 1993), children in the current study succeeded from as young as 2-years-old.

In serial possession tasks (Experiments 1 to 4), children were asked which of two characters owns a toy. This question had no correct answer because either character could have been the owner, and so there are many ways children might have responded: They could have selected the character who played with the toy most recently (this character also currently possessing the toy in possessed-at-end task versions); they could have selected according to the sex or the location (left or right side of the stage) of the characters; they could have selected both characters or neither; or they could have selected between the characters at random. Instead, children selected the character who possessed the toy first. This bias was predicted by the view that the first possession heuristic guides children's ownership inferences.

It is difficult for us to see what, other than first possession, might have guided children's inferences in the serial possession tasks. We ruled out the possibility that children simply selected the character first associated with the toy (Experiment 3). And it seems unlikely that children reasoned that the first possessor brought the toy from home and therefore owns it. First, our scenarios did not specify where the characters were, so children had no reason to assume that the characters were not at home. Second, children could just as easily have concluded that the second possessor will soon take the toy home, and therefore owns it.

Our findings suggest that children infer ownership with the first possession heuristic from age two. However, we also found evidence for developmental change in the use of this heuristic: In Experiment 2, 2-year-olds selected the first possessor when the toy was placed between the characters during questioning (supporting their use of the first possession heuristic), but not when the toy remained with the second possessor; 3-year-olds selected the first possessor regardless of where the toy was. What accounts for this developmental difference? One possibility is that 2-year-olds prefer responding according to current reality (e.g., toy with second possessor) over responding according to abstract principles like the first possession heuristic. When the toy is placed between the characters, current reality provides no hints about who owns the toy, and so 2-year-olds might be prompted to use the first possession heuristic. This explanation is analogous to 'reality bias' explanations for 3-year-olds' difficulty attributing false beliefs (e.g., Mitchell & Lacohee, 1991).

Alternatively, leaving the toy with the second possessor may pit the first possession heuristic against a 'current possession' heuristic, according to which an object's owner is whoever currently possesses it. If so, 2- and 3-year-olds might differ in how they resolve conflicts between the heuristics. That is, 3-year-olds might be more likely than 2-year-olds to side with the first possession heuristic.

Beyond investigating children's use of the first possession heuristic, we also investigated whether children can disregard this heuristic when provided with evidence that the first person to possess an object is not it owner. Our findings show that children *can* disregard the first possession heuristic, but suggest that their ability to do so may be quite limited. Children succeeded in correctly identifying the recipient of a gift as its owner when the gift was a wrapped birthday present (Experiment 4). But they failed when the gift was an unwrapped toy and the giving not motivated by a special occasion, often wrongly selecting the giver as owner (Experiments 4 and 5). Why did performance differ between these scenarios? We consider four explanations.

First, perhaps children use characteristic features (Keil, 1989) to recognize gift-giving situations. When an unwrapped toy is given as a present, it may lack the characteristic features of gifts (i.e., because it is not wrapped and not given on a special occasion). If so, children may have rejected the experimenter's claim that the unwrapped toy is a gift.

Second, the first possession heuristic may be prepotent and difficult to inhibit. But its prepotency might be reduced in situations where children have extensive practice disregarding it, and birthdays might be one such situation. If so, the heuristic may have been easy to inhibit when children reasoned about the wrapped birthday gift, but difficult to inhibit when they reasoned about the unwrapped toy given as a present.

Third, disregarding the first possession heuristic may be easier when the reason for disregarding it is made especially salient. If so, children may have succeeded in the scenario about the wrapped gift because this scenario provides many reminders that a gift is being given: the giving is motivated by the recipient's birthday, and the gift is wrapped and always referred to as a "present", including in the Ownership question. The unwrapped toy scenarios do not include these reminders, and children are only told once that the toy is given as a present.

The last and least interesting explanation is that children did not understand the phrase "as a present", which was only used in the scenarios about the unwrapped toys. Although we cannot conclusively reject this possibility, we regard it skeptically because we piloted the gift task using other wordings (e.g., "The boy gives the ball to the girl to keep for ever and ever; she never has to give it back") and children still performed poorly.

7.1. Future directions

Beyond testing between these four possibilities, the current paper raises many areas for future research. It will be important to discover whether 1-year-olds use the first possession heuristic, and to discover which other heuristics, or sources of information, young children use in solving the problem of who owns what.

Also worth investigating is the nature of possession. Here, we assumed that possession can be perceived, and that it is usually obvious whether someone possesses some object. Moreover, in devising our tasks we tried to make possession of the toys as obvious and uncontroversial as possible. However, possession may be subtle and complicated (Rose, 1985) and so future research might investigate what counts as possession for children (and adults), and whether the first possession heuristic works for all forms of possession. For example, findings might differ in a task pitting observed first possession against actual first possession – children would *see* one character with a toy, but be *told* that another character had possessed it earlier.

Probably the most important goal for future research is discovering the source of the first possession heuristic. Children might learn the heuristic, perhaps by hearing utterances that imply that first possessors are owners (e.g., "It's her doll, she had it first"), or by observing that first possessors usually are owners (though whether this is a statistical regularity is an open question). Alternatively, the heuristic might be innate, and perhaps the product of an innate Ownership Mechanism – a cognitive system dedicated to reasoning about ownership (for related views see Jackendoff, 1992 and Stake, 2004).

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Appendix 1. Sample story script for Experiment 1

I am going to tell you a story about these two kids. This one is a boy and this one is a girl. And what's this? It's a ball. Well, the boy plays with the ball, and then the girl plays with the ball.

And now I have a question for you.

Ownership. Whose ball is it?

Appendix 2. Sample story scripts for Experiment 4

Typical Gift

I am going to tell you a story about these two kids. This one is a boy and this one is a girl. And what's this? It is a present. Well, the boy has the present. And then he gives it to the girl *because it is her birthday*. [Italics said with emphasis.] And now the girl has the ball.

And now I have a question for you.

Ownership. Whose present is it?

Atypical Gift

I am going to tell you a story about these two kids. This one is a boy and this one is a girl. And what's this? It is a ball. Well, the boy has the ball. And then he gives it to the girl *as a present*. [Italics said with emphasis.] And now the girl has the ball.

And now I have a question for you.

Ownership. Whose ball is it?

References

Allen, R. (1995). Don't go on my property: A case study of transactions of user rights. *Language in Society, 24*, 349–372.

Bakeman, R., & Brownlee, J. R. (1982). Social rules governing object conflicts in toddlers and preschoolers. In K. J. Rubin & H. S. Ross (Eds.), *Peer relationships and social skills in childhood* (pp. 99–110). New York: Springer-Verlag.

Beggan, J. K. (1992). On the social nature of nonsocial perception: The mere ownership effect. *Journal of Personality and Social Psychology, 62*, 229–237.

Berti, A. E., Bombi, A. S., & Lis, A. (1982). The child's conceptions about means of production and their owners. *European Journal of Social Psychology, 12*, 221–239.

Brown, D. E. (1991). *Human universals*. New York: McGraw-Hill.

Canale, J. R. (1977). The effect of modeling and length of ownership on sharing behavior of children. *Social Behavior and Personality, 5*, 187–191.

Cram, F., & Ng, S. H. (1989). Children's endorsement of ownership attributes. *Journal of Economic Psychology, 10*, 63–75.

Cram, F., & Ng, S. H. (1994). Children's understanding of public ownership. *European Journal of Social Psychology, 24*, 469–480.

Dittmar, H. (1992). *The social psychology of material possessions: To have is to be*. New York: St. Martin's Press.

Eisenberg-Berg, N., Haake, R., Hand, M., & Sadalla, E. (1979). Effects of instructions concerning ownership of a toy on preschoolers sharing and defensive behaviors. *Developmental Psychology, 15*, 460–461.

Eisenberg-Berg, N., Haake, R. J., & Bartlett, K. (1981). The effects of possession and ownership on the sharing and proprietary behaviors of preschool children. *Merrill-Palmer Quarterly, 27*, 61–68.

Elkind, D., & Dabek, R. F. (1977). Personal injury and property damage in the moral judgments of children. *Child Development, 48*, 518–522.

Fasig, L. G. (2000). Toddlers' understanding of ownership: Implications for self-concept development. *Social Development, 9*, 370–382.

Flavell, J. H., Mumme, D. L., Green, F. L., & Flavell, E. R. (1992). Young children's understanding of different types of beliefs. *Child Development, 63*, 960–977.

Friedman, O. (in press). First possession: An assumption guiding inferences about who owns what. Psychonomic Bulletin & Review.

Furby, L. (1978). Possession in humans: An exploratory study of its meaning and motivation. *Social Behavior and Personality, 6*, 49–65.

Furby, L. (1980). Collective possession and ownership: A study of its judged feasibility and desirability. *Social Behavior and Personality, 8*, 165–184.

Gerstadt, C. L., Hong, Y. J., & Diamond, A. (1994). The relationship between cognition and action: Performance of children 3½–7 years old on a Stroop-like day-night test. *Cognition, 53*, 129–153.

Goldfield, B. A., & Snow, C. E. (1992). "What's your cousin Arthur's mommy's name?": Features of family talk about kin and kin terms. *First Language, 12*, 187–205.

Hook, J. (1993). Judgments about the right to property from preschool to adulthood. *Law and Human Behavior, 17*, 135–146.

Irwin, F. W., & Gebhard, M. E. (1946). Studies in object-preferences: The effect of ownership and other social influences. *American Journal of Psychology, 59*, 633–651.

Jackendoff, R. S. (1992). *Languages of the mind*. Cambridge, MA: MIT Press.

James, W. (1890). *The principles of psychology*. New York: Holt.

Kahneman, D., Knetsch, J., & Thaler, R. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of Political Economy, 98*, 1325–1348.

Kalish, C. W., Weissman, M. D., & Bernstein, D. (2000). Taking decisions seriously: Young children's understanding of conventional truth. *Child Development, 71*, 1289–1308.

Keil, F. C. (1989). *Concepts, kinds, and conceptual development*. Cambridge, MA: MIT Press.

Lueck, D. (1995). The rule of first possession and the design of law. *Journal of Law and Economics, 38*, 393–436.

Miller, G. A., & Johnson-Laird, P. N. (1976). *Language and perception*. Cambridge, MA: Harvard University Press.

Mitchell, P., & Lacohee, H. (1991). Children's early understanding of false belief. *Cognition, 39*, 107–127.

Moessinger, P. (1975). Developmental study of fair division and property. *European Journal of Social Psychology, 5*, 385–394.

Murdock, G. R. (1945). The common denominator of culture. In R. Linton (Ed.), *The science of man in the world crisis*. New York: Columbia University Press.

Parke, R. D. (1974). Rules, roles, and resistance to deviation: Recent advances in punishment, discipline, and self-control. In A. D. Pick (Ed.). *Minnesota symposium on child psychology* (Vol. 8, pp. 111–143). Minneapolis: University of Minnesota Press.

Rose, C. M. (1985). Possession as the origin of property. *The University of Chicago Law Review, 52*, 73–88.

Ross, H. S. (1996). Negotiating principles of entitlement in sibling property disputes. *Developmental Psychology, 32*, 90–101.

Ross, H., Tesla, C., Kenyon, B., & Lollis, S. P. (1990). Maternal intervention in toddler peer conflict: The socialization of principles of justice. *Developmental Psychology, 26*, 994–1003.

Shantz, C. U. (1987). Conflicts between children. *Child Development, 58*, 283–305.

Snare, F. (1972). The concept of property. *American Philosophical Quarterly, 9*, 200–206.

Sprankling, J. (2000). *Understanding property law*. New York: Lexis.

Stake, J. E. (2004). The property 'instinct'. *Philosophical Transactions of the Royal Society B: Biological Sciences, 359*, 1763–1774.

Staub, E., & Noerenberg, H. (1981). Property rights, deservingness, reciprocity, friendship: The transactional character of children's sharing behavior. *Journal of Personality & Social Psychology, 40*, 271–289.

Thaler, R. (1980). Towards a positive theory of consumer choice. *Journal of Economic Behavior and Organization, 1*, 39–60.

Tomasello, M. (1998). One child's early talk about possession. In J. Newman (Ed.), *The linguistics of giving* (pp. 349–373). Philadelphia: John Benjamins.