

Children's and Adults' Intuitions about Who Can Own Things

Nicholaus S. Noles^{a,*}, Frank C. Keil^b, Paul Bloom^b and Susan A. Gelman^a

^a Department of Psychology, University of Michigan, 2010 East Hall, 530 Church Street, Ann Arbor, MI 48109-1043, USA

^b Department of Psychology, Yale University, 2 Hillhouse Avenue, New Haven, CT 06520-8205, USA

* Corresponding author, e-mail: Nicholaus.Noles@gmail.com

Abstract

The understanding that people can own certain things is essential for activities such as trading, lending, sharing, and use of currency. In two studies, children in grades K, 2 and 4 ($N=118$) and adults ($N=40$) were asked to identify whether four kinds of individuals could be owners: typical humans, non-human animals, artifacts, and atypical humans (e.g., individuals who were sleeping or unable to move). Participants in all age groups attributed ownership to typical humans most often, non-human animals less often, and artifacts least often. In a third study, children and adults ($N=240$) attributed property rights to individuals who were awake, asleep, or tied up, but children continued to deny that these rights extend to atypical humans. Although both children and adults use an ontological boundary to guide their ownership attributions, concepts of owners change significantly over the course of development.

Keywords

Ownership, property, owner, categories

Who or What Are Owners?

The understanding that people can own certain objects and animals exists in every human culture (Brown, 1991). Ownership is an essential element of determining individual's right to use, and in the case of food, consume property. More generally, concepts of ownership are essential to social interactions, such as trading, lending, and sharing, and the concept of currency is predicated on private ownership.

Many aspects of ownership have been examined empirically in adults (see Pierce et al., 2003 for review), ranging from studies focusing on how we reason about owned versus not-owned objects (Thaler, 1980; Kahneman et al., 1990) to the relationships between objects and the self (Belk, 1988) to the role of

psychological ownership in the workplace (Pierce et al., 2004). Other studies have focused on the psychological meaning of property in relation to gender (Dittmar, 1991) and social category (Dittmar, 1992, 1994). In many ways, the things that we own socially and culturally define us. However, despite this wide diversity of approaches to the psychology of ownership, there are some gaps in our understanding regarding how people relate to property, especially from a developmental perspective (for a review, see Noles and Keil, 2011).

Some intuitions about ownership appear long before children enter school. Concepts of ownership are thought to be early emerging (e.g., Rodgon and Rashman, 1976), perhaps representing a “primitive” of social cognition (Jackendoff, 1992). For example, 18-month-olds differentiate between what is “mine” and what is “yours” (Nelson, 1976; Hay, 2006), and children as young as two are able to accurately identify their possessions and the possessions of other family members (Fasig, 2000). By age five, children exhibit adult-like intuitions when identifying property (Noles et al., 2009) and use nuanced heuristics such as first possession (Friedman and Neary, 2008) and “control of permission” (i.e., the right to determine who can and cannot use property, see Neary et al., 2009) to make attributions of ownership. Children also exhibit an adult-like bias to over-value personal property (i.e., the same irrational loss aversion and endowment effects demonstrated by adults; Harbaugh et al., 2001)—a finding that has been replicated with capuchin monkeys (Chen et al., 2006). Thus, even children’s earliest thoughts about ownership are multifaceted and show some degree of continuity with adult thinking.

In other respects, however, the full range of ownership concepts takes considerable time to develop. Children show no clear understanding of the distinction between owning and possessing at age two, though they do begin to understand this distinction by age four (Ross, 1996). Similarly, although young children understand that owners have more rights with respect to their property than non-owners, they do not grant the same property rights to owners that adults do (e.g., rights to access, use, transfer) until age eight or later (Hook, 1993; Kim and Kalish, 2009). Furthermore, children often have difficulty reasoning about property transfers, such as giving and selling, in novel contexts. With familiar scenarios, such as birthday parties, children can correctly identify owners following a property transfer. However, outside of this familiar scenario, children generally conflate property ownership with first possession, even after explicit transfers of ownership (Blake and Harris, 2009; Friedman and Neary, 2009), and children maintain this conservative stance until at least age 8 (Noles and Keil, data not shown). There are, therefore, certain aspects of a full understanding of ownership that elude younger children. In particular, children may fail to fully comprehend that the invisible

and abstract relationships between individuals and objects are often defined in social or psychological terms, rather than physical terms (e.g., use or proximity). As Snare (1972) put it, “a stolen apple doesn’t look any different from any other” (p. 200).

There are also cultural restrictions on ownership that have to be learned; for instance, in some societies, you can own people, and in others you cannot. Even within a society, there are subtle cases where people disagree: Can one own a patent on someone else’s DNA? Can one own a marketing innovation such as the “one-click” popularized by amazon.com? Thus, some strong and universal adult intuitions about some features of ownership may be much more tentative in children and require reinforcement by a culture. Conversely, ownership may be an entry point for children to begin to understand the social constructs that define many human interactions (Kalish and Anderson, 2011).

This investigation explores a fundamental aspect of understanding ownership that has been largely neglected, especially from a developmental perspective: Who, or what, can be an owner? We investigate these issues by asking children of different ages and adults to identify entities that can own property. Critically, we vary the ontological type of the potential owner, presenting participants with humans, non-human animals, and artifacts. In order to clarify the role of cognitive and physical capacity on attributions of ownership, we also vary the kinds of entities presented within two of these categories. For humans, we vary the age of potential owners and their physical and mental capabilities. For animals, we vary potential owners’ types (e.g., insects, mammals).

If children have a mature understanding of ownership, then they should endorse a relatively restricted range of entities, as adults do. A television has a remote, for example, but it does not own it. It is unclear, however, even for adults, just what is required to be an owner. In particular, we have less clear predictions about the extent to which children will ascribe ownership to non-human animals. For example, owners may need to meet a minimum cognitive requirement, but children may endorse animal owners that adults reject because children sometimes inflate the psychological sophistication of relatively simple organisms (e.g., Inagaki and Hatano, 1991). In contrast, if attributions of ownership vary between children and adults, then concepts of owners may be culturally specific.

Whereas broadly manipulating ontological type allows us to examine stable characteristics of cognitive capacity, manipulating age and species allows us to examine both transient aspects of cognitive capacity (i.e., age in humans) and stable traits that vary across different kinds of animals. Humans exhibit impressive cognitive abilities compared to other categories of thinking creatures.

However, the cognitive capacity expressed by any living thing varies over time. Young humans typically demonstrate less ability than older humans, some animals have greater cognitive and physical capabilities than others, and most organisms display little activity when they are asleep. Our studies ask if children and adults are sensitive to these factors and if they use them in making attributions of ownership.

Experiment 1

In Experiment 1, we asked children and adults whether a wide variety of people, non-human animals, and artifacts could own certain items (see Table 1). In common parlance, people often refer to a dog's bone or a horse's saddle, but no empirical test has determined if children and adults treat associations between animals and objects as ownership, or if these statements are simply linguistic shortcuts. Artifacts are similarly associated, but again may or may not be construed as owners.

The potential owners we examined represent four distinct ontological types: non-human animals, artifacts, typical humans, and atypical humans. Animals included individuals from a variety of classes, including insects, fish, and mammals. Typical humans included individuals of different ages, ranging from infancy through old age. Atypical humans included individuals who were in some way limited by their cognitive or physical state. This design allowed us to identify the ontological boundaries of property ownership and to determine whether either stable or transient variability in physical and cognitive capacities influenced attributions of ownership.

Method

Participants. Twenty kindergarteners (13 male, $M=6;0$), 20 second-graders (9 male, $M=8;5$), 20 fourth-graders (16 male, $M=10;3$), and 20 adults (10 male) participated in this study. Participants were recruited in a small university town in New England and in small towns in the Southeastern United States. Children were interviewed individually at their schools. Adults were undergraduates were tested in a laboratory setting. Participants represented a variety of socioeconomic and ethnic backgrounds. Children received a certificate and a sticker for their participation, and adults received a snack.

Procedure. Adults completed a survey containing twenty questions in the following format: "Can a [*target owner*] own a [*target object*]?" Each target object was selected to be something that thematically "goes with" or could be used or

Table 1
Test items

Typical humans	Animals
Can a little baby own a blanket?	Can a worm own a tiny pebble?
Can a toddler own a toy car?	Can a butterfly own a grain of sand?
Can a teenager own a book?	Can a lizard own a piece of tinfoil?
Can a grown woman own a watch?	Can a mouse own a piece of cotton?
Can a very old man own a chair?	Can a bird own a piece of string?
	Can a horse own a saddle?
Atypical mental states	Can a dog own a ball?
Can a grown woman who is only as smart as a very small child own a stapler?	Can a monkey own a stick?
Can a man who is asleep own a coffeepot?	
Can a woman who is asleep and no one knows if she will ever wake up own a desk?	Artifacts
Can a man who is awake but cannot move own a dax?	Can a watch own a wrist?
Can a man who cannot see or hear or talk own a dax?	Can a book own a shelf?
	Can a couch own a pillow?

Queries from Experiments 1 and 2. Unique object names were used in Experiment 1, but an object referred to as a “dax” was substituted for these objects in Experiment 2.

carried by the corresponding potential owner; see Table 1 for the complete list). Our goal was to provide participants with the best opportunity to positively identify owners. Children received the same set of questions as adults, but in order to make the task easier for younger participants and reduce memory load, black-and-white line drawings accompanied each item and items were presented in booklet format. Each page of the booklet contained a picture of a potential owner on the left side of the page and a picture of an object

on the right. Items were randomized and presented in one of two orders. For child participants, the experimenter asked each question aloud, indicating the target owner and object for each item.

Many investigations of ownership either implicitly or explicitly avoid use of the word “own” in favor of possessive language (e.g., Is it Todd’s?) or synonyms (e.g., Which one belongs to Todd). Anecdotally, the primary concern expressed about “own” is that children might not understand the meaning of the word. In the present study, we employed “own” because it is the word most directly tied to the study of ownership. However, in order to address this concern, we presented an additional 18 children (8 male, $M_{\text{age}}=6.39$) with questions about ownership. Embedded in these questions were two queries about ownership, one using the word “own” and another using either possessive language or “belongs to”. Children’s ownership attributions almost universally aligned. With the exception of a single child, when they determined that an individual owned – or did not own – something, they made the same response to the alternative query and vice versa.

Results and Discussion

In order to determine the effect of the different item types within each age group, we collapsed participants’ responses into composite scores for each item type (typical humans, atypical humans, animals, artifacts), ranging from 0 (participants endorsed no owners of this Item Type) to 1 (participants endorsed every owner of this Item Type). An omnibus analysis of variance (ANOVA) employing Age as a between subjects factor and Item Type as a within subjects factor revealed significant main effects for Item Type ($F(3, 74)=134.02, p<0.001, \eta^2=0.845$), as well as a significant Age \times Item Type interaction ($F(9, 228)=6.91, p<0.001, \eta^2=0.214$). Additional analyses by Age revealed significant effects of Age across all item types (all $p<0.01, \eta^2$ ranging from 0.15 to 0.40). As shown in Figure 1a, few young children attributed ownership to atypical humans, but as participant age increased, so did ownership attributions for atypical humans. Conversely, approximately half of our sample of 6–8-year-olds attributed ownership to artifacts, but these attributions became more rare as age increased. Finally, although the overall number of ownership attributions was much higher for typical humans than for animals, response patterns were similar for both Item Types: the number of ownership attributions gradually increased with Age until age ten and then fell in adults. For specific rates of endorsement by item, see Figure 2a.

Additional analyses by Item Type (see Figure 1a) revealed that participants in every age group except kindergarteners endorsed a significantly higher proportion of Typical Humans as owners than Artifacts or Non-human Animals.

Figure 1a: Experiment 1

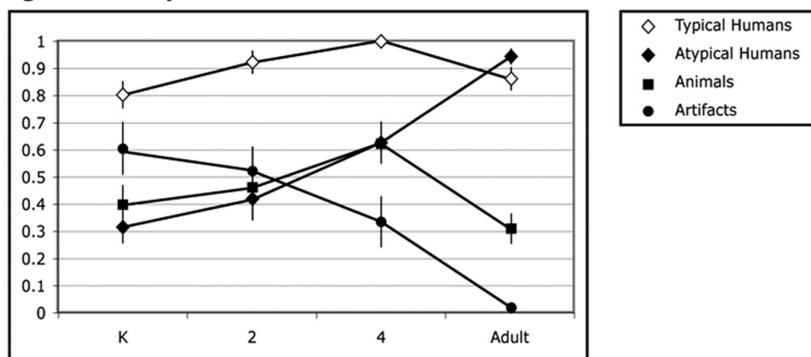


Figure 1b: Experiment 2

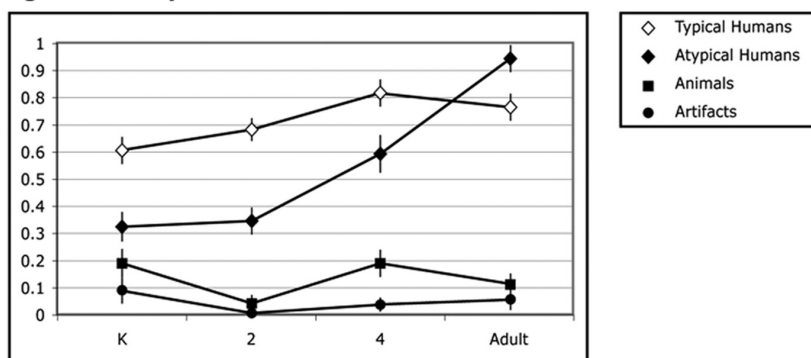


Figure 1. Mean composite scores for each age group.

Kindergarteners endorsed significantly more Typical Humans than Non-human Animals, but although they endorsed more Typical Humans than Artifacts, the difference between these two Item Types was not significant. Despite sharing a tendency to attribute ownership to Typical Humans, children and adults differed in their evaluation of the status of Atypical Human owners. Whereas adult endorsement of humans did not differ between Typical and Atypical Humans, children in all age groups only endorsed significant proportions of Typical Humans and treated Atypical Humans as more similar to Artifacts and Non-human Animals. Children also endorsed significantly more non-human items than adults, but only a small set of these items was endorsed above chance (see Figure 2a).

Ontological type played a central role in all participants' attributions of ownership. In all age groups, typical humans were most often viewed as potential

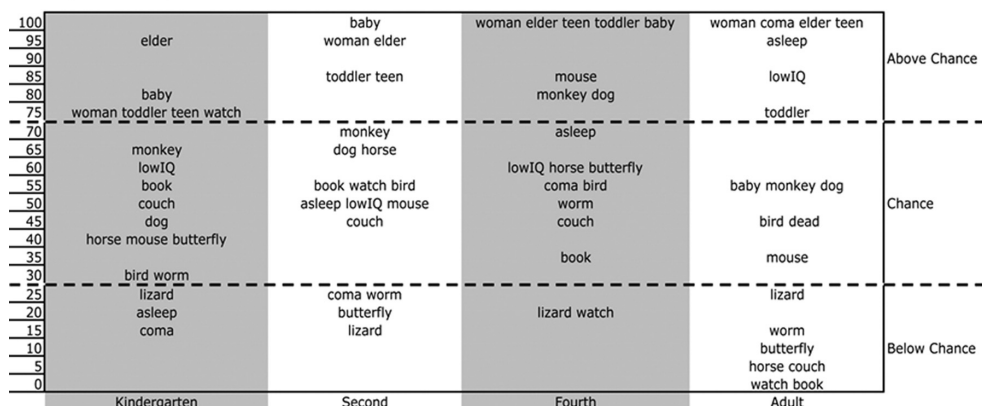
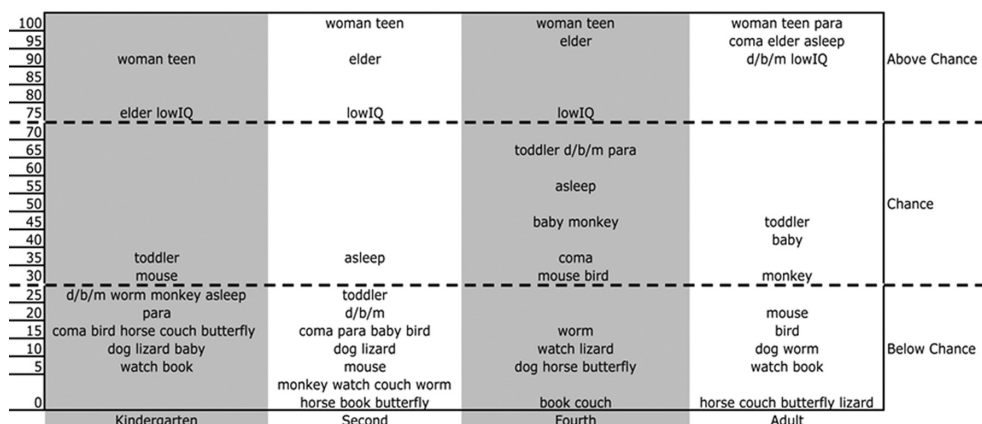
Figure 2a: Experiment 1**Figure 2b: Experiment 2**

Figure 2. The graphs above demonstrate the percentage of each test population that endorsed each item. Items above the dotted lines were endorsed by a significant portion of the relevant population, while items below the dotted lines were rejected by a significant proportion of each population as calculated using the binomial theorem.

owners, and artifacts and non-human animals were viewed as potential owners less often. Although young children demonstrated the same basic ontological boundaries as adults, they differed strongly in their reaction to atypical humans. The majority of kindergarten and second grade children judged that atypical humans were not owners, and most adults judged that atypical humans were owners. Children seemed to overemphasize the current cogni-

tive and physical capacity of potential owners, endorsing owners when their capacity is high and rejecting them when their capacity is low, even when the source of the capacity reduction was temporary and familiar (e.g., when a person was asleep). In contrast, adults appear to treat cognitive and physical capacity as a stable trait of all humans.

Experiment 2

The pattern of results reported in Experiment 1 indicates that children endorsed more non-humans than adults and rejected the notion that Atypical Humans owned property. These developmental differences may result from conceptual differences between adults and young children. But we were concerned that our younger participants may have substituted simple associations for owner–object relationships. For example, many kindergarteners may have attributed ownership of the watch to the wrist because watches and wrists are strongly associated. In order to control for owner–object associations, we replaced the multiple target objects employed in Experiment 1 with a single ambiguous object in Experiment 2.

We also further explored the influence of cognitive and physical restrictions on attributions of ownership by adding two additional owners, a paralyzed individual and an individual who could not speak, hear, or see. In Experiment 1, approximately half of the young children tested attributed ownership to the low intelligence human, but a significant proportion of these same children did not attribute ownership to individuals who were unconscious, regardless of whether their reduction in physical and cognitive capacity was temporary (i.e., they were asleep) or potentially permanent (i.e., they were in coma). The additional items in Experiment 2 explore in more detail the kinds of capacity limitations that children find unacceptable in potential owners.

Method

Participants. Participants included 20 kindergarteners (11 male, $M=6;4$ months), 18 second-graders (9 male, $M=7;5$), 20 fourth-graders (8 male, $M=10;3$) and 20 adults (11 male) drawn from the same populations used in Experiment 1.

Procedure. Stimuli were identical to Experiment 1, with the addition of two new drawings that represented a man who was paralyzed and a man who was deaf, blind, and mute. Target items were replaced with a small cylindrical wooden dowel, 2.5 cm long and 0.8 cm in diameter, commonly used in assembling

furniture. This item was selected because it was small, portable, neutral in appearance, and unfamiliar to the children. All participants were shown the dowel at the beginning of the session. The experimenter identified the object as a “dax” and then read each item aloud. All other procedural details were identical to Experiment 1.

Results and Discussion

Composite scores were compiled and analyzed as in Experiment 1. There were significant main effects for Age ($F(3, 74)=12.34, p<0.001, \eta^2=0.333$) and Item Type ($F(3, 72)=208.33, p<0.001, \eta^2=0.897$), as well as a significant Age \times Item Type interaction ($F(9, 222)=6.60, p<0.001, \eta^2=0.211$). Additional analyses by Item type identified significant effects of Age for Typical Humans ($F(3, 74)=4.47, p=0.006, \eta^2=0.153$) and Atypical Humans ($F(3, 74)=27.04, p<0.001, \eta^2=0.523$), but no significant effects for Animals or Artifacts.

Removing strong owner-object associations resulted in fewer overall attributions of ownership and a polarization of children’s response patterns. Instead of responding randomly, a significant portion of children either attributed ownership to an entity or did not for most items (see Figure 2b). Additional analyses by Age and Item Type revealed that participants in Experiment 2 exhibited the same general response patterns as those recorded in Experiment 1 when they were presented with typical and atypical humans, but responses to animals and artifacts were dramatically different. In the absence of strong owner-object associations, neither adults nor children attributed ownership to animals (see Figure 1b). Participants in all age groups used ontological type to guide their attributions of ownership. As in Experiment 1, atypical humans were identified as owners by a very small number of children under age 8. However, ownership attributions for this Item Type jumped dramatically after age eight and then again in adulthood.

The new items tested in Experiment 2 offer some additional insight into children’s refusal to attribute ownership to atypical humans. A significant proportion of children attributed ownership to the atypical human with low intelligence (see Figure 2b), but young children did not attribute ownership to the paralyzed individual. Ostensibly, the paralyzed individual is unable to move, but still enjoys the full cognitive capabilities of a conscious adult. The overall pattern of ownership attributions made by young children indicates that it is not the cognitive limitations of atypical humans that prevents them from owning property, but rather their inability to exercise their property rights. If atypical humans were unable to use property or keep other people from infringing on their property rights (e.g., who could not detect that their

property rights were being violated), then they were not identified as owners by young children.

Experiment 3

In Experiments 1 and 2, children reported that humans with physical limitations could not be owners, even when those limitations were familiar and temporary. We were especially intrigued by children's rejection of a potential owner that was merely asleep, because sleep is a temporary state and prior research has shown that young children understand the nature of sleep relatively well (e.g., Barrett and Behne, 2005).

There are at least two ways to explain this disconnect between child and adult intuitions. First, it is possible that the children were using different rules to determine if target owners could own property. For example, children may employ a stricter test than adults when identifying owners, leading them to reject the ownership rights of paralyzed individuals because they cannot fully exercise property rights (e.g., they cannot ride a bike, therefore they cannot own a bike). Conversely, adults may dismiss the inability to use property because ownership entails the right to use property but does not require it (e.g., a person can own a bike even if they have never learned to ride one). Second, perhaps our task did not accurately assess children's ownership concepts. That is, children may have interpreted "Can a man who is asleep own a dax?" as "Can a man who is asleep acquire or use a dax?" If so, then perhaps their intuitions about owners were justified.

Also, children's explicit knowledge of ownership may lag behind their implicit knowledge. For example, children may not explicitly recognize that sleeping individuals can be owners, but they may object if someone were to steal from a sleeping individual. If children truly believe that a sleeping actor is not an owner, then stealing from a sleeping person should not be interpreted as a moral violation or theft. In order to explore these possibilities more thoroughly, we designed an experiment focused on exploring children's interpretations of ownership, property rights, and physical limitations directly.

Method

Participants. Participants in Experiment 3 included 60 kindergarteners and first-graders (29 male, $M=6;0$), 60 second- and third-graders (31 male, $M=8;3$), 60 fourth- and fifth-graders (32 male, $M=10;1$) and 60 adults. Children were recruited and interviewed at their schools. Adults were tested in private testing spaces and received course credit for completing the experiment.

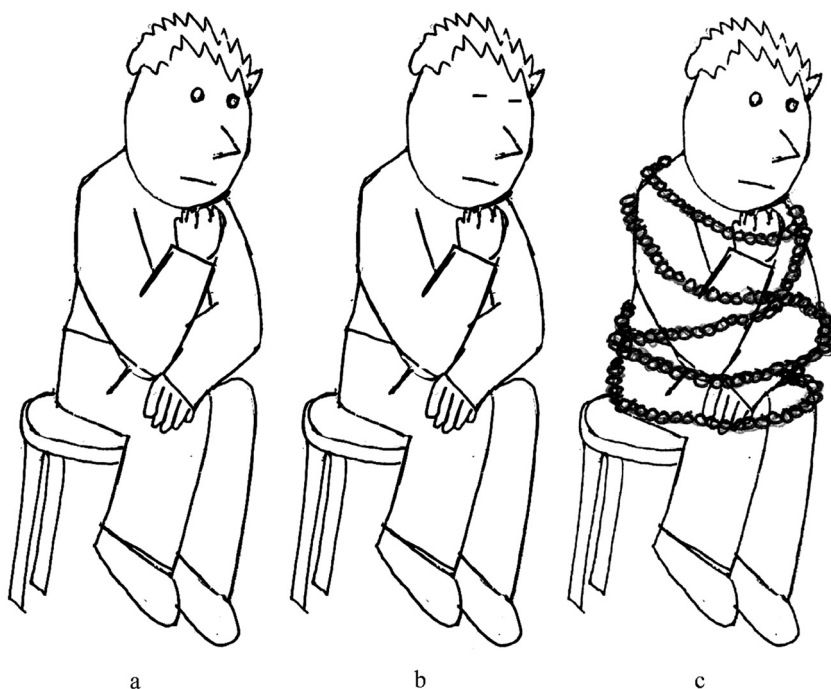


Figure 3. Pictures shown to child participants in Experiment 3 to represent (a) a person who is awake, (b) a person who is asleep, and (c) a person who is tied up.

Procedure. Participants were presented with a two-page booklet containing line drawings depicting an actor and his property. The first page depicted an actor sitting on a stool and a ball on a table (see Figure 3a). The experimenter presented this page and said, “This is Bob. This is Bob’s ball.” The second page varied by condition. In the Awake Condition, page two was identical to page one, and the experimenter said, “Look! Bob is awake.” In the Sleep Condition, Figure 3a was replaced with Figure 3b and the experimenter said, “Look! Bob is asleep.” Likewise, in the Tied-up Condition, Figure 3a was replaced with Figure 3c and the experimenter said, “Look! Bob is tied-up.” The “Bob” figure was carefully designed so that he could be described as awake, asleep, or tied-up with little change to the picture. Conditions varied only in the pictures on the second page of the booklet and the states referenced in each test item.

After presenting a scenario, the experimenter presented participants with the nine questions listed in Table 2. These questions included a query about ownership (Item 1), a practical control question to determine whether chil-

dren accurately understood the manipulation (Item 2), and three questions (Items 3–5) that roughly map onto property rights, including rights of use, control of permission, and transfer (i.e., giving). Two additional questions further explored property transfers (Items 6 and 7) by focusing on property acquisition through buying and receiving gifts. We also included a question about theft (Item 8) and a follow-up question asking participants to indicate whether theft from the actor would be “wrong” (Item 9). Items were presented in this order so that children would roughly proceed from more central and concrete aspects of ownership to more abstract and complex elements.

Results and Discussion

Responses to the nine items were collapsed into a composite score (Item 8 was reverse coded) ranging from 0 (no ownership, property rights, or physical abilities were attributed to the actor, and it was not wrong to take the actor’s object) to 9 (participants attributed ownership, independent action, and a full suite of property rights to the actor, and considered it wrong to take the actor’s object) for each participant. Composite scores were analyzed with an ANOVA using Age and Condition as factors, revealing significant effects for both Age ($F(3, 228)=13.07$, $p<0.001$, $\eta^2=0.147$) and Condition ($F(2, 228)=638.14$, $p<0.001$, $\eta^2=0.848$), as well as a significant Age \times Condition interaction ($F(6, 228)=6.67$, $p<0.001$, $\eta^2=0.149$). However, this omnibus test combined items that probe different intuitions across Condition. In order to extract more meaningful information from our data, we further analyzed responses to each item across both Age and Condition using Kruskal-Wallis tests for several independent samples (see Table 2).

Children and adults uniformly agreed that an individual who was awake owned property. In contrast, there was developmental shift in their judgments about individuals who were asleep or tied up. A significant proportion of adults, 10- and 8-year-olds determined that simply falling asleep did not break the owner-property bond, but only 35% of 6-year-olds reported that Bob still owned the ball after he fell asleep. Similarly, in the Tied-up condition, many children reported that Bob no longer owned the ball after he was tied up, but older children increasingly attributed ownership to tied-up Bob. Both the Sleep and Tied-up conditions exhibited significant Age effects; more children attributed ownership to sleeping and tied-up actors as age increased. These results are similar to those reported in Experiments 1 and 2.

An examination of the “Rights” items (Items 3–5) revealed that children and adults generally agreed on the set of property rights that could be exercised by actors in each condition, so children’s rejection of Atypical Humans is not driven by different right attributions. Rather, using the same underlying

Table 2
Experiment 3 data

Item	Age	Awake	Sleep	Tied-up	χ^2 (2, N=80)
Item 1: Does Bob still own the ball now that he is [state]?	6 years old	0.8	0.35	0.30	11.94, $p<0.01$
	8 years old	0.95	0.75	0.60	6.78, $p<0.05$
	10 year old	1.0	0.85	0.70	6.94, $p<0.05$
	Adult	0.85	1.0	1.0	6.21, $p<0.05$
Item 2: Can Bob see the ball while he is [state]?	χ^2 (3, N=60)	5.49, $p=0.14$	23.66, $p<0.01$	21.7, $p<0.01$	
	6 years old	1.0	0.00	1.0	59.00, $p<0.01$
	8 years old	1.0	0.00	1.0	59.00, $p<0.01$
	10 year old	1.0	0.00	1.0	59.00, $p<0.01$
	Adult	1.0	0.00	1.0	59.00, $p<0.01$
Item 3: Can Bob play with the ball while he is [state]?	χ^2 (3, N=60)	0.00, $p=1.0$	0.00, $p=1.0$	0.00, $p=1.0$	
	6 years old	1.0	0.00	0.00	59.00, $p<0.01$
	8 years old	1.0	0.00	0.00	59.00, $p<0.01$
	10 year old	1.0	0.00	0.00	59.00, $p<0.01$
	Adult	1.0	0.00	0.05	59.00, $p<0.01$
Item 4: Can Bob keep other people from playing with the ball while he is [state]?	χ^2 (3, N=60)	0.00, $p=1.0$	0.00, $p=1.0$	0.00, $p=1.0$	
	6 years old	0.80	0.00	0.20	30.68, $p<0.01$
	8 years old	0.90	0.00	0.00	50.57, $p<0.01$
	10 year old	0.95	0.00	0.00	54.68, $p<0.01$
	Adult	0.95	0.00	0.10	47.11, $p<0.01$
Item 5: Can Bob give the ball to a friend while he is [state]?	χ^2 (3, N=60)	3.29, $p=0.35$	0.00, $p=1.0$	7.83, $p=0.05$	
	6 years old	1.0	0.00	0.30	42.18, $p<0.01$
	8 years old	1.0	0.10	0.10	44.25, $p<0.01$
	10 year old	1.0	0.00	0.15	48.39, $p<0.01$
	Adult	1.0	0.00	0.35	40.92, $p<0.01$
	χ^2 (3, N=60)	0.00, $p=1.0$	6.08, $p=0.11$	4.81, $p=0.19$	

Table 2 (cont.)

Item	Age	Awake	Sleep	Tied-up	χ^2 (2, N=80)
Item 6: Can Bob buy a new ball while he is [state]?	6 years old	0.95	0.00	0.15	44.18, $p<0.01$
	8 years old	0.95	0.00	0.05	50.59, $p<0.01$
	10 year old	1.0	0.00	0.00	59.00, $p<0.01$
	Adult	1.0	0.00	0.05	54.89, $p<0.01$
Item 7: Can someone give Bob a new ball while he is [state]?	χ^2 (3, N=60)	2.03, $p=0.57$	0.00, $p=1.0$	4.00, $p=0.26$	
	6 years old	1.0	0.25	0.70	24.64, $p<0.01$
	8 years old	0.95	0.50	0.65	9.83, $p<0.01$
	10 year old	1.0	0.70	0.80	6.61, $p<0.05$
	Adult	1.0	1.0	1.0	0.00, $p=1.0$
Item 8: Can someone else take the ball home with them while Bob is [state]?	χ^2 (3, N=60)	3.00, $p=0.39$	25.12, $p<0.01$	8.48, $p<0.05$	
	6 years old	0.65	0.55	0.45	1.59, $p=0.45$
	8 years old	0.65	0.20	0.05	18.26, $p<0.01$
	10 year old	0.35	0.15	0.00	8.73, $p<0.05$
	Adult	0.90	0.00	1.0	51.38, $p<0.01$
Item 9: Would it be wrong for someone else to take the ball home with them while Bob is [state]?	χ^2 (3, N=60)	12.98, $p<0.01$	18.45, $p<0.01$	54.14, $p<0.01$	
	6 years old	0.75	0.85	0.95	3.09, $p=0.21$
	8 years old	1.0	1.0	1.0	0.00, $p=1.0$
	10 year old	0.90	1.0	1.0	4.07, $p=0.13$
	Adult	0.60	1.0	0.95	14.65, $p<0.01$
	χ^2 (3, N=60)	11.91, $p<0.01$	9.23, $p<0.05$	2.03, $p=0.57$	

The state referred to in particular questions varied by condition, including the following states: awake, asleep, and tied-up. Data in boldface represent significant Age effects within a given condition.

property right attributions, children and adults made different ownership attributions. If humans lacked the ability, even temporarily, to exercise their property rights, then children judged that they were not owners. In contrast, adults attributed ownership to humans even when they were unable to exercise most of their property rights.

Responses to the acquisition items (Items 6 and 7) revealed that most participants did not believe that sleeping or tied-up actors could acquire property. Also, although adults believed that actors in all three conditions could receive new property (see Table 2, Item 7), few children shared this sentiment. A significant proportion of six-year-olds denied that sleeping actors could receive property, but this proportion was smaller in older age groups. Children in the Tied-up condition expressed a similar, but less extreme response pattern. Young children believe that some cognitive investment or action is required to acquire property, even when acquisition is as simple as receiving a gift. Acquisition appears to be a primarily cognitive undertaking, because most children infer that a restrained person can receive a gift, but acquisition appears to be rooted to some degree by the physical action of receiving a gift because restraint is sufficient to block ownership attributions for some children.

In designing Experiment 3, we assumed that presenting children with an item focusing on theft would provide them with an opportunity to demonstrate implicit knowledge about ownership that could potentially surpass their explicit knowledge. Half of the six-year-olds indicated that someone could take the property of a sleeping actor, but few participants over age eight shared this belief. Moreover, the majority of participants in all age groups noted that taking property from a sleeping person would be wrong. This pattern of results is duplicated in the Tied-up condition with exception of the adults, who indicate that property can be taken from someone who is restrained.

Participants' responses to the Awake condition were more difficult to interpret. Many children and a statistically significant number of adults in the Awake condition stated that a person could take the property of an awake and unencumbered actor. More children reported that property could be taken from a wakeful actor than from a restrained actor. Thus, it appears that the ability to act intentionally, which is possessed by the Awake actor but not by the Tied-up actor, may play an important role in interpretations of theft.

Children clearly demonstrated an important asymmetry in their judgments about ownership and their intuitions about the morality of theft. A significant proportion of all age groups – except, strangely, adults – indicated that it would be wrong to take property from individuals regardless of their state. This asymmetry indicates that even the youngest children tested here understand that a sleeping or tied-up individual retains moral rights to an object, despite reporting that the individual does not own it.

The finding that young children deny ownership to a sleeping or tied-up person, yet express moral displeasure toward taking an object from a sleeping or tied-up person, is on the surface contradictory. Why might children make these contrasting judgments? Which judgment is a more accurate assessment of children's ownership concepts? Both responses may reflect important aspects of young children's ownership concepts. On the one hand, children are biased toward treating "own" as meaning "exercise ownership rights", thus focusing more than adults on the outward behavioral manifestations or consequences of ownership than on the sources of ownership. This bias undergoes developmental change between six and eight years of age. On the other hand, young children understand that ownership entails a set of rights, and that people with limited cognitive or physical capacities still have ownership rights. These two sets of beliefs are contradictory to adult perspectives that emphasize coherence and consistency across belief systems.

Children may have also shown adult-like patterns on Item 9 because they have heard parents and others explain how wrong it is to steal. However, this possibility would not explain why children would consider taking an object from a sleeping person to be stealing in the first place. Thus, the finding remains that even young children show inconsistent treatment of the ownership capacities of a person lacking psychological or physical capacities.

General Discussion

These experiments examine developmental differences in which items and entities can be considered owners, taking into account both ontological variation and variation in cognitive and physical capabilities. In Experiment 1, we discovered that both children and adults attributed ownership to typical humans. Adults also identified atypical adults as owners, but young children did not. Children also attributed ownership to more animals and artifacts than adults. When strong owner-object associations were removed in Experiment 2, the overall pattern of children's ownership attributions became more consistent and adult-like. All age groups used ontological boundaries to identify owners, indicating that children and adults shared intuitions about who and what can be an owner, but children's inferences were more readily contaminated by associative cues. Sensitivity to these cues is entirely appropriate. If a colleague wears the same watch every day, then it is likely that they own it. Indeed, Friedman and Neary (2008) have shown that simple proximity is sufficient to yield inferences that individuals own nearby objects. Thus, one surprising aspect of these data is not that children were overly inclusive when making ownership attributions, but that they were even more restrictive than adults.

In addition to the rough “humans only” ontological boundary that our adult participants applied, children also required owners to meet additional physical and cognitive capacity requirements. We explored children’s stricter ownership requirements in a study examining how individuals’ intuitions about ownership and property rights changed depending on whether an individual was awake, asleep, or physically restrained. Adults and children attribute the same abilities to individuals who are awake, asleep, and tied-up, but whereas adults attribute ownership to all of these individuals, children do not. Yet, even the youngest children judge it to be wrong to take an object away from a person who is sleeping or otherwise incapacitated. The youngest children, then, focus either on property rights (in the case of who can be an owner) or possession (in the case of moral judgments) when thinking about ownership but do not combine these elements into a consistent or coherent larger system. This duality reflects the multifaceted nature of ownership concepts.

Several underlying developmental differences may account for the age effects in our data. First, children and adults may differ in the way that they conceptualize the structure of ownership rights. At the most abstract level, ownership is a relationship between a person and an object. However, in a practical and legal sense, ownership is commonly treated as a bundle of separable rights (a view first systematically explored by Hohfeld, 1913). It is possible that adults conceptualize ownership in that way, whereas young children view ownership as a unitary link between person and property, judging that the absence of any single separable right severs this link. If so, the critical challenge faced by children during development would be to replicate the work of the modern legal system and evolve their view of ownership from a single-link to a rights-bundle framework. Second, children and adults may share a common framework for representing ownership (e.g., rights-bundles), but children may apply stricter criteria for identifying owners than adults. For example, children may determine that an individual cannot properly be identified as an owner if they are unable to exercise the full suite of property rights (e.g., if a sleeping individual cannot use objects, then they cannot own them).

Alternatively, children and adults may not share the same view of the owner-object relationship. Specifically, adults may understand the relationship between owner and property as a uniquely abstract and social connection that is persistent because it is maintained by both owners (who protect their privileged status) and non-owners (who observe and maintain links between people and property so as to maintain social order), whereas children may consider ownership to be a transient, active psychological undertaking. For example, children may treat “owning” in the same way that they treat juggling. While a person is making an effort to keep objects in the air, they are juggling, but

juggling stops the moment those objects come to rest. If ownership is a passive, persistent social relationship, then an individual should still be considered an owner if they temporarily lose the ability to express their relationship with their property (e.g., when a person is asleep) because the social network around them maintains the link between person and property. In other words, adults believe that other people keep our bowling pins and chainsaws “in the air,” even when we are not in the room. However, if children treat ownership as an active, online psychological process, then the link between owner and property may be lost when the owner is unable to actively maintain it.

The hypotheses outlined above are concerned with how children make ownership attributions and the mistakes that they make in the process of developing adult-like intuitions. However, ownership represents a set of complex and abstract social behaviors that can be evaluated on multiple levels. Children’s intuitions about who can own property differ from those of adults, but their more moral judgments align with adult ownership attributions. One potential interpretation of this asymmetry is that children’s explicit understanding of ownership principles (measured in their ownership judgments) lags behind their implicit understanding (measured in their moral judgments). On this view, children intuitively grasp a concept of ownership that is adult-like and places primacy on original ownership, and can be viewed when children are asked the morality question. However, when children are asked to reflect on ownership in a more metacognitive way, their awareness that a sleeping or tied-up person can’t interact with the object may interfere with their implicit judgments and lead to errors.

Alternatively, this task difference may reflect conceptual differences between children and adults. Whereas adults treat ownership as a coherent, interrelated set of social rules, children may reason about separate elements of ownership in distinct ways. One interpretation of the data presented in Experiment 3 is that children have one set of beliefs or judgments about property rights and another set of beliefs or judgments regarding property retention. For example, children may judge that sleeping individuals are entitled to retain their property, even if they do not own it while they are asleep. That is, they may appreciate that a change in mental or physical state can change the relationship between owner and property, while still maintaining a core belief that the original possessor retains certain rights. Future studies will focus on evaluating these possibilities and identifying exactly how children develop adult-like ownership concepts.

Developing mature ownership concepts is a difficult task, and children master different aspects of ownership on different schedules. Young children exhibit adult-like intuitions when identifying property (Noles et al., 2009),

but their intuitions about property transfers (Noles and Keil, data not shown) and property rights (Kim and Kalish, 2009) take time to mature. The experiments reported here indicate that children learn to limit ownership to humans at a very young age, but tuning their intuitions about who and what can be an owner is a task that requires time and experience. We attribute this relatively slow rate of development to the absence of explicit input that children receive with respect to ownership. When discussing ownership with their children, parents' goals are often to minimize conflict, protect a younger child, or convey ethical principles regarding fairness and sharing. All of these goals involve minimizing clear distinctions regarding ownership rights and emphasizing the importance of current possession (e.g., "Let your little brother play with that toy – he'll cry if you take it away") (e.g., see Ross, 1996). Yet ownership decisions are culturally specific to some degree and require direct input regarding the norms and mores of the culture in which the child develops. Our findings suggest that adult-like ownership attributions appear early and gradually become more inclusive and specific. These findings represent an important step in understanding the both cognitive architecture that underlies ownership concepts and the influence of culture on children's understanding of ownership.

Concepts of ownership are complex and multifaceted. Some aspects of ownership appear early in development and remain relatively constant. These include believing that only human agents can own things and understanding that ownership perseveres across time and space (Noles et al., 2009; Gelman et al., in press). Other aspects, however, may take longer to develop. Here, we have reported on a striking suggestion that young children assume that ownership requires an active and physically capable human agent. An adult-like understanding of ownership emerges gradually, and it may even be that, in adults, some vestiges of this bias remain when two parties contest ownership of property and the debates often invoke notions of active use (e.g., disputes regarding a parking space). These findings represent an important first step in understanding the cognitive architecture that underlies ownership concepts and elucidating the process by which children's understanding of ownership grows and changes over the course of development.

Acknowledgements

For assistance and helpful conversation and comments on earlier drafts, we thank Judith Danovitch, Gena Gorlin, Meghan McMahon, Joshua New, Jessica Noles, Alex Pichurko, Kathryn Pytiak, Sarah Stilwell, Alex Was, and the members of the Cognition and Development Lab and the Language and Cog-

nition Lab at Yale University and the Conceptual Development Lab and the Language Lab at the University of Michigan. Thank you to the children, teachers, administrators, and staff of Anderson Junior High School, Lauderdale County High School, Country Hills Elementary School and West Limestone County High School. This work was supported by NIH grant R37HD023922 awarded to F.C.K. and NICHD grant HD-36043 awarded to S.A.G.

References

- Barrett, H. C. and Behne, T. (2005). Children's understanding of death as the cessation of agency: A test using sleep versus death. *Cognition* 96, 93-108.
- Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research* 15, 139-168.
- Blake, P. R. and Harris, P. L. (2009). Children's understanding of ownership transfers. *Cognitive Development* 24, 133-145.
- Brown, D. (1991). *Human universals*. McGraw Hill, New York, NY.
- Chen, M. K., Lakshminarayanan, V. and Santos, L. R. (2006). How basic are behavioral biases? Evidence from capuchin monkey trading behavior. *Journal of Political Economy* 114, 517-537.
- Dittmar, H. (1991). Meanings of material possessions as reflections of identity: Gender and social-material position in society. *Journal of Social Behavior and Personality* 6, 165-186.
- . (1992). *The social psychology of material possessions*. St. Martin's Press, New York, NY.
- . (1994). Material possessions as stereotypes: Material images of different socio-economic groups. *Journal of Economic Psychology* 15, 561-585.
- Fasig, L. G. (2000). Toddlers' understanding of ownership: Implications for self-concept development. *Social Development* 9, 370-382.
- Friedman, O. and Neary, K. R. (2008). Determining who owns what: Do children infer ownership from first possession? *Cognition* 107, 829-849.
- Gelman, S. A., Manczak, E. M. and Noles, N. S. (in press). Preschool children trace the history and value of owned objects. *Child Development*.
- Harbaugh, W. T., Krause, K. and Vesterlund, L. (2001). Are adults better behaved than children: Age, experience, and the endowment effect. *Economic Letters* 70, 175-181.
- Hay, D. F. (2006). Yours and mine: Toddlers' talk about possessions with familiar peers. *British Journal of Developmental Psychology* 24, 39-52.
- Hohfeld, W. H. (1913). Some fundamental legal conceptions as applied to judicial reasoning. *Yale Law Journal* 23, 16.
- Hook, J. (1993). Judgments about the right to property from preschool to adulthood. *Law and Human Behavior* 17, 135-146.
- Inagaki, K. and Hatano, G. (1991). Constrained person analogy in young children's biological inference. *Cognitive Development* 6, 219-231.
- Jackendoff, R. (1992). *Languages of the mind: Essays on mental representation*. MIT Press, Cambridge, MA.
- Kahneman, D., Knetsch, J. L. and Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *The Journal of Political Economy* 98, 1325-1348.
- Kalish, C. W. and Anders, C. D. (2011). Ownership as social status. *New Directions for Child and Adolescent Development* 132, 65-77.

- Kim, S. and Kalish, C. W. (2009). Children's ascriptions of property rights with changes of ownership. *Cognitive Development* 24, 322-336.
- Neary, K. R., Friedman, O. and Burnstein, C. L. (2009). Preschoolers infer ownership from "control of permission." *Developmental Psychology* 45, 873-876.
- Nelson, K. (1976). Some attributes of adjectives used by young children. *Cognition* 4, 13-30.
- Noles, N. S. and Keil F. C. (2011). Exploring ownership in a developmental context. *New Directions for Child and Adolescent Development* 132, 91-103.
- . (under review). Possession attribution asymmetries: Context influences children's attributions of ownership.
- Noles, N. S., Keil, F. C. and Bloom, P. (2009). Categorical and pragmatic boundaries guide children and adults in identifying property. *Poster presented at the bi-annual meeting of the Society for Research in Child Development, 4/09, Denver, CO.*
- Pierce, J. L., Kostova, T. and Dirks, K. T. (2003). The state of psychological ownership: Integrating and extending a century of research. *Review of General Psychology* 7, 84-107.
- Pierce, J. L., O'Driscoll, M. P. and Coghlan, A. M. (2004). Work environment structure and psychological ownership: The mediating effects of control. *The Journal of Social Psychology* 144, 507-534.
- Rodgon, M. M. and Rashman, S. E. (1976). Expression of owner-owned relationships among holophrastic 14- and 32-month-old children. *Child Development* 47, 1219-1222.
- Ross, H. S. (1996). Negotiating principles of entitlement in sibling property disputes. *Developmental Psychology* 32, 90-101.
- Snare, F. (1972). The concept of property. *American Philosophical Quarterly* 9, 200-206.
- Thaler, R. H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization* 1, 39-60.

Copyright of Journal of Cognition & Culture is the property of Brill Academic Publishers and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.