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Early Representations of Ownership

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Abstract

To navigate a world filled with private property, children must be able to assign ownership information to objects and update that information when appropriate. In this chapter, the authors propose that children include ownership as an attribute of their object representations. Children can learn about ownership attributes either by witnessing owners acting on their property, a visual source, or by receiving information from the testimony of others, a verbal source. The authors consider the differences between these two forms of information and how they might conflict at the representational level, leading to difficulties in learning about ownership.

There is no image, no painting, no visible trait, which can express the relation that constitutes property. It is not material, it is metaphysical; it is a mere conception of the mind.

J. Bentham (1840). *Theory of legislation*. In *Principles of the civil code*, Chapter VIII. Of property (p. 137).

Introduction

Ownership, in its most basic form, constitutes a relationship between a person and some other entity that is acknowledged and respected by other people. Owned entities can take many forms—objects, land, ideas, even living entities like pets, or at certain points in history, other people. However, the relationship between owner and owned is itself not obvious or even visible. As Bentham notes in the quote above, we cannot rely on physical associations to determine ownership because this relationship is not physical—it is not material or concrete. The abstract and invisible nature of ownership raises the question of how we can recognize it at all. Rather than rely on enduring, concrete indications of ownership, we must encode ownership information in mental representations to acknowledge, track, and update the relationship between owner and owned. In this sense, property or ownership is a “conception of the mind,” even if the relationship itself is manifest in various social behaviors and utterances.

In this chapter, we examine the representational nature of ownership, attending specifically to how children represent ownership early in development. Given that few empirical data exist on conceptions of ownership, our model is quite speculative. Despite some proposals that humans may have inherited certain cognitive predispositions that pertain to ownership (Stake, 2004), we do not believe there is sufficient evidence to warrant the assumption of an innate module for property (although see Brosnan, this volume, for possible precursors in primates). Instead, we propose a developmental model, starting with simple visual associations between people and objects. With the emergence of language, person–object relationships can be communicated in a symbolic fashion. However, visual associations between people and objects remain a potent source of inference about ownership into adulthood. We propose that the tension between these two sources of information about ownership—visual and verbal—explains much of the difficulty children have in attaining a mature concept of ownership.

We make two simplifying assumptions to develop our proposal. First, we focus our analysis on the ownership of objects—as opposed to territory or ideas, for example. Children’s initial understanding of ownership centers on concrete relationships between people and objects. Focusing on objects allows us to trace a developmental path for a particular kind of ownership relationship from its earliest state. This choice also enables us

to evaluate two different representational models: a person-centric model, akin to situation models (Johnson-Laird, 1983), and an object-centric model where ownership is an attribute of object representations. Our second simplification is to focus on how children understand ownership relationships for other people as opposed to their own ownership claims. Children undoubtedly draw on their own experience with objects in order to understand ownership (Noles & Keil, this volume), but their personal relationships with objects may involve other developmental processes that are poorly understood. For example, children form attachments to particular objects that may be an extension of their attachment bonds with caregivers (Winnicott, 1953). However, attachment is unlikely to play a role in their understanding of other people's relationships with objects (see Rochat, this volume, for an alternative view).

Visual associations. As noted earlier, we doubt that children are born with an understanding of ownership. They rely on their own interactions with the world and with others to construct knowledge about the relationships between people and objects. One very basic way to identify unique person-object relationships is by physical association—a child who sees his father with a briefcase every day will associate Daddy and the briefcase. However, even this simple association depends on a foundation of visual processing. To form the Daddy-briefcase association, a child must first be able to identify a specific person (Daddy) and a specific object (the briefcase). Infants can identify specific people very early in life. For example, within days newborns can distinguish their mothers from strangers (Bushnell, Sai, & Mullin, 1989; Walton, Bower, & Bower, 1992). By four or five months of age, this ability extends to pictures of strangers (Hayden, Bhatt, Reed, Corbly, & Joseph, 2007; Mareschal & Johnson, 2003). Differentiating objects takes longer. In basic models of object recognition (i.e., Leslie, Xu, Tremoulet, & Scholl, 1998), infants rely on the visual features of objects to distinguish one thing from another. By comparing changes in the visible features of objects, studies have shown that infants follow a developmental progression in their ability to differentiate objects using different types of features: shape at seven months, texture at eleven months, and color at twelve months of age (Kaldy & Leslie, 2003; Wilcox, 1999). Based on this brief sketch, infants should have the visual processing capacities in place to form an association between Daddy and his briefcase (as opposed to a briefcase with a different color or shape) by twelve months of age.

Once children can form person-object associations the next problem is when to form these connections. Even focusing on the most important people in their lives, their caregivers, infants see Mommy and Daddy touch and encounter hundreds of objects every day. Encoding and tracking all of these associations would be overwhelming. Infants must engage in some sort of selective tracking to pick out the most frequent and salient relationships between people and objects. In many cases, adults will

corroborate children's assumptions about person–object relationships. For instance, a child who points to his mother's purse and says "Mommy" will probably receive corroborative feedback from his parents ("Yes, that's Mommy's purse."), which would reinforce the association. By contrast, an incorrect referent would be met with a correction or a less positive response.

It is far from clear how often a person and object must be seen together in order for a visual association to be formed between the two. Moreover, simple co-occurrence may not be sufficient. Some intentional action by the person toward the object seems necessary to establish an association. In a set of experiments, Friedman and Neary (2008) showed that two- and three-year-olds (Experiment 2, mean ages: 2;7 and 3;5) quickly established ownership relationships when told stories in which one character plays with a toy and then a second character plays with the same toy. Children watched the stories acted out using dolls and props. Children in both age groups tended to identify the first character they had seen with the object as the owner when asked "Whose ball is it?," although for the two-year-olds this first possessor bias only occurred when the toy was placed between the two characters during the question step. A follow-up experiment with three- and four-year-olds (Experiment 3) showed that the bias did not occur when the children were told that each character liked the toy (in a serial order), but neither character possessed the toy. In these studies, some intentional action on the object seemed necessary for children to infer an ownership relationship.

Friedman and Neary interpret this series of experiments as evidence of a first possessor heuristic (see also, Friedman, Neary, Defeyter, & Malcolm, this volume). However, the results are also consistent with a visual association interpretation as long as we assume that children resist overwriting the first visual association, a possibility which we will consider later. On this account, children will form person–object associations when they see the two presented together along with at least a description of an intentional action. However, more work is needed to determine exactly how the connection between person and object occurs. For example, children may not form an association based on one co-occurrence unless they are prompted by the question to create one.

Verbal evidence for visual associations. Forming a visual association between a person and an object may not depend on language, but children's first words do provide some evidence that they make basic person–object associations. Students of early language usage note that infants frequently say person names when pointing at objects (Bloom, 1973; Brown, 1973). For example, in a diary study of her daughter's first words, Bloom (1973) noted that at sixteen months of age, her daughter said "Dada" when pointing at her father's briefcase. Although these single-word utterances demonstrate the existence of an association between person and object, it is difficult to interpret what the utterance means. Bloom

considered this a reference to a “nonspecific relation” (p. 99) because her daughter did not yet know the word for briefcase: she wanted to refer to the briefcase but lacked the word and so uttered the first thing that came to mind—the person associated with it. Once children know the words for both person and object and yet choose to say only the person’s name, there is a stronger case that they recognize that a special kind of person–object relationship exists. For Bloom’s daughter, this type of deliberate reference occurred at eighteen months of age. Experimental studies have also elicited single-word references to owners or possessors before twenty-four months of age. In one test of toddlers between fourteen and thirty-two months of age (mean age: twenty-four months), children were shown pictures of their mommy’s purse, for example, and their reactions were recorded (Rodgon & Rashman, 1976). Several infants spontaneously identified their parent’s possessions by saying “Mommy” or “Daddy” as opposed to the object name. Those same infants identified similar objects by name when they belonged to a stranger. A similar result occurred in an experiment where children were prompted to identify the owner of objects from their home; for example, their mother’s toothbrush (Fasig, 2000). Children could pass the task by either saying “Mommy” or pointing to her. Thirty-two percent of children under twenty-four months of age (mean age: nineteen months) and 75 percent of children twenty-four months of age and over (mean age: twenty-five months) performed above chance levels.

Infants form visual associations between people and objects in the here and now. However, ownership relationships persist even when one part of the pair is missing. Language development researchers have noted that children’s initial use of possessive phrases tends to occur when the person and the object are in the same location at the same time (e.g., “Fraser coffee” in Brown, 1973; Tomasello, 1998). During the second half of the second year, children begin to refer to person–object associations when the object is present, but the person is not (e.g., a twenty-month-old refers to “Maria’s necklace” in Tomasello, 1998). These absent-person references demonstrate that, before twenty-four months of age, children can encode and maintain a person–object relationship—the association is no longer dependent on visual cues in the immediate environment.

Representing visual associations. Based on the limited evidence available concerning early person–object associations, one trend is already notable: the associations appear to have a particular direction, from object to person instead of from person to object. In the studies discussed, no child pointed at her mother and said purse. This asymmetry in the person–object association raises the question of how these associations are organized at a cognitive level. One possibility, described by Bloom (1973), is that children incorporate certain possessions into existing representations of the owner. On this view, the “schema” for Mommy expands so that the purse becomes an extension of her—pointing at the purse and saying

“Mommy” is the equivalent of pointing at her hand and saying “Mommy.” This kind of representation would accord with Piagetian models of the way in which new information is assimilated into a schema. However, as noted earlier, more recent research on object representation shows that infants can have separate representations of people and objects by twelve months of age if not earlier. At some point during their second year, infants must begin to represent the relationship between two distinct representations—person and object. Once infants know the words for these two entities, single-word references to a person while pointing to the object owned suggest a reference to the person–object relationship rather than a reference to the person schema. It is possible that this capacity exists before children can express it verbally, but it is not clear what nonverbal evidence would distinguish a schema model from a relationship model.

In the schema model, the person is the dominant representation, which helps to explain why objects evoke the person and not the other way around. A different person-centric model describes owned objects as spokes connecting to a central person representation. Here, the object and person are distinct representations, but this “situation model” centers on one person with connections to all of their possessions (Johnson-Laird, 1983; Radvansky, Wyer, Curiel, & Lutz, 1997). This organization has an intuitive appeal—a person’s property is basically the array of items associated with that person. In Johnson-Laird’s terms, the structure of this mental model would reflect the state of affairs in the world. Further, the central role of the person representation in this model also helps to explain why person information dominates person–object associations. However, in a test for the mental models used by adults to represent ownership, Radvansky et al. (1997) found that participants appeared to organize owned objects by locations and events rather than connecting the objects to the owners in a person-centric fashion. Another problem with this model arises when we consider that adults tend to assume that objects are owned even before knowing who the owner is. This assumption requires a placeholder owner until an actual person representation can be associated with the owned entities. A person-centric model may not be able to support this kind of abstraction as the hub of the model.

It is possible that children use person-centric models initially and then transition to a different mental model of ownership later in life. If this were the case, we would expect children to create person-centric models using representations of real entities—objects and owners that the child has encountered before—as opposed to hypothetical entities. Such a model would enable children to get beyond the constraints of visual associations. As long as a child had a mental representation of a particular person and a particular object, she could form an association between the two in a mental model. This connection could be generated on the basis of verbal information—being told that the car is Johnny’s when the two are not in the same visual space. Given the centrality of the owner in this model,

if children need any visual support while forming the ownership relationship it should be a view of the owner. We will consider a test for this model when we examine the evidence for learning about ownership via language.

The person-centric model of ownership suggests that owned entities are, in a sense, attributes of the owner—representations of property hang on to the representation of the owner. Another possibility is that objects are the central representation and owners are just one attribute of the object. In this model, when infants see a person and object together, they encode a link from the object to the person and that link to the person becomes an attribute of the object—an ownership attribute. This organization has a logical appeal. Person information can be used to differentiate two otherwise identical objects, just as other featural information (weight, scent) can. The same is true when the owner is not known—we can assign a placeholder attribute (owned) to one object and use that information to differentiate it from an identical but unowned object. In this model, owner information is a salient feature of objects that can be used to differentiate them. Thus, the object evokes that information. By contrast, people do not evoke object information because associations with objects do not differentiate people. Mommy is the same whether she has her purse or not and does not change in any essential way when she owns a new watch.

The ownership-attribute model would also allow children to get beyond the constraints of visual associations. As long as the child has concrete representations of the owner and the object, she should be able to form the connection between the two mentally simply by being told that the ownership relationship exists. Given that the object is the central representation in this model, if children need any visual support to encode the ownership attribute it should be a view of the object. For example, a child can be told that a toy car is Johnny's when the toy is visible but Johnny is not in the same room. She would then add an ownership attribute to the toy car, using the verbal information to establish a link to her representation of Johnny. In the next section, we discuss in more detail how children add ownership information to objects via language and consider a way to distinguish the two models described earlier.

Verbal Information

Learning via visual information is ordinarily limited to the here and now. To learn ownership relationships, preverbal infants must see both object and owner together at the same time. As children begin to comprehend and use language, they are liberated from spatial and temporal constraints. They can create ownership relationships when the owner is not present and/or when the object is not present. However, adding ownership attributes via language requires an understanding of possessive phrases. When do children understand the special language of ownership?

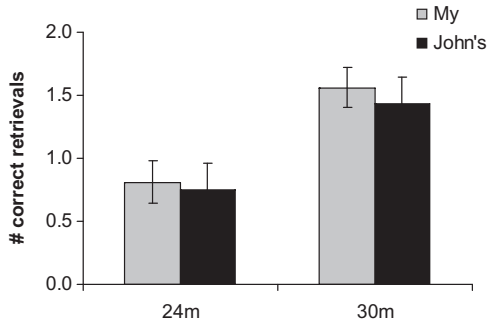
By the end of their second year, children both comprehend and use some possessive phrases. For example, in one study twenty-month-olds were able to identify the appropriate picture describing an ownership relationship when they heard a possessive phrase: “girl’s shoe,” “Mommy’s ball” (Golinkoff & Markessini, 1980). Standardized measures of language development based on parent report also indicate the use of proper noun possessive phrases (“Daddy’s cup”) by twenty-two months of age, on average (Fenson et al., 1994). Understanding possessive pronouns generally takes longer. Children begin to use the self-referential first-person possessives “my” and “mine” around eighteen months of age, earlier than second- and third-person possessive pronouns (Bates, 1990; Tomasello, 1998). Children struggle with all personal pronouns because the meaning of these words changes depending on who is speaking. Some perspective-taking skills may also be necessary to grasp to whom or what the speaker refers (Ricard, Girouard, & Décarie, 1999). By thirty months of age, most children understand, and many use, all of the possessive pronouns correctly, with third-person references (“his” and “hers”) appearing last (Fenson et al., 1994).

The ability to learn ownership relationships through language marks an important attainment. However, children do not acquire the ability to add new information to object representations overnight. A developmental progression is evident in absent referent tasks where children must learn new information about an object, the referent, while it is not in view. For example, when told that a stuffed animal has become wet, nineteen-month-olds need to see the wet stuffed animal while they receive the information to identify the correct one (Ganea, Shutts, Spelke, & DeLoache, 2007). By contrast, twenty-two-month-olds can learn about the change while the toy is out of view and incorporate this information into their representation of the object. Similarly, thirty-month-olds, but not younger children, can learn that a toy has changed location through verbal statements alone, without visual support (Ganea & Harris, 2010).

The absent referent paradigms described previously offer one way to evaluate different mental models of ownership. Given that a person is the main representation in the person-centric model, children should find it easier to learn ownership relationships when the owner is present as opposed to when the owner is absent. By contrast, in the object-centric, ownership-attribute model, children should find it easier to learn ownership relationships when the object is present as opposed to when it is absent.

We tested toddlers’ ability to learn ownership information using an absent referent paradigm where either the owner, the object, or both were absent (Blake, Ganea, & Harris, in preparation). Twenty-four- and thirty-month-olds were introduced to a set of toys by an experimenter and introduced to a third person, John, shown in a photograph. The photo was then overturned so that this owner was not visible during the test. Thus,

Figure 4.1. Absent referent task for ownership information. Correct retrievals (out of two trials) of the correct referent, “my toy” or “John’s toy.” Error bars are standard error of the mean.



children had some representation of the owner who would be absent when the ownership information was given. The experimenter then occluded the toys from view and told the child that one toy belonged to himself (“my horse”), one belonged to John (“John’s apple”), and the owner of the last toy was unknown. The occluder was then removed and the experimenter asked the child to retrieve either “my toy” or “John’s toy.” Preliminary results show that thirty-month-olds succeed at the task—they easily added the ownership information to their representations of each toy (Figure 4.1). Indeed, they did equally well regardless of who the owner was, the experimenter, who was present, or the third party, who was absent (i.e., John in the example), and regardless of the words used to describe ownership—a first-person possessive pronoun (“my toy”) or a proper noun possessive phrase (“John’s toy”). By contrast, twenty-four-month-olds did poorly at the task, performing at chance levels for both owners. In a follow-up experiment, currently underway, ownership information is provided in the same way, but the visibility of the toy is manipulated. Initial results show that twenty-four-month-olds can pass this task when the toys are visible, but not when the toys are absent from view; the absence or presence of the owner does not seem to matter.

These results suggest that by thirty months of age infants can add ownership information to an object representation simply by hearing the owner identified in a possessive phrase. Further, at this age children can capitalize on the flexible learning that language allows. They can learn about ownership relationships when both the person and the object are not in view, based solely on the verbal report of the experimenter. The performance of the twenty-four-month-olds also allows us to tentatively choose the owner-as-attribute model over the person-centric model of ownership. For this younger group, the object appears to be the central component of the owner-object relationship.

Differences Between Visual and Verbal Information

Thus far, we have discussed two means of acquiring ownership information: visual associations and verbal reports from others. However, it is not clear whether these two sources of information result in equivalent representations of ownership. One possibility is that the ownership attribute does not depend on the source of the information—verbal and visual information are encoded in the same way. If this is the case, one form of information is as good as the other. However, the results of some absent referent studies suggest that visual information may, in general, hold more weight than verbal information. For example, in the change of location experiment referred to earlier, Ganea and Harris (2010) asked twenty-three-month-olds to help them hide a toy in a room with several hiding places. After hiding the toy in one location, the child was brought behind a curtain and told that the toy had been moved to a new location. When asked to retrieve the toy, children at this age tended to return to the initial hiding spot. By contrast, in a direct observation condition in which the children witnessed the change in location, they were able to retrieve the toy from its new location. The authors interpreted these results in terms of competing visual and verbal representations. When the initial location information was visually encoded, it could only be updated by subsequent visual information. The verbal information about the new location was not sufficient to overwrite the initial visual information.

Differences in how visual and verbal ownership information is encoded in the first place suggest that similar issues may arise for ownership attributes. As noted earlier, children may need to see the owner perform an intentional act on the object to encode visual ownership information. Such intentional action also seems to result in a robust ownership relationship. In the Friedman and Neary (2008) study, seeing a second character play with the toy did not overwrite the association with the first possessor. Similarly, Blake and Harris (2009) found that young children believed that the first character acting on a toy remained the owner even after giving the toy away as a gift at a birthday party. Two- and three-year-olds (Experiment 1, mean ages: 2;5 and 3;7) believed that the toy should be returned to the gift-giver even after seeing the birthday child possess it and act on it. In addition to these visual cues, the children also heard a verbal description of the toy being given as a gift. Still, the younger children resisted updating the ownership relationship, implying that the initial visual representation of ownership was quite strong.

In contrast to visual information, which calls for an inference with respect to ownership, verbal ownership information—“That is John’s ball”—explicitly conveys an existing state of affairs. Linguistic information alone should be sufficient to add an ownership attribute to an object. However, because a verbal attribution of ownership does not require the

encoding of any action or intention information, this form of encoding may be weaker than visual encoding. If the strength of the ownership attribute depends on how it was initially encoded, children may be able to update the attribute more easily in one case than the other. That is, if visual association results in a stronger encoding of the ownership attribute, this will be more difficult to change. Children would resist a change in ownership no matter how the information about the newer owner is conveyed. Conversely, an ownership attribute encoded via verbal information would be easier to change. Children would be able to update the attribute with new ownership information. If the new information is visual, children should be able to overwrite the verbally encoded attribute easily. Even new verbal information about ownership may be able to replace an older verbally encoded attribute.

Such differences at the representational level would have consequences for children's understanding of ownership in their interactions with others. For example, the initial encoding of ownership would be biased toward the visual information. If a child saw a peer playing with a toy for the first time but was told by an adult that the toy belonged to another peer, this verbal information might be ignored. In addition, changes to ownership may be more easily understood when initial ownership information is verbally encoded. As long as a child does not see the initial owner in possession of the object, he may be able to grasp the idea of ownership transfers.

Children eventually learn to accept verbal information over visual experience in a number of domains (Gelman, 2009; Harris & Koenig, 2006) and the same is true for ownership attributes. By five years of age, children overcome their bias toward initial visual information and accept transfers of ownership that are witnessed and described (Blake & Harris, 2009). However, during the preschool years, conflicts at the representational level can help to explain children's difficulty in understanding who owns what and when.

Conclusions

Research on children's understanding of ownership has blossomed in recent years and new empirical evidence will allow us to draw more robust conclusions about how children represent ownership. However, based on the research to date we tentatively endorse an ownership-attribute model over a person-centric model of ownership. We can imagine further experiments to differentiate these models, such as a child-friendly version of the fan effect paradigm used with adults (Radvansky et al., 1997). The ownership-attribute model also provides a theoretical basis for assessing how the form of ownership information, visual or verbal, might affect how children learn who owns what.

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