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Cognitive Development



Generic language use reveals domain differences in young children's expectations about animal and artifact categories

Amanda C. Brandone^{a,*}, Susan A. Gelman^b

^a Department of Psychology, Lehigh University, Bethlehem, PA 18015, USA

^b Department of Psychology, University of Michigan, Ann Arbor, MI 48105, USA

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ABSTRACT

The goal of the present study was to explore domain differences in young children's expectations about the structure of animal and artifact categories. We examined 5-year-olds' and adults' use of category-referring generic noun phrases (e.g., "Birds fly") about novel animals and artifacts. The same stimuli served as both animals and artifacts; thus, stimuli were perceptually identical across domains, and domain was indicated exclusively by language. Results revealed systematic domain differences: children and adults produced more generic utterances when items were described as animals than artifacts. Because the stimuli were novel and lacking perceptual cues to domain, these findings must be attributed to higher-order expectations about animal and artifact categories. Overall, results indicate that by age 5, children are able to make knowledge-based domain distinctions between animals and artifacts that may be rooted in beliefs about the coherence and homogeneity of categories within these domains.

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Cognitive processes differ substantially as a function of ontological type. Knowing whether something is an animal or a human-made artifact has important implications for how we categorize it, how we interact with it, and our expectations for its behavior. In this paper, we explore how young children represent categories within the animal and artifact domains. Specifically, by analyzing their production of category-referring generic noun phrases (e.g., "Frogs eat bugs"), we aim to shed light on domain differences in young children's expectations about the coherence and homogeneity of animal and artifact categories.

* Corresponding author at: Department of Psychology, 17 Memorial Drive East, Lehigh University, Bethlehem, PA 18015, USA. Tel.: +1 610 758 5638.

E-mail addresses: acb210@lehigh.edu (A.C. Brandone), gelman@umich.edu (S.A. Gelman).

A large body of research has demonstrated that there are important differences in how children think about animals and artifacts, beginning in infancy (see Opfer & Gelman, 2010; Rakison & Poulin-Dubois, 2001 for reviews). By preschool age, children display extensive domain-specific knowledge. They view animals as created by nature whereas they recognize that humans are involved in the creation of artifacts (Bloom, 1996; Gelman & Bloom, 2000; Gelman & Kremer, 1991). Preschoolers make domain-specific judgments about category immutability, believing that animals retain their identity across transformations whereas the identity of artifacts can change due to external transformations or changes in use (Keil, 1989). Finally, preschoolers infer that animals have different kinds of insides (Gottfried & Gelman, 2005; Simons & Keil, 1995), are capable of different causal processes (e.g., self-generated movement; Gelman, Durgin, & Kaufman, 1995; spontaneous growth; Rosengren, Gelman, Kalish, & McCormick, 1991; healing; Backscheider, Shatz, & Gelman, 1993), and are subject to different causal mechanisms (e.g., tiredness, hunger; Hatano & Inagaki, 1994) than are artifacts. Thus, data confirm that preschoolers use different causal frameworks to reason about animals and artifacts. Less is known, however, about the extent to which young children's domain knowledge reflects principled, theory-laden distinctions.

One important, principled way in which categories within the animal and artifact domains differ is in coherence and within-category similarity. Categories of naturally occurring objects, including basic-level animal categories, are generally tightly structured, coherent, and share many similarities (e.g., rabbits have similar internal parts, external structure, behaviors). In contrast, basic-level categories of human-made artifacts are typically more loosely structured, less homogeneous, and share fewer important features (e.g., chairs vary in their shape, color, what they are made of). Awareness of how categories vary on these dimensions plays an important role in promoting or constraining the kinds of inductive inferences one makes when learning new information about a category member. Given that much of human reasoning involves making category-based inferences that extend beyond the available evidence, when children are aware of how categories differ in their coherence and homogeneity is an important developmental question.

Existing work indicates that by second grade, children's representations of animal and artifact categories reflect an awareness that domains differ in coherence and homogeneity. Gelman and colleagues found that when generalizing novel information about familiar basic-level categories (e.g., this rabbit/chair has an X inside), adults and second graders appropriately drew many more inferences within animal categories than within artifact categories (Gelman, 1988; Gelman & O'Reilly, 1988). Preschoolers, however, did not show this domain effect: unlike older children and adults, they judged animal and artifact categories as equally inductively rich (Gelman, 1988; Gelman & O'Reilly, 1988). These data suggest that across development children may become increasingly aware of how animal and artifact categories differ in their coherence and homogeneity.

Nonetheless, there is some evidence to suggest that younger children, too, are aware of these principled ways in which animal and artifact categories differ. One indirect form of support comes from research examining when young children represent categories as real and objective vs. invented and subjective. Adults believe that animal categories mark true, objective distinctions that exist in the world (e.g., cows vs. horses), whereas they believe that artifact categories mark subjective, flexible distinctions dependent on convention (e.g., bowls vs. plates; Kalish, 1998; Malt, 1990; Rhodes & Gelman, 2009a). Adults likewise view membership in animal categories as absolute, whereas they view membership in artifact categories as graded (e.g., an animal either does or does not fall in the category "mammal", but a belt can partially belong to the category "clothing;" Diesendruck & Gelman, 1999; Estes, 2003, 2004; Kalish, 1995). Importantly for the present discussion, kindergartners also represent animal but not artifact categories as natural kinds. For example, Rhodes and Gelman (2009a) showed that 5-year-olds construe artifact categories as more subjective and conventionalized than animal categories: children judged conventional animal categories as objectively correct ways of organizing the world, whereas they judged conventional artifact categories as among several acceptable options. Five-year-olds also readily endorsed partial category membership for atypical members of artifact categories (e.g., a headband as "sort of" a piece of clothing) but denied it for atypical members of animal categories (e.g., an ostrich as "sort of" a bird; Rhodes & Gelman, 2009b). Thus, collectively, these studies provide initial evidence for principled, theory-laden domain distinctions in young children.

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