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Infants transfer nonobvious properties from pictures to real-world objects

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ABSTRACT

The current research examined infants' ability to generalize information about the nonobvious properties of objects depicted in picture books to their real-world referents. Infants aged 13, 15, and 18 months ($N = 135$) were shown a series of pictures depicting an adult acting on a novel object to elicit a nonobvious property of that object. Infants were subsequently tested on their extension of the nonobvious property to the real-world object depicted in the book and their generalization of this property to a different color exemplar of the depicted object. Results indicated that, regardless of age, infants expected the real-world objects to have the nonobvious property, as indicated by their attempts to elicit this property with these objects. These findings indicate that early in their second year of life, infants are beginning to make inductive inferences about nonobvious object properties based on information provided in pictures.

Introduction

Inductive reasoning involves making an inference about the properties of one category member based on knowledge of the properties of another member of the same category (see Hayes, Heit, & Swendsen, 2010, for a review). The ability to reason inductively emerges during infancy, as evidenced

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by infants' willingness to generalize a nonobvious property of one object to another object if they view them as belonging to the same category (Baldwin, Markman, & Melartin, 1993; Welder & Graham, 2001). In this experiment, we asked whether 13-, 15-, and 18-month-old infants would draw inductive inferences about real objects based on information presented symbolically during a picture book interaction.

Much of what we know about infants' inductive reasoning is based on studies using imitation paradigms in which an experimenter performs an action on a target object that elicits a nonobvious property (Baldwin et al., 1993). If infants view the target and test objects as belonging to the same category, they will expect the test objects to share the nonobvious property and imitate the target action to trigger the property. Thus, infants' imitation of the target action on the test objects provides evidence of inductive reasoning. Using this paradigm, studies have demonstrated that inductive reasoning skills are present as early as 9 to 13 months of age (Baldwin et al., 1993; Graham, Kilbreath, & Welder, 2004). Furthermore, infants will rely on information about category membership, in the form of shared count nouns or shared perceptual similarity, to determine whether two objects belong to the same category and share nonobvious properties (Graham & Diesendruck, 2010; Graham & Kilbreath, 2007; Graham et al., 2004; Keates & Graham, 2008; Welder & Graham, 2001).

In the current research, we extended the examination of inductive reasoning during infancy in a novel direction by asking whether infants apply their inductive reasoning skills in the symbolic domain. The ability to draw inferences from symbolic artifacts is a critical skill that enables us to acquire novel information about the environment indirectly. The specific focus here was on whether infants make inferences about nonobvious object properties based on their knowledge of the objects from picture books. Pictures are among the most common symbols to which children are exposed very early in life (DeLoache & Ganea, 2009), and a growing body of research indicates that infants begin to understand their referential nature by the middle of their second year of life (Ganea, Allen, Butler, Carey, & DeLoache, 2009; Ganea, Bloom Pickard, & DeLoache, 2008; Preissler & Carey, 2004; Simcock & DeLoache, 2006, 2008; Simcock & Dooley, 2007).

Beginning in their first year of life, infants discriminate between objects and their two-dimensional representations (DeLoache, Strauss, & Maynard, 1979; Field, 1976; Rose, 1977) and perceive similarities between objects or people and their pictorial representations (DeLoache et al., 1979; Dirks & Gibson, 1977). Despite these early accomplishments, however, 9-month-olds will manually explore depicted objects, suggesting that they do not understand how pictures differ from their referents (DeLoache, Pierroutsakos, Uttal, Rosengren, & Gottlieb, 1998; Pierroutsakos & DeLoache, 2003). By 19 months of age, infants will point at and label depictions, indicating that they have begun to understand their referential nature—the fact that they can represent objects and situations in the real world (DeLoache & Burns, 1994). Further evidence of the emergence of pictorial competence during the second year of life comes from studies demonstrating that 15- to 24-month-olds will extend newly learned labels for depicted objects to their referents (Ganea et al., 2008, 2009; Preissler & Carey, 2004). For example, Ganea and colleagues (2008) showed that 15- and 18-month-olds will extend newly learned labels from realistic pictures to their real-world referents. The 18-month-olds also generalized the novel name to a new exemplar, suggesting that they interpreted the depicted object as representing a class of objects, not just an individual object. Overall, children were more likely to transfer the label from a depiction to its real referent with highly realistic pictures than with less realistic depictions (e.g., drawings, cartoons).

By 18 months of age, children can imitate a sequence of actions on novel real-world objects on the basis of a picture book interaction, demonstrating sophisticated reasoning from a symbolic source (Simcock & DeLoache, 2008; Simcock & Dooley, 2007). In one study, 18-, 24-, and 30-month-olds were shown a picture book depicting how to construct a novel object (a rattle) and subsequently tested on their ability to reenact the novel action sequence with real objects (Simcock & DeLoache, 2006). Children's reenactment scores varied as a function of age and the iconicity of the pictures. There was a significant increase in the number of depicted target actions produced by each successive age group, and the 18-month-olds imitated target actions primarily after seeing highly realistic photographs in the book. Critically, toddlers who had not seen a live demonstration or picture book illustrating the action sequence did not construct the novel object, demonstrating that the objects themselves did not afford the actions. In a subsequent study, Simcock and Dooley (2007) found that 18-month-olds would