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Two- and 3-year-olds integrate linguistic and pedagogical cues in guiding inductive generalization and exploration

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ABSTRACT

Young children can in principle make generic inferences (e.g., “doffels are magnetic”) on the basis of their own individual experience. Recent evidence, however, shows that by 4 years of age children make strong generic inferences on the basis of a single pedagogical demonstration with an individual (e.g., an adult demonstrates for the child that a single “doffel” is magnetic). In the current experiments, we extended this to look at younger children, investigating how the mechanisms underlying this phenomenon are integrated with other aspects of inductive inference during early development. We found that both 2- and 3-year-olds used pedagogical cues to guide such generic inferences, but only so long as the “doffel” was linguistically labeled. In a follow-up study, 3-year-olds, but not 2-year-olds, continued to make this generic inference even if the word “doffel” was uttered incidentally and non-referentially in a context preceding the pedagogical demonstration, thereby simply marking the opportunity to learn about a culturally important category. By 3 years of age, then, young children show a remarkable ability to flexibly combine different sources of culturally relevant information (e.g., linguistic labeling, pedagogy) to make the kinds of generic inferences so central in human cultural learning.

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Introduction

How do children leverage the knowledge of others around them to guide their own learning about the world? Although much of the empirical work has focused on learning from what adults say, children also learn a lot from observing what others do. Others' actions, and in particular the underlying intentions that guide them, are potentially rich sources of information about the world, supporting inferences about a person's visual access, desires, preferences, and possibly even beliefs (Luo & Baillargeon, 2007; Onishi & Baillargeon, 2005; Woodward, 1998) as well as facilitating imitative learning (Williamson & Meltzoff, 2011).

Moreover, recognizing that the goal behind an action is not merely instrumental (for the actor's own benefit) but rather social (e.g., for the child's benefit) may allow for further inferences about the intended meaning of that communicative act and why an adult is choosing to communicate this information in this particular context (Csibra, 2010; Csibra & Gergely, 2009; Shafto, Goodman, & Frank, 2012; Sperber & Wilson, 1996). Specifically, if the child recognizes that a communicative act is being done for him or her, this indicates that the communicator has the specific social goal that the child attend to and learn this information for some particular reason and, thus, may license a variety of inferences about the relevance, importance, and generalizability of that information. Recent theoretical and empirical work (for reviews, see Csibra & Shamsudheen, 2015; Gergely & Jacob, 2013) has illustrated that an early sensitivity to this subtle difference, between an instrumental action and a deliberate and social demonstration, can have powerful consequences for children's learning. In particular, recognizing actions as deliberate demonstrations may help children to tackle the classic inductive problem of learning broad general knowledge from sparse evidence (Goodman, 1965). Thus, this sensitivity may have the power to shape children's conceptualizations of the world. An important next step, then, is to ask how this process is integrated with other factors that influence children's inductive inferences and how that integration may occur over the course of development. In this study, we focused specifically on one factor that has been shown to play a critical role in children's early inductive inferences—the use of linguistic kind labels—and asked specifically how children may come to integrate pedagogical intent and linguistic labeling to guide their inferences about a novel object kind. Before turning to our experiments, it is important to briefly review the evidence for how each of these factors affects inductive inference in order to provide a clear roadmap for the current research.

Sensitivity to pedagogical intent

Preverbal infants are sensitive to cues that indicate whether or not actions are being carried out communicatively, and this sensitivity affects their encoding and memory for object features (Yoon, Johnson, & Csibra, 2008), their categorization of novel objects (Futó, Téglás, Csibra, & Gergely, 2010; Hernik & Csibra, 2015), and their expectations about whether knowledge will be widely shared by other people (Egyed, Király, & Gergely, 2013). In older children, this distinction has the power to influence their active inductive inferences—both their judgments about what properties are central and defining of a category (Butler & Markman, 2014b) and their inferences about and exploration of the generalizability of novel object properties (Butler & Markman, 2012, 2014a).

Moreover, preschoolers may take an actor's choice to deliberately demonstrate an object property as indicating that this is the only function (Bonawitz et al., 2011) or the normatively correct function (Vredenburgh, Kushnir, & Casasola, 2015) of a particular object. Finally, when children already know the information being communicated, they use both an actor's demonstrations and the actor's deliberate omissions of information (when an actor fails to demonstrate what he or she could have) to make third-party judgments of whether that demonstrator is being informative and helpful (Gweon, Pelton, Konopka, & Schulz, 2014). Thus, sensitivity to whether or not actions are carried out with social pedagogical goals has the potential to have major impacts on a variety of aspects of children's inductive inference process.

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