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Preschoolers' encoding of rational actions: The role of task features and verbal information

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ABSTRACT

In the current study, we first investigated whether preschoolers imitate selectively across three imitation tasks. Second, we examined whether preschoolers' selective imitation is influenced by differences in the modeled actions and/or by the situational context. Finally, we investigated how verbal cues given by the model affect preschoolers' imitation. Participants (3- to 5-year-olds) watched an adult performing an unusual action in three imitation tasks (touch light, house, and obstacle). In two conditions, the model either was or was not restricted by situational constraints. In addition, the model verbalized either the goal that was to be achieved, the movement, or none of the action components. Preschoolers always acted on the objects without constraints. Results revealed differences in preschoolers' selective imitation across the tasks. In the house task, they showed the selective imitation pattern that has been interpreted as rational, imitating the unusual action more often in the no-constraint condition than in the constraint condition. In contrast, in the touch light task, preschoolers imitated the unusual head touch irrespective of the model's constraints or of the verbal cues that had been presented. Finally, in the obstacle task, children mostly emulated the observed goal irrespective of the presence of the constraint, but they increased their imitation of the unusual action when the movement had been emphasized. Overall, our data suggest that preschoolers adjust their imitative behavior to context-specific information about objects, actions, and their interpretations of the model's intention to teach something.

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Introduction

By observing other children or adults, children can learn much about goal-directed actions and how these actions have an impact on their physical and social environment. Imitative learning, therefore, serves an important function in human development, offering the acquisition of many skills without the time-consuming process of learning through trial and error (Bekkering, Wohlschläger, & Gattis, 2000). Actions are defined as goal-directed behavior and mainly involve two observable components: a movement or means and an obtained action effect or end state (Elsner, 2007). These action components can be copied in different ways. Thus, children may emulate an environmental result produced by another person without attending to the exact movement used, or they may imitate both means and result in an attempt to reproduce another person's goal-directed actions (Carpenter, Call, & Tomasello, 2002).

But which context-specific information do children and infants use during an action observation in order to imitate action components selectively? And does the encoding of context-specific information change with advancing age? Here, we assume that preschoolers combine different sources of information, for example, object-related and situation-related aspects of an action executed by another person serving as a model. In other words, imitation is seen as a function of children's understanding of mystifying observations and interpersonal factors (Uzgiris, 1981).

For example, Nielsen (2006) investigated the development of selective imitation while varying the reason for a model's demonstration and the communicative cues given by the model. More specifically, 12-, 18-, and 24-month-olds watched a model open a series of boxes. Results indicated that younger children did not imitate the modeled actions; instead, they used alternative means to emulate opening the boxes. In contrast, when given a logical reason for the action demonstration, they imitated the modeled action. The older children imitated the modeled object use irrespective of the reason for the demonstration or the social disposition. In other words, the reason for a modeled action demonstration and the communicative cues that were given during demonstration relate with age to affect how young children engage in social learning.

Imitation research indicates that infants' and young children's interpretation of a model's action is affected by different context conditions as well as by children's interpretation of the model's intention (Call, Carpenter, & Tomasello, 2005; Carpenter et al., 2002; Gergely, Bekkering, & Kiràly, 2002; Schwier, van Maanen, Carpenter, & Tomasello, 2006). Thus, children's interpretation of object-related and situation-related aspects in a social learning context is influenced by the interplay of cognitive and social factors (Meltzoff & Williamson, 2010; Nielsen, 2006; Uzgiris, 1981).

Along this line, selective imitation in infants was documented by Gergely and colleagues (2002), in whose study infants watched an adult turning on a lamp with her forehead. The 14-month-olds imitated this unusual action more often when, during demonstration, the model's hands lay idly beside the lamp (hands-free condition) as compared with when the model's hands were constrained by holding a blanket around her shoulders (hands-occupied condition). Yet, in both conditions, all infants used their hand to switch on the light; thus, they chose a familiar movement from their repertoire to emulate the observed action effect. Gergely and colleagues interpreted the selective imitation of the unusual head action as evidence that infants' processing of others' actions bears on the so-called principle of rational action, which involves an evaluation of the rationality of the means in relation to the goal and the constraints of the situation (see Gergely & Csibra, 2003, for a review). In summary, when the situational context factors changed, 14-month-olds were able to decide on the most effective action that should be used to reach the goal (see also Gergely, Nádasdy, Csibra, & Bíró, 1995).

Moreover, to demonstrate that rational imitation in infants is flexible, Schwier and colleagues (2006) presented 12-month-olds with an adult who showed an unusual action by making a toy animal enter a toy house through the chimney instead of the door. As expected, the infants imitated the unusual action more often when, during demonstration, the door of the house was open as compared with when it was locked. Here again, infants took context-specific information into account and reproduced the model's behavior in relation to the situational constraints and the observed goal. Schwier and colleagues argued that rational action understanding is important in cultural learning processes in situ-