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The boundaries of overimitation in preschool children: Effects of target and tool use on imitation of irrelevant actions

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ABSTRACT

Overimitation is defined as the imitation of a series of actions, including causally irrelevant ones. Although previous studies have indicated that children's overimitation tends to be flexible, there is no research directly comparing overimitation occurrences due to types of irrelevant actions such as the target of irrelevant action or tool use. To identify the boundary of overimitation—that is, the point at which it occurs or not—Study 1 focused on the target of causally irrelevant tool-using actions. Specifically, the study examined the demonstration of irrelevant actions toward a main apparatus, a disconnected apparatus, or an actor's own body, followed by the demonstration of causally relevant actions, to 2-, 3-, and 5-year-old children ($N = 59$). Results indicated that children overimitated actions toward the apparatuses more than they did the actions toward an actor's body. These results showed that overimitation was affected by the target, the apparatus, or the actor's own body. Study 2 investigated the effect of tool use toward the disconnected apparatus or an actor's body based on the findings in Study 1. Concretely, Study 2 added two actions without tool use (e.g., action toward an actor's own body without tool use and action toward an apparatus without tool use) to Study 1's actions for comparison. The results of this study showed that children overimitated the action toward the apparatus and the action with the tool more than the action toward an actor's own body and the action without the tool. Taken together, these findings suggest that two factors are involved in the occurrence of overimitation: the target of the action (i.e., the apparatus) and the use of a tool. The

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current findings provide suggestions for considering important aspects of overimitation that are worthy of more attention.

Introduction

One adaptive learning strategy is imitation, which enables humans to transmit culture efficiently (Nielsen, 2012; Tomasello, 1999; Whiten, Hinde, Laland, & Stringer, 2011). During recent years, an increasing amount of research has focused on overimitation, a unique type of imitation that refers to reproducing a model's irrelevant and relevant actions toward a final goal (e.g., Call, Carpenter, & Tomasello, 2005; Horner & Whiten, 2005; Lyons, Young, & Keil, 2007). When children observe a model performing an obviously causally irrelevant action (e.g., tapping on an apparatus) and a causally relevant action (e.g., opening the door of an apparatus) to achieve a final goal (e.g., retrieving a reward hidden inside the apparatus), they often reproduce both actions to achieve that goal. Such overimitation is probably unique to humans (Call et al., 2005; Horner & Whiten, 2005), exists across cultures (Nielsen & Tomaselli, 2010), and is observable from early childhood (McGuigan & Whiten, 2009).

The hypothesis known as the normative account attempts to explain why overimitation occurs (Buchsbaum, Gopnik, Griffiths, & Shafto, 2011; Horner & Whiten, 2005; Kenward, Karlsson, & Persson, 2011; Keupp, Behne, & Rakoczy, 2013; Keupp, Behne, Zachow, Kasbohm, & Rakoczy, 2015). The normative account assumes that children understand that the irrelevant action is not necessary for achieving the final goal; however, they perceive it as an essential part of a series of actions and, thus, overimitate it (Buchsbaum et al., 2011). For instance, Keupp et al. (2015) demonstrated a sequence of causally irrelevant and relevant actions for a final goal (e.g., finding a puzzle piece), and they referred to the sequence using a novel word (e.g., "daxing"). Children showed more overimitation when they were instructed to "Have a go and dax" than when they were instructed to "Have a go and find a puzzle piece." Thus, children do not always show overimitation, and their overimitation appears flexibly. This means that children pay attention to a sequence of actions and judge whether to overimitate in response to the condition; thus, context affects overimitation (Keupp et al., 2015). Other previous studies showed that overimitation should be affected not only by context itself but also by contextual factors. For example, the presence of a model promoted overimitation more than did the absence of a model (Nielsen & Blank, 2011). Clegg and Legare (2016) showed that children overimitated more when the model showed the causally irrelevant actions conventionally (e.g., "Everyone always does it this way") compared with when the model showed them instrumentally (e.g., "I am going to make a necklace"). In addition, children solving by observing others, who showed irrelevant and relevant actions, overimitated the irrelevant action more than did children solving by personally experiencing, for which prior information affected overimitation (Wood, Kendal, & Flynn, 2013). In this way, a number of studies have revealed various contextual factors that may influence overimitation.

In contrast to contextual factors, non-contextual factors have been investigated less frequently. Lyons et al. (2007) described automatic causal encoding (ACE) as follows: Children's overimitation should result from automatically mis-encoding adults' causally irrelevant actions as being causally relevant when an adult demonstrates purposefulness in completing the action. ACE sheds light on non-contextual factors to understand the causal boundary that determines whether overimitation occurs. Lyons and colleagues hypothesized that overimitation occurred under the prescribed conditions according to the contact principle; that is, mechanical interactions cannot occur at a distance. They compared two conditions: one using an apparatus with a connected part and the other using an apparatus consisting of two independent parts. In this case, the children imitated irrelevant actions toward the connected apparatus more than they did irrelevant actions involving the disconnected apparatus. Lyons and colleagues proposed that an experimenter's irrelevant action toward the connected apparatus distorted children's causal beliefs, thereby leading to overimitation. Furthermore,