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# The influence of peers on the tendency of 3- and 4-year-old children to over-imitate



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### ABSTRACT

Human children have frequently been shown to be high-fidelity imitators who faithfully reproduce the actions performed by a model. Curiously, children do not always appear to copy actions rationally and often copy in situations where doing so will lead to a reduction in task efficiency. This over-imitative tendency has been explored extensively with respect to adult models, but we know very little of the influence that peers can have on the fidelity of copying behavior. In an initial experiment, 3- and 4-year-old children watched two peers retrieve a reward from a puzzle box using a sequence of actions that were either causally relevant or causally irrelevant to reward retrieval. On completion of the task demonstrations, one model left the testing room, leaving the children to perform the task in the presence of the remaining efficient or inefficient peer. The results showed that, rather than copying the strategy of the peer who was physically present, the children displayed “blanket efficiency” and rarely reproduced the causally irrelevant actions. Intriguingly, the children switched from their previously efficient behavior when they were exposed to additional peer models who performed the causally irrelevant actions. The switch to an inefficient approach appeared to result from normative conformity because the children failed to reproduce the causally irrelevant actions when allowed to perform the task one final time in private. We suggest that the influence of the majority, although detrimental to task efficiency in this case, is a key cornerstone of human cultural evolution.

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## Introduction

Recent studies from the developmental and comparative literatures have shown that young children are fastidious copiers who frequently copy the technique used by adult models when operating a range of tools and locking mechanisms to open different puzzle boxes (Horner & Whiten, 2005; McGuigan, Whiten, Flynn, & Horner, 2007; Nielsen & Tomaselli, 2010). Surprisingly, the level of detail with which children copy these techniques extends to components of the action sequence that are causally irrelevant to obtaining the reward, including unnecessarily tapping or swiping the top of the box with a tool (e.g., McGuigan, Makinson, & Whiten, 2011; Nielsen, Moore, & Mohamedally, 2012). The copying of such irrelevancies has become known as “over-imitation,” and many explanations have been put forward to account for this detailed level of copying, including most prominently causal confusion, social affiliation, and normativity accounts.

The causal confusion account proposes that children include causally irrelevant actions in their reproductions due to an automatic coding process in which all actions performed by a model are believed to be causally necessary for reward retrieval (Lyons, Damrosch, Lin, Macris, & Keil, 2011; Lyons, Young, & Keil, 2007). This account is supported by the pervasiveness of over-imitation under conditions where the countervailing task demands lend themselves toward task efficiency. In contrast to the causal confusion account, the social affiliation account suggests that children purposefully include the causally irrelevant elements of the task in order to affiliate with or to “be like” the model (Nielsen, 2006; Nielsen & Blank, 2011), an account that is supported by the finding that young children show less fidelity to actions performed by socially disengaged models than to those performed by socially engaged models (Brugger, Lariviere, Mumme, & Bushnell, 2007; Nielsen, 2006). The normativity account proposes that children are not copying the model’s irrelevant actions as a result of social affiliation or causal confusion; rather, children have acquired a norm that prescribes how that object ought to be operated (Kenward, 2012; Kenward, Karlsson, & Persson, 2011). The normativity account is supported by the finding that children who have initially viewed the task performed inefficiently frequently protest against other individuals who omit irrelevant actions, a pattern that is similar to the one witnessed with violation of the rules of games (Rakoczy, Brosche, Warneken, & Tomasello, 2009; Rakoczy, Warneken, & Tomasello, 2008, 2009). Under a normativity account, the irrelevant actions are deemed to be conventionally necessary rather than causally necessary.

Irrespective of the theoretical approach, the basic paradigm used in the majority of over-imitation studies is one in which the observer views a single model perform the task one time or multiple times using the same inefficient technique. The frequent outcome is that the observer copies all elements of the demonstration irrespective of their causal relevance. However, a recent study has shown that children can in some instances ignore the information provided by an inefficient model and operate more selectively (Nielsen & Blank, 2011). Nielsen and Blank (2011) devised a novel paradigm in which 4-year-old children viewed two adult models perform a puzzle box task. In one condition both models performed the task using the same inefficient technique, whereas in two other conditions the models adopted different strategies with one acting efficiently and one acting inefficiently. On completion of the two task demonstrations, one model (either the efficient or inefficient model) left the testing room, leaving the children to perform the task in the presence of the remaining model. Of interest was whether the children would over-imitate across conditions irrespective of which model was present or whether the children would match the remaining model’s approach. The results suggested that the children were socially motivated, performing only the actions necessary to retrieve the reward in the presence of the efficient model and copying the causally irrelevant elements in the presence of the inefficient model. That the children ignored the information provided by the efficient model and adhered to the technique displayed by the present (but inefficient) model is somewhat curious because the blanket adoption of a “copy the model present” strategy has the potential to lead children to adopt less effective approaches to a task. Of interest in the current study was whether the tendency of social affiliation to over-ride knowledge of the efficient task solution was specific to instances where the task demonstration was provided by adult models or whether incorporating alternative models into the Nielsen and Blank paradigm would lead to a different pattern of results.

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