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Does a peer model's task proficiency influence children's solution choice and innovation?

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ABSTRACT

The current study investigated whether 4- to 6-year-old children's task solution choice was influenced by the past proficiency of familiar peer models and the children's personal prior task experience. Peer past proficiency was established through behavioral assessments of interactions with novel tasks alongside peer and teacher predictions of each child's proficiency. Based on these assessments, one peer model with high past proficiency and one age-, sex-, dominance-, and popularity-matched peer model with lower past proficiency were trained to remove a capsule using alternative solutions from a three-solution artificial fruit task. Video demonstrations of the models were shown to children after they had either a personal successful interaction or no interaction with the task. In general, there was not a strong bias toward the high past-proficiency model, perhaps due to a motivation to acquire multiple methods and the salience of other transmission biases. However, there was some evidence of a model-based past-proficiency bias; when the high past-proficiency peer matched the participants' original solution, there was increased use of that solution, whereas if the high past-proficiency peer demonstrated an alternative solution, there was increased use of the alternative social solution and novel solutions. Thus, model proficiency influenced innovation.

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Introduction

Laboratory experiments with unfamiliar models enable a controlled investigation of children's social learning strategies, influencing the circumstances under which they copy. However, it is hugely beneficial to look at children's behavior "in the wild" (Flynn & Whiten, 2010), implementing a controlled design in a naturalistic setting, such as with familiar peers in a child's classroom or nursery group (Dean, Kendal, Schapiro, Thierry, & Laland, 2012; Flynn & Whiten, 2012). Such paradigms may also identify moments of innovation, whereby children find solutions that have not been socially demonstrated. The current study implemented an experimental procedure designed to mirror a naturalistic context to better understand children's solution choice and innovation relative to (a) the past proficiency of a known peer model and (b) their personal experience with a task.

Model past proficiency

When faced with divergent novel information from numerous individuals, it is adaptive to have a strategy as to whom to copy (Laland, 2004; Rendell et al., 2011). Children demonstrate such model-based biases in their learning (reviewed by Wood, Kendal, & Flynn, 2013b). For example, from infancy to 6 years of age, children consistently copy reliable models over unreliable models for linguistic labeling (Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005; Vázquez, Delisle, & Saylor, 2012) and artifact use (Birch, Vauthier, & Bloom, 2008; Zmyj, Buttelmann, Carpenter, & Daum, 2010). Copying a proficient successful model should increase the chances of personal success. In the current study, we use the term *past proficiency* to refer to a model's domain-specific ability exhibited in the past. As such, we focused on the potential for a model to have a reputation for being skilled within the domain that the model is currently demonstrating and a corresponding model-based bias to influence an observer's solution choice. We used novel artifacts to establish proficiency reputations, so proficiency refers to *successful interaction with novel artifacts.* The child models either scored high in past proficiency (hereafter High PPM for high past-proficiency model) or scored lower in past proficiency (hereafter Low PPM for low past-proficiency model) pertaining to the relative degree of exploration or, where appropriate, successful extraction of capsules containing stickers from the series of novel artifacts.

The strength of the current study is the use of familiar peer models, enabling an investigation of children's responses to peers based on their actual abilities rather than staged manipulations from two novel actors. However, this paradigm presents challenges. First, peers will differ in past proficiency *and* in other characteristics such as age, sex, popularity, and dominance, and these characteristics could also bias children's solution choice. For example, 7- and 8-year-olds copy the food choices of older children rather than younger children at the same school (Brody & Stoneman, 1981), and 3-year-olds copy the preferences of same-sex (over different-sex) unfamiliar child models for choices of novel food, clothes, toys, and games (Frazier, Gelman, Kaciroti, Russell, & Lumeng, 2012; Shutts, Banaji, & Spelke, 2010). These characteristics may also covary with proficiency; with an open-diffusion artificial fruits task, older, more dominant familiar children were watched more and had more successes than younger, less dominant children (Flynn & Whiten, 2012). The second related issue is that young children may struggle to differentiate the subtle differences in their peers' proficiency. For example, whereas Zmyj and colleagues (2010) differentiated proficiency through a model placing a shoe on his foot or his hand, the current study asked children to imagine who might be better at a task. If this is challenging, children might select peers based on more salient characteristics such as age and sex. To try to evaluate and minimize these challenges, age, sex, popularity, and dominance measures of the children were taken and analyzed in conjunction with peer ratings. In addition, for the test phase, models were matched on these characteristics.

Prior experience

Personal prior experience can influence whether a model will be copied; naive (no prior experience with the task) children who are presented with demonstrations of the same solution faithfully copy this solution, including the copying of causally irrelevant actions, even when other solutions are