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Observing an adult model can cause immediate improvement in preschoolers' knowledge judgments

Amanda R. Lipko-Speed[a,*], Stephanie Buchert[b], William E. Merriman[c]

[a] The College at Brockport, State University of New York, United States
[b] Longwood University, United States
[c] Kent State University, United States

ABSTRACT

We addressed whether preschoolers could learn how to make knowledge judgments by observing an adult make them correctly. In Experiment 1, children looked on as one adult answered another adult's questions about a hidden toy. In the modeling condition, the questions concerned whether the adult knew the identity of the toy. The model answered correctly and justified her answers by noting whether she had seen the toy being hidden. In the control condition, the model saw which toy was hidden on every trial and answered yes-no recognition questions about it. In both conditions, the children were then asked to make the kind of judgments that had only been demonstrated in the modeling condition. Younger children (*M*age = 3–4) were not affected by condition, but among the older children (*M*age = 4-1), those in the modeling condition made more accurate judgments and provided more perceptual access justifications than those in the control condition. Experiment 2 demonstrated that the modeling of knowledge judgments caused the accuracy of the older children's knowledge judgments to increase regardless of whether the model justified her judgments. Also, the modeling of perceptual access justifications increased the older children's tendency to give such justifications for knowledge judgments regardless of whether the justifications had been modeled for knowledge judgments or recognition responses.

1. Introduction

Ask a 3-year-old, "Do you know what a 'zav' is?" and he or she will likely answer with a very self-assured response of, "Yes!" Despite the fact that *zav* is a nonsense word that adults would readily admit to not knowing, young children tend to be overconfident when judging their own knowledge.

Preschool-age children's tendency to overestimate their own knowledge or ability has been demonstrated in a variety of tasks. These include memory prediction (e.g., Lipko, Dunlosky, & Merriman, 2009; Schneider, 1998), lexical knowledge judgment (e.g., Marazita & Merriman, 2004; Merriman, Lipko, & Evey, 2008), knowledge judgment based on perceptual access (e.g., Rohwer, Kloo, & Perner, 2012; Sodian & Wimmer, 1987), and perceptual, lexical, and memory confidence judgments (Hembacher & Ghetti, 2014; Lyons & Ghetti, 2011). Although even adults tend to overestimate their knowledge or ability (Fisher & Keil, 2015; Koriat & Bjork, 2005), the frequency and magnitude of these errors tends to decline over the course of childhood (Aguiar, Stoess, & Taylor, 2012; Lyons & Ghetti, 2011).

Our goal was to examine whether children's ability to make knowledge judgments based on perceptual access would improve after a brief observational learning experience. Would they become more likely to distinguish their states of ignorance from their states of knowledge if they first observed an adult make accurate reports of these states? In Experiment 1, we examined whether 3-year-olds and younger 4-year-olds would benefit from observing an adult not only make correct knowledge judgments about a hidden object, but justify these in terms of perceptual access. For Experiment 2, we examined whether older 3-year-olds and younger 4-year-

* Corresponding author at: The College at Brockport, State University of New York Psychology Department, 350 New Campus Drive Brockport, NY 14420, United States.
E-mail address: alipko@brockport.edu (A.R. Lipko-Speed).

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olds would benefit from only observing a model make correct judgments or from only observing a model offer perceptual access justifications.

No study has addressed whether preschool-age children's judgments of knowledge or belief might improve after observing a model make such judgments correctly. A microgenetic study by Amsterlaw and Wellman (2006) came the closest. Over 6–7 weeks, 3-year-olds repeatedly heard stories in which a character formed a false belief. For each story, the child predicted the character's utterance or action, then learned what the character actually said or did. One group was always asked to explain the character's behavior, whereas a comparison group was asked to do this for half of the stories. Only the first group showed an increased understanding of false belief on the posttest. Because participants received no explicit instruction or corrective feedback, both groups could be characterized as only having been exposed to a model of correct responding (i.e., the story character's responses). The results suggest that multiple sessions and a focus on explanation may both be necessary to promote successful observational learning of judgments of knowledge or belief.

The literature on attempts to directly train 3- and 4-year-olds to make such judgments also supports the possible importance of multiple training sessions and a focus on explanation (e.g., Clements, Rustin, & McCallum, 2000; Leece, Bianco, Demicheli, & Cavallini, 2014; Slaughter & Gopnik, 1996). In a review, Kloo and Perner (2008) concluded that training that informed children of the knowledge or belief states of various story characters and corrected the children whenever they misreported these states was only effective when the training was distributed over more than one session. Thus, children may only benefit if given sufficient time to "take in and integrate training experiences" (p. 124). Kloo and Perner also observed that direct training was more likely to succeed if it not only informed children of the correct answers, but also provided explanations for why these answers were correct. For example, Clements et al. (2000) found that 3- and 4-year-olds who received corrective feedback with explanations improved, but those who received corrective feedback alone did not. However, other studies have achieved positive training effects with corrective feedback alone (Hülsken, 2001; Slaughter & Gopnik, 1996; Slaughter, 1998).

There is good reason to hypothesize that older preschoolers may be able to learn how to make knowledge judgments that are based on perceptual access by observing someone else make these judgments accurately. By age four years, most children have acquired some understanding of how perceptual access affects another person's acquisition of knowledge. For example, they understand that another person will not know what is in a box after its contents have been switched (Hogrefe, Wimmer, & Perner, 1986; Lipowski & Merriman, 2011; Wellman & Liu, 2004) and that different kinds of knowledge are acquired by perception in different sense modalities (e.g., color knowledge through vision) (O'Neill & Chong, 2001). Thus, 4-year-olds may be able to identify the critical differences in perceptual access that cause a model to claim to know or not know in various situations.

Although there have been no studies of whether young children can learn how to make knowledge or belief judgments from a model, there is evidence that they can learn to behave according to a conceptual rule from a brief session in which they simply observed an adult follow the rule (Wang, Meltzoff, & Williamson, 2015; Williamson, Jaswal, & Meltzoff, 2010). The behavior and the rule in these instances were quite different from the behavior and rule that are the focus of the current study, however. In Williamson et al. (2010), Experiment 1), 3-year-olds who observed an adult sort an array of objects by color rather than by shape were more likely to adopt this sorting rule when they performed the task themselves. Likewise, in Experiment 2, 3-year-olds who watched an adult sort an array of objects by the sounds that the objects made were more likely to adopt this sorting rule. Wang et al. (2015) found that 4-year-olds, but not 3-year-olds learned to sort objects by weight after observing an adult use this sorting strategy. The investigators suggested that weight may just be a more difficult dimension for 3-year-olds to process than color or object sound. Although sorting objects is quite a different task from judging one's knowledge based on perceptual access, one similarity is that successful performance involves applying a conceptual rule to a set of decisions. The demonstrations by Williamson and colleagues at least establish a precedent in which preschool-age children learned to apply a conceptual rule from a single session of modeling that did not include explanations.

2. Experiment 1

We examined whether a single session of modeling that included explanations would cause an immediate improvement in preschoolers' knowledge judgments. The children had to judge whether they knew the identity of a toy that had been hidden in a box. Children five years old and younger have been observed to overestimate the knowledge that they gain from observing some hiding events of this kind (Rohwer et al., 2012; Sodian & Wimmer, 1987). For example, in Rohwer et al. (2012), 3- to 7-year-olds watched a toy being hidden in a box (complete knowledge), received no information about the toy hidden in a box (complete ignorance), or viewed two toys and then learned that one of them had been hidden in a box (partial knowledge). When asked whether they knew what toy was in the box, all groups responded accurately on complete knowledge and complete ignorance trials, but only children older than 5 years consistently acknowledged their ignorance on partial knowledge trials. A similar type of error has been observed in tasks requiring children to evaluate possible solutions to problems. Children under age 6 often identify a single solution to a particular problem (Beck, McColgan, Robinson, & Rowley, 2011, Experiment 2; Kloo, Rowher, & Perner, 2017, Experiment 1; Robinson, Rowley, Beck, Carroll, & Apperly, 2006), or say that they know how the problem was solved (Fay & Klahr, 1996; Klahr & Chen, 2003), when they have not received enough information to eliminate alternative solutions.

Regarding judgments concerning a hidden object, Rohwer et al. (2012) proposed that children under six years tend to decide that they know its identity if they can readily think of a plausible identity. On complete ignorance trials, where they receive no information about what the experimenter might be hiding, they later decide that they do not know what is in the box because no particular object comes to mind when they think about what is in there. On complete knowledge trials, where they see what the experimenter puts in the box, they later decide that they know what is in the box because this object comes to mind when they think