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Brief Report

Visual access trumps gender in 3- and 4-year-old children's endorsement of testimony

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ABSTRACT

Several studies have investigated how preschoolers weigh social cues against epistemic cues when taking testimony into account. For instance, one study showed that 4- and 5-year-olds preferred to endorse the testimony of an informant who had the same gender as the children; by contrast, when the gender cue conflicted with an epistemic cue—past reliability—the latter trumped the former. None of the previous studies, however, has shown that 3-year-olds can prioritize an epistemic cue over a social cue. In Experiment 1, we offer the first demonstration that 3-year-olds favor testimony from a same-gender informant in the absence of other cues. In Experiments 2 and 3, an epistemic cue—visual access—was introduced. In those experiments, 3- and 4-year-olds endorsed the testimony of the informant with visual access regardless of whether it was a same-gender informant (Experiment 3) or a different-gender informant (Experiment 2). These results demonstrate that 3-year-olds are able to give more weight to an epistemic cue than to a social cue when evaluating testimony.

Introduction

Research has uncovered a wide variety of cues young children use when evaluating testimony (e.g., Clément, 2010; Harris, 2012; Mills, 2013). Some of the cues children use make obvious epistemic sense, with visual access being a good example. It has been repeatedly demonstrated that young

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children understand that someone who has looked in a box knows what is inside, whereas a person who has not looked does not (e.g., Pillow, 1989; Pratt & Bryant, 1990; Sodian, Thoermer, & Dietrich, 2006). Thus, it was shown that preschoolers (including 3-year-olds) are more likely to believe an informant who had seen what was in a box than an informant who had not seen what was in a box (e.g., Robinson, Champion, & Mitchell, 1999).

Other cues seem to be more social than epistemic in nature. In particular, preschoolers tend to favor—everything else equal—the testimony of an informant who is more similar to them over that of a less similar informant. This has been observed for similarity based on accent (Kinzler, Corriveau, & Harris, 2011), gender (Ma & Woolley, 2013), hair color and food preference (Reyes-Jaquez & Echols, 2013, Experiment 1), and minimal group membership (MacDonald, Schug, Chase, & Barth, 2013).

In spite of the robustness of children's tendency to believe similar informants, evidence suggests that this tendency is trumped by some epistemic cues. In several experiments, young children were more likely to endorse the testimony of a dissimilar informant over that of a similar informant if the dissimilar informant had been accurate in the past and the similar informant had been inaccurate in the past (for accent: Corriveau, Kinzler, & Harris, 2013; for gender: Taylor, 2013; for hair color and food preference: Reyes-Jaquez & Echols, 2013; for minimal group membership: Elashi & Mills, 2014). This evidence is convergent with several other studies that have shown that for preschoolers (although sometimes only for older preschoolers) cues to past accuracy trump social cues such as familiarity (Corriveau & Harris, 2009), age (Jaswal & Neely, 2006), and consensus (Bernard, Proust, & Clément, 2015) (for an exception in which 4-year-olds favor familiarity over past reliability, see Danovitch & Mills, 2014).

Strikingly, none of these previous studies has demonstrated a preference for epistemic cues over social cues in 3-year-olds. Some studies did not incorporate this population (Bernard et al., 2015; Taylor, 2013). One study lumped 3- and 4-year-olds together, making it impossible to independently ascertain the performance of 3-year-olds (Jaswal & Neely, 2006). In some studies, 3-year-olds did take the epistemic cue into account but still weighed the social cue heavily, so that the children did not clearly favor the epistemic cue when the two cues were conflicting (Corriveau et al., 2013; Elashi & Mills, 2014; Reyes-Jaquez & Echols, 2013). Finally, in one study, 3-year-olds favored the social cue over the epistemic cue (Corriveau & Harris, 2009).

The current research investigated how young preschoolers, including a group of 3-year-olds, combine a social cue—similarity of gender—with an epistemic cue—visual access. We chose two cues that could be expected to be strong. As a social cue, gender is a particularly salient category (Fiske, 1998) that can, for children at least, trump other categories such as age and ethnic group (Shutts, Banaji, & Spelke, 2010). Although gender has been shown to exert a strong influence on the endorsement of testimony in 4- to 6-year-olds (e.g., Ma & Woolley, 2013), the current research would be the first demonstration of such an effect in 3-year-olds. The epistemic cue chosen was visual access, a factor that has been shown to strongly influence 3-year-olds' endorsement of testimony (Pillow, 1989; Robinson et al., 1999).

The three experiments in the current research relied on the same setup. The child was shown two informants standing next to a box. One informant was male and the other was female. The two informants gave conflicting testimony about the content of the box, and the child needed to say what she or he thought was in the box. What was manipulated was the perceptual access the informants had to the content of the box before providing their testimony. In Experiment 1, both informants had seen the content of the box. In the absence of a differential epistemic cue, we expected the child to believe the informant of the same gender. In Experiment 2, only the informant whose gender was different from the child's gender had seen what was in the box. In Experiment 3, only the informant whose gender was the same as the child's gender had seen what was in the box. Taken together, Experiments 2 and 3 allowed us to test the following predictions. If children prefer to use visual access (epistemic cue) to differentiate between conflicting claims, they will choose the informant who has seen inside the box regardless of gender. In contrast, if children tend to be guided by a same-gender preference (social cue), they will choose the same-gender informant regardless of visual access.

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Experiment 1

Method

Participants

This experiment involved 88 children: 45 3-year-olds (20 girls; M_{age} = 42.33 months, SD = 3.56, range = 36–47) and 43 4-year-olds (21 girls; M_{age} = 53.91 months, SD = 3.51, range = 48–59). All children were recruited from five day-care centers in a Swiss French-speaking city. Most children came from middle- and upper middle-class families. Only children whose parents had given their consent participated in the study. All children were administered the task on an individual basis in a quiet room located in their day-care center. The procedure lasted approximately 10 min.

Materials and procedure

A PowerPoint presentation including four counterbalanced stories was used. All stories were built on the same model. In the first vignette, two Playmobil characters in front view—a man and a woman—and a closed box between them were depicted. The experimenter gave the first names of the two characters (e.g., Lucie and Thomas) and checked whether the child could identify both characters by name through memory check questions, for instance: "Can you show me who is Lucie?" and "Can you show me who is Thomas?" (order counterbalanced). The experimenter explained that there was something in the box and that the two characters were going to look in the box (second vignette showing the two characters looking simultaneously into the opened box). Then each character in turn pointed to the box, which was closed again, while an animation bubble appeared. For the woman character the experimenter said aloud, for instance, "Lucie says there is a ball in the box" (third vignette), whereas for the man character the experimenter said aloud, for instance, "Thomas says there is a book in the box" (fourth vignette).

Finally, the fifth vignette again depicted the two Playmobil characters in front view with the closed box between them, and the experimenter asked the child, "According to you, what is in the box?" After the child gave her or his response verbally (e.g., "a ball," "a book"), the experimenter asked a justification question: "In your opinion, why is there a [child's response] in the box?"

The three other stories were built on the same model. The order in which the informants provided information, the informants' first names (eight different names were used for the eight different Playmobil characters presented to children: Lucie/Thomas, Julie/Hugo, Charlotte/Julien, and Marie/Olivier), the informants' location (right vs. left), the color of the boxes, and the objects named by the informants varied across trials. The child could obtain a maximum score of 4 points, that is, 1 point for each story in which the object's name provided by the same-gender character was chosen.

Results

All children correctly remembered the first names of all eight characters (memory check questions) in each story. A two-way analysis of variance (ANOVA) with age group (3-year-olds or 4-year-olds) and gender (girl or boy) as between-participants variables was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the same-gender character. This revealed no significant main or interaction effects between these two factors. The choice of the same-gender character's testimony was significantly above chance both for the children as a whole (64.2%, M = 2.57, SD = 1.09), $t(87) = 4.88$, $p < .001$, and within each age group: 3-year-olds (64.4%, M = 2.58, SD = 1.11), $t(44) = 3.47$, $p < .01$; 4-year-olds (63.9%, M = 2.56, SD = 1.07), $t(42) = 3.40$, $p < .01$ (see Fig. 1).

Regarding the justification question, very few gender-based explanations were produced after a same-gender response (e.g., when a boy said, "Because boys are stronger than girls"): 1.7% of trials for the 3-year-olds (n = 3) and 4.1% of trials for the 4-year-olds (n = 7).

Experiment 2

Experiment 1 demonstrated that when 3- and 4-year-olds needed to choose between the testimony of a same-gender character and that of a different-gender character, they tended to endorse

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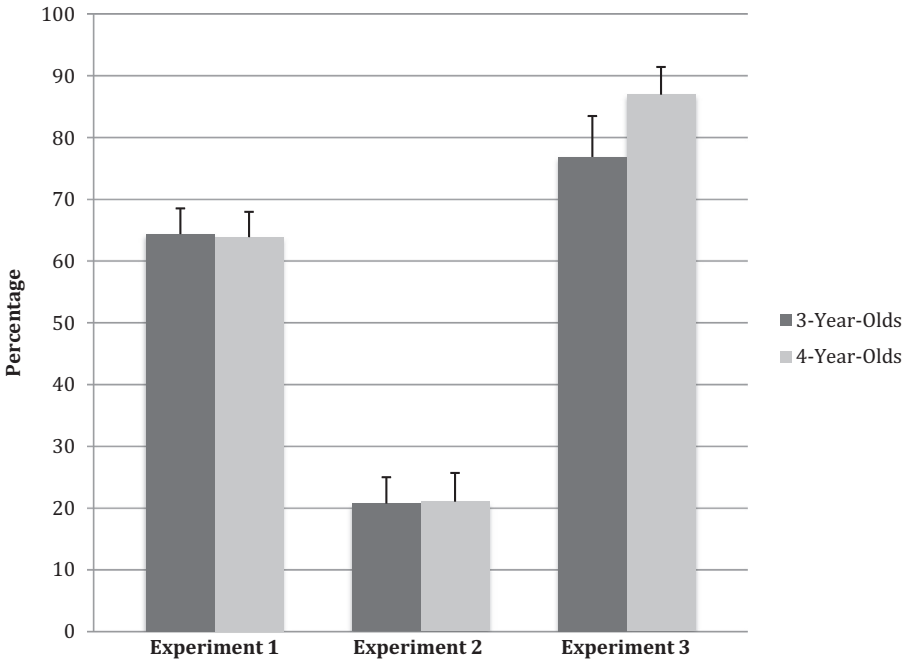

Fig. 1. Percentages of choices linked to the same-gender characters in each experiment.

the testimony of the same-gender character. Although this tendency was far from ceiling, it was similar to that observed in previous experiments with 4-year-olds (e.g., Taylor, 2013). The main goal of Experiment 1 was to establish a baseline preference for the same-gender informant. Experiments 2 and 3 tested the weight given to this evidence when it is opposed to (Experiment 2) or combined with (Experiment 3) an epistemic cue. The epistemic cue used was visual access; only one of the two informants saw what was in the box. In Experiment 2, it was the different-gender informant who had visual access. If the epistemic cue trumps the social cue, children should believe the different-gender informant who had visual access.

Method

Participants

This experiment involved 85 children: 41 3-year-olds (20 girls; M_{age} = 41.92 months, SD = 3.65, range = 36–47) and 44 4-year-olds (22 girls; M_{age} = 53.54 months, SD = 3.55, range = 48–59). The demographics and procedure were similar to those of Experiment 1.

Materials and procedure

The materials and procedure used in this experiment were the same as those used in Experiment 1 except for two modifications. First, a wall was introduced between the same-gender character and the box. Second, the same-gender character turned her or his back on the box when the different-gender character was looking in the box. These modifications were introduced to ensure that the child understood that the same-gender character could not have any perceptual access to the content of the box. Moreover, during the procedure, the presence of the wall and the fact that the same-gender character did not look in the box were emphasized by the experimenter. In the first vignette, the experimenter

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said, "You see here [the experimenter points to the wall], there is a wall between [X] and the box." In the second vignette, the experimenter said, "[Y] looks in the box but [X] does not."

Results

All children correctly remembered the first names of all eight characters. A two-way ANOVA with age group (3-year-olds or 4-year-olds) and gender (girl or boy) as between-participants variables was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the same-gender character with no perceptual access. This revealed no significant main or interaction effects between these two factors. The choice of the testimony provided by the same-gender character with no perceptual access was significantly below chance both for the children as a whole (20.8%, $M = 0.83$, $SD = 1.16$), $t(84) = -9.23$, $p < .001$, and within each age group: 3-year-olds (20.7%, $M = 0.82$, $SD = 1.09$), $t(40) = -6.86$, $p < .001$; 4-year-olds (21%, $M = 0.84$, $SD = 1.24$), $t(43) = -6.21$, $p < .001$ (Fig. 1).

Regarding the justification question, 3- and 4-year-olds did not produce any gender-based explanations after a same-gender response. After the choice of a character with visual access, justifications based on the visual access of the informant (saying, e.g., "Because [she/he] looked in the box") were given in 13.4% of trials for the 3-year-olds ($n = 22$) and in 45.4% of trials for the 4-year-olds ($n = 80$).

Experiment 3

Experiment 2 demonstrated that when there is a conflict between an epistemic cue (visual access) and a social cue (same gender), 3- and 4-year-olds tend to put more weight on the epistemic cue in their endorsement of testimony. The goal of Experiment 3 was to test the behavior of children from the same age group when the two cues are consistent. If the social and epistemic cues are additive, children should be more likely to believe the same-gender informant who had visual access than the different-gender informant who had visual access in Experiment 2.

Method

Participants

This experiment involved 53 children: 26 3-year-olds (13 girls; $M_{age} = 41.19$ months, $SD = 3.49$, range = 36–47) and 27 4-year-olds (13 girls; $M_{age} = 52.70$ months, $SD = 3.76$, range = 48–59). The demographics and procedure were similar to those of Experiments 1 and 2.

Materials and procedure

The materials and procedure used in this experiment were the same as those used in Experiment 2 except that the presentations used with the girls in Experiment 2 were presented to the boys (and the reverse pattern for the boys). Thus, in this experiment the same-gender character had perceptual access to the content of the box, whereas the different-gender character did not.

Results

All children correctly remembered the first names of all eight characters. A two-way ANOVA with age group (3-year-olds or 4-year-olds) and gender (girl or boy) as between-participants variables was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the same-gender character with perceptual access. This revealed no significant main or interaction effects between these two factors. The choice of the testimony provided by the same-gender character with perceptual access was significantly above chance both for the children as a whole (82.1%, $M = 3.28$, $SD = 1.17$), $t(52) = 8.01$, $p < .001$, and within each age group: 3-year-olds (76.9%, $M = 3.08$, $SD = 1.35$), $t(25) = 4.05$, $p < .001$; 4-year-olds (87%, $M = 3.48$, $SD = 0.93$), $t(26) = 8.23$, $p < .001$ (Fig. 1).

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After the choice of a same-gender character with visual access, the justifications based on the visual access of the informant were given in 14.4% of trials for the 3-year-olds ($n = 15$) and in 51.8% of trials for the 4-year-olds ($n = 56$). After the same choice, 3- and 4-year-olds did not produce any justifications based on gender.

To analyze the differences among the experiments, a three-way ANOVA with age group (3-year-olds or 4-year-olds), gender (girl or boy), and experiment (1, 2, or 3) as between-participants variables was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the same-gender character. This revealed only a significant main effect of experiment, $F(2, 214) = 72.53$, $p < .001$, $\eta^2 = .40$. Children chose the object linked to the same-gender character significantly more often in Experiment 3 (82.1%, $M = 3.28$, $SD = 1.17$) than in Experiment 1 (64.2%, $M = 2.57$, $SD = 1.09$), $p < .001$, and Experiment 2 (20.8%, $M = 0.83$, $SD = 1.16$), $p < .001$. Children chose the object linked to the same-gender character significantly more often in Experiment 1 than in Experiment 2, $p < .001$.

Finally, if the social and epistemic cues are additive, children should be more prone to follow the same-gender informant who had visual access (Experiment 3) than the different-gender informant who had visual access (Experiment 2). A three-way ANOVA with age group (3-year-olds or 4-year-olds), gender (girl or boy), and experiment (2 or 3) as between-participants variables was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the character who had visual access to the content of the box. This revealed no significant main or interaction effects among these three factors. Still, there was a nonsignificant difference in the expected direction (mean number of choices linked to the character who had visual access: 3.16 in Experiment 2; 3.28 in Experiment 3). This lack of significant difference between the experiments might be due to a ceiling effect given the high performance of the children in Experiment 2 (where $\sim$ 80% of the children endorsed the testimony of the informant with visual access). Improvements beyond this level of performance are difficult to observe in this population given that it is difficult to avoid noisy answers due to lapses of attention in very young children.

General discussion

The goal of the current experiments was to investigate how 3- and 4-year-olds weigh social and epistemic cues when evaluating testimony. In all three experiments, the children needed to choose between the testimony of an informant who had the same gender as them (same-gender informant) and one who did not (different-gender informant). Both pieces of testimony bore on the content of a box. In Experiment 1, there was no discriminating epistemic cue; both informants had seen what was in the box. Children from both age groups relied on the social cue; they were more likely to follow the same-gender informant. Experiment 1 extends previous results in three ways: (a) by showing that 3-year-olds also display a preference for testimony by a same-gender informant; (b) by showing that this preference for 3- and 4-year-olds extends to an episodic knowledge task (what can be in a box), in contrast to labelization tasks or tool use tasks (Ma & Woolley, 2013; Taylor, 2013); (c) by showing that a different method of presentation (Playmobil figures instead of movies of actual people as, e.g., in Taylor, 2013) can elicit preference for same-gender informants.

In Experiment 2, the social and epistemic cues conflicted; only the different-gender informant had seen what was in the box. Children from both age groups relied on the epistemic cue; they were more likely to follow the different-gender informant who had visual access. In Experiment 3, the social and epistemic cues were concordant; only the same-gender informant had seen what was in the box. Results indicate that the cues were not significantly additive; the children did not follow the informant who had visual access more when she or he was a same-gender informant (Experiment 3) than when she or he was a different-gender informant (Experiment 2). This lack of significance in spite of a difference in the expected direction might be due to a ceiling effect.

The finding that, in 3-year-olds, an epistemic cue can trump a social cue is novel and runs against previous findings that had shown either that 3-year-olds did not clearly favor the epistemic cue (Corriveau et al., 2013; Elashi & Mills, 2014; Reyes-Jaquez & Echols, 2013) or that they favored the social cue (Corriveau & Harris, 2009). This discrepancy might stem from a difference in the epistemic

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cue used in these various studies. In the current set of experiments the epistemic cue was visual access, whereas in the experiments cited above it was prior accuracy; when needing to name a familiar object, one informant had provided consistently accurate labels, whereas the other informant had provided consistently inaccurate labels. Thus, our results suggest that visual access is a stronger epistemic cue than prior accuracy—at least when learning the identity of hidden objects (see Brosseau-Liard & Birch, 2011).

On this basis, we interpret our results as providing a lower bound on the tendency of very young children to favor epistemic over social cues. They show that at least one epistemic cue is able to trump what could be deemed, on the basis of previous results, a strong social cue. It would be interesting to see whether a social cue could be designed that would be so strong as to trump visual access. One possibility could be a social cue that would suggest that one informant might be lying, in which case visual access would not entail reliable testimony—although 3-year-olds might find it difficult to understand the informational consequences of an informant's desire to lie (see, e.g., Mascaro & Sperber, 2009).

Regarding the justifications, 3-year-olds proved to be largely unable to adequately justify why they had chosen the testimony of the same-gender informant (Experiment 1) or of the informant who had visual access (Experiments 2 and 3). This result is consistent with past findings (for gender, see Shutts et al., 2010; for visual access, see Pillow, 1989). Although the 4-year-olds provided very few gender-based justifications for their choices in Experiment 1, approximately half of those who believed the informant with visual access in Experiments 2 and 3 were able to appropriately justify this choice. The development of the ability to justify the choice of the informant with visual access might be related to the development of explicit theory of mind skills. Although infants have been shown to possess implicit theory of mind skills (e.g., Onishi & Baillargeon, 2005; Scott, Baillargeon, Song, & Leslie, 2010), the ability to explicitly process mental states develops later, with important milestones being reached between 3 and 4 years of age (Wellman, Cross, & Watson, 2001). This increased ability to explicitly process mental states might explain why 4-year-olds are better able than 3-year-olds to justify the choice of the informant with visual access as well as why 4-year-olds are still unable to justify the choice of the same-gender informant (a choice that does not rest on mental state attribution).

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