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Learning from multiple informants: Children's response to epistemic bases for consensus judgments



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ABSTRACT

Consensus has both social and epistemic value. Children conform to consensus judgments in ways that suggest they are sensitive to the social value of consensus. Here we report two experiments providing evidence that 4-year-old children also are sensitive to the epistemic value of consensus. When multiple informants gave the same judgment concerning the hidden contents of a container, based on the observation of one of their members, children's own judgments tended to align with the consensus judgment over the judgment of a lone character, whose observation received no endorsements. This tendency was reduced, however, when children were shown that the group consensus lacked epistemic warrant. Together, the findings provide evidence that young children are sensitive to the epistemic basis of consensus reports.

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Introduction

When multiple individuals provide the same information, adults and children are predisposed to conform to their judgments, but the epistemic basis of this effect is not clear. Consensual judgments may arise for several reasons. First, people's expressed claims tend to reflect their beliefs, which in turn tend to be warranted. As more people express the same belief, therefore, they provide indirect

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evidence of its greater warrant, so observers of a consensus claim may infer that the claim is true. There is evidence that adults make this inference (Mercier & Morin, 2019). Second, people tend to share the beliefs of those to whom they are socially connected. As people express the same belief, therefore, their consensual judgments may suggest a social connection between them. There is evidence that children make this inference under some conditions (e.g., Heiphetz, Spelke, Harris, & Banaji, 2014). Here we asked whether the epistemic value of consensus judgments guides young children's construal of those judgments.

For adults and children, most research on consensus has focused on its social value. In the classic experiment of Asch (1952, 1956), adults judged the relative lengths of different lines in the presence of a group of unknown individuals (confederates of the experimenter) whose judgments preceded their own and converged on an erroneous answer. The participants tended to express the erroneous judgment and showed high stress in this situation, suggesting that their conformity stemmed not from a belief in the correctness of that judgment but rather from a fear of the social consequences of expressing a divergent view. Conformity to a group consensus also has been observed in young children (Corriveau & Harris, 2010). Moreover, this effect diminishes when children's judgments are made privately (Haun & Tomasello, 2011), suggesting that children's conforming judgments also are socially driven and, therefore, of diminished epistemic value (see also Corriveau, Fusaro, & Harris, 2009; Haun, Rekers, & Tomasello, 2012).

During recent years, empirical studies have begun to probe the conditions under which young children discount the epistemic value of consensus judgments, with mixed findings. In cases where children have their own prior knowledge or intuition, they are less likely to express false but consensual judgments (Bernard, Harris, Terrier, & Clement, 2015; Evans, Laland, Carpenter, & Kendals, 2018; Guerrero, Cascado, Sausa, & Enesco, 2017; Schillaci & Kelemen, 2014; Wilks, Collier-Baker, & Nielsen, 2015; but see Burdett et al., 2016). In some cases involving expert or conventional knowledge, however, young children endorsed consensus judgments supplied by unreliable members who previously provided inaccurate information; only by 6 years of age did children prefer a previously reliable dissenter's information (Bernard, Proust, & Clement, 2015; see also Boseovski, Marble, & Hughes, 2017; Sampaio, Harris, & Barros, 2019). In other cases, children under 5 years of age endorsed a consensus judgment over the judgment of a lone dissenter with privileged knowledge (Einav, 2014). These studies did not directly and clearly manipulate the *epistemic basis* of a consensus judgment, however (but see Einav, 2018, and Hu, Whalen, Buchsbaum, Griffiths, & Xu, 2015, for children's sensitivity to independent judgments of consensus members). In the current study, we asked whether children prefer a dissenter's judgment over a group consensus when the epistemic warrant of the consensus is unambiguously unsupported by evidence.

Finally, the consistently repeated claims of a single individual may have epistemic value under some conditions but not under others. If one person makes a claim repeatedly, the repetition may signal either that the claim has epistemic warrant, because it is based on repeated observations, or that the claim is biased by the claimant's desire that others believe it is true. For example, research provides evidence that children's own learning is affected by the repetition of an act by a single individual and that children weigh the repetition of an act by different individuals even more highly (Haun et al., 2012). After observing live demonstrations of three different people engaging in one action (i.e., putting a ball into a container) and one person engaging in a different action three times (i.e., putting a ball into a different container), children selectively copied the action demonstrated by multiple informants. However, when a single person demonstrated each action a different number of times, children also copied the more frequently demonstrated action. Nevertheless, in Haun et al. (2012), each demonstrator put a ball into a container and received a piece of food as a reward. As a result, the frequently demonstrated behaviors led to a greater number of rewards, raising the possibility that the repetition stemmed from the claimant's biased motivations. Although these experiments provided evidence that the children favored the consensus actions over the repeated actions for epistemic reasons, they failed to clarify why children favored the repeated actions over nonrepeated actions. In the current experiments, we compared children's reliance on consensus judgments with their reliance on repeated judgments in the absence of any rewards under conditions that shed light on children's epistemic inferences.

To focus on children's reasoning about the sources of consensus judgments rather than about their own social motives, our experiments presented children with situations in which they observed but did not participate in the consensus judgment. Moreover, we presented characters under conditions that minimized any tendency for children to identify personally with a character or social group. Children viewed animated abstract characters (talking circles with faces) on a computer screen presenting a single opaque box that was described as containing one of two hidden objects. Then two or more characters made different claims concerning the contents of the box. Finally, we asked children which of the two objects they thought the box contained. In different experiments, we varied whether the consensus judgment was based on sharing false information and whether claims were repeated by a single character or by a group of characters. By analyzing the effects of these variations on children's judgments, we asked whether children are sensitive to the epistemic value of consensus judgments.

Experiment 1

Experiment 1 was undertaken to replicate the findings of Haun et al. (2012) concerning children's use of consensus and repetition in their selective learning from others. Children were tested in two conditions, each of which presented four characters: one lone character and one character accompanied by two friends. In the consensus condition, two of the characters—the lone character and the central character with two friends—looked into the container. Then the character with friends spoke with her friends (through an unintelligible whisper), and finally the experimenter announced that each of the four characters would say what they believed was in the box. The three characters in the group of friends all reported the same object, whereas the lone character reported the other object.

The repetition condition was the same as the consensus condition except that only two characters gave reports concerning the contents of the box. Whereas the lone character gave this report once in the judgment phase as in the consensus condition, the socially connected character gave the same verbal report of the box's contents three times: once to each of the friends in the character presentation phase and once again in the judgment phase. Thus, children heard one of the conflicting reports three times, as in the consensus condition, but the repeated reports were given by a single character who communicated the report to her friends. In accord with the findings of Haun et al. (2012), we predicted that children would be affected both by the repetition of a report and by its convergence across different individuals. Thus, children would align their own judgment more with that of the socially connected character than with that of the lone character in both conditions, but this effect would be stronger in the consensus condition.

Method

Participants

Participants were 32 children aged 4 years. Prior to beginning any experiment, sample sizes were set at 16 participants per condition based on prior research (Haun et al., 2012); piloting served to determine when procedures were robust enough to meet this condition. No pilot data were included in any experiment. Half of the children (9 girls and 7 boys; $M_{\text{age}} = 4.41$ years, range = 3.95–4.91) participated in the consensus condition, and the other half (7 girls and 9 boys; $M_{\text{age}} = 4.49$ years, range = 4.07–4.97) participated in the repetition condition. All children were from middle- to upper-middle class families in the United States. Most of the children were Caucasian.

Displays

Children were presented with animated stories via a Keynote display on a computer screen. In the animation, a character was portrayed as a geometrical figure—a rounded circle with eyes, a mouth, and an adult female voice (see Fig. 1 for an example). All the characters were the same geometrical figures differing only in color and voice.

In both conditions, characters were presented on the bottom center of the screen. One main character was presented with two friends next to her. She introduced her friends (“Hi there! These are my friends”), and they danced around in a circle. The other main character noted the absence of her

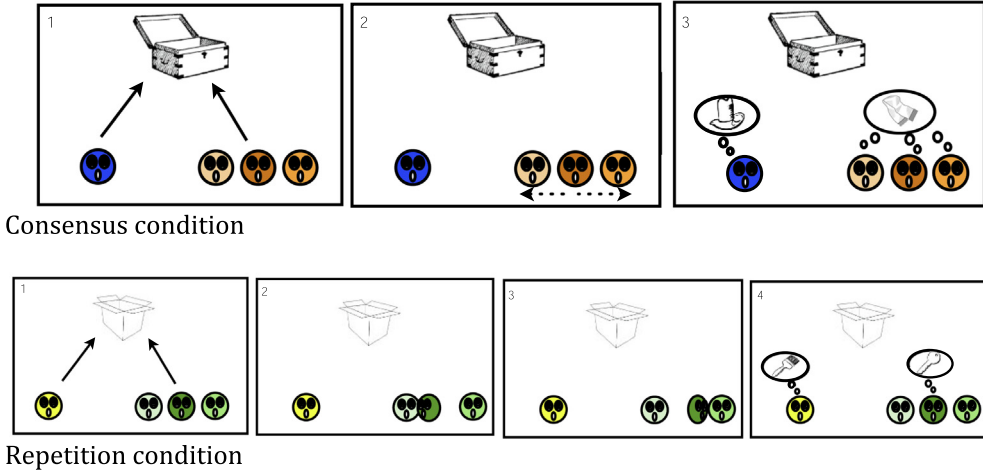


Fig. 1. An illustration of the key features of the method in Experiment 1. A solid line indicates that the character looked inside the container. A dotted line indicates that the main social character communicated to her friends in an unintelligible whisper. Panels 2 and 3 of the repetition condition depict the character verbally and audibly reporting the object to each of her friends.

friendship ties (“Hi there! I don’t have any friends”), and she danced around by herself. Then one opaque container appeared in the top center of the screen, and the two main characters announced both their ignorance of the container’s contents and their interest in discovering the contents by saying, “I wonder what’s inside the box.”

Then, in the consensus condition, both main characters looked into the container after announcing that they were going to look. The main character with friends said, “I’m gonna tell my friends” and then communicated (through whispering) to her friends, whereas the lone character moved laterally after saying, “I’m gonna think about what I saw.”

Finally, children encountered conflicting reports about the container’s contents. The experimenter said to the children, “Let’s see what they think is inside the box,” after which all three members of the group of friends gave the same report on the container’s contents. For half the children they all said “It’s a brush,” for the others they all said “It’s a key,” whereas the lone character gave the opposite report. Then children were asked what they thought was in the box (e.g., “This one said there is a brush in the box and these ones said there is a key in the box. What do you think is inside?”).

The repetition condition was the same as the consensus condition except that the character with friends audibly repeated her report three times, once facing each of the two friends and once facing forward. The experimenter then asked the children’s own judgment (“This one said there is a brush in the box and this one said there is a key in the box. What do you think is inside?”). See Fig. 1 for an illustration of the key features of the method in each condition.

Design and procedure

Individual children were tested in a laboratory. Each group of children received two trials in one condition. The order of the character presentation, the location of each character on the screen (left or right), the pairing of characters to reported objects, the character locations, and the order of speech of the two characters in a scenario were counterbalanced.

Data coding and analyses

Children received a score of 1 if their response was the same as the report from the character who had friends and score of 0 if their response was the same as the report from the lone character (no child failed to respond). Because children received two trials in each condition, children’s scores could range from 0 to 2. We conducted a one-sample Wilcoxon signed-rank test in each condition. We also

compared the two conditions using a Mann–Whitney U test. These analyses were decided prior to conducting any data analysis.

Results

Children's responses aligned with those of the group report in the consensus condition, Wilcoxon $z = 2.111$, $p = .035$ (Fig. 2). In contrast, their responses did not align with the repeated report of the social character in the repetition condition, Wilcoxon $z = 0$, $p = 1$. Children aligned their responses with the repeated report in the consensus condition more frequently than in the repetition condition, Mann–Whitney U , $z = 1.707$, $p = .044$ (one-tailed).

Discussion

Experiment 1 replicated one of the two primary findings from the experiments by Haun et al. (2012), using animated events and verbal reports rather than observed actions. As in Haun et al.'s study, children tended to align their responses with the consensus report of the three group members (consensus condition), and they did so reliably more than in a parallel condition where they heard the same number of reports given by a single group member (repetition condition). Thus, the consensus effect cannot be explained by the greater familiarity or frequency of the report. We return to this finding in the General Discussion.

Experiment 1 failed to replicate the effects of repetition that Haun et al. (2012) found; children were equally likely to rely on the report of the lone character, who gave a single report, and the social character, who repeated her report for her friends. In this third-party context, children were not influenced either by repetition or by the presence of social partners in determining who to learn from.

Why did children rely on reports from three individuals, rather than one individual, when in both the consensus and repetition conditions the source of the report was always the observations of a single individual? In the consensus condition, the report offered by the social character was accepted by her friends, whose own judgments reflected it. Children might have relied on the friends' judgment for either epistemic or social reasons. On epistemic grounds, the friends' converging reports may convey that they consider their friend to be a good witness—an accurate observer and honest reporter. Indeed, adults find reports based on the observations of a single individual to be more trustworthy when others endorse them (Yousif, Aboody, & Keil, 2019). On social grounds, however, the friends' acceptance and repetition of the social observer's report may convey that the reporter has social value

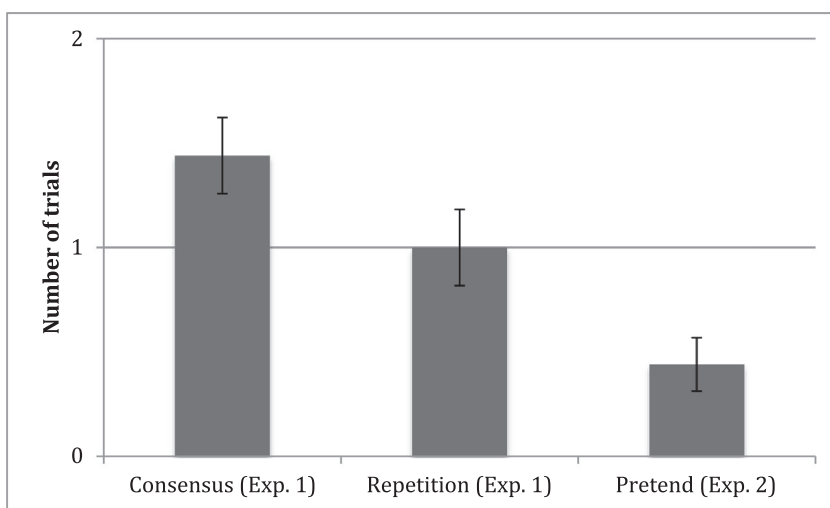


Fig. 2. Children's own responses in the two conditions of Experiment 1 and in Experiment 2. Error bars indicate standard errors.

to them. To distinguish these possibilities, Experiment 2 tested children's sensitivity to a manipulation that aimed to undermine the epistemic warrant for the consensus exhibited in Experiment 1 while preserving all the other information available in that condition, relative to an unrepeated judgment by a single character, with greater epistemic warrant.

Experiment 2

Experiment 2 consisted of one condition that paralleled the consensus condition from Experiment 1 while undermining the epistemic value of the report given by the group relative to the epistemic value of a report given by a lone but knowledgeable character. The lone character looked inside the container, as in Experiment 1, but the character with friends did not. In addition, and importantly, before communicating to her friends, the character with friends indicated her intention to pretend that she knew the contents of the container. Thus, the communication among the three friends was explicitly marked as lacking epistemic warrant. After this communication, the three friends gave the consensus report and the lone character gave the opposite report, as in the previous consensus condition, but without repetition. If children relied on consensus in Experiment 1 because they viewed it as having greater epistemic warrant than the judgment of a single character, then they should disregard the consensus judgment in Experiment 2 and align their judgment with that of the lone character. If children relied on consensus because they considered the reporter with friends to have higher social value, then they should continue to follow the consensus judgment in this experiment.

Method

The method was the same as in Experiment 1 except as follows. Participants were 16 children (7 girls and 9 boys; $M_{\text{age}} = 4.45$ years, range = 4.09–4.96). Sample size was predetermined to accord with that of Experiment 1.

Displays

After the social character introduced her friends as in the consensus condition of Experiment 1, her friends briefly disappeared and she stated her intention to pretend to know the contents of the box ("A box! I'm gonna pretend I know what's inside"). The character also mentioned her intention to tell her friends what she was pretending ("I'm gonna tell my friends what I'm pretending is inside"). When her friends reappeared, one of them said, "I wonder what's inside the box," and she communicated to them (by an unintelligible whisper). After this, each character in the group provided the same report without anyone looking inside the container. In contrast, the lone character indicated her ignorance about the contents, mentioned her intention to look inside the container, and looked inside the container. Then she announced she would think about what she saw ("I'm gonna think about what I saw") and provided a conflicting report to the group report. The friend characters were not present during either their partner's or the lone character's actions and comments concerning the contents of the container; they were present only in the beginning of the character presentation phase and in the judgment phase.

Data coding and analyses

Children received a score of 1 if their response was the same as the consensus report and a score of 0 if their response was the same as the lone character's report. Because children received two trials, children's scores could range from 0 to 2. We conducted a one-sample Wilcoxon signed-rank test. We also compared the condition of Experiment 2 with each condition of Experiment 1 using Mann–Whitney U tests.

Results

Children aligned their judgment with the judgment of the lone character in this experiment, Wilcoxon $z = -3.00$, $p = .003$ (Fig. 2). Children were less likely to align their judgment with the con-

sensus report in Experiment 2 than in either the consensus condition of Experiment 1, Mann–Whitney U , $z = -3.505$, $p < .001$, or the repetition condition of Experiment 1, Mann–Whitney U , $z = -2.236$, $p = .025$.

Discussion

Experiment 2 provides evidence that children's own judgment is influenced by the epistemic basis of consensus. When given reasons to doubt the epistemic basis of the group consensus (because the socially connected character announced that she was pretending to know the contents and also explicitly announced that she would tell unfounded information to others), children no longer aligned their judgments with the consensus.

General discussion

Two experiments provided evidence that young children are sensitive to the epistemic basis of consensus judgments. Children in Experiment 1 aligned their judgment more closely with a consensus judgment, rather than with a different report made by a lone dissenter, when the two main characters had looked into the container. Moreover, children were no more likely to rely on the repeated report of the social character who had looked into the container than on the nonrepeated report of the lone character. Thus, children's judgments were influenced by consensus and were not influenced by either repetition or the presence of silent social allies. These findings did not reveal, however, whether children are sensitive to the epistemic bases of a group consensus.

Experiment 2 provides such evidence. Given evidence that the consensus judgments lacked epistemic warrant, children disregarded the consensus judgments and instead aligned their judgments with the lone character who had looked into the box and whose judgment, therefore, had epistemic warrant. The findings provide the first evidence that when the epistemic basis of a consensus judgment is unambiguously questionable, 4-year-old children discount that judgment. They confirm that young children are sensitive to the epistemic qualities of a social group's consensus judgments.

The findings of these experiments provide evidence that children, like adults (see [Yousif et al., 2019](#)), view consensus judgments as having some epistemic value even when the judgments originate in a single source. In the consensus condition of Experiment 1, the friends' repetition confirmed the epistemic warrant of the information provided by the central character, who they knew (they were described as friends), who they saw looking into the box, and who gave them an apparently honest report of its contents. This interpretation is supported by the contrasting findings of children in the pretend condition; when the social reporter had not looked inside the box and, therefore, could not know its contents, and moreover placed the social episode in a playful pretense context, children switched their reliance to the lone observer.

The current findings rule out some alternative explanations for the effects of social consensus on children's judgments. First, children were not affected by the present variations in exposure to the reports. In contrast, [Haun et al. \(2012\)](#) found that toddlers responded to the frequency of behaviors demonstrated by a single informant. In their study, children copied the behavior repeatedly demonstrated by a single informant over the behavior demonstrated once by another informant. Although different findings may be attributable to different age groups as well as different methods used, future studies should further probe the apparent decrease in children's reliance on repetition in learning from others. Second, the current research provided clear evidence for an effect of epistemic warrant on children's reliance on consensus judgment; in judging the contents of a box, children relied more on the report of a single informant who had looked inside the box than on the consensus judgment of three individuals whose reports carried no epistemic warrant because none had looked inside the box.

The current research focused on children's sensitivity to the epistemic basis of the consensus in a third-party context. Children viewed cartoon characters on a computer screen with no specific social relation to the children themselves. It is possible that children would align their judgments with the unwarranted consensus of a social group if they interacted with real children to whom they had meaningful social ties. Moreover, it is possible that children's overt behavioral responses sometimes will diverge from their genuine beliefs, as did the reports of adults in the [Asch \(1952, 1956\)](#) experiment.

Consistent with this possibility, an experiment by Haun and Tomasello (2011) revealed that children conformed to a group judgment, given by real children, when their own judgment was made in public, in the presence of those children, but not when they made judgments privately. Future studies using variations of both the current methods and the more naturalistic methods of Haun and Tomasello are needed to further probe the conditions under which a reliance on consensus reflects children's beliefs or only modulates their behavior in public social contexts. Nevertheless, the current findings reveal that when children are outsiders, and social influences are minimized, they are able to evaluate some of the epistemic qualities of consensus reports.

Finally, the current research concerns children's judgments about factual information. This kind of information can be obtained from any informants and can be objectively verified. In contrast, when learning from others involves other types of information such as social and cultural norms, children may consider the basis of consensus differently. Cultural anthropologists (e.g., Richerson & Boyd, 2005) and psychologists (e.g., Tomasello, Kruger, & Ratner, 1993) have long argued that children have learning biases that foster learning of culturally shared information (but see Csibra & Gergely, 2006, 2009, for a different view). Future research should investigate children's reliance on socially based and epistemically based consensus judgments concerning culturally variable information such as norms of behavior, aesthetic preferences, and knowledge of culturally shared myths and rituals.

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