

Selective Trust: Children's Use of Intention and Outcome of Past Testimony

David Liu, Kimberly E. Vanderbilt, and Gail D. Heyman

University of California, San Diego

Author Note

We thank the children and parents who participated in our study. Correspondence concerning this article should be addressed to David Liu, Department of Psychology, University of California, San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0109. E-mail: davidliu@ucsd.edu.

**Abstract**

Children's epistemic vigilance was examined for their reasoning about the intentions and outcomes of informants' past testimony. In a 2 x 2 factorial design, 5- and 6-year-olds witnessed informants offering advice based on the intent to help or deceive others about the location of hidden prizes, with the advice leading to positive or negative outcomes. Informants then suggested to the children where to search for hidden prizes. Children trusted informants who had previously tried to help others more than informants who had previously tried to deceive others, regardless of past outcome. In addition, children trusted informants with positive past outcomes more than informants with negative past outcomes, regardless of intention. By varying intention and outcome independently, this study revealed that when children are deciding whether to trust testimony, they take into account the informant's mental states, but also give slightly greater weight to the informants' past outputs.

*Keywords:* selective trust, epistemic vigilance, intention and outcome

### Children's Use of Intention and Outcome of Past Testimony for Informant Trust

To acquire vast amount of culturally-accumulated knowledge, humans must learn from others. The ability to obtain information from others permits humans to learn more, and to do so faster than if they were dependent on first-person experience (Gelman, 2009; Tomasello 1999). Learning from others, however, involves several potential pitfalls since the information obtained could be inaccurate. This can happen when informants lack knowledge about the topic in question, when informants are motivated to deceive, or when informants simply make errors. Recognizing these situations and being able to determine whether to trust someone's testimony are abilities fundamental to successful, critical consumption of information from others.

### **Epistemic Vigilance**

To guard against misinformation, a critical task for learners is to take others' knowledge and honesty into account—to exercise epistemic vigilance (Sperber et al., 2010). Recent research on selective trust of testimony has examined the existence and origins of young children's ability to consider the competence and knowledgeability of informants (Clement, Koenig, & Harris, 2004; Harris, 2007). Results from these studies show that preschool-age children are not completely gullible and prefer to trust informants who had previously been reliable (e.g., Birch, Vauthier, & Bloom, 2008; Jaswal & Neely, 2006; Koenig, Clement, & Harris, 2004; Koenig & Harris, 2005) and informants who show other evidence of being knowledgeable (e.g., Birch & Bloom, 2002; Sabbagh & Baldwin, 2001; Sabbagh, Wdowiak, & Ottaway, 2003).

Beyond accounting for the epistemic state of communicators, recipients must also account for communicators' motives—informants might have the intention to lie and deceive. Recent research has started to examine young children's ability to evaluate others' motives when

deciding whether to trust their testimony (Couillard & Woodward, 1999; Mascaro & Sperber, 2009; Vanderbilt, Liu, & Heyman, 2011). Vanderbilt et al. (2011) had 3- to 5-year-olds observe an informant with helpful intentions (was happy to give correct advice) and an informant with malicious intentions (was happy to mislead others). When it was the children's turn to decide whether to trust the informant, 3- and 4-year-olds did not differentiate between benevolent and malevolent informants, but by 5 years of age, children preferred the advice of the benevolent informant more than the malevolent informant. Whereas Vanderbilt et al. (2011) demonstrated children's use of informants' past behaviors to infer their intentions, Mascaro and Sperber (2009) examined 3- to 5-year-olds' selective trust when informants' intentions are explicitly identified. Mascaro and Sperber (2009) observed that 3- and 4-year-olds preferentially trusted benevolent informants. Sperber and colleagues (Mascaro & Sperber, 2009; Sperber et al., 2010) concluded that preschool-age children begin to exercise epistemic vigilance towards communicators' malicious motives. Nevertheless, there are many unexamined questions about the robustness of young children's epistemic vigilance towards communicators' motives and about the extent to which children reason about informants' mental states when assessing whether to trust informants.

Previous research found that 5-year-olds' distrust of malevolent informants was well short of ceiling even when provided with *unambiguous* information about informants' intentions (Mascaro & Sperber, 2009; Vanderbilt et al., 2011). These findings raise questions about the robustness of children's ability to exercise epistemic vigilance in less clear-cut contexts where they have to encode and weigh different cues about informants and infer their intentions. Furthermore, there is an important question as to whether children reason about the mental states underlying informants' past testimony or reason simply about informants' overt outputs (see

Birch et al., 2008; Heyman, 2008; Nurmsoo & Robinson, 2009a, 2009b). At issue is whether children are thinking deeply about the nature of informants' accuracies and inaccuracies or are they merely tracking the informants' surface behaviors. One possibility is that children make mentalistic inferences about the knowledge and intentions of informants with a history of inaccurate testimony. Another possibility, however, is that children generalize from past testimony without any concerns about internal mental states, just as one might learn to distrust a clock that tells the wrong time without inferring or caring about the reasons for the clock's inaccurate output.

In two recent studies, Nurmsoo and Robinson (2009a, 2009b) addressed this issue by investigating whether children would excuse informants' previous inaccuracies by taking into account the circumstances for their lack of accurate knowledge (e.g., was blindfolded). In Nurmsoo and Robinson (2009a), 3- to 5-year-olds had to identify hidden objects' color or hardness. The objects were hidden inside a tube, and from one end, one can see an object's color but not tell its hardness, whereas from the other end, one can reach in and feel the object's hardness but not see its color. In the critical condition, children observed an informant provide inaccurate information because the informant had the wrong type of access (e.g., felt the object to identify its color). But when the previously-inaccurate informant finally had the right type of access (e.g., looked to identify the objects' color), the 3- to 5-year-olds (there was not an effect of age) trusted the informant. Thus, the children were able to dismiss the informant's inaccurate outputs by taking the informant's knowledge-access into account. However, in another set of studies, Nurmsoo and Robinson (2009b) found different results. In the critical condition, children ages 3 to 7 years observed a blindfolded speaker name familiar objects incorrectly and another speaker, who could see, also name familiar objects incorrectly. On test trials, both

speakers could see, and they provided different novel labels for unfamiliar objects. The 3- to 7-year-olds (there was not an effect of age) showed no preference for trusting the previously blindfolded speaker; they did not take into account the blindfolded speaker's lack of knowledge-access in the past. Instead, the children trusted both speakers equally, based on both having the same inaccurate outputs. Intriguingly, the children were able to attribute the blindfolded speaker's inaccuracies to not being able to see. Thus, it was not the case that the children were unable to infer the speaker's lack of knowledge-access, but rather they did not take it into account and trusted based simply on past outputs.

Nurmsoo and Robinson (2009a, 2009b) suggested that the discrepant findings between their two studies could be due to different procedures having different communicative and social cues. They also suggested children might be more cautious about some types of information (e.g., labels for objects) than other types of information (e.g., colors of objects). Overall, these studies suggest that although children can often reason about the knowledge states underlying informants' past testimony, they nevertheless may occasionally focus more on the outcome of past testimony. In the current study, we extend research on the question of how children reason about mental states versus outcome by investigating children's reasoning about informants' intentions, rather than their knowledge.

### **Intention versus Outcome**

Theoretically, pitting intention against behavioral outcome is an important test of children's understanding, because an intention can go unfulfilled, and recognizing the independence between intention and outward behavior is fundamental to understanding intentional action. Someone with an intention to buy apples might not end up getting apples; conversely, just because someone does not get apples does not mean that person did not have the

intention to buy apples. Furthermore, people's actions are often judged more by their intentions than the overt consequences (e.g., in moral and legal considerations). Someone who intentionally breaks a single vase is considered more culpable than someone who accidentally knocks over three vases. In an early investigation of children's moral judgment, Piaget (1932) presented these sorts of scenarios to children and asked them who is more to blame. Piaget (1932) observed that before the age of 7 years, children almost exclusively based their moral judgments on the consequences of the actions, rather than the intentions. This finding that younger children focus on outcomes over intentions in moral judgments has been widely replicated (e.g., Bandura & McDonald, 1963; Costanzo, Coie, Grumet, & Farnill, 1973; Helwig, Hildebrandt, & Turiel, 1995). However, in studies using Piaget's (1932) paradigm, intentions and outcomes were always strongly pitted against each other—positive intentions resulted in more negative outcomes and negative intentions resulted in more positive outcomes—thereby obscuring young children's comprehension of intentions. Indeed, when investigators varied the valence of intentions systematically (and held outcomes constant), preschool-age children demonstrated the capacity to take intentions into account in their moral judgments (Farnill, 1974; Leon, 1982; Nelson, 1980; Yuill, 1984; Zelazo, Helwig, & Lau, 1996). Beyond intentions, children also take other mental states into account, such as false beliefs (Killen et al., 2011).

Behne, Carpenter, Call, and Tomasello (2005) showed that even 9-month-old infants can differentiate actions based on varying intentions when outcome is held constant. In this study, infants were presented with negative outcomes of an adult failing to hand them different toys, but on some trials, the adult was unwilling to hand over the toy (e.g., teasing the child with it), and on other trials, the adult was unable to hand over the toy (e.g., accidentally dropping it). The infants were much more impatient and upset with the adult in the unwilling condition (negative

intention) than the unable condition (positive intention). However, the ability of infants and preschool-age children to reason about intentions (Baird & Moses, 2001; Behne, et al., 2005; Nelson, 1980) does not reveal the extent to which they might just ignore intentions when there are outcome cues available that they can use instead. For instance, in Behne et al.'s (2005) study, both the unwilling (negative intention) actions and the unable (positive intention) actions led to the same outcome of the child not getting the toy.

The question of how children weigh intention cues versus outcome cues has primarily been examined in the context of moral judgments. These studies generally suggest a developmental shift around 7 years of age from weighing outcome more heavily to weighing intention more heavily (Costanzo, et al., 1973; Farnill, 1974; Helwig, et al., 1995; Leon, 1982; Piaget, 1932), although Heyman and Gelman (1998) found that 5- and 6-year-olds were able to weigh intention against outcome in their judgments of people's social-moral traits. In the current study, instead of moral judgments, we address this question in the context of children's trust of informants' past testimony.

### **Current Study**

Here we examine whether children account for the intentions underlying informants' past testimony versus the overt outputs of informants' past testimony (Birch et al., 2007; Heyman, 2008; Nurmsoo & Robinson, 2009a, 2009b). Consider this scenario: your stapler has disappeared from your cubicle at work. One coworker has the best intentions to help you find your stapler, but you do not find your stapler at the location she suggests, to which she responds that she had hoped you would find your stapler. Another coworker has the worst intentions and does not want you to find your stapler, but accidentally suggests that you look where your stapler happens to be hiding, to which he responds that it is too bad you found your stapler. Later, you

cannot find your scissors and the two coworkers suggest different locations to look—should you trust the former or the latter coworker? At whose suggested location would you look first? The current study explores how young children, when deciding whether to trust informants' testimony, weigh informants' intentions versus the outcomes of informants' actions.

Paralleling methods used in other selective trust studies (Koenig et al., 2004; Koenig & Harris, 2005; Vanderbilt et al., 2011), we asked 5- and 6-year-olds to decide whether to trust informants based on how informants had previously acted. Using a 2 (Intention: help versus deceive) x 2 (Outcome: positive versus negative) between-subjects factorial design, children observed informants acting to help or deceive others, which resulted in positive or negative outcomes. By manipulating the intention variable independent of the outcome variable, we were able to test the extent to which children took each factor into account, independent of one another, in deciding to trust informants.

## **Method**

### **Participants**

Ninety-eight 5- and 6-year-old children participated in the study, comprised of forty-four 5-year-olds (20 females and 24 males; *M* age = 5.6 years, age range: 5.0 to 5.9 years) and fifty-four 6-year-olds (29 females and 25 males; *M* age = 6.5 years, age range: 6.0 to 7.2 years). We tested these age groups because Vanderbilt et al. (2011) found that 5-year-olds, but not 4-year-olds, selectively preferred the advice of a previously-benevolent informant more than a previously-malevolent informant. And it is around age 5 to 6 years that children start weighing intention against outcome in their judgments of people's traits (Heyman & Gelman, 1998). Children were recruited from schools in a city in southern California. The sample was approximately 74% Caucasian (non-Latino), 17% Asian, and 9% Latino.

## Materials and Procedure

**Trust-distrust task.** Children were randomly assigned to one of four experimental conditions: 1) *positive intention-positive outcome*, 2) *positive intention-negative outcome*, 3) *negative intention-positive outcome*, or 4) *negative intention-negative outcome*. In all conditions, children were presented with three trials assessing their decision to trust or distrust the testimony of informants about the location of sticker prizes. To maintain consistency in the actions of informants and searchers across trials and conditions, we presented their actions in video vignettes. We edited the vignettes for the four conditions by pairing the two video clips of the informant's positive or negative affective response with the two video clips of the positive or negative outcome (see below for details).

On each trial, for the informant history phase, children were shown two differently colored boxes and were informed that only one contained stickers. Next, children observed an adult informant suggest to an adult searcher to look in one of the two boxes for stickers (pointing and saying, "You should pick this one."). The adult searcher would (always) open the box suggested by the informant. With the box open such that the children could see whether there were stickers inside, the adult searcher would say "yay," if there were stickers, or "aww," if the box was empty. Children then observed the informant react either with a clear, audible expression of joy (saying, "Yes!" and smiling) or a clear, audible expression of disappointment (saying, "No!" and frowning) when the searcher found stickers or found an empty box, depending on the experimental condition. In the 1) *positive intention-positive outcome* condition, the informant reacted with joy when the searcher found stickers; in the 2) *positive intention-negative outcome* condition, the informant reacted with disappointment when the searcher found an empty box; in the 3) *negative intention-positive outcome* condition, the

informant reacted with disappointment when the searcher found stickers; and in the 4) *negative intention-negative outcome* condition, the informant reacted with joy when the searcher found an empty box. Thus, children had to integrate cues of the informant's affective response with the outcome to attribute the informant's intention. Children then observed the same adult informant make a suggestion to a second searcher and react in the same way as with the first searcher—that is, on each test trial, the children observed the consistent consequence of the informant's testimony on two other people.

After observing the informant offer advice to two other people, it was the children's turn to receive advice from the informant. For the child test phase, two differently colored boxes were placed in front of the children, and in the video, two boxes were displayed in front of the informant. Children were informed that the pair of boxes in the video was the same pair of boxes now in front of them. Children were told that the informant “knows where the sticker is, because she just peeked. She will tell you the box she wants you to pick; then you pick the box *you* think has a sticker.” The informant then suggested to the children to look in one of the two boxes (pointing and saying, “You should pick this one.”). Children's responses were recorded to indicate whether they chose the box suggested by the informant.

We tested the children on three trials of the same condition; each trial followed the same described procedure with a different adult informant. For each of the three informants, children observed two instances of the informant make a suggestion to an adult searcher before making a suggestion to them. Children were not provided with a chance to see whether the boxes they chose contained stickers until the end of the session, after all three test trials.

**Memory-check, comprehension, and inference questions.** To ensure that the children encoded and understood the critical information presented in the trust-distrust task, we asked

them a set of forced-choice memory-check and comprehension questions after the first test trial. The memory-check questions asked whether the children encoded and remembered the outcome (“When she [the informant] played with the other finders [the searchers], did they find the sticker?”) and the informant’s affective response (“Was the pointer [the informant] happy or not happy about what happened?”). The comprehension question asked whether the children recognized and understood the informant’s intention (“Did the pointer *want* the other finders to find the sticker?”).

After all three test trials, children were asked a set of follow-up inference questions. Because we did not provide children with any explanations for why an informant had a positive or negative intention, we were interested in exploring their attributions. We speculated that children might attribute an informant’s intention to be associated with whether she is nice or mean (Heyman & Gelman, 1998). Using questions adapted from Liu, Gelman, and Wellman’s (2007) study of trait reasoning, we asked children to judge the informant’s dispositional trait (“Is this pointer nice or mean?”) and to predict a trait-relevant behavior (“This pointer just saw another person trip, fall and drop a lot of papers—would she stop and help the other person pick up the papers, or keep walking and not stop to help?”). Children were also asked to judge the informant’s ability (“Do you think this pointer can run fast, or not run fast?”) to explore whether children generalized positive intention to a positive attribute beyond niceness.

## **Results**

Each child had a trust score between zero and three for the number of trials in which the child chose the location suggested by the informant. Thus, a higher score indicates greater trust of the informant’s testimony. Preliminary analyses found no main effect of gender or age, and all interactions with intention and outcome were not significant. Thus, gender and age were

excluded from the following analyses. Analyses of children's answers to the memory-check questions indicate that they remembered the crucial information presented to them: 90% of the children remembered the outcome and 97% of the children remembered the informant's affective response (both binomial tests were significant,  $p < .001$ ).

Children's mean trust score in each condition was 2.64 (positive intention-positive outcome), 1.75 (positive intention-negative outcome), 2.26 (negative intention-positive outcome), and 1.28 (negative intention-negative outcome), which is shown in Figure 1. Mean trust score was significantly different from chance performance (i.e., 1.50) in the positive intention-positive outcome condition,  $t(21) = 6.29, p < .001$ , and in the negative intention-positive outcome condition,  $t(26) = 6.29, p < .001$ , but not in the positive intention-negative outcome condition,  $t(23) = 1.14, ns$ , or in the negative intention-negative outcome condition,  $t(24) = 0.94, ns$ . A 2 (Intention: help versus deceive) x 2 (Outcome: positive versus negative) ANOVA was conducted on children's trust score. There was a significant main effect of intention,  $F(1, 94) = 4.12, p = .045, \eta_p^2 = .042$ , and a significant main effect of outcome,  $F(1, 94) = 19.97, p < .001, \eta_p^2 = .18$ ; there was not a significant interaction between intention and outcome. As shown in Figure 1, this pattern of results indicates that children trusted informants with an intention to help more than informants with an intention to deceive, regardless of the outcomes of the informant's suggestions. In addition, children trusted informants whose suggestions resulted in positive outcomes more than informants whose suggestions resulted in negative outcomes, regardless of the informant's intention. It thus appears that, by age 5 years, children consider *both* the intention and outcome of past testimony to decide whether to trust someone's current testimony. Nevertheless, the larger effect size for the main effect of outcome

than for the main effect of intention suggests that 5- and 6-year-olds weigh the outcome of past testimony slightly more than the intention of past testimony.

To assess whether children were able to identify the informants' intentions, we analyzed children's answers to the comprehension question that asked children to explicitly identify whether the informant *wanted* others to find stickers. We found that the children were generally accurate in identifying the informant's intention: 78% of the children in the help conditions, but only 33% of the children in the deceive conditions indicated that the informant wanted others to find stickers. That is, responses to this question was significantly associated with the intention factor,  $\chi^2(1) = 20.41, p < .001$ . Table 1 provides the proportion of children attributing positive intention in each of the four conditions. Since the intention attribution question is dichotomous, instead of running an ANOVA, a logistic regression was conducted with intention and outcome as independent variables, to compare their effects on responses to this question. There was a significant effect of intention, Wald  $\chi^2(1) = 18.98, p < .001$ , but not an effect of outcome, Wald  $\chi^2(1) = 1.79, ns$ . Thus, children were generally correct in attributing the informant's intention and were not significantly biased by the outcome. This pattern of results is different than the above pattern of results for children's trust score, which had a significant effect of both intention and outcome. Therefore, children's trust score cannot simply be explained by any difficulty recognizing the informants' intentions.

There might still be a concern, however, that the children were not perfect or near-perfect on the intention attribution question. To take another approach to address this concern, we conducted another 2 (Intention: help versus deceive) x 2 (Outcome: positive versus negative) ANOVA on children's trust score, but restricted to the seventy-one children who got the intention attribution question correct. The same pattern of results was found. There was a

significant main effect of intention,  $F(1, 67) = 8.52, p = .005, \eta_p^2 = .11$ , and a significant main effect of outcome,  $F(1, 67) = 13.10, p < .001, \eta_p^2 = .16$ ; there was not a significant interaction between intention and outcome.

Lastly, we conducted exploratory analyses of the follow-up inference questions (see Table 1). We conducted a logistic regression with intention and outcome as independent variables for each of the three questions. For children's judgment of whether the informant was nice, there was a significant effect of intention, Wald  $\chi^2(1) = 16.35, p < .001$ , but not an effect of outcome, Wald  $\chi^2(1) = 2.62, ns$ . For their judgment of whether the informant would help someone who fell, there was also a significant effect of intention, Wald  $\chi^2(1) = 14.99, p < .001$ , but not an effect of outcome, Wald  $\chi^2(1) = 0.86, ns$ . However, for their judgment of whether the informant could run fast, there was a significant effect of outcome, Wald  $\chi^2(1) = 4.26, p = .039$ , but not an effect of intention, Wald  $\chi^2(1) = 1.34, ns$ . These results suggest that children reasoned that informants with helpful intentions are slightly nicer, whereas children reasoned that informants who produce positive outcomes are slightly more capable.

### Discussion

The current study was the first to directly examine the extent to which children consider the intentions underlying informants' past testimony versus the overt outputs of informants' past testimony. We showed that 5- and 6-year-olds trusted someone who had previously tried to help others locate prizes more than someone who had previously tried to deceive others, regardless of whether previous testimony resulted in positive or negative outcomes. That is, when informants' outputs were matched, children trusted benevolent informants more than malevolent informants. This finding provides further support for children taking into account others' motives when deciding whether to trust their testimony (Mascaro & Sperber, 2009; Vanderbilt et al., 2011).

However, children's trust was not only based on intention. They also trusted the testimony of someone whose previous testimony resulted in positive outcomes more than someone whose previous testimony resulted in negative outcomes, regardless of whether the intention behind the testimony was to help or deceive others. That is, when informants' intentions were matched, children trusted informants with positive outputs more than informants with negative outputs. This finding suggests that 5- and 6-year-olds take others' previous outputs into account when deciding whether to trust their testimony.

Our findings address the open question in the selective trust literature of whether children reason about the mental states underlying informants' past testimony or reason simply about informants' overt outputs. Two recent studies suggest that children account for informants' knowledge-access in some contexts but not in others (Nurmsoo & Robinson, 2009a, 2009b); additionally, no previous study has investigated this question for intention, rather than knowledge. Overall, this issue has been largely unexamined because most previous studies have used procedures that did not separate mental states from outputs (see Heyman, 2008). By varying intention and outcome independently, our study revealed that 5- and 6-year-olds do not exclusively reason one way or the other, but rather reason about informants' mental states *and* their past outputs when deciding whether to trust someone.

One might interpret children's consideration of outcomes in their reasoning about informants as immature and irrational, just as one might interpret consideration of outcomes in moral judgments as immature and irrational (Piaget, 1932). However, we believe that such an interpretation is not necessarily warranted. Even adults in moral judgments take outcomes into account. Cushman (2008) found that although people relied on mental states (beliefs and desires) to judge the wrongness and permissibility of an act, they also considered causal

responsibility of harmful consequences to judge punishment and blame for an act. That is, judgments about the severity of punishment were sensitive to the degree of harm caused by perpetrators. Indeed, even though culpability in American criminal law requires *mens rea* or “guilty mind”—the intention to commit a crime—punishment is heavily based on the resulting harm (Schulhofer, 1974). As such, children’s consideration of outcomes to judge informants is not patently immature reasoning. In addition, there might be good reasons why in our research, as in previous research (Grant & Mills, 2011), children often fail to rely on mental states even though they understand and remember the informants’ mental states—one cannot always be completely certain of others’ mental states, but positive outcomes generally suggest who has the ability to produce positive outcomes. Indeed, children’s answers to our exploratory question on the informant’s ability suggest this line of reasoning. Children generalized positive outcomes to an ability to run fast, but they did not do so for positive intentions. Thus, when cues about informants are somewhat ambiguous (as is likely the case in everyday life), it appears that children sensibly note who has the track-record of producing the desired result.

In contrast to children’s answers to the exploratory question on the informant’s ability, their answers to the exploratory questions on the informant’s dispositional trait and trait-relevant behavior were influenced by the informant’s intention, but not by outcome. Children inferred that positive intentions were associated with being nice and willingness to help. This suggests that children are attributing the informants’ intentions to their disposition of being nice or mean. Thus, children’s weighing of informants’ intentions might be related to their understanding of dispositional traits. In general, research on trait reasoning suggests that around 4 to 6 years of age, children start to demonstrate some understanding of good and nice versus bad and mean, but it is not until 7 to 8 years of age that children understand more specific traits and reliably predict

consistent behaviors (Heyman, 2009; Heyman & Gelman, 1998; Liu, et al., 2007). And as children from 3 to 8 years of age increasingly predict trait-consistent behaviors, they might place greater emphasis on informants' past intentions when judging future testimony. Many have suggested that selective trust is associated with theory of mind development (Koenig & Harris, 2005; Moses & Baldwin, 2005), but perhaps it is also associated with trait-reasoning development.

The current study provides initial data on the question of how children reason about the intentions underlying informants' past testimony relative to informants' overt outputs. However, there are several aspects of this question that remains to be examined. We did not observe an age-related difference in performance; both 5- and 6-year-olds accounted for informants' intentions and outcomes when they decided whether to trust informants' testimony. Future work is needed to explore age-related change over a wider age range. Given that the reasoning patterns for 5- and 6-year-olds in the present study were similar to those seen in moral judgment research (Costanzo, et al., 1973; Farnill, 1974; Helwig, et al., 1995; Heyman & Gelman, 1998; Leon, 1982; Piaget, 1932), which has established an increased emphasis on intention over outcome with age, it seems reasonable to predict the same developmental trend in children's selective trust.

Another important issue is whether children's consideration of knowledge versus outcome information in selective trust is similar to their consideration of intention versus outcome information. Nurmsoo and Robinson (2009a, 2009b) tested children's consideration of informants' lack of knowledge-access to explain their inaccuracies, but they did not vary knowledge and outcome information independently (as we have done for intention and outcome

information). Thus, it is still unknown how children weigh knowledge and outcome information and whether its development parallels how children weigh intention and outcome information.

An intriguing topic to explore is whether children reason differently when they decide whether to trust a single informant alone versus when they decide whom of two informants to trust. In some selective trust studies (including the current study), the procedure involved questions that asked children to judge the testimony of individual informants (Nurmsoo & Robinson, 2009b; Robinson, Champion, & Mitchell, 1999; Sabbagh & Baldwin, 2001; Vanderbilt, et al., 2011); however, in other studies, the procedure involved forced-choice questions that asked children to choose between the testimony of two opposing informants (Birch et al., 2008; Corriveau & Harris, 2009a, 2009b; Jaswal & Neely, 2006; Koenig & Harris, 2005; Pasquini et al., 2007). It is possible that the way children reason about the reliability of a single informant differs from the way they reason about the relative reliability between informants (Liu & Vanderbilt, in press; Vanderbilt, Heyman, & Liu, 2012).

Two potential limitations of the current study that are associated with the specific materials and procedure also warrant further investigation. One potential limitation of our study is that, during the informant history phase, children had to infer each informant's intention from her affective responses to the outcomes, rather than told explicitly the informant's intention. We used emotional reactions to convey informants' intention because we wanted our procedure to parallel that of previous selective trust studies (e.g., Koenig et al., 2004; Koenig & Harris, 2005), which typically presented children with examples of informants' accuracies and inaccuracies; in these studies of object labeling, informants' competence and knowledge were demonstrated, rather than told explicitly. Furthermore, a task in which children have to infer intentions is more similar to the type of everyday situations children encounter when deciding whether to trust

someone. With a large majority of the children correctly identifying the informants' intentions, it appears that this inference was not especially difficult. And when we restricted our analyses to children who correctly identified the informants' intentions, the effects of intention and outcome remained significant. Nonetheless, future research should investigate children's performance when told explicitly informants' intentions.

Another potential limitation of our study is that children's might have been confused as to whether the informants knew the correct location of the stickers when informants provided advice to the children. During the child test phase, we explicitly told the children that the informant "knows where the sticker is, because she just peeked." However, the procedure did not include other steps that could have bolstered our instructions about the informants' knowledge state, such as having the informants actually look inside the boxes. We decided not to overemphasize the informants' knowledge state during the child test phase, because we did not want to inadvertently prime or cue children to focus on informants' knowledge, rather than their intention. Still, future research should explore whether emphasizing informants' knowledge state in our procedure would influence children's performance. A more general issue in need of research is how children integrate information about intention, knowledge, and outcome (Killen et al., 2011). When judging the reliability of an informant, children's inferences about the informants' intention will likely contribute to their inferences about the informants' knowledge state and vice versa.

Our study showed that 5- and 6-year-olds use both intentions and outcomes of past testimony to decide whether to trust an informant. In children's decisions about whether to accept testimony from an informant, it appears that they do not rely purely on their attributions

of the informant's underlying mental states. Instead, it appears that children also base their decisions on the informant's track-record of producing positive or negative results.

### References

- Baird, J. A., & Moses, L. J. (2001). Do preschoolers appreciate that identical actions may be motivated by different intentions? *Journal of Cognition and Development, 2*(4), 413-448.
- Bandura, A., & McDonald, F. J. (1963). Influence of social reinforcement and the behavior of models in shaping children's moral judgment. *The Journal of Abnormal and Social Psychology, 67*(3), 274-281.
- Behne, T., Carpenter, M., Call, J., & Tomasello, M. (2005). Unwilling Versus Unable: Infants' Understanding of Intentional Action. *Developmental Psychology, 41*(2), 328-337.
- Birch, S. A. J., & Bloom, P. (2002). Preschoolers are sensitive to the speaker's knowledge when learning proper names. *Child Development, 73*(2), 434-444.
- Birch, S. A. J., Vauthier, S. A., & Bloom, P. (2008). Three- and four-year-olds spontaneously use others' past performance to guide their learning. *Cognition, 107*(3), 1018-1034.
- Clément, F., Koenig, M., & Harris, P. (2004). The ontogenesis of trust. *Mind & Language, 19*(4), 360-379.
- Costanzo, P. R., Coie, J. D., Grumet, J. F., & Farnill, D. (1973). A reexamination of the effects of intent and consequence on children's moral judgments. *Child Development, 44*, 154-161.
- Couillard, N. L., & Woodward, A. L. (1999). Children's comprehension of deceptive points. *British Journal of Developmental Psychology, 17*(4), 515-521.
- Cushman, F. (2008). Crime and punishment: Distinguishing the roles of causal and intentional analyses in moral judgment. *Cognition, 108*(2), 353-380.
- Farnill, D. (1974). The effects of social-judgment set on children's use of intent information. *Journal of Personality, 42*(2), 276-289.

Grant, M. G. & Mills, C. M. (2011). Children's explanations of the intentions underlying others' behaviour. *British Journal of Developmental Psychology*, 29, 504-523.

Harris, P. L. (2007). Trust. *Developmental Science*, 10(1), 135-138.

Helwig, C. C., Hildebrandt, C., & Turiel, E. (1995). Children's judgments about psychological harm in social context. *Child Development*, 66(6), 1680-1693.

Heyman, G. D. (2008). Children's critical thinking when learning from others. *Current Directions in Psychological Science*, 17(5), 344-347.

Heyman, G.D. (2009). Children's reasoning about traits. In P.J. Bauer (Ed.), *Advances in child development and behavior* (Vol. 37, pp. 105-143). New York: Academic Press.

Heyman, G. D., & Gelman, S. A. (1998). Young children use motive information to make trait inferences. *Developmental Psychology*, 34, 310-321.

Jaswal, V. K., & Neely, L. A. (2006). Adults Don't Always Know Best: Preschoolers Use Past Reliability Over Age When Learning New Words. *Psychological Science*, 17(9), 757-758.

Killen, M., Mulvey, K. L., Richardson, C., Jampol, N., & Woodward, A. (2011). The accidental transgressor: Morally-relevant theory of mind. *Cognition*, 119(2), 197-215.

Koenig, M. A., Clément, F., & Harris, P. L. (2004). Trust in testimony: Children's use of true and false statements. *Psychological Science*, 15(10), 694-698.

Koenig, M. A., & Harris, P. L. (2005). Preschoolers mistrust ignorant and inaccurate speakers. *Child Development*, 76(6), 1261-1277.

Leon, M. (1982). Rules in children's moral judgments: Integration of intent, damage, and rationale information. *Developmental Psychology*, 18(6), 835-842.

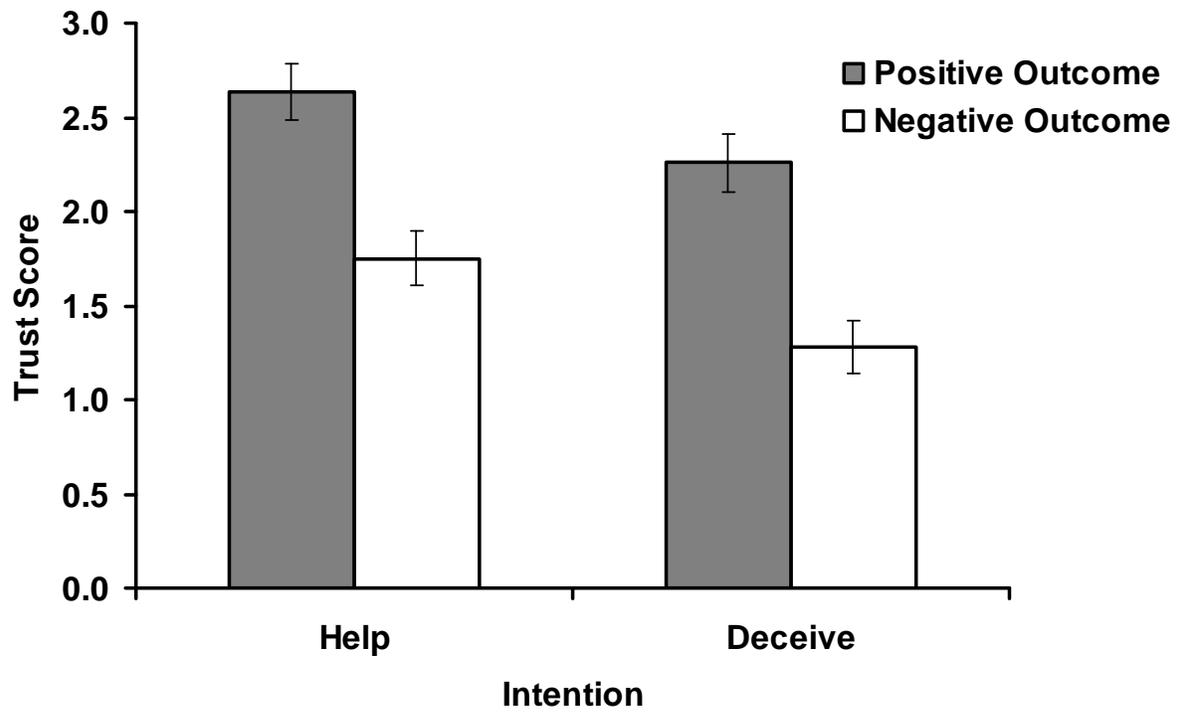
- Liu, D., Gelman, S. A., & Wellman, H. M. (2007). Components of young children's trait understanding: Behavior-to-trait inferences and trait-to-behavior predictions. *Child Development, 78*, 1543-1558.
- Liu, D. & Vanderbilt, K. E. (in press). Children learn from and about variability between people. In M. R. Banaji & S. A. Gelman (Eds.) *Navigating the Social World: A Developmental Perspective*. New York: Oxford University Press.
- Mascaro, O., & Sperber, D. (2009). The moral, epistemic, and mindreading components of children's vigilance towards deception. *Cognition, 112*(3), 367-380.
- Nelson, S. A. (1980). Factors influencing young children's use of motives and outcomes as moral criteria. *Child Development, 51*(3), 823-829.
- Nurmsoo, E., & Robinson, E. J. (2009a). Children's trust in previously inaccurate informants who were well or poorly informed: When past errors can be excused. *Child Development, 80*(1), 23-27.
- Nurmsoo, E., & Robinson, E. J. (2009b). Identifying unreliable informants: Do children excuse past inaccuracy? *Developmental Science, 12*(1), 41-47.
- Piaget, J. (1932). *The moral judgment of the child*. London: Routledge & Kegan Paul.
- Sabbagh, M. A., & Baldwin, D. A. (2001). Learning words from knowledgeable versus ignorant speakers: Links between preschoolers' theory of mind and semantic development. *Child Development, 72*(4), 1054-1070.
- Sabbagh, M. A., Wdowiak, S. D., & Ottaway, J. M. (2003). Do word learners ignore ignorant speakers? *Journal of Child Language, 30*(4), 905-924.
- Schulhofer, S. J. (1974). Harm and punishment: A critique of emphasis on the results of conduct in the criminal law. *University of Pennsylvania Law Review, 122*, 1497-1607.

- Sperber, D., Clément, F., Heintz, C., Mascaro, O., Mercier, H., Origg, G. (2010). Epistemic vigilance. *Mind & Language*, 25(4), 359-393.
- Vanderbilt, K. E., Heyman, G. D., & Liu, D. (2012). *Young children's inferences about inaccurate informants*. Unpublished manuscript.
- Vanderbilt, K. E., Liu, D., & Heyman, G. D. (2011). The development of distrust. *Child Development*, 82, 1372–1380.
- Yuill, N. (1984). Young children's coordination of motive and outcome in judgements of satisfaction and morality. *British Journal of Developmental Psychology*, 2(1), 73-81.
- Zelazo, P. D., Helwig, C. C., & Lau, A. (1996). Intention, act, and outcome in behavioral prediction and moral judgment. *Child Development*, 67, 2478-2492.

Table 1

*Endorsement of Judgments about the Informant as a Percentage of Children in Each Condition*

Question	Intention-Outcome Condition			
	Positive-Positive	Positive-Negative	Negative-Positive	Negative-Negative
Intention (was positive)	95%	63%	30%	36%
Dispositional trait (is nice)	100%	79%	52%	44%
Behavioral prediction (will help)	100%	83%	52%	52%
Ability (runs fast)	73%	46%	56%	40%



*Figure 1.* Number of trials (out of three) children trusted the informant as a function of intention and outcome of previous testimony.