



# Young Children's Trust in Overtly Misleading Advice

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## Abstract

The ability of 3- and 4-year-old children to disregard advice from an overtly misleading informant was investigated across five studies (total  $n = 212$ ). Previous studies have documented limitations in young children's ability to reject misleading advice. This study was designed to test the hypothesis that these limitations are primarily due to an inability to reject specific directions that are provided by others, rather than an inability to respond in a way that is opposite to what has been indicated by a cue. In Studies 1 through 4, a puppet identified as *The Big Bad Wolf* offered advice to participants about which of two boxes contained a hidden sticker. Regardless of the form the advice took, 3-year olds performed poorly by failing to systematically reject it. However, when participants in Study 5 believed they were responding to a mechanical cue rather than the advice of the Wolf, they were better able to reject misleading advice, and individual differences in performance on the primary task were systematically correlated with measures of executive function. Results are interpreted as providing support for the communicative intent hypothesis, which posits that children find it especially difficult to reject deceptive information that they perceive as being intentionally communicated by others.

*Keywords:* Deception; Trust (social behavior); Interpersonal communication; Early-childhood development; Cognitive development; Informants; Social cognition

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## 1. Introduction

When children place trust in individuals who do not have their best interests in mind, the consequences can be severe. There is widespread agreement that children should be taught to avoid risky actions such as getting into a car with a stranger or posting personal information on the Internet. To maximize the effectiveness of these messages, it is important to understand the developmental trajectory of children's ability to distrust others, and the cognitive factors that underlie difficulty in reasoning within this domain.

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It is well established that by age 5, children have a wide range of competencies for evaluating others as sources of information (for reviews see Harris, 2007; Heyman, 2008; Gelman, 2009). When seeking information from others, preschool-age children prefer informants who have previously been accurate to those who have not (Birch, Vauthier, & Bloom, 2008; Corriveau & Harris, 2009; Harris, 2007; Jaswal & Neely, 2006; Koenig & Harris, 2005). Children of this age are also sensitive to a range of other knowledge-related cues. For example, they would rather learn about an unfamiliar object from its creator than from others (Jaswal, 2006; Sabbagh & Baldwin, 2001), and they would rather learn from individuals who have perceptual access to the relevant information than from those who do not (Nurmsoo & Robinson, 2009). Young children also consider certain types of prior knowledge to be more relevant than others (Lutz & Keil, 2002; Sobel & Corriveau, 2010).

There is evidence that preschool-age children have some appreciation of the possibility of deception. By age 3, they understand that speakers sometimes say things that they do not believe (Lee & Cameron, 2000), and that an individual's beliefs and behavior can be influenced by the deceptive behavior of others (Hala, Chandler, & Fritz, 1991). Three-year olds engage in lie telling and other deceptive practices (Chandler, Fritz, & Hala, 1989; Lewis, Stanger, & Sullivan, 1989; Polak & Harris, 1999; Talwar & Lee, 2002; Talwar, Murphy, & Lee, 2007) and prefer the testimony of prosocial speakers to that of malicious speakers (Mascaro & Sperber, 2009).

Despite these documented competencies, limitations in young children's reasoning about deception remain (Heyman, 2008; Heyman & Legare, 2005; Jaswal, Croft, Seftia, & Cole, 2010; Mascaro & Sperber, 2009; Mills & Keil, 2005; Moses & Baldwin, 2005; Vanderbilt, Liu, & Heyman, 2011). For example, Heyman and Legare (2005) found that 6- and 7-year olds agreed with the assertion that self-report is an effective way to learn about value-laden personal characteristics of others (e.g., whether they are honest), which suggests a failure to anticipate the potential effects of motives relating to social desirability.

Most relevant to the present question is research examining preschool-age children's response to advice from informants who clearly demonstrate an intent to deceive, or behave in ways that strongly imply a deceptive intent (Couillard & Woodward, 1999; Jaswal et al., 2010; Mascaro & Sperber, 2009; Mills & Keil, 2005; Moses & Baldwin, 2005; Vanderbilt et al., 2011). In one paradigm used to address this issue, participants search for a prize that is hidden in one of two locations and are offered advice about its location by one or two informants. Mascaro and Sperber (2009) found that 3-year olds consistently followed the advice of an informant who was labeled as a "big liar" and showed no improvement in their performance after receiving feedback on their choices from an experimenter. Vanderbilt et al. (2011) found that 3- and 4-year olds were equally willing to accept advice from *helpers* who happily gave correct advice to others, and *trickers* who happily gave incorrect advice to others.

One possible explanation for these findings is that young children are more hesitant than older children and adults to make negative judgments of others in the absence of strong and salient cues (see Boseovski, 2010), and they require stronger evidence before they are willing to conclude that an individual is untrustworthy. However, Vanderbilt

et al. (2011) found that even when young children were able to articulate the distinction between speakers who were willing to help and those who were not, they often failed to put this understanding into practice.

### 1.1. *Two hypotheses*

One explanation for young children's inability to reject deceptive information is that it is due to limitations in their executive functioning, which makes it difficult for them to respond in a way that is opposite to what has been indicated by a cue. According to this explanation, differing levels of executive functioning are required for children to reject deceptive information that appears in different forms (Couillard & Woodward, 1999; Jaswal et al., 2010; Palmquist & Jaswal, 2011). In particular, cues that are highly familiar are especially difficult to reject. Support for this possibility comes from studies showing that when deceptive advice is presented in a highly conventional form, such as by pointing, it is more difficult for young children to reject than when it is presented in a less conventional form (Couillard & Woodward, 1999; Jaswal et al., 2010; Palmquist & Jaswal, 2011), presumably because rejecting a conventional cue requires inhibiting familiar patterns of response that are associated with obtaining positive outcomes. For example, Couillard and Woodward (1999) found that preschool children were better at rejecting advice from a "tricky" informant about the location of a hidden sticker when the advice was conveyed by placing a ball near the location being referenced than when the advice was conveyed via pointing. Similarly, Jaswal et al. (2010) found that 3-year olds could locate an object hidden in one of two cups after being presented with a deceptive cue that took the form of a cardboard arrow pointing toward the cup (an unconventional form of communication), but not when the deceptive cue took the form of a verbal statement (e.g., "it's in the red cup," a conventional form of communication).

An alternative explanation is that children find it especially difficult to reject deceptive information when they perceive it as being intentionally communicated by others. We refer to this explanation as the *communicative intent hypothesis*. This hypothesis is also consistent with evidence that children have more difficulty rejecting deceptive advice that is presented using conventional cues (Couillard & Woodward, 1999; Jaswal et al., 2010; Palmquist & Jaswal, 2011), because it is possible that children are able to treat unconventional cues as accurate indicators of what not to do, thus transforming the task into one that no longer involves rejecting deceptive advice (Mascaro, 2011; Mascaro & Sperber, 2009). If this hypothesis is correct, then once the communicative intent of the informant has been clearly established, measures of executive functioning should show little if any relation to children's ability to reject the deceptive information.

### 1.2. *The present research*

The present research investigates two central issues: the robustness of children's difficulties with rejecting the advice of individuals who demonstrate clear deceptive intent, and whether young children's difficulty in this domain can be accounted for by the

communicative intent hypothesis. We addressed these questions by asking 3- and 4-year olds to complete a sticker-finding task in which success can only be achieved by rejecting a cue that relates to which of two boxes contains a hidden sticker.

To investigate the question of robustness, we examined whether children would be able to show distrust under conditions in which indicators of the deceptive intent of the informant are as salient as possible. We chose *The Big Bad Wolf*, in the form of a puppet with a distinctive gruff voice, as the informant because children are likely to already have negative associations with this character. These associations could make it easier for them to accept the possibility of deceptive intent. The experimenter told participants that the Wolf is “bad” and that he always gives incorrect information. Children also observed the experimenter demonstrate both an incorrect trial, in which she followed the Wolf’s advice and was denied a sticker, and a correct trial, in which she rejected the Wolf’s advice and earned a sticker. After each of these demonstrations, the experimenter commented on the connection between her own choice and the outcome (e.g., that she had earned the sticker because she had rejected the Wolf’s advice). Finally, children received both material feedback, in the form of either earning or failing to earn a sticker on each trial based on the box they chose, and social feedback in the form of comments from the experimenter and a gloating comment from the Wolf (“Ha ha ha ha ha, I tricked you!”) each time they failed to earn a sticker.

We evaluated the communicative intent hypothesis in several different ways. First, we presented children with executive function tasks to assess whether their performance would be positively correlated with their responses to the sticker-finding task. We hypothesized that executive function tasks, in which the instructions are likely to be interpreted as cues about what not to do, would show minimal correlation with performance on the sticker-finding task. We used two executive function tasks: the day–night task (Gerstadt, Hong, & Diamond, 1994) and the head-to-toes task (Ponitz et al., 2008), each of which requires children to respond in a manner that is opposite to a cue. These tasks were chosen because children’s performance shows substantial variability within the targeted age range (Carlson, 2005), and because they closely parallel the structure of the sticker-finding task: in each case, children are being asked to select a response that is opposite to a cue.

A second way we evaluated the hypotheses was to examine whether children’s performance would be sensitive to the way in which the cue was presented, as has been seen in previous studies of selective trust (Couillard & Woodward, 1999; Jaswal et al., 2010; Palmquist & Jaswal, 2011). If the communicative intent hypothesis is correct, then the form of the cue should only matter to the extent to which it encourages children to conceptualize the task as one of interpreting the advice of an informant, versus as one of making use of a reliable indicator of an incorrect location. Because we made the communicative intent behind the Wolf’s deceptive cues highly salient, evidence that the nature of the cue does not influence performance would provide support for the communicative intent hypothesis.

A third way we sought to evaluate the two hypotheses was to present a version of the sticker-finding task in which the cue to the location of the sticker was one that children would be unlikely to interpret as being associated with communicative intent on the part

of an informant. In Study 5, participants saw an indicator that appeared to operate automatically rather than being controlled by the Wolf. If the communicative intent hypothesis is correct, children should be more successful at this version of the task because they would no longer conceptualize it as one requiring the rejection of advice.

## 2. Study 1

The primary experimental task was a sticker-finding game in which participants chose whether to accept or reject advice from a puppet described as *The Big Bad Wolf*. The advice took the form of explicit statements and pointing. Two additional tasks, the day–night task and the head-to-toes task, were included to measure children’s executive function. These tasks have been used to assess behavioral regulation among preschool-age children (Carlson, 2005; Ponitz et al., 2008).

### 2.1. Method

#### 2.1.1. Participants

Participants were 40 preschool-age children: twenty 3-year olds ( $M = 3.52$ ,  $SD = 0.29$ ; 10 female) and twenty 4-year olds ( $M = 4.50$ ,  $SD = 0.34$ ; 10 female) who were recruited from preschools in northern and southern California. The sample was approximately 50.0% Caucasian, 32.5% Asian, 7.5% Latino, 5.0% African American, and 5.0% biracial.

#### 2.1.2. Procedure

In individual sessions with a female experimenter, children were presented with a verbal sticker-finding task, a pictorial day–night task, and a verbal head-to-toes task.

On the verbal sticker-finding task, participants were told about a sticker-finding game that they would be playing with a wolf puppet that was described as *The Big Bad Wolf*, and that the objective of the game was to win a sticker hidden in one of two white boxes. The boxes were identical except that one had a circular green sticker on it, and the other had a circular yellow sticker.

Participants were introduced to a wolf puppet, who always spoke in a gruff voice. They were told, “He’s a scary wolf, isn’t he? He’s really mean and tricky. He tricked Little Red Riding Hood when he pretended to be her grandma and made Little Red Riding Hood sad.”

Participants were asked, “Is the Big Bad Wolf nice or mean?” All children responded that he is mean. The experimenter confirmed this response, by saying, “Yes, he’s very, very mean!” and added, “The Big Bad Wolf loves to trick people and will trick anyone.” Next the experimenter said, “Now I’m going to play a game with the Big Bad Wolf.” The Wolf reminded the experimenter, “If you win, you get to keep the sticker that you find!” The experimenter then responded, “Ooh, I get to keep the sticker all to myself?” and the Wolf said, “Only if you can find it! I’m going to hide the sticker now.”

Next, the experimenter played the sticker-finding game with the Wolf for two trials. On each of these trials, the Wolf indicated where the sticker was located by saying, “This one! This one! The sticker is in this box!” and pointing to one of the boxes. On the first trial, the experimenter selected the box indicated by the Wolf. The experimenter looked inside the box, showed the participant that it was empty, and said, “What? There’s no sticker in there!” Next, the experimenter showed the child that the sticker was in the other box. The script continued as follows.

*Big Bad Wolf:* Ha ha ha ha ha, I tricked you!

*Experimenter:* You told me the wrong one!

*Big Bad Wolf:* I tell *everyone* the wrong one.

*Experimenter:* You naughty wolf! I’m going to try to get the sticker again!

The experimenter then told the participant, “This time, I’m not going to listen to the Big Bad Wolf because he’s mean and he lies!” The experimenter played the sticker-finding game again, and after the Wolf indicated which box to pick, she said, “This time I know better. I’m not going to listen to you, Big Bad Wolf. I’m going to pick the *other* one.” She then opened the box, found the sticker, and said, “Yay yay yay, I got the sticker! I didn’t listen to the Big Bad Wolf and got the sticker!” The Wolf replied by expressing frustration.

Next, the participants were told that it was their turn to play the sticker-finding game with the Wolf and were reminded, “He’s going to try to trick you.” The experimenter once again reminded the participant of the Wolf’s intent to misinform, and that he or she should be very careful. On each of six trials, the Wolf indicated that he would hide the sticker and did so out of the child’s view. Next, the experimenter asked the Wolf, “Which box has the sticker?” The Wolf responded by pointing to one of the two boxes and saying, “This one! This one! The sticker is in this box!”

On each trial in which the participant found the sticker due to rejecting the Wolf’s advice, the experimenter replied, “Good job! You won the sticker for yourself!” On each trial in which the participant failed to find the sticker due to following the Wolf’s advice, the experimenter replied, “Oh, no. The sticker isn’t here,” and the Wolf replied, “Ha ha ha ha ha! I tricked you!” The experimenter then showed that the sticker was in the other box. Next, the Wolf gleefully declared, “I trick everyone” and the experimenter asked the participant to remember that the Wolf is mean and tricky. Responses to each trial were scored as either correct or incorrect. A correct response received one point, so each participant’s score on the sticker-finding task had a possible range from 0 to 6 points.

When the sticker-finding task was completed, participants responded to two other tasks designed to assess their capacity to respond in a manner that is opposite to a cue.

In the pictorial day–night task, children performed a six-trial version of the day–night task (Gerstadt et al., 1994) in which they were asked to say “day” in response to a picture depicting the night sky, and “night” in response to a picture depicting the sun on a bright day. Each participant was given four practice trials in which the experimenter offered corrections of any mistakes that were made, and then six experimental trials in one of two orders. As with the sticker-finding task, each correct response received one point, such that each participant had a score that ranged from 0 to 6.

Following the day–night task, a six-trial version of the verbal head-to-toes task was presented (Ponitz et al., 2008). Participants were instructed to touch their head when told to touch their toes, and *vice versa*. As in the day–night task, there were four practice trials, the experimental trials appeared in one of two orders, and scores had a possible range from 0 to 6.

## 2.2. Results

Mean scores for the verbal sticker-finding task are shown in Table 1, for Study 1 and all subsequent studies. Preliminary analyses of the Study 1 data showed no significant effects of gender or trial order on the sticker-finding task, so these variables were excluded from subsequent analyses.

The 3-year olds rejected the advice of the Wolf 52.5% the time, which did not differ significantly from chance,  $t(19) = 0.330$ ,  $p > .10$ , 95% CI: 2.20, 4.10, and 4-year olds did so 82.5% of the time, which was significantly better than chance,  $t(19) = 4.65$ ,  $p < .001$ , 95% CI: 4.07, 5.83. An ANOVA using Age (3, 4) as a between-subjects factor revealed that this difference was significant,  $F(1,38) = 8.46$ ,  $p = .006$ .<sup>1</sup> The distribution of possible scores in Study 1 and subsequent studies is shown in Table 2, by age group.

Performance on the sticker-finding task was not correlated with performance on the day–night task and was positively correlated with performance on the head-to-toes task

Table 1  
Mean scores for all tasks in each study, by age group

Task	Age Group	
	3-Year Olds	4-Year Olds
Study 1		
Verbal sticker-finding	3.15 (2.03)	4.95 (1.88)
Pictorial day–night	3.75 (2.20)	4.35 (2.01)
Verbal head-to-toes	0.65 (1.42)	3.70 (2.43)
Study 2		
Verbal sticker-finding	2.43 (2.36)	4.14 (2.26)
Pictorial day–night	5.19 (1.40)	4.62 (2.04)
Pictorial head-to-toes	4.19 (2.25)	4.48 (2.29)
Study 3		
Verbal sticker-finding	2.86 (2.05)	
Pictorial day–night	4.72 (1.45)	
Study 4		
Pictorial sticker-finding	2.10 (2.34)	4.60 (2.44)
Pictorial day–night	4.05 (2.24)	4.60 (1.10)
Pictorial head-to-toes	4.30 (2.23)	5.90 (0.31)
Study 5		
Lightbulb sticker-finding	4.72 (1.74)	5.95 (0.22)
Pictorial day–night	4.56 (1.98)	4.86 (1.90)

Note: Each score had a possible value from 0 to 6. Standard deviations are shown in parentheses.

Table 2

Percent of children in each study who answered the sticker-finding task correctly on the minimum possible 0 trials through the maximum possible 6 trials, by age group

Age Group	Number of Trials Answered Correctly						
	0	1	2	3	4	5	6
Study 1							
3-year olds	10.0	15.0	15.0	20.0	10.0	10.0	20.0
4-year olds	10.0	0.0	0.0	5.0	5.0	20.0	60.0
Study 2							
3-year olds	33.3	9.5	19.0	0.0	14.3	4.8	19.0
4-year olds	9.5	14.3	4.8	0.0	9.5	19.0	42.9
Study 3							
3-year olds	13.6	22.7	4.5	22.7	9.1	13.6	13.6
Study 4							
3-year olds	45.0	5.0	10.0	10.0	10.0	5.0	15.0
4-year olds	20.0	0.0	0.0	0.0	10.0	0.0	70.0
Study 5							
3-year olds	5.6	0.0	5.6	11.1	11.1	16.7	50.0
4-year olds	0.0	0.0	0.0	0.0	0.0	4.8	95.2

( $p = .002$ ). However, after controlling for age, neither correlation was significant. The correlations between the primary task and the inhibitory tasks for Study 1 and subsequent studies are shown in Table 3.

To provide an index of whether learning had taken place, average performance on the first two trials was compared to average performance on the last two trials. There was no evidence of learning: For 3-year olds, the mean level of performance was identical ( $M = 0.53$  for both the earlier and later trials), and for 4-year olds the difference was not significant ( $M = 0.78$  for the early trials and  $M = 0.88$  for the later trials,  $p > .10$ ).

Table 3

Correlations between sticker-finding tasks and executive function tasks from each study

Sticker-Finding Task	Executive Function Task	
	Day-Night	Head-to-Toes
Study 1	0.165 (0.019)	0.483* (0.141)
Study 2	-0.005 (0.049)	0.067 (-0.030)
Study 3	-0.125 (-0.199)	
Study 4	0.284 (0.112)	0.248 (-0.046)
Study 5	0.363* (0.345*)	

*Note:* Partial correlations controlling for age are shown in parentheses. Correlations marked with an asterisk were significant at the  $p < .05$  level. Cues in the sticker-finding task were presented by the Wolf in Studies 1 through 4, and with a lightbulb in Study 5. Cues in the executive function tasks were pictorial except for the head-to-toes task of Study 1, which used verbal cues.



### 2.3. Discussion

Study 1 tested young children's ability to reject the advice of the Big Bad Wolf, an overtly misleading informant. Children in the 4-year-old group performed significantly better than chance but failed to reject the Wolf's advice on almost a fifth of the trials. The 3-year olds rejected the Wolf's advice only about half the time, even though they all correctly identified the Wolf as mean. These findings suggest that the strong emphasis on the Wolf's deceptive tendencies may have played some part in helping children to reject his advice. For example, even though 3-year olds accepted or rejected the Wolf's advice about equally often, this level of performance is substantially better than what was seen in previous studies in which children were provided with fewer indicators of the informant's deceptive tendencies (Mascaro & Sperber, 2009; Vanderbilt et al., 2011).

An examination of correlations between results of the sticker-finding task and the day-night task suggests that children's ability to respond in a manner that is opposite to a pictorial cue is independent of their ability to distrust an overtly misleading informant.

Success on the sticker-finding task was correlated with success on the head-to-toes task, but this finding is difficult to interpret for two reasons. First, the correlation is no longer significant when the effect of age is partialled out, which suggests that it may be an artifact of increases in general competencies on both tasks or due to other age-related factors such as a developmental increase in receptive language skills. Second, and of greater theoretical interest, is the possibility that the necessity of rejecting direct instructions on the head-to-toes task (i.e., the instructions that involved verbal instructions to "touch your head" or "touch your toes," rather than showing a picture of a head or toes) led children to conceptualize the task as one that involves rejecting advice. If this interpretation is correct, then performance on the head-to-toes task may have been correlated with the sticker-finding task because both tasks were measuring children's ability to reject intentionally communicated information. This possibility suggests that if the head-to-toes task were presented in a way that does not involve rejecting direct instructions, children's performance would improve and would be uncorrelated with their performance on the sticker-finding task.

### 3. Study 2

Why did children have trouble rejecting the advice of the Big Bad Wolf? Perhaps it was because the Wolf's advice involved pointing. Children learn to interpret pointing around the time of their first birthday, and they appear to associate it with receiving helpful information (Couillard & Woodward, 1999). Pointing can be more effective than language for determining a referent (Grassmann & Tomasello, 2010), and the ability to disregard information provided by pointing may require inhibiting a highly practiced pattern of response (see Jaswal et al., 2010). To evaluate this possibility, Study 2 used a version of the sticker-finding task in which the Wolf offered advice about the location of the sticker without pointing.

A comparison condition was added to Study 2 to provide a baseline for performance under conditions in which there is no obvious reason for children to distrust an informant. Finally, Study 2 included a pictorial, nonverbal version of the head-to-toes task. Improved performance on this version of the head-to-toes task and the absence of a correlation with the sticker-finding task would support the communicative intent hypothesis.

### 3.1. Method

#### 3.1.1. Participants

Participants were 42 preschool-age children: twenty-one 3-year olds ( $M = 3.61$ ,  $SD = 0.27$ ; 10 female) and twenty-one 4-year olds ( $M = 4.56$ ,  $SD = 0.31$ ; 10 female) who were recruited from preschools in southern California. The sample was approximately 81.0% Caucasian, 11.9% Asian, 4.8% Latino, and 2.4% biracial. An additional group of fifteen 3-year-old children ( $M = 3.48$ ,  $SD = 0.32$ ; 10 female) were tested in a baseline condition, and this sample was approximately 86.7% Caucasian, 6.7% Asian, and 6.7% biracial.

#### 3.1.2. Procedure

The procedure for the sticker-finding task was identical to that of Study 1, except that each time the experimenter asked the Wolf, "Which box has the sticker?" he responded by verbally indicating which box the child should pick without pointing. For example, he said, "The sticker's in the green box!" To ensure that children would understand this advice, a color check was administered at the beginning of the task in which children were asked to identify the color of the label on each box. All participants responded correctly, with the exception of one 3-year old who did not answer. This child was then offered three color options for each box and responded correctly to both questions.

A pictorial, nonverbal version of the head-to-toes task was used in which participants were asked to touch their head when they saw a card that showed a drawing of toes, and touch their toes when they saw a card that showed a drawing of a head. The order in which the day-night and head-to-toes task were presented was counterbalanced. The day-night task was identical to that of Study 1.

The comparison condition involved a similar sticker-finding task, but with a puppet named *Fluffy the Rabbit* serving as the informant rather than the Wolf. Fluffy was introduced as being "very, very nice," and Fluffy indicated the correct box on each of six trials. The feedback was also modified such that Fluffy expressed positive affect when the child won ("Good job! You won the sticker for yourself!") and negative affect when he or she lost ("Aw, man! I tried to help you!").

### 3.2. Results

Preliminary analyses showed no significant effects of gender or task order on the sticker-finding task, so these variables were excluded from subsequent analyses. Three-year olds rejected the advice of the Wolf 40.5% the time, which did not differ

significantly from chance,  $t(20) = -1.11$ ,  $p > .10$ , 95% CI: 1.36, 3.50, and the 4-year olds did so 69.0% of the time, which was significantly greater than chance,  $t(20) = 2.31$ ,  $p = .032$ , 95% CI: 3.11, 5.17. An ANOVA using age (3, 4) as a between-subjects factor confirmed that the performance of the 4-year olds was significantly better than that of the 3-year olds,  $F(1,40) = 5.78$ ,  $p = .021$ . A comparison with results from the sticker-finding task of Study 1 indicated that performance did not differ significantly across the studies.

Performance on the sticker-finding task showed no significant correlations with either the day–night task or the head-to-toes task, regardless of whether age effects were partialled out. Because in this study both executive function tasks took a form that could be readily interpreted as an accurate indicator of which cue to reject, these scores were averaged to form a single index. The index showed no significant correlation with the performance of 3-year olds ( $r^2 = .13$ ,  $p > .10$ ) or with 4-year olds ( $r^2 = .03$ ,  $p > .10$ ).

Performance on the pictorial version of the head-to-toes task ( $M = 4.33$ ) was significantly better than that of participants in Study 1 on the verbal head-to-toes task ( $M = 2.18$ ),  $t(80) = 2.16$ ,  $p < .001$ . One surprising finding was that the 3-year olds appeared to perform better than the 4-year olds on the day–night task. The difference was not statistically significant ( $p > .10$ ), and it can be accounted for by the fact that the majority of children in both age groups got perfect scores, but two of the 4-year olds answered every item incorrectly. Nevertheless, the high rate of success on both executive function tasks shown by the 3-year olds is noteworthy, and it suggests that their difficulty with rejecting advice from a deceptive informant is not simply a matter of an inability to respond in a manner that is opposite to what is indicated by a cue.

As in Study 1, 3-year olds showed no clear evidence of learning across trials ( $M = 0.33$  for the first two trials and  $M = 0.45$  for the last two trials,  $p > .10$ ). Four-year olds showed marginally significant improvement across trials ( $M = 0.60$  for the first two trials and 0.76 for the last two trials,  $p < .10$ ).

Children followed the advice of Fluffy the Rabbit on 87.8% of the trials in the comparison condition.

### 3.3. Discussion

Modifying the Wolf's advice to eliminate pointing did not lead to an improvement in children's performance. Four-year olds performed better than chance but were not at ceiling, rejecting the Wolf's advice on 69.0% of the trials, as compared with 82.5% of the trials for the 4-year olds in Study 1. Children in the 3-year-old group rejected the Wolf's advice on only 40.5% of the trials, as compared with 52.5% of the trials for the 3-year olds in Study 1. This lack of improvement in Study 2 as compared with Study 1, and the lack of significant correlations between the sticker-finding task and the two executive function tasks, is consistent with the communicative intent hypothesis.

As predicted, performance on the nonverbal head-to-toes task in Study 2 was better than performance on the verbal head-to-toes task in Study 1, providing further support for the possibility that the task demands of rejecting intentionally communicated instructions exceed those of remembering a cue and switching responses accordingly.

The comparison condition confirmed previous findings (Vanderbilt et al., 2011) that indicate that young children will show a high degree of trust in informants in the absence of reasons for distrust. This pattern of response differs substantially from the pattern of chance responding that was seen among 3-year olds in the sticker-finding task.

## 4. Study 3

One goal of Study 2 was to determine whether young children would find it easier to reject deceptive advice that did not involve pointing, as in Study 1. We found no evidence to support this possibility, even though prior research suggests that young children may have more difficulty rejecting deceptive advice when it is presented in a highly conventional form. Of primary interest in Study 3 was to determine whether this pattern of results would replicate under conditions that were designed to control for all other procedural differences between Studies 1 and 2. An additional goal was to determine whether there would be any task order effects based on whether children were presented with an executive function task first.

### 4.1. Method

#### 4.1.1. Participants

Participants were twenty-two 3-year-old children ( $M = 3.54$   $SD = 0.34$ ; 13 female) who were recruited from preschools in northern and southern California. The sample was approximately 72.7% Caucasian, 22.7% Asian, and 4.6% biracial. Children were randomly assigned to a *pointing* or a *nonpointing* condition.

#### 4.1.2. Procedure

In individual sessions with a female experimenter, children were presented with a verbal sticker-finding task and a pictorial day–night task. The order of the tasks was counter-balanced between subjects.

*4.1.2.1. Verbal sticker-finding task:* The procedure was identical to that of Study 2, except that for children in the pointing condition, the Wolf pointed to the box as he referred to it verbally.

*4.1.2.2. Pictorial day–night task:* The day–night task was identical to that of Study 1.

### 4.2. Results

Preliminary analyses showed no significant effect of gender on the sticker-finding task, so this variable was excluded from subsequent analyses. Participants (3-year olds only for this study) rejected the advice of the Wolf 47.7% of the time ( $M = 2.86$ ), which did not

differ significantly from chance,  $t(19) = -0.31$ ,  $p > .10$ , 95% CI: 1.95, 3.77. This pattern did not significantly differ by pointing condition or task order. Specifically, children in the pointing condition did not perform significantly worse than children in the no-pointing condition ( $M = 3.18$  and  $2.55$ , respectively), and children who completed the day–night task first did not perform significantly better on the sticker-finding task than did children who completed the day–night task last ( $M = 3.18$  and  $2.55$ , respectively). These results confirm the results of Study 2 that indicated that removing pointing from the Wolf’s instructions did not improve children’s performance. As in Studies 1 and 2, 3-year olds showed no clear evidence of learning across trials ( $M = 0.45$  for the first two trials and  $M = 0.50$  for the last two trials,  $p > .10$ ).

Again, performance on the sticker-finding task was uncorrelated with performance on the executive function task.

### 4.3. Discussion

Study 3 replicated findings from Studies 1 and 2 showing that 3-year olds are not able to systematically reject the advice of the Wolf, and that performance on the sticker-finding task is unrelated to measures of executive function. Performance on the sticker-finding task was unaffected by the presence of pointing, or by recent experience with an executive function task.

## 5. Study 4

Although Study 3 found no significant effect of pointing, it is possible that there was no such effect because the Wolf continued to present the advice verbally, which is a conventional form (see Jaswal et al., 2010). If so, the form of communication may matter, but an unconventional form would be required as a basis for comparison. This possibility is consistent with evidence from Jaswal et al. (2010) that 3-year olds were able to search in a pattern opposite to that indicated by a cue when it appeared in the form of an arrow, but not when the same information was presented verbally. To investigate this possibility, the Wolf in Study 4 presented advice in an unconventional form by showing a card that depicted one of the boxes. Because this way of presenting the advice was substantially different from what we used in the previous studies, we included a comparison condition to provide a baseline for performance under conditions in which there is no apparent reason to distrust the informant.

### 5.1. Method

#### 5.1.1. Participants

Participants were 40 preschool-age children: twenty 3-year olds ( $M = 3.58$ ,  $SD = 0.29$ ; 6 female) and twenty 4-year olds ( $M = 4.52$ ,  $SD = 0.30$ ; 13 female) who were recruited from preschools in southern California. An additional 3-year old was dropped from

the study because he became frightened after hearing the Wolf speak and told the experimenter he did not want to play anymore. The sample was approximately 62.5% Caucasian, 30.0% Asian, and 7.5% biracial.

An additional fourteen 3-year-old children ( $M = 3.42$ ,  $SD = 0.29$ ; 12 female) were run in a baseline condition. The sample was approximately 71.4% Caucasian, 21.4% Asian, and 7.1% African-American.

### 5.1.2. Procedure

The procedure was identical to that of Study 2, except that in the sticker-finding task, each time the experimenter asked the Wolf, "Which box has the sticker?" he gave no verbal response. Instead, his only response was to show a line-drawn color picture of either the green box or the yellow box.

The pictorial head-to-toes task was the same as that of Study 2, except that participants were asked to respond verbally by saying "head" when they saw a card depicting toes, and by saying "toes" when they saw a card depicting a head. The day-night task was identical to the one used in Studies 1 and 2. The order in which the head-to-toes and day-night tasks were presented was counterbalanced.

The procedure for the comparison condition was the same as the comparison condition for Study 2, except that the Fluffy the Rabbit puppet presented the helpful advice using the same cards that the Wolf used in the primary sticker-finding task.

## 5.2. Results

Preliminary analyses showed no effects of gender or task order on the sticker-finding task, so these variables were excluded from subsequent analyses. Three-year olds rejected the advice of the Wolf 35.0% of the time, which did not differ significantly from chance,  $t(19) = -1.72$ ,  $p = .101$ , 95% CI: 1.01, 3.19, and 4-year olds did so 76.7% of the time, which was significantly greater than chance,  $t(19) = 2.94$ ,  $p = .009$ , 95% CI: 3.46, 5.74. An ANOVA using age (3, 4) as a between-subjects factor revealed that the age difference was significant,  $F(1,38) = 10.96$ ,  $p = .002$ .

As was seen in Studies 2 and 3, performance on the sticker-finding task showed no significant correlation with either of the executive function tasks regardless of whether age effects were partialled out. As was done in Study 2, the two executive control tasks were averaged to form a single index. As in Study 2, the index showed no significant correlation with the performance of 3-year olds ( $r^2 = .05$ ,  $p > .10$ ) or 4-year olds ( $r^2 = .30$ ,  $p > .10$ ).

Performance in the comparison condition was near ceiling, with children accepting the advice on 95.2% of the trials.

Again, average performance on the first two trials of the sticker-finding task was compared with average performance on the last two trials. There was no clear evidence of improvement among the 3-year olds ( $M = 0.25$  for the earlier trials and  $M = 0.42$  for the later trials,  $p > .10$ ) or the 4-year olds ( $M = 0.70$  for the early trials and  $M = 0.80$  for the later trials,  $p > .10$ ).

### 5.3. Discussion

The Wolf offered advice in pictorial rather than verbal form in Study 4, but this modification did not lead to significant improvements in children's performance. The 4-year olds performed better than chance, but rejected the Wolf's advice only 76.7% of the time, and the 3-year olds performed no better than chance, rejecting the Wolf's advice only 35.0% of the time. These results suggest that it made no difference whether the primary task was presented verbally or pictorially, and they appear to be inconsistent with findings by Jaswal et al. (2010), in which 3-year olds succeeded at rejecting misleading cues provided in a nonconventional form (an arrow).

We interpret our findings as providing support for the communicative intent hypothesis. We argue that communicative intent was emphasized to a much greater extent in this study than in Jaswal et al. (2010). This emphasis took many forms, such as the experimenter's description of the Wolf's deceptive intent and the behavior of the experimenter and the Wolf on practice trials. Because we so clearly established that the Wolf was offering advice, we believe that the specific form in which the advice was presented did not provide the children with any additional relevant information. However, there are other aspects of the way our research was conducted that might explain why the results differed from those of previous studies that found the form of the cue to be important. For example, it may be that the specific form in which a nonconventional cue appears can affect children's responses. If young children consider pictorial instructions but not arrows to be iconic, the intent that lies behind a pictorial message may be more salient to them.

As was seen in the previous studies, the absence of correlations between the sticker-finding task and the executive function tasks provides further evidence in favor of the communicative intent hypothesis.

## 6. Study 5

The preschool-aged children in Studies 1 through 4, and the 3-year olds in particular, had difficulty rejecting the Wolf's advice on the sticker-finding task regardless of the form the advice took. We interpret the lack of effects relating to the conventionality of the cues in the sticker-finding task, as well as the lack of correlations between the sticker-finding and executive function tasks, as support for the communicative intent hypothesis. In Study 5, we further tested this hypothesis by exploring the prediction that young children would be more successful if they conceptualized the sticker-finding task as one of interpreting a reliable cue as to where the sticker is not located, rather than interpreting it as the advice of an informant. We adapted the sticker-finding task to evaluate this possibility. The Wolf was still present, but he was portrayed as sitting on the sidelines rooting for children to make incorrect choices, rather than delivering advice. The cues about which box to choose were provided via a lightbulb that turned either blue or red, and children were told that to earn the sticker they needed to choose the box that was marked with the color that differed from the color indicated by the lightbulb.

## 6.1. Method

### 6.1.1. Participants

Participants were 39 preschool-age children: eighteen 3-year olds ( $M = 3.63$ ,  $SD = 0.27$ ; 9 female) and twenty-one 4-year olds ( $M = 4.60$ ,  $SD = 0.32$ ; 10 female) who were recruited from preschools in southern California. The sample was approximately 82.1% Caucasian, 10.3% Asian, 5.1% Latino, and 2.6% African American.

### 6.1.2. Procedure

In individual sessions with an experimenter, children were presented with an adapted version of the sticker-finding task and the day–night task that was used in Studies 1 through 4. The order of tasks was counterbalanced between subjects.

The lightbulb was operated by the experimenter via a wireless remote control that was hidden from the child's view. The experimenter explained, "If you win, you get to keep the sticker, but the Big Bad Wolf is really mean so he wants you to lose." The rules of the game were explained to children as follows:

The light is going to show red or blue and you win by picking the other color. So, when the light is blue, you want to pick the red box to win the sticker. And when the light is red, you want to pick the blue box to win the sticker.

As in the other versions of the sticker-finding task, the experimenter demonstrated failure and success on the task, and children received stickers only on trials in which they were successful. The Wolf provided similar feedback as he did in Studies 1 through 4. Specifically, each time a child selected the incorrect box, the Wolf responded by saying, "Ha ha ha ha ha! You lost the sticker!" in a taunting voice.

## 6.2. Results

Preliminary analyses showed no effects of gender or task order on the sticker-finding task, so these variables were excluded from subsequent analyses. Children performed significantly better than chance, both within the 3-year-old group (78.7% of the trials),  $t(19) = 4.19$ ,  $p < .001$ , 95% CI: 3.86, 5.59, and the 4-year-old group (99.2% of the trials),  $t(19) = 62.00$ ,  $p < .001$ , 95% CI: 5.85, 6.05. An ANOVA using age (3, 4) as a between-subjects factor revealed that the age difference was significant,  $F(1,37) = 10.32$ ,  $p = .003$ . Student's  $t$  comparisons between sticker-finding task performance on Study 5 versus on the previous studies revealed that performance was consistently better in Study 5 (compared with Study 1:  $t[178] = 2.70$ ,  $p = .008$ ; Study 2:  $t[178] = 4.30$ ,  $p < .001$ ; Study 3:  $t[178] = 4.31$ ,  $p < .001$ ; Study 4:  $t[178] = 4.12$ ,  $p < .001$ ).

Unlike the previous studies, performance on the sticker-finding task showed a significant correlation with the executive function task, regardless of whether age was partialled out.



### 6.3. Discussion

When the sticker-finding task was reframed so that the cues were not linked to communicative intent, children performed better, and even 3-year olds demonstrated success. This finding suggests that the central factor in young children's difficulty with rejecting the Wolf's advice is not the specific form in which the cues are presented, but whether children conceptualize the cues as representing communicative intent. The findings demonstrate that young children have the capacity to select a box that differs in color from what has been indicated by a cue. The findings also suggest that 3-year-old children's performance is weak if they conceptualize the task as one in which they must reject advice, but strong when they conceptualize the task as one in which they must reverse a cue that has not been communicated to them by a sentient being. Only in this latter case was performance on the sticker-finding task correlated with measures of executive function. Thus, the findings provide strong support for the communicative intent hypothesis and are also consistent with prior research suggesting that young children reason differently about information that appears to come from a person rather than an inanimate object (Meltzoff, 1995; Woodward, 2009). However, to confirm this interpretation, future studies will be needed. In particular, it will be important to examine the implications of telling children exactly what rule they need to follow to successfully complete the task, which was done in Study 5, but not in Studies 1 through 4.

## 7. General discussion

This research examined the robustness of children's difficulty rejecting advice from an overtly misleading informant and its cause. We assessed the ability of 3- and 4-year olds to distrust the advice of an informant whose deceptive intent was made highly salient: the Big Bad Wolf, a familiar story character who carries strong negative associations. The experimenter repeatedly emphasized the Wolf's malicious intentions and reminded children of the consequences of accepting or rejecting his advice. Even so, it was not uncommon for children to accept the Wolf's advice on the sticker-finding task, and 3-year olds never achieved better than chance performance, despite their unanimous agreement that the Wolf was mean. Some children went as far as telling the Wolf that he was meanwhile simultaneously accepting his advice. These findings parallel findings showing that 3-year olds often have substantial difficulty deceiving others (Hala & Russell, 2001; Peskin, 1992) and are consistent with evidence that 3-year olds have substantial difficulty rejecting advice from deceptive others (Jaswal et al., 2010; Mascaro & Sperber, 2009; Vanderbilt et al., 2011).

Although 3-year olds performed poorly on the sticker-finding task, they were clearly sensitive to the experimental manipulations. Across studies, they successfully rejected the advice of the Wolf in the sticker-finding task between 35.0% of the time (Study 4) and 52.5% of the time (Study 1), even though they rarely rejected the advice of the benevolent Fluffy the Rabbit character in the comparison conditions of Studies 2 and 4.

The 3-year olds also rejected the advice of the Wolf in the sticker-finding task at rates higher than the below-chance level seen in similar studies, in which the indicators of deceptive intent have been weaker (Mascaro & Sperber, 2009; Vanderbilt et al., 2011). For example, Vanderbilt et al. (2011) found that only 5.6% of the time did 3-year olds reject the advice of an informant who had tricked others. These results suggest that one of the difficulties young children have in learning to reject deceptive advice is in using the available evidence to conclude that an informant is untrustworthy. Direct comparisons between strong and weak cues to deceptive intent will be needed to test this possibility.

Although the strong cues about the Wolf's deceptive tendencies appeared to promote a greater degree of skepticism, the task remained challenging for young children, and there was little evidence of learning across trials. Across the different studies, performance remained the same or improved only slightly, with improvement levels never reaching statistical significance for either age group. This is surprising given that children received direct feedback about whether their answers were correct and were actively taunted by the Wolf after giving incorrect answers. One possible reason for the lack of learning effects is that most of the learning took place before the testing began. This explanation is plausible, given the extensive information that children were provided about the Wolf's antisocial tendencies, and their opportunity to observe two trials of the task before they began playing. Whether children learn about deception through observation and whether such learning is equivalent to direct learning that involves being tricked or tricking others will be an important topic for future research.

Of particular interest was whether the poor performance of young children, and the 3-year olds in particular, could be explained in terms of the communicative intent hypothesis. This hypothesis posits that the difficulty is specific to perceiving the task as one that requires rejecting of intentionally communicated advice, rather than one that provides an accurate indicator of what not to do (see Mascaro & Sperber, 2009). One way we attempted to evaluate the communicative intent hypotheses was through the inclusion of both the sticker-finding task and the executive functioning tasks. In support of this hypothesis, 3-year olds tended to perform more poorly on the sticker-finding task than on the executive function tasks, even though both involved responding in a manner that was opposite to what had been indicated by a cue. The only exception was on the head-to-toes task of Study 1, in which children performed substantially worse than on other executive function tasks. This exception can be explained by the fact that this is the only version of the task in which the cues were direct verbal instructions (e.g., say "touch your head"), which suggests that a key distinction concerns whether children viewed the task as one of rejecting what they were being told to do or as one of doing the opposite of a cue that provides accurate information about what not to do. The lack of significant correlations between the sticker-finding and executive functioning tasks provides additional support for the possibility that these are largely independent skills.

A second way we tested the hypotheses was to examine whether advice is more difficult to reject when it is presented in conventional forms, as has been seen in prior

research (Couillard & Woodward, 1999; Jaswal et al., 2010; Palmquist & Jaswal, 2011). We argue that if the communicative intent hypothesis is correct, the form of advice should only matter to the extent that it is informative concerning whether the task involves communicative intent, and that in our sticker-finding task no such cue was needed because the communicative intent was so clearly established. As is consistent with this possibility, we found that it made no difference whether the Wolf pointed or communicated verbally.

Why was it that the form in which the information was presented made a difference on the executive function tasks, but not on the sticker-finding tasks? We argue that for these particular executive function tasks, as on those used by Couillard and Woodward (1999), Jaswal et al. (2010), and Palmquist and Jaswal (2011), communicative intent was not clearly established, and as a result, children interpreted the task as one in which they were to respond to an indicator that provided accurate information about what not to do. Thus, we argue that what is important is not the form of communication itself, but the extent to which the form serves to emphasize or de-emphasize the speaker's communicative intent. Our results suggest that when a speaker's intention to communicate is salient, young children are less likely to respond in a strategic, reflective manner (see Hala & Russell, 2001, for a related argument).

A final way we tested the hypothesis was to examine a version of the sticker-finding task in which the cue was presented in the absence of communicative intent. We did this by making a task as similar as possible to Study 4, in which the Wolf communicated his advice by showing color cards. In Study 5, these pictorial cues were replaced with a color-changing lightbulb made to look as though it were operating automatically, with the Wolf sitting on the sidelines rooting for children to make incorrect choices. Children were much more successful in Study 5, providing further support for the communicative intent hypothesis.

Although our results support the communicative intent hypothesis, there may be other factors that can help to explain young children's difficulty with responding to deceptive intent. One contributing factor may be limitations in young children's theory of mind skills (Vanderbilt et al., 2011). Although children show some capacity to reason about intentions even before they reach age 2 (Behne, Carpenter, Call, & Tomasello, 2005; Meltzoff, 1995; Woodward, 1998), their theory of mind skills are still developing in the age range that we tested (Wellman, Cross, & Watson, 2001; Wellman & Liu, 2004). Another possibility relates to limitations in young children's reasoning about trait-relevant information. Although participants had no difficulty verbally labeling the Wolf as "bad" in our research, this does not necessarily mean that they deeply processed the negative trait information about him or thought through the implications of this information.

Taken together, the present results suggest that young children find rejecting advice to be fundamentally different from responding in a manner opposite to what is indicated by a cue outside of an advice context. These findings raise the possibility that young children may have difficulty integrating information about a "bad" individual doing something as fundamentally prosocial as offering advice (see Mascaro & Sperber, 2009).

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## Note

1. We also performed Wilcoxon's signed rank tests against chance for all tasks, as well as regressions accounting for exact age. None of these tests yielded new significant effects or substantively changed the pattern of results.

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