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# Young Children Have a Specific, Highly Robust Bias to Trust Testimony

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## Abstract

Why are young children so willing to believe what they are told? In two studies, we investigated whether it is because of a general, undifferentiated trust in other people or a more specific bias to trust testimony. In Study 1, 3-year-olds either heard an experimenter claim that a sticker was in one location when it was actually in another or saw her place an arrow on the empty location. All children searched in the wrong location initially, but those who heard the deceptive testimony continued to be misled, whereas those who saw her mark the incorrect location with an arrow quickly learned to search in the opposite location. In Study 2, children who could both see and hear a deceptive speaker were more likely to be misled than those who could only hear her. Three-year-olds have a specific, highly robust bias to trust what people—particularly visible speakers—say.

### Keywords

testimony; trust; deception; preschoolers

Young children have a well-deserved reputation for credulity. From an adult perspective, many of the stories they believe are outrageous—that a machine can shrink a room (DeLoache, Miller, & Rosengren, 1997) or clone an object (Hood & Bloom, 2008), or that a fat man in a red suit flies through the air on a sleigh pulled by reindeer. Of course, adults sometimes stage an event or plant evidence to corroborate the fantastical tales they tell children (Woolley, Boeger, & Markman, 2004). But even when adults make surprising claims without offering any supporting evidence, children are often credulous. For example, they are willing to take an adult's word that the earth is round even though it appears flat (Vosniadou & Brewer, 1992), and that an eel is a fish even though it looks like a snake (Gelman, 2003).

Three-year-olds' willingness to believe what they are told is so robust, in fact, that they will sometimes continue to believe an informant who has repeatedly misled them. For example, in a study by Mascaro and Sperber (2009), a puppet asserted that a marble was hidden in one box even though it was actually in a second box. Four-year-olds quickly learned to select the box that was the opposite of the one mentioned by the puppet. But over the course of six trials and despite an explicit reminder after each one that the puppet had told them the wrong thing, 3-year-olds repeatedly selected the box mentioned by the deceptive puppet (see also Freire, Eskritt, & Lee, 2004).



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Why do 3-year-olds have such difficulty "disbelieving" testimony, even when a speaker has repeatedly misled them? Why can they not learn what seems like a simple contingency—to do the opposite of what they are told? Perhaps their willingness to believe testimony reflects a general, undifferentiated expectation that the individuals with whom they interact will behave in helpful ways. As Baier (1986) pointed out, children are entirely dependent on other people, and so have little choice but to trust those around them: They "can make suspicious, futile, self-protective moves against the powerful adults in their world…. But surviving infants will usually have shown some trust, enough to accept offered nourishment, enough not to attempt to prevent such close approach" (p. 241). Note that Baier meant the term *trust* to reflect a default setting, rather than an active or conscious choice, and we follow this usage in this article.

But another possibility is that in addition to whatever general bias they may have to trust people, children have a specific bias to trust what people tell them. One reason to suspect that a specific bias could be at work comes from a study on children's understanding of deceptive pointing gestures (Couillard & Woodward, 1999). In this study, preschoolers played a game in which a "tricky" experimenter hid a sticker under an upside-down bowl. As she invited the children to search for the sticker, she indicated a second (empty) bowl, either by pointing toward it or by placing a ball on it. Over the course of 10 trials, 3-year-olds were more likely to be misled (i.e., to search in the empty bowl) when the experimenter had pointed to it than when she had placed a ball on it. Although Couillard and Woodward did not frame their work in terms of trust, if children had only a domain-general expectation that the individuals with whom they interact would be helpful, they should have been misled to the same extent in the two conditions.

Couillard and Woodward (1999) argued that 3-year-olds have been reinforced repeatedly for searching where they see someone point. Thus, not searching the bowl that the experimenter pointed to required the children to inhibit this highly practiced response. Because the children had little or no reinforcement history associated with the placement of a ball, searching in the location opposite to where the ball was placed did not present the same inhibitory challenge. Four-year-olds performed well even in the pointing condition, presumably because they could better inhibit responding on the basis of a prepotent signal like pointing (see also Carlson, Moses, & Hix, 1998; Russell, Mauthner, Sharpe, & Tidswell, 1991).

Testimony is similar to pointing in that it usually involves the transmission of true beliefs (e.g., Bok, 1978; Dennett, 1981; Grice, 1975). A bias to trust testimony could be adaptive because it would allow children to sidestep the usually unnecessary, often time-consuming, and sometimes impossible task of evaluating the veracity of everything they are told (e.g., Coady, 1992; Dawkins, 1995; Gilbert, 1991; Spinoza, 1677/1982). Indeed, Reid (1764/2000) suggested that without such a bias, "no proposition that is uttered in discourse would be believed, until it was examined and tried by reason…. Children, on this supposition, would be absolutely incredulous; and therefore absolutely incapable of instruction" (p. 194).

We adapted the methodology used by Couillard and Woodward (1999) to investigate whether 3-year-olds' willingness to believe what they are told is the result of a general, undifferentiated trust in other people, or whether it stems from a more specific trust in testimony. We focused on 3-year-olds because previous work using a similar procedure found that older children are less credulous (Mascaro & Sperber, 2009). In our first experiment, on each of eight trials, an experimenter hid a sticker under one cup and then indicated that it was under a different (empty) cup, either by referring to the empty cup verbally or by placing an arrow on it. If the children were misled by the experimenter to the

same extent in the two conditions—if they searched in the empty cup frequently regardless of whether the experimenter used testimony or an arrow to indicate that cup—this would suggest that 3-year-olds' trust in testimony is the result of a general bias to trust other people. If, however, the children were more often misled by testimony than by the arrow, this would suggest that in addition to whatever general inclination 3-year-olds may have to trust other people, they have an especially robust bias to trust what people tell them.

## Study 1

### Method

**Participants—**Thirty-two 3-year-olds participated, 16 in a testimony condition (mean age = 3 years 5 months; range = 3 years 0 months–3 years 11 months; 8 girls, 8 boys) and 16 in an arrow condition (mean age = 3 years 7 months; range = 3 years 0 months–3 years 11 months; 8 girls, 8 boys).

**Procedure—**Participants were tested individually. They sat at a small table, next to a confederate and across from the experimenter.

In the testimony condition, the confederate explained that the children were going to play a game that involved finding small stickers hidden underneath upside-down cups. If the children found a sticker in the first cup they looked under, they would get to keep it; if not, the experimenter would get to keep it. The experimenter exclaimed, "I'm going to try to get as many stickers as I can! How about you?"

On each of eight test trials, the experimenter placed two differently colored cups on opposite ends of a tray and then concealed them using a cardboard screen. The screen blocked the children's view of the tray and cups, but allowed them to see the experimenter's head and shoulders. She showed the children the sticker she was about to hide, concealed her hands behind the screen, and acted as if she was hiding the sticker under each cup. The screen was removed to reveal the two cups, and the experimenter asserted that the sticker was in the cup opposite to the one where she had actually hidden it. For example, if there was one yellow and one red cup on the tray, and if she had hidden the sticker under the yellow cup, she said, "It's in the red cup."

The experimenter pushed the tray forward to allow the children to search. If they searched under the cup opposite to the one she had mentioned, thereby finding the sticker, she assured them that it was theirs to keep. If they searched under the cup she had mentioned and so failed to find the sticker, she showed them where it was and kept it herself. After the third and sixth trials, the confederate said, "[Experimenter] is tricky, isn't she?!" Children who responded incorrectly on several successive trials were occasionally offered a sticker, to prevent frustration. At the end of the session, the children were given all the stickers.

There were four colors of cups (red, green, blue, and yellow), which were paired together so that over the course of the eight trials, every possible pair of colors was used once or twice; the sticker was hidden underneath each color twice; it was hidden under the cup on the left four times and under the cup on the right four times.

The arrow condition was similar to the testimony condition, but began with training to familiarize the children with the conventional use of an arrow. First, the confederate showed the children a small black cardboard arrow, affixed to a stand and pointing downward, and used it to point to the table, the floor, and her leg. Next, she explained that she had hidden some finger puppets in boxes, and that she could use the arrow to indicate where they were. On each of three training trials, she brought out a pair of identical small cardboard boxes,

placed the arrow on one of the boxes (which she had earlier baited with a puppet), and invited children to find the puppet. Children were praised if they found the puppet, and corrected otherwise. Thirteen children found the puppet on all three training trials, 1 required correction once, and 2 required correction on all three trials. Following the arrow training, the experimenter entered the room and suggested that they play a game. From this point, the procedure was the same as in the testimony condition, except that on each of the eight test trials, instead of asserting that the sticker was in the empty cup, the experimenter unambiguously placed the arrow on it.

## Results

As Figure 1 shows, none of the children in either condition found the sticker on the first trial; all 32 searched in the (empty) cup the experimenter indicated. After the first trial, however, the two conditions bifurcated. Children in the arrow condition quickly learned to search in the cup that the experimenter had not marked, whereas those in the testimony condition continued to search in the cup she had mentioned. Over the course of the eight test trials, children in the arrow condition found the sticker, on average, on 5.19 ($SD = 2.34$) trials; children in the testimony condition found it less often, on just 1.44 ($SD = 2.16$) trials, $t(30) = 3.75$, $p < .0001$, $d = 1.67$. Children in the arrow condition found (marginally) more stickers than expected by chance, $t(15) = 2.03$, $p = .06$, $d = 0.51$, whereas children in the testimony condition found fewer than expected by chance, $t(15) = 4.78$, $p = .0003$, $d = 1.19$.

Finally, and most remarkably, 9 of the 16 (56%) children in the testimony condition never found a sticker; they were misled on all eight trials. In contrast, just 1 of the 16 (6%) children in the arrow condition failed to find a sticker. These distributions differed by Fisher's exact test, $p = .006$.

## Discussion

Three-year-olds in both the arrow and testimony conditions initially trusted the experimenter to provide helpful information in a conventional way. When this trust was violated, children in the arrow condition quickly adapted and searched in the cup opposite to the one the experimenter marked. In contrast, those in the testimony condition were unable to adapt; most continued to search in the cup the experimenter mentioned even though this meant that they never found a sticker. Children's difficulty in the testimony condition relative to the arrow condition suggests that their willingness to believe what they are told is not merely the result of a general inclination to trust other people. Instead, it seems to reflect a more specific, highly robust trust in testimony.

The difference between the two conditions is reminiscent of work on *symbolic distancing*. For example, Boysen and her colleagues (Boysen & Berntson, 1995; Boysen, Berntson, Hannan, & Cacioppo, 1996) found that over the course of 400 trials, chimpanzees never learned to select the smaller of two quantities of candies in order to receive the larger one. But when the candies were replaced by Arabic numerals, the same chimps (who had earlier learned to use numerals for a different line of research) readily chose the smaller numeral. Boysen and her colleagues argued that the intrinsic appeal of the candies interfered with the chimps' ability to perform the task. The numerals lacked that appeal and so allowed the chimps to respond more optimally (for similar work with children, see Apperly & Carroll, 2009; Carlson, Davis, & Leach, 2005).

By analogy, in Study 1, the normally reasonable expectation that the experimenter would use testimony veridically interfered with children's ability to interpret it in a nonveridical manner. The expectation that she would use an arrow veridically was much less entrenched (and indeed, for some children, may actually have been created during the training trials),

and so children did not experience the same degree of interference when it was used nonveridically.

What is it about testimony that children find so compelling? One possibility is that it is the words themselves. If this were true, children would be as likely to be misled by testimony from a speaker they could not see as from one they could. In Study 2, we investigated this possibility.

## Study 2

Children are highly sensitive to the presence of a potential teacher; the same information conveyed without a visible, engaging communicative partner is often much less compelling. For example, 18-month-olds are less likely to learn new words from a disembodied voice than from a live speaker (Baldwin, Markman, Bill, Desjardins, & Irwin, 1996), and 10-month-olds are less likely to commit the A-not-B error when the hiding events occur as if by magic (with strings and pulleys) than when a visible experimenter hides the objects (Topal, Gergely, Miklosi, Erdohegyi, & Csibra, 2008).

In Study 2, we compared how likely 3-year-olds were to be misled by deceptive testimony from a speaker they could see versus one they could not. We used the procedure from Study 1, but the tray, cups, and stickers appeared on a computer in animated form. In an audio condition, children heard (but could not see) the experimenter deliver exactly the same testimony she had offered in person in Study 1. In a video condition, children could both see and hear her. We used a computerized presentation so that exactly the same testimony could be delivered in both conditions.

### Method

**Participants—**Thirty-two different 3-year-olds participated, 16 in the audio condition (mean age = 3 years 6 months; range = 3 years 0 months–3 years 10 months; 8 girls, 8 boys) and 16 in the video condition (mean age = 3 years 7 months; range = 3 years 0 months–3 years 11 months; 8 girls, 8 boys).

**Procedure—**The procedure was very similar to the one used in the testimony condition of Study 1 except the hiding game occurred on a computer, and the experimenter was not physically present. Instead, her voice (in the audio condition), or her voice and image (in the video condition), had been prerecorded. The confederate explained that the children were going to play a computer game in which they would try to find a (virtual) star sticker hidden under one of two (virtual) cups. If the sticker was under the cup they first indicated, they would get an actual sticker; if not, the computer would get a sticker. At this point, the children heard (in the audio condition) or saw and heard (in the video condition) the experimenter say, “I’m going to try to get as many stickers as I can. How about you?”

On each of eight trials, two differently colored cups appeared on the screen, and the experimenter said, “It’s in the [color] cup!” The children pointed to where they thought the sticker was, and the confederate clicked on the selected cup. If the children chose the cup opposite to the one the experimenter mentioned, it rose to reveal a star. The experimenter said, “You found it!” and the confederate gave them a sticker. If the children chose the cup the experimenter mentioned, it rose to reveal an empty space, and the experimenter said, “It’s not in that one.” As the other cup rose to reveal the star, the experimenter continued, “That means it’s in this one.” The confederate then placed a sticker in a pile that represented the computer’s stickers. Figure 2 shows the sequence of events in a trial from the video condition.

All other details, including the colors of the cups, their pairings, and the confederate's reminders after the third and sixth trials that the experimenter (referred to as "the computer") was being tricky, were the same as in Study 1.

## Results

As Figure 3 shows, none of the children in the video condition found the sticker on the first trial, and just 3 of the 16 children in the audio condition did so. Just as in Study 1, then, most children in both conditions initially searched in the empty cup the experimenter mentioned ($ps < .05$ by binomial tests), expecting that her testimony would be helpful. But on each trial, more children in the audio condition than in the video condition found the sticker. Children in the audio condition found the sticker on 3.94 ($SD = 2.54$) trials; children in the video condition found it significantly less often, on just 1.69 ($SD = 2.47$) trials, $t(30) = 2.54$, $p = .02$, $d = 0.90$. The number of stickers found by children in the audio condition did not differ from what would be expected by chance, $t(15) < 1$, but the number found by children in the video condition was significantly less than would be expected by chance, $t(15) = 3.75$, $p = .002$, $d = 0.94$.

Finally, whereas 9 of 16 (56%) children in the video condition failed to find a sticker on any trial, only 2 of 16 (13%) in the audio condition were similarly unsuccessful. These distributions differed by Fisher's exact test, $p = .02$.

## Discussion

Children who could see the experimenter as she delivered the deceptive testimony were misled more often (i.e., found fewer stickers) than those who could only hear her. The presence of the speaker—even on video—made it especially difficult for children to inhibit the normally appropriate bias to believe what they were told. Although children often find information presented on video to be less powerful than the same information presented live (Anderson & Pempek, 2005), performance in the video condition was almost exactly the same as performance in the (live) testimony condition of Study 1 (1.69 vs. 1.44 stickers found). One explanation for this difference from previous results could be that, in contrast to much of the work on the video deficit, our procedure made the experimenter's actions in the video condition contingent on children's responses (e.g., her verbal responses and gaze direction were contingent on which of the two cups they selected).

Children in the audio condition were misled less often than those in the video condition, but their overall performance did not differ from what would be expected by chance. Unlike children in the arrow condition of Study 1, who learned to search in the cup opposite to the one indicated by the experimenter, these children were, on average, as likely to search in the cup she mentioned as in the one she did not.

One possible explanation for performance being at chance levels in the audio condition is that children simply do not attend to testimony when they cannot see the speaker. To investigate this possibility, we conducted a control study with 8 different 3-year-olds. The procedure was the same as in the audio condition, but the experimenter's disembodied voice named the correct rather than the incorrect cup on each trial. If 3-year-olds simply do not attend to testimony from a disembodied voice, then, as in the audio condition of Study 2, they would be about as likely to search in the cup mentioned as in the other cup. In fact, on each of the eight trials, all children searched in the cup the experimenter mentioned. Clearly, children do not automatically ignore testimony from a disembodied voice. When it is helpful, they attend to it closely and consistently. When it is not helpful, they may tune it out completely or attend to it only occasionally, but they do not readily learn to do the opposite of what they hear.

## General Discussion

Three-year-olds were initially inclined to trust a deceptive informant regardless of whether she used verbal testimony or another, less practiced means of reference, but their trust in testimony—particularly from a visible informant—was much more robust. These results are important because they demonstrate that children's willingness to believe what they are told reflects a specific bias to trust testimony, rather than a generic, undifferentiated trust in other people.

We suspect that a specific bias to trust testimony develops out of a generally trusting disposition that would be adaptive in infancy (e.g., Baier, 1986). Some baseline level of trust may be needed to get language acquisition started (Coady, 1992), but the specific, highly robust bias to trust testimony could emerge from the accumulation of evidence that what people say is normally true (Hume, 1748/2004). An advantage of this explanation over one positing that testimony is privileged from the start is that the same learning mechanism can be used to explain why 3-year-olds are so credulous when it comes to pointing, another common, normally veridical social signal (Couillard & Woodward, 1999). Presumably, with enough reinforcement, children could develop robust expectations about the veridicality of other forms of reference as well (e.g., an arrow).

Veridical testimony is so ubiquitous that a specific bias to trust testimony is likely to emerge quite early in development and to remain a powerful force throughout. For example, Jaswal (in press) found that 2.5-year-olds repeatedly believed an informant's account of an event even when it conflicted with what they had just seen and even when believing the account prevented them from obtaining a tasty treat. Although older children can more readily learn to do the opposite of what they are told (e.g., Mascaro & Sperber, 2009), they also sometimes respond reflexively to verbal information, as vividly demonstrated by their errors on "Simon Says" (Strommen, 1973). Finally, adults, too, are biased to trust testimony: When cognitive resources are taxed, adults are more likely to misremember as true information that they earlier learned was false than to misremember as false information that they earlier learned was true (Gilbert, Krull, & Malone, 1990).

Children in Study 2 were more likely to be misled by a visible speaker than by a disembodied voice, even though the testimony was exactly the same in the two cases. This sensitivity to the presence of a potential teacher is consistent with previous findings (e.g., Baldwin et al., 1996) and demonstrates that the social aspects of information transmission, including gaze direction and contingency, can play an important role in the uptake (for better or worse) of that information (Csibra & Gergely, 2006; Tomasello, 1999). Indeed, if the speaker in the testimony condition of Study 1 or the video condition of Study 2 had been less engaging, the children may not have been as likely to be misled (e.g., Topal et al., 2008). Also, adults appear to make automatic judgments about trustworthiness based on people's faces (Todorov & Engell, 2008), and this raises the possibility that the particular visage of the speaker in the testimony condition of Study 1 and the video condition of Study 2 (the same individual) contributed to the children's credulity.

It is worth noting that there are some circumstances in which 3-year-olds can discount information from an unreliable source. For example, they prefer testimony from a previously accurate speaker over testimony from a previously inaccurate one (e.g., Corriveau, Meints, & Harris, 2009). But when faced with a single engaging and confident speaker, they tend to accept what he or she says, sometimes even if that testimony is mildly discrepant from their expectations (Jaswal & Malone, 2007).

In summary, although 3-year-olds may be generally inclined to trust other people, their willingness to believe what they are told stems from a specific, highly robust bias to trust

testimony. The mechanisms by which children learn to become more skeptical and the sources of individual differences in credulity remain intriguing questions for future work.

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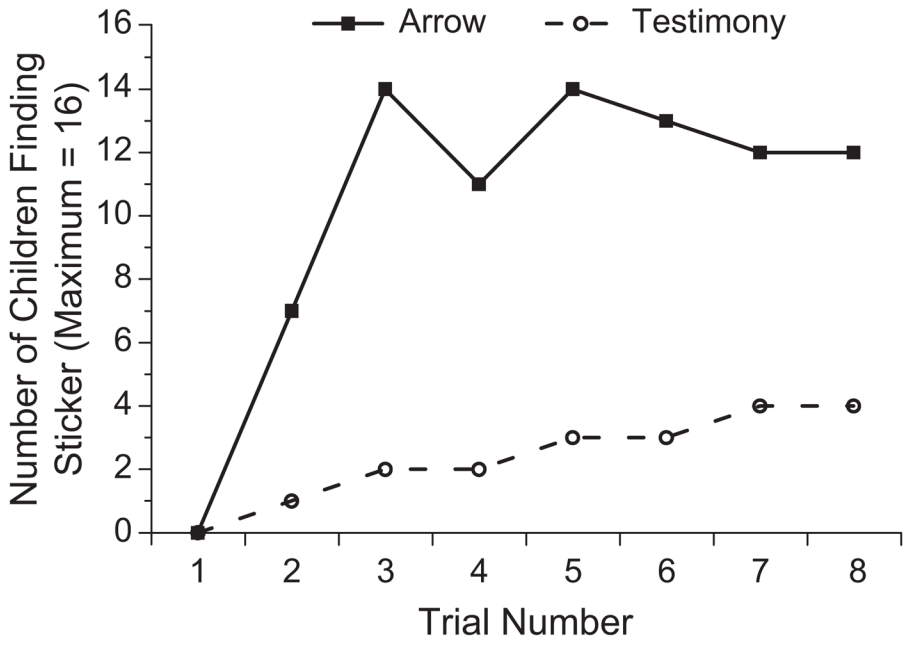


**Fig. 1.**
Results from Study 1: the number of children who found the sticker as a function of trial number and condition (arrow vs. testimony).

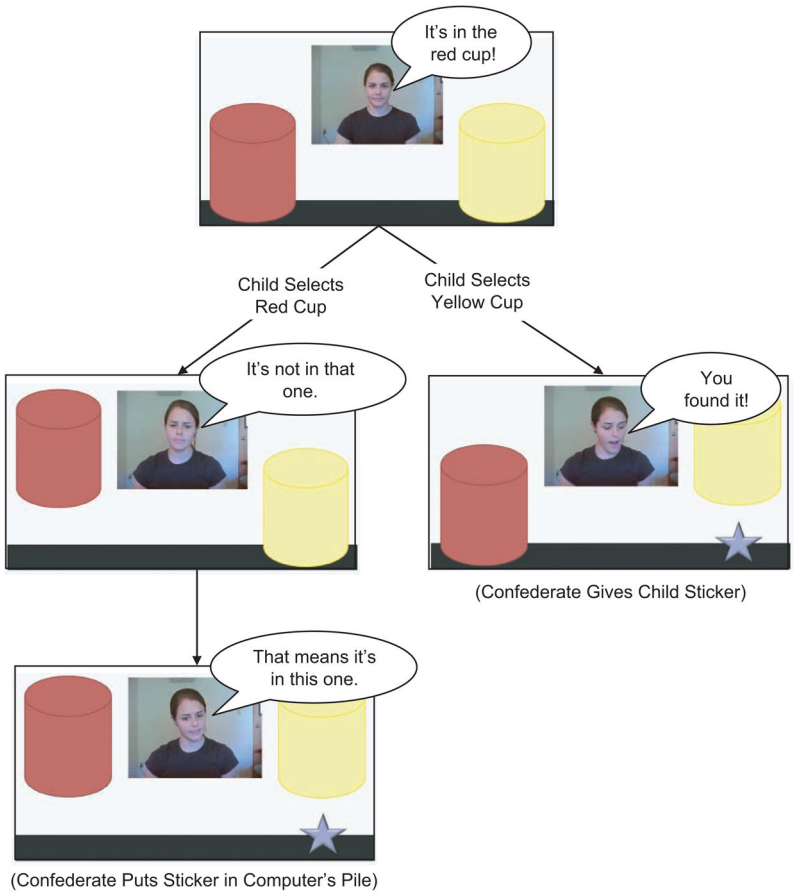


**Fig. 2.**

Sequence of events in the video condition of Study 2. The audio condition was similar, but the children did not see the experimenter; they only heard the audio track.

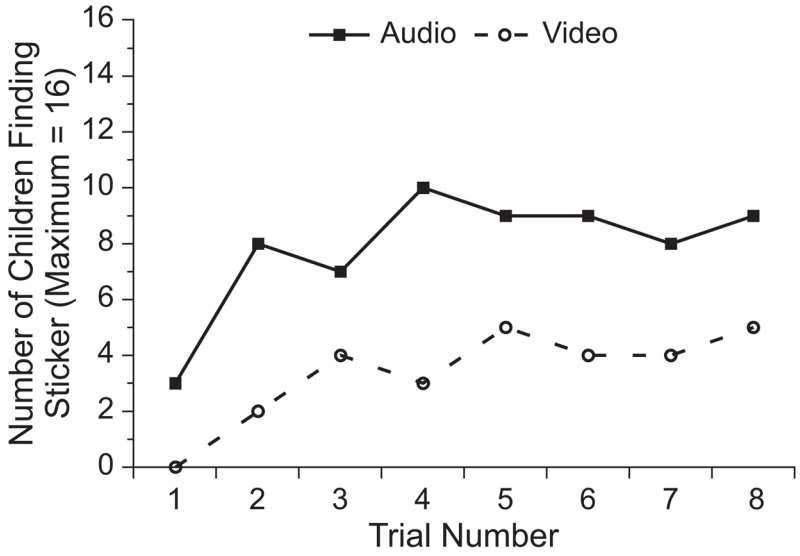


**Fig. 3.**
Results from Study 2: the number of children who found the sticker as a function of trial number and condition (audio vs. video).