"I Hardly Cried When I Got My Shot!" Influencing Children's Reports about a Visit to Their Pediatrician

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BRUCK, MAGGIE; CECI, STEPHEN J.; FRANCOEUR, EMMETT; and BARR, RONALD. *"I Hardly Cried When I Got My Shot!" Influencing Children's Reports about a Visit to Their Pediatrician.* CHILD DEVELOPMENT, 1995, **66**, 193–208. We examined, in 2 phases, the influence of postevent suggestions on children's reports of their visits to a pediatrician. Phase 1 examined the effect of giving one of 3 types of feedback to 5-year-old children immediately following their Diphtheria Pertussis Tetanus (DPT) inoculation. Children were given pain-affirming feedback (the shot hurt), pain-denying feedback (the shot did not hurt), or neutral feedback (the shot is over). 1 week later, they did not differ in their reports concerning how much the shot hurt or how much they cried. In Phase 2, the same children were visited approximately 1 year after their inoculation. During 3 separate visits, they were either given additional pain-denying or neutral feedback. They were also given misleading or nonmisleading information about the actions of the pediatrician and the assistant. Children given pain-denying feedback reported that they cried less and that the shot hurt less than did children given neutral feedback. Those who were given misleading information about the actions of the assistant and the pediatrician made more false allegations about their actions than did children who were not given this information. These results challenge the view that suggestibility effects are confined to peripheral, nonaction events; in this study children's reports about salient actions involving their own bodies in stressful conditions were influenced.

Studies of children's suggestibility have been conducted since the turn of the twentieth century. For the first 80 years, researchers examined the influences of a single misleading suggestion on children's reports of neutral, nonscripted, and often uninteresting events that occurred in a laboratory setting (e.g., Binet, 1900). The results of these studies consistently indicated that children were suggestible and, moreover, that they were more suggestible than adults (see Ceci & Bruck, 1993, for review). These results are of importance to theoretical issues concerning whether suggestions alter children's reports because of children's desire to comply with adult authority figures who supplied the erroneous suggestions (i.e., a social explanation) or because of the effects of one or more cognitive factors, such as trace alteration, source misattributions, or reasoning-

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based inferences (see Ceci & Bruck, 1993).

Despite their theoretical importance, however, these studies have been criticized for their limited practical and legal relevance regarding the reliability of the child witness. Specifically, it is argued that the procedures used in laboratory studies are so qualitatively different from those that pertain to the child witness that the results do not permit inferences about children's suggestibility in more authentic circumstances.

Some researchers claim that these studies are not forensically relevant because they do not examine how children respond to questions about salient events involving their own body that occurred in personally experienced, stressful situations. Because salient information is given privileged encoding (Strangor & McMillan, 1992), it is thought that suggestibility effects might be greatly diminished under such situations. In order to address these issues, more recent studies have focused on asking children misleading questions about being touched. In some of these studies, children are questioned about an embarrassing or stressful medical procedure such as an inoculation or a genital examination (Goodman, Hirschman, Hepps, & Rudy, 1991; Saywitz, Goodman, Nicholas, & Moan, 1991). It has been found that children rarely make false claims about touching and particularly about sexual touching in response to a single misleading question in a single interview. According to these researchers, the results of earlier studies overestimated children's suggestibility (e.g., Melton, 1992).

This line of study, however, does not examine the effects of a planted suggestion on children's recall; it merely examines how children answer misleading questions about a medical procedure. Phase 1 of the present study addresses this issue. It examines the influence of a postevent suggestion on children's recall of their reactions to a somewhat stressful medical procedure, an inoculation.

A different set of concerns about the validity of earlier studies of children's suggestibility focuses on the argument that the interviewing procedures of such studies were so much less intense than those that bring children to court as to result in a potential *underestimation* of children's suggestibility (Raskin & Esplin, 1991; Steller, 1991). The interview procedures of traditional laboratory studies are qualitatively different from forensic interviews in several ways. First, children who come to court are often questioned weeks, months, or even years after the occurrence of an event (as opposed to several minutes or days later). Suggestibility effects may be more salient after long delays because the original memory trace has faded sufficiently to allow a more complete penetration of the suggestion than might occur after shorter delays (Loftus, Miller, & Burns, 1978). Second, child witnesses are rarely interviewed only one time, by one interviewer, under nonstressful neutral conditions. They are interviewed many times about the same events by child protection workers, law enforcement officers, therapists, lawyers, and parents (e.g., Goodman et al., 1992; Gray, 1993). The incessant use of leading questions and suggestions in these interviews may result in a qualitatively different type of report distortion than that which arises from a single misleading question in a single postevent interview. Third, an examination of the interviews of some child witnesses reveals that the term "suggestive interview" describes more than the use of misleading questions. Rather, implicit and explicit suggestions can be woven into the fabric of the interview through the use of bribes, threats, repetitions of certain questions, and the inductions of stereotypes and expectancies (Ceci & Bruck, 1993).

Although it is very difficult to create experimental conditions that reflect the confluence of these variables, the results of recent studies indicate that children who are repeatedly given suggestions in multiple interviews prior to and following the occurrence of an event will eventually make many false allegations about the perpetrators of the event and will report inaccurate details that are nevertheless consistent with the event (Ceci, Leichtman, & White, in press). Also, when questioned by interviewers who have a particular bias or incorrect information about an event, children's reports eventually come to resemble the interviewer's interpretation of the event (e.g., Ceci et al., in press; Goodman & Clarke-Stewart, 1991; Pettit, Fegan, & Howie, 1990). One important caveat, however, is that conclusions about the influences of repeated suggestions within and across interviews are based on interviews about unpredictable (i.e., nonscripted) and low-stress events. Although some researchers claim that suggestibility is diminished or nonexistent for central and personally experienced actions, especially those involving their bodies (Melton, 1992; Saywitz et al., 1991) or for highly predictable

scripted events, such as a visit to their pediatrician (see Hudson, Fivush, & Kuebli, 1992), the effects of repeated suggestions on children's recalls of such events are simply not known. These issues are addressed in Phase 2 of the present study. Approximately 1 year after their inoculation, children were given repeated suggestive interviews. The effects of these interviews on their subsequent reports of personally experienced, predictable, and salient events were examined.

Phase 1

Method

Design

Five-year-old children were given one of three types of feedback immediately after receiving a Diphtheria Pertussis Tetanus (DPT) inoculation at their pediatrician's office. Children were told that the shot hurt, that the shot did not hurt, or that the shot was over. One week later, these children were asked how much the shot hurt and how much they cried.

Subjects

Subjects were between 54 and 70 months at the time of their medical visit. All were patients of the same pediatrician (E. Francoeur). The social class backgrounds of the children were normally distributed. Most of the children were Caucasian. None of the children had undergone major medical procedures or exhibited unusual developmental histories.

Although 83 children were given feedback immediately following the inoculation, only 75 were included in the data analysis. Subjects were omitted either because they refused to interact with the research assistant at the 1-week follow-up visit, their parents interfered with the experimental procedures, or the parents could not reschedule the 1-week follow-up appointment. These omitted subjects were equally distributed across the three feedback conditions.

Procedures

Parental assistance.—A research assistant (RA) described the aims and procedures of the study to the parents when they arrived at the pediatrician's office for their child's medical examination. While their child was occupied in the playroom in another part of the waiting room, parents were told that they could comfort their child nonverbally during the inoculation procedure, but they were asked not to say anything to their child other than, "It's OK. It's over now." Parents were told about the three types of feedback, but they were not told which one their child would receive.

Six parents refused to participate. Those who agreed to participate were given a diary and asked to record for 1 week, the day, date, time, and summary of any conversations, complaints, or reactions related to the inoculation.

Medical examination and inoculation.—The pediatrician carried out a routine medical examination. The RA was not present for this part of the visit. After the examination, the parent and child entered the "inoculation room" where they were met by the RA, who talked to the child about a poster on the wall. Approximately 5 min later, the pediatrician entered the room. After reminding the parent how to comfort the child, he gave the child an oral polio vaccine and then the DPT inoculation. The RA coded the child's level of distress at the time of inoculation. She also timed the number of seconds between the inoculation and the child's leaving the inoculation room, which occurred only after the child stopped crying and said he or she was ready to participate in the next part of the study. The entire procedure was audio-recorded for subsequent coding and reliability checking.

Postinoculation feedback.—After the child had calmed down, the RA took the child and parent to a third room where she randomly assigned the child to one of three feedback conditions. Children in the pain-denying (i.e.,"no-hurt") feedback condition were told:

> Your shot didn't seem to hurt you at all. You acted like a big kid, and a very brave kid! It doesn't hurt big kids when they get a shot. Here's a lollipop and a sticker for being such a big kid and for not letting it hurt.[1]

Children in the pain-affirming (i.e.,"hurt") feedback condition were told:

> Your shot seemed to hurt you a lot. But you know,

[1] Children who received feedback that was totally inconsistent with how they acted during their shot never resisted our erroneous feedback. Preschoolers' willingness not to challenge obviously discrepant feedback has been found in numerous other studies (e.g., Ceci, Ross, & Toglia, 1987) and may be a source of their vulnerability.

it hurts kids when they get a shot. So it's OK that it hurt a lot. Here's a lollipop and a sticker because it hurt so much.

Children in the neutral feedback condition were told:

Your shot—it's over now. You know, lots of kids today get shots. Its all over now and here's a lollipop and a sticker."

The RA then read the child a story about a child who goes out to play and falls out of a tree. In the story, the mother gives the child feedback consistent with the feedback the RA had just given the subject. The RA pointed out that the story character acted just like the actual child when the inoculation was given. The pediatrician was not in the room for the feedback or the story.

One-week follow-up interview.—One week later, a different research assistant (blind to the feedback condition) visited the child at home. The child was taught to use a rating scale and then to indicate how much the shot had hurt and how much he or she cried at the time of the shot. The Peabody Picture Vocabulary Test (PPVT-R), a test of receptive vocabulary that correlates highly with verbal intelligence (Dunn & Dunn, 1981), was also administered at this time. The diaries were collected from the parents. Seventy-eight percent had been filled out: 69% in the "no hurt" condition, 79% in the "hurt" condition, and 88% in the neutral condition.

Measures

Distress ratings.—The Torrance Global Mood Scale (Torrance, 1968) was adapted for this study to describe the distress levels of children during the inoculation. This seven-point scale rates the child's distress on the basis of facial features, verbalizations, and degree of crying. The lowest rating of "1" is given to children who are attentive, happy, and interested. A rating of "4" characterizes unhappy, worried, or anxious children who do not cry. Finally, children who scream and who are held down receive a rating of "7."

Research assistants were trained to use the rating scale by viewing videotapes of children being prepared for anesthesia and then rating these children's levels of distress. Training was complete when their ratings were identical to those of the principal investigator for 18 children. During the actual experiment, the pediatrician provided distress ratings for 32 of the subjects. In all cases, these ratings were identical to those of the research assistant.

How Much Did It Hurt Scale.—This scale was adapted from "Hester's Poker Chip Tool" (Hester, 1979). The child was shown five piles of poker chips, each representing a different level of hurt. The first pile contained one white poker chip. The next piles contained one red chip, two red chips, three red chips, and four red chips, respectively. The experimenter explained to the child that the white chip shows no hurt at all, that the pile with one red chip shows a little bit of hurt, that two red chips shows a little bit more hurt, that three red chips shows even a little more, and that the pile with four red chips shows all the hurt you can have.

The child was then asked to use the chips to show how much it hurts when the experimenter gently taps the child's arm, and when the child falls off a bike onto the sidewalk. The procedure was repeated if the child did not use more chips for the second than for the first question. Children were then asked to use the chips to show how much it hurt when they got their shot.

Hester (1979) found that children's ratings of hurt, obtained after an inoculation, were highly correlated with measures of children's distress during the inoculation.

How Much Did You Cry Scale.—Children were shown six cartoon faces of a child. The faces ranged in intensity from a very happy, smiling face (face 1) to a very unhappy face shedding many tears (face 6). These faces were arranged on one piece of paper in descending order from happy to sad. The experimenter gave verbal description for each face (e.g., "This face is smiling a lot"; "This face is crying a little"; "This face is crying the most"). The child was asked to point to the face that shows "what you look like when you are having a lot of fun," and "when a sharp knife cuts your finger." This procedure was repeated if the child did not point to one of the happy and then one of the sad faces. The child was then asked to point to the face that showed "what you looked like when you got your shot."

Peabody Picture Vocabulary Test (PPVT-R).—This standardized test of receptive vocabulary (Dunn & Dunn, 1981) was used to assess overall verbal ability. The child is asked to identify from among four pictorial alternatives the one that corresponds to an orally presented word.

TABLE 1

SUMMARY OF RESULTS FOR PHASE 1

	FEEDBACK		
	No Hurt (n = 24)	Hurt (n = 25)	Neutral (n = 26)
Age (months)	61 (.6)	62 (.7)	60 (.5)
% females	54	48	46
Distress rating	4.3 (.3)	4.6 (.3)	4.4 (.3)
Seconds to calm after shot	92 (7.4)	90 (7.1)	90 (8.4)
PPVT (raw scores)	61 (2.8)	61 (3.1)	62 (2.8)
How much hurt	3.5 (.3)	3.5 (.3)	3.6 (.3)
How much cry	2.9 (.4)	3.6 (.4)	3.2 (.4)
Days of postinoculation pain	2.5 (.3)	2.8 (.3)	2.8 (.3)

NOTE.—Standard errors are presented in parentheses. Days of postinoculation pain was based on parent diary reports.

RESULTS

The three feedback groups did not differ significantly in terms of age, gender, distress ratings, and PPVT-R scores (see Table 1). The distress ratings indicate that on average the children were unhappy and worried. However, there was much variation within each group, with some children appearing unaffected during the procedure whereas others screamed and raged.

Two separate one-way analyses of variance were carried out to examine the effect of feedback condition on children's ratings of how much the shot hurt and how much they cried. The mean responses for each scale are shown in Table 1. The results can be summarized simply: There was no significant effect of feedback condition for either the Hurt scale ($p > .96$) or the Cry scale ($p > .25$).

Examination of the parent diaries indicated that, on average, children experienced 2–3 days of discomfort following the shot (see Table 1). The number of days of discomfort was not associated with the children's hurt or cry ratings nor with their group membership (all $ps > .66$).

The children's postinoculation conversations about the shots, as recorded in the parent diaries, reveal that they often received feedback inconsistent with that of the experimental condition. One-third of the children who had been told by the experimenter that the shot hurt were later told by parents, friends, or other adults that they had been very brave or that shots don't hurt. Similarly, 33% of the children who had been told by the experimenter that the shot didn't hurt were later told by parents or adults that shots really do hurt. Finally, 20% of the children given neutral feedback by the experimenter were later given feedback consistent with the "hurt" or "no-hurt" condition. Because the parent who filled out the diary was not privy to all conversations that the child had about the shot or may not have recorded all conversations, the above figures probably underestimate the number of children who received feedback inconsistent with that of the experimental condition.

DISCUSSION

Providing suggestive feedback to children concerning how much a shot hurt did not influence their reports of how much the shot hurt or of the more objective measure, how much they cried. These nonsignificant results do not reflect children's difficulties in using the scales to rate their memories, because their ratings of how much they cried and hurt were positively correlated with their distress ratings at the time of the inoculation: r = .65 and .27, respectively ($ps < .05$). Thus, these ratings reflect the children's behavior during the inoculation procedure and their ability to use the scales accurately.

These results indicate that the children in this study could not be easily influenced to make inaccurate reports concerning significant and stressful procedures involving their own bodies. Several factors may have contributed to these results. First, a review of the parent diaries revealed that the experimental suggestion may have been ineffective because it was only one of different types of feedback that the child received

after the shot. Second, although the inoculation itself was not very painful, most children experienced several days of discomfort following the shot, according to the parent diaries. It is possible that the discomfort after the inoculation may have overridden the potential influence of the suggestion.

Finally, providing children with approximately 1–2 min of feedback immediately following a somewhat stressful experience may not be sufficient to influence their reports. As indicated above, children may not give sway to a single suggestion in a single interview when the event involves their own bodies.

Phase 2

In Phase 2, we examined the influence of multiple suggestive interviews, which occurred many months after the inoculation, on children's recall of the inoculation. In addition to examining the effects of repeated feedback on children's subsequent reports of how they acted during the inoculation, we also examined the effects of repeated misinformation on children's reports of salient and personally experienced events during the inoculation visit.

Few studies have examined the wide-reaching effects of misinformation on subsequent reports; most have merely examined whether misinformation is directly incorporated into children's false reports. In Phase 2, we examined whether misleading information about specific events promoted children's false reports about the suggested events as well as about other logically related events. This objective was motivated by previous findings that preschool children possess strong "implicational structures" that guide their probabilistic reconstruction of the past and that at times this deployment of normal inferential processes can lead to unwarranted conclusions (Ceci, Caves, & Howe, 1981).

In Phase 2, we also attempted to isolate some of the characteristics that differentiate children who fall sway to misinformation from those children who resist misinformation. First, we examined the relation between suggestibility and memory of the target events. Even though theorists differ in their accounts of suggestibility effects, most predict a negative correlation between memory of the original event and suggestibility. For example, according to Loftus's memory impairment view (1992), weak traces of the original event permit the erroneous suggestion easier access and incorporation into memory, thus "overwriting" or erasing the original trace. According to the demand characteristic view of McCloskey and Zaragoza (1985; Zaragoza, 1991), children who have no memory of an event may be more likely to accept the suggestions of a trustworthy interviewer in order to provide a response and please the interviewer. Despite these predictions, there has been little developmental evidence to show that suggestibility is highest when memories are weakest (see Ceci & Bruck, 1993).

Next, we examined the relation between suggestibility and children's stress levels at the time of the inoculation. There is considerable debate concerning the association between stress and children's suggestibility. Some researchers claim that high stress levels increase children's suggestibility (e.g., Peters, 1991), some claim that high stress levels are associated with lower suggestibility (e.g., Goodman et al., 1991), and some researchers find no consistent association between the two (see Ceci & Bruck, 1993).

Finally, we examined the relation between suggestibility and IQ. Many earlier studies report robust negative correlations between IQ and children's suggestibility (see Ceci & Bruck, 1993): Children with lower IQ scores were more suggestible. However, these studies often entailed paper and pencil tests of both suggestibility and IQ, thus raising the possibility that literacy skills accounted for the common variance between IQ and suggestibility measures. The correlation may also reflect the common variance due to memory in both the suggestibility and intelligence tests since many of these earlier studies focused on children's memories of peripheral events.

Method

Design and Hypotheses

Four to 18 months after their inoculation (average delay = 11 months), children who participated in Phase 1 of this study were given one of two types of feedback concerning how they felt and acted when they received their inoculation. Some children were given "positive" feedback; they were told that they acted brave and that they did not cry at all. Other children were given "neutral" feedback; that is, they were given no feedback about how they acted at the

time of the shot. Children were given the same feedback in three different visits spread out over a 2-week period. On the fourth visit, children were asked to rate how much the shot had hurt and how much they had cried 1 year previously. If children cannot be influenced to make inaccurate statements about bodily events, then positive feedback should have no effect on their subsequent reports of how much the shot hurt and how much they cried.

During the three interviews, children were also provided with different types of information about who carried out different actions during the inoculation visit. There were two between-subject factors (information about the RA, information about the pediatrician), each with two levels (misleading, no information). These two factors were completely crossed; thus children were assigned to one of four groups. Children in group 1 were falsely reminded that the RA had given them their inoculation and oral vaccine, and that the pediatrician had shown them a poster, given them treats, and read them a story during the inoculation visit. Children in group 2 were falsely reminded that the RA had given them their inoculation and their oral vaccine, and that *someone* had shown them a poster, given them treats, and read them a story. The reverse held for children in group 3, who were told that someone had given them an inoculation and an oral vaccine but falsely reminded that the pediatrician had shown them a poster, given them treats, and read them a story. Children in group 4 were given no misinformation and were simply reminded that someone had given them an inoculation and an oral vaccine, and that someone had shown them a poster, given them treats, and read them a story. In the fourth and final visit, children recalled the details of their inoculation visit.

An implication from past research is that misleading information should not influence the accuracy of children's reports if it is incongruent with children's scripted expectations or if it involves central actions and personally experienced events (Goodman, Rudy, Bottoms, & Aman, 1990; Saywitz et al., 1991). We predicted that these statements do not generalize to conditions when children are repeatedly interviewed after a long delay. Furthermore, we predicted that misinformation not only affects children's reports about the suggested events but also about other logically related events. Thus, children who were told that the RA had given them their shot and oral vaccine were predicted to report later that the RA had given them a shot, an oral vaccine, *and* a checkup.

Subjects

Parents whose children had participated in Phase 1 were sent a letter describing the goals and general procedures of Phase 2. In order to avoid possible contamination, parents were not given examples of the actual feedback or misinformation that might be given to their child. Sixty-six of the 83 Phase 1 children were retested. Two families had moved, and two families refused to have their children retested. The remaining 13 families could not be conveniently scheduled.

Children were assigned to a positive feedback condition ("you were brave, it didn't hurt, you didn't cry") or to a neutral feedback condition.[2] The assignment procedure was constrained to equate the two groups in terms of (*a*) interval between Phase 1 and Phase 2, (*b*) gender, (*c*) distress rating at the time of inoculation, and (*d*) feedback condition of Phase 1 (i.e., the three feedback conditions of Phase 1 were fully crossed with the two feedback conditions of Phase 2).

The two feedback conditions in Phase 2 were fully crossed with four other conditions which differed in the amount of misinformation given about the RA and the pediatrician. Thus, subjects were assigned to one of these four conditions to equate for Phase 2 feedback conditions as well as for gender and for the interval between Phase 1 and Phase 2. In order to conform to the matching criteria and to include all 66 subjects, not all cells had equal numbers of subjects. Eighteen children were given misleading information about the RA (+RA) and about the pediatrician (+P). This group is referred to as +RA+P. Sixteen children were given misleading information about the RA (+RA), but no information about the pediatrician (−P). This group is referred to as +RA−P. Fifteen children were given no information about the RA but misleading information

[2] A third condition, "hurt" feedback was not used in this study. We felt that it was unethical to attempt to convince children 1 year later that their prior doctor's visit had been very painful, particularly for those who had not reacted with great distress.

about the pediatrician (−RA+P). Seventeen children were given no information about the RA or about the pediatrician (−RA−P).

Procedures: Session 1

Session 1 consisted of four components: eliciting children's recall of their inoculation visit, giving children positive or neutral feedback about how they acted during the inoculation, providing children misleading or no information about the RA, and giving children misleading or no information about the pediatrician.

Recall of inoculation.—The interviewer (who did not participate in Phase 1) visited the children either at their preschool or home. She told the children that she worked with their pediatrician and asked them to tell everything they could remember about the time they got their shot (Free Recall). If the child did not mention the RA, she or he was asked if she or he remembered anyone else at the office during that visit. The experimenter then told the child that the RA works at the pediatrician's office and that the RA was at the pediatrician's office when the child got the shot.

Children were shown a photograph of the pediatrician along with three other foils; they were asked to point to and name anyone they knew in the lineup. All children correctly selected and named the pediatrician. Similarly, they were shown a photograph of the RA along with three foils. If the child did not select the correct photograph, this information was provided. (Only 35% of the children selected the correct picture of the RA.) The target photographs were kept in front of the child for the rest of the interview.

Feedback about reactions to shot.

Next, children were given positive or neutral feedback about their reactions to their shot. The following is part of the positive feedback given in Session 1:

Laurie (RA) and Dr. F . . . said that when you got your shot, you were really a brave kid. They said you didn't cry at all when you got your shot. It was like it didn't even hurt you at all.

The following is part of the neutral feedback given in Session 1:

Laurie (RA) and Dr. F . . . said they remembered the day you went to get your shot. They said that first you came into the office and Maureen, the secretary, talked to your Mom (or Dad).

Information about the research assistant.—Next, children were given misleading or no information about who gave them their shot. The following is a segment of the misleading-information script given to children in conditions +RA+P and +RA−P:

Laurie (RA) . . . gives kids their shots. She gave you your shot. Laurie said that she remembered when she gave you your shot, but she couldn't remember whether she gave you something to drink. When Laurie gave you your shot, did she give you something to drink?

The following is part of the script given to children who received no information about who gave them the shot—children in conditions −RA+P and −RA−P:

Laurie (RA) and Dr. F . . . said that when kids get shots they sometimes get something to drink. They couldn't remember whether you got something to drink when you got your shot. Did you drink something?

Information about the pediatrician.—Next, children were given misleading or no information about who showed them the poster. The following is part of the misleading sequence in conditions +RA+P and −RA+P.

Dr. F . . . said he showed you a big picture on the wall in the room where you got your shot. And Dr. F. talked to you about the picture on the wall. What was in the picture that Dr. F showed you?

The following is part of the sequence in conditions which provided no information about who showed the poster (conditions +RA−P and −RA−P).

Laurie and Dr. F said there was a big picture on the wall in the room where you got your shot. They said that someone talked to you about the picture on the wall. What was in that picture?

In between these exchanges the experimenter talked to the child about common events and played Legos with the child. The entire session lasted approximately 45 min. In this and all subsequent interviews, no adults or other children were present. This and all other sessions were audiotaped and later transcribed.

Procedures: Sessions 2 and 3

The same procedures were followed for Sessions 2 and 3 as for Session 1, except that children were not asked to recall the inoculation visit. At the beginning of each session,

the experimenter showed the photographs of the RA and the pediatrician, leaving them out for the whole session and pointing to them when appropriate. She played with the child while conducting the interview. Each session lasted approximately 45 min. Sessions were separated by approximately 5 days.

Feedback about reactions to shot.—The feedback (positive or neutral) was repeated in each of these sessions with a different script but with the same concepts as those used in the first session.

Information about RA.—In Session 2, children who were misled about the RA were told that she gave them their shot, and this time they were also told that she also gave them their oral vaccine. As part of this script, they were also asked:

When Laurie (RA) gave you the shot, was your mom or dad with you?

Children who were given no information about who gave them the shot were told that someone gave them a shot and an oral vaccine. They were asked:

When you got your shot, was your mom or dad with you?

In Session 3, children who were given misleading information about the RA were reminded that the RA gave them a shot. As part of the script, the children were asked:

Did anybody listen to your heart or look in your ears, when Laurie (RA) gave you your shot?

Children who were given no information about the RA were asked if anybody listened to their heart or looked in their ears.

Information about the pediatrician.—In Session 2, children who were given misleading information about the pediatrician were reminded that he had shown them a poster and were told that he usually gives kids treats. As part of the script, the children were asked:

Did Dr. F give you any treats?

Children who were given no information about the pediatrician were reminded that someone had shown them a poster and were told that children usually get treats after their shots. These children were asked if they got treats.

In Session 3, children who were given misleading information about the pediatrician were falsely reminded that the pediatrician had given them a treat and also read them a story. They were asked to recall the details of the story that Dr. F had read. Children given no information about the pediatrician were reminded that someone had given them a treat and read them a story. They were asked to recall the details of the story.

Procedures: Session 4

The fourth and final visit occurred 5 days after Session 3. The same experimenter who questioned the children in the first three sessions served as the interviewer.

Recall of Phase 1.—Children were first asked to try to tell everything they could remember when they had their shot. Next, the children were shown photographs of the pediatrician and of the RA and asked to tell everything that the RA did and everything that the pediatrician did. If a child did not name the agent of the shot, oral vaccine, checkup, poster, treat, or story event in either the free recall or open-ended photo-prompt questions, then the experimenter explicitly asked him or her to name the agent (e.g., "Who gave you your shot?").

Ratings of hurt and crying.—Using the same procedures described in Phase 1, children used the Hurt scale and the Cry scale to show how much the shot had hurt and how much they had cried when they got their shot. After the study was completed, parents were sent a letter summarizing the results.

Measures

The number of target details that the child reported in the free recall at the beginning of Session 1 and of Session 4 were counted. There were six target details: the oral vaccine, the shot, the checkup, the poster, the treats, and the story. The agent of these actions did not have to be reported in order for the detail to be coded as present. Two raters scored the recall data. The proportion of agreements across raters was .98; discrepancies were resolved through discussion.

The number of false reports of the agents of these six target actions that were elicited through free recall, photo-prompt, or explicit questions in Session 4 was counted.

The number of visits to the pediatrician between Phase 1 and Phase 2, as indicated

TABLE 2

SUMMARY OF NEUTRAL AND POSITIVE FEEDBACK RESULTS FOR PHASE 2

	FEEDBACK	
	Positive (n = 33)	Neutral (n = 30)
Age (months)	72 (.7)	73 (.7)
Months since shot	11.1 (.6)	11.7 (.6)
% females	50	48
Distress rating at time of shot	4.5 (.2)	4.4 (.3)
Seconds to calm after shot	85 (5.3)	89 (8.0)
PPVT (raw scores)	61 (2.8)	61 (2.3)
Doctor visits between Phase 1 and Phase 2	2.6 (.6)	2.5 (.5)
Hurt—1 week	3.7 (.3)	3.3 (.3)
Hurt—1 year	1.9 (.2)	2.5 (.2)
Cry—1 week	3.6 (.4)	3.0 (.3)
Cry—1 year	2.7 (.3)	3.6 (.2)

NOTE.—Standard errors are presented in parentheses.

by the pediatrician's records, was also counted.

Results

Effects of feedback on children's hurt and cry ratings.—Two separate two-way analyses of variance with repeated measures were carried out to examine the degree to which children's reports of how they acted during the inoculation changed as a function of feedback condition. The dependent variable in the first analysis was children's ratings of how much the shot hurt, and the dependent variable in the second analysis was children's ratings of how much they cried. The independent variables were the feedback conditions for Phase 2 (positive vs. neutral) and the repeated measure, time of rating (1 week after the shot vs. approximately 1 year after the shot).[3] Three children who had not been tested 1 week after the shot because of scheduling difficulties were excluded from these analyses. Thus, there were 30 children in the neutral feedback group and 33 children in the positive feedback group. Results of these analyses along with background characteristics of these children are presented in Table 2. Before the feedback was given for Phase 2, children in these two groups did not differ on any of the background variables.

For the "hurt" analysis, there was a significant main effect of time, $F(1, 61) = 35.32$, $p < .001$, and a significant interaction between feedback condition and time, $F(1, 61) = 6.04$, $p < .02$. Post hoc Neuman-Keuls tests carried out on the interaction revealed that the children in the positive and neutral feedback conditions produced similar hurt ratings 1 week following the shot; however, children who were given three sessions of positive feedback approximately 1 year after the shot reported less hurt than children not given this feedback. Although both groups of children showed significant reductions in their ratings of hurt in the year following their shot, planned comparison tests indicated that the reductions were significantly greater in the positive feedback condition than in the neutral feedback condition.

Similarly, for the "cry" scale analysis, there was a significant feedback × time interaction, $F(1, 60) = 9.04$, $p < .004$. Post hoc Neuman-Keuls tests indicated that 1 week after the shot, the ratings of the two feedback

[3] Analyses of how much the shot hurt and how much the child cried were rerun including a third independent variable—feedback condition of Phase 1 (no-hurt, hurt, and neutral) and a fourth independent variable—the four different combinations of misleading and no information concerning the actions of the RA and the pediatrician. These two factors were never significant nor did they ever interact with the repeated measure of time of testing or with the feedback condition of Phase 2 (all $ps > .47$). For clarity the results of these analyses are not reported in the text.

TABLE 3

CHARACTERISTICS OF CHILDREN RECEIVING MISINFORMATION OR NO INFORMATION ABOUT THE RESEARCH ASSISTANT AND THE PEDIATRICIAN

	CONDITION			
	+RA+P (n = 18)	+RA−P (n = 16)	−RA+P (n = 15)	−RA−P (n = 17)
Age (months)	73 (1.2)	72 (.8)	72 (1.2)	71 (1.0)
Months since shot	10.5 (.8)	12.0 (.7)	12.0 (.7)	10.7 (1.0)
% females	50	50	47	53
Distress rating at time of shot	3.7 (.3)	4.4 (.4)	4.7 (.3)	4.9 (.3)
Seconds to calm after shot	75 (7.7)	85 (10.6)	98 (10.3)	94 (8.8)
PPVT (raw scores)	56 (3.6)	63 (4.5)	59 (3.7)	64 (2.6)
Doctor visits between Phase 1 and Phase 2	2.6 (1.0)	2.7 (.6)	1.7 (.3)	2.8 (.8)

NOTE.—Standard errors are presented in parentheses.

groups were equivalent; however, after 1 year and repeated suggestions, children in the positive feedback group reported significantly less crying than children in the neutral group. Also, there was no change in the absolute magnitude of the ratings for the neutral group from 1 week to 1 year, thus indicating highly stable reports. Children in the positive group, however, reported significantly less crying after 1 year than after 1 week. Thus, repeated positive feedback 1 year after the shot produced substantial reductions in children's reports of their distress during the inoculation procedure.

Effects of misinformation on reports of central actions and persons.—Background characteristics of the children in each of the four different misleading/no information conditions are presented in Table 3. The children were equated by design in terms of months since the shot and gender. They also had similar PPVT scores at Phase 1, and the same number of visits to their pediatrician between Phase 1 and Phase 2. However, children in condition +RA+P had significantly lower distress ratings at the time of the shot than did children in conditions −RA−P and −RA+P, $F(3, 65) = 2.70$, $p < .05$. There were no between-group differences in terms of number of seconds to calm after the shot.

Three separate chi-square analyses were carried out to compare the percentage of children in each of the four conditions who falsely reported at the fourth and final interview that the RA (*a*) gave them a shot, (*b*) gave them the oral vaccine, and (*c*) looked in their ears and nose (or any other action involved in a general medical checkup; Fig. 1).

Children in conditions +RA+P and +RA−P who were given misleading information about the RA were more likely than children not given this misinformation to falsely report in Session 4 that the RA had given them a shot, $\chi^2(3) = 13.41$, $p < .003$. Only one child inaccurately reported that the RA had given the shot when no information was provided, compared to 11 (32%) children in the two +RA misinformation conditions. The results of the analysis of the oral vaccine data just missed traditional levels of significance, $\chi^2(3) = 6.97$, $p < .07$. However, the analysis is significant when the two +RA conditions are collapsed and compared to the two collapsed −RA conditions. Five children (16%) in the −RA conditions inaccurately reported that the RA administered the oral vaccine, compared with 42% of the children in the +RA conditions, $\chi^2(1) = 4.92$, $p < .03$. Finally, none of the children in the two −RA conditions said that the RA gave them a checkup, compared to 38% of the children in the two +RA conditions who had been told that the RA gave them a shot and the oral vaccine. Further

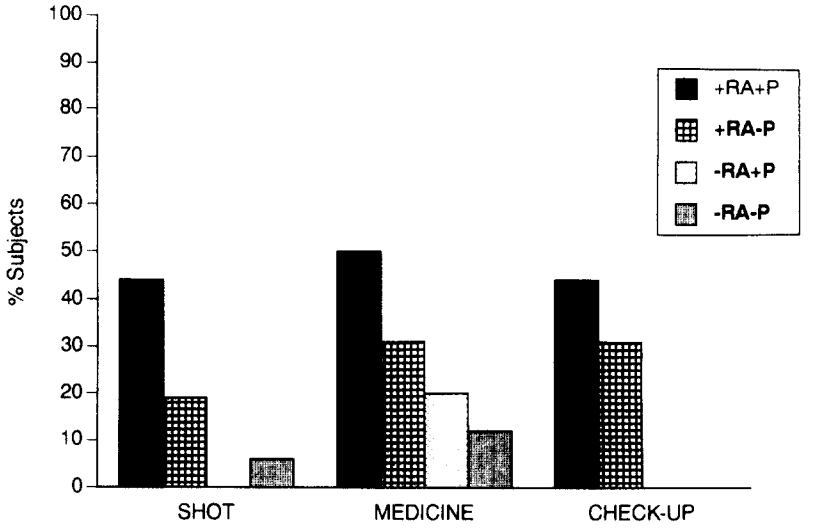

FIG. 1.—Subjects (%) in each condition who incorrectly reported the research assistant

analyses revealed no differences in the false reports of children in the +RA+P and +RA−P conditions.

Three separate chi-square analyses were carried out to compare the percentage of children in each of the four conditions who falsely reported at the fourth and final interview that the pediatrician had (*a*) shown the poster, (*b*) given treats, and (*c*) read a story.

As shown in Figure 2, children who were given no information about the RA and the pediatrician (condition −RA−P) were significantly less likely than children in the other three conditions to report falsely that the pediatrician had shown the poster, $\chi^2(3) = 10.51$, $p < .01$, given treats, $\chi^2(3) = 12.02$, $p < .01$, or told a story, $\chi^2(3) = 8.68$, $p < .03$. There were no significant differences in the response rates of the other three groups.

Characteristics of suggestible children.—For each of the six target events, children who were given misleading information about the agent of that event were classified, based on their Session 4 reports, as giving a false report (nonresistors) or re-

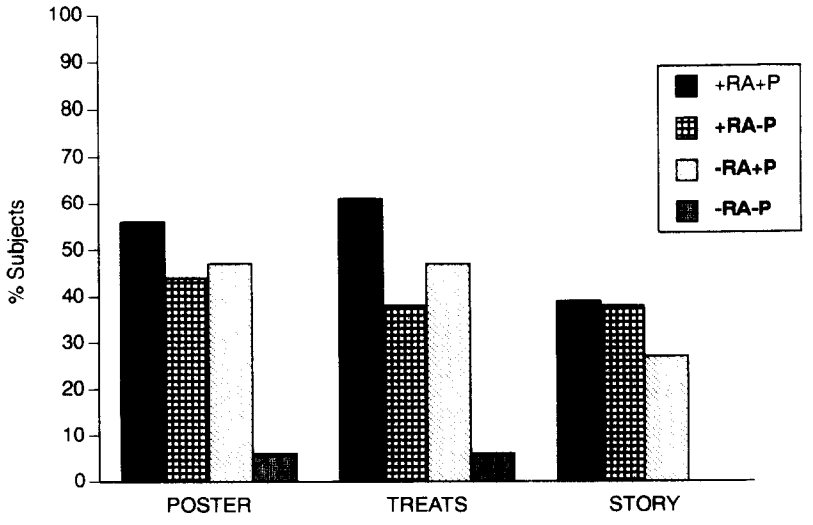

FIG. 2.—Subjects (%) in each condition who incorrectly reported the pediatrician

sisting misleading information about the agent (resistors). For each target event, a series of analyses of variance were carried out to rule out the possibility that the differences between resistors and nonresistors occurred as a function of a number of potentially confounding variables, namely, visits to the pediatrician between Phase 1 and Phase 2, age at Phase 1, age at Phase 2, and interval between Phase 1 and Phase 2. None of these differences were significant, thus ruling out potential confounds.

In the next set of analyses, the effects of memory, stress, and IQ on susceptibility to misleading information were investigated. For each of the target events, analyses of variance were carried out to compare resistors' and nonresistors' distress ratings during inoculation, seconds to calm after inoculation, PPVT score at Phase 1, number of target events recalled in Session 1, and correct identification of the photo of the RA in Session 1. The first two variables assess stress at the time of inoculation, the third variable assesses verbal IQ, and the last two variables assess children's memories of the target events. Only two of the 30 analyses yielded significant results. In both cases, susceptibility to suggestion was associated with higher stress at the time of the inoculation. Specifically, children who fell sway to the suggestion about the RA giving them a shot (nonresistors) took longer to calm after the inoculation, $F(1, 33) = 7.61$, $p < .01$, than children who resisted. Similarly, children who falsely reported that the RA gave them a checkup (nonresistors) took longer to calm after the inoculation than did resistors, $F(1, 33) = 3.99$, $p < .05$.

Characteristics of suggestible versus inaccurate children.—We attempted to delineate those variables that differentiated misled children who gave inaccurate reports from children who gave inaccurate reports in the absence of a misleading suggestion (i.e., those in the no-information conditions). The only significant variable was the spontaneity of the children's false allegations. In the fourth and final visit, children were asked to remember everything they could about their visit to the pediatrician (free recall, Session 4). They were then shown pictures of the RA and the pediatrician and asked to tell everything that each did during the visit. If the children did not name the agent of a target action (shot, oral vaccine, checkup, poster, treat, story), they were asked to provide a name (e.g., "Who gave you the shot?"). Summing over the six target actions, children gave 28 inaccurate reports when they had been given *no* information about the actors. In 27 of these cases, the incorrect target name was supplied in response to the specific question, "Who . . . ?" Thus only one false allegation was spontaneous. In contrast, misled children made 85 false allegations; 41 (48%) of these were spontaneous, occurring in reports to open-ended questions. In nine cases these occurred in response to "Tell me everything that happened," whereas 32 false reports were in response to the second open-ended question, "Tell me everything he or she did." When children made false allegations in response to the latter question, the information about the actor was not provided in response to the first question. Thus, in the present study, children who were given misleading information were much more likely to make spontaneous false allegations than children who were not given this information.

General Discussion

The results of this study place boundaries on children's suggestibility. First, the results of Phase 1 indicate that giving 5-year-old children a single suggestion in the course of a single interview about how they acted during a distressing event, immediately following that event, has little if any influence on their report of how they acted a week later. These results are not consistent with other studies that *have* found suggestibility effects for children of this age (e.g., Ceci et al., 1987). However, in most of these other studies children's suggestibility was assessed by a response to misleading information about either neutral or peripheral events (e.g., Ceci et al., 1987, misled children about the contents of a story character's breakfast). In contrast to studies that have found suggestibility effects for peripheral details, Phase 1 of the present study found no effects of suggestion on children's recall of a salient event that involved their own bodies, their own feelings, and their own actions. Moreover, these other studies presented misleading information to nondistressed children who may have been better able to process the suggestions than did children in the present study, who were still upset by the shot when the misleading information was first given. Taken together, these data indicate that 5-year-old children are not sponges soaking up misinformation from the environment and incorporating it into their reports. Both their affective states and the

nature of the event being recalled seem to have buffered them from succumbing to the suggestions about their expressed pain.

While the data from Phase 1 portray 5-year-olds as resistant to a salient postevent suggestion about their bodies, the data from Phase 2 show that there is somewhat greater latitude in the scope of children's suggestibility than indicated either in Phase 1 or, more generally, in the developmental literature. First, we found that under certain circumstances 6-year-old children's reports concerning their own bodies can be influenced. That is, children who were provided with repeated positive feedback about how they had acted during their inoculation reported significantly less crying and hurt than children not provided with this feedback. Second, we also found that children's reports of salient events can be influenced by repeated suggestions. For example, approximately one-third of all children who were provided misleading information about the gender of the person who administered the shot incorrectly reported being inoculated by a female research assistant rather than by a male pediatrician.[4] Significantly, we found that children will even incorporate such central misinformation into their responses to open-ended questions and not just in response to yes/no questions. This is something that has not heretofore been found, since the popular wisdom is that, although children do not provide much information in response to open-ended questions, what they do provide is highly accurate (e.g., Goodman et al., 1990).

Although we did not directly manipulate the variables, we suggest that the difference in the pattern of results obtained in Phase 1 and Phase 2 reflects the confluence of three factors. The first factor concerns the time between the original event and the suggestions. We interviewed subjects in Phase 2 from 4 to 18 months after the shot. Perhaps this was enough time for the original memories to be weakened so that erroneous feedback could interfere with them or, if there was no longer any original memory, fill the void.

A second factor concerns the distress levels of the children at the time of the first suggestion, which immediately followed the administration of the shot in Phase 1. Many of the children were moderately to severely distressed as a result of their shot, and consequently may not have accurately processed the pain-affirming or pain-denying feedback of Phase 1. In Phase 2, the suggestions were given many months after the shot, when the children were no longer distressed. Thus, suggestions may have been more effective in Phase 2.

Third, our success in influencing children's reports in Phase 2 was achieved largely because of the nature of the repeated suggestions. These suggestions did not take the form of one sentence or of one misleading question but, rather, were woven into the experimenter's conversations with the children within and across interviews. In doing this, we deliberately tried to mimic interviews that child witnesses may undergo with their parents, law enforcement officials, or therapists.

In Phase 2, we also examined the associations between children's suggestibility, IQ, and two measures of stress (seconds to calm and ratings of stress) with six different dependent measures, thus yielding 18 analyses. Only two of the 18 analyses were significant, and both of these involved the link between stress and suggestibility. Children who fell sway to Phase 2 suggestions took longer to calm after their inoculation than children who resisted these suggestions. This finding is consistent with the assumption that high stress levels lower the efficiency with which information is processed (Peters, 1991), making children more susceptible to suggestibility, even when questioned a long time after the event.

We now turn to a more direct consideration of the mechanisms that may account for children's suggestibility in Phase 2. Throughout this paper we have consistently used the phrase "influence children's reports" as opposed to "influence children's memories." The former phrase implies that children's ratings and reports *may* have reflected genuine memory or cognitive change as a result of initial attempts to comply with the suggestions of the experimenter, but they also may only have reflected children's

[4] One might argue that our subjects were easily misled because since receiving their DPT shot, they had visited a female health professional who had given them a shot. However, an inspection of the children's records did not indicate any subsequent shots. Therefore, the DPT vaccination was a unique event for these children.

attempt to comply with the suggestions of the experimenter. The experimenter who obtained the final reports was the same person who gave the original erroneous suggestions in Phase 2, so it is possible that children may have been more likely to comply than if two different experimenters had been used. The present experimental procedure limits our ability to shed light on this distinction because the interviewing procedures were purposely designed to be similar to those that occur in some legal contexts where children's reports emerge after repeated interviews with the same individuals.

Nevertheless, two pieces of evidence indicate that, in addition to social processes, memory or cognitive changes in the form of reasoning-based inferential processes may account for some of the results of Phase 2. First, a substantial percentage of children given the misleading information that the RA had given them both the shot and the oral vaccine later reported that she had also given them a checkup, although this particular misinformation had never been provided to any of the children. These results may reflect cognitive mechanisms involving children's attempts to make the RA's actions congruent with those of someone who administers shots and oral vaccines (i.e., a pediatrician). It appears that children were using their expectations, based on the previous two weeks of suggestions, to construct a congruent script (e.g., Ceci et al., 1981). They filled in gaps that were consistent with, but not necessarily implied by, the suggestion. If social forces alone were operating to produce children's erroneous reports (e.g., a desire to please the interviewer), it is unclear why they would falsely report in Session 4 that the RA checked their ears and throat, since these actions had never been suggested to them by an adult.

Second, children who were given misleading information about the RA but no misleading information about the pediatrician (condition +RA−P) gave as many inaccurate reports about the pediatrician as did children who were given misleading information about the pediatrician (conditions +RA+P and −RA+P). Children's use of expectations to fill in gaps when a script is incomplete could explain these results. Many children know that when they visit the pediatrician, he always does something (see Ornstein, Larus, & Clubb, 1991). Thus, when told that the RA performed some of the actions that a pediatrician usually performs, the children may have attempted to find something else for their pediatrician to do, even if it involved showing them a poster, giving them treats, and telling a story. Conversely, children who were given no information about the RA and misleading information about the pediatrician (condition −RA+P) did not claim that the RA gave them a shot, perhaps because the children had no expectancy about the role and associated actions of the RA. Taken together, this pattern of performance would appear to implicate some cognitive mechanisms in children's false reports, whereby they restructure their reports in order to make them consistent with the suggestions as well as with their more general expectations about visiting a pediatrician. It is not easy to envision how an exclusively social mechanism could account for these asymmetrical results.

In summary, the results of this experiment indicate that 6-year-old children can be misled about salient events involving their own bodies when repeatedly provided with misinformation about the event after a lengthy delay. Furthermore, repeated misinformation also increases children's false reports about other salient events for which no misinformation is provided. These results challenge the view that suggestibility effects are confined to peripheral, neutral, and nonmeaningful events.

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