Effects of Discrete Emotions on Young Children’s Suggestibility

Linda J. Levine
University of California, Irvine

Stewart L. Burgess
St. George’s Independent School

Cara Laney
University of Leicester

Two experiments investigated the effects of sadness, anger, and happiness on 4- to 6-year-old children’s memory and suggestibility concerning story events. In Experiment 1, children were presented with 3 interactive stories on a video monitor. The stories included protagonists who wanted to give the child a prize. After each story, the child completed a task to try to win the prize. The outcome of the child’s effort was manipulated in order to elicit sadness, anger, or happiness. Children’s emotions did not affect story recall, but children were more vulnerable to misleading questions about the stories when sad than when angry or happy. In Experiment 2, a story was presented and emotions were elicited using an autobiographical recall task. Children responded to misleading questions and then recalled the story for a different interviewer. Again, children’s emotions did not affect the amount of story information recalled correctly, but sad children incorporated more information from misleading questions during recall than did angry or happy children. Sad children’s greater suggestibility is discussed in terms of the differing problem-solving strategies associated with discrete emotions.

Keywords: suggestibility, memory, emotion, discrete emotions
emotion as “arousal”—a variable that can be measured on a single scale ranging from relaxed to very aroused or stressed. Research on memory stemming from an arousal-based model of emotion has led to fundamental advances, but this model may err on the side of simplicity, leading to conflicting pictures of the effects of emotion on memory and suggestibility (Levine & Burgess, 1997; Levine & Pizarro, 2004; Reisberg & Heuer, 2004).

**Discrete Emotions, Memory, and Suggestibility**

A separate line of theory and research has focused on the differing functions of discrete emotions. According to appraisal theory, emotions are evoked primarily when a person’s goal is attained or obstructed, and it becomes necessary for the person to revise his or her prior beliefs about the goal or construct new plans. Research on appraisal theory has shown that discrete emotions, such as happiness, anger, and sadness, are elicited by different interpretations or appraisals of events. Once evoked, these emotions lead to different cognitive and interpersonal problem-solving strategies (e.g., Frijda, 1987; Keltner & Gross, 1999; Oatley & Johnson-Laird, 1987; Scherer, 2003; Smith & Lazarus, 1993; Stein & Levine, 1987). Thus, our understanding of the effects of emotion on children’s memory and suggestibility may benefit from moving beyond the notion of general arousal and considering the differing functions of discrete emotions.

How might discrete emotions, such as happiness, anger, and sadness, affect children’s memory and suggestibility? According to appraisal theory, people feel happy when they attain a goal or avoid an undesirable state. Once evoked, feelings of happiness serve as a signal that all is well and that no immediate crisis requires the diversion of cognitive resources (Schwarz & Clore, 1983). Researchers have found that when people are happy, they tend to retrieve information and solve problems in a manner that is both efficient and creative (for a review, see Isen, 2000). Isen (2000) suggested that feelings of happiness may activate an elaborate network of positive associations that facilitates memory retrieval. Happiness has interpersonal as well as cognitive consequences. Because it follows goal attainment, happiness is associated with feelings of self-efficacy in interactions with others (Izard & Ackerman, 2000). These features should affect children’s suggestibility. Specifically, when adults ask misleading questions, children may agree because the misleading information has altered their representations of events or they may acquiesce knowing their answers to be false (Gudjonsson, 1986). The cognitive and interpersonal features of happiness would be expected to lead to resistance to both of these forms of suggestibility. It is more difficult to alter children’s memory for an event when they can retrieve a clear and elaborate representation of it (Ceci & Bruck, 1993). Moreover, if happy children feel good about themselves and their abilities, including perhaps their ability to remember, they should be less inclined to doubt themselves and less willing to acquiesce or go along with misleading information.

In contrast to happiness, anger and sadness are both elicited by goal failure and are associated with attention to threatened goals. These two negative emotions appear to have very different functions, however. Stein and Levine (1989; Levine, 1995) found that young children describe feeling angry most often when they believe that they can do something to reinstate a threatened goal. These findings are in keeping with appraisal models that describe the function of anger as motivating people to overcome obstacles to their goals (e.g., Oatley & Johnson-Laird, 1987; Stein & Levine, 1987). Because anger is associated with persistence in the pursuit of goals, and with aggression toward agents who obstruct goals, angry people tend to display a sense of self-efficacy and resistance in interpersonal exchanges (Lemerise & Dodge, 2000). The interpersonal problem-solving strategy associated with anger led us to predict that angry children would be resistant to incorporating misleading information into their representations of events and to acquiescing to such information.

In contrast to anger, children describe feeling sad when they believe that there is nothing they can do to reinstate their goals (Levine, 1995; Stein & Levine, 1989). According to appraisal theories, sadness is associated with irrevocable failure and motivates the substitution of more realistic goals, beliefs, and expectations for the future (e.g., Levine, 1996; Smith & Lazarus, 1993). Interpersonally, sadness is associated with uncertainty (e.g., Tiedens & Linton, 2001), with the belief that one’s own resources are inadequate and with seeking help and comfort from others (e.g., Izard & Ackerman, 2000). Because sadness leads to cognitive restructuring (i.e., revision of beliefs and goals) and is associated with feelings of low self-efficacy and help-seeking, we predicted that children would be particularly vulnerable to suggestion when sad. Greater suggestibility would be expected to result both from malleable representations of events and from the tendency to acquiesce and accept others’ accounts of events.

On the basis of past research on discrete emotions, then, children’s memory and suggestibility would be expected to vary depending on their emotional state at the time they attempt to retrieve information from memory. Specifically, we predicted that children would be more vulnerable to misleading information when sad than when happy or angry. Both malleability of memory traces and acquiescence would be expected to contribute to these differences. Little research has examined the effects of discrete emotions on children’s suggestibility. However, findings concerning the personality traits associated with greater suggestibility are consistent with our prediction that children would be more suggestible when feeling sad. The personality traits of compliance or acquiescence (e.g., Gudjonsson, 1986) and low self-esteem (Baxter, Jackson, & Bain, 2003; Singh & Gudjonsson, 1984) have been found to be associated with greater suggestibility. Lower self-esteem or achievement-related competence also has been found to be associated with greater suggestibility in young children (Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001; Howie & Dowd, 1996; but see Chae & Ceci, 2005). On a temporary basis, these traits are likely to characterize children who are sad. Goodman and her colleagues investigated the relation between children’s emotions and their memory for a painful and invasive medical procedure. Children who felt proud were less suggestible concerning what had occurred than children who felt sad or ashamed (Goodman, Quas, Battenman-Faunce, Riddlesberger, & Kuhn, 1994). A key next step for exploring these intriguing findings would be to compare a child’s suggestibility when he or she is feeling different emotions in order to clarify whether these differences in suggestibility were due to children’s temporary emotional states or to their stable personality traits.

We assessed memory and suggestibility in 4- to 6-year-old children because a number of studies of memory and suggestibility have found developmental differences between preschoolers and
children older than five (Ceci & Bruck, 1993). Further, children between the ages of 4 and 6 represent a reasonable sample of young children who might be allowed to testify in a court of law. In a study of eight jurisdictions, Gray (1993) found that while only 18% of child witnesses in sexual abuse cases were below the age of 6, 41% of the cases that actually went to trial concerned children below this age. This finding highlights the need to include preschool children in research pertaining to children as witnesses. On the basis of prior research, younger children were expected to recall less information and to be more susceptible to misleading information than older children (e.g., Bruck & Ceci, 1999; Geddie, Fradin, & Beer, 2000). Younger children have memory capacity limitations, often lack knowledge that makes events causally cohesive, and have a limited repertoire of retrieval strategies (Brainard & Ornstein, 1991). As a result, they may retrieve less complete representations of events, making them less likely to spot misinformation. Younger children also may adopt a more compliant stance toward adults than older children who have more experience with question and answer formats in school (e.g., Gordon, Baker-Ward, & Ornstein, 2001; Robinson & Briggs, 1997).

The Current Investigation

The current research was designed to clarify some of the conditions under which children’s reports are likely to be resistant or vulnerable to suggestion. In Experiment 1, we presented 4- and 6-year-old children with three interactive stories on a video monitor. At the end of each story, the child was asked to help the story protagonist deliver a prize to the child by finding and pressing a target picture on the video monitor. The outcome of the child’s efforts was predetermined in order to elicit happiness, anger, or sadness. To elicit happiness, we allowed the child to attain the goal. The target picture was clearly presented, and when the child touched it, he or she received the prize. To elicit anger, we obstructed the child’s goal-directed activity. The target picture was presented, but when the child touched it, no prize was delivered. To elicit sadness, we created a mild experience of irretrievable goal failure. The target picture was not presented, so no chance of helping the protagonist deliver the prize was available. The structure of the three stories was identical, and each story was paired nearly equally often with each emotion elicitation. In short, our method was to hold story information constant and use the child’s participation at the end of the story to vary the emotion evoked in the child. We then assessed children’s memory and suggestibility concerning the stories. Experiment 2 was designed to replicate and extend the results of Experiment 1 by using a different emotion-elicitation procedure and by reducing apart simple acquiescence to misleading questions from changes in children’s memory for story events.

Experiment 1

Method

Participants. Four-year-old children ($N = 40$; 21 boys and 19 girls) and 6-year-old children ($N = 38$; 20 boys and 18 girls) participated in the study. The 4-year-olds ranged in age from 4 years 0 months to 4 years 9 months ($M = 4$ years 6 months). The 6-year-olds ranged in age from 6 years 0 months to 6 years 9 months ($M = 6$ years 5 months). Participants were recruited from preschools and after-school programs in Orange County, California. The majority of the children were from middle- to upper middle-income homes. The ethnicities of the children were Caucasian (46%), Chinese (17%), Korean (13%), Hispanic (13%), Persian (5%), African American (3%), and other (3%).

Design. The study had two within-subjects factors, story and emotion elicitation condition, and one between-subjects factor, age group. Each child was presented with three stories. At the end of each story, the child was given an opportunity to help the story protagonist and, as a result, win a prize. The outcome of the child’s efforts was predetermined in order to elicit happiness, anger, or sadness. The order in which the three stories were presented, and the order of the happiness, anger, and sadness elicitations, were counterbalanced so that each story was paired nearly equally often with each emotion elicitation.

Materials. Story illustrations consisted of still-frame pictures featuring cartoon animal protagonists. Illustrations were presented on a video monitor and were accompanied by audiotaped narration. Although the three stories designed for this study had different characters and specific details, each story was structurally identical and included the same number and types of details. Each story included (a) the setting, (b) the protagonist’s goal to give a toy or prize to the child, (c) an agent or second cartoon character who sometimes thwarts and sometimes facilitates attaining that goal, (d) positive and negative outcomes such as getting or not getting a toy, and (e) positive and negative consequences of those outcomes. These types of information were included because they correspond to a canonical story structure that is easily understood by young children (Nezworski, Stein, & Trabasso, 1982). Table 1 (top) shows an example story and the types of information included, with the details used for coding children’s memory separated by slash marks.

Apparatus. Stories were presented on a Sony Trinitron color video monitor. Below the monitor was an opening where prizes were delivered. Behind the monitor, out of view of the child, the experimenter delivered prizes manually by sliding them down a ramp. Also out of view of the child were electronic noise makers that emitted a brief positive (rising) or negative (falling) sequence of tones when a prize was delivered or withheld, respectively. A hidden JVC VCR unit was operated by the experimenter using a remote control. During the experimental sessions, children were led to believe that the video monitor had touch-screen capabilities and that prizes were delivered automatically as a result of touching the target picture.

Procedure. Female undergraduate researchers served as experimenters. Children were interviewed individually, and the experimental sessions were videotaped. Interviews lasted about 45 min. The experimenter first taught the child to use the imitation touch-screen monitor and introduced the child to the encoding assessment procedure. She demonstrated that touching the right picture on the monitor led to delivery of a prize and that touching the wrong picture led to no prize. She then explained that the child would listen to the stories through headphones, and since the experimenter could not hear the story, she would stop the story a few times to ask the child what was happening.

The first story was then presented. Approximately halfway through the story, after setting, goal, and agent information had been presented, the experimenter assessed encoding by asking the
child to describe what had happened in the story so far. When the child could add no further details following two prompts (“What else happened?” “Anything else?”), the experimenter asked open-ended questions about the story (e.g., “Who was in the story?” “Where did the dolphin live?” “Was there something special that the dolphin wanted to do?” “Was anyone else in the story?” “What did he do?”). After presenting the second half of the story (outcomes and consequences) but before the emotion elicitation, the experimenter again assessed encoding using prompts (“What did the lady say?” “Anything else?”) and open-ended questions (e.g., “Did she say something about finding something?” “What was that?” “What happened then?”).

The emotion elicitation procedure occurred next. The child was asked to help the cartoon protagonist in a way that would result in the child getting a prize. To elicit happiness, the target picture was clearly presented. When the child touched it, the positive tone sequence was activated and the child received a prize from the apparatus. To elicit anger, the target picture was clearly presented, but when the child touched it, the negative tone sequence was activated and no prize was delivered. To elicit sadness, the target picture was not presented, so no chance of helping the protagonist deliver the prize was available. The negative tone sequence was activated and no prize was delivered to the child. After the emotion elicitation, the experimenter asked the child how he or she was feeling: “I’d like to know how you are feeling right now. Would you say you are happy, or sad, or mad?” The order of the emotion choices was counterbalanced. Facial and behavioral expressions of emotion also were coded from videotapes of the sessions. A 30-s distraction task followed (e.g., shape identification).

The child was then asked to recall the story. Free recall was followed by the same prompts and open-ended questions described above for assessing story encoding. To assess suggestibility, the experimenter said, “Tell me if these things happened in the story” and proceeded to present seven leading questions. Two questions presented correct information (e.g., “Splash the Dolphin lives in the ocean, doesn’t he?”). Each of the remaining five questions presented misleading information concerning one of the five categories of story information (setting, goal, agent, outcome, and consequence). For example, the experimenter said, “Splash wanted to give you his favorite rubber duck, didn’t he?” when the goal had been to give the child Splash’s favorite toy ball. Table 1 (bottom) shows examples of the five misleading questions.

The stories presented identical information irrespective of emotion condition. The actual outcome and consequence that children experienced, however, differed depending on whether they were in the happiness condition (in which they received a prize) or in the anger or sadness conditions (in which they did not receive a prize). Therefore, the structure of misleading questions concerning settings, goals, and agents did not differ across emotion conditions, but misleading questions about outcomes and consequences were framed differently depending on whether they followed the happiness elicitation or the anger or sadness elicitation. For example, following the happiness elicitation, misleading questions suggested that children had not received the prize (e.g., “You didn’t get the ball that Ollie hid, did you?”). Following the anger and sadness elicitations, misleading questions indicated that children had received the prize (e.g., “You got the ball that Ollie hid, didn’t you?”).

A set of distraction tasks lasting one minute was presented after completion of the suggestibility phase for one story and before presentation of the next story. These tasks (e.g., coloring shapes, _______

1 In analyses for Experiment 1, we used observer’s ratings of children’s emotions rather than children’s self-reports. This was done because comparisons between observers’ ratings and children’s self-reports suggested that children may have been reluctant to report negative feelings to the experimenters. Specifically, 99% of children reported feeling happy in the happiness condition; this was consistent with observers’ ratings that 91% of the children looked happy. But approximately half of the children also reported feeling happy in the two negative emotion conditions, even though observers rated the majority of children (over 90%) as expressing negative emotions. Thus, observers’ ratings were used because they provided a more sensitive measure of children’s negative emotions than children’s self-reports. (Chi-square analyses, conducted separately for each emotion condition, revealed no differences between age groups in the frequencies with which children reported feeling happy, angry, and sad.)
making a tower from blocks) took place at a separate table and were designed to distract the child in order to minimize any carryover of elicited emotion to encoding of the next story. Each step of the procedure was then repeated for the second and third stories. Finally, the experimenter praised the child’s performance and gave the child small prizes.

**Data coding.** Session videotapes were used to code children’s facial and behavioral expressions of emotion, story recall, and suggestibility. Two independent coders were used for each task. When coders disagreed, a third coder resolved the disagreement. Emotional state was assessed on the basis of children’s facial expressions and behaviors as recorded by a video camera placed next to the monitor on which the story was displayed. Thus, coders could see the child and the child’s actions (e.g., touches to the screen) but could not see the images displayed on the monitor. Coders examined session videotapes, with the sound turned off, from a point just prior to the emotional elicitation to the point just prior to the child’s self-report of emotion. Emotional state was coded as happy, angry, sad, or neutral.

Because the moments during the emotion manipulation and those shortly thereafter contained most of the outward signs of emotion, coders of emotional expression were aware of whether the child being viewed had obtained a prize. They were blind, however, to study hypotheses and to whether children were in anger or sadness elicitation condition. Coders were told that children often have very different emotional responses to the same events and that it was the emotion the child was expressing and not the event that was important in this study.

Coders were instructed in the hallmarks of facial and behavioral expressions of happiness, anger, and sadness (Ekman & Friesen, 1982). Happiness was associated with smiles and behaviors such as holding up the prize while smiling. Facial expressions of anger included straight mouths or mouths with a slight downturn at the corners and eyebrows that were drawn together and down in the center. Behavioral indicators of anger included frustrated utterances directed at the screen or experimenter, repeated screen touches, or pointing at the screen while showing an angry expression. Facial indications of sadness included down-turned corners of the mouth in a frown or pout and eyebrows drawn up at the center. Behavioral indicators of sadness included looking down, tucking in the chin, and slumping back in the chair. Analysis of interrater agreement using the kappa statistic showed good agreement between raters in coding children’s expressions as happy, angry, sad, or neutral ($\kappa = .80$).

A second team of research assistants, who were blind to study hypotheses and emotion condition, coded the self-report of emotion, encoding, recall, and suggestibility portions of the sessions. This coding was done in two passes through the videotapes so that coders also were blind to self-reported emotion when coding the encoding, recall, and suggestibility portions of the tapes. That is, assistants first coded the tapes for encoding, recall, and suggestibility. On a second pass through the tapes, they used separate coding sheets to record children’s self-reports of emotion. Encoding and recall scores were based on the total number of story details reported by the child (including information provided following prompts and open-ended questions). The information children reported was checked off on a form that listed each story detail. Details corresponded to noun, verb, object, and adjective phrases, which were structured and coded identically across stories such that each story included 7 setting details, 6 goal details, 6 agent details, 7 outcome details, and 4 consequence details, for a total of 30 story details overall. **Encoding** refers to the total number of story details reported by the child prior to the emotion manipulation. **Recall** refers to the total number of story details reported after the emotion manipulation. Encoding and recall data from one third of the children were randomly selected for interrater reliability comparisons. Because coding procedures and story details for encoding and recall were the same, encoding and recall scores were combined for interrater reliability comparisons. Yule’s $Y$ coefficient, an index of coder agreement, was 97% overall. Children’s encoding scores ranged from 4 to 23 ($M = 13.15, SD = 4.69$), and their recall scores ranged from 1 to 18 ($M = 9.57, SD = 4.04$).

Children responded to seven leading questions. Two questions presented correct information. Preliminary analyses showed that children’s emotions had no impact on their responses to these questions. Each of the remaining five questions presented misleading information concerning one of the five categories of story information. Children’s responses to the misleading questions were coded dichotomously: 1 if the child agreed and 0 if the child disagreed. Suggestibility was defined as the sum of a child’s scores for the five misleading questions. Children’s suggestibility scores ranged from 0 to 5 ($M = 3.31, SD = 1.28$).

**Analyses.** We conducted repeated measures analyses using the SAS software procedure Proc Mixed, specifying the Huynh–Feldt covariance structure. The Proc Mixed procedure was chosen because it uses a likelihood-based estimation method that allows the inclusion of all available data instead of ignoring participants with missing data. Because Proc Mixed does not compute sums of squares, effect sizes were computed for key contrasts between emotion groups as squared point-biserial correlations ($r^2_{pb}$).

**Results**

**Emotion elicitation.** In the happiness condition (finding the target picture and receiving a prize), observers rated 91% of the children as happy, 4% as sad, and 5% as neutral. In the sadness condition (not finding the target picture and not getting the prize), observers rated 76% of the children as sad, 15% as angry, 5% as happy, and 4% as neutral. In the anger condition (finding the target picture but not getting the prize), observers rated 35% of the children as angry, 62% as sad, 1% as happy, and 2% as neutral. Chi-square analyses, conducted separately for each emotion condition, revealed no age differences in children’s emotions in the happiness and sadness conditions. In the anger condition, 4-year-olds were rated as sad (73%) more often than angry (23%), whereas 6-year-olds were rated as sad (50%) and angry (47%) about equally often, $\chi^2(2, N = 78) = 5.07, p = .02$. Thus, most children looked happy in the happiness condition and most looked sad in the sadness condition. Expressions of anger were less frequent than happiness and sadness but were most often observed in the anger condition. However, because both of the negative emotion conditions evoked sadness in some children and anger in others, analyses of children’s recall and suggestibility were conducted in two ways: first, by comparing emotion conditions to contrast happiness and negative emotion, and second, by comparing observer-rated emotions to contrast happiness, anger, and sadness.
Preliminary analyses. We conducted a repeated measures analysis of variance (ANOVA) on encoding to rule out the possibility of a confound between children’s initial encoding of story information and emotion condition. This analysis included emotion condition as a within-subject factor, age group as a between-subjects factor, and their interaction. As expected, the amount of information reported prior to the emotion elicitation did not differ by emotion condition, nor was a significant interaction found. Six-year-olds reported more information (M = 15.48, SE = 0.67) than did 4-year-olds (M = 10.93, SE = 0.65), F(1, 76) = 23.76, p < .0001.

Children were presented with three stories that differed in content but were matched for structure and complexity. Preliminary analyses showed no differences in encoding, recall, or suggestibility scores as a function of story content, so story content was not included as a factor in subsequent analyses. Preliminary analyses also showed no differences in encoding or recall of specific types of information (e.g., setting, agent) as a function of emotion condition or as a function of observer-rated emotion. Therefore, subsequent analyses of encoding and recall were conducted on the total amount of information reported.

Use of a within-subject design raises the possibility of carryover of emotions and of practice or fatigue effects, across stories. Between the emotion elicitation procedure for one story and presentation of the next story, children engaged in several intervening activities: They engaged in a 30-s distraction task, recalled the story, responded to questions, and engaged in a 1-min distraction task at a different table. These activities reduced the likelihood that the emotion elicited following a preceding story would carry over to influence children’s performance on the next story. To test this, we conducted separate one-factor (previous emotion elicitation) ANOVAs on children’s encoding, recall, and suggestibility scores for the second and third stories. (Memory and suggestibility scores for the first story were omitted from these analyses because the first story had no previous emotion elicitation.) No significant carryover effects were found (ps ranged from .13 to .89). To check for practice or fatigue effects across stories, we conducted repeated measures ANOVAs on children’s encoding, recall, and suggestibility scores. These analyses included story order, age group, and their interaction. The results revealed a practice effect. The amount of information that children encoded, F(2, 152) = 7.79, p = .0006, and recalled, F(2, 152) = 8.49, p = .0003, increased across stories, whereas suggestibility decreased across stories, F(2, 152) = 8.80, p = .0002. Because the happiness, anger, and sadness elicitation procedures were counterbalanced so that they occurred nearly equally often in each story position, this order effect does not complicate interpretation of study results. Nevertheless, we controlled for story order in subsequent analyses.2

Recall by emotion condition. After the emotion elicitation, children were asked to recall the entire story. To assess the effects of emotions on story recall, we conducted a repeated measures analysis of covariance (ANCOVA; controlling for encoding and story order) that included emotion condition, age group, and their interaction. The results (adjusted means are reported) showed that story recall did not differ significantly by emotion condition, nor was an interaction found between emotion condition and age group. Six-year-olds recalled more information (M_adj = 10.97, SE = 0.41) than did 4-year-olds (M_adj = 8.24, SE = 0.40), F(1, 76) = 21.32, p < .0001. In addition, the covariates were significantly related to recall: encoding, F(1, 149) = 75.95, p < .0001; story order, F(2, 149) = 3.05, p = .05.

Recall by observer-rated emotion. Because both negative emotion conditions elicited anger in some children and sadness in others, we also examined recall by observers’ ratings of children’s emotions. Children were rated as happy following 76 stories, as angry following 39 stories, and as sad following 110 stories. (The 9 cases in which children expressed neutral emotion were omitted for this analysis.) We conducted a repeated measures ANCOVA (controlling for encoding and story order) on the amount of information recalled. Use of the Proc Mixed procedure allowed us to compare the amount of story information recalled by children who expressed happiness, anger, and sadness, even though the numbers of children expressing these emotions were not equal. This analysis included observer-rated emotion as a repeated factor nested within subject, age group as a between-subjects factor, and the interaction of observer-rated emotion and age group.

As we found when we examined recall by emotion condition, the amount of story information children recalled did not differ significantly by observer-rated emotion, nor was an interaction found between observer-rated emotion and age group. Again, 6-year-olds recalled more information than did 4-year-olds, F(1, 75) = 18.03, p < .0001. The covariate, encoding, was significantly related to recall, F(1, 141) = 65.72, p < .0001.

Relation between recall and suggestibility. Suggestibility was defined as the total number of the five misleading questions with which children agreed. To examine the relation between recall and suggestibility, we computed partial correlations (controlling for age) for each emotion condition. The results showed that, the more story information children recalled, the less vulnerable they were to the suggestion in the happiness condition, r(78) = -.40, p = .0003, and in the sadness condition, r(78) = -.30, p = .008. This negative relationship did not reach significance in the anger condition, however, r(78) = -.19, p = .09.3

Suggestibility by emotion condition. The effect of emotion condition on children’s suggestibility was examined next. A repeated measures ANCOVA was conducted (controlling for recall and story order) that included emotion condition, age group, and their interaction. Post hoc tests were conducted using Tukey-Kramer pairwise comparisons (p < .05). The results showed a significant main effect of emotion condition, F(2, 149) = 11.37, p < .0001. As shown in Table 2 (top), children were more suggestive in the anger and sadness conditions than they were in

---

2 We also conducted preliminary analyses to assess the potential contribution of several other variables on children’s memory and suggestibility. For Experiment 1, all analyses were conducted including the interaction between story order and emotion condition, and the interaction between story order and observer-rated emotion. No significant interactions were found. All analyses in Experiments 1 and 2 initially were conducted including gender as a factor. Because no gender differences were found, analyses without gender are reported. Finally, preliminary analyses showed no significant effect of specific interviewer in Experiment 1 (4 girls) or Experiment 2 (4 girls).

3 A repeated measures ANOVA was conducted on children’s suggestibility scores, with emotion condition, recall, and their interaction as factors. The results indicated that the association between recall and suggestibility did not differ significantly by emotion condition, F(2, 151) = 1.37, p = .26.
the happiness condition. In addition, 4-year-olds were more suggestible (Madj = 3.76, SE = 0.17) than were 6-year-olds (Madj = 2.83, SE = 0.18), F(1, 76) = 12.42, p = .0007. The covariates were significantly related to suggestibility: recall, F(1, 149) = 9.72, p = .002; story order, F(2, 149) = 5.76, p = .004.

**Suggestibility by observer-rated emotion.** Analyses by emotion condition showed that children were more suggestible in the negative emotion conditions than in the happiness condition. As discussed above, however, according to observers, some children reacted with sadness and others with anger in both negative emotion conditions. To find out whether sadness, anger, or both negative emotions were associated with greater suggestibility, we also examined whether children rated by observers as happy, angry, and sad differed in their vulnerability to misleading questions. We conducted a repeated measures ANCOVA (controlling for recall and story order) on suggestibility. This analysis included observer-rated emotion nested within subject, age group, and their interaction. Post hoc tests were conducted using Tukey–Kramer pairwise comparisons (p < .05). The results showed a significant main effect of observer-rated emotion, F(2, 91) = 21.18, p < .0001. As shown in Table 2 (bottom), children rated as sad were more suggestible than children rated as angry or happy. In addition, 4-year-olds were more suggestible (Madj = 3.65, SE = 0.17) than were 6-year-olds (Madj = 2.82, SE = 0.17), F(1, 75) = 10.56, p = .002. The covariates were significantly related to suggestibility: recall, F(1, 141) = 8.18, p = .005; story order, F(2, 141) = 5.72, p = .004.

Misleading questions about outcomes and consequences were framed differently depending on whether they followed the happiness elicitation or the anger or sadness elicitation (see Table 1, bottom). Therefore, the analysis above was repeated using a suggestibility score based only on children’s responses to the misleading questions about settings, goals, and agents. These misleading questions addressed identical information and were framed identically in all conditions. The results again showed a significant main effect of observer-rated emotion, F(2, 91) = 11.92, p < .0001. Post hoc tests (Tukey–Kramer, p < .05) showed that children rated as sad were more suggestible (Madj = 2.42, SE = 0.08) than children rated as angry (Madj = 1.85, SE = 0.12) or happy (Madj = 2.03, SE = 0.10). In addition, 4-year-olds were more suggestible (Madj = 2.40, SE = 0.11) than were 6-year-olds (Madj = 1.80, SE = 0.11), F(1, 75) = 14.75, p = .0003. The covariate, recall, was significantly related to suggestibility, F(1, 141) = 5.02, p = .03.

In summary, 4-year-olds were more vulnerable to agreeing with misleading questions than 6-year-olds. Analyses by emotion condition indicated that children were more suggestible in the negative emotion conditions than in the happiness condition. Because some children reacted with sadness and others with anger in both negative emotion conditions, however, we also examined children’s suggestibility on the basis of observers’ ratings of children’s emotions. Those analyses showed that the greater suggestibility of children in the negative emotion conditions could be attributed to children who expressed sadness.

The finding that sadness was associated with greater suggestibility is open to two alternative interpretations: Children may be more suggestible when they are feeling sad—a transitory emotional state effect. Alternatively, those children who tend to react to negative outcomes with sadness may be more suggestible—a personality trait effect. To find out whether children’s transitory emotional states influenced their suggestibility, we conducted an additional analysis. There were 19 children (5 four-year-olds and 14 six-year-olds) who were rated by observers as displaying happiness in the happiness condition, sadness in the sadness condition, and anger in the anger condition. We conducted a repeated measures ANCOVA, controlling for recall, on the suggestibility scores for this subset of children. This analysis included emotion condition, age group, and their interaction. The results showed that children's vulnerability to misleading questions differed depending on their transitory emotional state, F(2, 33) = 8.07, p = .001. Post hoc tests (Tukey–Kramer, p < .05) showed that children reacted more suggestible when expressing sadness (Madj = 3.51, SE = 0.38) than when expressing anger (Madj = 2.59, SE = 0.32) or happiness (Madj = 1.97, SE = 0.38). For this smaller group of participants, suggestibility did not differ significantly by age group, F(1, 17) = 3.20, p = .09. The covariate, recall, was marginally related to suggestibility, F(1, 33) = 3.89, p = .06.

**Discussion**

Consistent with previous research, 4-year-olds were more vulnerable to misleading questions than 6-year-olds. Younger children’s greater suggestibility was accounted for in part by the fact

---

**Table 2**

*Mean Number of Incorrect Responses to Leading Questions by Emotion Condition and by Observer-Rated Emotion (Experiment 1)*

<table>
<thead>
<tr>
<th>Emotional State</th>
<th>Happiness (H)</th>
<th>Anger* (A)</th>
<th>Sadness* (S)</th>
<th>Contrasts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Condition</strong></td>
<td>M</td>
<td>Madj</td>
<td>SE</td>
<td></td>
</tr>
<tr>
<td>Happiness (H)</td>
<td>2.87a</td>
<td>3.69b</td>
<td>3.36b</td>
<td>H vs. A: t(149) = 4.71, p = .0001, ( r_{pb}^2 = .13 )</td>
</tr>
<tr>
<td>Anger (A)</td>
<td>2.86</td>
<td>3.66</td>
<td>3.37</td>
<td>H vs. S: t(149) = 2.98, p = .01, ( r_{pb}^2 = .06 )</td>
</tr>
<tr>
<td>Sadness (S)</td>
<td>2.86</td>
<td>3.66</td>
<td>3.37</td>
<td>A vs. S: t(149) = 1.73, p = .09, ( r_{pb}^2 = .02 )</td>
</tr>
<tr>
<td><strong>Observer-rated emotion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of stories</td>
<td>M</td>
<td>Madj</td>
<td>SE</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>2.68</td>
<td>2.62</td>
<td>3.99b</td>
<td>H vs. A: t(91) = 1.34, p = .38, ( r_{pb}^2 = .02 )</td>
</tr>
<tr>
<td>39</td>
<td>2.79</td>
<td>3.08</td>
<td>3.84</td>
<td>H vs. S: t(91) = 6.40, p = .0001, ( r_{pb}^2 = .31 )</td>
</tr>
<tr>
<td>110</td>
<td>0.16</td>
<td>0.20</td>
<td>0.13</td>
<td>A vs. S: t(91) = 3.43, p = .002, ( r_{pb}^2 = .11 )</td>
</tr>
</tbody>
</table>

**Note.** Values with different subscripts differ significantly at the .05 level based on Tukey–Kramer pairwise comparisons. Adjusted means controlled for the amount of story information recalled. SE refers to the standard error for the adjusted means.

* Observers’ ratings indicated that some children reacted with sadness and others with anger in both negative emotion conditions.
that they recalled less information than older children. Even after we controlled for story recall, though, 4-year-olds were more vulnerable to suggestion than 6-year-olds.

Children’s emotions did not affect the amount of story information they recalled but did influence their vulnerability to misleading questions about the stories. Specifically, analyses by emotion condition indicated that children were more likely to agree with misleading questions when feeling negative emotions than when feeling happy. Because some children reacted with sadness and others with anger in both negative emotion conditions, we also examined children’s suggestibility on the basis of observers’ ratings of children’s emotions. The results showed that the greater suggestibility of children in the negative emotion conditions was due to children who expressed sadness. The effect of sadness on suggestibility was not due to poorer memory for story information. Children rated as sad were more suggestible, even after we controlled for the amount of story information they remembered.

In naturalistic studies of children’s suggestibility, it is difficult to tease apart the contributions of transitory emotional states versus more enduring personality traits. For example, Goodman et al. (1994) found that children who felt sad following a painful medical procedure were more suggestible concerning what had occurred than children who felt proud. It is not clear, though, whether children’s temporary feelings of sadness affected their suggestibility or whether children’s emotions reflected enduring traits, such as low self-esteem, that are associated with greater suggestibility (Baxter et al., 2003). In the current study, to tease apart these alternative interpretations of the findings, we examined the suggestibility of those children for whom our emotion elicitation procedure worked perfectly; that is, they reacted to goal attainment with happiness, to the frustration of their goal-directed actions with anger, and to irrevocable failure with sadness. The results again demonstrated that children were more suggestible when expressing sadness than anger or happiness. Thus, it appears that children’s suggestibility was affected by their current emotional state. Transitory feelings of sadness led to greater suggestibility over and above any contributions of lasting personality traits such as low self-esteem or compliance.

As predicted, then, children were more vulnerable to agreeing with misleading questions when expressing sadness than when expressing anger or happiness. These findings suggest that children’s vulnerability to misleading questions is influenced not simply by arousal but by the particular emotion they are feeling at the time of retrieval.

Experiment 1 had several limitations. First, because we elicited emotion by manipulating whether children received a prize, stories in the happiness condition had positive outcomes and consequences for the child, whereas stories in the anger and sadness conditions had negative outcomes and consequences for the child. As a result, differences in the likelihood of assenting to misleading questions about story outcomes and consequences could have been due to differences in the way these questions were framed, or to differences in the memorability of positive versus negative events, rather than to children’s emotional state. Second, presenting children with multiple stories allowed for the possibility of a practice effect (which was found) and carryover of emotion across stories (which was not found). Third, in Experiment 1, the procedure used to elicit emotion was not entirely effective. Anger was observed most frequently in the anger elicitation condition, but frustrating children’s attempts to attain a prize still evoked more sadness than anger. Finally, the mechanism underlying the finding that sad children assented to more misleading questions than happy or angry children remained to be examined. Experiment 2 was designed to address these issues.

Experiment 2

Overview

In Experiment 2, we used a between-subjects design in which each child heard a single, identical story. This was done to ensure that all participants were given information of equal memorability and to eliminate the possibility of order effects across stories and of carryover of emotion across elicitation procedures. Because children are often asked to testify about negative events, we chose a negative story rather than a positive or neutral story.

We also used an alternative procedure for eliciting emotions based on methods developed by Liwag and Stein (1995). We asked children to recall autobiographical events that had made them feel happy, angry, or sad. We used photographs of children with happy, angry, or sad facial expressions to prompt recall. Recalling autobiographical events is one of the most widely used methods for evoking discrete emotions in children and has been shown to be effective at yielding statistically significant differences on emotion measures between conditions (for a detailed review, see Bremer, 2000). Moreover, simply viewing facial expressions of emotion can induce self-reports of congruent emotion through contagion effects (e.g., Hess & Blairy, 2001). The potency of emotional expressions also has been demonstrated using behavioral measures. For example, in adults (Hess, Sabourin, & Kleck, 2007) and in infants (Balaban, 1995), eyeblink startle is potentiated when participants view photographic slides of angry faces and is reduced when they view happy faces.

Experiment 2 also was designed to investigate the mechanism behind sad children’s greater assents to misleading questions. Children may agree with misleading questions posed by adults while knowing the suggestions to be false (acquiescence), or they may agree because the misleading information has altered their representation of an event. Both forms of suggestibility are of grave concern in legal settings, but changes in representations are likely to persist across interviewers. For this reason we included two interviewers in Experiment 2. The first interviewer read children a story; elicited emotion by having children recall happy, angry, or sad autobiographical events; and then asked children leading questions about the story they had heard. This experimenter then left the room and a second experimenter entered and asked children to recall the story. A second experimenter was used to reduce any pressure that children might feel to incorporate misleading information from questions asked by the first experimenter into their recall of the story. We predicted that children would be more suggestible when sad than when happy or angry, both agreeing with more misleading questions and incorporating more misleading information when recalling the story.

Method

Participants. Children (N = 60) from preschool and kindergarten classrooms in Orange County, California, participated in the study. Children ranged in age from 4 years 7 months to 6 years 7
months ($M = 5$ years $6$ months). Thirty-four (56%) of the children were male. The ethnicities of the children were Caucasian (83%), Middle Eastern (7%), Asian (5%), Hispanic (3%), and other (2%), with the majority coming from middle- to upper middle-income homes.

**Design.** Children were randomly assigned to emotion conditions (happy, angry, sad), with the constraints that each condition included a roughly equal number of boys and girls and of preschool and kindergarten children.

**Procedure.** Children were interviewed individually by research assistants who were blind to the study hypotheses. The first part of the interview (responses to emotion elicitation questions, mood assessment questions, and leading questions about the story) was recorded in writing. The second part of the interview (story recall) was audiotaped and later transcribed.

To obtain a baseline assessment of children’s emotional state, the experimenter first presented line drawings of a happy, mad, and sad face and asked children to point to the person feeling (happy/mad/sad). The order of the emotion faces was counterbalanced. All children were able to identify the three emotional expressions correctly. Children were then asked to point to the face that showed how they felt.

The experimenter then read children a modified version of the “Splash the Dolphin” story that had been used in Experiment 1. The story was accompanied by brightly colored pictures. The story contained five types of information: (a) the setting that introduced Splash and his friend Sally Seal who was having a birthday; (b) Splash’s goal to give a ball to Sally Seal for her birthday; (c) an agent, Ollie Octopus, who thwarts that goal by taking the ball; (d) the outcome that Splash was not able to give the ball to Sally; and (e) the consequence that Sally was not able to play with the ball.

After a 1-min distraction task (felt pieces), children were given an autobiographical recall task designed to elicit a mild state of happiness, anger, or sadness. Children viewed four photographs of children’s faces displaying either a happy, angry, or sad expression. As each picture was presented, the experimenter said, “This child feels happy/mad/sad. Can you tell me about a time you felt happy/mad/sad?” To elicit detailed accounts, for the final picture, the experimenter also asked why the event the children described had made them happy/ sad/mad, what they thought about when the event happened, what they wanted to do, and what they really did. After the emotion elicitation procedure, children were asked to indicate their current feelings by pointing to a drawing of a happy, angry, or sad face.

Suggestibility concerning the story was assessed next. The experimenter said, “Tell me if these things happened in the story” and proceeded to present 10 leading questions. Five questions presented correct information (e.g., “Splash the Dolphin lives in the ocean, doesn’t he?” “Did you see the picture of Ollie Octopus?”). Preliminary analyses showed that the emotion condition had no impact on children’s responses to these questions. Five questions presented misleading information concerning the story setting (“Did you see the picture of Sally Seal’s birthday cake?”), goal (“Splash wanted to give Sally Seal his favorite toy boat, didn’t he?”), agent (“Ollie Octopus took Splash’s toy boat, didn’t he?”), outcome (“Splash found his red ball, didn’t he?”), and consequence (“Did you see the picture of Sally Seal playing with the ball?”).

The leading questions were followed by distraction tasks lasting a total of 3 min (coloring, sorting plastic bears). A second experimenter then entered the room, was introduced to the child, and the first experimenter left. The second experimenter told the child that she had not heard the story about Splash the Dolphin and asked the child to tell her everything that happened in the story. When the child stopped speaking, the experimenter followed up with prompts (e.g., “Anything else?”) and open-ended questions (“What did Splash the Dolphin want to give Sally Seal for her birthday?” “What did Ollie Octopus do?”). Finally, the first experimenter returned, completed the story with a happy ending, and gave the child a small gift in appreciation for his or her participation.

**Data coding.** Data were coded from written transcripts and audiotapes by research assistants who were blind to the study hypotheses and to children’s demographic information, emotion condition, and self-report of emotion. Two research assistants coded children’s responses to the emotion elicitation questions; a second pair of research assistants coded children’s responses to leading questions and story recall in separate passes through the data. Coding disagreements were resolved through discussion. Responses to each emotion elicitation question (e.g., “Can you tell me about a time you felt happy/mad/sad?”) were typically one or two sentences in length. Responses to each question were given a single code indicating whether they described (a) positive events (e.g., “My cousin came over and we went to Disneyland” “Playing in the sandbox”), (b) negative events involving interpersonal conflict (e.g., “When my sister kicked me” “He pushed me for no reason”), (c) negative events involving loss (e.g., “When Grandma died” “I was alone and didn’t have anyone to play with”), (d) both interpersonal conflict and loss (e.g., “My big sister took the computer away when I was playing,” “My parents said clean up your room and no watching TV or playing, and I didn’t want to”), or (e) miscellaneous responses (“I don’t get mad”). Analysis of interrater agreement showed a kappa value of .85.

Responses to leading questions were coded as 1 if the child agreed and as 0 if the child disagreed. Total scores for the five correct leading questions ranged from 3 to 5 ($M = 4.87, SD = 0.39$). Total scores for the five misleading questions ranged from 0 to 5 ($M = 2.72, SD = 1.70$). Story recall was coded by checking off the information children provided either during free recall or in response to open-ended questions on a form that listed each detail in the story. A total recall score of 39 was possible, representing 13 setting, 9 goal, 9 agent, 4 outcome, and 4 consequence details. Recall scores ranged from 1 to 17 ($M = 8.70, SD = 3.68$). Children’s recall of the story also was coded for intrusions of information that had been presented in the misleading questions. For example, one child recalled that, “Splash the Dolphin gave the seal a toy boat but then he found the red ball that he likes to play with” (emphasis added to show intrusions). Thirty-five percent of the children ($n = 21$) included information from the misleading questions at least once during recall; 3 of these children included such information despite having replied “no” to the pertinent misleading question. Across all children, the number of intrusions of misleading information ranged from 0 to 5 ($M = 0.55, SD = 1.03$). Recall also was coded for intrusions related to the story that had not been presented in misleading questions (e.g., “He was a bad octopus”). Eighteen percent of children included such extraneous information (range = 0 to 4; $M = 0.35, SD = 0.86$). Two coders independently coded recall and intrusions for one third of the children. Analyses of interrater agreement showed kappa values of .71 for recall and .76 for intrusions.
Results

Emotion elicitation. In the happiness condition, 81% of the children indicated that they felt happy (14% angry; 5% sad). In the anger condition, 65% indicated that they felt angry (29% sad; 6% happy). In the sadness condition, 67% of the children indicated that they felt sad (28% angry; 5% happy), \( \chi^2(4, N = 60) = 44.77, p < .0001 \). Thus, on the basis of children’s self-reported emotion, the emotion elicitation procedure evoked the intended emotion in the majority of children in every condition. As in Experiment 1, however, correspondence between the intended and reported emotion was higher for the happiness condition than for the negative emotion conditions. The likelihood of a match between emotion condition and self-reported emotion was not significantly associated with children’s age in months, \( r(58) = .19, p = .14 \). Children’s responses to the emotion elicitation questions also were examined. All 20 children in the happiness condition described positive events. Nineteen children in the anger condition described negative events (16 interpersonal conflict and loss, 3 interpersonal conflict only); 1 child gave a miscellaneous response. Nineteen children in the sadness condition described negative events (14 interpersonal conflict and loss, 2 interpersonal conflict only, 3 loss only); 1 child gave a miscellaneous response. Prior research has shown that although interpersonal conflict tends to elicit anger and loss tends to elicit sadness, both types of negative events can elicit either emotion in children as well as in adults depending on whether they believe that they can reinstate the threatened goal (e.g., Levine, 1995; Oatley & Johnson-Laird, 1987). Thus, all but 2 of the children gave appropriate responses to the emotion elicitation questions.

Recall. We conducted an ANCOVA to examine the amount of story information recalled by emotion condition, controlling for children’s age in months. As in Experiment 1, children recalled more information with increasing age, \( F(1, 59) = 4.88, p = .03 \), but no significant differences were found in the amount of story information recalled by children in the happiness, anger, and sadness conditions, \( F(2, 59) = 1.01, ns \).

Assents to misleading questions. To assess the effects of children’s emotions on suggestibility, we first conducted an ANCOVA on the number of assents children made to misleading questions. This analysis included emotion condition as the between-subject-factor, and controlled for children’s age in months, the amount of story information recalled, and the number of assents to correct leading questions. Though the \( F \) value for emotion condition did not reach significance, \( F(2, 59) = 2.02, ns \), we proceeded to conduct \( t \) tests to test the a priori hypothesis that children would be most suggestible in the sadness condition. The results showed that children in the sadness condition agreed with significantly more misleading questions (\( M_{sad} = 3.20, SE = 0.32 \)) than did children in the happiness condition (\( M_{happ} = 2.33, SE = 0.31 \)). \( r(38) = 1.98, p = .05 \), \( r^2 = .09 \). Children in the sadness condition also agreed with more misleading questions than did children in the anger condition (\( M_{anger} = 2.62, SE = 0.31 \)), but this difference did not reach significance, \( r(38) = 1.30, p = .20 \). \( r^2 = .04 \). The number of assents to misleading questions in the happiness and anger conditions did not differ significantly, \( r(38) = 0.66, p = .51 \), \( r^2 = .01 \). In addition, vulnerability to misleading questions decreased with age, \( F(1, 59) = 23.58, p < .0001 \).

Intrusions of misleading information. The percentage of children who included information from the misleading questions when recalling the story (at least once vs. never) was 50% in the sadness condition, 40% in the happiness condition, and 15% in the anger condition, \( \chi^2(2, N = 60) = 5.71, p = .06 \). We conducted an ANCOVA (controlling for age and recall) to examine the number of intrusions of misleading information each child made by emotion condition. The results showed a significant effect of emotion condition, \( F(2, 59) = 4.39, p = .02 \). Children in the sadness condition included more misleading information during recall (\( M_{sad} = 1.02, SE = 0.20 \)) than did children in the happiness condition (\( M_{happ} = 0.46, SE = 0.20 \)) or the anger condition (\( M_{anger} = 0.17, SE = 0.20 \)). Sadness versus happiness: \( t(38) = 1.94, p = .05 \), \( r^2 = .09 \); sadness versus anger: \( t(38) = 2.91, p = .005 \), \( r^2 = .18 \); happiness versus anger: \( t(38) = 1.01, p = .32 \), \( r^2 = .03 \). In addition, younger age, \( F(1, 38) = 11.48, p = .001 \), and recalling more information from the story, \( F(1, 59) = 8.36, p = .006 \), were associated with more intrusions of misleading information. Finally, we repeated this analysis for intrusions of information that had not been suggested in misleading questions. The results showed no significant effects of emotion condition, age, or recall. Thus, sad children’s greater number of intrusion errors was specific to material that had been suggested in misleading questions.

Discussion

Experiment 2 provided two measures of suggestibility: assents to misleading questions and subsequent incorporation of the misleading information when recalling the story for a new interviewer. As found in Experiment 1, both assents to misleading questions and intrusions of misleading information in recall decreased with...
Children’s emotions did not affect the amount of information recalled correctly, nor did their emotions affect the likelihood of including extraneous information during recall that had not been presented in misleading questions.

Children’s emotions did affect the frequency of agreeing with misleading questions and the frequency of subsequently incorporating misleading information when recalling the story. As in Experiment 1, sad children agreed with misleading questions significantly more often than did happy children. Sad children also tended to agree with misleading questions more often than did angry children, but this difference did not reach significance. Thus, the tendency for sad children to assert more frequently than happy or angry children was found in both studies but was more pronounced in Experiment 1. The precise source of this difference between the two experiments is not known but may have been due to the intensity of the emotions elicited or to the effects of recalling the story before misleading questions (Experiment 1) versus after (Experiment 2). Past research has shown that sadness is associated with appraisals of uncertainty, whereas happiness and anger are associated with appraisals of certainty (e.g., Tiedens & Linton, 2001). Thus, in Experiment 1, children’s emotions may have affected their confidence during story recall, which in turn affected their vulnerability to subsequent misleading questions.

Children’s intrusion errors in Experiment 2 provided further evidence of the effects of sadness on suggestibility. Sad children included significantly more misleading information during recall than did happy or angry children. Children were retelling the story to a new interviewer, and the initial interviewer was not in the room. Thus, the effects of sadness on suggestibility cannot be explained simply in terms of acquiescence to misleading questions. Sad children appear to have incorporated more information from misleading questions into their representations of story events.

**General Discussion**

This research investigated the effects of sadness, anger, and happiness on children’s memory and suggestibility concerning story events. To our knowledge, it is the first investigation to experimentally manipulate discrete emotions while holding constant the material children were asked to remember. The key finding was that 4- to 6-year-old children were more suggestible when sad than when angry or happy. Sadness led to greater suggestibility even after we controlled for children’s memory for story information. In Experiment 1, children rated as sad were more vulnerable to agreeing with misleading questions than children rated as happy or angry. In Experiment 2, sad children again tended to agree more with misleading questions and were significantly more likely than happy or angry children to incorporate this misleading information when asked subsequently to recall the story. Past research on emotion and suggestibility has yielded mixed findings concerning whether emotional arousal is associated with greater or lesser suggestibility. The results of this research demonstrate that children’s vulnerability to misleading information is influenced not simply by arousal but by the particular emotion they are feeling at the time of retrieval.

Consistent with previous research, children’s ability to recall story events and resist misleading questions increased with age. Cognitive factors, such as increasing narrative skill, knowledge, and memory abilities, may partially account for these developmental differences. Older children typically know more about events and may encode them more completely than younger children, leaving their memories less susceptible to misleading questions. Children’s retrieval skills and source monitoring abilities also improve over the preschool years (for reviews, see Brainerd & Ornstein, 1991; Pipe, Thierry, & Lamb, 2007). Even after controlling for story recall, however, we found that children’s resistance to misleading information increased with age. Independent of the strength of their memory for the events in question, older children may be less trusting of adults’ omniscience and more willing to contradict them (Ceci & Bruck, 1993). Also, as children gain experience in school, they become familiar with having adult authority figures ask them for information rather than simply turning to adults as sources of information (Lamb, Orbach, Warren, Esplin, & Herkowitz, 2007). Thus, a range of cognitive and pragmatic factors likely contributed to children’s enhanced memory performance and decreased suggestibility with age, a robust trend that extends to children both younger than (e.g., Quas et al., 2007) and older than (e.g., Roebers, Schwarz, & Neumann, 2005) the children who participated in the current research.

In both experiments, children’s emotions did not affect the amount of story information they recalled. We elicited emotions in children after story information had been presented. Thus, the studies assessed the effects of children’s emotions on memory at the time of retrieval. Discrete emotions may have more pronounced effects on encoding than on retrieval processes, particularly in situations involving mild emotions and brief retention intervals, as was the case in these studies (e.g., Levine & Burgess, 1997; Reisberg & Heuer, 2004).

**Discrete Emotions and Suggestibility**

The finding that children were more resistant to suggestion when angry or happy than when sad is consistent with theory and research concerning the differing functions and problem-solving strategies associated with discrete emotions. People feel angry when they believe that goal reinstatement is possible (e.g., Levine, 1996; Stein & Levine, 1987) or have a sense of power or control in a situation (Scherer, 2003; Smith & Lazarus, 1993). If the function of anger is to prepare individuals for confrontation concerning goal reinstatement, angry people may resist suggestions made by others concerning those events. People feel happy when they have attained their goals. This success leads to feelings of self-efficacy (Izard & Ackerman, 2000). Thus, anger and happiness are both associated with feelings of self-efficacy that may allow children to resist misleading suggestions.

People feel sad when they appraise goal failure as irrevocable. Once evoked, sadness often leads to revising beliefs and expectations and substituting more realistic goals (Levine, 1996; Oatley & Johnson-Laird, 1987; Smith & Lazarus, 1993). Sadness also leads to increased reliance on others for help with a predicament (Izard & Ackerman, 2000). For example, Saarni (1997) found that children identified problem solving as the best strategy for coping with situations that elicited anger, but they identified support seeking as the best strategy for coping with sadness. In situations in which one’s efforts have been ineffectual, changing one’s views and seeking help is a functional response. When sad, then, children may have a general sense that their own understanding of a situation and resources are inadequate and turn to others for...
assistance. Greater reliance on help from outside sources would increase suggestibility.

An alternative explanation for children’s greater suggestibility when feeling sad is that children were less motivated to retrieve the story information needed to distinguish between actual and suggested events. Motivation is just as essential, though, for retrieving story information from memory. The finding that children retrieved as much story information when sad as when angry or happy suggests that lower motivation is not an adequate explanation for children’s greater suggestibility when sad.

Limitations and Directions for Future Research

This research represents an important first step toward clarifying the effects of discrete emotions on children’s suggestibility, but limitations should be noted. First, the methods used to evoke discrete emotions in children were only partially successful. In both experiments, correspondence between intended and reported emotions was higher for happiness than for sadness or anger. This may be because negative events (e.g., not getting a prize; recalling a negative autobiographical experience) often elicit a blend of negative emotions (Levine, 1995). In addition, children may report emotions that they think will please the experimenter rather than their actual feelings. Indeed, after failing to receive a prize in Experiment 1, many children reported feeling happy even though observers rated the majority of children as expressing sadness or anger. On the basis of his review of the challenges involved in inducing and assessing emotions in children, Brenner (2000) recommended that investigators use a variety of procedures and measures. Our confidence in the current findings is increased by the fact that, across different procedures for eliciting emotions (giving or withholding prizes; emotional photographs and autobiographical recall) and different measures for assessing emotions (coding of children’s expressions; self-report using faces), sadness led to greater suggestibility.

Another limitation is that the current research assessed the effects of sadness on suggestibility in children within the narrow age range of 4 to 6 years. Past research offers mixed results concerning whether the effect of sadness on suggestibility persists or declines over the course of development. On one hand, sadness is associated with feelings of low-self-efficacy and uncertainty in both children (Izard & Ackerman, 2000) and adults (Tiedens & Linton, 2001). Moreover, low self-efficacy and uncertainty have been found to be associated with greater suggestibility in both children (e.g., Bruck & Melnyk, 2004; Burgwyn-Bailes et al., 2001; Chae & Ceci, 2005; Howie & Dowd, 1996) and adults (Baxter et al., 2003; Singh & Guðjonsson, 1984). So the tendency of sadness to promote uncertainty about one’s representations and to increase reliance on misleading information provided by others may persist.

On the other hand, older children are less likely to rely on others for help in understanding events than young children (e.g., Gordon et al., 2001; Robinson & Briggs, 1997). If older children rely less on others when they feel sad, they may be less susceptible than younger children to incorporating misleading information into their representations of events. Indeed, in the absence of reliance on others, sadness may promote careful scrutiny of one’s own representations of events (Tiedens & Linton, 2001), limiting memory errors. For example, in a recent study, adults who felt sad about a past event rated their memory for that event as less clear than adults who felt happy about the same event. Sad adults also used a more conservative retrieval strategy that resulted in fewer schema-consistent memory errors (Levine & Bluck, 2004). Thus, further research is needed to find out whether the greater suggestibility displayed by young children when sad remains constant or decreases with age. In this research it will be important to assess whether the source of misleading information (schema-consistent recollections of the self vs. suggestions of authoritative others) is a key determinant of when sadness decreases and when it increases intrusion errors in memory.

Finally, the current research assessed children’s suggestibility over brief retention intervals using simple narratives. Future research is needed to find out whether children’s suggestibility concerning these simple narratives extends to other types of memory tasks in experimental settings such as witnessed and experienced events. Some findings suggest that the effects of sadness on suggestibility do extend beyond the time frames and materials used in these experiments. For example, Goodman et al. (1994) found that children who felt sad or ashamed about a painful medical procedure were more suggestive when later recalling the procedure than children who felt proud. To assess the generalizability of the current findings more directly, one should also examine the effects of discrete emotions on suggestibility outside of the laboratory, assessing children’s memory and suggestibility as they recall real-world events that evoke emotions of greater intensities. Longer delay periods also should be used. In real-world settings, children are often interviewed concerning a witnessed event after a considerable delay. Implanting false details into a report of an event is typically easier after a long delay, when memory traces are likely to have decayed, than after a short delay, when traces are likely to be strong (e.g., Bruck & Ceci, 1999). Thus, sadness at the time of retrieval may lead to even greater suggestibility as the delay between the event and interview increases.

Conclusions

In conclusion, this research shows that discrete emotions differ in their effects on suggestibility. The findings are of both practical and theoretical importance. On a practical level, children providing testimony in the courtroom may be asked to remember events that elicit emotions such as sadness and anger. Our findings suggest that young children are more vulnerable to leading questions and to incorporating misleading information into memory when they are feeling sad than when they are feeling angry or happy. The findings also highlight the potential risk of suggestive questioning about past experiences in therapeutic contexts when children may be feeling sad. With respect to researchers’ broader understanding of emotion, the debate in the suggestibility literature has long been about the extent to which emotion or stress influences suggestibility. The findings of the current study demonstrate that emotion, even negative emotion, does not have a uniform effect on children’s suggestibility. To understand how emotion affects children’s reports, one must take the functions of discrete emotions into account.
References


Quas, J. A., Goodman, G. S., Bidrose, S., Pipe, M.-E., Craw, S., & Ablin,


Received October 10, 2005
Revision received November 6, 2007
Accepted November 27, 2007