

Reality Compared With Its Alternatives: Age Differences in Judgments of Regret and Relief

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Three experiments examined developmental change in children's understanding of regret and relief, two second-order emotions whose quality depends on a comparison between reality and "what might have been." In Experiment 1, participants 7 years of age and older, but not 5-year-olds, made regret-related emotion-response judgments that took into account a comparison of reality with its alternatives. In Experiment 2, 5-year-olds judged that an individual would feel better, rather than worse, when a counterfactual outcome was better than what actually occurred (the opposite of the pattern found with older children and adults). Experiment 3 focused on the understanding of relief. In contrast to the findings from Experiment 1, the 7-year-olds in Experiment 3 made their judgments solely on the basis of what actually occurred.

It is an undeniable, but sometimes tragic, fact of life that the arrow of time moves in just one direction. As obvious as this may be, it does not deter one from reflecting on "what might have been" if a different course of action had been taken. Such counterfactual thinking may be quite adaptive (Roese, 1997). When the outcome of a decision to follow a particular course of action is negative, there is potential benefit in thinking about alternative courses of action that might have produced a more positive outcome. Even when an outcome is positive, there may be value in reflecting on the decisions that helped one avoid potentially less positive results.

The adaptive value of this process is closely linked to the affective consequences of counterfactual thinking. Reflecting on ways in which events might have turned out better, for example, is associated with the experience of regret. Recent research on judgment and decision making has highlighted the importance of regret as a factor influencing individuals' learning from decisions and their judgments about future courses of action (Bar-Hillel & Neter, 1996; Mellers, 2000; Mellers & McGraw, 2001; Ritov, 1996; Roese, 1997; Zeelenberg, 1999; Zeelenberg, van Dijk, Manstead, & van der Pligt, 2000). This research has demonstrated that a consideration of the factors that influence regret is necessary to explain not only the nature of the action decisions that people make but also why they sometimes avoid making any decision at all (Anderson, 2003; Beattie, Baron, Hershey, & Spranca, 1994).

Regret is one of a set of complex, second-order emotions whose quality and intensity depend not only on the exact nature of the outcome of a situation but also on a comparison of reality to its alternatives (Kahneman & Miller, 1986; Miller & Taylor, 1995; Roese, 1997; Roese & Olson, 1995). In general, *regret* is experienced in situations in which the actual course of action one has

chosen to follow produces an outcome whose quality is less positive than that of an outcome that reasonably would have occurred had some alternative course of action been followed (Kahneman & Miller, 1986; Mellers, 2000; Ritov, 1996; Roese, 1994; Zeelenberg, 1999; Zeelenberg et al., 2000). Closely related to regret is *relief*, an emotion that is experienced in situations in which (a) the actual outcome of a course of action is positive or neutral and (b) a possible alternative decision would have resulted in a more negative outcome.

An understanding of counterfactual-reasoning-based emotions not only is important for a general understanding of human behavior but also plays a crucial role in individuals' ability to make appropriate behavioral decisions for themselves (Amsel, 2003). The understanding of these emotions also contributes to the selection of effective consoling strategies for both the self and others. For example, use of "it could have been worse" as a self-consoling strategy has been found to occur more often in people who consider themselves lucky and optimistic than in people who are pessimistic and consider themselves generally unlucky (Wiseman, 2003). Similarly, anyone who has ever experienced a time of significant misfortune in his or her life is familiar with the tendency for others to attempt to provide consolation by pointing out that no matter how bad the outcome really was, it was not as bad as it might have been.

Research on children's understanding of emotions has been dominated by work on their understanding of the basic emotions of happiness, sadness, anger, and fear. Research in this area suggests a well-developed understanding of the nature of these emotions, and of the kinds of situations that produce these emotions, by 5 years of age (e.g., Fabes, Eisenberg, Nyman, & Michelieu, 1991). Children at this age also understand the ways in which the anticipation of the basic emotions affects behavior (Denham, 1986, 1998; Denham & Couchard, 1990; Denham, Zoller, & Couchard, 1994; Strayer, 1986). The somewhat smaller literature on children's understanding of the kinds of situations that evoke the more complex self-conscious emotions (pride, guilt, shame, embarrassment) suggests that the understanding of these emotions develops somewhat later, usually after age 7 (Arsenio & Lover, 1999; Berti,

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We wish to express our appreciation to the principal, teachers, and students of St. Pius X school for their generous contributions to the project.

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Garattoni, & Venturini, 2000; Harris, Olthof, Terwogt, & Harman, 1987; Harter & Whitesell, 1989; Nunner-Winkler & Sodian, 1988; Thompson, 1987).

Conspicuously absent from the developmental emotion-understanding literature has been research on children's understanding of the counterfactual-reasoning-based emotions. The sole exception is a recent study of children's understanding of regret (Amsel et al., 2003). Participants in the Amsel et al. (2003) study played a card game and reported on their own feelings or made judgments about the emotional responses of someone else playing the card game. In the card game, the player sometimes had to make a choice between two cards. When there was not a positive outcome for the player, it was sometimes the case that "the card not chosen" would have produced a more positive outcome; in other cases, the card not chosen would not have produced a better outcome than the outcome that actually occurred.

Amsel et al. (2003) found that even preschool-age children could judge accurately how they or another player would have felt if the card not chosen had actually been chosen. This finding is consistent with previous evidence suggesting that by age 5, children are capable of engaging in the kinds of counterfactual reasoning processes that are necessary (but not sufficient) for the understanding of regret and relief (Harris, German, & Mills, 1996; Kuczaj & Daly, 1979; Robinson & Beck, 2000). However, when the preschool children in the Amsel et al. study were asked how they felt in the actual situation, or how another player would feel in that situation, they showed no evidence of having compared what actually happened with what might have been. Thus, for example, for the case in which the card not chosen would have produced a more positive outcome, the preschoolers judged that there would be no change in the player's feelings about the actual outcome after learning that the other card would have produced a better result. In contrast, beginning at age 7, children judged that the quality of a player's emotional responses to a particular outcome would become more negative after the player learned that the card not chosen would have resulted in an outcome that was more positive than the outcome that actually occurred. Amsel et al. (2003; see also Amsel & Smalley, 2000) concluded that it is not until children are 7 or 8 years of age that they compare what actually occurred with alternatives to reality when making judgments of emotional responses. Instead, younger children base their judgments solely on the quality of the actual outcome itself.

The present article reports the findings from three experiments designed to further examine children's understanding of the counterfactual-reasoning-based emotions. Participants in the present study were presented with stories and were required to make judgments about the emotional responses of the stories' characters. As such, the focus of the study was on children's understanding of emotional responses in others, rather than on children's experiencing of the emotions themselves. Research on children's earliest developing understanding of the emotions of others has linked the development of this understanding to the developmental changes that occur in children's understanding of mind during the preschool years (see Banerjee, 1997, for a review of the relevant literature). By age 4 or 5, however, children's development of an adultlike theory of mind is sufficient to support an analysis of the way in which situational factors interact with beliefs and desires to affect emotional responses (Saarni, Mumme, & Campos, 1998).

The present study used as its dependent variable a measure similar in general form to the Counterfactual Inference Test developed by Hooker, Roese, and Park (2000). Specifically, participants in the present study were presented with stories that always described the experiences of two characters. In all stories, the two characters were in matching situations and experienced identical outcomes. In addition, the outcome was always the consequence of a conscious decision that the characters made. The stories, however, also always included one element that was different for the two characters. Although the exact nature of this differentiating element varied somewhat across the different stories used in the different experiments, this event always related to a factor known to be relevant to judgments of regret and relief when those judgments were made by adults.

The participant's task in all cases was to judge whether the two characters in any given story would feel the same about the outcome or whether one would feel better or worse than the other. Thus, whereas Amsel et al. (2003) indexed children's emotion understanding by measuring whether children judged that the intensity of an emotional response would change after an individual learned what would have happened if a different choice had been made, in the present study participants simply had to judge whether one individual would be likely to feel differently than another. In general, previous research has found that comparison judgments like these are easy for children to make, and tasks requiring such judgments tend to serve as sensitive measures of children's emotion understanding (e.g., Harter, 1981, 1982).

Experiment 1

Amsel et al. (2003) examined whether children of different ages understood that an individual's response to an outcome could be affected by "what might have been." Experiment 1 of the present study examined children's understanding of a somewhat more subtle aspect of the way in which situational factors affect counterfactual-reasoning-based emotional responses: the effects of event mutability on the experience of regret. Previous research by Kahneman and others (Gleicher et al., 1990; Kahneman & Miller, 1986; Kahneman & Tversky, 1982; Landman, 1987; Roese, 1997; Roese & Olson, 1995) has shown that even when comparing two situations in which what might have been is better than what actually occurred, adults judge that regret is particularly likely to be experienced, or is likely to be experienced more intensely, when the event that actually occurred is highly cognitively mutable.

One factor that affects mutability is the typicality of the action that produced the negative outcome (Kahneman & Miller, 1986). In general, atypical courses of action are more mutable than are typical courses of action. As a result, the same negative outcome will produce greater feelings of regret following a decision to take an atypical course of action than following a decision to take a typical course of action. Thus, for example, greater feelings of regret are likely to be experienced if one is late for work because of a traffic jam on a day when one took a new route to work than on a day when one took one's typical route to work. Greater feelings of regret are also more likely to be experienced following decisions leading to acts of commission (deciding to take action to change a situation) than following decisions leading to acts of omission (deciding not to take action in a particular situation). For example, among individuals who lose money as owners of a

particular stock, greater regret is likely to be felt by someone who has recently sold a different stock in order to buy the stock in question than by someone who has owned this particular stock for a period of time and has simply chosen recently not to sell it.

To examine children's understanding of the influence of these factors on regret, we presented participants in Experiment 1 with four two-character stories in which each character was faced with a choice of two possible courses of action. In all cases, the general features of the situation, the actual outcome of the situation, and the alternative possible outcome of the situation were the same for both characters. The only factor that differentiated the two characters was the nature of their decision process. In two of the stories, the course of action that was selected by both characters was described as the typical course of action for one character but as an atypical course of action for the other character. In the other two stories, the only factor differentiating the two characters was whether the decision was framed as an act of commission or an act of omission.

The participants in the experiment were 5-, 7-, and 9-year-olds and adults. We hypothesized, consistent with Amsel et al.'s (2003) findings, that the 5-year-olds would not take alternatives to reality into account when making their judgments and therefore that their modal response would be that the two characters in each story would feel the same. Of greater interest was whether children at either of the two older ages would exhibit an understanding of the effects of mutability (as related to decision typicality and whether the decision was framed as an act of omission or commission) on emotional responses.

Method

Participants. The participants were 18 five-year-old children (mean age = 5.6 years), 25 seven-year-old children (mean age = 7.8 years), 54 nine-year-old children (mean age = 9.8 years), and 83 adults. The children were all students enrolled at a private parochial elementary school. The adults were students enrolled in an introductory psychology course whose participation helped fulfill a course requirement.

Materials. Appendix A presents the four stories that were used in the experiment. In two of the stories, the course of action that was selected was a typical course of action for one character but was an atypical course of action for the other character. In the remaining two stories, the selected course of action was framed as an act of commission for one character and an act of omission for the other character. The question asked at the end of each story incorporated a reminder of the outcome and a reminder of the one critical element of the story that differentiated the two characters.

Procedure. A slightly different procedure was used with each age group. For the adults, booklets were prepared with each story printed on a separate sheet of paper. Beneath each story was printed the critical question regarding which character felt worse, and space was provided for the adults to provide a written explanation for their response. Two orderings of the stories were used in the booklets. One set of booklets (Set A) contained the stories in the following sequence: Typical/atypical 1, Omission/commission 1, Typical/atypical 2, Omission/commission 2. The ordering of the stories in the second set of booklets (Set B) was the reverse of that used for Set A. The adults were tested in groups ranging in size from 4 through 14. Forty adults received Set A booklets, and 43 adults received Set B booklets.

The two sets of booklets were also used with the 9-year-olds. The 9-year-old children were tested in two large groups. The 28 children in Group 1 received Set A booklets, and the 26 children in Group 2 received Set B booklets. For the 9-year-olds, however, the experimenter read each story aloud as the children read the story in their own booklets. The

children then indicated in writing in the booklet which character they thought would feel worse or whether they thought the two characters would feel the same. The children were also asked to write down an explanation for their response.

The booklets were not used with children in the two younger groups (the 5- and 7-year-olds). The children at these ages were each tested individually. For the 7-year-olds, each story was read aloud to the child by the experimenter. At the end of the reading of each story, the children were asked to judge the emotional responses of the two characters in the story (i.e., they were asked to indicate which character would feel worse or whether the two characters would feel the same) and were asked to explain their answers. Half the 7-year-old children were read the stories in the same sequence that was used with the Set A booklets; the reverse ordering was used for the remaining children at this age.

The 5-year-olds were presented with only two of the stories (Typical/atypical 1 and Omission/commission 1). The ordering of the stories was counterbalanced across children. The experimenter read each story to each child, and the 5-year-olds were also shown a set of pictures depicting the main events of the story. The pictures did not depict the characters' emotional responses following the stories' outcomes. After reading a story to a child, the experimenter reminded the child of the critical elements of the story and asked the child whether one character would feel worse than the other character or whether the two characters would feel the same. The children were also asked to explain their responses.

Results

Emotional response judgments. The percentage of participants at each age providing each category of response for each of the four stories is presented in Table 1. The "target" character was the character who made an atypical decision in the typical/atypical stories and the character whose decision involved an act of commission in the omission/commission stories. Separate chi-square analyses were conducted for each story. For each analysis, the

Table 1
Percentage of Participants at Each Age Who Made Each Type of Judgment for Each of the Different Regret Stories in Experiment 1

Story and judgment type	Age			
	5 years	7 years	9 years	Adult
Typical/atypical 1				
Target	6	76	78	72
Nontarget	16	16	14	12
Same	78	8	8	16
Omission/commission 1				
Target	28	80	88	91
Nontarget	22	4	2	5
Same	50	16	10	4
Typical/atypical 2				
Target		64	78	75
Nontarget		16	5	11
Same		20	17	14
Omission/commission 2				
Target		48	66	79
Nontarget		20	12	9
Same		32	22	12
Average across stories				
Target	17	67	78	79
Nontarget	19	14	8	9
Same	64	19	14	12

“same” and “nontarget” categories were combined into a single category.

For Story 1 (Typical/atypical 1), there was a significant age difference in the pattern of responses, $\chi^2(3, N = 180) = 43.56, p < .01$. Paired comparisons revealed that the responses of the 5-year-olds differed significantly from those at each of the other three ages; for each comparison, $\chi^2(1, N = 43) > 11.72, p < .01$. No differences were found for comparisons not involving the 5-year-olds.

The results for Story 2 (Omission/commission 1) were similar to those for Story 1. There was a significant age difference in the pattern of responses, $\chi^2(3, N = 180) = 36.10, p < .01$, and paired comparisons revealed that the pattern of responses of the 5-year-olds differed significantly from the pattern exhibited by each of the other three age groups; for each comparison, $\chi^2(1, N = 43) > 20.86, p < .01$. No differences were found for comparisons not involving the 5-year-olds.

For Story 3 (Typical/atypical 2, a story that was not presented to the 5-year-olds), no significant age difference in the pattern of responses was found, $\chi^2(2, N = 162) = 1.71, p > .25$.

For Story 4 (Omission/commission 2, the other story that was not presented to the 5-year-olds), there was a significant age difference in the pattern of responses, $\chi^2(2, N = 162) = 9.87, p < .01$. Paired comparisons revealed a significant difference in the patterns of responses of the 7-year-olds versus the adults, $\chi^2(1, N = 108) = 9.51, p < .01$, and a marginally significant difference for the 9-year-olds versus the adults, $\chi^2(1, N = 137) = 3.46, p < .07$.

Because the results of the statistical analyses suggested a somewhat different pattern for Story 4 than for the other three stories, analyses were also conducted across stories within each age group. These analyses revealed, however, that there were no statistically significant effects of the different stories on judgments for any of the age groups.

Explanations. Explanations for why the target character or the other character would feel worse were classified into one of three categories: (a) reference to the choice or to the alternative outcome (e.g., “David will feel worse because he chose to ride around the pond on the right side that day” or “David will feel worse because he would have been OK if he’d ridden around the other side” or “Bob will feel worse because he didn’t choose to go the other way that day”); (b) some other explanation, involving reference to some other element of the story or to something apparently made up by the participant (e.g., “Bill will feel worse because he was on a team with his friends that lost all its games”); or (c) no reason given. The explanations for why the two characters would feel the same were also classified into one of three categories: (a) reference to the fact that the outcomes were the same for the two characters (e.g., “Both girls got the same prize”); (b) reference to the choices or decisions of *both* characters (e.g., “Karen and Michelle will feel the same because Karen changed her mind while Michelle decided to stick with her first choice”); or (c) no reason. Because the number of judgments in some categories was small, and because a preliminary inspection of the judgment patterns provided no evidence that the patterns varied across stories, we collapsed the judgment data across stories at each age.

When participants at any age selected the target character, they almost always justified their response with reference to the alternative possible course of action; the percentage of target responses

justified in this manner was 83% (5 out of 6 instances) for the 5-year-olds, 99% (67/68 instances) for the 7-year-olds, 96% (161/168 instances) for the 9-year-olds, and 99% (262/264 instances) for the adults. None of these small age differences was significant.

When the nontarget character was selected by the 5-year-olds, an explanation making reference to the decision or to the alternative outcome was provided for 29% (2/7) of the judgments. No reason was given for 43% (3/7) of these judgments, and some other explanation was provided for 29% (2/7) of these judgments. When the nontarget character was selected by the 7-year-olds, reference was made to the decision or to the alternative outcome for 85% (11/13) of these judgments. The two remaining cases were classified as “other” explanations. For the 9-year-olds, every instance (18/18) in which the nontarget was selected was justified with reference to the alternative possible outcome. Similarly, for the adults, every instance in which the nontarget was selected (27/27 instances) was justified with reference to the alternative possible outcome. Thus, for all age groups except for the 5-year-olds, even the selection of the nontarget character was almost always justified with a counterfactual-reasoning-based explanation. Although this pattern was not found with the youngest children, statistical analyses did not reveal any statistically significant age differences in the pattern of explanations for nontarget responses.

At all ages, the modal explanation for “same” judgments involved reference to the fact that both characters experienced the same outcome; the percentage of “same” judgments justified in this manner was 91% (21/23 instances) for the 5-year-olds, 100% (19/19 instances) for the 7-year-olds, 60% (18/30 instances) for the 9-year-olds, and 88% (36/41 instances) for the adults. The age differences in the percentage of “same” judgments justified in this way were primarily a result of age differences in the percentages of participants who made reference to the decisions made by both characters when justifying “same” responses; none of the 5-year-olds or 7-year-olds made reference to both characters’ decisions when justifying “same” responses, whereas that form of explanation was provided 33% of the time (10/30 instances) by the 9-year-olds and 12% of the time (5/41 instances) by the adults. A statistical comparison of the two older groups with the two younger groups revealed a significant age difference in the percentage of “same” judgments justified with reference to the decisions made by both characters, $\chi^2(1, N = 180) = 9.50, p < .01$.

Discussion

Experiment 1 examined children’s understanding of the way in which mutability (action typicality and the framing of decisions as acts of commission vs. omission) affects emotional responses to negative outcomes. The findings revealed that the pattern of judgments of children as young as 7 years of age closely matched those of adults. Across this entire age range, participants judged that a character who had engaged in an atypical action would feel worse about a negative outcome than would a character who had engaged in a typical course of action, even though both the outcome and the action itself were the same for both characters. Similarly, beginning at 7 years of age, participants judged that a character whose decision was framed as an act of commission would feel worse than a character whose decision was framed as an act of omission. These findings suggest that from a surprisingly early age, children are sensitive to the nature of the situational factors that affect the

mutability of events and that they understand the implications of these situational factors for emotional responses to negative outcomes.

The modal response of the 5-year-olds, in contrast, was that the two characters in each story would feel the same. This finding is consistent with previous evidence suggesting that children at this age usually base their judgments solely on the quality of the outcome of the event as it actually occurred, without reference to what might have happened had some alternative course of action been followed (Amsel et al., 2003). As Amsel et al. (2003) demonstrated, this pattern of judgments cannot be attributed to a simple inability on the part of 5-year-old children to reflect on how a person would feel in a counterfactual situation. Instead, the children at this age appear not to understand how the counterfactual outcome might affect emotional responses to what actually occurred.

From the findings of the present experiment alone, however, it cannot be known whether the 5-year-olds gave no consideration to “what might have been” or whether they considered the alternative course of action but were not sensitive to the situational variables affecting mutability. Accordingly, Experiment 2 was designed to examine further the degree to which 5-year-olds might reflect on “what might have been” when making judgments of emotional responses.

Experiment 2

In Experiment 2, stories were again used in which there were two characters who both made the same decision and experienced the same negative outcome. However, unlike in the Experiment 1 stories, in the Experiment 2 stories, the outcome that would have resulted from the alternative course of action was not the same for the two characters. Instead, “what might have been” was better than what actually occurred for one of the characters but was the same as what actually occurred for the other character. We hypothesized that the structure of these stories would serve to maximize the salience of the critical element that was relevant to a character’s experience of regret. Thus, if children 5 years of age have even a limited and fragile understanding of the fact that people tend to feel worse when “what might have been” is better than what actually occurred, they should tend to judge that the target characters in these stories (the characters for whom what actually occurred was worse than what might have been) should feel worse than should the nontarget characters.

Another methodological change implemented in Experiment 2 involved the inclusion of a series of questions designed to test whether the children fully understood and remembered the critical details of the stories. Although there were no hints in Experiment 1 that the reason for the different pattern of responses by the 5-year-olds was a comprehension or memory problem, we thought it prudent to include a memory/comprehension check for the 5-year-olds in Experiment 2.

Method

Participants. The participants were 18 five-year-old children (11 boys and 7 girls, mean age = 6.3 years) and 18 adults recruited from the same sources used in Experiment 1.

Procedure. The two stories used in Experiment 2 are presented in Appendix B. Appendix B also includes the six memory/comprehension questions that were used for each story with the children.

The children were tested individually. Each story was read aloud to the child, and the 5-year-olds were also shown a set of pictures depicting the main events of the story. The pictures did not depict the characters’ emotional responses following the stories’ outcomes. After reading a story to a child, the experimenter reminded the child of the critical elements of the story and asked the child whether one character would feel worse than the other character or whether the two characters would feel the same. The children were also asked to explain their responses. After the explanation was given, the children were asked the series of six questions to assess their memory for, and comprehension of, the critical story details.

For the adults, booklets were prepared with each story printed on a separate sheet of paper. Beneath each story was printed the critical question regarding which character felt worse, and space was provided for the adults to provide a written explanation for their response. The memory/comprehension questions were not used with the adults, and the adults were tested in a single group.

Results

Judgments. Table 2 presents the percentage of participants at each age who made each judgment for each story. A chi-square test revealed a significant age difference in the pattern of responses for each of the two stories: for Story 1, $\chi^2(2, N = 36) = 22.34, p < .01$, and for Story 2, $\chi^2(2, N = 36) = 25.11, p < .01$. Inspection of Table 2 reveals that although most of the adults judged that the target character would feel worse than the nontarget character, the children usually judged that the nontarget character would feel worse than the target character.

Explanations. Explanations were classified using the same general classification scheme used in Experiment 1. In all cases in which a “same” judgment was made by either a child or an adult, the judgment was justified with reference to the fact that the outcome was the same for both characters. All judgments by the adults regarding why the target character would feel worse included reference to the more positive outcome that would have resulted if a different decision had been made. For the small number of children who selected the target character, 40% (2/5) of the explanations included reference to the more positive alternative possible outcome, whereas 60% (3/5) of the explanations were classified as referring to some other element of the story (e.g., “Tom will feel worse because they both got sick”). Virtually all of the explanations for the selection of the nontarget character by the children (96%, 26/27) made reference to the fact that events would have turned out poorly for that character no matter which choice had been made. One child’s explanation for this judgment was

Table 2
Percentage of Participants at Each Age Who Made Each Type of Judgment for Each of the Regret Stories in Experiment 2

Story and judgment type	Age	
	5 years	Adult
Typical/atypical		
Target	13	72
Nontarget	72	0
Same	11	28
Omission/commission		
Target	11	94
Nontarget	78	6
Same	11	0

classified as “other.” The one instance in which an adult selected the nontarget character was justified by an explanation referring to the fact that both choices would have resulted in a negative outcome for that character.

Memory/comprehension. Performance by the children on the memory/comprehension questions was almost perfect. A total of three errors were made, representing an overall error rate of less than 2%.

Discussion

The findings from Experiment 2 were not as expected. We had hypothesized that the comparison procedure used in the present study would serve to highlight the regret-relevant element of each story in such a way that even the 5-year-olds would tend to judge that the target character (the character for whom the outcome could have been better) would feel worse than would the nontarget character. Barring that pattern of results, we hypothesized that the likely alternative would be that the 5-year-olds would base their judgments solely on the quality of the outcome and therefore would judge that the two characters would feel the same. We did not, however, anticipate what actually was found: that most of the 5-year-olds would judge that the nontarget character would feel worse than the target character.

Possible reasons for this pattern of results, and the implications of this finding for our conceptualization of the development of the understanding of regret, are discussed further in the General Discussion section. Another issue to be considered at this point, however, relates to children’s understanding of counterfactual-reasoning-based emotions other than regret. In Experiments 1 and 2, all of the stories focused on situations in which the outcome was negative. Experiment 3 was designed to extend these findings by examining counterfactual thinking and judgments of emotional responses for situations with neutral or positive outcomes and in which a likely alternative outcome was less positive than the outcome that actually occurred.

Experiment 3

Regret is experienced in situations in which the actual outcome is more negative than a reasonably likely alternative. Regret is not, however, the only emotion that depends on a comparison of reality with its alternatives. Relief is experienced in situations in which an outcome is neutral or positive and in which there is a reasonably likely alternative outcome that would have been more negative than the outcome that actually occurred. There has been much less research on relief than on regret, although it has generally been assumed that the same mutability factors that affect the likelihood of regret (e.g., typicality of the course of action) will affect the likelihood and intensity of relief as well (Gleicher et al., 1990).

Experiment 3 was designed to examine children’s understanding of relief using a procedure similar to that used in Experiment 1. Two relief stories were presented in Experiment 3, each of which involved two characters who experienced the same neutral outcome while avoiding a more negative outcome. In Story 1, one character avoided the negative outcome through a typical action, whereas the other character avoided the negative outcome through the selection of an atypical course of action. In Story 2, the decision that permitted the characters to avoid the negative out-

come involved an act of commission for one character and an act of omission for the other character.

Experiment 3 also involved the presentation of two “elation” stories. In these stories, the outcome was clearly positive, and the alternative outcome was neutral. For example, in one of the stories, the characters made a decision (deciding which route to take when riding to school) that resulted in each of them finding money on the ground. The counterfactual outcome in this case was neutral (riding to school without finding any money on the ground). In one of the elation stories, the positive outcome was the result of a typical action for one character and the result of an atypical action for the other character. In the second elation story, the positive outcome was the result of an act of commission for one character and the result of an act of omission for the other character.

Structurally, the stories used in Experiment 3 were very similar to those used in Experiment 1. Previous research with adults using stories with positive outcomes, however, showed that even adults are less likely to reflect on alternatives to reality when outcomes are positive than when outcomes are negative (Gleicher et al., 1990; Landman, 1987; Roese, 1997; Roese & Hur, 1997). These findings suggest that negatively valenced outcomes provide stronger support for the activation of counterfactual thinking than do neutral or positive outcomes (Roese & Hur, 1997). If 7-year-olds are at a stage in which they are just beginning to understand the way in which thoughts about alternatives to reality affect emotional responses, it may be that they require the strong support provided by negative outcomes if they are to take alternatives to reality into account when making emotion-response judgments. From this perspective, we hypothesized that even though the 7-year-olds performed in a manner very similar to that of adults with the regret stories used in Experiment 1, children at this age might be less likely than adults to compare reality to its alternatives with the weaker support for counterfactual thinking provided by the relief and relative elation stories used in Experiment 3.

Method

Participants. The participants were 17 seven-year-old children (mean age = 7.7 years) and 18 adults recruited from the same sources used in Experiment 1.

Procedure. Appendix C presents the four stories that were used in the experiment. With the exception of the difference in stories, the procedures used in Experiment 3 exactly matched those used with the corresponding age groups in Experiment 1.

Results and Discussion

Judgments. Table 3 presents the percentage of participants at each age who provided each category of response for each of the four stories. Separate chi-square analyses were conducted for each story. As was done with the analyses for Experiment 1, the “same” and “nontarget” categories were combined into a single category.

A significant age difference in the pattern of responses was found for each of the four stories: relief–typical/atypical, $\chi^2(1, N = 35) = 15.10, p < .01$; relief–omission/commission, $\chi^2(1, N = 35) = 5.38, p < .05$; elation–typical/atypical, $\chi^2(1, N = 35) = 6.88, p < .01$; elation–omission/commission, $\chi^2(1, N = 35) = 8.34, p < .01$. Table 3 reveals that the percentage of adults judging that the target character would feel better than the nontarget

Table 3
Percentage of Participants at Each Age Who Made Each Type of Judgment for Each of the Relief and Elation Stories in Experiment 3

Story and judgment type	Age	
	7 years	Adult
Relief-typical/atypical		
Target	18	83
Nontarget	6	0
Same	76	17
Relief-omission/commission		
Target	18	56
Nontarget	0	0
Same	82	44
Elation-typical/atypical		
Target	18	50
Nontarget	18	0
Same	64	50
Elation-omission/commission		
Target	6	66
Nontarget	6	12
Same	88	16
Average across stories		
Target	15	65
Nontarget	8	3
Same	77	32

character ranged from 50% to 83% for the different stories. For the children, the range was from 6% to a high of only 18%.

Explanations. The same form of coding system used in Experiments 1 and 2 was used to categorize the explanations provided by participants in Experiment 3. As was the case with the previous experiments, the judgments were summed across stories.

For those cases in which the 7-year-olds selected the target character, the explanations included reference to the decision that was made or to the alternative outcome for 90% (9/10) of the judgments. The adults provided similar explanations for 96% (43/45) of their target character judgments. This difference was not significant. All cases in which a nontarget character was selected were justified in a similar manner (5/5 cases for the 7-year-olds and 2/2 cases for the adults).

Judgments that the two characters would feel the same were usually explained by reference to the fact that the outcome was the same for the two characters. This explanation was provided for 89% (52/58) of the explanations of "same" judgments by the 7-year-olds and for 77% (20/26) of the "same" judgment explanations by the adults. Five of the remaining six of the 7-year-olds' explanations (9% of their "same" judgment explanations) were classified in the "other" category, and the one remaining case involved reference to the decisions made by both of the two characters. For the adults, 23% (6/26) of their "same" judgments were justified with reference to the decisions made by both of the characters. This difference, which involved a small number of participants at each age, was not significant.

The findings from Experiment 3 differ markedly from those found in Experiment 1, particularly for the 7-year-olds. Whereas the children at this age usually selected the target character in Experiment 1, in Experiment 3 the 7-year-olds usually judged that the two characters would feel the same, basing their judgments in Experiment 3 on the quality of the outcome alone, without taking

into account the quality of the outcome that would have resulted if a different course of action had been taken.

General Discussion

Previous research has found that 5-year-olds tend to base their judgments of emotional responses solely on the basis of the quality of the outcome that actually occurred, without taking into account the quality of outcomes that "might have been." The findings from Experiment 1 of the present study were consistent with that finding. In Experiment 2, however, we found that the 5-year-olds' judgments were significantly affected by "what might have been." Children at this age consistently judged that a character who experienced a negative outcome but who almost experienced a much more positive outcome would feel *better* than a character who experienced the same negative outcome but for whom the alternative possible outcome was also negative.

Although this pattern of results indicates that the 5-year-olds were taking the alternative outcome into account, their pattern of judgments was dramatically different from that of older children and adults. Indeed, the pattern of judgments exhibited by the 5-year-olds in Experiment 2 was essentially the opposite of the pattern exhibited by the adults, who judged that an individual would feel worse if the alternative outcome was better than what actually occurred. The adult pattern reflects awareness of the emotion-intensification effect produced by the contrast between the positive emotional response that would be produced in the counterfactual case in comparison with the negative response produced by the outcome that actually occurred. In the case of the judgments made by the 5-year-olds, on the other hand, the judgment was based on a kind of summation of the emotional responses that would be produced by the counterfactual case and by the outcome that actually occurred; when both situations would have resulted in a negative outcome, the individual was judged to feel worse than if the counterfactual outcome was better than what actually occurred. Thus, although the judgments of the children at this age were affected by what might have been, what was missing from their judgment strategy was a comparison of the feelings that the character would experience in the two situations and an understanding that a positive alternative would intensify the negative feelings produced by the outcome that actually occurred. In other words, what was missing from the judgment strategy of the 5-year-olds was an understanding of the essence of regret.

The pattern of responses of the 7-year-olds and the 9-year-olds with the regret stories in Experiment 1 was almost the same as that of the adults. This finding suggests that by the time children are 7 or 8 years of age, they have begun to understand some of the different situational factors that affect event mutability as well as the effects of mutability on emotional responses to events with negative outcomes.

While demonstrating a rather dramatic change in the understanding of regret between 5 and 7 years of age, the present findings are agnostic regarding the factors responsible for this change. Clearly, the level of understanding exhibited by the 7-year-olds depends on a more sophisticated and complex form of analysis of the scenarios than was required for the kinds of judgments provided by most of the younger children, which suggests that the different information-processing demands of the two judgment strategies may be one factor contributing to the age difference in judgment patterns. Further research is required to deter-

mine the extent to which age differences in information-processing capacity or efficiency (Case, Kurland, & Goldberg, 1982; Kail, 1991; Kail & Bisanz, 1992) may help explain the shift from age 5 to age 7 found here with respect to the understanding of regret or whether other, as yet unspecified, factors related to the learning of the situational factors responsible for different emotions might carry greater explanatory weight.

Experiment 3 of the present study demonstrated that the mature form of understanding of regret exhibited by the 7-year-olds in Experiment 1 does not extend to the understanding of relief and elation. Even though the general structure of the stories used in Experiment 3 to study the understanding of relief and elation was essentially identical to the structure of the stories used to study regret in Experiment 1, a very different pattern of results emerged from the two experiments. Whereas the 7-year-olds responded in a manner similar to that of adults with the regret stories used in Experiment 1, in Experiment 3 the 7-year-olds usually judged that the two characters would feel the same rather than that the target character would feel better.

What might account for the different patterns of performance exhibited by the 7-year-olds in the two experiments? One factor that can be ruled out is the general structure or complexity of the stories, because the stories used in the two experiments were structurally virtually identical. It is also clear from the findings from Experiment 1 that 7-year-olds are capable of engaging in counterfactual reasoning when making judgments of emotional responses and are sensitive to the effects of decision typicality and the effects on event mutability of whether a decision is framed as an act of commission or an act of omission.

The primary difference between the stories used in the two experiments involved the valence of the outcomes; whereas the regret stories used in Experiment 1 necessarily involved negative outcomes for the characters, the relief and elation stories used in Experiment 3 involved outcomes that were neutral or positive. We believe that the key to understanding the different patterns of developmental change found in the two experiments is the fact that even adults tend to engage in less counterfactual analysis when outcomes are positive than when outcomes are negative. This finding suggests that negative outcomes provide a particularly strong trigger for counterfactual reasoning (Gleicher et al., 1990; Landman, 1987; Roese, 1997). We hypothesize that even though 7-year-olds may be capable of comparing reality to its alternatives when making judgments of emotions, they may tend to do so only with fairly strong triggers or supports for a counterfactual analysis—the kinds of support provided by situations in which the outcome is negative. Adults, on the other hand, may require a less powerful trigger for the comparison of reality to its alternatives and therefore may be more likely than 7-year-old children to apply counterfactual reasoning when making emotion judgments in situations in which the outcome is neutral or positive.

Interestingly, the finding that outcome valence may affect the age at which children first appear to reason in a manner similar to that of adults is not limited to the study of judgments of emotional responses. Recent research on counterfactual reasoning and children's judgments of causality, for example, has found an effect of outcome valence that directly parallels the results found here, albeit at a significantly earlier age. This research has shown that 3-year-old children utilize a counterfactual-reasoning-based approach to causal judgments about negative, but not positive, events (German, 1999). One possible explanation for this general pattern

of results is that German's findings, and the findings from the present study, may each reflect an interaction between age differences in the accessibility or efficiency of counterfactual reasoning on the one hand and the differential support for counterfactual reasoning provided by positive and negative outcomes on the other.

Although neither the present study nor the study by German (1999) included a direct assessment of the efficiency of counterfactual reasoning, research on developmental change in children's spontaneous use of memorization strategies provides evidence for a parallel phenomenon in that domain. In the case of the use of multi-item rehearsal, for example, it has been found that older children are able to use the strategy more efficiently (in terms of demands on processing resources) than are younger children (Guttentag, 1984). Importantly, these age differences in processing efficiency have been found to interact with the amount of strategy-use support provided by the structure of specific memorization tasks to affect the age at which children first use the strategy spontaneously (Folds, Footo, Guttentag, & Ornstein, 1990). Further research involving direct assessments of the efficiency of counterfactual thinking is needed to determine whether a similar effect occurs in the emotion judgment domain.

In summary, the present findings extend previous research on children's understanding of counterfactual-reasoning-based emotions in several important ways. In a manner consistent with previous findings, the 5-year-olds in the present study exhibited little evidence of understanding either regret or relief. Experiment 2 of the present study, however, also showed that the emotion response judgments of children at this age may be affected by the children's consideration of a counterfactual state of affairs. The counterfactual information was, however, applied very differently by the 5-year-olds than by older children and adults; rather than focusing on the emotion-intensification effect of a *contrasting* counterfactual outcome, 5-year-old children tended to combine the actual and counterfactual cases in something like a summative manner. Thus, unlike adults, the 5-year-old children judged that an individual who experienced a negative outcome would feel better (rather than worse) if the counterfactual outcome was better than what actually occurred. It should be noted that the present findings provide evidence for this phenomenon solely for the case in which the actual outcome was negative. It is not known if the effect would generalize to a situation in which both the actual and the counterfactual outcomes were positive.

Also in a manner consistent with the results of past research, the 7-year-olds in the present study performed very similarly to adults on the measures of the understanding of regret. Children at this age, however, did not exhibit a similarly mature level of understanding of relief, despite the seemingly similar information-processing demands of the regret-understanding and relief-understanding tasks. Because children older than 7 years of age were not tested in Experiment 3, the exact age at which the understanding of relief first emerges remains an open question.

Another limitation of the present study was that it focused solely on children's understanding of the emotions of others and did not directly examine children's actual experiencing of these emotions. Amsel et al. (2003) found that both the experiencing of regret and the understanding of regret as experienced by others first emerged at about 7 years of age, which suggests a close linkage between these two aspects of the development of the counterfactual-reasoning-based emotions. Further research is required to deter-

mine whether this close developmental linkage also holds true for the case of the experiencing and understanding of relief.

References

- Amsel, E. (2003, April). *Regret assessment as a model of adolescent decision-making*. Paper presented at the biennial meeting of the Society for Research in Child Development, Tampa, FL.
- Amsel, E., Robbins, M., Tumarkin, T., Janit, A., Foulkes, S., & Smalley, J. D. (2003). *The card not chosen: The development of judgments of regret in self and others*. Manuscript submitted for publication.
- Amsel, E., & Smalley, D. (2000). Beyond really and truly: Children's counterfactual thinking about pretend and possible worlds. In K. Riggs & P. Mitchell (Eds.), *Children's reasoning and mind* (pp. 99–134). Brighton, England: Psychology Press.
- Anderson, C. J. (2003). The psychology of doing nothing: Forms of decision avoidance result from reason and emotion. *Psychological Bulletin*, *129*, 139–167.
- Arsenio, W., & Lover, A. (1999). Children's conceptions of sociomoral affect: Happy victimizers, mixed emotions, and other expectancies. In M. Killen & D. Hart (Eds.), *Morality in everyday life: Developmental perspectives* (pp. 87–128). New York: Cambridge University Press.
- Banerjee, M. (1997). Peeling the onion: A multi-layered view of children's emotional development. In S. Hala (Ed.), *The development of social cognition* (pp. 242–272). East Sussex, England: Psychology Press.
- Bar-Hillel, M., & Neter, E. (1996). Why are people reluctant to exchange lottery tickets? *Journal of Personality and Social Psychology*, *70*, 17–27.
- Beattie, J., Baron, J., Hershey, J. C., & Spranca, M. D. (1994). Psychological determinants of decision attitude. *Journal of Behavioral Decision Making*, *7*, 129–144.
- Berti, A., Garattoni, C., & Venturini, B. (2000). The understanding of sadness, guilt, and shame in 5-, 7-, and 9-year-old children. *Genetic, Social, and General Psychology Monographs*, *126*, 293–318.
- Case, R., Kurland, M., & Goldberg, J. (1982). Operational efficiency and the growth of short-term memory span. *Journal of Experimental Child Psychology*, *33*, 386–404.
- Denham, S. A. (1986). Social cognition, social behavior, and emotion in preschoolers: Contextual validation. *Child Development*, *57*, 194–201.
- Denham, S. A. (1998). *Emotional development in young children*. New York: Guilford Press.
- Denham, S. A., & Couchard, E. A. (1990). Young preschoolers' understanding of emotions. *Child Study Journal*, *20*, 171–192.
- Denham, S. A., Zoller, D., & Couchard, E. A. (1994). Preschoolers' causal understanding of emotion and its socialization. *Developmental Psychology*, *30*, 928–936.
- Fabes, R. A., Eisenberg, N., Nyman, M., & Michelieu, Q. (1991). Young children's appraisals of others' spontaneous emotional reactions. *Developmental Psychology*, *27*, 858–866.
- Folds, T., Footo, M., Guttentag, R., & Ornstein, P. (1990). When children mean to remember: Issues of context specificity, strategy effectiveness, and intentionality in the development of memory. In D. F. Bjorklund (Ed.), *Children's strategies: Contemporary views of cognitive development* (pp. 67–91). Hillsdale, NJ: Erlbaum.
- German, T. P. (1999). Children's causal reasoning: Counterfactual thinking occurs for "negative" outcomes only. *Developmental Science*, *2*, 442–447.
- Gleicher, F., Kost, K. A., Baker, S. M., Strathman, A. J., Richman, S. A., & Sherman, S. J. (1990). The role of counterfactual thinking in judgments of affect. *Personality and Social Psychology Bulletin*, *16*, 284–295.
- Guttentag, R. E. (1984). The mental effort requirement of cumulative rehearsal: A developmental study. *Journal of Experimental Child Psychology*, *37*, 92–106.
- Harris, P. L., German, T., & Mills, P. (1996). Children's use of counterfactual thinking in causal reasoning. *Cognition*, *61*, 233–259.
- Harris, P. L., Olthof, T., Terwogt, M. M., & Hardman, C. E. (1987). Children's knowledge of the situations that provoke emotion. *International Journal of Behavioral Development*, *10*, 319–343.
- Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology*, *17*, 300–312.
- Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development*, *53*, 87–97.
- Harter, S., & Whitesell, N. R. (1989). Developmental changes in children's understanding of single, multiple, and blended emotion concepts. In C. Saarni & P. Harris (Eds.), *Children's understanding of emotion* (pp. 81–116). New York: Cambridge University Press.
- Hooker, C., Roese, N. J., & Park, S. (2000). Impoverished counterfactual thinking is associated with schizophrenia. *Psychiatry*, *63*, 326–335.
- Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, *93*, 136–153.
- Kahneman, D., & Tversky, A. (1982). The psychology of preferences. *Scientific American*, *246*, 160–173.
- Kail, R. (1991). Processing time declines exponentially during childhood and adolescence. *Developmental Psychology*, *27*, 259–266.
- Kail, R., & Bisanz, J. (1992). The information-processing perspective on cognitive development in childhood and adolescence. In R. J. Sternberg & C. A. Berg (Eds.), *Intellectual development* (pp. 229–260). New York: Cambridge University Press.
- Kuczaj, S. A., & Daly, M. J. (1979). The development of hypothetical reference in the speech of young children. *Child Language*, *6*, 563–579.
- Landman, J. (1987). Regret and elation following action and inaction: Affective responses to positive versus negative outcomes. *Personality and Social Psychology Bulletin*, *13*, 524–536.
- Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin*, *126*, 910–924.
- Mellers, B. A., & McGraw, A. P. (2001). Anticipated emotions as guides to choice. *Current Directions in Psychological Science*, *10*, 210–214.
- Miller, D. T., & Taylor, B. R. (1995). Counterfactual thought, regret, and superstition: How to avoid kicking yourself. In N. J. Roese & J. M. Olson (Eds.), *What might have been: The psychology of counterfactual thinking* (pp. 305–331). Mahwah, NJ: Erlbaum.
- Nunner-Winkler, G., & Sodian, B. (1988). Children's understanding of moral emotions. *Child Development*, *59*, 1323–1328.
- Ritov, I. (1996). Probability of regret: Anticipation of uncertainty resolution in choice. *Organizational Behavior and Human Decision Processes*, *66*, 228–236.
- Robinson, E. J., & Beck, S. (2000). What is difficult about counterfactual reasoning? In P. Mitchell & K. J. Riggs (Eds.), *Children's reasoning and the mind* (pp. 101–119). Hove, England: Psychology Press/Taylor & Francis.
- Roese, N. J. (1994). The functional basis of counterfactual thinking. *Journal of Personality and Social Psychology*, *66*, 805–818.
- Roese, N. J. (1997). Counterfactual thinking. *Psychological Bulletin*, *121*, 133–148.
- Roese, N. J., & Hur, T. (1997). Affective determinants of counterfactual thinking. *Social Cognition*, *15*, 274–290.
- Roese, N. J., & Olson, J. M. (1995). Counterfactual thinking: A critical overview. In N. J. Roese & J. M. Olson (Eds.), *What might have been: The social psychology of counterfactual thinking* (pp. 1–55). Mahwah, NJ: Erlbaum.
- Saarni, C., Mumme, D. L., & Campos, J. J. (1998). Emotional development: Action, communication, and understanding. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 237–311). New York: Wiley.
- Strayer, J. (1986). Children's attributions regarding the situational deter-

minants of emotion in self and others. *Developmental Psychology*, 22, 649–654.

Thompson, R. A. (1987). The development of children's inferences of the emotions of others. *Developmental Psychology*, 23, 124–131.

Wiseman, R. (2003). The luck factor. *Skeptical Inquirer*, 27(3), 26–30.

Zeelenberg, M. (1999). Anticipated regret, expected feedback, and behav-

ioral decision making. *Journal of Behavioral Decision Making*, 12, 93–106.

Zeelenberg, M., van Dijk, W. W., Manstead, A. S. R., & van der Pligt, J. (2000). On bad decisions and disconfirmed expectancies: The psychology of regret and disappointment. *Cognition & Emotion*, 14, 521–541.

Appendix A

Experiment 1 Stories

Regret Story 1: Typical/Atypical

Bob and David live near each other, and both ride their bikes to school each morning. The bike path to the school goes around a pond, and there are two ways to go around the pond; you can ride around the pond on the right side, or you can ride around the pond on the left side. The path is smooth on both sides, and neither side is faster or easier than the other.

Every day, when Bob gets to the pond, he takes the path around the right side of the pond. Today, Bob took his usual route to school on the path that goes around the right side of the pond. Unfortunately, today a tree branch fell across the path that goes around the right side of the pond. Bob hit the branch with his bike, fell off his bike, was hurt, and was late for school. Everything on the path on the left side was fine.

David always takes the path that goes around the left side of the pond. David, however, decided today that, instead of taking his usual path around the left side, he was going to ride around on the right side. David also hit the branch, fell off his bike, was hurt, and was late for school.

Who would be more upset about deciding to ride along the path that went around the right side of the pond that day?

Bob, who rides on the path around the right side of the pond everyday, or

David, who usually rides around the pond on the left side but decided to ride around on the right side today, or

Do you think they would feel the same?

Regret Story 2: Commission/Omission

Karen does well on a test, and her teacher tells her she can choose a prize. The teacher shows Karen two boxes. One box is blue, and one box is red. Each box has a prize in it, and the teacher tells Karen to choose one of the boxes. However, she also warns Karen that the prize in one of the boxes is a lot better than the prize in the other box. Karen picks the blue box. The teacher asks Karen if she wants to change her choice. Karen decides to change from the blue box to the red box. The teacher then opens the boxes and shows her that the blue box had a large stuffed animal and the red box, which Karen ended up with, only had a small package of balloons.

Michelle also does well on a test, and the teacher tells her she can choose a box with a prize in it. The teacher shows Michelle two boxes. One box is green, and one box is yellow. The teacher tells Michelle that the prize in one box is a lot better than the prize in the other box. Michelle chooses the yellow box. The teacher asks Michelle if she would like to change her choice. Michelle decides to stay with the yellow box. The teacher then opens the boxes and shows her that the green box had the stuffed animal

and the yellow box, which Michelle chose, only had a small package of balloons.

Which girl do you think would feel worse about picking the box with the package of balloons?

Karen, who first picked the blue box with the stuffed animal but then switched to the red one, or

Michelle, who picked the yellow box with the balloons and didn't change, or

Do you think they would feel the same?

Regret Story 3: Typical/Atypical

Mary and Susan both like pudding of almost all flavors, and they definitely like both vanilla and chocolate—the only two flavors they can get in their school cafeteria. In the lunch cafeteria at school, however, Mary always decides to eat vanilla pudding for her dessert, while Susan always decides to eat chocolate pudding. Today at lunch, Susan ate her usual dessert, chocolate pudding. Mary, however, decided not to have her usual dessert (vanilla pudding). Instead, she decided to try the chocolate pudding.

Today there were germs in the chocolate pudding, and everyone who ate chocolate pudding got stomachaches. Mary and Susan got sick because they ate the chocolate pudding, which had germs in it.

Do you think one girl would feel worse about eating the chocolate pudding today and getting sick?

Susan, who usually eats chocolate pudding, or

Mary, who usually eats vanilla pudding but today decided to eat chocolate pudding instead, or

Do you think they would feel the same?

Regret Story 4: Commission/Omission

Bill and Tom play baseball. Last year, Bill played for the Lions, and Tom played for the Hawks. Both teams won about half their games last season. At the beginning of the season this year, Bill and Tom both have the chance to change teams. Bill decides to switch from the Lions to the Hawks. Tom decides to stay with the Hawks instead of switching to the Lions. At the end of the season, it turns out that the Hawks have lost every game, while the Lions have turned out to be the best team in the league.

Do you think one of the boys would be more upset about being on a team that lost all its games?

Bill, who switched from what turned out to be the good team (the Lions) to the losing team (the Hawks), or

Tom, who decided to stay with the Hawks instead of switching to the Lions, or
Do you think they would feel the same?

(Appendixes continue)

Appendix B

Experiment 2 Stories

Story 1

Tom and Bill are both in kindergarten, but they go to different schools. Both of them like to eat pudding for dessert at school, and both of them like both vanilla and chocolate. On Monday, when Tom got to the dessert section in the cafeteria, there were only two puddings left—one chocolate, one vanilla. He thought for a while, and then picked the vanilla. Unfortunately, someone had coughed on the vanilla pudding and it had germs in it and he got a bit sick. There were no germs in the chocolate pudding, so if he'd decided to have chocolate that day, he wouldn't have gotten sick.

Meanwhile, at Bill's school Bill was in the cafeteria and there were only two puddings left—one chocolate and one vanilla. He thought for a while and then picked the vanilla. Unfortunately, someone had coughed on the vanilla, and it had germs in it and he got sick too. But it turned out that at his school someone had coughed on the chocolate pudding too, so he would have gotten sick no matter which pudding he chose.

Both boys felt badly that they chose pudding that made them sick. Do you think one boy feels worse than the other about choosing the vanilla pudding that made him sick?

Bill, who got sick from the vanilla pudding but would have gotten sick anyway even if he'd chosen the chocolate pudding, or

Tom, who got sick from the vanilla pudding but wouldn't have gotten sick if he'd chosen the chocolate pudding, or

Would they feel the same about picking vanilla pudding that made them sick?

Memory/Comprehension Questions

How many boys were in the story?

What did the boys have for dessert?

What flavors of pudding were there?

Which flavor did each boy pick?

Were there germs in the vanilla pudding that each boy picked?

Were there germs in the chocolate pudding also for both of the boys, or for just one of the boys, or for neither of the boys?

Story 2

Mary and Nancy are in different kindergarten classes at the same school. Fridays are "prize" day in kindergarten, when one child in each class gets

to play a game where they might win a prize. Today Mary and Nancy both get chosen to play the game in their classes. In this game, the teacher brings out a big barrel that has lots of small boxes inside it. Some of the small boxes have a really nice prize in them, but others have nothing. To play the game, a child first picks two small boxes from the barrel. Then the child gets to choose which one of those two boxes s/he wants to keep. If the one s/he keeps has a prize, the child gets the prize. If it has nothing, the child gets nothing.

Mary shuts her eyes and picks two boxes from the barrel—a red box and a blue box. Then, after thinking a long time, she picks the blue box as the one she wants to keep. She opens it and it has nothing in it. The teacher then opens the red box to show Mary what she would have won if she'd kept the red box. Mary sees that she would have won the big prize instead of winning nothing.

Meanwhile, in Nancy's class, Nancy shuts her eyes and picks two boxes from the barrel in her classroom. She picks a green box and an orange box. Then, after thinking a long time, Nancy decides to keep the green box. She opens it and it has nothing in it. The teacher then opens the orange box and shows Nancy that it didn't have anything in it either, so even if she'd kept that one she wouldn't have won anything.

The two girls were a bit unhappy that they didn't win anything. Do you think one girl will feel worse about winning nothing than the other?

Mary, who won nothing but would have won the big prize if she'd kept the other box that she picked, or

Nancy, who won nothing and would have won nothing no matter which box she kept at the end, or

Do you think they'd feel the same?

Memory/Comprehension Questions

How many girls were in the story?

In the game, how many boxes did each girl pick out of the barrel at first?

How many boxes did each girl get to open?

Did either girl win the big prize?

What was the big prize?

Was there a prize in the box that each girl almost picked? If so, was there a prize in the other box for both of the girls, or for just one of the girls?

Appendix C

Experiment 3 Stories

Relief Story 1: Commission/Omission

Brittany and Jessica live near each other and enjoy going shopping with their mothers. There are two ways to drive to the shopping center from their neighborhood. One way goes past a park, and the other way goes across a bridge. Both ways take the same amount of time to get to the shopping center, and it's just as easy to go either way. Sometimes Brittany's mom and Jessica's mom drive across the bridge and sometimes they drive past the park.

Today Brittany's mom asks Brittany if she wants to go the way past the park or if she wants to go over the bridge to get to the shopping center. Brittany decides that they should go over the bridge today, so Brittany and her mom go the way that crosses the bridge.

Jessica's mom asks Jessica which way she wants to go. Jessica decides she wants to go the way that passes the park. However, when they are about to turn to go that way, Jessica changes her mind and says she wants to go the way that crosses the bridge. Jessica and her mom also go the way that crosses the bridge.

Later that day, Brittany and Jessica find out that there was a bad car accident on the way that passes the park and other people who went that way got stuck in traffic for hours. Both girls are happy that they didn't go on the route past the park and that they didn't get stuck in traffic.

Do you think one girl would be happier than the other about the way she picked to go to the shopping center?

Brittany, who decided to go the way that crosses the bridge and didn't change her mind, or

Jessica, who decided to go the way that passes the park but then changed her mind to go the way that crosses the bridge, or

Do you think they would feel the same?

Relief Story 2: Typical/Atypical

Mary and Susan both like pudding of almost all flavors, and they definitely like both vanilla and chocolate—the only two flavors they can get in their school cafeteria. In the lunch cafeteria at school, however, Mary always decides to eat vanilla pudding for her dessert while Susan always decides to eat chocolate pudding. Today at lunch, Susan ate her usual dessert, chocolate pudding. Mary, however, decided not to have her usual dessert (vanilla pudding). Instead, she decided to try the chocolate pudding.

Today there were germs in the vanilla pudding and everyone who ate vanilla pudding got stomachaches. Mary and Susan did not get sick because they ate the chocolate pudding, which had no germs in it.

Do you think one girl would be happier about eating the chocolate pudding today and not getting sick?

Susan, who usually eats chocolate pudding, or

Mary, who usually eats vanilla pudding but today decided to eat chocolate pudding instead, or

Do you think they would feel the same?

Elation Story 1: Commission/Omission

Karen does well on a test, and her teacher tells her she can choose a prize. The teacher shows Karen two boxes. One box is blue, and one box

is red. Each box has a prize in it, and the teacher tells Karen to choose one of the boxes. The teacher tells Karen that the prize in one of the boxes is a lot better than the prize in the other box. Karen picks the blue box. The teacher asks Karen if she wants to change her choice. Karen decides to change from the blue box to the red box. The teacher then opens the boxes and shows her that the blue box, which Karen almost chose, only had a small package of balloons in it, and the red box, which Karen ended up with, had a large stuffed animal in it.

Michelle also does well on a test, and her teacher tells her she can choose a prize. The teacher shows Michelle two boxes. One box is green, and one box is yellow. The teacher tells Michelle that the prize in one of the boxes is a lot better than the prize in the other box. Michelle chooses the yellow box. The teacher asks Michelle if she wants to change her choice. Michelle decides to stay with the yellow box. The teacher then opens the boxes and shows her that the green box had the small package of balloons in it and the yellow box, which Michelle chose, had a large stuffed animal in it.

Do you think one girl would feel more happy about picking the box with the large stuffed animal?

Karen, who first picked the blue box that only had the balloons but switched to the red box with the stuffed animal, or

Michelle, who picked the yellow box with the stuffed animal and didn't change her choice, or

Do you think they would feel the same?

Elation Story 2: Typical/Atypical

Bob and David live near each other and both ride their bikes to school every morning. The bike path to the school goes around a pond. There are two ways to go around the pond—you can ride around the pond on the left side or ride around on the right side. Neither side is faster or easier than the other.

Every day, when Bob gets to the pond, he takes the path around the right side of the pond. Today Bob took his usual route to school on the path that goes around the right side of the pond and found some money on the side of the path.

David always takes the path that goes around the left side of the pond. David, however, decided that today, instead of taking his usual path around the left side, he was going to ride around on the right side. David also found some money.

Both boys found the same amount of money on the ground and both were happy.

Do you think one boy would feel happier about finding the money?

Bob, who takes the path on the right side every day and found money, or

David, who usually takes the path on the left side but today decided to ride on the right side and found money, or

Do you think they would feel the same?

Received June 24, 2003

Revision received March 5, 2004

Accepted March 25, 2004 ■