

HUMAN RESPONSE TO TRAUMATIC EVENTS: AN INTEGRATION OF COUNTERFACTUAL THINKING, HINDSIGHT BIAS, AND ATTRIBUTION THEORY¹

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Summary.—In documenting cognitive processes underlying persons' reactions to negative events, counterfactual thinking, hindsight bias, and attribution theory focus on distinct, although not unrelated, aspects of human information processing. Counterfactual thinking highlights the cognitive processing undertaken when persons imagine different courses of action that lead to alternative outcomes. Hindsight bias describes the inflated retrospective estimates individuals make regarding event probabilities that come with the advantage of knowledge about outcomes. And attribution theory concerns the affective and behavioral consequences that result from the perceived causes of events. This essay argues that a more comprehensive understanding of the processes underlying human response to traumatic events results from the integration of counterfactual thinking, hindsight bias, and attribution theory into a single model.

Psychological research has amply demonstrated that reactions to events are determined in large part by persons' mental representation or construal of the events; see the reviews contained in Fiske and Taylor (1991), for example. Rather than attending, encoding, storing, and retrieving from memory a literal, unbiased copy of reality, social cognition research has shown that individuals often hold a distorted view of occurrences. There are several reasons for this, including event ambiguity, the uniqueness of individual knowledge structures, and the inherent limitation humans have in their capacity for information processing. As a result of these limitations, human responses are often guided by how information is interpreted or represented in memory rather than by its objective content.

Findings from social cognition research contribute to understanding how individuals react to negative outcomes with a variety of cognitive, affective, and behavioral responses. Investigations in cognitive heuristics and biases (see Kahneman & Tversky, 1982b; Nisbett & Ross, 1980; Sherman & Corty, 1984, for reviews) and causal attribution (see reviews by Weiner, 1985, 1986) document cognitive processes that facilitate rapid or distorted judgments and how people explain why events have occurred. These processes may be especially informative with respect to understanding victim and observer reactions to traumatic or catastrophic episodes such as failed medical devices (e.g., failed heart valves, ruptured breast implants), automobile accidents, airline disasters, train derailments, toxic chemical spills, refinery ex-

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plosions, and so on. In particular, *counterfactual thinking* (Miller, Turnbull, & McFarland, 1990), *hindsight bias* (Fischhoff, 1975; Fischhoff & Beyth, 1975) and *causal attribution* (Weiner, 1985, 1986) are cognitive mediational processes that seem especially relevant for explaining the information processing people engage in *after* a tragic event has occurred. These processes can determine the thoughts and emotions of victims and observers of the calamity and, ultimately, the actions they undertake in response to it.

Although there is an extensive body of literature associated with each

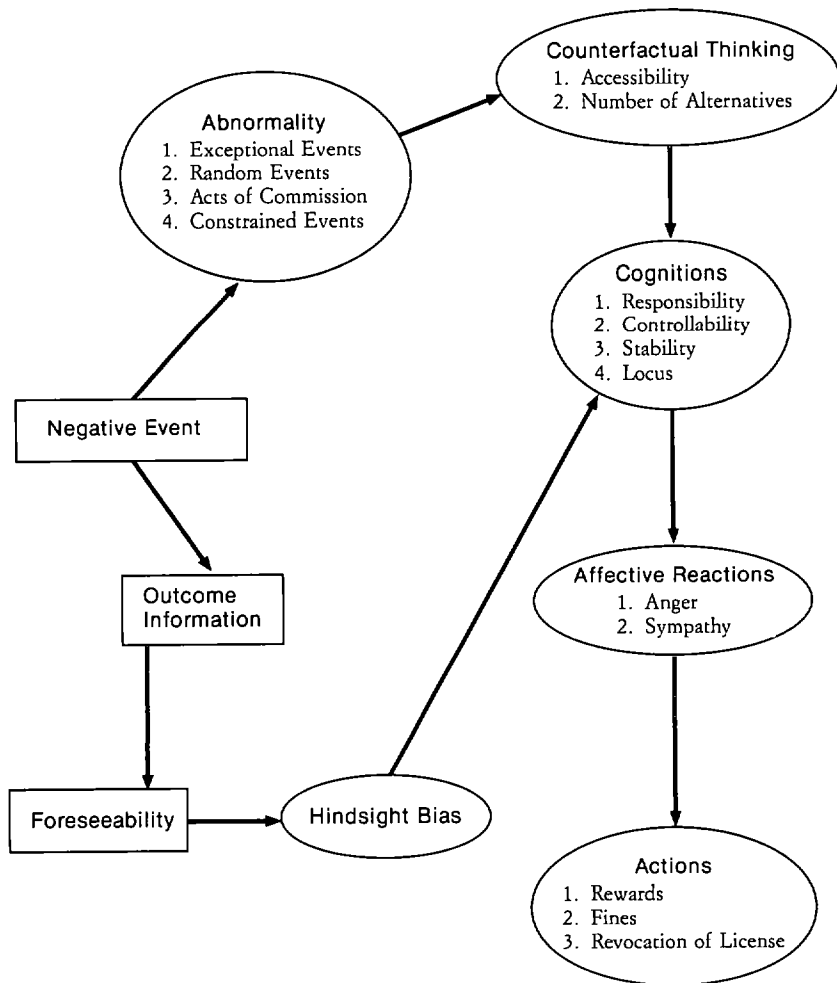


FIG. 1. A model of counterfactual thinking, hindsight bias, and attribution processes

research tradition, there has been no attempt to integrate their separate contributions into a more comprehensive picture of how humans process information related to negative events and what the consequences of this processing are. Because empirical studies related to each perspective appear to intersect most often in the area of legal judgments (see, e.g., Carroll & Weiner, 1982; Macrae & Milne, 1992; Sue, Smith, & Caldwell, 1973), this context was chosen to explore the increase in understanding that results from conceptualizing human responses to negative events as a combined function of counterfactual thinking, hindsight bias, and causal attribution. This article is a discussion of these concepts individually and a description of how features of each combine to explain perceptions of responsibility, affective reactions, and judgments regarding compensation for victims of tragic events.

Fig. 1 orients the reader to the general stages of information processing in the proposed model (the model is discussed in greater detail in the presentation that follows). After a negative event, certain conditions increase the probability that individuals will engage in counterfactual thinking (exceptional events, random events, acts of commission, constrained events) and evidence hindsight bias (outcome information). Once information related to the event is subjected to counterfactual construction or is perceived in hindsight, cognitions regarding the cause of the event are elicited (responsibility, controllability, stability, and locus). Consistent with attribution theory, these cognitions generate distinct affective reactions (e.g., sympathy) which, in turn, lead to particular behavioral responses (e.g., financial compensation).

COUNTERFACTUAL THINKING

Counterfactual thinking is defined as the tendency for individuals to imagine alternative courses of action that mentally undo negative events (see Miller, Turnbull, & McFarland, 1990). Factors that influence the likelihood of counterfactual thinking include unusual circumstances, acts of commission, number of alternative options, and empathic focus. In the following, a selected number of supporting empirical studies are presented.

Differential reactions of individuals to the outcome of an event may be generated by comparing the actual event with pre-existing beliefs or expectations of what should happen. For example, a highly favored football team may produce surprise and disappointment among its supporters after losing to a less-skilled opponent. Fan response is presumably elicited by the difference between the pregame belief of certain victory for the highly rated team and their actual defeat. Reactions may also be formulated by assessing the discrepancy between the actual event and thoughts generated after its occurrence with regard to what might have happened (Kahneman & Miller, 1986). To illustrate, imagine the same football contestants when the less-skilled team loses by a single point. In this scenario, disappointment is elicited because the alternative outcome of winning is easily imagined by supporters of the

less-skilled team. The latter vignette illustrates the process of counterfactual thinking: alternatives to the actual outcome are imagined or simulated *post hoc*.

Similar cognitions occur after traumatic events. Because people do not typically anticipate extremely negative outcomes as those mentioned earlier (Weinstein, 1980, 1982) and because people are motivated to explain sudden, unexpected, and negative events (Wong & Weiner, 1981), there is increased probability that survivors and observers of these incidents will engage in the process of counterfactual thinking and causal search. Participants ruminate over or speculate about different hypothetical outcomes based on variations in the behavior of persons or agents perceived as causal. For example, individuals might imagine what might have been "if only" the automobile driver had taken a different route, "if only" the airline passenger had chartered another flight, "if only" the oil company had implemented stricter safety precautions, and the like. Some researchers have argued that counterfactual thinking is a spontaneous and automatic response to negative outcomes (Gleicher, Kost, Baker, Strathman, Richman, & Sherman, 1990). Nevertheless, once the counterfactual thinking process has been stimulated, observers of disasters are likely to imagine or simulate alternative scenarios to the actual event that undo or reverse the actual outcome.

Counterfactual thinking is facilitated by events that are seen as changeable (Kahneman & Miller, 1986), and the perceived mutability of negative outcomes is affected by a perception of them as exceptional instead of usual (Johnson, 1986; Kahneman & Tversky, 1982b; Miller & McFarland, 1986), when the victim was active rather than inactive (Kahneman & Tversky, 1982a), and when more alternatives to the negative event were available (Wells & Gavansky, 1989). These antecedents of counterfactual thinking can affect the intensity of individuals' cognitive, emotional, and behavioral reactions to events including judgments of regret, happiness, blame, causality, and victim compensation (e.g., Gleicher, *et al.*, 1990; Johnson, 1986; Landman, 1988; Macrae, 1992; Miller & Gunasegarami, 1990; see also a review by Miller, *et al.*, 1990).

Unusual Circumstances

In demonstrating the link between unusual circumstances surrounding an event and emotional amplitude, Kahneman and Tversky (1982b) presented subjects with a scenario depicting two individuals who had been killed when driving home from work. One group of subjects read that the driver had been killed while taking his normal route home. A second group of subjects read that he had died driving on a route he only took when he wanted a change of scenery. Despite having suffered identical fates, subjects reported the "change of scenery" or exceptional story as more upsetting than did subjects who read the "normal route" scenario. Kahneman and

Tversky (1982b) proposed that the difference in emotional amplitude was related to the greater accessibility of the alternative fate in the second scenario (i.e., not being killed) than in the first. The discrepancy between "what might have been if only he had . . ." and what actually happened was responsible for eliciting predictions of greater emotional upset.

In a study that is more comprehensive in terms of the consequences of counterfactual thinking in cases of traumatic episodes, Miller and McFarland (1986) presented subjects two versions of a story about a shopper who was injured during the course of a robbery. In the first version, the person was injured while shopping in a store he regularly patronized, and in the second version while shopping in a store he did not commonly frequent. Miller and McFarland (1986) hypothesized that the counterfactual outcome of noninjury would be more accessible to subjects reading the second scenario than those who had read the first. Their predictions were supported by findings that subjects in the unusual or exceptional condition reported the victim more deserving of sympathy and entitled to greater monetary compensation than subjects who were assigned to the normal condition. In fact, compensation in the exceptional condition amounted to more than \$100,000 above the amount awarded by subjects in the usual condition. The implications of these findings for juries deliberating the compensatory award in an injury case are clear. If the circumstances surrounding the injury are perceived as exceptional as opposed to usual, the victim will be the object of increased sympathy and greater monetary award.

Acts of Commission

Kahneman and Tversky (1982a) presented evidence showing that alternatives to negative outcomes are easier to imagine if they are due to the victim's action rather than inaction. In their investigation, subjects read about investor A who lost money because he had switched his stock to a company whose fortunes later went sour. They also read about investor B who had thought about moving his stock out of the company that eventually lost value, but who ultimately decided against this action. Although the outcome was the same in both scenarios, subjects believed that stockholder A who had switched his investment into the devalued company would feel more regret than investor B who had decided to simply leave it there. This finding implies, for example, that jurors are likely to perceive an injured person as suffering greater pangs of regret if the injury occurred as a consequence of performing a particular task rather than as a result of not having performed the task.

Increased Number of Options

There is also increased likelihood for counterfactual thinking if it is perceived that a greater rather than lesser number of options existed prior to

the negative outcome. Wells and Gavansky (1989) presented subjects with two different versions of how a young woman had died from an allergic reaction to ingesting wine. The young woman's dinner partner, unaware of her wine allergy, had ordered her a meal that contained wine. He had selected the fatal dish from among two items *both* containing wine in the first version and from two items but only *one* containing wine in the second. Despite identical outcomes, subjects reading the second version as compared to the first believed more strongly that the ordering decision caused the young woman's death. This disparity was explained by the greater availability of the alternative action, i.e., not ordering the fatal dish, in the second scenario. Extending this finding to judgments of culpability, an oil company's action, believed as having led to a refinery explosion, might be seen as a causal source when more predecision options are perceived as available before the incident.

Empathic Focus

In perhaps the most comprehensive study to date of the effects of counterfactual thinking on social judgments, Macrae and Milne (1992) examined the influence of empathic focus and event exceptionality on affective and behavioral response to injury. Subjects read about a woman who suffered food poisoning after dining at a regularly, or irregularly, frequented restaurant. Empathic focus was manipulated by having subjects identify with either the woman diner or with the restaurant. The investigators found that identification with the victim magnified affective reactions while identification with the restaurant attenuated them. Among the specific findings were that subjects who read the story from the perspective of the young diner, as opposed to the restaurant, felt more sympathy for the victim, awarded her higher compensation, and levied a stiffer fine against the restaurant. Macrae and Milne (1992) concluded that sympathetic responses mediated the effects of counterfactual thinking on subsequent judgments. A salient implication of this study is that influencing a jury to adopt the perspective of a litigant could have profound consequences on the outcome of a trial.

In their review, Miller, *et al.* (1990) allude to the concept of *foreseeability* with reference to the relationship between counterfactual thinking and attribution of responsibility or blame. "The ascription of responsibility by virtue of foreseeability requires that the perceiver believe that Y would not have occurred if the target had not done X and that the target should have known that X could have led to Y" (p. 311). Although not empirically tested, it is reasonable to assume a positive correlation between imagining counterfactual alternatives and ascription of blame. That is, the easier it is for observers to imagine alternative outcomes to a tragic event, the easier it is to construe that the target could and should have done more about preventing the tragedy, and the more the target will be blamed for the outcome.

It is the idea of foreseeability that leads to the topic of *hindsight bias*. It will be argued that hindsight bias and counterfactual thinking influence the readiness with which individuals assign blame following a negative event.

HINDSIGHT BIAS

In a recent review article, Hawkins and Hastie (1990) define hindsight bias as "a projection of new knowledge into the past accompanied by a denial that the outcome information has influenced judgment" (p. 311). Primarily, this knowledge influences judgments regarding the perceived likelihood of an event. Thus, individuals with information about an outcome in hand are more certain that they would have predicted the event as it happened than are individuals without this knowledge. With the advantage of having knowledge of the outcome, prior events appear as if they could not have happened any other way. The "knew-it-all-along" comment is a prototypical phrase that often accompanies retrospective insight. In this section, the effects of hindsight bias on a variety of decision-making tasks are presented along with a discussion of related concepts such as *creeping determinism* and "*responsibility of foreseeability*" (Miller, *et al.*, 1990, p. 311).

Basic research has documented the existence of hindsight bias (e.g., Fischhoff, 1975; Fischhoff & Beyth, 1975; Walster, 1967; Wood, 1978) which affects a diversity of judgments in a variety of domains including, for example, medical diagnoses (e.g., Arkes, Wortmann, Saville, & Harkness, 1981), political election outcomes (e.g., Powell, 1988), and legal judgments (e.g., Sue, *et al.*, 1973). An investigation by Fischhoff (1975) is representative of the classic within-subjects paradigm. Subjects were given a description of an historical event (e.g., the British-Gurka war) followed by information about the outcome. Some subjects were given the actual result while others were given a list of possible outcomes. Next, subjects indicated their predictions regarding the occurrence of each outcome on the list with instructions to respond as if they *did not know the actual outcome*. Analysis showed that subjects given the actual outcome were unable to ignore this information when making retrospective probability judgments. These subjects indicated significantly greater certainty that they would have predicted the reported outcome than did subjects who did not know the outcome.

Not only does the possession of knowledge of outcome inflate the confidence of ordinary laboratory subjects in their predictive abilities (e.g., undergraduate students), it can also bias the probability estimates of persons apparently better trained in the scientific method. For example, Arkes, *et al.* (1981) compared physicians' diagnoses of a medical condition. Doctors read a case history that either specified a particular condition or was left unlabeled. The doctors were then asked to rate the probability they thought they would have assigned the diagnosis. Physicians with knowledge of the specific

condition exhibited the hindsight effect with increased certainty that they would have known the specified condition.

Fischhoff (1975) coined the term *creeping determinism* to refer to the process whereby persons with knowledge of an outcome automatically assimilate information preceding the event into knowledge structures related to the event. The result of this process is that with hindsight, events preceding the outcome appear inexorably linked to it such that the outcome "could not have happened any other way." This is an interesting phenomenon in light of the earlier discussion regarding *counterfactual thinking*. It will be recalled from the Wells and Gavansky (1989) study that the easier it is to imagine alternative activity that overturns a negative outcome, the more observers will hold as responsible an agent who failed to pursue this action. The concepts of creeping determinism and counterfactual thinking appear complementary in that, if a number of options are seen as existing prior to the event, not only will observers be more prone to speculate about what might have been if only certain actions had been undertaken (i.e., counterfactual thinking), but they will unconsciously enlist those unemployed factors, and agents perceived as responsible for their employment, as having caused its occurrence (i.e., creeping determinism). Following the home team's loss, for example, the disheartened baseball fan might imagine the coach replacing the pitcher earlier in the game, starting a different first baseman, having the batter bunt instead of 'swing-away' in the fifth inning, and so on. These imagined alternatives and the manager's failure to use them may be enlisted as causes of the team's loss.

Further, with the introduction of *foreseeability* (see Miller, *et al.*, 1990), i.e., that the target should have known that a certain factor(s) would lead to the negative outcome and is therefore responsible, we can see how these different constructs appear interrelated and combine to explain more fully how a target can be perceived as being to blame for a tragic event. Although the association between these concepts has yet to be empirically tested, they seem logically related and together provide greater insight with respect to the hindsight phenomenon.

COUNTERFACTUAL THINKING AND HINDSIGHT BIAS

To illustrate and summarize these ideas, imagine a refinery explosion in which people were killed or injured. Because people do not generally anticipate traumatic occurrences (e.g., Weinstein, 1980) and because people are motivated to explain surprising and negative events (Wong & Weiner, 1981), survivors and other interested parties will seek to explain what happened and who was responsible. Depending upon circumstances surrounding the event, i.e., exceptional events, acts of commission versus omission, constrained events (see review in Miller, *et al.*, 1990), individuals are expected to engage in generating counterfactual scenarios. To the extent this is done,

interested individuals may feel a variety of emotions including sympathy (e.g., Miller & McFarland, 1986) or regret (Kahneman & Tversky, 1982a). And because the outcome is known, individuals are also likely to overestimate in retrospect the probability of the event occurring (Fischhoff, 1975).

Imagine further that several *possible* causal factors are identified, such as lack of adequate safety training of employees, inadequate monitoring by supervisors, irresponsible acts by subcontractors, negligence of victims, and so on. Since individuals are presumably engaged in counterfactual thinking, and perhaps have taken the perspective of one side in a situation perceived as adversarial (e.g., identifying with the injured workers or with the oil company, but not with both) and are influenced by hindsight bias, these possible causal factors will be assimilated into the evaluators' knowledge structure regarding the outcome [see Fischhoff (1975) for discussion of creeping determinism]. That is, they will be seen not as possible causes but as actual causes and as inevitably having led to the explosion. Also, since these "causes" are perceived as deterministic (e.g., an explosion due to negligence) instead of random (e.g., as a result of a freak accident) [for discussion, see Hawkins and Hastie (1990)], the hindsight bias will be especially strong. And finally, the cumulative effect of this biased information processing is the perception that the responsible party should have known what was going to happen (i.e., foreseeability), could have taken steps to prevent the outcome, and is therefore to blame.

ATTRIBUTION THEORY

Although counterfactual thinking and hindsight bias can account for individuals' faulty processing of information related to a negative outcome, and although there is some documentation of how counterfactual thinking is associated with affect and action (Macrae & Milne, 1992), a more complete explanation or modeling of how persons' thoughts about prior events can affect emotion and behavior is needed. Attribution theory (Weiner, 1985, 1986) provides this opportunity for explanation. The constructs of attribution theory delineate the consequences of causal construal of events on the quality of emotional and behavioral responses. Specifically, attribution theory adds explanatory power to the concepts of counterfactual thinking, hindsight bias, and foreseeability by specifying more explicitly and comprehensively the relationship between causal ascription, affect and action. This section discusses the contribution attribution theory makes for increased understanding of the influence that counterfactual thinking and hindsight bias have on social judgment.

Although people may offer an abundance of reasons for why something has happened, attribution theorists argue that these causes may be described in terms of a few underlying properties (e.g., Heider, 1958; Rotter, 1966). Weiner (1985, 1986) has proposed that these properties include locus of causality, stability, and controllability. Locus refers to the perception of a cause

as either internal or external to the actor, stability refers to whether the cause is fixed or changeable over time, and controllability refers to the degree to which the cause is subject to volitional influence. Going back to the example of a refinery explosion, consider the case of an observer who, through the mechanisms of counterfactual thinking and hindsight bias, arrives at the perception that the explosion was due to the oil company's failure to install a proper warning sign on a dangerous device which had been present for years. This perception of causation becomes dimensionalized as internal, stable, and controllable. That is, the cause is internal because their neglect is categorized as due to factors residing within the company itself as opposed to factors residing in the environment. It is stable because the neglect has a long history and is expected to continue. And the cause is perceived as controllable because it was within the wherewithal of the company to have acted otherwise.

These latent or dimensional properties of causes rather than their surface content are associated with distinct cognitive, affective and behavioral consequences. For example, because the oil company's perceived negligence is categorized as stable, the company is expected to behave carelessly in the future, and because their carelessness is seen as controllable, there is increased likelihood for observers to feel anger towards the company and sympathy for the victims (if victims are viewed as not also responsible for the explosion).

What attribution theory adds is the answer to this question: after individuals have engaged in counterfactual thinking or show hindsight bias, how do the resultant perceptions elicit specific emotions and particular actions? What is it about perceiving the oil company as negligent, the airline pilot as careless, or the railroad company as more interested in deadlines for customers than workers' safety that triggers feelings, such as anger or sympathy, and impels actions, such as awarding large damages in a lawsuit? The answer resides in perceivers' dimensional categorizations of these causes, rather than the specific manifest causes themselves, and in the affective and behavioral consequences associated with the categorizations. For example, the oil company's perceived negligence is dimensionalized as internal, stable, and controllable. Because stability is linked with expectancy and controllability with perceptions of responsibility and certain social emotions (e.g., anger, sympathy, guilt; see review by Weiner, 1986), the petroleum company is held responsible for having behaved negligently, is anticipated to be careless in the future, and will be the object of anger. Because anger involves an attribution of blame and is associated with retribution or retaliation (see e.g., Averill, 1982; Miller & Vidmar, 1981), jurors are likely to punish the company with fines. Injured persons, by comparison, are likely to be the recipients of sympathy and monetary compensation.

COUNTERFACTUAL THINKING, HINDSIGHT BIAS, AND ATTRIBUTION

We now summarize the proposed linkages in a model that integrates counterfactual thinking, hindsight bias, and attribution theory to explain how persons ultimately arrive at a judgment after a tragic event (see Fig. 1). The model begins with a negative event and describes the intervening, hypothesized steps in arriving at a decision (e.g., compensation).

After the event, certain factors increase the likelihood of counterfactual thinking. These include exceptional events, acts of commission, and constrained events. Also, since the outcome is known, the elicitation of hindsight bias and creeping determinism is expected. Both counterfactual thinking and the hindsight bias evoke imagination or simulation activities regarding alternatives to the event, making "what-might-have-been" scenarios more cognitively available or salient. These activities then lead to perceptions that antecedent events led inevitably to the outcome (hindsight bias), and target responsibility for the outcome through foreseeability (counterfactual thinking). Finally, perceptions of controllability and associated affective consequences (e.g., anger) are linked with actions (e.g., high compensation awards, findings of perpetrator's guilt).

CONCLUSION

In this essay it is argued that a more complete picture of the cognitive processes underlying human reaction to traumatic episodes may be obtained by uniting the concepts of counterfactual thinking, hindsight bias, and causal attribution. By applying the explanatory strength of each approach to the appropriate stage in the information processing sequence, greater understanding of persons' cognitive, affective, and behavioral responses is achieved. In the earliest stages of processing, outcome information is either encoded into or retrieved from memory. Because the outcome is known, counterfactual thinking and hindsight bias are hypothesized as working in tandem, perhaps simultaneously, in facilitating judgments regarding the likelihood that the observed outcome would happen and what alternative activities could have led to a different result. Given that the outcome is negative and unexpected, individuals will then search for its causes at a later stage in the sequence. Guided by conclusions reached through counterfactual thinking and hindsight bias, the outcome is ascribed to a particular cause(s). Attribution theory accounts for the quality of affective and behavioral responses based on the dimensional categorization of the perceived cause.

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