Temporal Order and the Perceived Mutability of Events
Implications for Blame Assignment

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ABSTRACT

It was hypothesized that later occurrences in a series of events tend to evoke counterfactual alternatives more strongly, and hence tend to be blamed more for ensuing negative outcomes, than do earlier occurrences. In Study 1, Ss played the role of students whose task it was to read an article and then to identify the questions they thought a teacher might include on a test of it. Consistent with the hypothesis, Ss were less critical of a teacher whose test questions did not match their own when the teacher generated his or her questions before they did, than when he or she generated them after they did. In Study 2, Ss played the role of teachers whose task it was to select questions to be answered by a student. Presumably, because of a greater fear of being blamed, Ss selected easier questions when their selection of questions occurred after the student had finished studying than when it occurred before the student began studying.

We wish to thank Cathy McFarland, Bill Turnbull, Igor Gavanski, and four anonymous reviewers for their comments on the article.
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Received: December 14, 1989
Revised: May 14, 1990
Accepted: May 16, 1990

Imagining alternatives to reality is a pervasive aspect of people's mental lives, and thoughts about "what might have been" and "what could have been" play an important role in a diverse range of psychological phenomena, including judgments of causality (Kahneman & Miller, 1986; Wells & Gavanski, 1989), perceptions of happiness (Johnson, 1986), feelings of regret (Kahneman & Tversky, 1982; Landman, 1987), and expressions of sympathy (Miller & McFarland, 1986; Miller, Turnbull, & McFarland, 1990). People's capacity to generate counterfactual thoughts is rich and protean, but not without limits. Not all of the ways in which an experience could be imagined otherwise seem equally natural. Some aspects of reality appear mutable and are easily imagined otherwise, whereas others appear immutable and are resistant to mental modification (Hofstadter, 1979, 1985; Kahneman & Miller, 1986; Kahneman & Varey, 1990).

Kahneman and Miller (1986) speculated on some of the factors that control the differential mutability of attributes and, in turn, the differential availability of alternatives to reality. They proposed, for example, that exceptional actions are more mutable than are routine or default actions and, thus, that the counterfactual alternatives evoked by an action sequence will tend to share the routine aspects of the sequence but modify the unusual aspects (see also Gavanski & Wells, 1989, and Kahneman & Tversky, 1982). Another factor they identified as affecting an attribute's mutability is its temporal order in an event sequence. Specifically, they proposed that the second member of an ordered pair is likely to be more mutable than the first, with the consequence that imagined alternatives to the observed sequence are more likely to involve the modification of the second than the first event. Some support for this hypothesis was provided by a study in which subjects were presented with a pair of consonants (e.g., xf) on a computer screen and were asked to quickly replace one of the letters. Consistent with the hypothesis that the second event (letter) was perceived as more mutable than the first, a sizable majority of the subjects chose to replace the second letter rather than the first.
The present studies seek stronger evidence for the link between temporal order and mutability. In doing so they also explore the link between the mutability of actions and the attribution of responsibility. Kahneman and Miller (1986) proposed the following link between these two variables: "Features of a situation that have highly available alternatives are attributed greater causal effectiveness than equally potent but less mutable factors" (p. 144). Thus, when action sequences involve two or more parties, the party whose actions occurred last--because his or her actions should seem the most mutable--should be perceived as most responsible for the outcome.

To illustrate our approach and the hypothesis guiding the present research, consider the following scenario.

Imagine two individuals (Jones and Cooper) who are offered the following very attractive proposition. Each individual is asked to toss a coin. If the two coins come up the same (both heads or both tails), each individual wins $1,000. However, if the two coins do not come up the same, neither individual wins anything. Jones goes first and tosses a head; Cooper goes next and tosses a tail. Thus, the outcome is that neither individual wins anything.

Who would you predict will experience more guilt--Jones or Cooper? And will Jones blame Cooper more or will Cooper blame Jones more for their failure to win $1,000? Of course, in a logical sense neither party should experience any guilt or desire to blame because the tossing of a coin constitutes a chance event. Nevertheless, the vast majority of the 88 undergraduate subjects to whom we presented the foregoing scenario predicted that Cooper would experience more guilt (86%) and would be blamed more by Jones (92%) than vice versa. But why? In what sense is Cooper more responsible than Jones for their mutual loss? It is true that if Cooper had tossed a head, they would have won the $1,000, but it is equally true that they would have won the $1,000 if Jones had tossed a tail.

To help us understand this asymmetry, let us return to the concept of mutability. To begin, note that there are two alternative scenarios in which the two individuals could be imagined to be $1,000 richer; one would have Jones tossing a tail to match the toss of Cooper and the other would have Cooper tossing a head to match the toss of Jones. However, if the first event is less mutable than the second, these two alternatives should not be equally available either to the participants or to observers. The scenario in which the second toss matched the first should be more available than the equally positive and equally probable scenario in which the first toss matched the second. To test this hypothesis, subjects were also asked to respond to the following probe: "There are two ways that Jones and Cooper could have won $1,000. Which of these alternatives comes more readily to mind: (a) Jones tossing a tail; (b) Cooper tossing a head." Eighty-nine percent of the subjects chose the option that modified the second rather than the first toss, supporting the hypothesis that the second event was perceived as more mutable than the first. Given this finding, and the proposed link between mutability and responsibility, there is now an account of why Cooper might feel more guilty than Jones. Cooper is seen to be more responsible for the loss because his behavior is perceived to be more mutable. Study 1 provides a further test of these intuitions.

**Study 1**

The context we chose for our first study was that of the exam sequence. The "exam script" can be viewed as having three principal components: (a) an exam is generated, (b) students prepare for the exam, and (c) students write the exam. The order of the last of these events in the sequence is fixed, but the order of the first two events can vary. That is, an exam can be made up before students prepare for it or students can prepare for an exam before it is made up. The question we are interested in is, Does the order of these two events affect students' reactions to their exam performances? Consider the case where students encounter an exam that asks many questions for which they are not prepared. Two different, more positive alternatives could be evoked in this circumstance: (a) an alternative in which the student had better prepared for the questions that appeared on the exam or (b) an alternative in which the questions appearing on the exam were ones for which the student was better prepared. According to the proposed link between mutability and temporal order, the first alternative should be more available when the questions existed before the students began their studying and the second alternative more available when the questions were not generated until after the students completed their studying. In other words, students can be expected to presuppose the existence of the questions and imagine what else they might have done in the former condition, and presuppose their preparation and imagine what other questions could have been asked in the latter condition.

According to the proposed link between mutability and responsibility, the differential availability of these alternatives in the two temporal sequences should, in turn, lead the students to locate responsibility differently in the two sequences.
When the questions existed prior to their preparation, students can be expected to take more responsibility for their poor performance than they assign to the teacher, saying to themselves something such as "If only I had studied X rather than Y." On the other hand, when they have completed their preparation before the teacher generated the questions, students can be expected to assign more responsibility for their poor performance to the teacher than to themselves, saying to themselves something such as "If only the professor had asked Y rather than X." Study 1 was designed to explore this reasoning.

Method Subjects.

A total of 48 male and female undergraduates served as subjects. They were recruited by telephone from a list of volunteers.

Procedure.

Subjects arrived individually at the laboratory for a study purportedly concerned with "study methods and comprehension." Subjects were told that the main objective of the research project was to determine whether generating potential exam questions during the exam preparation phase would facilitate students' comprehension and learning. They were told that the more specific objective of the present study was to determine whether people viewing the same test material from different perspectives (that of a teacher and that of a student) would generate similar questions. More specifically, they were told that the research was designed to determine how well students (individuals who were going to be examined on material) could anticipate the questions that teachers would select to test the students' comprehension of material. Subjects were then told that they had been randomly assigned to the student condition. This assignment entailed that they read a technical article (on the topic "benefits of biowaste") from the perspective of a student who would have to answer questions on the material. A second subject, not present, was allegedly paired with the subject. This subject supposedly was assigned to the teacher role and thus would read the same material from the perspective of someone who had to choose questions that would fairly and reasonably test someone's comprehension of the material.

Subjects were then given 10 min to read the article with the instruction to do so as if they were actually going to have to answer questions on it. Once they had finished, they were given a list of 10 potential questions that could be asked about the material. Then they were asked to select the 3 that they thought a teacher who spent the same amount of time with the article as they had would select as the most fair and reasonable tests of a student's comprehension of the material. They were informed that their selections would then be compared with the selections of the subject playing the role of a teacher.

Independent variables.

There were two independent variables: feedback and temporal order. The feedback variable focused on the degree of success subjects had at guessing which questions had been selected by the teacher. Subjects were informed either that they had successfully selected all three questions selected by the teacher (success condition) or that they had failed to select any questions selected by the teacher (failure condition). The temporal order variable focused on the temporal relation between the student's (subject's) and teacher's selection of the questions. In the student-first condition, subjects were told that the subject playing the role of teacher had been scheduled to arrive in a few minutes. Thus, their task was described to them as one of seeing how well they could guess the questions that the teacher "might select" after reading the article. To bolster the credibility of the claim that the teacher arrived later than the subject, the experimenter left the experimental room twice: once for a period of 5 min and once for a period of 10 min. The first departure was allegedly to see whether the other subject had arrived and occurred when the subject was selecting the questions. The second departure occurred when the subject had made his or her question selection and was working on the filler task (an attitude survey)–presumably providing the teacher with the opportunity to finish reading the article and to select his or her questions. When the experimenter returned from her second departure, she was carrying what she alleged to be the questions selected by the teacher. In the student-second condition, the subjects were told that the subject playing the role of teacher had arrived some time before them, had spent 10 min reading the article, and was currently in the process of selecting his or her questions. (Subjects were given the filler task to perform while they waited for the teacher to finish selecting his or her questions.) Subjects in this condition were told that their task was to see how well they could guess the questions "previously selected" by the teacher.

Dependent measures.
Results and Discussion

We hypothesized that subjects' reaction to the success with which they were able to match the questions allegedly selected by a subject playing the role of a teacher would depend on (a) their degree of success at this task and (b) the order in which they and the other subject allegedly selected the questions. A 2 × 2 analysis of variance (Feedback × Order) performed on the responses to the three dependent measures revealed a number of significant effects. First, there was a main effect for feedback on each measure: perceived fairness, \( F(1, 44) = 78.57, p < .001 \); perceived reasonableness, \( F(1, 44) = 134.71, p < .001 \); and perceived accuracy, \( F(1, 44) = 9.49, p < .004 \). Second, there was a main effect of order on the perceived fairness and perceived reasonableness questions, \( F(1, 44) = 9.93, p < .01 \), and \( F(1, 44) = 10.02, p < .01 \), respectively. Third, there was a significant Feedback × Order interaction effect on each measure: perceived fairness, \( F(1, 44) = 15.00, p < .001 \); perceived reasonableness, \( F(1, 44) = 16.07, p < .001 \); and perceived accuracy, \( F(1, 44) = 3.79, p < .06 \).

Inspection of the means presented in Table 1 reveals that the responses to the perceived fairness and perceived reasonableness questions followed a clear pattern. First, when the teacher's questions matched their own, subjects rated them as highly fair and reasonable in both order conditions. Second, subjects' tendency to rate the teacher's questions as less fair and less reasonable when they did not match their own than when they did was stronger in the student-first than in the student second condition. Indeed, consistent with the key hypothesis, failing subjects in the student-first condition perceived the teacher's questions to be less fair, \( t(22) = 3.18, p < .01 \), and less reasonable, \( t(22) = 3.92, p < .01 \), than failing subjects in the student-second condition. The pattern of responses to the perceived accuracy question was less straightforward. Although subjects in the student-first condition judged the diagnostic accuracy of the task to be greater in the success than failure condition, \( t(22) = 2.50, p < .02 \), subjects' responses in the student-second condition did not differ across the two feedback conditions, \( t < 1 \). Why subjects did not credit the task with greater diagnostic accuracy when they succeeded than when they failed in the student-second condition is not clear.

In the main, the results of Study 1 are consistent with the hypothesis that early events in a sequence are more likely to be presupposed or taken for granted than are later events. Subjects' ratings of the fairness and reasonableness of the teacher's questions suggest that subjects took more responsibility for the mismatch between those questions chosen by them and those chosen by the teacher when the subject had chosen second than when he or she had chosen first. In effect, subjects in the student-second condition responded as though they viewed the mismatch as due to their failure to select the teacher's questions, whereas subjects in the student-first condition responded as though they viewed the mismatch as due to the teacher's failure to select their questions.

Follow-Up Study

We hypothesized that actions occurring later in a sequence are perceived to be more responsible for the ensuing outcome because they are perceived to be more mutable. The results of Study 1 are consistent with this hypothesis; unfortunately, however, they provided no direct evidence for the differential mutability of early and late actions. That is, Study 1 provided no evidence that subjects viewed the questions selected second as being more mutable than those selected first. In an attempt to redress this omission, we conducted a follow-up vignette study involving four groups of undergraduate subjects. We presented two of these groups with one of two versions of the following vignette (the manipulated information is italicized).

Imagine the following scenario. A professor distributes a list of three study questions to her class and announces that the exam will consist of one of these questions that she already has selected (will select an hour before she distributes the exam). Nancy does not have time to prepare for all of the questions, so she decided to prepare for only two of the questions. When Nancy gets the exam she is dismayed to see that the selected question is the one that she did not prepare for.

Following the scenario subjects were asked: "Which of the following two thoughts is Nancy most likely to have in this
The results supported the hypothesis that early actions are less easily imagined otherwise than later actions. When the professor selected the exam question prior to the student's preparation, 75% of the subjects (n = 55) expected that the target would be more likely to have the thought "Why didn't I prepare for this question?" than the thought "Why did the professor select this question?" In contrast, when the professor selected the question after the student had completed his or her preparation, only 51% of the subjects (n = 57) expected that the target would more likely have the former thought, as compared with 49% who expected that she would more likely have the latter thought, $\chi^2 = 6.66, p < .01$.

Providing further support for the differential mutability hypothesis are the results from two other groups. These subjects were presented with a vignette that was identical to the one described above except that it omitted the manipulated information and varied instead the question it asked of subjects. In one condition subjects were asked, "In which of the following two circumstances is Nancy most likely to think to herself, 'If only I had prepared for the question the professor selected'?" In the second condition subjects were asked, "In which of the following two circumstances is Nancy most likely to think to herself, 'If only the professor had selected one of the questions I prepared for'?" The two circumstances to be chosen between were (a) the professor announced that she already had selected the exam question when she distributed the list of three study questions and (b) the professor announced at the exam that she only selected the exam question an hour before distributing the exam.

Eighty-one percent of the subjects (n = 53) expected that the target would most likely have thoughts of what else she might have done when the professor had selected the question before the target began studying. Conversely, 82% of the subjects (n = 55) expected that the target would most likely have thoughts of what else the professor might have done when the professor did not select the question until after the target had completed her preparation, $\chi^2 = 42.83, p < .001$.

The scenario used in the follow-up study, although not precisely paralleling the procedure used in Study 1, does bear a strong schematic resemblance to it. As such, the results of the follow-up study strengthen the mutability interpretation of subjects' responses in Study 1. Recall that subjects who were informed that they had failed to anticipate any of the questions selected by the teacher evaluated the teacher's questions as fairer and more reasonable when the teacher made his or her selection before the subject made his or her selection. We hypothesized that this result reflected the fact that subjects were more inclined to presuppose the teacher's selection and consider alternatives to their own selections when the teacher selected first than when they did. The phenomenology that subjects attributed to a failing student in the follow-up study comports nicely with this reasoning. A failing student was assumed to be less likely to have thoughts that focused on alternatives to the professor's selection (rather than her own) when the professor's selection preceded her own than when it followed.

**Study 2**

Study 1 looked at the exam script from the student's perspective. Study 2 considered this sequence from the teacher's perspective and asked whether teachers are inclined to generate different questions when they generate them before students begin their studying than when they do so after students have completed their studying. Our analysis suggests that such a difference could exist to the extent that teachers anticipate that they will feel (and be held) more responsible for a poor performance by students in the latter than in the former circumstance. Specifically, the anticipation of greater blame for students' poor performances can be expected to lead teachers to generate easier questions when they generate them after the students have completed their studying than when they generate them before. 1

**Method Subjects.**

A total of 26 male and female undergraduates participated as subjects. They were recruited by telephone from a list of volunteers.

**Procedure.**

As in Study 1, the experiment was described as one of a number of investigations being conducted on the general question of "study methods and comprehension." More specifically, subjects were told that the study's purpose was to
see how successfully individuals enacting the role of students could anticipate the questions that subjects playing the role of teachers would ask about an article. The experimenter told subjects that they had been randomly assigned to the role of teacher. Fulfilling this role entailed that they read an article (the same article used in Study 1) and then select 3 questions from a list of 10 that they thought would be a fair and reasonable test of a second subject's (student's) knowledge of the material presented in the article. Subjects were told further that the test questions had been ranked for difficulty level by a team of engineering professors on campus. Subjects also were told that the student-subject would actually have to try to answer the questions selected by them and that he or she subsequently would have an opportunity to evaluate the fairness and reasonableness of the questions.

Independent variable.

The only manipulated variable was the temporal order of the event sequence. In the teacher-first condition, subjects were led to believe that they were reading the article and selecting the three test questions before the alleged student-subject began studying the article; in the teacher-second condition, subjects performed this task believing that the alleged student-subject had already completed his or her studying of the article. The instructions closely corresponded to those described in Study 1.

Dependent measure.

Once subjects had read the article, they were shown a list of 10 questions, presumably ranked in terms of difficulty, and asked to select 3 that they thought were fair and reasonable questions to ask someone who had studied the article for 30 min. Once subjects had done this, they were debriefed.

Results and Discussion

We reasoned that subjects playing the role of teachers would anticipate both feeling and being assigned more responsibility for any exam difficulty that student-subjects had when the subjects had selected the questions after, as opposed to before, the student-subjects had completed their studying. This reasoning led to the prediction that subjects would choose questions of lower rated difficulty in the teacher-second than in the teacher-first condition. This prediction was confirmed. The difficulty level of the three questions selected by subjects in the teacher-second condition was lower than that of the questions selected by subjects in the teacher-first condition ( \( M = 3.46 \) vs. \( M = 4.71 \)), \( t (24) = 3.16, p < .01 \).

The results of Study 2 complement those of Study 1 and provide further support for the hypothesized links between both the variables of temporal order and mutability and the variables of mutability and perceived responsibility. Subjects apparently anticipated that the degree of responsibility they would be assigned for any resulting noncorrespondence between their actions and those of the student-subjects would depend on the temporal relations of their respective actions. From the perspective of the teacher-subjects in the teacher-second condition, the preparation of students was fixed and immutable and, as such, the students could be assigned only limited responsibility for a poor performance. This was not the case from the perspective of teacher-subjects in the teacher-first condition. From their perspective, the students' opportunity to study was not fixed, and thus their failure to be adequately prepared for the test items would be primarily their own responsibility.

General Discussion

The counterfactual constructions evoked by experience tend to share certain features with reality but not others (Kahneman & Miller, 1986). The general question guiding the present research is, What determines which aspects of reality are immutable and remain part of any imagined alternative, and which are mutable and tend to take different values in the evoked alternatives?

The present studies have focused on one potential determinant of mutability—temporal order. Specifically, we have explored the hypothesis that early events in a sequence tend to be less mutable than later events. Two predictions were derived from this hypothesis: (a) The alternatives that a sequence of events brings to mind are more likely to have held constant, or presupposed, the early events and have varied, or mentally mutated, the later events than the converse, and (b) the greater perceived mutability of later events will imbue them with greater perceived causal potency.
The most direct evidence for the first prediction comes from the data we reported on the coin-toss scenario. When two individuals were described as losing an opportunity to win $1,000 by failing to match coin tosses, subjects overwhelmingly indicated that the more positive alternative that came "most readily to mind" was the counterfactual alternative in which the toss of the second person matched that of the first person rather than vice versa. The scenario data also supported the second prediction by indicating that the person whose actions were most easily mentally modified (the person who tossed second) was predicted to experience the most guilt and receive the most blame.²

Studies 1 and 2 extended and conceptually replicated the scenario results. In Study 1 subjects (students) judged teacher-selected questions that they had failed to anticipate as "fairer" and "more reasonable" when they had been selected prior to their studying of an article than when they had been selected after their studying of the article. Paralleling the results of the coin-toss scenario, the mental alternatives generated by the mismatch between those questions focused on by the "teacher" and those focused on by the subjects (students) appeared to presuppose the actions of the person who acted first. The actions of the person who responded second, by appearing more mutable, resulted in him or her being perceived as more responsible for the mismatch. Study 2 showed that subjects apparently anticipated that they would be held, and possibly also would feel, more accountable for students’ poor showing on a test when they did not select the questions until after the students had completed their studying. Subjects enacting the role of teachers chose easier questions when they thought a student had completed his or her studying than they did when they thought the student was yet to begin his or her studying.

The tendency for later events, by appearing figural, to be perceived as "counting" more than earlier events may have diverse effects. It may, for example, underlie blackjack players’ aversion to playing on the seventh (last) box, where cards not taken go to the dealer (Wagenaar, Keren, & Pleit-Kuiper, 1984). This aversion appears to reflect the perception that the decision of the player on this box to take or not take another card—even though he or she does not know what the next card will be—is more responsible for the value of the card next drawn by the dealer than are the decisions of the previous players. This reasoning is explicable, according to the present analysis, to the extent that the "if only" thoughts of losing blackjack players are more likely to focus on, and to mentally modify, the decision of the player on the seventh (last) box than the decisions of the players on any of the previous boxes.

As another possible manifestation of the order—mutability link, consider a scene from the movie Return of the Pink Panther, starring Peter Sellers as the redoubtable Inspector Clouseau. In this scene Clouseau and his trusted manservant, Cato, are attempting to peer into a bar through a high window. Because of the height of the window, they decide it is necessary for one of them to stand on the shoulders of the other. This decision prompts a brief moment of hilarious confusion as they decide who should stand on whose shoulders. Eventually, Clouseau climbs onto Cato’s shoulders, claiming that this makes sense because he is taller than Cato. The humor of this scene depends on the tension between the awareness that it does not logically matter whether the taller or the shorter person goes on top and the compelling intuition that the person on the top does somehow count more, making it preferable that he be the taller. Now it may be too much to expect subjects to explicitly reason like Inspector Clouseau when deciding how to build human ladders, but it would not be surprising to see them display more subtle forms of such reasoning. For example, "successful" ladders might bring more, or at least swifter, congratulations to the person on the top than to the person on the bottom.

Continuing this line of speculation, perceptions of mutability, and Inspector Clouseau-like reasoning, may help sustain the common belief that one should put the fastest member of a relay team last. Relays are admittedly much more complex social organizations than are human ladders—and there may often be rational reasons to put the fastest member last—but it is possible that even here the differential mutability of early and late events is playing a role. Namely, the performance of the last member, because it is more mutable, may be perceived to be more responsible for—and to count more toward—the team’s overall performance than the performances of the other team members. To the extent that this perception exists, coaches might reasonably be expected to prefer to put their fastest member in the last position, just as Clouseau preferred to have the tallest person in the top position and as blackjack players might be expected to prefer to have the most skilled (or luckiest) player on the seventh box.

Finally, the present analysis may be relevant to the tendencies of individuals to wager more on their predictions than on their postdictions (Rothbart & Snyder, 1970; Strickland, Lewicki, & Katz, 1966) and to prefer, when given the chance, to predict events than to postdict them (Brun & Teigen, 1990). Consider the situation in which a person is attempting to guess (Event A) the outcome of the toss of a die (Event B). These two events can occur in one of two sequences: A/B or B/A. The research of Brun and Teigen suggests that most people would prefer sequence A/B over sequence B/A; that is, they would prefer to make their guess before the die is tossed. This hypothesis is compatible with the present findings in
the following way. If a person guessed wrong, he or she could be expected to feel more responsible if the guess was made after the die was tossed than if it was made before. Thus an inaccurate guess should lead to the greater availability of "if only" thoughts involving one's guess when the toss of the die preceded the guess than when it followed it. Consistent with this hypothesis, many of Brun and Teigen's subjects mentioned that a failed postdiction would be more painful than a failed prediction. In the words of one of their subjects, "I think I would become more angry with myself if I guessed wrong after the die was tossed" (p. 21). The anticipation of greater self-blame in the postdiction than in the prediction condition may account for why people prefer to make a guess in the latter condition than in the former condition. It may also account for why people wager less on postdiction tasks than on prediction tasks. The more focal the actions of the self are in a sequence that results in the loss of money, the more painful that loss can be expected to be. In summary, the link between temporal order and mutability may help one understand certain asymmetries involving prediction and postdiction. Still, it is unlikely to be able to provide the whole story. For example, it is not obvious how the differential mutability hypothesis can explain the greater confidence in prediction guesses than in postdiction guesses (Rothbart & Snyder, 1970).

Causal Versus Temporal Chains

The present results, although consistent with the proposed link between mutability and responsibility assignment, can be contrasted with a series of studies that demonstrate that people attribute greater causal responsibility to early than to later events in causal chains (Brickman, Ryan, & Wortman, 1975; Johnson, Ogawa, Delforge, & Early, 1989; Vinokur & Ajzen, 1982; Wells, Taylor, & Turtle, 1987). Consider Johnson et al.'s (1989) study in which subjects were presented with a scenario concerning a negligence suit against a dog owner. The scenario involved two events: (a) a dog (Fido) jumping a fence and biting a child (Ted), and (b) the child teasing the dog. The order of the two events was varied. Under one version of the facts, Fido first jumped the fence and wandered near Ted, who was playing in his own backyard. Only then did Ted begin teasing Fido, "which caused Fido to bite Ted." In the other version, Ted's teasing caused Fido "to jump over the fence and bite Ted." Subjects in the condition in which Fido's jumping of the fence was causally prior to Ted's teasing of Fido tended to believe that the dog owner was more responsible for the injuries than did subjects presented with the opposite event sequence.

The so-called causal primacy effect may appear, on quick analysis, to contradict the current findings and the hypothesis that later events in a temporal sequence are perceived to be both more mutable and more causally potent than later events. However, a closer analysis suggests an important difference between the two sets of studies. Those studies that find a causal primacy effect focus on events that form chains that are not only temporal but are also causal, that is, chains in which the early events precipitate later events. In contrast, our research focuses on temporal chains in which the two events (e.g., two coin tosses) are independent of one another. One obvious possibility suggested by this difference is that causal temporal chains may evoke different reactions from observers than do noncausal temporal chains. In cases involving causal chains, precipitating causes may be seen as both more mutable and more causally responsible for the ensuing outcomes than later events. Indeed, when presented with causal chains and asked to identify ways in which the outcome would have been different, subjects show an overwhelming preference to change early events (Wells et al., 1987). Thus, later events, when determined or controlled by early events, may seem less mutable and, consequently, less causally potent (Vinokur & Ajzen, 1982; Wells et al., 1987).

Finally, the effects of event order on responsibility assignment may not always be mediated by the relative mutability of early versus late events. Consider a modified version of the coin-toss scenario described earlier. In this version, winning the $1,000 requires Jones and Cooper to both toss heads. Jones goes first and tosses a tail; Cooper goes next and also tosses a tail. In this case it seems unlikely that Cooper will be blamed more than Jones for their loss; indeed, it seems possible that Jones will be targeted for the most blame. Here the first event (toss) does not control the second event, but it does, in and of itself, ensure a negative outcome, thereby reducing the relevance of the second event. Interestingly, unlike the previously discussed examples of temporal and causal chains, this example does not appear to involve differential mutability. Although the second toss is rendered less relevant by the first toss, it is not rendered less mutable. If Jones were to be targeted for greater blame in this scenario, it probably would not be because of the greater availability of "if only" thoughts involving his behavior.

Additional Order Effects

Recognition of the fact that later events in a sequence are perceived to be more mutable than early events may also be relevant to the effects of information order on the impression formation process (Jones & Goethals, 1971). By way of
illustration, imagine two students (Mary and Sue) who each write two exams. Mary receives a grade of A on the first exam and a grade of C on the second. Sue receives a grade of C on the first exam and a grade of A on the second. The proposition that early events are seen as less mutable than later events suggests that the counterfactual alternatives brought to mind by these two sequences will tend to hold the first event constant and permit the second to vary rather than vice versa. Thus, the alternative sequence evoked most strongly by Mary's grade sequences should be A/A, and that evoked most strongly by Sue's should be C/C. By presupposing the first grade more strongly than the second, the causal questions that the two sequences generate also may be very different (Kahneman & Miller, 1986; Miller, Taylor, & Buck, 1990). In the case of Mary, the evoked alternative may suggest the question, "Why didn't she get an A on the second exam?" and in the case of Sue it may suggest the question, "Why didn't she get a C on the second exam?" To test this hypothesis, we presented 118 undergraduate subjects with one of the two grade sequences and asked them to indicate whether "the best and most natural explanation" for the inconsistent sequence would be an explanation that (a) accounted for why the second grade was not the same as the first or (b) accounted for why the first grade was not the same as the second. As predicted, the majority of the subjects (67% vs. 33%) answered this question by selecting the first option, z(118) = 3.48, p < .01.

This difference in question salience could influence the impression formation process in more than one way. One possibility is that the tendency to "explain away" the more recent performances might lead to a primacy effect with observers weighting early performances most heavily in their impressions. Explanations focusing on the recent performances need not always render them less reliable, however. Some causal accounts may even make them seem a more reliable and valid indicator of the student's ability, which, in turn, would lead to them being accorded greater weight in the impression formed. Thus, the hypothesis that later events are more mutable than early events does not lead to an unequivocal prediction about the occurrence of primacy and recency effects in impression formation. Neither should it be viewed as constituting an alternative account to the various other accounts proposed to explain order effects in impression formation (see Jones & Goethals, 1971, for a review). However, a consideration of the relevance of the concept of mutability for order effects in impression formation may serve to deepen understanding of this phenomenon.

**General Implications for the Understanding of Counterfactual Thought**

Temporal order was investigated in the present studies not only because of its intrinsic interest but because it illustrated some more general points about stimulus or event mutability and counterfactual thought. The most general of these points is that not all possible mental modifications of experience are equally natural; some alternatives to reality are more available than others. Temporal order appears to be one of the factors that influences the relative availability of different possible alternatives to experience. Kahneman and Miller (1986) speculated on some other possible determinants, and there are doubtless many more. It remains for future research to explore more fully both the rules of mutability and their psychological bases. By linking the variable of event mutability to variables such as blame, responsibility, and fairness, we hope the present research (see also Miller & Turnbull, 1990; Miller et al., 1990) helps to demonstrate the potential value of this undertaking for social psychology.

**References**


136-153.


This study was inspired by Danny Kahneman's observation that the closer to an exam he prepares his questions, the easier they become.

A possible question for future research is, What effect, if any, does order of revelation, as opposed to order of determination, have on the assignment of responsibility? For example, how would responsibility have been apportioned if Cooper tossed before Jones but Jones revealed his toss before Cooper revealed his?

We are grateful to Igor Gavanski and Jim Sherman for providing this example.

There are still other ways in which event order might affect responsibility assignment that do not involve mutability. For instance, later events in a temporal sequence may be assigned more causal responsibility because they are more available in memory. The differential memory hypothesis provides a possible alternative explanation for Study 1 but not for the coin-toss scenario where the events were provided simultaneously.
Table 1
Mean Responses to the Questions Selected by the “Teacher” as a Function of Temporal Order and Feedback

<table>
<thead>
<tr>
<th>Condition/measure</th>
<th>Temporal order</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Student first</td>
<td>Student second</td>
</tr>
<tr>
<td>Success</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived fairness</td>
<td>8.08</td>
<td>7.75</td>
</tr>
<tr>
<td>Perceived reasonableness</td>
<td>8.08</td>
<td>7.75</td>
</tr>
<tr>
<td>Perceived accuracy of task</td>
<td>6.75</td>
<td>4.91</td>
</tr>
<tr>
<td>Failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived fairness</td>
<td>2.67</td>
<td>5.67</td>
</tr>
<tr>
<td>Perceived reasonableness</td>
<td>1.92</td>
<td>4.75</td>
</tr>
<tr>
<td>Perceived accuracy of task</td>
<td>4.17</td>
<td>4.33</td>
</tr>
</tbody>
</table>

Note. Higher numbers indicate higher perceived fairness, higher perceived reasonableness, and higher perceived accuracy.