European Journal of Social Psychology
Eur. J. Soc. Psychol. **30**, 273–296 (2000)

Counterfactual intensity

LAWRENCE J. SANNA[1]*
and KANDI JO TURLEY-AMES[2]
[1]*Washington State University, USA*
[2]*Idaho State University, USA*

Abstract

Counterfactual intensity, the strength with which counterfactuals are experienced, influenced the magnitude of affective and preparative reactions. Intensity influenced reactions when counterfactual numbers were held constant for samples of participants' actual experiences (Study 1) and contributed significantly to responses over counterfactual numbers (Study 2) and reaction times (Study 3) after performing laboratory tasks. This was found when participants spontaneously generated counterfactuals (Study 2), and when participants responded to counterfactual statements (Study 3). As upward counterfactuals became intense, so did greater preparation and worse moods; as downward counterfactuals became intense, so did better moods and lesser preparation. Intense moods also conversely influenced the intensity of counterfactuals (Study 3). Conceptual and methodological implications and possibilities for future research are discussed. Copyright © 2000 John Wiley & Sons, Ltd.

Counterfactual thinking refers to 'if only' or 'at least' mental simulations of alternative outcomes that people often have in response to events in their lives. Such thoughts about 'what might have been' can occur spontaneously (Sanna & Turley, 1996) and they can differ by direction (e.g. Markman, Gavanski, Sherman, & McMullen, 1993; Roese, 1994; Sanna, 1996). Upward counterfactuals, mentally simulated alternatives that are better than actuality (e.g. 'If only I lived in a warmer climate, I would not have to spend winters digging my car out of the snow'), may serve future preparation. These counterfactuals can function as schemas for future action (Johnson & Sherman, 1990), making salient plans that are necessary to facilitate a successful change (e.g. actually planning a move to a warmer locale). Downward counterfactuals, mentally simulated alternatives that are worse than actuality (e.g. 'At

*Correspondence until June 30, 2000 to: Lawrence J. Sanna, Institute for Social Research, University of Michigan, 426 Thompson Street, Ann Arbor, MI 48106-1248, USA.
Correspondence after July 1, 2000 to: Lawrence J. Sanna, Department of Psychology, P.O. Box 644820, Washington State University, Pullman, WA, 99164-4820, USA. e-mail: sanna@wsu.edu

Received 1 March 1999
Accepted 18 June 1999

least I got lucky on a few multiple choice questions, or I might have failed my exam'), may serve affective functions. By way of contrast (Schwarz & Bless, 1992), comparisons to worse possible alternatives may elicit good moods. Evidence for these proposals was obtained by Markman *et al.* (1993), who found that manipulations that affected counterfactual direction on a computer-generated card-game, outcome frame and expectancy of a second try, also influenced reactions. More upward counterfactuals were found following failure (losing), and when participants expected to play the game again. Participants who lost or who expected another try were argued to have greater need for preparatory information which might help them win in the future. These manipulations elicited not only more upward counterfactuals but also greater dissatisfaction. In contrast, more downward counterfactuals were found following success (winning), which was related to greater satisfaction. Roese's (1994) participants who generated downward counterfactuals similarly reported better moods than those who generated upward counterfactuals (see also Sanna, 1996; Sanna, Meier, & Turley-Ames, 1998; Sanna, Turley-Ames, & Meier, 1999).

COUNTERFACTUAL INTENSITY: METHODOLOGICAL AND CONCEPTUAL ISSUES

Common experiences, however, seem to dictate that there is more influencing reactions than just whether counterfactuals are upward or downward *per se*. Reactions should also depend upon the intensity with which these thoughts are experienced, a characteristic of counterfactuals which we call *counterfactual intensity*. Counterfactual intensity is used here to refer to the strength or magnitude with which a particular counterfactual is experienced. Other things being equal, the degree of people's preparative and affective reactions should be strongly related to the intensity of the experienced counterfactual itself. There are both methodological and conceptual issues related to the property of counterfactual intensity.

Several methodologies may provide indirect, but at best partial, evidence for our proposals. In one set, participants read scenarios and then choose who experiences more intense reactions (e.g. who would experience greater regret; Gleicher, Kost, Baker, Strathman, Richman, & Sherman, 1990; Landman, 1987; Lundberg & Frost, 1992). For instance, in the classic Mr Crane and Mr Tees scenario (Kahneman & Tversky, 1982), one person misses his plane by 30 minutes and the other by 5 minutes. Participants feel that the person who misses his plane by 5 minutes feels greater regret. Reactions (e.g. regret) thus differ on the basis of closeness of alternatives (or in other studies on the basis of exceptionality, commission, etc.; Miller, Turnbull, & McFarland, 1990). However, no counterfactuals are actually measured in this research, and neither is their intensity. A related set of studies requires participants to read vignettes while responding to dependent measures (e.g. Likert or semantic-differential scales) that assess emotional or other responses (Boninger, Gleicher, & Strathman, 1994; Macrae, 1992; Macrae & Milne, 1992; Miller & Gunasegaram, 1990; Miller & McFarland, 1986; Turley, Sanna, & Reiter, 1995). Again, however, neither counterfactuals nor their intensity are measured. These methods alone thus make it difficult to evaluate the notion of counterfactual intensity. One has no way of knowing, for instance, if reactions differ because participants generate greater

numbers of counterfactuals (e.g. 'If only I didn't get caught at that last stoplight . . .', 'If only the ticketing agent was quicker . . .', etc.) in the close than far conditions, or because participants in the close conditions generate the same number of counterfactuals (even if only one) but more intensely.

Another set of methodologies measures the number or frequency of counterfactuals and has shown that the quantity of thoughts can influence reactions. Greater numbers of upward counterfactuals are associated with more preparation and worse moods, whereas greater numbers of downward counterfactuals are associated with better moods and less preparation (e.g. Markman *et al*., 1993; Roese, 1994; Sanna, 1996). We do not disagree with these findings, but, at best, frequency is a (poor) proxy for what we mean by intensity. To illustrate our point, consider the thoughts of two people, Ms Intense and Ms Frequent, after an automobile accident. Ms Intense may think counterfactually about the accident very rarely (e.g. only twice in 10 days), but intensely (e.g. 8's on an intensity scale ranging from 1 = *very weakly* to 9 = *very strongly*). In contrast, Ms Frequent might counterfactualize more often (e.g. five times in 10 days), but weakly (e.g. 2's on a 1 to 9 intensity scale). Our argument is that the counterfactuals of these people differ greatly, and can have very different implications. In particular, even though Ms Frequent counterfactualizes more often, the reactions of Ms Intense may be stronger. Put another way, in terms of 'intensity scores', Ms Intense experiences counterfactuals with an average intensity of 8, whereas Ms Frequent experiences counterfactuals with an average intensity of 2. The point is that numbers alone do not encapsulate what we presently mean by counterfactual intensity. In short, counterfactual intensity and frequency are not isomorphic, and we believe that intensity can show psychologically meaningful relationships to preparative and affective reactions over and above that of numbers.

At least one final methodology has possible relations to counterfactuals intensity, and has received some research attention. Theorists have proposed that emotions could be 'amplified' by thinking counterfactually; one reason for this is that counterfactuals may be more accessible under certain conditions (e.g. when outcomes are close) than others (Kahneman & Miller, 1986). Thus, research using reaction times to measure counterfactual activation (Roese & Olson, 1997; Sanna *et al*., 1999) might be related to counterfactual intensity; faster reaction times may indicate greater accessibility and intensity. Although closeness may amplify emotions and certain manipulations may influence activation, as with number or frequency, neither accessibility nor activation captures fully what we mean by intensity. In particular, any specific counterfactual may be thought of quickly, but this does not necessarily imply that once accessed it will be experienced intensely or strongly. Moreover, in the few studies using reaction times, no independent assessments of intensity are made, nor is intensity related to preparative and affective reactions. Once again this makes the present hypotheses difficult to evaluate in the absence of direct empirical evidence.

Measuring counterfactual intensity directly, however, may lead to a greater understanding of how counterfactuals influence reactions, and represents another step in establishing the ecological validity of counterfactuals as people actually experience them in their daily lives. Our studies advance a more systematic examination of counterfactual intensity, both methodologically and conceptually. Measuring counterfactual intensity directly may provide a methodological advance that is more sensitive than frequency and more easily implemented than accessibility. Taking into account counterfactual intensity may also result in more accurate predictions of

people's responses when dealing with life events, improving our knowledge of the mechanisms underlying counterfactual thinking. For reasons outlined previously, people who experience counterfactuals intensely may react differently beyond that suggested by measurements of just numbers or reaction times. That is, people may have stronger or weaker responses based upon counterfactual intensity, irrespective of counterfactual frequency or accessibility. In fact, accounting for intensity may help to clarify further the linkages between counterfactuals and affective and preparative reactions (e.g. explain why relationships are sometimes weak or strong). To test our proposals, we conducted a series of three studies. In Study 1, we tested whether self-reported counterfactual intensity could predict affective and preparative reactions even when counterfactual numbers were held constant in response to actual life events. In Study 2, we allowed counterfactual numbers and intensity to vary, and tested whether intensity accounts for responses over that of numbers on a laboratory task. In Study 3, we tested whether the intensity of moods could conversely influence the intensity of counterfactuals and further account for variability in relations beyond that of reaction times. Each of our three studies thus used a slightly different approach to triangulate on our hypotheses.

STUDY 1 EXPERIENCE SAMPLING AND PROMPTED COUNTERFACTUAL DIRECTION

Our first order of business was to test whether the intensity of experienced counterfactuals influences the magnitude of preparative and affective reactions. To do this, we held constant the number of counterfactuals while asking our participants to supply intensity ratings. We used an Experience Sampling Methodology (ESM; e.g. Hormuth, 1986; Reis & Wheeler, 1991), to capture more fully participants' experiences as they occurred during weekly activities. Participants recalled positive or negative life events, after which they generated better (upward) or worse (downward) alternatives over a five-week period. The main design of study 1 was a 2 (event: positive, negative) $\times$ 2 (counterfactual: upward, downward) between-subjects factorial. If counterfactual intensity influences the magnitude of reactions, then a relationship between intensity and reactions should be obtained even though counterfactual numbers are held constant. We also expected this relation to be moderated further by counterfactual direction (e.g. intense upward counterfactuals being most preparative but resulting in greatest bad moods).

Method

Participants

Fifty-three (35 female and 18 male) introductory psychology students received extra course credit. They were randomly assigned with approximately equal numbers, and approximately equal proportions of women and men, within each condition. Although the initial sample consisted of 60 participants, seven dropped out before completing all ratings. Three participants completed only the first two ratings, and the

remaining four each completed four or fewer ratings. Participants who dropped out were approximately equally distributed among conditions.

Procedure

Data collection was accomplished using an ESM (e.g. Hormuth, 1986; Reis & Wheeler, 1991). ESMs are designed to gather data from situations that participants might normally encounter in their daily lives (see Tennen, Suls, & Affleck, 1991); in our research, participants completed several reports of life events in accordance with a predetermined schedule.

ESM

Participants signed up for a study on the 'life events of college students'. They were met individually by one of the authors and the study was described. Over a five-week period, participants were given a series of questionnaires and rating scales to record life events and to give their reactions to them. Each person responded to a set of five questionnaires, one per week.

The questionnaires varied on a between-subjects basis whether participants were to recall either positive or negative life events, and whether they should generate either upward or downward counterfactuals to these events. Each of the five questionnaires also pertained to a different life domain, which varied on a within-subjects basis.

To minimize misunderstandings, one of the authors explained each part of the ESM to participants, who were asked to complete a practice questionnaire during the initial visit. A telephone number was also provided for anyone who had further questions during the ESM recording period. Participants received one questionnaire per week. They could complete the questionnaire at any time during that week, but they were asked to complete the questionnaire as soon as possible after an appropriate event occurred. Participants returned their questionnaires according to schedule, and once returned, they were given the next one until all five were completed. The questionnaires, which consisted of several parts, on the first page read as follows:

> We are studying the life events of college students. On the following pages, we ask that you think about a particular event and to rate your thoughts and feelings. Please think about the event as clearly as you can, and try to vividly imagine yourself in that situation as it occurred. Describe this event in as much detail as possible, in a way that we can fully understand what happened to you. We ask that you not rush through this task. Take your time and describe the situation in detail.

Event valence. The instructions then diverged depending on condition. Participants in the *positive* event condition were asked to think and write about good events that had actually happened to them within the past week; participants in the *negative* event condition were asked to think and write about bad events that had actually happened to them within the past week. Each of the five questionnaires also pertained to a

different life domain. These domains were a *classroom* situation, a *family* situation, a *friendship* situation, a *work* situation, and a *leisure/hobby* situation. A questionnaire which pertained to a different life domain was given each week, the order of which was randomly predetermined for each participant. For each participant, however, the five events were either all positive or all negative, depending on condition.[1] A second page of the questionnaire booklet was provided for participants to write about the respective life events.

Counterfactual intensity. On a third page, participants were asked to generate a counterfactual for the event they wrote about by reading the following instructions:

> When thinking about various life events, people often have thoughts like 'if only' or 'at least'. Sometimes these thoughts can be about things that would have made the situation better, and they are about things that are better than what actually happened; sometimes these thoughts can be about things that would have made the situation worse, and they are about things that are worse than what actually happened. Now, in the space below, we would like you to think about ONE THING that might have happened but did not actually happen to you in the —— situation that you described on the previous page.

Each event domain was inserted into the blank. In the *upward* counterfactual condition, instructions continued by asking participants to write about something that might have happened that would have made the event better; in the *downward* counterfactual condition, participants were asked to write about something that might have happened that would have made the event worse.

Of primary importance to the present research, participants were then asked to make counterfactual intensity ratings. To do this, on a fourth page, all participants were instructed to think about the counterfactual that they had just written and to assign a number indicating the extent to which the thought was experienced intensely. A scale was provided on which they asked a number ranging from 1 (*very weakly*) to 9 (*very strongly*) with 5 as a mid-point labeled *moderately*, indicating the extent to which they were experiencing the counterfactual intensely.

Affect and preparation. On a final page, participants rated affect and preparation. They were asked to use a series of positive and negative adjectives (e.g., Sanna, 1998; Sanna *et al*., 1998, 1999; cf. Watson, 1988) to indicate how they felt while thinking about the counterfactual alternative they had described. Positive adjectives were *happy*, *satisfied*, *pleased*, *delighted*, *content*, *relieved*, and *glad*; negative adjectives were *gloomy*, *annoyed*, *depressed*, *miserable*, *sad*, *disappointed*, and *frustrated*. Also among filler items, participants answered three questions in which they rated the extent to

[1]For example, one participant might have been given the family situation first, work situation second, leisure/hobby situation third, and so on. Another participant might have been given the classroom situation first, family situation second, and so on. However, as we mentioned, participants always wrote about either all positive or all negative events (i.e. irrespective of event order). These different life domains were included primarily for exploratory purposes; that is, we had no specific hypotheses for possible differences across event domain. Additional analyses revealed no significant main effects for event domain (findings were slightly but nonsignificantly weaker for the leisure/hobby domain than for the other four) nor did event domain interact with our other independent variables. Because event domain did not qualify our findings, and for the sake of simplicity, we thus report our results averaged over event domain in Study 1. These findings only serve to bolster the generality of our results, as they were obtained irrespective of event domain.

Table 1. Mean counterfactual intensity, affect, preparation, and correlations by counterfactual direction and event for Study 1

	Upward counterfactual		Downward counterfactual	
Variable	Positive event	Negative event	Positive event	Negative event
Intensity (I)	5.30	6.98	6.61	4.98
Affect (A)	4.51	3.35	5.67	5.20
Preparation (P)	6.02	6.11	4.30	5.56
r(A–I)[a]	−0.581*	−0.672*	0.505**	0.584*
r(P–I)[a]	0.623*	0.511**	−0.426	−0.590*
n	14	13	14	12

Note: r(A–I) = correlation between intensity and affect; r(P–I) = correlation between intensity and preparation, n number of participants per cell.
[a] = rs were Fisher's r to Z transformed for analyses and then transformed back (Z to r) for presentation.
* = rs significantly different from zero at $p < 0.05$.
** = rs significantly different from zero at $p < 0.10$.

which they felt prepared, the extent to which they felt like they could handle, and the extent to which they felt ready to deal with, the various life events in the future. Affect and preparation were rated on 9-point scales anchored by 1 (*not at all*) and 9 (*very much*).

After the study was completed, all participants were fully debriefed and thanked.

Results and Discussion

The relationships between counterfactual intensity and affective and preparative reactions were examined in several ways. First, we present and analyze the means for intensity, affect, and preparation. Second, and perhaps most importantly from the perspective of the present hypotheses, we assess the relationship between intensity and affect, and intensity and preparation. We did this by testing for mean differences in the correlations between intensity and affective and preparative reactions, and by conducting regressions to test the degree to which counterfactual intensity may contribute to reactions beyond that of our independent variables (see Table 1).

Each participant contributed five ratings to the data, one for each week. To account for this, we first calculated the means for intensity, affect, and preparation for each participant, and these were then entered as dependent variables in our analyses (i.e. each participant's data represents an average of the five ratings). Similarly, correlations between intensity and affect, and intensity and preparation, were first calculated for each participant; these were then entered as dependent variables in our analyses (correlations were transformed via Fisher's r to Z before entry to account for any possible nonnormality in their distribution; see Cohen & Cohen, 1983).

Comparisons of Means

Date were first analyzed using a series of 2 (event) × 2 (counterfactual) analyses of variance (ANOVAs). Follow-up contrasts (Rosenthal & Rosnow, 1985) were used to compare means.

Intensity. Participants wrote about life events and generated one counterfactual for each. An inspection of questionnaires indicated that participants clearly understood and followed instructions, and they generated counterfactuals easily. For example, one participant in the negative-event upward-counterfactual condition wrote about her boyfriend going to another college across country, and counterfactualized over how they would be together if only they had been admitted to the same school. Another participant in the positive-event upward-counterfactual condition wrote about receiving a pay raise at work, and counterfactualized about how it would have been better if he had gotten even more money, and so on.

After writing about life events and providing counterfactuals, participants made intensity ratings. Analyses of intensity ratings revealed only an Event × Counterfactual interaction, $F(1, 49) = 6.79$, $p < 0.05$. As seen in the first row of Table 1, counterfactuals were experienced somewhat more intensely in the negative-event upward-counterfactual and positive-event downward-counterfactual conditions; a contrast comparing the combined mean from these conditions ($M = 6.78$) against the other two ($M = 5.12$) revealed a significant difference, $t(49) = 2.58$, $p < 0.05$. Specific contrasts of the means in Table 1 also indicated that, within the negative-event condition, the upward- and downward-counterfactual means differed from each other, $t(49) = 2.15$, $p < 0.05$.

Affect. Ratings of the negative mood adjectives were reverse scored and averaged with those of the positive mood adjectives (Cronbach's $\alpha = 0.94$).[2] An analysis of this index revealed only a main effect of counterfactual, $F(1, 49) = 7.25$, $p < 0.01$, whereby participants felt worse after generating upward counterfactuals ($M = 3.25$) than downward counterfactuals ($M = 5.44$). Specific contrasts on the means in the second row of Table 1 also indicated that participants felt worse in the negative-event upward-counterfactual condition than in either of the two downward-counterfactual conditions, both $t(49)$s > 2.31, ps < 0.05.

Preparation. Three questions assessing preparation were averaged (Cronbach's $\alpha = 0.74$). Analysis of this index revealed only a marginal main effect of counterfactual, $F(1, 49) = 3.72$, $p = 0.08$; participants felt more prepared after generating upward- ($M = 6.05$) than downward-counterfactuals ($M = 4.92$). Contrasts on the means in the third row of Table 1 indicated that participants felt least prepared in the positive-event downward-counterfactual condition than in either of the two upward-counterfactual conditions, both $t(49)$s > 2.12, ps < 0.05.

Comparisons of Associations

Even more direct evidence for the relationship between intensity and affect and preparation was obtained by inspecting the correlations among these variables. We tested for mean differences among the correlations using ANOVAs. As we mentioned, the correlations were transformed via Fisher's r to Z before analyses; after analyses,

[2]Because each participant in Study 1 contributed five sets of ratings to the affect data, responses to each of the mood adjectives were first averaged for each participant across the five questionnaires before calculating reliabilities. We used a similar procedure before calculating reliabilities for our preparation measure in Study 1.

they were transformed back (Z to r) for presentation and interpretation (Cohen & Cohen, 1983). (Analyses of nontransformed rs produced an identical pattern of results and are thus not discussed in this article.) We also conducted analyses of covariance (ANCOVAs) to test whether counterfactual intensity accounts for variation between our independent variables and affective and preparative reactions.

Intensity and affect. We predicted that counterfactual intensity would influence affective reactions even though counterfactual numbers were held constant. As can be seen in the fourth row of Table 1, intensity was related to affect in all conditions (significantly so in three of the four conditions and marginally so in the other). Further analyses of these correlations tested whether these associations differed by experimental conditions. There was a main effect for counterfactual, $F(1, 49) = 7.55$, $p < 0.01$; intense upward counterfactuals were negatively associated with affect ($M = -0.624$) but intense downward counterfactuals were positively associated with affect ($M = 0.543$). Contrasts on the means in Table 1 indicated that the upward-counterfactual negative-event cell differed from both downward-counterfactual cells, both $t(49)$s > 2.01, ps < 0.05. The upward-counterfactual positive-event cell similarly differed from the downward-counterfactual negative-, $t(49) = 2.00$, $p < 0.05$, and (marginally) positive-event, $t(49) = 1.86$, $p < 0.08$, cell.

Intensity and preparation. The relations between intensity and preparation were assessed in a similar manner. Although not as strong as results for affect, as can be seen in the fifth row of Table 1, intensity was related to preparation in three of the four conditions (marginally so in the upward-counterfactual negative-event condition). As intensity of upward counterfactuals increased so did preparation, whereas as intensity of downward counterfactuals increased, preparation decreased. In the downward-counterfactual positive-event condition, although nonsignificant, the correlation was in the predicted direction. Additional analyses revealed a counterfactual main effect, $F(1, 49) = 5.28$, $p < 0.05$. Participants who generated intense upward counterfactuals ($M = 0.556$) felt more prepared than did those who generated intense downward counterfactuals ($M = -0.507$). The magnitude of the relationships in Table 1 did not differ within counterfactual condition.

Covariance analyses. We also conducted ANCOVAs to test whether counterfactual intensity accounts for variability between our independent variables and affect and preparation. The relationships between our independent variables and affect and preparation were described previously; ANOVAs indicated a main effect of counterfactual direction for each. However, once intensity ratings were introduced into the model as a covariate, the effects of the independent variables on affect and preparation should become nonsignificant (or be significantly reduced) if these ratings account for any variability. This occurred both for the affect, $F(1, 48) = 1.63$, $p > 0.43$, and preparation, $F(1, 48) = 0.09$, $p > 0.82$, main effects.

Study 1 provides direct empirical evidence that counterfactual intensity influences the magnitude of affective and preparative reactions even though counterfactual numbers were held constant, and there are several findings of note. First, our analyses of means indicated that upward counterfactuals after negative events, and downward counterfactuals after positive events may be experienced more intensely. Correspondingly, upward counterfactuals produced worse moods but greater preparation and

downward counterfactuals produced better moods but lesser preparation (Markman *et al*., 1993; Roese, 1994; Sanna, 1996). Study 1, however, adds to prior research by providing direct evidence that reactions vary continuously with counterfactual intensity. Second, even more direct evidence for the association between intensity of counterfactuals and magnitude of reactions was obtained in our correlational analyses; there were generally significant correlations between intensity and reactions across conditions. Intensity ratings also accounted for significant variation between our independent variables and reactions. Considering the intensity of experienced counterfactuals may allow one to predict more accurate responses.

STUDY 2 MANIPULATED OUTCOMES AND SPONTANEOUS COUNTERFACTUALS

Study 1 provided direct evidence that counterfactual intensity can influence the magnitude of affective and preparative reactions. We conducted a second study to address some unresolved issues, and to test the generality of the results of Study 1. First, in Study 1, participants wrote about actual life events, and were prompted to generate counterfactuals with direction specified. The ESM was valuable from the standpoint of external validity, as participants generated counterfactuals for actual life events over a five-week period. But aside from controlling event domain, we did not control which events were written about. That there were few event valence effects in Study 1 may have been due at least in part to this uncontrolled variability, and to the fact that specifically prompting our counterfactual direction overwhelmed our ability to detect any valence effects. In Study 2, to control for 'event domain', we used a laboratory word-association task, the Remote Associates Test (RAT; McFarlin & Blascovich, 1984), after which success and failures were manipulated. Second, was the issue of prompting for counterfactual direction in Study 1. In Study 2, instead of prompting participants for counterfactuals, we simply had them write about their performances (e.g. Sanna, 1996, 1998, 1999; Sanna *et al*., 1998). Descriptions were later coded for counterfactual direction and intensity. Such a procedure enabled us to assess counterfactuals as they may occur in a more natural and spontaneous fashion (e.g. Sanna & Turley, 1996).

Method

Participants

Participants were 68 (41 female and 27 male) introductory psychology students who received extra course credit. There were approximately equal numbers of participants, and approximately equal proportions of women and men, within each experimental condition.

Procedure

Participants were tested individually and were seated at a table on which sat a personal computer. A cover story noted how the researchers were interested in

people's reactions to life events and that, in the present research, test-taking abilities and intellectual performances were of focus. Participants read the following instructions that were presented on their computer screens (e.g. Sanna & Mark, 1995; Sanna & Pusecker, 1994):

> In this experiment, we are studying people's test taking competence and aptitude on a test of intellectual ability called the Remote Associates Test (RAT). Each RAT item consists of three stimulus words that are somehow related to a fourth word that you are to determine and record. For example, an item might consist of the three stimulus words: 'elephant,' 'lapse,' and 'vivid.' A correct response would be the fourth word 'memory.' That is, in this example, the fourth word, 'memory,' can be related to each of the three stimulus words in the following way: (a) memory like an 'elephant'; (b) memory 'lapse'; (c) 'vivid' memory. During this experiment, you will be asked to perform a series of RAT items, and to answer some questions concerning your perceptions of the tasks and your performance.

RAT. The RAT is effective for manipulating success and failure, and consists of three separate lists (see McFarlin & Blascovich, 1984). The success list is composed of 10 easy items, the failure list of 10 difficult items, the control list of five easy and five difficult items is moderately difficult. Each RAT item consisted of three stimulus words that were related to a fourth unreported word that participants were to identify and record. Each triad of stimulus words were presented on the computer screen for 1 minute. During each 1-minute interval, participants attempted to identify the fourth word. Participants were instructed that, once identified, they should type the fourth word into the computer using the keyboard. If participants could not think of an answer, they were told that they could leave their answer blank or take a guess. However, the instructions stated that each word would remain on the screen for only 1 minute. Similar procedures have been used effectively in previous research (Sanna, 1992; Sanna & Mark, 1995).

Outcome valence. On the basis of results of previous research (Sanna & Mark, 1995; Sanna & Pusecker, 1994), as well as pilot testing with an independent sample, outcome valence was manipulated by varying RAT list difficulty and providing bogus normative feedback. In the *success* condition, participants performed the 10 items from the easy RAT list, whereas in the *failure* condition, participants performed 10 items from the difficult RAT list (McFarlin & Blascovich, 1984). In the present study, the five easy items from the control list were added to our easy list, and the five difficult items to our difficult list, resulting in 15 total items on our easy RAT list and 15 total items on our difficult RAT list (cf. Sanna & Mark, 1995; Sanna & Pusecker, 1994). The 15 RAT items within each list were presented to participants in random order.

To augment the list-difficulty manipulation, after the 15 RAT items were presented, participants read that they could calculate how well they performed, in terms of percentile ranking. Participants read that because the RAT had been used in previous research, there were norms available that would indicate how well they did in comparison to other people who have performed this task. They were told that these norms had been previously entered into the computer and that they could calculate how well they did by pressing the spacebar.

Once the spacebar was pressed, there was an approximately 9-second interval in which the screen flashed 'CALCULATING ... Please Wait'. Participants in the success condition read that they had performed very well and had scored in the top 20 per cent of students tested at their university; participants in the failure condition then read that they had performed very poorly and had scored in the bottom 20 per cent at their university. Similar success and failure manipulations using list difficulty plus bogus normative performance feedback have been used effectively in previous research with the RAT (e.g. Sanna, 1992; Sanna & Pusecker, 1994).[3]

Counterfactual intensity. After receiving false feedback, participants' spontaneous counterfactuals were recorded and later coded. To do this, participants were handed a page titled 'Performance Description', and were asked to write about their RAT performances (Sanna, 1996, 1999; Sanna *et al*., 1998; Sanna & Turley, 1996). All participants read that they should take 3 minutes to think about their RAT performances. They next read the following instructions:

> Please describe your performance on the RAT in as much detail as possible. When doing this, elaborate on and give your opinion about any aspect of your performance or about the circumstances leading up to your performance. Describe your performance on the RAT in such a way that the researchers could fully understand your performance on that task. Writing a description of your RAT performance will normally take you about 10 to 15 minutes.

Nothing more was said. That is, participants were not explicitly prompted for counterfactual thoughts; they were merely asked to write about their performances on the RAT.

After writing about performances, participants read a description of 'if only' and 'at least' counterfactuals which was similar to Study 1, but which was adapted to the RAT; of course, no mention of thinking about only one counterfactual was made in Study 2. To assist in identifying and coding, examples of counterfactuals, based on notions of *if only*, *at least*, *should've*, *would've*, *could've*, were also provided to participants (cf. Sanna & Turley, 1996). However, these examples were from domains completely unrelated to the RAT (e.g. meeting a stranger for the first time). Participants were handed back their performance descriptions, and were asked to read them looking for any counterfactuals. It was emphasized that people may or may not have counterfactual thoughts and that participants should only identify counterfactuals they had actually written about. Participants were instructed to underline any counterfactuals they had identified.

Once identified, participants coded their direction by marking a plus sign beside thoughts that might have made the RAT performance better (upward counterfactuals), and a minus sign beside thoughts that might have made the RAT perform-

[3]Participants answered an average of 11.89 (easy list) RAT items correctly in the success condition and an average of 6.32 (difficult list) RAT items correctly in the failure condition, $F(1, 66) = 19.87$, $p < 0.001$, reinforcing the effectiveness of our outcome valence manipulations. There also was an additional questionnaire on which participants were asked to rate the degree to which they thought they were successful on the RAT, and the degree to which they thought their performance on the RAT was good. Unfortunately, this questionnaire was inadvertently given to only 41 of our participants. Nevertheless, analyses on the average of these two questions indicated that participants felt more successful in the success ($M = 6.70$) than failure ($M = 4.33$; on a 9-point scale) condition, $F(1, 39) = 8.11$, $p < 0.01$, additionally supporting the effectiveness of our manipulations.

ance worse (downward counterfactuals), a method used successfully in prior research (Sanna, 1996). Participants then made intensity ratings for these thoughts on a 1 to 9 scale similar to that used in Study 1.

Affect and preparation. Finally, participants responded to identical mood adjectives and similar measures of preparation as used in Study 1, but adapted for the RAT. After sessions were completed, each participant was fully debriefed about the purposes and procedures, including the necessity of false feedback, and were thanked.

Results and Discussion

The relations among our variables were examined in several ways. First, we present a comparison of means. Second, we assess the relative influence of number versus intensity of counterfactuals and reactions using a series of hierarchical regressions.

Comparisons of Means

Means by condition are presented in Table 2.

Number. Participants wrote about RAT performances without explicit prompts for counterfactuals. Having written descriptions, participants read them over, and underlined and coded for counterfactual direction, which they were adept at doing. Upward counterfactuals changed things that might have made performances better (e.g. '. . . I was feeling pretty tired, or I might have scored higher on the RAT . . .'), and downward counterfactuals changed things that might have made performances worse (e.g. 'Ironically, I've been studying for the GREs, so I might have otherwise scored worse'). This procedure allowed us to assess counterfactuals in a more spontaneous fashion and as viewed from the participants' perspective.

The mean number of counterfactuals was analyzed using a 2 (outcome: success, failure) × 2 (counterfactual: upward, downward) ANOVA, with counterfactual as a within-subjects variable. There was an outcome main effect, $F(1, 66) = 4.02, p < 0.05$;

Table 2. Mean counterfactual frequency, intensity, affect, and preparation by outcome valence for Study 2

	Outcome valence	
Variable	Success	Failure
Frequency	0.68/1.31	1.69/0.95
Intensity	5.21/6.85	7.14/6.33
Affect	5.98	4.57
Preparation	5.63	5.25
n	36	32

Note: n = number of participants per cell. For frequency, within each cell, upward counterfactuals are presented first and downward counterfactuals are presented second. For intensity, within each cell, upward intensity is presented first and downward intensity is presented second.

more counterfactuals were generated after failures ($M = 2.64$) than successes ($M = 1.99$). However, this was qualified by an Outcome × Counterfactual interaction, $F(1, 66) = 11.52$, $p < 0.01$; means from this interaction are presented in the first row of Table 2. Planned-contrasts revealed that more downward than upward counterfactuals were generated after successes, $t(66) = 2.43$, $p < 0.05$, but that more upward than downward counterfactuals were generated after failures, $t(66) = 2.69$, $p < 0.05$.

Intensity. Participants also coded how intensely they experienced counterfactuals. Intensity ratings were divided by the number of counterfactuals to obtain average upward and downward intensity ratings in the respective conditions; means are presented in the second row of Table 2. A 2 (outcome) × 2 (counterfactual) ANOVA revealed an outcome main effect, $F(1, 66) = 5.32$, $p < 0.05$. Counterfactuals were experienced more intensely after failures ($M = 6.73$) than after successes ($M = 6.03$). However, this was qualified by an Outcome × Counterfactual interaction, $F(1, 66) = 16.06$, $p < 0.001$. Contrasts indicated that downward counterfactuals were experienced more intensely than upward counterfactuals after successes, $t(66) = 3.94$, $p < 0.01$, but that the reverse was true (marginally) after failures $t(66) = 1.84$, $p < 0.08$.

Affect and preparation. Mood adjectives were appropriately reverse scored and averaged (Cronbach's $\alpha = 0.80$). Participants felt better after successes than failures, $F(1, 66) = 4.99$, $p < 0.05$. Preparation measures were also averaged (Cronbach's $\alpha = 0.77$); although participants felt more prepared after successes than failures, means did not differ, $F(1, 66) = 2.00$, *ns*.

Comparisons of Associations

Study 2 allowed us to compare both the numbers and intensity of counterfactuals to affective and preparative reactions. We did this using regressions.

Regression analyses. We first tested the relation between counterfactual number and reactions, and counterfactual intensity and reactions. To do this, an index of counterfactual direction was created by subtracting the mean number of upward from downward counterfactuals (positive numbers indicating more downward counterfactuals; e.g. Sanna *et al.*, 1998). There were significant associations between number-index and affect ($\beta = 0.250$), $F(1, 65) = 4.66$, $p = 0.039$, $R^2 = 0.062$, and preparation ($\beta = -0.229$), $F(1, 65) = 4.00$, $p < 0.05$, $R^2 = 0.052$. A similar index of intensity was created by subtracting the mean intensity of upward from downward counterfactuals. There were significant associations between intensity-index and affect ($\beta = 0.389$), $F(1, 65) = 10.33$, $p < 0.001$, $R^2 = 0.151$, and preparation ($\beta = -0.309$), $F(1, 65) = 6.98$, $p = 0.013$, $R^2 = 0.095$. Each of these regressions controlled for the independent variable of outcome valence. As downward counterfactual numbers increased, moods were more positive and preparation decreased (or as upward counterfactual numbers increased, moods were more negative and preparation increased). As downward counterfactual intensity increased, moods were more positive and preparation decreased (or as upward counterfactual intensity increased, moods were more negative and preparation increased).

Hierarchical analyses. We also tested whether counterfactual intensity accounts for any variability in reactions over and above that of number, and vice versa. A hierarchical regression was estimated in which counterfactual number was entered then intensity ratings were entered next. These regressions also controlled for the independent variable of outcome valence, as in our analyses above. Intensity ratings accounted for variability above that of number for both affective, $F(1, 64) = 5.44$, $p < 0.05$; $\Delta R^2 = 0.082$) and preparative, $F(1, 64) = 4.02$, $p < 0.05$; $\Delta R^2 = 0.043$) reactions. However, a similar regression with intensity entered and then number entered next revealed that counterfactual number did not contribute to the prediction of affective and preparative reactions above that of intensity, both $F(1, 64)$s > 1.22, *ns*, ΔR^2s < 0.01.

Study 2 extend our results and what is known about counterfactual intensity in several ways, and there were several findings of note. First, more downward than upward counterfactuals were generated after successes and more upward than downward counterfactuals were generated after failures. Second, downward counterfactuals after successes and upward counterfactuals after failures were experienced more intensely. Third, counterfactual intensity added to prediction of reactions (affective and preparative) over and above that of counterfactual numbers—an additional 8.2 per cent and 4.3 per cent of the variability in affect and preparation, respectively. However, counterfactual number did not account for variation above that of intensity. Finally, it is further noteworthy that the results of Study 2 were obtained with more spontaneously generated counterfactuals, and with ratings made by participants themselves. The results of Study 2 thus provide additional direct empirical evidence that counterfactual intensity can show psychologically meaningful relationships to people's affective and preparative responses.

STUDY 3 MANIPULATED MOODS AND COUNTERFACTUAL STATEMENTS

Our studies focused on how intense counterfactuals influence the magnitude of reactions, one primary reaction being affect. However, in Study 3 we tested the reverse possibility: Whether intense moods can influence how intensely counterfactuals are experienced. This proposal reverses the influence of counterfactual intensity on affect that we found in Studies 1 and 2. The basis for this hypothesis stems from research indicating that moods influence counterfactual thinking in other contexts. For example, Sanna *et al*. (1998, 1999; Sanna, 1998; Sanna, Meier, & Wegner, 1999, unpublished manuscript) have shown that directly manipulated moods (e.g. via films or music) can influence counterfactuals; when not moderated by other variables, upward counterfactuals were thought about more often in negative moods, whereas downward counterfactuals were thought about more often in positive moods. Sanna *et al*. (1999) found that reaction times were similarly influenced by moods; overall, upward counterfactuals were agreed to faster in bad moods and downward counterfactuals were agreed to faster in good moods. We again used a version of the RAT. However, instead of providing false outcome-feedback, we directly manipulated participants' moods after performing via a series of films (Martin, Ward, Achee, & Wyer, 1993; Sanna, Turley, & Mark, 1996). Participants then responded to

a series of upward and downward counterfactual statements (Sanna *et al.*, 1999), and intensity ratings and reaction times were recorded. The main design of Study 3 was a 2 (mood: positive, negative) × 2 (statement: upward, downward) between-subjects factorial.

Method

Participants

Participants were 76 (57 female and 19 male) introductory psychology students who received extra course credit.

Procedure

A cover story indicated to participants that the session involved a series of unrelated activities that were being tested for possible inclusion in future research. The procedures for Study 3 were similar to those of Study 2, with some exceptions.

RAT. First, participants performed the series of 10 items from the RAT control list (McFarlin & Blascovich, 1984).[4] Administration of the RAT was otherwise identical to Study 2.

Mood induction. Second, as a purported unrelated task and instead of providing normative performance feedback as in Study 2, participants' moods were manipulated by having them watch and rate a series of films. In the *positive*-mood condition, participants watched humorous clips from the films *Splash* and *Stripes*, whereas in the *negative*-mood condition, participants watched sad clips from the films *Gallipoli* and *Sophie's Choice*. Preceding these, participants watched a car-chase scene from the movie *Bullit*; though engaging, this clip is relatively neutral in valence. The series of films lasted about 20 minutes. After each clip, participants responded to 'Pilot Movie Ratings', which asked for routine ratings for the film clips (e.g. whether they had seen the movie before; see Sanna *et al.*, 1996). These procedures have effectively induced moods in previous research (Martin *et al.*, 1993; Sanna, 1998, 1999; Sanna *et al.*, 1996, 1999). As a manipulation check, participants responded to the mood adjectives used in our first two studies.

Counterfactual intensity. Third, participants were asked to respond to a series of upward or downward counterfactual statements depending on condition, which were presented by computer (see Sanna *et al.*, 1999). To accomplish this, participants read the following:

> As part of our study about people's reactions to various life events, we will provide you with a series of statements about your RAT performance. These

[4]Participants answered an average of 5.12 RAT items in Study 3, which is about half of the items on the control list. This was similar to previous research (McFarlin & Blascovich, 1984), and with our pilot testing, on which participants viewed their performance quality in the absence of normative feedback as relatively ambiguous (Sanna, 1998; Sanna *et al.*, 1998).

> statements represent thoughts that some people might have in reaction to their RAT performance. We would like you to think back on your RAT performance, and respond to each statement by pressing the appropriate numerical keys on your computer keyboard.

Participants in the *upward* counterfactual condition were presented with a series of 10 statements about a better performance (e.g. 'I might have performed better on the RAT task if only I had more time'; 'If only I had gotten some easier RAT items, I might have performed a lot better'). Participants in the *downward* counterfactual condition were presented with a series of 10 parallel statements about a worse performance (e.g. 'I might have performed worse on the RAT if only I had less time', etc.). The sets of counterfactual statements were modeled after those provided to us by participants in Study 2, and in our previous research using similar laboratory tasks (Sanna, 1996, 1997; Sanna & Turley, 1996), and were modified for use in this study. Within each condition, the 10 counterfactual statements were presented to participants in random order.

Of course, the procedures of Study 3 differed from Study 2 in another way. In Study 2, participants generated their own counterfactuals according to instructions and then rated their intensity; but in Study 3 participants responded to already provided statements. Participants in Study 3 thus really had two tasks: (a) to decide whether or not a counterfactual statement was relevant; and (b) if relevant, to decide how intensely such a thought was experienced. To accomplish this rating, we used a 10-point response scale, ranging from $0 = \textit{not at all}$ to $9 = \textit{very strongly}$. The remainder of our instructions emphasized the difference between zero and nonzero ratings (adapted from Schimmack & Diener, 1997), and continued as follows:

> Please consider first, whether the statement characterizes your thoughts or not. Think about the intensity of the thought only afterwards, if you have first decided that the thought is one that you are experiencing. Use the numbers from 0 to 9 on the computer keyboard for your responses. A zero response means that the statement does not characterize a thought that you are having. Responses from 1 to 9 mean that you are experiencing the thought with one of the following intensities ($1 = \textit{very weakly}$; $5 = \textit{moderately}$; $9 = \textit{very strongly}$); you can use the remaining numbers to indicate more specific degrees of intensity.

To increase the salience of the difference between zero and nonzero responses, the zero category was visually separated from the remaining categories. The reminder of the scale was identical to that used in Study 2, with the scale ranging from 1 to 9 and end- and mid-points labeled appropriately. The scale appeared on the screen with each statement, and participants responded by pressing the appropriate numbers on the computer keyboard. Participants read that they had as much time as they liked to complete the thought rating task, but that they should make sure that their responses reflected their true thoughts about their RAT performance. Response times as well as numerical ratings for each counterfactual statement were recorded.

After each session, all participants were fully debriefed and thanked.

Table 3. Mean mood, counterfactual intensity, and reaction time by mood and counterfactual statement for Study 3

	Upward statement		Downward statement	
Variable	Positive mood	Negative mood	Positive mood	Negative mood
Mood	5.64	4.01	5.59	3.98
Intensity	5.21	6.95	6.01	5.31
Reaction Time	7.02 s	5.73 s	6.20 s	6.95 s
n	20	19	17	20

Note: Reaction times in seconds. n = number of participants per cell.

Results and Discussion

Comparisons of Means

Mood. Mood adjectives were reverse scored and averaged (Cronbach's $\alpha = 0.88$) as a manipulation check. A 2 (mood) × 2 (statement) ANOVA revealed only a mood main effect, $F(1, 72) = 10.22$, $p < 0.01$. Participants who viewed the humorous films reported feeling happier ($M = 5.62$) than those who viewed the sad films ($M = 4.00$), indicating the mood manipulations were effective. For comparison, the mood means by condition are presented in Table 3.

Intensity. Intensity was recorded for each counterfactual. It will be recalled that each participant rated 10 statements. To account for this, an intensity index was constructed analogous to that used by Schimmack and Diener (1997), here with intensity equal to the sum of the 10 ratings divided by the number of applicable counterfactuals (excluding zero ratings).[5] A 2 × 2 ANOVA on this intensity index revealed a main effect of mood, $F(1, 72) = 4.19$, $p < 0.05$ (positive, $M = 5.60$; negative, $M = 6.14$), and a Mood × Statement interaction, $F(1, 72) = 16.72$, $p < 0.01$. Contrasts on the means in the second row of Table 3 indicated that upward counterfactuals were experienced more intensely in negative than positive moods, $t(72) = 3.95$, $p < 0.05$; downward counterfactuals were experienced somewhat (though nonsignificantly) more intensely in positive than negative moods.

Reaction times. Each participant contributed 10 reaction times. An index of reaction times was constructed in a manner similar to intensity. 2 × 2 ANOVA revealed only a Mood × Statement interaction, $F(1, 72) = 14.21$, $p < 0.01$. Contrasts on means in the third row of Table 3 indicated that upward statements were reacted to faster in

[5]Specifically, following Schimmack and Diener (1997), a counterfactual intensity index was calculated according to the following formula: M(counterfactual intensity) = F(counterfactuals) × I(counterfactuals)/N, where N is the number of ratings, F is the number of nonzero ratings, and I is the intensity score, computed as an average across all nonzero ratings. It should be noted that analyses simply summing each participants' score and dividing by the number of ratings (i.e. 10) produced a virtually identical pattern of results. However, because the former index provides a measure of intensity more independent of number (see Schimmack & Diener, 1997), we report only these analyses. A similar strategy was retained for reaction times in Study 3. We thank an anonymous reviewer for suggesting these analysis procedures.

bad than good moods, $t(72) = 3.99$, $p < 0.05$; the reverse was (nonsignificantly) true for downward statements, $T(72) = 1.21$, *ns*.[6]

Comparisons of Associations

Regression analyses. We tested whether intense moods produce intense counterfactuals. To do this, we used the mood manipulation check as a measure of mood intensity (i.e. extreme ratings indicate intense moods). The intensity index was then regressed on moods to test whether they are related. Because different patterns were expected for associations between moods and intensity based on direction, we conducted regressions for upward and downward counterfactual statements separately. As predicted, upward counterfactuals became more intense as moods became worse ($\beta = -0.521$), $F(1, 37) = 8.95$, $p = 0.004$, $R^2 = 0.271$, and downward counterfactuals became more intense as moods became better ($\beta = 0.591$), $F(1, 37) = 13.80$, $p = 0.002$, $R^2 = 0.349$. Moods were also associated with reaction times for both upward ($\beta = 0.459$), $F(1, 37) = 6.72$, $p = 0.012$, $R^2 = 0.210$, and downward ($\beta = -0.528$), $F(1, 37) = 8.53$, $p = 0.006$, $R^2 = 0.276$, statements.

Hierarchical analyses. We next tested whether ratings of mood intensity could account for variability in counterfactual intensity over that of reaction times. A hierarchical regression was estimated in which reaction times were entered and mood intensity index was entered next. Mood intensity accounted for variability above that of reaction times for both upward, $F(1, 36) = 5.01$, $p < 0.05$; $\Delta R^2 = 0.085$, and downward, $F(1, 36) = 4.97$, $p < 0.05$; $\Delta R^2 = 0.082$, statements.

Expanding the results of our first two studies, and supporting the hypotheses of Study 3, more intense moods also produce more intense counterfactuals, and several findings are of note. First, upward counterfactuals were experienced more intensely in negative moods and downward counterfactuals were experienced more intensely in positive moods. Second, upward counterfactuals were reacted to more quickly when in negative moods, and downward counterfactuals were reacted to more somewhat more quickly in positive moods. Third, reaction times did not fully account for the associations between moods and counterfactual intensity.

GENERAL DISCUSSION

Our three studies provide converging evidence that complements and extends the counterfactual literature by demonstrating that the intensity of experienced counterfactuals influences the magnitude of affective and preparative reactions. Counterfactual intensity influenced reactions when counterfactual numbers were held constant for samples of participants' actual experiences (Study 1) and contributed significantly to responses over counterfactual numbers (Study 2) and reaction times

[6]Additional analyses of reaction times indicated that, overall, zero ratings were made fastest ($M = 5.44$ s). For the remaining categories, responses became somewhat faster with increasing intensity ('1', $M = 7.02$ s; '2', $M = 6.87$ s; '3', $M = 6.66$ s; '4', $M = 6.31$ s; '5', $M = 6.13$ s; '6', $M = 5.75$ s; '7', $M = 5.60$ s; '8', $M = 5.52$ s; '9', $M = 5.49$ s). This pattern of responding, however, did not interact with our experimental conditions, and so is not discussed further.

(Study 3) after performing laboratory tasks. This was found when participants generated counterfactuals which differed by direction (Study 1), when participants spontaneously generated counterfactuals (Study 2), and when participants responded to counterfactual statements (Study 3). As upward counterfactuals became intense, so did greater preparation and worse moods; as downward counterfactuals became intense, so did better moods and lesser preparation. Intense moods also conversely influenced the intensity of counterfactuals (Study 3). These results suggest that a more systematic investigation of counterfactual intensity may help to delineate reactions when dealing with life events.

Reciprocal Relations Between Intensity of Counterfactuals and Moods

Upward counterfactuals may prepare people for the future at the expense of bad moods, whereas downward counterfactuals may enhance good moods, but at the expense of leaving people unprepared (e.g. Markman *et al*., 1993; Roese, 1994; Sanna, 1996; cf. Sanna, 1997). Our present studies add to this by indicating that it may be necessary also to consider the intensity with which upward or downward counterfactuals are experienced. To be sure, past research provides important information regarding the causes and consequences of counterfactuals. However, common experiences seem to indicate that intensity is an important characteristic of counterfactuals. The present studies demonstrate that self-reported measures of intensity can provide meaningful relations to reactions (Studies 1 and 2), and that the intensity of moods can conversely influence the intensity of counterfactuals (Study 3). Together, these findings suggest reciprocal relations between moods and counterfactuals. That moods influenced intensity, as well as vice versa, may have intriguing connections to research which shows that moods can influence counterfactuals in other contexts. For example, Roese and Olson (1997) found faster reaction times when responding to a counterfactual prompt ('My anagram score could easily have been different') after failures than after successes, and successes and failures may have produced good and bad moods, respectively. That more counterfactuals were generated after failures than successes in Study 2 is consistent with this reasoning. Sanna (1998, 1999; Sanna *et al*., 1999) also found that directly manipulated moods influenced counterfactual direction; bad moods produced upward counterfactuals and good moods produced downward counterfactuals. Reaction times similarly revealed that upward counterfactuals were agreed to faster in bad moods and downward counterfactuals were agreed to faster in good moods. The interactions on intensity ratings in the present studies are consistent with these notions, but extend prior findings to counterfactual intensity as well. Our research also moves beyond prior research by demonstrating that counterfactual intensity is not reducible to counterfactual frequency (Studies 1 and 2) or accessibility (reaction times; Study 3), increasing the generality of our studies by using varying methodologies to triangulate on our hypotheses.

Conceptualizing Counterfactual Intensity and Other Characteristics

There has been a proliferation of counterfactual research in recent years, each with somewhat different foci. How does counterfactual intensity relate to other

characteristics? Although there may be many ways to parse this area, we propose the following (evolving) framework. There are several *properties* of counterfactuals which appear relevant when determining people's experiences. These include number or frequency, intensity or strength, and duration or length. Several researchers have recorded counterfactual numbers (e.g. Markman *et al*., 1993; Sanna, 1999; Sanna & Turley, 1996), as we described. In general, greater numbers are associated with greater reactions. A few studies have assessed counterfactual duration (e.g. Davis, Lehman, Wortman, Silver, & Thompson, 1995). Longer durations are also associated with greater reactions. For instance, parents still thinking about what might have been different to prevent a child's death weeks or months later might experience relatively powerful reactions. Little research aside from the present studies has focused directly on counterfactual intensity. However, we believe that each of these properties combine to influence the overall experience of 'degree of counterfactual thinking'. Perhaps a psychological analogue of the properties of sound is in order. Sound waves can vary by number or frequency, by intensity or amplitude, and by duration or length. Although these properties may be correlated (e.g. as in loud sounds), each can vary independently and contributes to the total experience of sound. The same may be true of counterfactuals. Counterfactuals may vary by their number, intensity, and duration, and each property contributes to the total experience of counterfactual thinking. Pursuing this analogue may be an interesting area for future research, and may lead to better predictions about the effects of counterfactuals.

These properties are distinguished from characteristics that activate (*activators*) counterfactuals, as well as their *content*. Distinctions between activation and content have already been made (Roese, 1997). Activators include variables such as closeness, outcome valence, affect, and expectancy violation. However, once counterfactuals are activated, by whatever mechanism, they may then vary by the properties we described (i.e. number, intensity, and duration). For instance, close versus far alternatives may initially activate counterfactuals, but once activated people can have more or less of them, experience them strongly or weakly, or for a longer or shorter length of time. The same is true for other activators. Evidence linking activators to properties has been generally lacking. However, conceiving of counterfactuals in this way, as well as testing relations between activation and properties, may lead to more precise predictions. Research demonstrating that closeness amplifies reactions (e.g. Kahneman & Tversky, 1982; Kahneman & Miller, 1996), suggests that our proposals are reasonable. However, because counterfactuals were not directly measured in that research, any direct connections remained difficult to evaluate. Our research thus represents a more explicit step in establishing those linkages, but we go even further to suggest that linkages between other activators and properties are fruitful areas for future research. Once activated, counterfactuals can also vary by content, including direction (upward versus downward) and structure (additive versus subtractive), but activation and content may be independent (Roese, 1997). These can be distinguished further from *reactions*, such as affect or preparation. In sum, the relation between properties, activators, content, and reactions, may be effectively viewed as follows. Several characteristics activate counterfactual thinking. Once activated, counterfactuals vary by properties of number, intensity, and duration. These vary further by content. Combinations of these characteristics together determine reactions and the total 'experience of counterfactual thinking'. Further research explicitly testing the linkages between various characteristics may be especially intriguing.

In closing, we reemphasize our purpose in conducting these studies, and propose a final possibility. We do not argue against the validity of past theorizing, nor point out some supposed 'fatal flaw' that renders previous research uninterpretable. Far from it. We substantiated empirically that counterfactual intensity influences the magnitude of preparative and affective reactions. Thus, our research is perfectly harmonious with previous findings. Intensity is a characteristic of the counterfactual itself. Knowing the intensity of counterfactuals can increase predictive ability, and our studies provide direct evidence in this regard. Just as if one is predicting a person's potential for athletic prowess, it may be useful to know several characteristics such as height, weight, and a variety of other qualities. The same may be said of counterfactuals. We used self-report measures of intensity. One potentially interesting additional avenue for future research may be to decompose intensity further. For example, it may be that intense counterfactuals are particularly vivid, believable, or 'real'. A striking example perhaps comes from Juan Romero, who on 5 June 1968, was a 17-year-old busboy at the Ambassador Hotel in Los Angeles, CA. A photograph was taken as Romero cradled in his arms American presidential candidate Robert F. Kennedy's head as Kennedy lay dying after being shot by an assassin. When interviewed 30 years later, Romero talked about how he 'imagined it as if it was yesterday', and how he wished he 'could change the way that photo came out' (Salters, 1998). Particularly intense counterfactuals may have that vivid quality to them. Intensity, vividness, or realism may be contrasted in future research using alternate self-report measures. However, it is perhaps even more interesting to speculate that physiological correlates (e.g. Cacioppo, Berntson, & Crites, 1996; Fredrickson, 1999) may better distinguish intensity. Intense counterfactuals may be those that are 'hotter' and produce strong visceral reactions. Accounting for intensity, along with other characteristics,[7] may clarify further the nature of the linkages between counterfactuals and reactions (e.g. explain why relations are sometimes strong or weak). Intensity may be a relevant characteristic whenever counterfactuals are experienced.

ACKNOWLEDGEMENTS

Parts of this research were presented at the 71st annual meeting of the Midwestern Psychological Association, Chicago, IL, USA, April 1999. We thank the following people for their assistance with the data collection, coding, and entry: Andrea Cotner, David Gray, Sitaram Lanka, Susan Lykens, and Ivan Navarro. We also thank Fritz Strack, Editor, and the anonymous reviewers for their helpful suggestions on an earlier version of this article.

REFERENCES

Boninger DS, Gleicher F, Strathman A. 1994. Counterfactual thinking: From what might have been to what may be. *Journal of Personality and Social Psychology* **67**: 297–307.

[7]It is also interesting to speculate that there may be a dimensionality to counterfactual thoughts, similar to that proposed by some attribution theorists (e.g. Weiner, 1986).

Cacioppo JT, Berntson GG, Crites SL. 1996. Social neuroscience: Principles of psychophysiological arousal and response. In *Social Psychology: Handbook of basic principles*, Higgins ET, Kruglanski AW (eds); Guilford Press: New York; 72–101.

Cohen J, Cohen P. 1983. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, (2nd. edn). Erlbaum: Hillsdale, NJ.

Davis CG, Lehman DR, Wortman CB, Silver RC, Thompson SC. 1995. The undoing of traumatic life events. *Personality and Social Psychology Bulletin* **21**: 109–124.

Fredrickson BL. 1999. What good are positive emotions? *Review of General Psychology* **2**: 300–319.

Gleicher F, Kost KA, Baker SM, Strathman AJ, Richman SA, Sherman SJ. 1990. The role of counterfactual thinking in judgments of affect. *Personality and Social Psychology Bulletin* **16**: 284–295.

Hormuth S. 1986. The random sampling of experiences in situ. *Journal of Personality* **54**: 262–293.

Johnson MK, Sherman SJ. 1990. Constructing and reconstructing the past and the future in the present. In *Handbook of Motivation and Cognition: Foundations of social behavior*, Vol. 2, Higgins ET, Sorrentino RM (eds); Guilford: New York; 482–526.

Kahneman D, Miller DT. 1986. Norm theory: Comparing reality to its alternatives. *Psychological Review* **93**: 136–153.

Kahneman D, Tversky A. 1982. The simulation heuristic. In *Judgment under Uncertainty: Heuristics and biases*, Kahneman D, Slovic P, Tversky A (eds); Cambridge University Press: New York; 201–208.

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.

Lundberg CG, Frost DE. 1992. Counterfactuals in financial decision making. *Acta Psychologica* **79**: 227–244.

Macrae CN. 1992. A tale of two curries: Counterfactual thinking and accident-related judgments. *Personality and Social Psychology Bulletin* **18**: 84–87.

Macrae CN, Milne AB. 1992. A curry for your thoughts: Empathic effects on counterfactual thinking. *Personality and Social Psychology Bulletin* **18**: 625–630.

Markman KD, Gavanski I, Sherman SJ, McMullen MN. 1993. The mental simulation of better and worse possible worlds. *Journal of Experimental Social Psychology* **29**: 87–109.

Martin LL, Ward W, Achee JW, Wyer RS. 1993. Mood as input: People have to interpret the motivational implications of their moods. *Journal of Personality and Social Psychology* **64**: 317–326.

McFarlin DB, Blascovich J. 1984. On the Remote Associates Test (RAT) as an alternative to illusory feedback: A methodological note. *Basic and Applied Social Psychology* **6**: 223–229.

Miller DT, McFarland C. 1986. Counterfactual thinking and victim compensation: A test of norm theory. *Personality and Social Psychology Bulletin* **12**: 513–519.

Miller DT, Gunasegaram S. 1990. Temporal order and perceived mutability of events: Implications for blame assignment. *Journal of Personality and Social Psychology* **59**: 1111–1118.

Miller DT, Turnbull W, McFarland C. 1990. Counterfactual thinking and social perception: Thinking about what might have been. In *Advances in Experimental Social Psychology*, Vol. 23, Zanna MP (ed.); Academic Press: New York; 305–331.

Reis HT, Wheeler L. 1991. Studying social interaction with the Rochester interaction record. In *Advances in Experimental Social Psychology*, Vol. 24, Zanna MP (ed.); Academic Press: New York; 269–318.

Roese NJ. 1994. The functional basis of counterfactual thinking. *Journal of Personality and Social Psychology* **66**: 805–818.

Roese NJ. 1997. Counterfactual thinking. *Psychological Bulletin* **121**: 133–148.

Roese NJ, Olson JM. 1997. Counterfactual thinking: The intersection of affect and function. In *Advances in Experimental Social Psychology*, Vol. 29, Zanna MP (ed.); Academic Press: San Diego, CA; 1–59.

Rosenthal R, Rosnow RL. 1985. *Contrast Analysis: Focused comparisons in the analysis of variance*. Cambridge University Press: New York.

Salters, L. (correspondent) (1998). 30-year anniversary of Robert Kennedy's death. In *World News Tonight* (segment #9); American Broadcasting Company: New York; 6 June).
Sanna LJ. 1992. Self-efficacy theory: Implications for social facilitation and social loafing. *Journal of Personality and Social Psychology* **62**: 774–786.
Sanna LJ. 1996. Defensive pessimism, optimism, and simulating alternatives: Some ups and downs of prefactual and counterfactual thinking. *Journal of Personality and Social Psychology* **71**: 1020–1036.
Sanna LJ. 1997. Self-efficacy and counterfactual thinking: Up a creek with and without a paddle. *Personality and Social Psychology Bulletin* **23**: 654–666.
Sanna LJ. 1998. Defensive pessimism and optimism: The bitter-sweet influence of mood on performance and prefactual and counterfactual thinking. *Cognition and Emotion* **12**: 635–665.
Sanna LJ. 1999. Mental simulations, affect, and subjective confidence: Timing is everything. *Psychological Science* **10**: 339–345.
Sanna LJ, Mark MM. 1995. Self-handicapping, expected evaluation, and performance: Accentuating the positive and attenuating the negative. *Organizational Behavior and Human Decision Processes* **64**: 84–102.
Sanna LJ, Meier S, Turley-Ames KJ. 1998. Mood, self-esteem, and counterfactuals: Externally attributed moods limit self-enhancement strategies. *Social Cognition* **16**: 267–286.
Sanna LJ, Pusecker PA. 1994. Self-efficacy, valence of evaluation, and performance. *Personality and Social Psychology Bulletin* **20**: 82–92.
Sanna LJ, Turley KJ. 1996. Antecedents to spontaneous counterfactual thinking: Effects of expectancy violation and outcome valence. *Personality and Social Psychology Bulletin* **22**: 906–919.
Sanna LJ, Turley KJ, Mark MM. 1996. Expected evaluation, goals, and performance: Mood as input. *Personality and Social Psychology Bulletin* **22**: 323–335.
Sanna LJ, Turley-Ames KJ, Meier S. 1999. Mood, self-esteem, and simulated alternatives: Thought-provoking affective influences on counterfactual direction. *Journal of Personality and Social Psychology* **76**: 543–558.
Schimmack U, Diener E. 1997. Affect intensity: Separating intensity and frequency in repeatedly measured affect. *Journal of Personality and Social Psychology* **73**: 1313–1329.
Schwarz N, Bless H. 1992. Constructing reality and its alternatives: An inclusion/exclusion model of assimilation and contrast in social judgment. In *The Construction of Social Judgments*, Martin LL, Tesser A (eds); Erlbaum: Hillsdale, NJ; 217–245.
Tennen H, Suls J, Affleck G (Eds). 1991. Personality and daily experience [Special issue]. *Journal of Personality* **59**(3).
Turley KJ, Sanna LJ, Reiter RL. 1995. Counterfactual thinking and perceptions of rape. *Basic and Applied Social Psychology* **17**: 285–303.
Watson D. 1988. The vicissitudes of mood measurement: Effects of varying descriptors, time frames, and response formats on measures of positive and negative affect. *Journal of Personality and Social Psychology* **55**: 128–141.
Weiner B. 1986. *An Attributional Theory of Motivation and Emotion*. Springer-Verlag: New York.

