Counterfactual Potency

John V. Petrocelli
Wake Forest University

Elise J. Percy and Steven J. Sherman
Indiana University, Bloomington

Zakary L. Tormala
Stanford University

Counterfactual thoughts typically take the form of implied or explicit if–then statements. We propose that the multiplicative combination of "if likelihood" (the degree to which the antecedent condition of the counterfactual is perceived to be likely) and "then likelihood" (the perceived conditional likelihood of the outcome of the counterfactual, given the antecedent condition) determine the strength and impact of counterfactuals. This construct, termed *counterfactual potency*, is a reliable predictor of the degree of influence of counterfactual thinking upon judgments of regret, causation, and responsibility. Through 4 studies, we demonstrate the predictive power of this construct in a variety of contexts and show that it plays a causal role in determining the strength of the effects of counterfactual thought. Implications of counterfactual potency as a central factor of counterfactual influence are discussed.

Keywords: counterfactual thinking, counterfactual potency, metacognition, regret, probability

I came back thinking that *I could* have saved them all *I should* have saved them all but *I couldn't* . . . I was just a kid.
—Jose Ramos, Vietnam War veteran (quoted in McRoberts, 2003)

Most tragic stories have one: a scene with a parent, police officer, friend, or war veteran who turns to a trusted confidant and describes all the things he or she could have done to avert an unwanted outcome. In the usual progression of such a scene, the listener often counters by insisting how implausible such a counterfactual world actually is. Sometimes, as in the case of the war veteran quoted above, these abstract questions of counterfactual plausibility can even cause tension within the self. These kinds of situations suggest that the perceived *degree* to which something could have been otherwise, and not only the sheer *fact* that something could have been otherwise, wields great influence in daily life. How can such a notion be conceptualized and quantified, and what might doing so reveal about how the alternative worlds that we construct affect our responses to reality?

Counterfactual Thinking

Since Kahneman and Tversky's (1982) seminal work on the simulation heuristic over 25 years ago, an enormous body of

research has developed to illustrate the power of counterfactual thought over human judgment (for reviews see Mandel, Hilton, & Catellani, 2005; Roese, 1997; Roese & Olson, 1995b). Counterfactual thinking, as we treat it here, is characterized by conditional mutations of a past event (e.g., "If only I hadn't taken out so many student loans, then I might be able to buy a house by now"; "If she hadn't been wearing her seatbelt, then she could have been killed in that accident"). Such thoughts typically recruit alternatives that are better than the outcome that actually occurred (upward counterfactuals) rather than worse than the actual outcome (downward counterfactuals; see Markman, Gavanski, Sherman, & McMullen, 1993; Roese & Olson, 1997). Research on counterfactual thinking is particularly intriguing in that it turns the usual approach of judgment research on its head. That is, counterfactual research focuses not only upon psychological reactions to what actually did happen in a given instance but also upon reactions to what did not happen, and how notions of these other possible worlds influence judgments, feelings, and behaviors in response to the one world that truly exists (see Petrocelli & Sherman, 2010).

Such thoughts have indeed been demonstrated as important factors in affect and judgment. For example, Wells and Gavanski (1989) demonstrated that ratings of an individual's causality for a tragedy increased when a salient counterfactual mutation of that individual's behavior would have averted the outcome (compared with a version in which such a mutation would not have changed the outcome), even though the actual behavior of the individual was the same in the two scenarios. However, the effects of counterfactual thought are not limited to the context of causal reasoning. Research has shown that counterfactual thoughts influence a wide variety of responses, including affective reactions (e.g., Johnson, 1986; Landman, 1987), feelings of satisfaction (e.g., Medvec, Madey, & Gilovich, 1995), judgments of blame and responsibility (e.g., Alicke, Buckingham, Zell, & Davis, 2008; Goldinger, Kleider, Azuma, & Beike, 2003; Miller & Gunasegaram, 1990), per-

sonal feelings of regret (e.g., Miller & Taylor, 1995), and perceptions of regret experienced by other individuals (e.g., Kahneman & Miller, 1986; Kahneman & Tversky, 1982).

This important role of counterfactual thinking is not a mere laboratory artifact or a phenomenon limited to scenario studies. On the contrary, particularly following undesirable events, such thoughts appear to be ubiquitous (see Hofstadter, 1979), spontaneous (Markman et al., 1993; McEleney & Byrne, 2006), and automatic (Goldinger et al., 2003; Roese, Sanna, & Galinsky, 2005). These thoughts naturally occur and influence real-life judgments, such as prisoners' feelings of guilt for their crimes (Mandel & Dhami, 2005) or tendencies for self-blame among rape victims (Branscombe, Wohl, Owen, Alison, & N'gbala, 2003). Further enhancing the power of counterfactual thoughts is the tendency for thoughts about what "could have" happened to become thoughts about what "should have" happened, a phenomenon known as the counterfactual fallacy (Miller & Turnbull, 1990).

Counterfactual Potency

In light of all this, the proposition that counterfactual thought influences affect and decision making is hardly a controversial one. However, the questions of when counterfactuals influence judgments, how strongly they influence judgments, and why particular counterfactual thoughts influence judgments more than others (i.e., what makes a particular counterfactual highly impactful) are issues that have only been investigated piecemeal. A consultation of most works describing circumstances that lead to influential counterfactual thought (e.g., Byrne, 2002; Kahneman & Miller, 1986; Roese & Olson, 1995a) will reveal the canonical form in which such findings are often presented: *The List.* That is, rather than a synthesis or explanation of what makes counterfactuals impactful, the existing literature delineates only the types of events associated with counterfactual thoughts. Counterfactual thoughts are likely or influential to the extent that they mutate an event that: was unexpected, was close to a desired outcome, involved an action rather than an inaction, was controllable, happened suddenly, and occurred early in a causal chain (see Byrne, 2002; Kahneman & Miller, 1986; Roese & Olson, 1995a).

This list is a helpful and efficient way to distill information, explain findings, and make predictions. However, such a method of conceptualization is problematic in its theoretical clumsiness as well as in its lack of clear quantification and precise predictive value. To address these issues, we propose a single conceptual (and quantifiable) framework termed *counterfactual potency* and demonstrate its utility for furthering our understanding of the processes behind counterfactual thought. Such a conceptualization draws together what we believe are the two fundamental components of what makes counterfactual thoughts influential: the perceived likelihood of the antecedent in the counterfactual (termed "*if likelihood*" or IL) and the perceived conditional likelihood of the alternative outcome, given the antecedent condition (termed "*then likelihood*" or TL). The interactive effect of these two components constitutes counterfactual potency (CP), which we propose is a key predictor of the degree and strength of influence that a counterfactual thought (or set of thoughts) will exert. In addition to synthesizing much of what is known about counterfactual thinking, we believe that this approach provides a means of

future innovation by raising new questions and generating novel predictions.

We begin by drawing the evidence for the importance of IL and TL out of the existing literature individually, and then explain in more detail how they combine to form the construct of CP. We then describe a series of studies that demonstrate the ability of CP to explain and predict the influence of counterfactual thoughts on judgment.

The Importance of "If Likelihood" (IL)

In order for a counterfactual to be effective, one must believe that the proposed alternative antecedent condition (or the "if" part of the counterfactual) was reasonably likely, and the degree of this perceived likelihood should affect the influence of such a thought upon judgment. An alternative antecedent may consist of a different decision, a different behavior, or a different circumstance. The importance of perceived antecedent likelihood (IL) is buttressed by many lines of counterfactual research, including those on the simulation heuristic, expectancy violation, and counterfactual constraints, which we address in turn.

The simulation heuristic (Kahneman & Tversky, 1982) is fundamentally linked to perceived likelihood. This is the phenomenon by which the effects of counterfactual thoughts are determined according to the ease of imagining them. In one seminal study, participants read about two men, Mr. Tees and Mr. Crane, both arriving late for a flight. In the scenario, Mr. Tees misses the flight by only 5 minutes while Mr. Crane misses it by 20. Despite their similar predicaments, participants expected Mr. Tees to be more disappointed with his outcome than Mr. Crane. A second study involving the story of Mr. Jones, a man who meets his untimely death in a traffic accident, showed that participants most commonly mutate deviations from routine behaviors (as opposed to routine behaviors themselves) in generating counterfactuals about tragic events. In both the case of the missed flight and the tragic automobile accident, results indicated the importance of the ease of imagining particular *alternative antecedents*, an indication of the perceived likelihood of the counterfactual. It is easier to imagine the means (i.e., alternative antecedent conditions) by which Mr. Tees could have avoided missing the flight than it is for Mr. Crane, and so Mr. Tees is expected to feel more disappointment. Likewise, it is easier to imagine behaviors (i.e., alternative antecedent conditions) that could have averted Mr. Jones's death that relate to deviations from routine (where high-likelihood alternatives are salient) than those that mutate normal events (where no such high-likelihood alternatives exist; see also Kahneman & Miller, 1986).

Differences in the mutability of controllable versus uncontrollable events also have been conceptualized with an emphasis on a notion akin to antecedent plausibility (see Girotto, Legrenzi, & Rizzo, 1991; McCloy & Byrne, 2000). For example, Roese (1997) framed Markman et al.'s (1993) finding (that gamblers tended to mutate the element of the game over which they perceived themselves to have control) in terms of research showing that people expect to have control over their lives (see Langer, 1975) and that differences in controllable versus uncontrollable elements in counterfactual thought may be seen as a special case of expectancy-violation effects. That is, the controllable event has a counterfactual antecedent with a higher a priori probability.

To evaluate the evidence from the other angle, that of *implausibility*, it has repeatedly been shown that counterfactual thoughts usually avoid mutating antecedents for which alternatives are difficult to imagine. The relevant evidence indicates that people are more likely to mutate unstable rather than stable features of a situation (Girotto et al., 1991; Kahneman & Miller, 1986). Changes in stable factors are more difficult to imagine and thus are seen as less plausible than changes in unstable factors. Along the same lines, work on counterfactual constraints (mechanisms that preclude a class of events from mutation; see Seelau, Seelau, Wells, & Windschitl, 1995) such as natural-law constraints (e.g., laws of physics) has shown that antecedents for which alternatives are implausible (e.g., "If only the laws of gravity were different . . .") are generally not mutated in counterfactual thoughts (Rescher, 2001). In other words, influential counterfactual thought does not occur unless a plausible alternative antecedent is available.

The Importance of "Then Likelihood" (TL)

Despite the importance of antecedent plausibility (IL) in counterfactual thought, this characteristic is influential only to the extent that the change in the antecedent, however plausible or likely, is ultimately associated with an alternative outcome (TL). For example, only to the extent that Mr. Jones's deviation from routine is linked to avoidance of the undesirable outcome (e.g., "If only Mr. Jones had taken a different route . . ." vs. "If only Mr. Jones had worn a different shirt . . .") will mutations of that antecedent exert effects upon judgment, regardless of how plausible the alternative antecedent is perceived to have been. For that reason, the influence of perceived antecedent likelihood is always contextualized by the associated antecedent–alternative outcome contingency (TL).

Prior research has established that the ability of a counterfactual to "undo" an outcome is an integral factor in its effectiveness. Take, for example, Wells and Gavanski's (1989) finding that the influence of a salient alternative antecedent depends on its association with a change in the outcome. In their research, attributing the cause of a tragedy to a particular individual (an employer who ordered an allergenic dish for his employee at a restaurant, resulting in her death) was dependent upon the contingency between the alternative antecedent condition (a different dish choice) and an alternative outcome (successful avoidance of the allergic reaction). Participants who read a version in which both dishes would have contained the lethal allergen assigned less causality to the employer for the tragedy than did participants who read a version in which the alternative dish would have been safe for the employee to eat. Additional evidence for the importance of TL comes from research by Branscombe, Owen, Garstka, and Coleman (1996). They demonstrated that blame to victims versus perpetrators in a rape scenario depended on whether a change to that target's behavior would have changed the outcome.

In models of counterfactual-based causal reasoning (see Spellman, 1997; Spellman, Kincannon, & Stose, 2005; Walsh & Byrne, 2004), an integral component of causality judgments is the perception of the strength of the antecedent–outcome relationship. Only to the extent that changes to the antecedent are perceived to be related to changes in the outcome will counterfactuals about a particular change in an antecedent (selected from infinite possible antecedents) lead to a perception that the antecedent plays a causal role (see Hart & Honoré, 1985). In other words, when using counterfactuals to reason about causation, something akin to TL is of prime importance. The importance of such antecedent–outcome contingencies is also supported by work on semifactuals (Barker, 1991; Goodman, 1973), or "even if" thoughts (see Green, Applebaum, & Tong, 2006; McCloy, & Byrne, 2002). These thoughts alter an antecedent without altering the outcome (e.g., "Even if I had studied harder, I still might have failed chemistry").

Neither IL nor TL operates independently, but rather each component contextualizes the other's effect. For example, despite the fact that perceptions of antecedent–outcome contingencies are important in causal reasoning about counterfactuals (Hilton, 1988; Mandel, 2003; Spellman, 1997), the cognitive availability of alternative antecedents has been shown to moderate this influence. Specifically, explicit references to changes in particular antecedents can change perceptions of causation, even if contingencies are held constant (see Byrne & McEleney, 2000). Such research (and the evidence for the overall importance of IL described earlier) supports the important relationship between the two components, such that the ultimate influence of a counterfactual thought is determined by their interaction. We now describe in more detail the combination of these factors into CP.

Counterfactual Potency: Integrating IL and TL

In this article, we propose counterfactual potency (CP) as a new manner of conceptualizing the influence of counterfactual thought. Along with this proposal, we formulate and test a quantitative approach for using CP to predict the influence that any particular counterfactual thought (or set of thoughts) will have upon subsequent affect and judgment.

Notably, this proposal does not constitute a challenge to existing theory or research. As should be clear from the discussion above, the individual notions of IL and TL emerge directly from existing work on counterfactual thought, and our thinking owes greatly to Roese and Olson's (1995a) discussion of antecedent-based and outcome-based determinants of counterfactual thought, as well as Kahneman and Tversky's (1982) important work on the simulation heuristic. Our conceptualization also derives partly from previous work on counterfactual thinking and judgments of causality, particularly the work of Gleicher et al. (1990) and Spellman et al. (2005). Spellman and colleagues theorized that people can estimate the probability of an alternative outcome (e.g., the probability that a tragedy could have been avoided) by first considering all of the ways that an event could have unfolded (i.e., the various alternative antecedents). The probability of an alternative is then obtained by summing each of the products of the probabilities of the ways that could have occurred and their conditional probabilities (i.e., probabilities of an alternative outcome given that the "way" occurred).

Our primary proposition is that the effect of any particular counterfactual on judgment is a function of the interaction between two independent probability judgments: the perceived a priori likelihood of the antecedent condition (IL) and the perceived likelihood of the alternative outcome given the antecedent condition (TL). We propose that the interactive relationship between these two components (CP) can explain many circumstances known to make one counterfactual more or less impactful (or more

or less likely to be spontaneously generated) than another. This construct, both quantifiable and measurable, is a promising means of predicting and understanding the effects of counterfactual thought.

We propose that the influence of any counterfactual can be accurately predicted by the interaction of IL and TL (each of which exists on an independent continuum ranging from very low to very high perceived likelihood). In other words, a counterfactual should exert influence to the extent that both the alternative antecedent is plausible and that such a change to the antecedent would be associated with an alternative outcome of interest. Our approach is distinct from that of Spellman et al. (2005) in at least a few important ways. First, our approach constitutes a methodological advance, in that it involves measuring CP for individual counterfactuals via IL and TL ratings, and thereby provides a measure that can be employed to predict the effects of a single counterfactual thought or set of thoughts. Spellman et al., on the other hand, provided a more general theory for how the probability of an alternative event (and thus causation) is assessed. Second, CP constitutes a theoretical advance in that it broadens the scope of probability judgments in this domain beyond causation to explain and synthesize a very wide range of counterfactual thinking phenomena. Finally, our approach extends Spellman et al.'s theorizing about how people assess probability to determine causation by examining how multiple probability judgments interact to determine the influence of counterfactuals.

IL and TL Are Independent and Subjectively Determined

IL and TL (although they may be correlated under certain circumstances) are theoretically independent. Indeed, imagine the (implausible) counterfactuals that could be generated by a person watching coverage of a plane crash on the evening news. It is possible, within a particular counterfactual, for IL to be very low while TL is very high (e.g., "If only aliens had intervened, then the plane might not have crashed"). On the other hand, TL may be low while IL is high (e.g., "If only I had used my usual toothbrush today, then the plane might not have crashed"). In short, the perceived a priori likelihood of the antecedent condition in a counterfactual is not dependent upon the contingency between the antecedent and the alternative outcome or vice versa.

Also important, IL and TL are subjectively determined; it is the *perceived likelihoods* that are important for the purposes of CP, not the objective or true likelihoods. If, for example, one really believes that the use of a particular toothbrush would have averted the disasters of the world (or, alternatively, that the intervention of aliens is plausible), such counterfactuals as described above may truly be impactful upon that person's affect and judgments. One direct result of this subjective quality is that CP is not dependent upon the particular content of any given counterfactual per se—two different people could generate the same counterfactual and have very different levels of CP.

Counterfactual Potency as a Metacognitive Construct

By definition, IL and TL are metacognitive constructs in that they constitute judgments or thoughts about one's own (counterfactual) thoughts. As such, the CP construct owes to previous

research demonstrating that judgments about one's own thoughts (be it judgments of accessibility, fluency, or confidence) in part determine the effects of such thoughts on subsequent judgment and behavior (see Petty, Briñol, Tormala, & Wegener, 2007; Schwarz et al., 1991; Schwarz, Sanna, Skurnik, & Yoon, 2007; Schwarz & Vaughn, 2002; Tversky & Kahneman, 1973). It is important to note that, like other metacognitive phenomena, the processes involved need not be explicit or deliberative to wield influence (see Reder & Schunn, 1996). We do not submit that decision makers consciously and deliberately measure and combine IL and TL in order to make judgments subsequent to counterfactual thought. However, we do believe that CP as we define and measure it captures the essence or substance of what makes a counterfactual thought seem plausible, and thereby influential.

Within the broader literature on metacognition, one particularly relevant framework for CP is that of *thought confidence*, developed by Petty, Briñol, and Tormala (2002; see also Briñol & Petty, 2009). This work has shown that confidence in one's own thoughts is an important variable in persuasion and resistance processes. In particular, thought confidence has been shown to moderate the impact of thoughts on attitudes, such that thoughts are impactful upon attitudes only to the extent that they are associated with some degree of confidence. Although CP is conceptualized, measured, and employed in a manner quite different from the construct of thought confidence, it is analogous to this construct in that it constitutes a metacognitive sense of confidence or degree of belief in one's thoughts that can be used to predict the influence of those thoughts on later judgment.

The Measurement of CP

To measure CP, we have adopted the general paradigm of having participants supply counterfactuals and subsequently rate each of those counterfactuals for both IL (i.e., "Look at the 'if' part of your statement. What was the likelihood of that actually happening?") and TL (i.e., "Now look at the 'then' part of the statement you supplied. Given that the 'if' part had taken place, what do you think was the likelihood of that actually happening?") for each counterfactual generated on corresponding response scales (e.g., ranging from *not at all likely* [1] to *highly likely* [9]). We then use these data to predict the effects of those thoughts upon subsequent affect and judgments. We have also manipulated IL and TL in experimental paradigms to assess the role of these factors in determining the impact of counterfactual thoughts.

We propose here (and offer empirical support of the notion) that such measures of IL and TL combine multiplicatively within a given counterfactual to produce CP (i.e., IL $\times$ TL = CP).[1] With such an approach, counterfactuals for which IL and TL are both high should exert particularly strong effects on affect and judgment, whereas counterfactuals for which either component is low should exert a weak effect. In other words, any situation in which one or both components are very low will lead to a relatively impotent counterfactual (i.e., multiplying 100 by zero, similar to multiplying zero by zero, produces zero). However, it is important

---

[1] Such a multiplicative term is analogous to other theoretical interactions, such as McGuire's (1968) notion of the interactive relationship between reception and yielding in persuasion.

to note that, in order to control for the potential lack of scale invariance across the measures of the two components, the independent effects of IL and TL must be considered when CP is computed. In other words, in addition to their interactive effect, it is possible for IL and TL to exert main effects, and these must be partialed out to interpret the interaction. In some cases, without controlling for the component effects, the apparent correlation (or lack thereof) between CP and other measures could be misleading. For this reason, we do not advocate merely computing CP and investigating its correlation with other measures—IL and TL must be independently considered as well.

In addition to being a characteristic of individual counterfactuals, to the extent that a set of counterfactuals mutates behavior of a particular target toward a particular end (e.g., "If only I had studied harder for the test I might have passed," "If only I hadn't partied so much the night before the test I might have passed," etc.), one should be able to assess CP across multiple counterfactuals using an averaging method.[2] In this way, CP can be measured across multiple counterfactuals and used to predict postcounterfactual judgments and affect.

Overview of Studies

As a means of clarifying and testing our proposed construct of CP, we conducted four studies. Study 1 demonstrated that CP is a reliable predictor of the relationship between counterfactual thought and judgment in a correlational design; this study also showed the predictive ability of CP when averaged across multiple counterfactuals. In Study 2, we assessed the causal role of the IL × TL interaction by manipulating IL and TL for a salient counterfactual about an event. Study 3 demonstrated the effects of manipulating judgments of an event through feedback about counterfactual likelihood and showed that CP mediates and explains these effects. Study 4 investigated the predictive power of CP for judgments about a personally involving decision, in which we manipulated IL and TL in a gambling task and showed that CP explains judgments both when the alternative outcome is known and when it is not.

Study 1: "Mr. Jones": The Predictive Power of CP

The purpose of Study 1 was twofold. First, we set out to demonstrate how IL and TL could be successfully measured as distinct components of counterfactual thoughts. More important, we examined whether our measure of CP (the multiplicative combination of IL and TL) was a reliable predictor of the influence of counterfactual thinking on judgments. In doing so, we used a modified version of a classic scenario from early counterfactual research (that of "Mr. Jones" from Kahneman & Tversky, 1982) and measured participants' estimates of IL and TL for each "if only" statement generated. We also manipulated the frequency of counterfactual thoughts (by asking participants to list one, three, or five counterfactual thoughts) so that we could examine the predictive power of CP both in the case of a single counterfactual as well as when averaged across multiple counterfactuals. Additionally, such a manipulation allowed us to compare the predictive ability of CP to that of sheer counterfactual frequency.

Method

Participants and design.   A total of 92 undergraduate students, enrolled in an introductory psychology course at Wake Forest University, took part in the study in exchange for partial course credit. The data of two participants were excluded from analysis due to responding to several items well above or below 3 *SD*s from the means, reducing the total sample to 90 participants. We employed a 3 (counterfactual thought frequency: one, three, or five) × 2 (order of IL/TL measurement: before vs. after other dependent variables) between-participants factorial design.

Procedure.   Upon arrival, participants were greeted by a laboratory assistant who presented a brief, oral introduction to the experiment described as a study of social perception. Participants were escorted to a cubicle equipped with a personal computer. Experimental materials were presented using MediaLab v2006 Research Software (Jarvis, 2006). The instructions of the experiment were self-paced, and participants advanced the instructions by pressing a response key.

Event.   Participants were presented with a modified version of a scenario used by Kahneman and Tversky (1982), which described the tragic automobile accident of Mr. Jones. The scenario described several features that potentially could be mutated: (a) driving his wife's car to work (because he forgot to fill up his truck with gas); (b) leaving work earlier than usual to attend to some long-overdue household chores that he promised his wife he would complete; (c) using a rarely used route along the shore to enjoy the view; (d) stopping along the way to buy an ice cream; (e) listening to the radio full-blast; and (f) braking hard while crossing an intersection. Mr. Jones was described as suffering severe injuries and being confined to a wheel chair following the accident.

Thought-listing task.   After reading about the event, participants read that, as commonly happens in such situations, Mr. Jones often thought and often said, "If only . . . , then this terrible accident might have been avoided," during the days that followed the accident. Participants were asked to list either one, three, or five ways in which Mr. Jones might have completed this thought. They were instructed to begin each thought with the words "If only Mr. Jones . . ." and to complete it with "then this terrible accident might have been avoided."

Counterfactual potency.   Participants were randomly assigned to one of two order conditions, whereby they responded to the IL and TL items either before or after the measurement of the other dependent variables. To complete these measures, each counterfactual that had been generated was presented back to the participant one at a time. To measure IL, participants were asked to consider just the first part of the thought (i.e., the "if" part of the statement) and to report their perceived likelihood of Mr. Jones actually doing that using a 9-point scale anchored at *extremely unlikely* (1) and *extremely likely* (9). To measure TL, participants were asked to consider just the second part of the thought (i.e.,

---

[2] Although other models for combining CPs for multiple counterfactuals were considered (e.g., an additive model), our comparisons of the available methods have shown that an averaging model leads to the strongest predictive power. Although we feel that the simultaneous predictive ability and elegance of an averaging model serves our purposes here, the question of whether more complex models may provide even stronger predictive power is a reasonable one that deserves future attention.

the "then" part of the statement) and to indicate the likelihood of the accident having been avoided, given that Mr. Jones had done the behavior in the "if" part (using the same 9-point scale). The process of providing IL and TL ratings was repeated for each counterfactual that a participant generated (e.g., a participant who generated three counterfactuals would go through the IL/TL rating process a total of three times).

Dependent variables. Participants were asked to respond to eight different dependent variable items, including how responsible Mr. Jones was for the accident; how much Mr. Jones was to blame; how careless he was; how foolish he was; how much regret, bitterness, and disgust they thought Mr. Jones feels with regard to the accident; and how much they thought Mr. Jones blames himself for the accident. Participants responded to each of the items using a 9-point response scale with *very little* (1) and *very much* (9) as the anchor labels.

Results and Discussion

Preliminary analyses. To simplify the report of our findings, we first subjected the eight dependent variables to a principal components factor analysis with oblimin rotation to assess how they might best be combined. This preliminary analysis indicated that the two items that implicated Mr. Jones as responsible and blameworthy for the accident loaded on the first factor, whereas the other six items loaded on the second factor of a two-factor solution. These two factors, which we term Responsibility/Blame and Negative Affect, explained 56.48% of the variance in the data. Further, the responsibility and blame items had a Cronbach's alpha of .80, and the other six items had a Cronbach's alpha of .76.

Counterfactual potency. To compute CP, we first multiplied each individual IL/TL pair to yield CP for each counterfactual and then averaged these products for the participants who generated more than one. For participants who generated only one counterfactual, the CP value for that counterfactual was used. This variable thus represents the average CP estimate for each participant's counterfactual thoughts. To investigate whether thought frequency or task order had any unintended influence upon the IL and TL measures, we subjected CP to a 3 (counterfactual thought frequency: one, three, or five) $\times$ 2 (order of IL/TL measurement: before vs. after other dependent variables) analysis of variance (ANOVA). This analysis revealed an unanticipated main effect for thought frequency, $F(2, 84) = 6.98$, $p < .01$. Participants who were asked to list a single counterfactual thought reported a significantly smaller CP estimate ($M = 23.00$, $SD = 9.74$) than did participants who were asked to list three counterfactuals ($M = 31.86$, $SD = 11.60$), $t(84) = -3.33$, $p < .01$, or five counterfactuals ($M = 31.40$, $SD = 8.70$), $t(84) = -3.14$, $p < .01$.[3] Participants who were asked to list three counterfactuals did not report a significantly different CP estimate from participants asked to list five, $t(84) = 0.17$, *ns*. No effects involving the order manipulation were observed ($Fs < 1$).

Dependent variables. Preliminary analyses revealed no significant effects involving the order manipulation. Thus, order of measurement is not discussed further. As a formal test of our hypotheses, the analyses of primary interest concerned whether CP was a reliable predictor of the dependent variables when each of its individual components (IL and TL) was taken into account. We were also interested in whether CP would be a more reliable

predictor than simple counterfactual thought frequency. To this end, we computed hierarchical regression models, entering counterfactual thought frequency, IL, and TL in the first step and CP (i.e., IL $\times$ TL) in the second step.[4]

For the model predicting responsibility/blame, number of counterfactual thoughts was marginally related to judgments ($\beta = -.19$), $t(86) = -1.75$, $p = .08$; a marginal effect was found for IL ($\beta = .18$), $t(86) = 1.63$, $p = .11$; and a significant effect was found for TL ($\beta = .29$), $t(86) = 2.85$, $p < .01$. The second step of the analysis showed that, controlling for these other influences, the CP estimate significantly accounted for variance in responsibility/blame attributed to Mr. Jones for the accident ($\beta = .29$), $t(85) = 2.02$, $p < .05$.

Similar results were found for the model predicting negative affect. Although the data did not reveal a main effect of counterfactual thought frequency ($\beta = -.04$), $t(86) = -0.32$, *ns*, significant main effects were found for IL ($\beta = .26$), $t(86) = 2.31$, $p < .05$, and TL ($\beta = .23$), $t(86) = 2.23$, $p < .05$. Again, though, the second step of the analysis showed that the CP estimate significantly accounted for variance in negative affect judgments above and beyond the other predictors ($\beta = .31$), $t(85) = 2.11$, $p < .05$.

In short, the more that participants simultaneously felt that (a) an alternative behavior on the part of Mr. Jones was possible and that (b) such an alternative behavior would have led to a different and more desirable outcome, the more responsibility/blame they assigned to Mr. Jones and the more negative affect they expected him to experience. In addition to demonstrating how CP (the multiplicative product of IL and TL) can be measured and used to

---

[3] These findings are contrary to what one might expect, given that an observer's first counterfactual thought might be expected to be more salient and, thus, more potent than subsequent counterfactuals. However, participants were cognizant of the number of thoughts they were being asked to list before they began listing their thoughts. We suspect that requesting multiple counterfactual thoughts, as opposed to only one, enhanced the salience and perceived relevance of counterfactual thinking in response to the scenario. This ultimately may have made it seem that any single alternative antecedent was actually more likely to occur and subsequently inflated CP estimates in the three and five-thought conditions.

[4] Providing a basic demonstration that our construct generally predicts postcounterfactual judgments, across conditions CP was found to be significantly correlated with both responsibility/blame ($r = .25$, $p < .02$) and negative affect ($r = .36$, $p < .001$). We also examined the correlations between CP and the dependent variables in each of the three conditions separately. All of the correlations for the three- and five-counterfactual conditions were statistically significant (all $rs > .35$, all $ps < .05$). However, for the one-counterfactual condition, the relationship between CP and responsibility/blame failed to reach significance ($r = .17$, *ns*), and the CP–negative affect correlation reached only marginal significance ($r = .33$, $p = .07$). These results likely stem from the fact that we observed less variance in our measure of CP when it was derived from a single counterfactual thought. Although we find these correlations to be informative in this initial test, we caution against interpreting the correlation between the IL $\times$ TL product and some criterion without partialing out the component variables (see our discussion regarding scale invariance across the measures of the two components in the section The Measurement of CP). We include the correlations here (drawn from IL and TL measures that were conceptually scales from 0% probability to 100% probability, and thus arguably scale invariant) only to make the relationships between all study variables clearer to our audience.

predict judgments, results of Study 1 also suggest that CP offers more predictive utility than the sheer frequency of counterfactual thoughts generated (a characteristic that to this point has been the only quantitative index used to predict counterfactual thought effects; see Roese, 1997; Seta, Seta, McElroy, & Hatz, 2008). Results also clarified that both CP for a single counterfactual as well as an average CP (in the case of multiple counterfactuals) can predict judgments.

Study 2: *Let's Make a Deal*: Manipulation of IL and TL

Whereas Study 1 demonstrated the predictive power of CP in a correlational design, we devised Study 2 to demonstrate the causal role of the IL × TL interaction in judgment. To do so, we created a paradigm that made a particular counterfactual salient while independently manipulating that counterfactual's associated IL and TL. To accomplish this, we had participants learn about a contestant's experience on a game show (loosely based upon the *Let's Make a Deal* game show that originally aired in the 1960s), in which, after choosing the wrong game show door, the contestant loses. Four versions of the game's events were constructed to directly manipulate IL and TL for the salient counterfactual. After reading the scenario, we assessed IL, TL, and judgments about the event (negative affect and responsibility). The predicted causal role of the IL × TL interaction would be demonstrated by a two-way IL Condition (low, high) × TL Condition (low, high) interaction upon the dependent measures. Moreover, we predicted that participants' own judgments of CP (the interaction of the IL and TL ratings for the salient counterfactual) would have predictive value.

Method

Participants and design. A total of 153 undergraduates, enrolled in an introductory psychology course at Wake Forest University, participated in exchange for partial course credit. The data of two participants were excluded from the analyses due to one participant's failure to complete the protocol and another participant's CP score being greater than 4 *SD*s above the mean. Thus, the final sample consisted of 151 participants. The current study employed a 2 (IL condition: high vs. low) × 2 (TL condition: high vs. low) × 2 (order of measurement of IL/TL: before vs. after other dependent variables) between-participants factorial design.

Procedure. All of the basic procedures and experimental materials were presented in the same way as in Study 1. Again, the experiment was described as a study of social perception.

Scenario. Participants were presented with a scenario involving a modified version of the TV game show *Let's Make a Deal*. The target in the scenario was a 35-year-old auto mechanic named Sam. Participants read the following:

> One day Sam is on the game show *Let's Make a Deal*. Sam's options include picking Door #1, Door #2, or Door #3. Behind two of the doors there is nothing. Behind one of the doors is a man who will ask him a trivia question. If Sam picks the correct door, and subsequently answers the trivia question correctly, he will win $50,000. Otherwise, Sam will get nothing. Thus, Sam has to do both things in order to win:

pick the correct door and correctly answer the question asked by the person behind the door.

In order to manipulate the IL and TL for the salient counterfactual ("If only Sam had picked Door #2, then he might have won"), we varied certain characteristics of the event. First, participants were randomly assigned to one of two IL conditions. In the low IL condition, Sam was depicted as having been very unlikely to have picked Door #2, the correct door. In this condition, participants read the following:

> Sam wastes no time at all in selecting a door. His favorite number is 3. Like his favorite baseball player, Babe Ruth, Sam's softball jersey number is 3. No doubt, Sam picks Door #3.

In the high IL condition, Sam was depicted as having very nearly chosen Door #2. In this condition, participants read the following:

> Sam takes his time in selecting a door. He agonizes over the decision. Sam thinks about Door #2 as well as Door #3. He goes back and forth in his mind. The game show host pressures Sam for an answer. At the last moment, Sam picks Door #3.

All participants then read that the game show host opened Door #3, and with a disappointed sigh from the audience, nothing was found behind the door. Participants were informed that the person posing the trivia question was actually behind Door #2. The game show host then said, "Well, let's at least see the category that the trivia question was from, behind Door #2! The category of the question Sam would have been asked: Ancient Aztecs."

Participants were also randomly assigned to one of two TL conditions. Participants in the low TL condition read that, after the category of the question was announced, Sam commented: "I know very little about the Ancient Aztecs." Thus, participants were led to believe that, even if Sam had chosen the correct door, ultimately winning the prize would remain unlikely. Participants in the high TL condition read that, after the category of the question was announced, Sam's eyes grew large, and he commented: "I just watched, on television, an in-depth documentary about the lives of the Ancient Aztecs!" In this case, participants were led to believe that, if Sam had chosen the correct door, there was a high likelihood that he would have won the prize.

Counterfactual potency. Participants were asked to respond to two items similar to those used in Study 1. We did this partly to determine whether the IL and TL manipulations were successful, but more importantly so that we could examine the ability of their multiplicative combination (CP) to predict their judgments. As in Study 1, participants were randomly assigned to one of two order conditions, such that they responded to these items either before or after the measurement of the other dependent variables.

Because participants were not asked to list their thoughts (but rather responded with reference to a particular counterfactual), we provided detailed instructions to ensure that participants were clear about what we were asking them. Participants read the following:

> You might be thinking: "If only Sam had picked Door #2, then he might have won the money." This is an example of an if–then statement. People often make "if . . . then" statements after undesirable outcomes that are nearly desirable. For example, imagine a doctor who has to decide upon one of two treatments for a patient with a serious disease. The doctor decides on Treatment A and, unfortunately, the patient dies. The doctor might say, "IF only I had chosen

Treatment B, THEN the patient might have lived." We might ask the doctor questions about this "if . . . then" statement: 1) Consider the "IF" part of that statement: At the time you decided, how likely were you to choose Treatment B instead of Treatment A? (i.e., how close did you come to choosing Treatment B instead of Treatment A?); and 2) Consider the "THEN" part of that statement: Assuming you had actually chosen Treatment B instead of Treatment A, then how likely do you think it was that the patient would have lived? Make sure you understand the difference between these two kinds of questions before moving on to the next screen frame.

Following these instructions, to measure IL, participants were asked, "If only Sam had picked Door #2, then he might have won the money. Consider just the first part of this thought. What do you perceive was the likelihood of Sam actually picking Door #2?" To measure TL, we asked,

> If only Sam had picked Door #2, then he might have won the money. Consider the second part of this thought. That is, given that Sam had picked Door #2, what do you perceive was the likelihood that he would have correctly answered the question?

Participants responded to both questions on a 9-point scale anchored at *extremely unlikely* (1) and *extremely likely* (9).

Dependent variables. Following the measures of IL and TL, participants were asked to respond to eight different dependent measures, assessing how responsible Sam was for the outcome, how much Sam was to blame, as well as how much anger, regret, bitterness, sadness, disappointment, and disgust Sam felt with regard to the outcome. Participants responded to each of the items using a 9-point scale anchored at *very little* (1) and *very much* (9).

Results and Discussion

Preliminary analyses. Similar to Study 1, we subjected the eight dependent variables to a principal components factor analysis with oblimin rotation in order to identify how the variables might best be combined. This preliminary analysis revealed a factor structure similar to that found in Study 1. The two items that implicated Sam as responsible and blameworthy for the outcome loaded on the first factor (referred to as Responsibility/Blame), whereas the other six items loaded on the second factor (referred to as Sam's Negative Affect) of a two-factor solution. These two factors explained 70.42% of the variance in the data. Furthermore, the responsibility and blame items had a Cronbach's alpha of .77, and the negative affect items had a Cronbach's alpha of .91.

Dependent variables. As in Study 1, no significant effects involving the order of the measures were obtained, so we do not discuss this issue further. In a more precise test of our hypotheses, we expected to find interactions between manipulated IL and TL for our dependent variables, such that negative affect and judgments of responsibility/blame would be greatest when both IL and TL were high. When either or both are low, the salient counterfactual ought to have little impact. Moreover, we expected that IL and TL ratings would explain this effect. To test this hypothesis in a context in which mediation analysis was not ideal,[5] we conducted a conceptually similar analysis by demonstrating three relationships: (a) the IL/TL manipulations influenced the dependent measures in the predicted interactive fashion (i.e., the manipulation → dependent measure relationship); (b) the IL and TL manipulations influenced IL and TL ratings as predicted (i.e., the manipulation → mediator relationship, synonymous for our purposes with a manipulation check); and (c) IL and TL ratings have the predicted interactive effect upon the dependent measures (the mediator → dependent measure relationship).

Responsibility/blame. To assess whether the manipulations of IL and TL led to the anticipated effects upon ratings of responsibility/blame, we conducted a 2 (IL condition: low vs. high) × 2 (TL condition: low vs. high) ANOVA. A main effect of IL condition emerged, $F(1, 147) = 6.01$, $p < .02$, such that participants assigned to the high IL condition reported that Sam was more responsible for the outcome ($M = 4.42$, $SD = 2.67$) than did participants in the low IL condition ($M = 3.51$, $SD = 2.12$). A main effect of TL condition also emerged, $F(1, 147) = 4.20$, $p < .05$, such that participants assigned to the high TL condition reported that Sam was more responsible for the outcome ($M = 4.30$, $SD = 2.42$) than did participants in the low TL condition ($M = 3.59$, $SD = 2.43$). However, these main effects were qualified by the expected interaction, $F(1, 147) = 5.74$, $p < .02$. Consistent with expectations, when the TL was low, levels of responsibility/blame did not differ with respect to high IL ($M = 3.60$, $SD = 2.51$) and low IL ($M = 3.58$, $SD = 2.38$), $t(147) = 0.03$, *ns*. However, when TL was high, greater responsibility/blame was observed when IL was high ($M = 5.31$, $SD = 2.59$) than when it was low ($M = 3.45$, $SD = 1.88$), $t(147) = 3.42$, $p < .001$.

To determine whether our experimental manipulations of IL and TL led to the expected effects upon IL and TL ratings (essentially manipulation checks), we conducted separate two-way ANOVAs for each index with the IL and TL conditions as the independent variables. For IL ratings, only a main effect of IL condition was observed, $F(1, 147) = 116.41$, $p < .001$, such that participants assigned to the high IL condition reported a greater IL ($M = 5.45$, $SD = 1.42$) than did participants assigned to the low IL condition ($M = 3.01$, $SD = 1.37$). Also as expected, for TL ratings, only a main effect of TL condition was observed, $F(1, 147) = 227.93$, $p < .001$, such that participants assigned to the high TL condition reported a greater TL ($M = 6.63$, $SD = 1.61$) than did participants assigned to the low TL condition ($M = 2.89$, $SD = 1.40$). Neither of these main effects was qualified by an interaction ($Fs < 1$). Thus, our manipulations of IL and TL led to the predicted effects upon IL and TL ratings.

Finally, to assess whether the IL and TL ratings (which interact as CP) had the predicted interactive effect upon responsibility/blame, we employed hierarchical regression analyses, following

---

[5] We arrived at this analysis plan after carefully considering an alternative strategy. One argument may be in favor of a Baron and Kenny (1986) approach, whereby we test whether relationships between the manipulated conditions (antecedent and outcome) and the dependent variables are mediated by CP. However, meditational analyses are not appropriate for cases in which the manipulated variable is not conceptually distinct from the mediator (thus, the more effective our manipulations of IL and TL were in influencing IL and TL ratings, the more difficult it would be to find that these ratings mediate other effects). In cases where variables are perfectly manipulated by experimental conditions, the variables are statistically identical to the experimental conditions. Consistent with the arguments of Spencer, Zanna, and Fong (2005), our analytic approach is preferred when the manipulation and the measurement of the proposed process are conceptually the same, as in the current situation.

the recommendations of Cohen, Cohen, West, and Aiken (2003), by regressing responsibility/blame onto the measures of IL and TL (continuous, mean centered) and their interaction term. Main effect tests were examined in Step 1, and the interaction term was examined in Step 2. This analysis revealed a marginally significant main effect of IL ($\beta = .14$), $t(147) = 1.68$, $p < .10$, such that high IL was associated with assigning greater responsibility/blame. A main effect of TL also emerged ($\beta = .18$), $t(147) = 2.30$, $p < .05$, such that high TL was associated with greater responsibility/blame. Most important, these main effects were qualified by the IL × TL interaction ($\beta = .16$), $t(147) = 1.95$, $p = .05$. As displayed in the top panel of Figure 1, when IL was low, TL did not predict responsibility/blame, $t(147) = 0.20$, ns. However, when IL was high, greater TL was associated with greater responsibility/blame ($\beta = .34$), $t(147) = 2.97$, $p < .01$.

In short, for ratings of Sam's responsibility/blame, the three predicted relationships integral to demonstrating that CP explains such judgments (i.e., IL/TL manipulation → responsibility/blame rating, IL/TL manipulation → CP, and CP → responsibility/blame rating) were all supported by the data.

Negative affect.   In order to evaluate the relationship between the manipulations of IL and TL and ratings of Sam's negative affect, we conducted an ANOVA identical to the one employed for responsibility/blame. A main effect of IL condition emerged, $F(1,$

$147) = 20.38$, $p < .001$, such that participants assigned to the high IL condition reported that Sam would experience greater negative affect ($M = 6.08$, $SD = 1.77$) than did participants in the low IL condition ($M = 4.93$, $SD = 1.52$). A main effect of TL condition also emerged, $F(1, 147) = 6.97$, $p < .01$, such that participants assigned to the high TL condition expected Sam to experience greater negative affect ($M = 5.83$, $SD = 1.67$) than did participants in the low TL condition ($M = 5.18$, $SD = 1.77$). However, these main effects were qualified by the expected interaction between the IL and TL conditions, $F(1, 147) = 5.74$, $p < .02$. When TL was low, the negative affect that Sam was expected to experience did not differ with respect to high IL ($M = 5.45$, $SD = 1.90$) and low IL ($M = 4.90$, $SD = 1.59$), $t(147) = -1.50$, ns. However, when TL was high, greater expectations of negative affect were observed when IL was high ($M = 6.76$, $SD = 1.34$) than when it was low ($M = 4.96$, $SD = 1.46$), $t(147) = 4.88$, $p < .001$.

As noted already, we also found that the IL and TL manipulations had the predicted effects on IL and TL ratings (the components of CP). We do not repeat these analyses here.

To demonstrate that IL and TL ratings (which interact to form CP) had the predicted effect on ratings of Sam's negative affect, we again conducted hierarchical regression analyses. This analysis similarly revealed main effects of IL and TL, $\beta = .17$, $t(147) = 2.09$, $p < .05$, and $\beta = .16$, $t(147) = 2.03$, $p < .05$, respectively, such that participants rated Sam as experiencing more negative affect as IL and TL increased. Most important for our hypotheses, these main effects were qualified by the expected interaction between IL and TL ($\beta = .16$), $t(147) = 2.05$, $p < .05$. As displayed in the bottom panel of Figure 1, when IL was low, TL did not predict expected negative affect, $t(147) = -0.06$, ns. However, when IL was high, greater TL predicted greater expectations of negative affect ($\beta = .33$), $t(147) = 2.98$, $p < .01$. These results demonstrate that IL and TL ratings interact to predict judgments. Thus, for ratings of Sam's negative affect, the three important relationships to demonstrate CP's role (i.e., IL/TL manipulation → negative affect rating, IL/TL manipulation → CP, and CP → negative affect rating) were all supported.[6]

In summary, Study 2 demonstrated the causal role of the IL × TL interaction in judgment and supported the notion that CP can explain such effects. These results provide further evidence for the validity of CP as a predictive construct and build upon the correlational evidence obtained in Study 1.

Study 3: "Eugene and Tina": CP as a Mediator

If CP predicts the effect of counterfactual thoughts on judgment, it should be possible to demonstrate that the effect of a counterfactual judgment manipulation can be statistically mediated by CP. In Study 3, after participants generated counterfactual thoughts in response to a scenario about a tragic event (specifically, the "Eugene and Tina" scenario developed by Wells & Gavanski, 1989), we manipulated their sense of the likelihood of their thoughts compared with those of other individuals, using false feedback. We then obtained their causal attributions about the
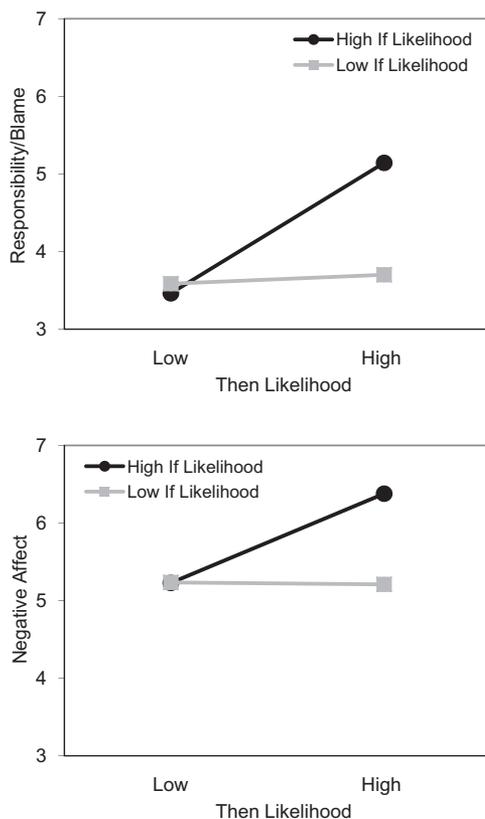

Figure 1.   Predicted regression means of responsibility/blame and negative affect means by if likelihood and then likelihood (Study 2). Means are plotted at ±1 SD above and below the means of if likelihood and then likelihood.

---

[6] In simple correlation analyses as well, CP was found to predict judgments of both Sam's responsibility/blame ($r = .15$, $p < .06$) and his negative affect ($r = .15$, $p = .06$).

event, as well as their ratings of IL and TL for the counterfactuals supplied. Although the primary goal of this experiment was to test CP as a mediator of the manipulation's effect, this experiment was also intended to replicate our previous findings of the power of CP in a context in which counterfactual frequency was free to vary.

To manipulate participants' judgments about the tragedy, we used modified manipulations employed by Petty et al. (2002) and Petrocelli, Tormala, and Rucker (2007) to induce high or low perceived likelihood of mentally simulated alternatives, which was expected to exert its effect through CP (IL × TL). After asking participants to list "if only" statements in reaction to the scenario, we led some participants to believe that their thoughts were consistent with most of the thoughts we had already collected from other respondents (high correspondence), whereas other participants learned that their thoughts were inconsistent with these data (low correspondence). This manipulation was expected to influence how participants evaluated their counterfactual thoughts and thus impact their causal judgments about the event. Moreover, we expected that causal judgments would be mediated by CP.

Method

Participants and design. A total of 42 undergraduates, enrolled in an introductory psychology course at Wake Forest University, took part in exchange for partial course credit. The design of the current study included a single between-subjects factor: correspondence feedback condition (high vs. low).

Procedure. All of the basic procedures and experimental materials were presented in the same way as in Studies 1 and 2. Again, the experiment was described as a study of social perception.

Scenario. Participants were presented with information about the tragic death of a young married couple (Eugene and Tina; see Wells & Gavanski, 1989). Partially paralyzed and confined to wheelchairs, the couple was denied a ride from a taxi driver. Afterward, they decided to drive themselves in a car equipped with special hand controls. In order to get downtown from their house, they had to travel across a bridge. A severe storm the night before had weakened the structure of the bridge. About 5 minutes before Eugene and Tina reached it, a section of the bridge collapsed (the taxi driver had reached the bridge about 10 minutes before them and made it safely across). In the dark, Eugene and Tina drove off the collapsed bridge, and their car plummeted into the river below. They both drowned.

Thought-listing task. Following the scenario, participants were asked to complete a brief thought-listing task adapted from Kahneman and Tversky's (1982) commonly used method. It was explained to participants that, after negative experiences, people sometimes cannot help thinking "if only . . ." and imagining how things might have gone differently. It was further explained that Eugene and Tina's family and friends often thought and often said "If only . . ." during the days that followed the accident. Participants were asked to think about how the family and friends continued such thoughts. On the next seven screens, participants were instructed to type any "if only" thoughts that came to mind or might have run through the minds of Eugene and Tina's family and friends (typing only one thought per screen). Participants were also reminded to begin each thought with the words, "If only . . ." in order to ensure that participants supplied only the number of counterfactuals that easily came to mind, they were instructed to

type "N/A" for any remaining thought-listing screens if they ran out of thoughts.

Correspondence manipulation. After completing the thought-listing task, we informed participants that we had collected thought responses to the Eugene and Tina scenario from over 1,000 students. Participants were also led to believe that the computers were programmed to analyze thought responses with the same technology that was designed by "Paradigms, LLC for Turnitin," an online plagiarism prevention program that helps educators detect plagiarism. It was explained that this program identifies common themes, concepts, and words, and it was useful to us because we were interested in gaining more knowledge about how the majority of college students perceive events such as the one they had just read. They were also told that, by comparing their thought responses with others collected in our lab, we could determine a number of things about their thoughts. We informed participants that we were primarily interested in the consistency of their thoughts with previous data. To make this analysis seem as realistic as possible, a delay of 9 s was employed, and "Please wait. The computer is processing your thought-listings. This may take a few moments . . ." was displayed at the top of the screen.

Participants were then randomly assigned to one of two correspondence conditions. In the high correspondence condition, participants were led to believe that their total correspondence score was 87%, meaning that their thought listings were similar to those of the majority of students on campus. These participants were further informed that their data would be accepted into the pool for future research because they were highly representative of the rest of their peer group. In the low correspondence condition, participants were led to believe that their total correspondence score was only 8%, meaning that their thought listings were dissimilar to those of the majority of students on campus. These participants were further informed that their data would not be accepted into the pool for future research because they were unrepresentative of the rest of their peer group. To boost the plausibility of the feedback, different colored fonts and backgrounds were used for the display of the feedback.

Dependent variable. We included a single dependent variable in the current study. Participants were asked to report the extent to which they thought the taxi driver's refusal to take Eugene and Tina caused their deaths on a 7-point scale anchored at *not at all causal* (1) and *very causal* (7).

Counterfactual potency. Following the dependent variable, participants were asked to respond to a series of questions regarding the likelihood estimates they associated with the "if only" statements that they completed. Two questions were posed for each individual statement listed. For each question, the participant's earlier "if only" statement appeared on the screen. Questions included an IL question ("How confident are you that the first part of this thought [i.e., the 'if' part] might actually have occurred?"; *not at all confident* [1] to *extremely confident* [7]) and a TL question ("Now also think about the 'then' part of this thought. Assuming that what you listed actually occurred, how confident are you that this would have changed the outcome?"; *not at all confident* [1] to *extremely confident* [7]). Participants were then debriefed and dismissed from the experimental session. A multiplicative index of CP (averaged across multiple counterfactuals if applicable) was computed using the same method as that described in Study 1.

Results and Discussion

Because the causal evaluation involved the taxi driver, we were concerned only with the counterfactuals that implicated the taxi driver ($M = 1.31$, $SD = 0.60$). As such, only CPs for these thoughts were used in the analyses; data for the remaining counterfactuals were excluded.

Effect of correspondence manipulation.   Comparisons of the experimental conditions showed that the correspondence feedback manipulation affected the extent to which participants thought the taxi driver's refusal to take Eugene and Tina caused their deaths, $F(1, 40) = 4.35$, $p < .05$. Participants provided with high correspondence feedback reported greater causality ($M = 4.76$, $SD = 1.72$) than did participants provided with low correspondence feedback ($M = 3.71$, $SD = 1.52$). The correspondence feedback manipulation also significantly affected CP, $F(1, 40) = 4.76$, $p < .05$; participants provided with high correspondence feedback reported greater CP ($M = 31.54$, $SD = 11.72$) than did participants provided with low correspondence feedback ($M = 23.77$, $SD = 11.33$).

Mediation analysis.   Finally, we assessed mediation using the procedure outlined by Baron and Kenny (1986). As already stated, without controlling for CP, the correspondence feedback manipulation significantly affected the extent to which participants felt that the taxi driver's refusal to take Eugene and Tina caused their deaths ($\beta = .31$, $t(40) = 2.08$, $p < .05$. The correspondence manipulation also predicted CP ($\beta = .31$), $t(40) = 2.08$, $p < .05$. However, when controlling for CP, the correspondence feedback manipulation was no longer a significant predictor of causality ($\beta = .19$), $t(39) = 1.32$, ns, whereas CP was ($\beta = .35$), $t(39) = 2.32$, $p < .03$. A Sobel test revealed that the reduction in the effect of correspondence feedback was significant ($z = 2.16$, $p < .03$). Thus, as predicted, CP mediated the relationship between the correspondence manipulation and judgments of causality.

As in Study 1, the frequency of counterfactual thoughts that implicated the taxi driver was not predictive of the causality judgment, $r(40) = -.05$, ns. Thus, using a paradigm in which counterfactual frequency was free to vary, Study 3 demonstrated that the effect of a correspondence manipulation on judgments of causality was mediated by CP.[7]

Study 4: Roulette: CP in the Context of One's Own Decisions

We have thus far described studies in which participants reported their thoughts and reactions to events in which they themselves did not make the decisions. In Study 4, we investigated whether our model also characterizes how people perceive personally relevant outcomes in the context of decisions that they make for themselves. Thus, we presented participants with a chance to win real money ($20) in a game of roulette. Participants selected one of two roulette wheels, each locking them into a predetermined bet. The bets were either similar or dissimilar in their a priori probabilities of winning. The large discrepancy situation (dissimilar bet probabilities) was conceptualized as a low IL condition because people should be unlikely to perceive themselves as nearly having selected the alternative wheel (less likely to win). The small discrepancy situation (similar bet probabilities) was conceptualized as a high IL condition in that individuals should carefully consider the rejected alternative wheel before they stated a preference, and thus in retrospect perceive the likelihood of having made that alternative choice to have been high.

Participants then watched the chosen roulette wheel being spun, and all participants lost (unbeknownst to participants, all of the bets were rigged). Some participants learned that the other wheel would also have resulted in a loss (low TL; the alternative choice was not associated with a change in the outcome); some participants learned that the other wheel would have resulted in a win (high TL; the alternative choice was associated with a change in the outcome); and some participants were not informed about what would have happened with the other wheel (uncertain TL; the relationship between the alternative choice and a change in the outcome was uncertain).

We then measured IL (perceived likelihood of selecting the other wheel), TL (perceived likelihood that if they had chosen the other wheel they would have won), and feelings of regret in response to the outcome. In line with our theoretical approach, we expected that our manipulations of IL and TL would influence the effects of counterfactual thoughts upon judgment in an interactive fashion and that our measure of CP (IL × TL ratings) would mediate this effect. In addition, we hypothesized that IL and TL should predict the dependent measure even in cases in which the alternative outcome was uncertain. Such cases closely approximate real-life situations in which alternative outcomes generally remain unknown. To address this question, we conducted regression analyses on the unknown outcome condition alone, to demonstrate that CP plays an important role in this context.

Method

Participants and design.   A total of 127 undergraduates, enrolled in an introductory psychology course at Wake Forest University, took part in the study in exchange for partial course credit. The current study employed a 2 (bet discrepancy: large vs. small) × 3 (alternative outcome: unknown vs. lose vs. win) × 2 (order of IL/TL measurement: before vs. after other dependent variables) between-participants factorial design. We excluded the data of 20 participants who selected the bet with the lower probability of winning; thus, our final sample consisted of 107 participants.[8]

Procedure.   All of the basic procedures and experimental materials were presented in the same way as in the previous studies. The experiment was described as a study of what people think about when playing gambling games. We designed the

---

[7] As in Studies 1 and 2, CP on its own was also significantly correlated with judgments of the taxi driver's causal role in the accident ($r = .41$, $p < .01$).

[8] We excluded participants who chose the worst bet because for these individuals we would make the opposite IL predictions for the two discrepancy conditions. For example, in the large discrepancy condition (where overall we predicted IL to be particularly low), participants would have been particularly likely (high IL) to select the much better bet than the worse bet they ultimately selected. This would lead to higher IL than in the small discrepancy condition—the opposite of our prediction for the participants who selected the better bet. Among the excluded participants, 12 had been assigned to the small discrepancy condition, and eight had been assigned to the large discrepancy condition. The degree of participant loss across these two primary conditions was not significant, $\chi^2(1, N = 20) = 0.80$, $p = .37$.

presentation of our experiment to aid participants in feeling as if they were about to make a real decision about a roulette gamble that takes place in a casino. We informed participants that if they won the gamble they would receive a $20 prize for participating in the study. At this point, the words "You are in a casino in Las Vegas!" were displayed on the screen. A brief audiovisual stimulus of a dynamic flyover view of several gambling tables was also displayed. Participants then read the following passage:

> You decide to play roulette. In the game of roulette, players may choose to place bets on a single number, a range of numbers, the 18 red numbers, the 18 black numbers, the 18 odd numbers, the 18 even numbers, the one green number, or some combination of numbers. To determine the winning number and color, the wheel is spun in one direction, and the ball is spun in the opposite direction around a tilted circular track running around the circumference of the wheel. The ball eventually loses momentum and falls onto the wheel and into one of 37 colored and numbered pockets on the wheel. Your task is to place a bet on one of two roulette wheels. The two wheels you will be asked to select from will be randomly selected from a pool of 25 wheels from free Internet game websites. Remember, if you win the gamble you will be awarded a $20 prize. Therefore, it is important to make a good decision between the two possible gambles. Also keep in mind that there is no "catch" to this study. All wins, no matter from which wheel, result in the same prize. Good luck! You will now select from the two possible gambles on the computer.

With a roulette table displayed on the screen, participants were randomly assigned to one of two bet-discrepancy conditions in which they selected one of two possible gambles. The gambles were characterized by a relatively large discrepancy in terms of a priori win probability (i.e., betting on all black numbers less than 31 [15 winning numbers] vs. betting on all red numbers greater than 18 [9 winning numbers]) or a relatively small discrepancy (i.e., betting on all red numbers greater than 6 [15 winning numbers] vs. betting on all black numbers less than 28 [13 winning numbers]). Due to the anticipated effect of this manipulation on the perceived likelihood of choosing the alternative bet, these conditions were conceptualized as low and high IL, respectively.

After choosing his or her bet, each participant watched the roulette wheel being spun, and all participants lost their bets. Afterwards, participants were randomly assigned to one of three alternative outcome conditions. Some participants then watched an alleged video recording of the unselected wheel and learned that it would have resulted in a win (high TL); others watched and learned that the unselected wheel also would have resulted in a loss (low TL); others did not learn about what would have happened with the unselected wheel (uncertain TL).

Counterfactual potency. Participants were asked to respond to the IL and TL items in a manner similar to the previous studies. Participants were randomly assigned to one of two order conditions, whereby they responded to IL and TL items either before or after the measurement of the other dependent variables. In completing these items, participants were first asked to report their IL estimate, answering the question "When you were choosing between the two wheels, how close did you come to selecting the other wheel? In other words, was it extremely likely or unlikely for you to have chosen the other wheel?" using a scale ranging from 1 to 9 with *extremely unlikely (I gave no consideration to picking the other wheel)* and *extremely likely (I very nearly picked the other wheel)* as the anchor labels. Participants then completed the

TL item, answering the question "Given everything that you were shown, had you chosen the other gamble what would have been the outcome?" using a 9-point scale with *it is certain that I would have lost* (1) and *it is certain that I would have won* (9) as the anchor labels.

Dependent variable. Participants were asked to report how much regret they felt with regard to the outcome using a 9-point scale anchored at *very little* (1) and *very much* (9).

Results and Discussion

As in Studies 1 and 2, there was no effect of the order of the measures upon regret; nor was order found to interact with the IL and TL ratings to influence regret measures. Order of measurement is not discussed further.

The explanatory role of CP when outcomes are known. We began by examining the role of CP in predicting judgments when outcomes of alternative choices are known. As a formal test of our hypothesis, we employed the same approach as in Study 2, where the role of CP is assessed through a series of analyses conceptually similar to establishing mediation, demonstrating three relationships: (a) the IL/TL manipulations influencing the dependent measure in the predicted interactive fashion (i.e., the manipulation → dependent measure relationship); (b) the IL and TL manipulations influencing IL and TL ratings (i.e., the manipulation → mediator relationship, synonymous for our purposes with a manipulation check); and (c) the IL and TL ratings having the predicted interactive effect upon the dependent measures (the mediator → dependent measure relationship). Such analyses would demonstrate both that the IL and TL manipulations influenced judgments as predicted and that this effect can be explained by CP.

To assess whether the manipulations of IL and TL affected regret, we conducted a 2 (bet discrepancy: large vs. small) × 2 (alternative outcome: lose vs. win) ANOVA. A main effect of the alternative outcome condition emerged, $F(1, 63) = 28.35$, $p < .001$, such that participants assigned to the alternative win condition reported experiencing greater regret ($M = 4.78$, $SD = 2.37$) than did participants in the alternative lose condition ($M = 2.29$, $SD = 1.81$). A main effect of bet discrepancy was not observed ($F = 0.19$). However, we did obtain the expected interaction, $F(1, 63) = 7.06$, $p < .02$ (see Figure 2). When the alternative outcome
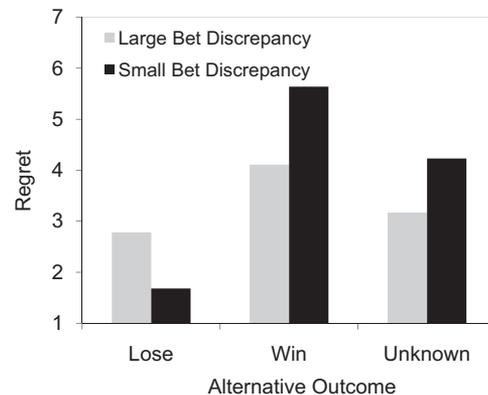

Figure 2. Reported regret means by bet discrepancy and alternative outcome conditions (Study 4).

was a loss, regret did not differ with respect to bet discrepancy, $t(63) = 1.61$, *ns*. However, when the alternative outcome was a win, greater regret was reported when the bet discrepancy was small, $t(63) = 2.13$, $p < .05$. Viewed differently, the alternative outcome mattered more when the bet discrepancy was small, $t(63) = 5.34$, $p < .001$, than when it was large, $t(63) = 1.96$, $p < .06$.[9]

We next sought to determine whether our experimental manipulations of IL and TL led to the expected effects upon reported IL and TL. Thus, we conducted separate ANOVAs for each index. For IL ratings, only a main effect of bet discrepancy was observed, $F(1, 63) = 5.41$, $p < .03$, such that participants assigned to the small bet-discrepancy condition reported a greater IL ($M = 5.20$, $SD = 1.86$) than did participants assigned to the large bet-discrepancy condition ($M = 4.00$, $SD = 2.34$). For TL ratings, only a main effect of alternative outcome condition was observed, $F(1, 63) = 56.34$, $p < .001$, such that participants assigned to the alternative win condition reported a greater TL ($M = 6.40$, $SD = 1.98$) than did participants assigned to the alternative lose condition ($M = 2.68$, $SD = 2.00$). Neither of these main effects was qualified by an interaction. Thus, our manipulations of IL and TL led to the predicted effects upon the components of CP provided by the participants.

In order to demonstrate that ratings of IL and TL interact to predict judgments of regret (the CP → regret rating relationship), we conducted an analysis of the interaction between IL and TL ratings using hierarchical regression. This analysis revealed significant effects of both IL and TL on regret: $\beta = .27$, $t(64) = 2.40$, $p < .02$, and $\beta = .43$, $t(64) = 4.94$, $p < .001$, respectively. However, these main effects were qualified by the predicted interaction ($\beta = .08$), $t(64) = 2.29$, $p < .03$ (see top panel of Figure 3). Simple slopes analysis revealed three significant effects. When the IL estimate was high, regret increased as the TL estimate increased ($\beta = .67$), $t(64) = 5.53$, $p < .001$; this was also true, but to a lesser extent, when the IL estimate was low ($\beta = .29$), $t(64) = 2.36$, $p < .05$. From another angle, this analysis revealed that when the TL estimate was high, regret was greater when the IL estimate was high than when it was low ($\beta = .43$), $t(64) = 4.01$, $p < .001$. However, when the TL estimate was low, regret did not vary with respect to the IL estimate ($\beta = .05$), $t(64) = 0.38$, *ns*.

The preceding analyses demonstrate strong support for our three relationships of interest (IL/TL manipulation → regret, IL/TL manipulation → CP [IL/TL ratings], CP → regret). These results show that manipulations of IL and TL influenced participants' sense of regret in the predicted pattern and that their own ratings of the CP components (IL and TL) can be used to explain such effects.[10]

The predictive power of CP when outcomes are unknown. A second goal of this experiment was to investigate the predictive power of CP when the alternative outcome is unknown. This context is critical, both because it closely approximates real life (where outcomes to alternative antecedents are often unknown) and because such an analysis demonstrates the power of IL and TL as they relate to natural intuitions or naïve theories about likelihood. To address these issues, we used the data from the unknown outcome condition and computed a hierarchical regression analysis of regret, including IL and TL ratings in the first step and the CP in the second step. This analysis revealed a significant effect of IL ($\beta = .31$), $t(36) = 1.98$, $p < .05$, but no main effect for TL. Most germane, we found a two-way interaction ($\beta = .17$), $t(36) = 2.24$,
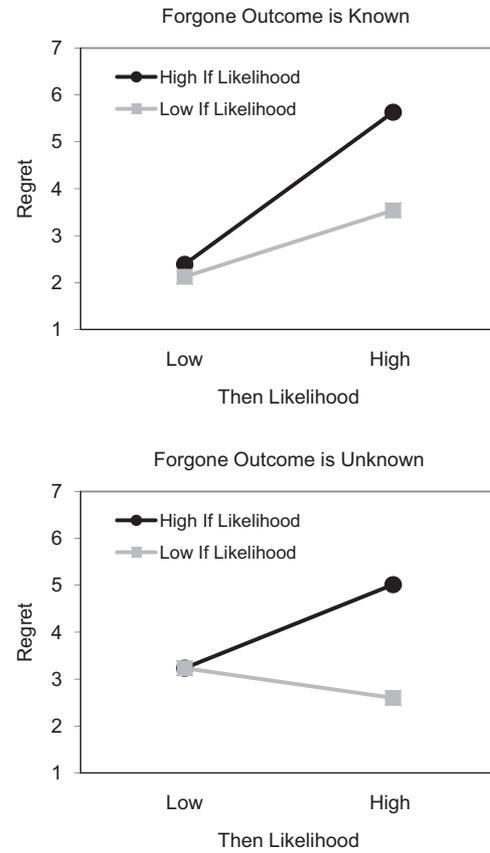

Figure 3. Predicted regression means of regret by if likelihood and then likelihood when the forgone outcome is known (top panel) and when the forgone outcome is unknown (bottom panel; Study 4). Means are plotted at ± 1 *SD* above and below the means of if likelihood and then likelihood.

———

[9] We reanalyzed the effects of the alternative outcome and bet-discrepancy manipulations on regret in a 2×3 ANOVA including the unknown alternative outcome condition. This analysis yielded a very similar pattern of results to the 2×2 ANOVA, and here we focus only on those results that concern the unknown alternative outcome condition. A main effect of alternative outcome emerged, $F(1, 101) = 14.74$, $p < .001$; participants assigned to the unknown alternative condition reported significantly greater regret ($M = 3.63$, $SD = 1.98$) than did those in the alternative lose condition, $t(101) = 5.34$, $p < .001$, but significantly less regret than those in the alternative win condition, $t(101) = -2.44$, $p < .05$. Again, a main effect of bet discrepancy was not observed ($F = 1.63$). However, the expected interaction qualified these results, $F(1, 101) = 4.28$, $p < .02$. Among the unknown alternative outcome participants, regret was marginally greater when the bet discrepancy was small ($M = 4.23$, $SD = 2.04$) than when it was large ($M = 3.17$, $SD = 1.85$), $t(101) = 1.69$, $p < .10$. Viewed another way, however, when the bet discrepancy was small the unknown alternative outcome condition reported significantly greater regret than the alternative lose condition, $t(101) = 3.70$, $p < .001$, but marginally less regret than the alternative win condition, $t(101) = -1.95$, $p < .06$. When the bet discrepancy was large, regret in the unknown condition did not differ from either the alternative lose or win conditions ($ts < 1.50$).

[10] As in the previous studies, CP was shown to be significantly correlated with feelings of regret for the outcome ($r = .53$, $p < .001$). It is worth noting that this correlation is stronger than those obtained in the previous studies, providing potential evidence for the predictive power of CP being even greater in contexts in which participants are personally involved.

$p < .05$ (see bottom panel of Figure 3). Simple slopes analysis revealed two significant effects similar to the pattern of data observed when the forgone outcome was known. First, when the IL estimate was high, regret increased as the TL estimate increased ($\beta = .45$), $t(64) = 2.85$, $p < .01$, but this was not true when the IL estimate was low ($\beta = -.16$), $t(64) = 0.65$, ns. Second, when the TL estimate was high, regret was greater when the IL estimate was high than when it was low ($\beta = .61$), $t(64) = 4.03$, $p < .001$, but this was not true when the TL estimate was low ($\beta = .00$), $t(64) = 0.00$, ns.

Thus, our hypothesis that the IL $\times$ TL interaction can predict responses to the outcomes of one's own decisions was supported. We demonstrated that feelings of regret for an outcome depended on both the likelihood of the alternative choice (IL) and its likelihood of resulting in the desired outcome (TL). Such a finding highlights the importance of the IL $\times$ TL interaction in determining how people respond when their decisions result in negative outcomes. Our results demonstrate that these effects can be explained by CP (the product of IL and TL ratings). Moreover, even when the outcome of the alternative choice was unknown, we demonstrated that CP is a reliable predictor of affect and judgment. In addition to conceptually replicating our previous findings, then, this study extended them by demonstrating CP's predictive utility in a highly involving and realistic context.

General Discussion

We demonstrated in four studies that counterfactual potency (CP), the multiplicative combination of "if likelihood" (IL) and "then likelihood" (TL), is correlationally and causally related to the effects of counterfactual thoughts on responses to events. Across studies, we have demonstrated the important role of CP in broad and varied ways. We have highlighted CP's applicability to situations in which people learn about the experiences of others as well as when they have personally involving experiences of their own. CP predicted judgments both when it was measured for a single counterfactual and when it was taken as an average across a set of counterfactuals, and both when counterfactual frequency was predetermined and when it was free to vary. We have identified CP's relevance to varying subject matter, including unusual tragic events as well as everyday disappointments. We have also demonstrated CP's ability to predict a variety of judgments, including responsibility/blame, causation, perceptions of regret and negative affect, and one's personal feelings of regret. We have provided evidence to show CP's importance both when the outcome of an alternative antecedent is certain and when it is unknown. We have also described a manner in which these components can be easily measured in experimental paradigms, and we have shown that CP ratings are correlated with other important judgments regardless of whether the ratings precede or follow those judgments. Taken together, our findings provide important evidence for CP's spontaneous role in cognition.

Contributions of Counterfactual Potency

As stated earlier, we do not present CP as a challenge to existing research and theory on counterfactual thought. Rather, we feel strongly that the individual notions of IL and TL themselves emerge directly out of past research and that our conceptualization

of CP builds directly from the wealth of knowledge on counterfactual thought that has been produced. Nonetheless, the present work represents an important advance for a number of reasons.

First, the CP approach goes beyond simply demonstrating the importance of these two factors (IL and TL) by providing a conceptualization that defines such constructs and draws them together. CP emphasizes the important interactive (specifically, multiplicative) influences of IL and TL, which until now (with the possible exception of Spellman et al., 2005) have been investigated only individually. Only here are they specifically identified as independent interactive components of counterfactuals. Because the effect of one component will always depend on the other, we stress the importance of attention to their interactive effect in future work, and we hope that our identification of these components will influence future discourse about what counterfactuals are and how they operate.

Second, CP represents an important theoretical advance in that it is able to synthesize many counterfactual phenomena under a single conceptual framework (the IL $\times$ TL interaction). Such a theoretical contribution assists not only in providing a new way to conceptualize how counterfactuals affect judgment but also in allowing us to better explain exactly why effects described in extant literature have been obtained. Although surely CP cannot explain every counterfactual effect, there is nonetheless an impressive array of work that can be included under the umbrella of the CP approach, as was discussed earlier. In our view, CP fills a longstanding void in this regard, as the only other quantitative construct used to predict the degree of counterfactual influence has been the frequency of counterfactuals. For both conceptual and empirical reasons (buttressed also by results of the present studies), counterfactual frequency has not shown itself to be a very promising or fruitful predictor of counterfactual thinking effects.

Third, we believe that our approach represents an important methodological advance. Instead of simply assuming particular effects of counterfactuals on judgments, we have directly measured the beliefs that mediate such effects and demonstrated a manner in which they can be mathematically combined to predict those judgments. The implications of such a measure should not be understated, as it provides a way of determining something very important: how much people actually *believe* in the counterfactuals that they generate. The error of presuming the same level of belief for everyone should be readily apparent, because the degree to which any person believes that, for example, the use of a seat belt would have reduced injuries sustained in a car accident, or that a single vote would have made a difference in an election, or that metaphysical beings could have intervened to avert a disaster, differs among individuals. Moreover, not only do some individuals believe in these things while others do not, but the degree to which individuals believe in such things differs in a *continuous* manner, a characteristic that is captured by CP. The present work opens up the possibility of adopting CP in future research. For example, by adding IL and TL measures to their experimental tasks, researchers could account for the variance related to individual differences in CP, or perhaps investigate how CP interacts with other variables.

Practical Implications

The present work also speaks to practical questions of how CP might be changed when such changes are desirable. For example, when the grieving parent of a suicide victim says "If only I would have forced him into counseling, he might be alive today . . . ," how might such a thought (and the negative effects with which it is associated) be changed? From our view, there are at least two methods of countering such a counterfactual thought—specifically, through challenges to IL or TL. For example, a person might challenge IL by saying, "Forcing him into counseling would have been impossible. He never would have gone along with it." Or, they might challenge TL by saying, "Counseling is no perfect defense against tragedies like this—people in counseling commit suicide all the time." Future work could examine where it is most effective to "push" when challenging such counterfactuals, and under what circumstances the IL route or the TL route would be the most appropriate place to raise such challenges. In fact, these notions have important implications for any domain geared toward changing thoughts, be it therapy, politics, or persuasion more generally. We believe that altering such implicit beliefs about likelihood (i.e., the likelihood of alternative antecedents or the likelihood of changes to certain alternative actions leading to a change in the outcome) could be a key to belief change.

Addressing Possible Challenges to the Counterfactual Potency Approach

A proposal such as this one raises many questions, and not all of them can be fully addressed here. However, a few additional comments are in order as they may help clarify the issues and address possible challenges to such an approach. One might argue that the conditional form that we have set up for describing counterfactuals (i.e., assuming if–then components to these thoughts) is a limited one because many counterfactuals are not conditional statements. We hold that many counterfactual thoughts involve *implied conditionals*, if not stated ones (see Byrne, 2002, regarding the conditional nature of counterfactuals). CP is intended to apply to counterfactual conditionals whether the proposed outcome is implied or explicitly stated. That said, in the case of a counterfactual thought that is not construed as a conditional (e.g., "Someday the world will be a peaceful place"), we would agree that CP might not be directly applicable.

It is also possible that a proposition such as ours might be interpreted as a proposal that CP can explain all the effects of counterfactual thinking upon judgment. Of course, many other features of experience, such as affect (Sanna & Turley, 1996) and motivation (Epstude & Roese, 2008; Markman et al., 1993; Roese & Olson, 1997), are important and likely interact with CP. Neither CP nor any other "cold" judgment variable can fully explain the effects of counterfactual thought. Thus, we have presented evidence here that CP can account for a great deal of the influence of particular counterfactual thoughts, and we feel that questions of how CP interacts with these other variables (e.g., how CP and motivation, affect, and other characteristics of the situation interact) are extremely interesting and worth future attention.

Future Directions

One of the most exciting elements of the present work is that it opens up numerous new questions that can be addressed through (and arguably only through) a CP approach. For example, under what circumstances might IL and TL be differentially weighted in determining the degree of influence from a given counterfactual, and in what situations might one element dominate the other? Although here we have assumed a simple equal-weighting model of IL and TL as they combine to form CP, the weighting of the individual components is likely determined by features of the situation. Analogous questions have been successfully addressed in McGuire's (1968) important work on the weighting of reception and yielding in determining the degree of persuasion, and it seems fitting that a structurally similar construct such as ours might similarly benefit from this increased level of complexity or nuance.

Another important future question is that of how CP might be affected by judgmental bias. Although a great deal of evidence for self-serving biases exists (see Kunda, 1990; Molden & Higgins, 2008) and biases of such a nature are likely influential upon CP, perhaps an even more interesting direction for future work lies in the many self-defeating biases that operate when people consider alternatives to reality. Consider, for example, the case of the rape victim who is plagued with the sense that a different action or set of actions would have averted the outcome, despite the insistence of friends and family that such alternative actions were unlikely to have occurred or would have been ineffective at preventing the event. Whether it's victims of crimes, parents who lose children through tragic accidents, individuals suffering from lifelong diseases and disabilities, or those who have painful experiences such as domestic abuse, erroneous beliefs in the likelihood of alternative worlds can be incredibly deep seated and result in terrible and far-reaching consequences of guilt, shame, and self-blame. The important role of IL and TL in perpetuating such self-defeating biases presently remains totally unexamined, and we believe this constitutes an important avenue for additional research.

People deal not only with complementary counterfactuals but also with *competing counterfactuals*, and using CP to predict the effects of such competing alternative worlds is an important future direction. One example of such competing counterfactuals involves those that implicate multiple targets, as in the context of blame attribution (see Branscombe et al., 1996). For example, Driver A will likely argue how Driver B could have performed different behaviors to avert an accident, and Driver B will enthusiastically reciprocate with his own "suggestions" for how Driver A could have performed otherwise. To outside observers, the effect of Driver A's counterfactual might be said to "cancel out" that of Driver B. Without a construct such as CP, it would be very difficult to quantitatively predict judgments based on exposure to counterfactuals that operate to opposing ends (e.g., to blame Driver A vs. to blame Driver B). An analogous case is that of the simultaneous consideration of upward (outcome improving; e.g., "If only she hadn't left, I wouldn't be so lonely") and the less common (see Roese & Olson, 1997) downward counterfactuals (outcome worsening; e.g., "But if she had stayed, the fighting would have been unbearable"; see Markman et al., 1993). CP could be an excellent candidate for aiding in the prediction of judgments based on competing counterfactuals.

Conclusion

In sum, the present work demonstrates that counterfactual thoughts exert effects to differing degrees and that this degree of

influence can be conceptualized and measured according to our construct of counterfactual potency. This construct provides insight into classic questions about counterfactuals and raises important new questions to be addressed in future research. Our findings suggest that the influence of alternative worlds upon our judgment is determined not only by which alternative worlds come to mind but also by how plausible we find each of those alternative worlds to be.

References

Alicke, M. D., Buckingham, J., Zell, E., & Davis, T. (2008). Culpable control and counterfactual reasoning in the psychology of blame. *Personality and Social Psychology Bulletin, 34,* 1371–1381. doi:10.1177/0146167208321594

Barker, S. (1991). Even, still and counterfactuals. *Linguistics and Philosophy, 14,* 1–38. doi:10.1007/BF00628303

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182. doi:10.1037/0022-3514.51.6.1173

Branscombe, N. R., Owen, S., Garstka, T. A., & Coleman, J. (1996). Rape and accident counterfactuals: Who might have done otherwise and would it have changed the outcome? *Journal of Applied Social Psychology, 26,* 1042–1067. doi:10.1111/j.1559-1816.1996.tb01124.x

Branscombe, N. R., Wohl, M. J. A., Owen, S., Alison, J. A., & N'gbala, A. (2003). Counterfactual thinking, blame assignment, and well-being in rape victims. *Basic and Applied Social Psychology, 25,* 265–273. doi:10.1207/S15324834BASP2504_1

Briñol, P., & Petty, R. E. (2009). Persuasion: Insights from the self-validation hypothesis. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 41, pp. 69–118). New York, NY: Elsevier.

Byrne, R. M. J. (2002). Mental models and counterfactual thoughts about what might have been. *Trends in Cognitive Sciences, 6,* 426–431. doi:10.1016/S1364-6613(02)01974-5

Byrne, R. M. J., & McEleney, A. (2000). Counterfactual thinking about actions and failures to act. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 26,* 1318–1331. doi:10.1037/0278-7393.26.5.1318

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.

Epstude, K., & Roese, N. J. (2008). The functional theory of counterfactual thinking. *Personality and Social Psychology Review, 12,* 168–192. doi:10.1177/1088868308316091

Girotto, V., Legrenzi, P., & Rizzo, A. (1991). Event controllability in counterfactual thinking. *Acta Psychologica, 78,* 111–133. doi:10.1016/0001-6918(91)90007-M

Gleicher, F., Kost, K. A., Baker, S. M., Strathman, A. J., Richman, S. A., & Sherman, S. J. (1990). The role of counterfactual thinking in judgments of affect. *Personality and Social Psychology Bulletin, 16,* 284–295. doi:10.1177/0146167290162009

Goldinger, S. D., Kleider, H. M., Azuma, T., & Beike, D. (2003). "Blaming the victim" under memory load. *Psychological Science, 14,* 81–85. doi:10.1111/1467-9280.01423

Goodman, N. (1973). *Fact, fiction and forecast.* Cambridge, MA: Harvard University Press.

Green, D. W., Applebaum, R., & Tong, S. (2006). Mental simulation and argument. *Thinking and Reasoning, 12,* 31–61. doi:10.1080/13546780500145686

Hart, H. L. A., & Honoré, T. (1985). *Causation in the law.* Oxford, England: Oxford University Press.

Hilton, D. J. (1988). Logic and causal attribution. In D. J. Hilton (Ed.), *Contemporary science and natural explanation* (pp. 33–65). New York, NY: New York University Press.

Hofstadter, D. R. (1979). *Gödel, Escher, Bach: An eternal golden braid.* New York, NY: Vintage Books.

Jarvis, W. B. G. (2006). MediaLab v2006 [Computer software]. New York, NY: Empirisoft.

Johnson, J. T. (1986). The knowledge of what might have been: Affective and attributional consequences of near outcomes. *Personality and Social Psychology Bulletin, 12,* 51–62. doi:10.1177/0146167286121006

Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review, 93,* 136–153. doi:10.1037/0033-295X.93.2.136

Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 201–210). New York, NY: Cambridge University Press.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin, 108,* 480–498. doi:10.1037/0033-2909.108.3.480

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. doi:10.1177/0146167287134009

Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology, 32,* 311–328. doi:10.1037/0022-3514.32.2.311

Mandel, D. R. (2003). Judgment dissociation theory: An analysis of differences in causal, counterfactual, and covariational reasoning. *Journal of Experimental Psychology: General, 132,* 419–434. doi:10.1037/0096-3445.132.3.419

Mandel, D. R., & Dhami, M. K. (2005). "What I did" versus "what I might have done": Effect of factual versus counterfactual thinking on blame, guilt, and shame in prisoners. *Journal of Experimental Social Psychology, 41,* 627–635. doi:10.1016/j.jesp.2004.08.009

Mandel, D. R., Hilton, D. J., & Catellani, P. (Eds.). (2005). *The psychology of counterfactual thinking.* New York, NY: Routledge.

Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1993). The mental simulation of better and worse possible worlds. *Journal of Experimental Social Psychology, 29,* 87–109. doi:10.1006/jesp.1993.1005

McCloy, R., & Byrne, R. M. J. (2000). Counterfactual thinking about controllable actions. *Memory & Cognition, 28,* 1071–1078.

McCloy, R., & Byrne, R. M. J. (2002). Semifactual "even if" thinking. *Thinking and Reasoning, 8,* 41–67. doi:10.1080/13546780143000125

McEleney, A., & Byrne, R. M. J. (2006). Spontaneous causal and counterfactual thoughts. *Thinking and Reasoning, 12,* 235–255. doi:10.1080/13546780500317897

McGuire, W. J. (1968). Personality and attitude change: An information processing theory. In A. G. Greenwald, T. C. Brock, & T. M. Ostrom (Eds.), *Psychological foundations of attitudes* (pp. 171–196). San Diego, CA: Academic Press.

McRoberts, S. (2003, January 25). Seeking belated welcome: Local man campaigns for a day to honor Vietnam veterans. *Whittier Daily News.* Retrieved from http://www.whvvd.org/whvvdwebsite/web%20newspaper%20articles/Whitter%20Daily%20News%201-25-03

Medvec, V. H., Madey, S. F., & Gilovich, T. (1995). When less is more: Counterfactual thinking and satisfaction among Olympic medalists. *Journal of Personality and Social Psychology, 69,* 603–610. doi:10.1037/0022-3514.69.4.603

Miller, D. T., & Gunasegaram, S. (1990). Temporal order and the perceived mutability of events: Implications for blame assignment. *Journal of Personality and Social Psychology, 59,* 1111–1118. doi:10.1037/0022-3514.59.6.1111

Miller, D. T., & Taylor, B. R. (1995). Counterfactual thought, regret, and superstition: How to avoid kicking yourself. In N. J. Roese & J. M.

Olson (Eds.), *What might have been: The social psychology of counterfactual thinking* (pp. 305–331). Mahwah, NJ: Erlbaum.

Miller, D. T., & Turnbull, W. (1990). The counterfactual fallacy: Confusing what might have been with what ought to have been. *Social Justice Research, 4,* 1–19. doi:10.1007/BF01048532

Molden, D. C., & Higgins, E. T. (2008). How preferences for eager versus vigilant judgment strategies affect self-serving outcomes. *Journal of Experimental Social Psychology, 44,* 1219–1228. doi:10.1016/j.jesp.2008.03.009

Petrocelli, J. V., & Sherman, S. J. (2010). Event detail and confidence in gambling: The role of counterfactual thought reactions. *Journal of Experimental Social Psychology, 46,* 61–72. doi:10.1016/j.jesp.2009.09.013

Petrocelli, J. V., Tormala, Z. L., & Rucker, D. D. (2007). Unpacking attitude certainty: Attitude clarity and attitude correctness. *Journal of Personality and Social Psychology, 92,* 30–41. doi:10.1037/0022-3514.92.1.30

Petty, R. E., Briñol, P., & Tormala, Z. L. (2002). Thought confidence as a determinant of persuasion: The self-validation hypothesis. *Journal of Personality and Social Psychology, 82,* 722–741. doi:10.1037/0022-3514.82.5.722

Petty, R. E., Briñol, P., Tormala, Z. L., & Wegener, D. T. (2007). The role of metacognition in social judgment. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (2nd ed., pp. 254–284). New York, NY: Guilford Press.

Reder, L. M., & Schunn, C. D. (1996). Metacognition does not imply awareness: Strategy choice is governed by implicit learning and memory. In Reder L. M. (Ed.), *Implicit memory and metacognition* (pp. 45–77). Mahwah, NJ: Erlbaum.

Rescher, N. (2001). *Paradoxes: Their roots, range, and resolution.* Chicago, IL: Open Court Press.

Roese, N. J. (1997). Counterfactual thinking. *Psychological Bulletin, 121,* 133–148. doi:10.1037/0033-2909.121.1.133

Roese, N. J., & Olson, J. M. (1995a). Counterfactual thinking: A critical overview. In N. J. Roese & J. M. Olson (Eds.), *What might have been: The social psychology of counterfactual thinking* (pp. 1–55). Mahwah, NJ: Erlbaum.

Roese, N. J., & Olson, J. M. (Eds.). (1995b). *What might have been: The social psychology of counterfactual thinking* (pp. 1–55). Mahwah, NJ: Erlbaum.

Roese, N. J., & Olson, J. M. (1997). Counterfactual thinking: The intersection of affect and function. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 1–59). San Diego, CA: Academic Press.

Roese, N. J., Sanna, L. J., & Galinsky, A. D. (2005). The mechanics of imagination: Automaticity and control in counterfactual thinking. In R. R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 138–170). New York, NY: Oxford University Press.

Sanna, L. J., & Turley, K. J. (1996). Antecedents to spontaneous counterfactual thinking: Effects of expectancy violation and outcome valence. *Personality and Social Psychology Bulletin, 22,* 906–919. doi:10.1177/0146167296229005

Schwarz, N., Bless, H., Strack, F., Klumpp, G., Rittenaur-Schatka, H., & Simmons, A. (1991). Ease of retrieval as information: Another look at the availability heuristic. *Journal of Personality and Social Psychology, 61,* 195–202. doi:10.1037/0022-3514.61.2.195

Schwarz, N., Sanna, L. J., Skurnik, I., & Yoon, C. (2007). Metacognitive experiences and the intricacies of setting people straight: Implications for debiasing and public information campaigns. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 39, pp. 127–161). San Diego, CA: Academic Press.

Schwarz, N., & Vaughn, L. A. (2002). The availability heuristic revisited: Ease of recall and content of recall as distinct sources of information. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 103–119). New York, NY: Cambridge University Press.

Seelau, E. P., Seelau, S. M., Wells, G. L., & Windschitl, P. D. (1995). Counterfactual constraints. In N. J. Roese & J. M. Olson (Eds.), *What might have been: The social psychology of counterfactual thinking* (pp. 57–79). Mahwah, NJ: Erlbaum.

Seta, C. E., Seta, J. J., McElroy, G. T., & Hatz, J. (2008). Regret: The roles of consistency-fit and counterfactual salience. *Social Cognition, 26,* 700–719. doi:10.1521/soco.2008.26.6.700

Spellman, B. A. (1997). Crediting causality. *Journal of Experimental Psychology: General, 126,* 323–348. doi:10.1037/0096-3445.126.4.323

Spellman, B. A., Kincannon, A. P., & Stose, S. J. (2005). The relation between counterfactual and causal reasoning. In D. R. Mandel, D. J. Hilton, & P. Catellani (Eds.), *The psychology of counterfactual thinking* (pp. 28–43). New York, NY: Routledge.

Spencer, S. J., Zanna, M. P., & Fong, G. T. (2005). Establishing a causal chain: Why experiments are often more effective than mediational analyses in examining psychological processes. *Journal of Personality and Social Psychology, 89,* 845–851. doi:10.1037/0022-3514.89.6.845

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5,* 207–232. doi:10.1016/0010-0285(73)90033-9

Walsh, C. R., & Byrne, R. M. J. (2004). Counterfactual thinking: The temporal order effect. *Memory & Cognition, 32,* 369–378.

Wells, G. L., & Gavanski, I. (1989). Mental simulation of causality. *Journal of Personality and Social Psychology, 56,* 161–169. doi:10.1037/0022-3514.56.2.161